
# Lower Devonian Amphipora of the Muruntau Mountains (Central Kyzilkum)

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**ABSTRACT**

The results of the study and a monographic description of the amphiporides of the Tamdytaumountains are presented. The sections are characterized by carbonate deposits, in which amphipores characteristic of the Lower Devonian of a subcylindrical form are observed. Amphipores are not only rock-forming, but also a good benchmark for identifying Lower Devonian deposits.

**Keywords:** amphipores, Lower Devonian, Muruntau, Dzhengeldinskaya Formation

**Introduction**. The Lower Devonian sections of the Tamdytau Mountains are characterized by carbonate and carbonate-terrigenous deposits, where rare forms of stromatoporates or amphiporous meadows can be found.

The sections of the city of Muruntau are represented by dolomitic limestones, in which amphiporous meadows are common. Amphiporous meadows in the area are 40 cm wide and are well traced along the strike. As Bogoyavlenskaya (1985, p. 65-68) notes, "analyzing the features of the distribution of amphipores, which are represented by a subcylindrical form, we can conclude that they lived in the coastal part of water bodies, enduring significant desalination and cloudiness of water. Under these conditions, they could spread widely in the basin, forming amphiporous meadows typical of the Devonian. The main condition for their development was light: when sunlight penetrated through the water layer, the vital activity of amphipores could be carried out with slow rotations of the coenosteums in the axial plane.

Apparently, some violations in the symmetry of the coenosteum are explained by the benthic, although not attached, way of life. With such a way of life, amphiporous meadows could form only at a shallow depth (on the order of a few meters), since sunlight is necessary for the vital activity of coelenterates.Apparently, the amphipores easily tolerated the desalination of the basin: the presence of echinoderms and other stenohaline organisms is not established within the amphipore communities, tabulates, rugoses, and brachiopods are rare.When approaching the coastline of the ancient basin, the amphipores bear traces of numerous damages to the coenosteum wall; traces of the growth of coenosteums on top of each other are not uncommon. As you move away from the coast, these phenomena disappear.

In our case, amphiporous meadows are found in black dolomitized limestones and dolomites, they are mostly recrystallized and can only be identified to the genus.

The sections of the city of Muruntau are characterized by the development of a complex consisting of amphipores - *Amphipora intexta* Yavorsky, *Stellopora* ex gr. *raritatis* (Yavorsky), *Stellopora rasilis* (Yavorsky), *Paramphipora anomalis* Lessovaya, *Paramphipora*

*gracilisporis tomiensis* Lessovaya, *Kisilstroma* Karimova et Khromych, *Kisilstroma muruntaviensis* Karimova et Khromych, *Kisilstroma ornatus* Karimova et Khromych – characteristic of the Lower Devonian of the Kusaganyuryakh Formation of the North-East of Russia, Mt. Ulakhan-Sis.

Amphipores are the most characteristic species found in the sections of the Lower Devonian of the city of Muruntau and the Elemesashchi well and having a relatively wide geographical distribution. In the Muruntau mountains, amphipores are not only rock-forming, but also a good benchmark for identifying Lower Devonian deposits. The wide distribution in the Paleozoic of subcylindrical stromatoporates with the collective name "amphipores" has long been known. However, until 1980, this group of fossils was practically not used for the subdivision of sections and interregional correlations. This is mainly due to its poor study. In recent years, a wide distribution of subcylindrical stromatoporates has been established in the Devonian of the West Siberian Plate, on the Volga-Ural uplift, in the Caspian syneclise, Kyrgyzstan, Uzbekistan, and Tajikistan. At an early stage of the study, stromatoporates with a subcylindrical form of the coenosteum were assigned by G. Nicholson (1886-1892) to the family Idiostromatidae on the basis of two characters: the original form of the coenosteum and the presence of an axial canal. The size of the family has existed unchanged for almost a century, despite the ongoing discussion about the nature and genetic relationships of subcylindrical stromatoporates with "true" massive forms. And only in 1938, L.B. Rukhin singled out the family Amphiporidae. In layered, silty, dark gray limestones with an insignificant admixture of fragments of pelecypod shells, ostracods, and primitive foraminifers, well-preserved coenosteums with well-defined skeletal elements are found. Finds of strongly altered coenosteums with leached internal cavities are characteristic of dolomites and dolomitic limestones. Usually there are many amphipores, they are included in the space between rugose skeletons, colonies of tabulatomorphic corals, massive stromatoporates and are cemented by silty, clayey, layered limestone, bituminous areas. In sections, they are usually unevenly distributed and occur both sporadically and in large numbers. The described amphipores were studied from the deposits of the Dzhengelda Formation of the lower part of the Devonian system. The Dzhengeldinskaya suite was identified by P.N. Podkopaev et al. (1966f) in South Tamdytau by the well of the same name. It composes the southern steep slopes of the Muruntau ridge and the western slopes of the Myutenbai block. The most complete section of the suite is located in the area north of the Besapan well. It occurs with erosion, angular and azimuthal unconformity, and basal layers at the base on various parts of the section of the Besapan Formation (second, third, fourth subformations) of the Middle Ordovician-Silurian age, and on the area under consideration - on its third subformation. It is overlain according to deposits of the Madaniyat Formation of the Lower Devonian (Bukharin et al., 1984, 1990; Cherkashenko et al. 1986; Stratigraphic Dictionary, 2001). The most complete section of the lower subformation is exposed on the southern slopes of the Muruntau mountains and in the Myutenbai block. The deposits of the subformation are represented by dark gray, black fine-grained, spotty-banded, brecciated thick-massively layered dolomites and micrite-sparitic dolomitic limestones. Of the organic remains, they contain lenticular accumulations of amphipores, stromatoporates, and single tabulate colonies. Forms are defined in the fauna complex: *Kisilstroma muruntaviensis* Karimova et Khromych, *Kisilstroma ornatus* Karimova et Khromych, *Paramphipora gracilisporis* Lessovaya, *Paramphipora anomalis* Lessovaya, *Vicinostachyodes* sp., *Stellopora rasilis* (Yavorsky), *St*. ex gr. *raritatis* (Yavorsky) (definitions of Karimova F.S.); tabulatomorph corals: *Thamnopora* sp., *Favosites* sp., *Pachifavosites* sp., *Pachyfavosites* cf. *nitella* Winchell (definitions of Salimova F.A.) typical for the Lower Devonian of the Lokhkov-Pragien interval of the MSS and the Kunzhak-Khukar horizons of the regional scheme. According to A.I. Kim and others

(1974f), in the lower subformation in this area, tabulates are identified: *Favosites* cf. *Admirabilis* Dubatolov, *Squameofavosites* sp. (definitions of Kim A.I.); brachiopods: *Hysterolites* cf. *Mirificus* Kulkov (definitions Larina N.M.) and others characteristic of the Kunzhak Horizon, Lokhkovian Stage, and Lower Devonian. Thus, taking into account the above, the lower subformation of the Dzhengelda Formation is determined by us in the interval of the Lokhkovian Stage. The lower boundary here is tectonically disturbed and black dolomites are in direct contact with the rocks of the Besapan Formation. The incomplete thickness of the subformation is 95m

FAUNA DESCRIPTION
STROMATOPORATES
Type PoriferaGrant, 1836
Class Stromatoporoidea Nicholson &Murie, 1878
Detachment Amphiporida Rukhin, 1938
Family Amphiporidae Rukhin, 1938
Genus *Kisilstroma* Karimova et Khromych, 2018
Type view *Kisilstroma muruntaviensis* Karimova et Khromych

**Diagnosis.** The coenosteum is cylindrical and superimposed on each other. Астроризы фистулярные. The structure of tissue fibers is finely porous and there are no peripheral cells
**Comparison**. From genus *Paramphipora* Yavorsky genus *Kisilstroma* differs by the absence of peripheral cells and finer porosity.
**Species composition and distribution**. *Kisilstroma muruntaviensis* Karimova et Khromych, *Kisilstroma ornatus* Karimova et Khromych, Lower Devonian, Pragian Stage.
*Kisilstroma muruntaviensis* Karimova et Khromych, 2018
Table 1, fig. 9.10
**Holotype.** №18/1069, Museum of the State Committee for Geology of the Republic of Uzbekistan; Lower Devonian, Dzhengeldin Formation, Muruntau city, Central Kyzylkum.
**Description.** The coenosteum is cylindrical, as it were, double. The diameter of the cenosteum is from 2.8 to 4.0 mm. The thickness of the fibers is 0.1 mm. Fistular astrorhiza, running along the axis of the coenosteum. Astroris diameter 0.5 mm. They are elongated and round. The fibers of the fabric are finely porous.
**Comparison.** The described species differs from all dendroid forms in its internal structure, which cannot be compared with any of the known species of the genus *Paramphipora*.
**Location.** See holotype.

*Kisilstroma ornatus* Karimova et Khromych, 2018
Table 1, fig. 11,12,13
**Holotype.** №20,21/1069, Museum of the State Committee for Geology of the Republic of Uzbekistan; Lower Devonian, Dzhengeldin Formation, Muruntau city, Central Kyzylkum.
**Description.** The coenosteum is cylindrical, as if double. The diameter of the cenosteum is 4 mm. Astrorhiza fistular, running along the axis of the coenosteum. The diameter of the astrorhiza or central canal is 0.4 mm. Here, laminas with a thickness of 0.1 mm are observed. There are 4 laminas and 4 columns per 1 mm. But the thickness of the columns is 0.05-0.1 mm. Laminas and columns form squares when connected. Fabric fibers are finely porous
**Comparison**. The described species has no close forms.
**Location.** See holotype.

Family Amphiporidae Rukhin, 1938
Genus *Amphipora* Schulz, 1883
*Amphipora intexta* Yavorsky, 1957
Table 1, Fig. 4,5,7,8

*Amphipora intexta* Yavorsky: Yavorsky, 1957, c. 62, tab. 34, fig. 5-9.
**Description.** The coenosteum is cylindrical, 2.5 mm in diameter. Central astrorhisal canal with a diameter of 0.40 mm. In the longitudinal section, a grid is observed, formed by intersecting columns and arcuately curved plates. The thickness of both is the same and equal to 0.06-0.10 mm. There are 4 plates and 6 columns per 1 mm. The cells resulting from

the intersection of plates and columns are in the form of squares or rectangles. Along the outer wall are vesicles elongated in the vertical direction up to 0.20 mm wide.

**Comparison.** The described view is very similar to the original.

**Spreading.** Southern Urals, Mugodzhary, Middle Devonian; Northeast slope of Salair, Lower Devonian.

**Location.** Central Kyzylkum, Muruntau city, Lower Devonian, Dzhengeldinskaya suite.

Genus *Stellopora* Bogoyavlenskaya, 1971

*Stellopora seducta* Karimova, 2020

Table 1, fig. 1

**Holotype.** No. 24/1069, Museum of the State Committee for Geology of the Republic of Uzbekistan; Lower Devonian, Dzhengeldin Formation, Muruntau city, Central Kyzylkum.

**Description.** Cenosteum is cylindrical, diameter is 3.5 mm. The astrorhizal channel is not observed. The columns are straight and long, the diameter of which is 0.2 mm. There are 3 columns per 1 mm. Laminas are well observed in the middle part of the longitudinal section. The number of laminas per 1 mm is 4. The diameter of the lamina is 0.1 mm. When connecting the lamin with the columns, rectangular cells are obtained, with a width of 0.2-0.3 mm. Bottoms are observed in the cells. The structure of the fabric is dense. Vesicles are absent. The outer wall of the stem is absent.

**Comparison.** The described species has no close forms.

**Location.** See holotype.

Genus *Paramphipora* Yavorsky, 1955

*Paramphipora tomiensis gracilisporis* Lessovaya, 1962

Table 1, Fig. 2,3,6

*Paramphipora tomiensis gracilisporis* Lessovaya: Lessovaya, 1962, с. 145, табл. 15, фиг. 1-2.

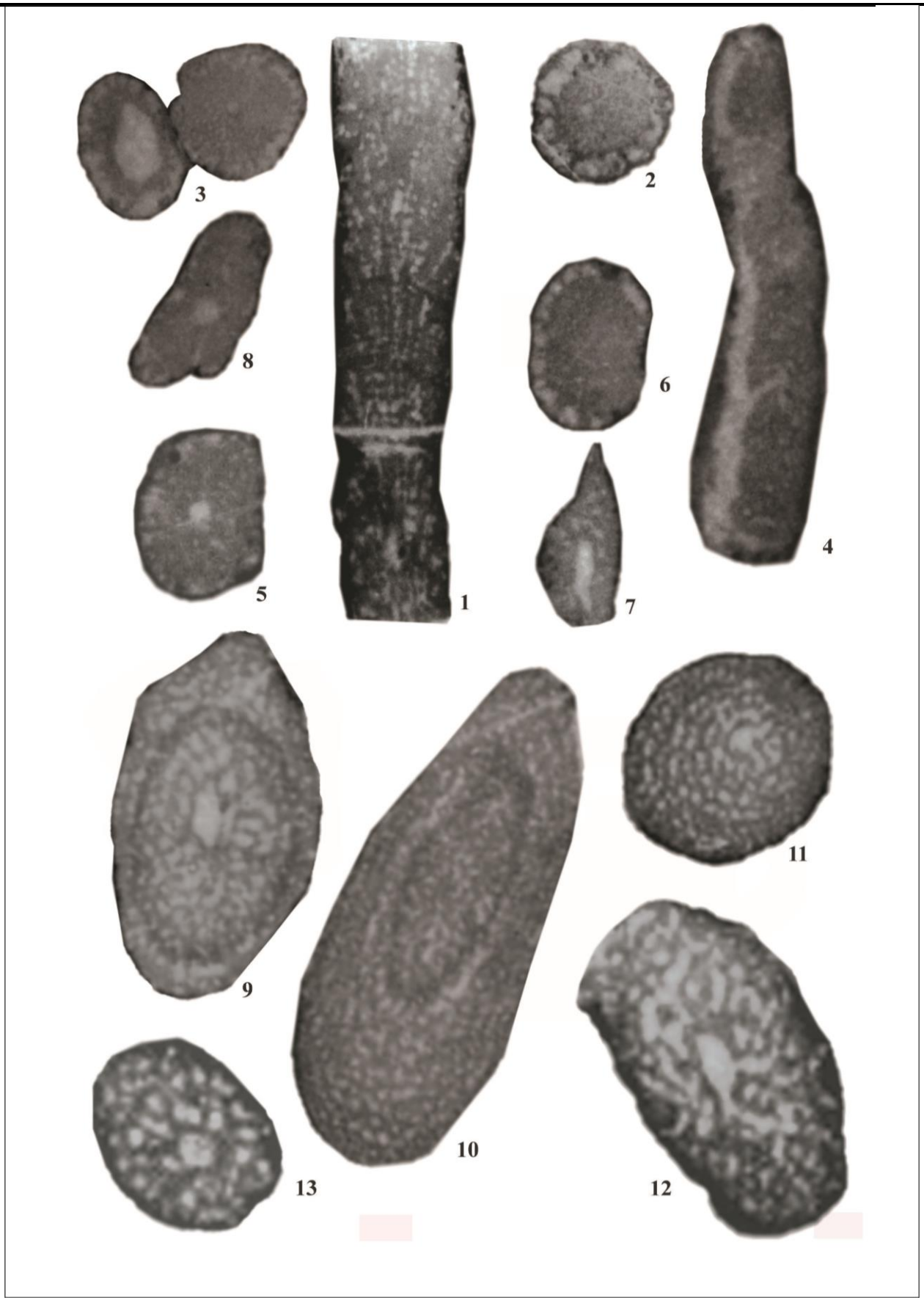
**Holotype**. №213-2/3, 3/2а, Museum of the State Committee for Geology of the Republic of Uzbekistan; Lower Devonian, Muruntau, Central Kyzylkum.

**Description.** The coenosteum is cylindrical, 2.5-3.0 mm in diameter. The central astrorhizal canal is uneven, 0.5 mm in diameter. Vesicles are large and irregular in shape. The width of the largest vesicles is up to 1.0 mm. The central canal, as well as the vesicles, are crossed by bottoms. The tissue of the vesicle septa is distinctly punctate, the wall thickness of the vesicles is 0.2-0.3 mm.

**Comparison.** The described species differs from the holotype in an insignificant difference. In the described species, the central canal is 0.5 mm in diameter, while in the holotype it is 0.7 mm.

**Spreading**. Lower Devonian of the Central Kyzyl Kum, Zeravshan Range.

**Location**. Central Kyzylkum, Muruntau; Lower Devonian, Dzhengelda Formation.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