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Palaeozoic carbonates and fossils of the Mendeleev Rise (eastern Arctic): A study of dredged seafloor material

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ABSTRACT

Fossiliferous carbonate rocks dredged during the "Arctic-2012" cruise on the Mendeleev Rise (eastern Arctic) provide proof of the presence of Upper Silurian(?)–Middle Devonian, Famennian–Tournaisian, Bashkirian–Kasimovian, Gshelian–lower Asselian(?) and Kungurian–Kazanian carbonate deposits. The wide spectrum of facies includes deposits of both photic zone (with fusulinids, algae, relicts of microbial and coral reefs) and deeper dysphotic areas (with trilobites, deep-water tentaculitids and ostracods). The results obtained suggest that there were at least three periods of carbonate platform sedimentation during the latest Silurian(?) to Permian.

The Late Silurian?–Devonian biota do not show biogeographical differentiation, but rather are distributed globally. Shallow-water foraminifera and some algae of early Pennsylvanian–basal Cisuralian age belong to the warm-water province. These forms are unknown in the Moscovian–Permian of the Boreal Realm (Taimyr, New Siberian Islands, Verkhoyanie, Omolon Massif) but are typical for Alaska and Arctic Canada, Wrangel Island, Chukotka, Polar Urals and Svalbard. The disappearance of warm-water biota during late Artinskian-Kungurian times led to a subsequent predominance of smaller foraminifera: this assemblage with *Protonodosaria* is widely distributed in Permian deposits of Novaya Zemlya, Urals, Barents Sea and the eastern Arctic.

The warm-water Bashkirian-Asselian biota suggests that the Mendeleev-Chukotka-Wrangel block was a low-latitude shallow basin with predominant carbonate sedimentation, being part of the Arctida supercontinent, connected temporarily with the eastern margin of Laurasia (Chukcha-Alaska block).

1. Introduction

The first published data on the sedimentary seefloor rocks obtained from the deep eastern Arctic Basin appeared during the expedition "Arctic – 2000". However, for the first time the scientific value of the dredged material had been demonstrated after pioneering geological expeditions and studies of seafloor rock fragments between 1950 and 1970 in the Barents Sea (Dibner et al., 1970). The Late Palaeozoic and Mesozoic ages of seafloor samples collected during vessel cruises in 1940, 1946, 1947, 1948, 1960 and 1964 in the Barents Sea were determined based on macrofaunas and microfossils (foraminifera, spores and pollen). Onshore, the first data on middle Pennsylvanian fusulinids from the Franz Josef Land were obtained in 1955. The occurrence of Upper Palaeozoic rocks in the Barents shelf was confirmed by later boreholes on Kolguev Island, the Franz Josef Land, the shelf of the Pechora Sea and by shallow boreholes on the Finnmark Platform (Bugge et al., 1993).

Geological studies in the eastern Arctic Ocean in the late 20th and early 21 st centuries have been stimulated by the Arctic countries within the framework of national programmes for the delineation of extended shelves. However, seismic surveys of the Mendeleev Rise did not result in a complete picture of the geological structure of offshore areas, and direct geological observations remained few and scattered.

Dredged samples of various sizes collected in the absence of drillings are practically the only source of information on the rock composition of the basement of the eastern Arctic Basin. The coarse rock fragments sampled from the seafloor can be divided into two main groups: (1) so-called ice-rafted rocks, transported to the Arctic deep-water basin by

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