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RESEARCH AND CURRENT STATE OF UPPER VENDIAN (EDIACARAN) OUTCROPS IN THE HORYN FACIES ZONE

The Ediacaran Period lasted from approximately 635 to 541 million years ago and was characterized by global geological and ecological processes that had a significant impact on the evolution of life. During the Cryogenian and Ediacaran, several key processes occurred, including the warming after the global glaciation, continental drift, which involved the breakup of the supercontinent Rodinia and the formation of Gondwana, as well as the impact of an asteroid, the evidence of which is the Acraman impact structure.

The Ediacaran Period is notable for the emergence of the Ediacaran biota, which consisted of several groups of metazoans with a rather complex morphology. These were soft-bodied organisms, mostly not similar to modern biotic groups, which complicates their genetic classification and understanding their role in the evolutionary history of life.

In Ukraine, Ediacaran deposits are widespread in the Volyn-Podillia Plate and partly in the Pereddobruzkyi Through, which situated in the southwest part of the East European Platform [1-8]. The upper Vendian (Ediacaran) in Volyn and Podillia is represented by the Mohyliv-Podil's'kyy and Kanyliv group, which represent the Novodniester and Ushytsa horizons of the regional stratigraphic scheme [1].

In contrast to the Vendian of Podillia, which is characterized by a unique completeness of a sedimentary sequence, detailed stratigraphic subdivision, and a sufficiently high level of lithological study [1-8], the deposits of the Upper Ediacaran of the Horyn facies zone (FZ) lie monoclinally and most of the rocks are overlaid by a thick sedimentary cover, which significantly complicates their study.

They are exposed only in the valley of the Horyn River and its tributary, the Vilia River (from the town of Ostroh to the village of Khotyn, Rivne Region). The Vendian deposits were previously investigated primarily using core material from deep geological mapping boreholes of 1980-1984 (sheet M-35-XV; Rivne). The cores of these boreholes have been lost, and the methods and tools for examining Ediacaran rocks have recently undergone significant changes. The monograph "Vendian of Ukraine" by Velikanov et al. [4] describes six outcrops of Vendian deposits in Volyn (NW Ukraine).

The lowest stratigraphic interval includes outcrops in the village of Rozvage to the north of the town of Ostroh. A small outcrop of deposits similar in stratigraphic position can be observed at the mouth of Tatarskyi Yar in the town of Ostroh (in the yard of the house on 146a, Dzerzhynskogo Street). One of the largest outcrop is an abandoned quarry in the village of Slobidtsi, the right bank of the Vilia River. The only outcrop of the Kalyus Beds in Volyn is located in the area of the village of Khotyn, north of the city of Rivne [4].

Of the six outcrops in the Horyn FZ described in the monograph “Vendian of Ukraine”, the author found that only the man-made outcrop (abandoned quarry) in the village of Kamianka on the right bank of the Vilia River (Fig. 1, a) is accessible. Other outcrops are flooded (quarries) or sodden (gullies).

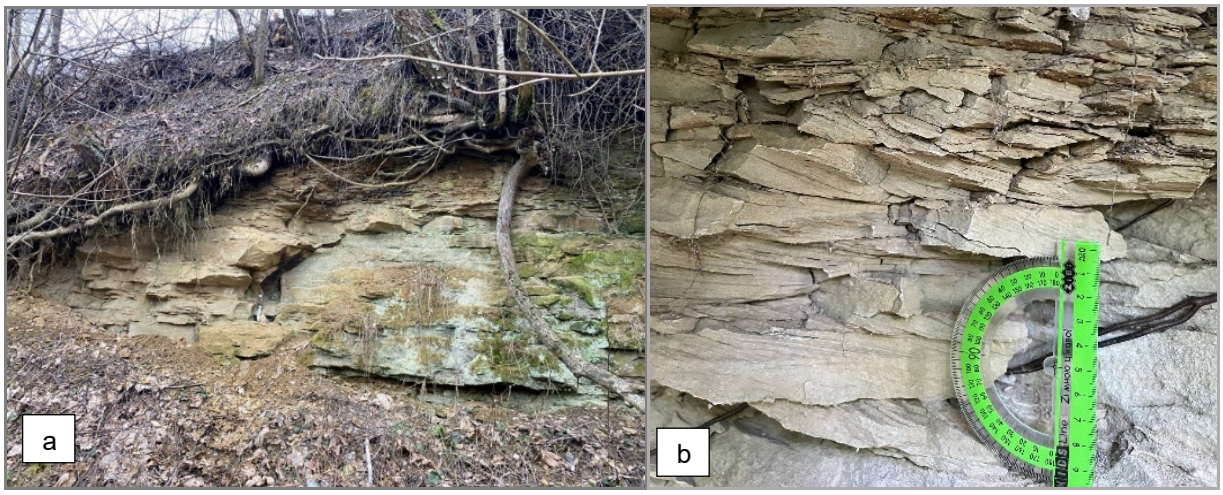

Fig. 1. Ediacaran rocks exposed in the village of Kamianka:
a) Outcrop panorama; b) Textural features of siltstones

The section in the quarry in the village of Kamianka comprises sandstones and siltstones. The lower part of the section consists of a 1.1 m-thick layer of a massive, gray-red, fine-grained, feldspar-quartz and micaceous sandstone. The upper part of the section is consists of thin- and wavy-layered, micaceous, weathered siltstones. In some places, mica forms thin lenses and layers over 0.4 m thick (Fig. 1, b).

V.A. Aseeva [4] identified an assemblage of microscopic phytofossils in the sandstone bed, which is typical of the lower part of the Kanyliv Group. Although these deposits are similar to the rocks of the Mohyliv Formation of Podillia in terms of lithological parameters and depositional conditions (Fig. 2) [5]. Therefore, they require further research.

Fig. 2. The Lomoziv Beds of Podillia (photo by A.I. Martyshyn)

The Kanyliv Group was initially described as the Kanylov strata of the Lower Cambrian by O.V. Krasheninnikova [6] in the basin of the Horyn River. It was subsequently divided into two lithostratigraphic units: the lower sandstone bed and the upper thin-bedded sandstone-mudstone-siltstone bed [7]. These strata were initially established based on the well log charts and compared by stratigraphic position and volume with the Zharniv, Krushaniv and Studenytsi formations of the Podillian ledge of the Ukrainian Shield. However, the lithological composition, structure, and organic remains were not characterized due to the lack of core material.

V.Ya. Velikanov [8] was the first to successfully correlate the Kanyliv Group in Volyn with its analogues in Podillia and eastern Poland. This correlation led to the creation of the lithostratigraphy of the Kanyliv Group and monitoring of the evolution of the sedimentary basin.

Therefore, it can be concluded that the study of the depositional conditions of the upper Vendian (Ediacaran) sediments of Volyn is in its initial stage and requires further research. This includes a detailed examination of the geochemical, mineralogical, and lithological features, which are crucial for reconstructing the ecology of the Ediacaran paleobasin. These tools enable the monitoring of paleoenvironmental changes and the development of new models of climate change, as the mineral composition of rocks is controlled by various factors, such as geotectonic setting, source of clastic material, degree of weathering, and depositional conditions (e.g. grain size and hydraulic sorting of minerals with different densities and grain shapes), as well as diagenesis and hydrothermal events.

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