UDC 552(477.4)

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STRUCTURE OF TOVTRY REEF IN THE CENTRAL PART OF VOLHYNO-PODILLIA REGION

The article contains general information of the Tovtry reef structure in the central part of Volhyno-Podillia region. It's components of rocks and it's structural features are described. The carbonate rocks and sand-clay deposits are identified and described mostly in reef structure and adjacent territories structures. One of the main results is the Miocene deposits strict division for Badenian and Sarmatian parts.

Key words: Tovtry reef, Miocene, Volhyno-Podillia, Badenian, Sarmatian, limestones.

The **objects of research** were lithology of Tovtry, features of its rocks and the characteristics of the structure and morphology of Tovtry reef. The **objective of the study** was to streamline the results of interpret the data of previous researchers according to the actual stratigraphic schemes and additions its own data observations.

Our **tasks** included:

- collection and to re-interpretation previously conducted studies – specialized and general geological and survey work;
- compilation of the scheme for a detailed examination based on the data of boreholes, field books and specialized works;
- analysis of the findings of previous stages, sampling, description and stratification geological sections according to the actual schemes of stratigraphy of the investigated area and summarizing based on obtained data.

The great number of researchers have been studying of Tovtry reef (Fig. 1) for nearly 200 years. During the 19th and the first half of the 20th century the widespread investigations were carried out by such researchers as Yakovytski (1827, 1828, 1830), Eichwald (1830), Barbot-de-Marni (1867), Myhailskyi (1895), Lomnytskyi (1898), Teisseire (1894, 1900) and others. In the subsequent time for study of the genesis and structure of Tovtry had played important part the works by Laskariev (1914), Vyrzhykivskyi (1928), Gerenchuk (1949, 1950), Koroliuk (1952), Cys (1955, 1962), Maslov (1956), Vialov (1962, 1965), Kudrin (1966).

In recent years, studies have been associated with the names of Yarysh (1972), Zaika-Novatskyi (1972), Znamenska (1973, 1976), Rizun (1986), Syvyi (1999, 2004) and others. In addition, much attention is paid to Tovtry reef during geological surveying and prospecting (e.g. work by Mikhailov, Zhukov, etc.). The studies gave a large amount of factual material, conclusions about the genesis of the reef, the history of geological development, the prospects for different types of minerals resources [2].

Works were carried out in 2008 to prepare the State Geological map of territory and the author of the article has been involved in this [2] project.

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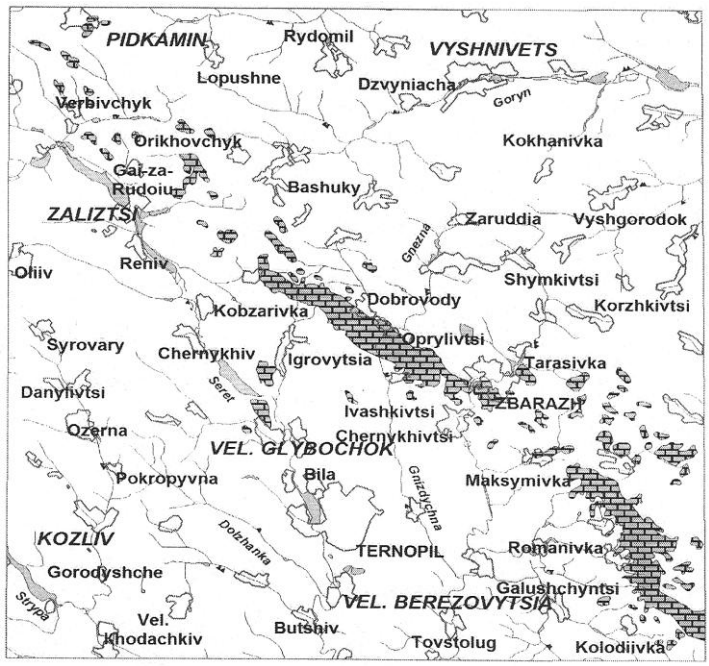

Fig. 1. The area of researching. Scale 1: 500 000. Gray colour with marks indicates the reefs from Tovtry

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This is formation of medium Miocene (Ternopil layers of upper Badenian) and upper Miocene (Volyn layers of lower Sarmatian) [5]. This section overlies the crystalline limestones and shales of Silurian age or glauconitic sands with gravel of flints (Upper Cretaceous, Cenomanian) or chalks and chalky limestones (Upper Cretaceous, Turonian) in depressions of the Paleozoic basement.

South-west from the study area they are overlap by speckled clays and sands (middle Sarmatian) and generally geological section covered by loams, clays and gruss (Quaternary).

For Miocene in the central part of Volhyno-Podillia region we distinguish such layers as (from bottom to top at Fig. 2):

1) quartz sands, glauconite-quartz sands;

2) litotamnium limestones (clayey and sandy);

3) organic-detrital and detrital-litotamnium and clayey litotamnium limestones;

4) reef litotamnium limestones with lens organic-detrital limestones;

5) organic-detrital and litotamnium with detrit limestones (tail of the reef) and their varieties away from the reef – clayey litotamnium limestones (upper Badenian);

6) coquinoid and serpuloid reef limestones overlying Badenian reef and organic-detrital and detrital-oolitic limestones;

7) biohermal coquinoid and serpuloid limestones;

8) alternation of beds of calcareous clays and marles (lower Sarmatian).

Basis of Tovtry reef has been formed from early Badenian sediment are spread everywhere. The maximum thickness the sediments is about 150 m [2]. They are represented by organic, organic-detrital and litotamnium limestones, marles, clays, siltstones, sands, sandstones.

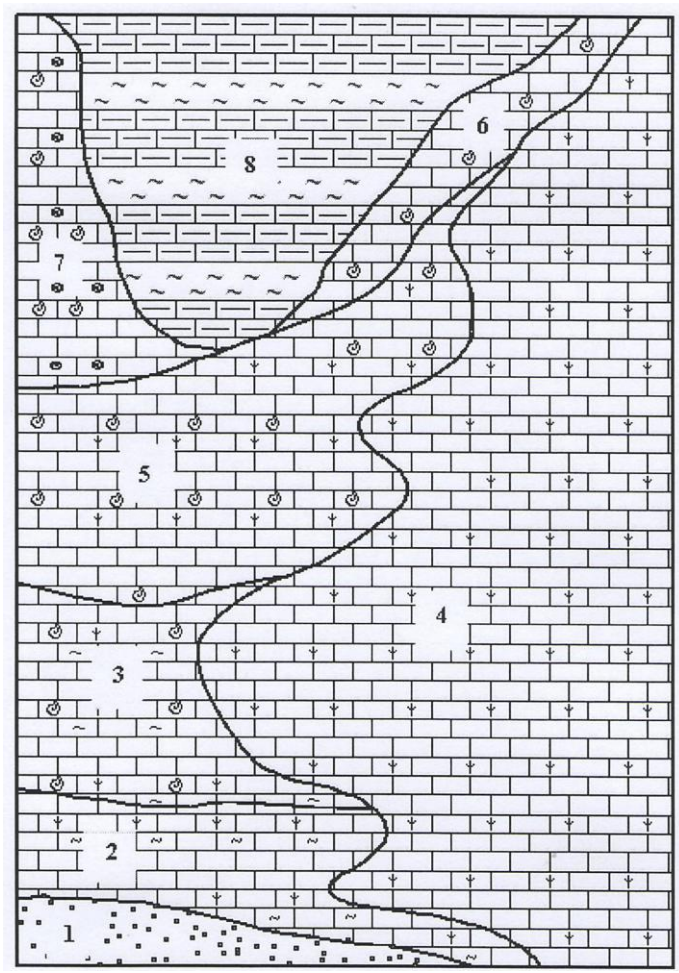

Fig. 2. Generalized scheme of the Tovtry's structure. The numbers in the Figure correspond to the numbers in the text

East from Tovtry at the bottom of the section are dominated by sands, sandstones, sandy limestones – a complex of sediments formed by conditions of shallow basin near the shoreline. Above ones are dominated by clayey litotamnium limestones with layers and lenses of sandy limestones, limestone sandstones, shell-detrital limestones and calcareous litotamnium clays.

West from Tovtry at the bottom of the section are dominated by clayey litotamnium limestones which interbedded with sands, clays, coquinoid limestones. Under the clayey litotamnium limestones at the bottom of the section has deposited chemogenic light grey limestones in the extreme south-western parts. The upper part of the section is characterized by great variety, alternation of clays, siltstones, sandstones, clayey litotamnium limestones and organic-detrital limestones [1].

The bottom part of the section in Tovtry reef is composed of a quartz sands with a trace of glauconite or sandy litotamnium limestones (clastic material represented by grains of quartz, flint, etc.). A strata of clayey litotamnium limestones with interbeds of organic-detrital limestones is lies above. There are often, but not everywhere clayey litotamnium limestones are overlapped by fairly uniform detrital limestones which are covered by reef limestones that complete the section of upper Badenian for Tovtry reef.

The layer of sands with lenses of small thickness and layers of limestones and sandstones (buglivski layers) is completes section of upper Badenian in the central part of Volhyno-Podillia region outside the Tovtry reef. There are carbonate-quartz varigrained sands and sandstones with the mixed of Badenian and Sarmatian fauna [1].

The sediments of the lower Sarmatian are represented by volyn layers and were found on all territory of studies, except a river valleys, large beams and the highest peaks of Tovtry reef. The thickness of layers of lower Sarmatian formations is vary from a few meters to several tens of meters. They have a very diverse composition: a variety of limestones, clays, marls, siltstones, sands, sandstones. Outside the Tovtry reef the section of lower Sarmatian presented by organic-detrital limestones, chemogenic limestones, marles, clays, siltstones, sands [2].

Results

There was prepared the general geological cross-section and was created graphical representation of Tovtry reef. We had given the general characteristics of construction different part of Tovtry reef and areas adjacent to it. The final result of this thesis was a clear separation of known cross-section of Miocene strata in Badenian and of the Sarmatian parts according to the actual stratigraphic schemes [5].

Conclusions

Tovtry reef is characterized by variegated structure for whole area. Its structure varies in the vertical and lateral directions. It has composed from reef limestones in axial parts and organic-detrital limestones of the same age on the slopes. The limestones of Badenian age overlapping by Sarmatian reef limestones, clays and Quaternary sediments. We have identified the and have described predominantly carbonate, sands and clays types of sediment in construction of reef and areas adjacent to it.

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БУДОВА ТОВТРОВОЇ ГРЯДИ В ЦЕНТРАЛЬНІЙ ЧАСТИНІ ВОЛИНО-ПОДІЛЛЯ

Наведена загальна характеристика будови Товтрової гряди в межах центральної частини Волино-Поділля. Подано опис порід, що її складають, а також її структурні особливості. Загалом, у будові гряди та безпосередньо прилягаючих до неї територій виділено та описано переважно карбонатні та піщано-глинисті типи відкладів. Одним із основних результатів даної роботи є чіткий поділ відомих розрізів міоценової товщі на баденську та сарматську частини.

Ключові слова. Товтрова гряда, міоцен, Волино-Поділля, баденій, сармат, вапняки.

А.В. Усминская

СТРОЕНИЕ ТОЛТРОВОЙ ГРЯДЫ В ЦЕНТРАЛЬНОЙ ЧАСТИ ВОЛЫНО-ПОДОЛИИ

Дана общая характеристика строения Товтровой гряды в пределах центральной части Волыно-Подолии. Приведено описание составляющих ее пород, а также ее структурные особенности. В целом, в строении гряды и непосредственно прилегающих к ней территорий выделены и описаны преимущественно карбонатные и песчано-глинистые типы отложений. Одним из основных результатов данной работы стало четкое разделение известных разрезов миоценовой толщи на баденскую и сарматской часть.

Ключевые слова. Толтровая гряда, миоцен, Волыно-Подолия, бадений, сармат, известняки.

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Стаття надійшла: 05.09.2013