



Estonian Journal of
Earth Sciences
2023, 72, 1, 10–13

<https://doi.org/10.3176/earth.2023.60>

www.eap.ee/earthsciences
Estonian Academy Publishers

SHORT COMMUNICATION

Received 6 April 2023
Accepted 13 May 2023
Available online 9 June 2023

Keywords:

Ordovician, Ukraine, brachiopods,
gastropods, museum collections

Corresponding author:

Volodymyr Grytsenko
favoites@ukr.net

Citation:

Anfimova, G. and Grytsenko, V. 2023.
Ordovician collections stored at the
National Museum of Natural History of the
NAS of Ukraine. *Estonian Journal of Earth
Sciences*, 72(1), 10–13.
<https://doi.org/10.3176/earth.2023.60>



© 2023 Authors. This is an open access article
distributed under the terms and conditions of the
Creative Commons Attribution (CC BY) license
(<http://creativecommons.org/licenses/by/4.0>).

Ordovician collections stored at the National Museum of Natural History of the NAS of Ukraine

Galyna Anfimova and Volodymyr Grytsenko

Department of Geology, National Museum of Natural History of the NAS of Ukraine, 15
Bogdan Khmelnytsky, 01054 Kyiv, Ukraine

ABSTRACT

We reviewed our department's collections dealing with the Ordovician System, stored at the National Museum of Natural History of the National Academy of Sciences of Ukraine (NMNH NAS). The first investigation of the Ordovician palaeontology of Ukraine was published by the Romanian researcher T. Vascăușanu before the Second World War. The study of the Ordovician sections during the 1960s was related to geological prospecting. Most outcrops along the Dniester River in the middle of the valley were available for study before the construction of the dam of the Novodniestrovski Hydropower Station, which raised the level of the reservoir near the dam to 60 m. The reservoir is 198 km long and has covered outcrops ranging from the Ediacaran to the Pridoli. Ordovician fossils are represented by diverse remains of brachiopods, molluscs, corals, bryozoans, graptolites, echinoderms, conodonts, and others.

Introduction

In total, the National Museum of Natural History in Kyiv has only twelve collections containing Ordovician samples, collected from 1874 to 2011. Two of the older collections were transferred from Kyiv University as a result of its reorganisation. The others were given by authors for preservation as monographically described collections. Some samples are displayed in the museum, whereas others are stored in the hall of 'monographic collection', which is only accessible to specialists. These monographic collections were assembled by P. N. Venjukov, V. S. Krandievskiy, P. D. Tsegelnjuk, V. P. Grytsenko, N. V. Zernetskaya, and others.

In Ukraine, the Ordovician sections are largely eroded, with a total thickness of only approximately 10 m. The outcrop sections are located on the banks of the Dniester River (Fig. 1) and represented by two members (Horaivka and Subich formations) divided by an unconformity. More than 400 samples from these sections are

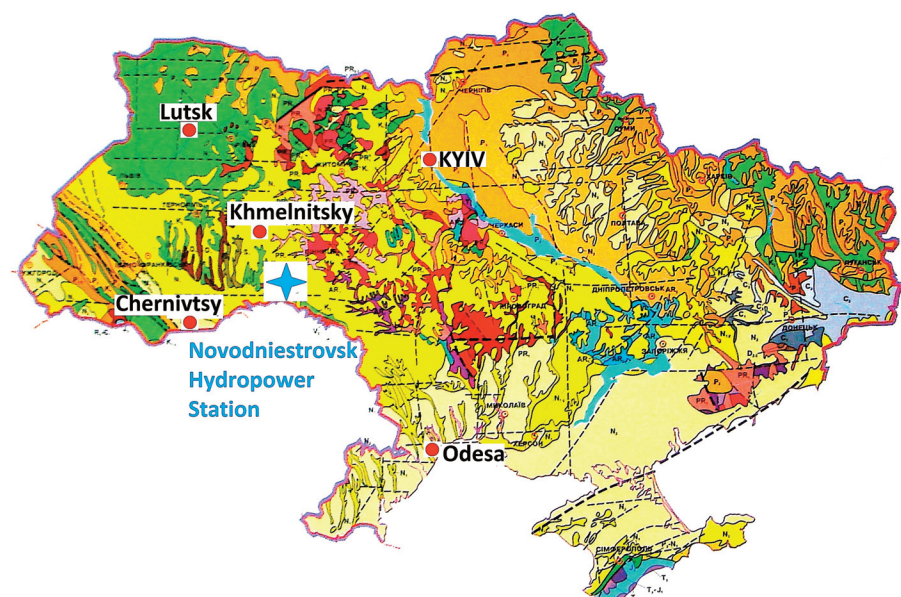


Fig. 1. Geological map of Ukraine (after Bragin et al. 2001, 67) showing the locations mentioned in the text.

represented by brachiopods, corals, graptolites, molluscs and bryozoans. Other samples were obtained from the boreholes in Volyn and Podillia, which are located along the western slope of the Ukrainian Shield, extending from Lutsk to Odesa (Fig. 1). Some samples were obtained from boreholes drilled in Moldova.

Results and discussion

The Middle–Upper Ordovician deposits in the territory of Ukraine were first described in 1931 in the Dniester Valley Basin (Vaskâutsanu 1931). The stratigraphic description and the age of the Ordovician deposits was clarified by T. N. Alikhova (1956). She showed that the Molodove Stage extends into the upper part of the Middle and lower part of the Upper Ordovician. The first palaeogeographic map was created by P. L. Shulga (1960).

The Ordovician strata in the Podillia and Volyn regions of western Ukraine are represented in the lower part by limestone, glauconite-rich and clayey sediments with graptolites (Fig. 2D). These beds are closer in lithology to the Lower Ordovician Leetse Formation.

The Tremadocian Stage with *Obolus apollinis* Eichwald was found in Volyn in cores intersecting the Vyzhivka Formation at the base of the sequence. Stratigraphically overlying units are the Ishev, Nadishev and the Pishcha formations, which are correlated with regional stages such as Hunneberg, Billingen (Lower Ordovician), Volkhov, Kunda, Aseri, Lasnamägi, Uhaku (Middle Ordovician), Kukruse, Haljala, Keila, Oandu, Rakvere, Nabala and Vormsi (Upper Ordovician).

The Ordovician deposits of the Kovel Region (Volyn) were divided into two formations: Petrovichi and Viysk (Tsegelnjuk 1977). Subsequently, these formations were renamed the Smidyn and Rostan formations, respectively, in accordance with the decisions of the Ukrainian Regional Interdepartmental Stratigraphic Committee (Grytsenko 1984).

The Ordovician terrigenous-carbonate deposits of the Middle Transnistria region belong to the Molodove Stage (Alikhova 1956), which is divided into the Horaivka and Subich formations. The Horaivka Formation was correlated with the Oandu and Rakvere stages on the basis of data from a monographic study on brachiopods, and the Subich Formation was correlated with the Vormsi Stage of the regional standard of the Ordovician deposits of Estonia (Nölvak et al.

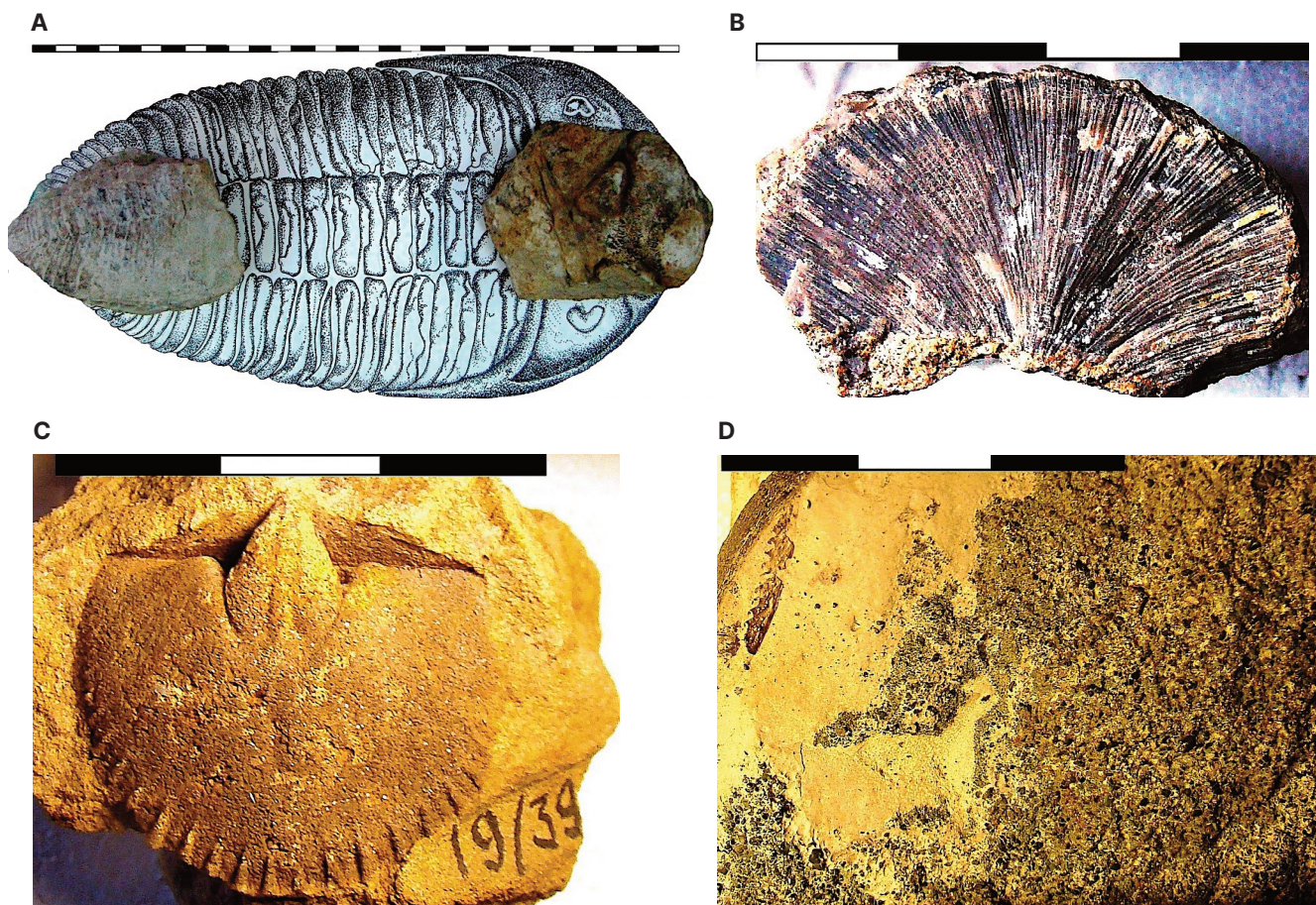


Fig. 2. **A** – *Chasmops extensa* from the Horaivka Formation, reconstructed from fragments; **B** – *Esthonioporella crassimuralis*, Darrivilian, Horaivka Formation, Nadniestrianka village; **C** – *Boreadorthis* cf. *sadewitzensis* (Roemer), No. 1786/4, Nadniestrianka village, Darrivilian, Horaivka Formation; **D** – oolitic sandstone with graptolite gen. et sp. indet., borehole 5443, depth 347 m; Floian, lower part of the Smidyn Formation; **E** – *Subulites* (*Subulites*) *gigas* (Eichwald), No. 1922/196, Nadniestrianka village, left bank of the Dniester River; Middle Ordovician, Horaivka Formation; **F** – *Holopea ampullacea* Eichwald, No. 1922/126, Kytaigorod village, left bank of the Ternava River; Upper Ordovician, Subich Formation; **G** – *Loxoplocus* (*Lophospira*) *esthona* Koken, No. 1922/109, Nadniestrianka village, left bank of the Dniester River; Upper Ordovician, Subich Formation; **H** – limestone with a fragment of *Megistaspis* sp., No. 2210-14, Volyn, borehole 5443, depth 341.5 m, Dapingian Stage, Smidyn Formation. Scale bar is calibrated in 10 mm intervals. (Continued on the next page)

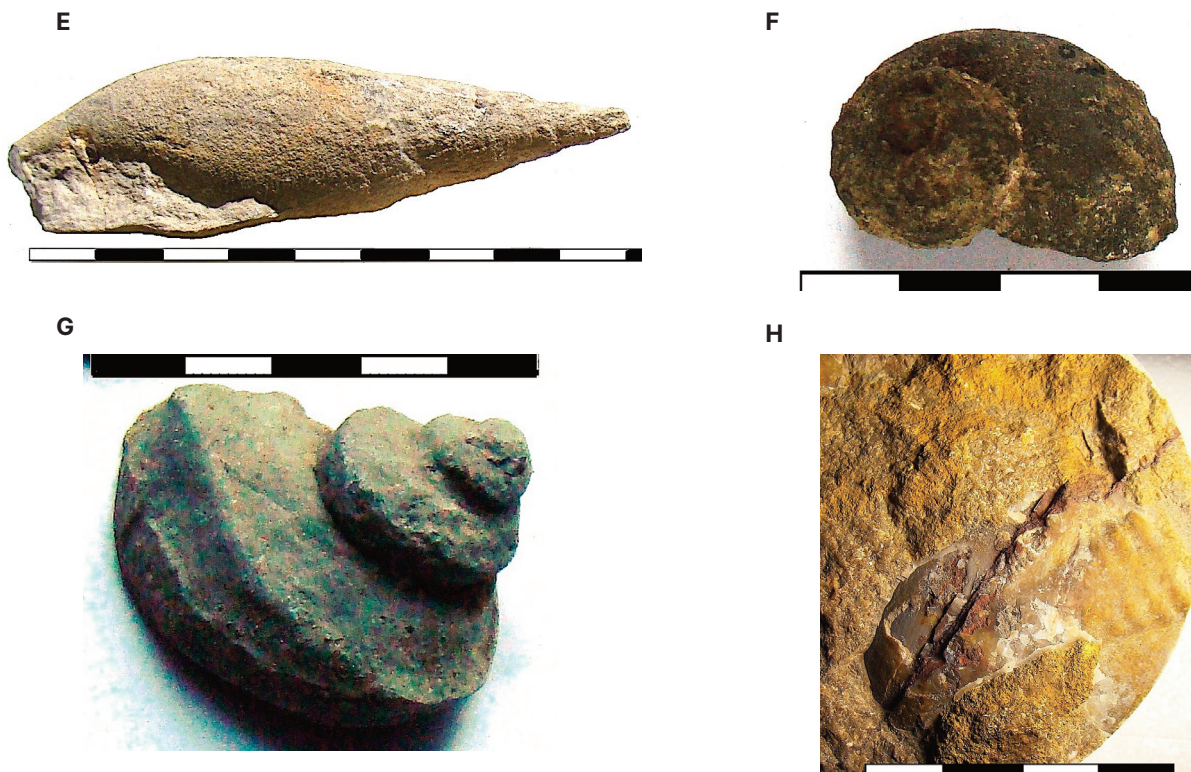


Fig. 2. Continued.

2006). The Horaivka Formation is distributed from north of Podillia to south-east of the Moldova Plate and reaches the Odessa region of Ukraine (Bukatchuk and Tsegelnjuk 1973). In the south-western part of the territory of Moldova, the Baroncha Beds extend into the Middle Ordovician and are overlain by the Molodove Stage, which was attributed to the Upper Ordovician (Bukatchuk 1972).

The limestones of the Upper Ordovician Series within the territory north-west of Moldova and the Chernivtsi region of Ukraine extend into the Moresheshty Beds of the lower Silurian (Trandafilova et al. 1968). In the limestones, P. D. Tsegelnjuk recognized *Triplesia insularis* Roemer, *Pseudolingula quadrata* Sowerby and *Bekkeromena semipartita* (Roemer), which are found in the Subich Formation in the Upper Ordovician (Bukatchuk and Tsegelnjuk 1973). The Upper Ordovician deposits are not known southwards, in the north-western Black Sea region and the southern part of Moldova (Tsegelnjuk 1980).

The Middle Ordovician limestones of the Belichevska Formation (light grey argillites with siltstones) were found in the Lviv Palaeozoic Trough in boreholes Litovizh-1 and Dublyany-4 (Drygant 1976, 1979). In the tectonic blocks of the Ukrainian Carpathians, the remains of conodonts and graptolites were discovered, correlating them with the upper part of the Lower and the lower part of the Upper Ordovician (Drygant and Boichevska 1984). Based on this data, the Ordovician extends along the south-western outskirts of the East European Platform from Volyn to Odesa regions (Krandievskiy and Bukatchuk 1969; Tsegelnjuk 1980, 1993).

Some of the important groups of fossils that were studied include: ostracods – by Krandievskiy (1969) and Abushik and Sarv (1983); brachiopods – by Tsegelnjuk (1976); conodonts – by Drygant (1975, 1979) and Drygant and Boichevska

(1984); gastropods – by Zernetskaya (1976); trilobites – by Konstantinenko (2002, 2005). These studies made it possible to carry out a total biostratigraphic analysis of the Ordovician deposits in Ukraine (Konstantinenko 2011, 2013).

Conclusions

Ordovician deposits are distributed in Ukraine on the western slope of the Ukrainian Shield. In the Middle Transdnier region, these rocks include sandstone of the Horaivka Formation and limestone of the Subich Formation, correlated with the Middle and Upper Ordovician, respectively. The sections include a rich fossil assemblage, although in many cases preservation is not good due to the influence of recrystallization and weathering. Nevertheless, graptolites, ostracods, conodonts, brachiopods, trilobites, gastropods, and other fossils were found and studied.

The Ordovician deposits and fossils, which were actively investigated in Ukraine in the second half of the 20th century, support a correlation mostly with the Baltic region.

The sedimentation during the Middle Ordovician and the fossils testify to shallow-water conditions and warm water with normal salinity. The Upper Ordovician sediments (mostly limestones) suggest a deeper sea and warmer climate.

The restricted thickness of the Ordovician deposits provides evidence of an almost stable regressive tectonic regime.

Unconformities and conglomerates located in the lower and upper parts of the formation are evidence of erosion of sediments in the outcropping sections of Podillia.

Acknowledgements

This study is a contribution to the IGCP Project 735 ‘Rocks and the Rise of Ordovician Life’ and was supported by the

Estonian Research Council grant PRG1701. We especially thank Dimitri Kaljo for long collaboration in different projects and Olle Hints for the invitation to participate in Project 735. The publication costs of this article were partially covered by the Estonian Academy of Sciences.

References

- Abushik, A. and Sarv, L. 1983. Остракоды молдовского горизонта Подолии (Ostracodes from the Moldovo Stage of Podolia). In *Палеонтология древнего палеозоя Прибалтики и Подолии (Lower Paleozoic Paleontology of Baltics and Podolia)* (Klaamann, E. R., ed.). ENSV Teaduste Akadeemia, Tallinn, 101–134.
- Alikhova, T. N. 1956. О возрасте молодого горизонта и о границе между ордовиком и силуром в Приднестровье (About the age of Molodovo horizon and about the boundary among Ordovician and Silurian in the Near Dniester area). *Transactions of All-Soviet Union Oil Scientific-Research Geological-Prospecting Institution*, **4**, 29–31.
- Bragin, Yu. M., Velikanov, B. Ya., Gavrylenko, M. M., Goshovsky, S. V., Gozhyk, P. F., Gursky, D. S. et al. 2001. Geological map of Ukraine. In *Атлас 'Геологія і корисні копалини України' (Atlas 'Geology and Minerals of Ukraine')* (Galetskyi, L. S., ed.). Taki Spravy, Kyiv.
- Bukatchuk, P. D. 1972. Південно-західна частина Молдавії (The south-west part of Moldavia). *Stratigraphy of Ukrainian SSR. The Ordovician*, **3**(2), 186–192.
- Bukatchuk, P. D. and Tsegelnjuk, P. D. 1973. Ордовіцькі відклади Молдавії (The Ordovician deposits of Moldavia). *Reports of the Academy of Sciences of the Ukrainian SSR*, **В**(2), 105–109.
- Drygant, D. M. 1975. Конодонти і вік нижньоордовіцьких глауконітових порід Волині (The conodonts and age of Lower Ordovician glauconitic rocks of Volyn). *Reports of the Academy of Sciences of the Ukrainian SSR*, **В**(2), 103–107.
- Drygant, D. M. 1976. Про поширення і вік ордовіцьких відкладів у Львівському палеозойському прогині (On the occurrence and age of Ordovician deposits in Lviv's paleozoic depression). *Transactions of the Academy of Sciences of the Ukrainian SSR*, **В**, **12**, 1062–1065.
- Drygant, D. M. 1979. Корреляция и тектонические условия формирования ордовикских отложений юго-западной окраины Восточно-Европейской платформы (The correlation and tectonic conditions of forming Ordovician deposits of south-west outskirts East-European platform). In *Геология и геохимия горючих ископаемых (Geology and Geochemistry of Combustible Minerals)*. Kyiv, Naukova dumka, 51–57.
- Drygant, D. M. and Boichevska, L. T. 1984. Перша знахідка нижньоордовіцьких граптолітів і конодонтів в Українських Карпатах (The first find of Lower Ordovician graptolites and conodonts in Ukrainian Carpathians). *Reports of the Academy of Sciences of the Ukrainian SSR*, **В**(6), 8–11.
- Grytsenko, V. P. 1984. Совещание нижнепалеозойской секции Украинской региональной межведомственной стратиграфической комиссии (УРМСК) (Meeting of the Lower Paleozoic Section of the Ukrainian Regional Interdepartmental Stratigraphic Commission (URMSK)). *Geological Journal*, **44**(4), 139–140.
- Konstantinenko, L. I. 2002. Трилобіти і стратиграфія ордовіцьких відкладів Поділля (Trilobites and stratigraphy of the Ordovician sediments of Podillia). In *Еволюція органічного світу як підґрунтя для вирішення проблем стратиграфії (The Evolution of the Organic World as a Basis for Solving Problems of Stratigraphy)*. Kyiv, 19–21.
- Konstantinenko, L. I. 2005. Трилобіти роду Chasmops із ордовіку Поділля (Trilobites of the genus Chasmops from the Ordovician of Podillia). *Paleontological Review*, **37**, 17–29.
- Konstantinenko, L. I. 2011. Стратиграфія ордовіку Придністров'я (Stratigraphy of the Ordovician Transdnistria). *Tectonika i Stratigraphia*, **38**, 42–50.
- Konstantinenko, L. I. 2013. Частина 4. Ордовіцька система (Part 4. Ordovician System). In *Stratigraphy of Upper Proterozoic, Paleozoic and Mesozoic of Ukraine* (Gozhyk, P. F., ed.), 167–175.
- Krandievskiy, V. S. 1969. Стратиграфічне поширення остракод в ордовіцьких відкладах Волино-Поділля (The stratigraphic spreading of ostracods in the Ordovician deposits of Volyn-Podillia). *Reports of the Academy of Sciences of the Ukrainian SSR*, **В**(10), 870–874.
- Krandievskiy, V. S. and Bukatchuk, P. D. 1969. Нові дані про наявність ордовіцьких відкладів на півдні Молдавії (The new data about availability of Ordovician deposits on the South of Moldavia). *Reports of the Academy of Sciences of the Ukrainian SSR*, **В**(10), 870–874.
- Nölvak J., Hints, O. and Männik P. 2006. Ordovician timescale in Estonia: recent developments. *Proceedings of the Estonian Academy of Sciences. Geology*, **55**(2), 95–108.
- Shulga, P. L. 1960. Ордовіцький період (Ordovician period). In *Атлас палеогеографічних карт Української і Молдавської ССР (The Atlas of Palaeogeographical Maps of Ukrainian and Moldavian SSR)* (Bondarchuk, V. G., ed.). Academy of Sciences of the Ukrainian SSR, Kyiv, 1–75.
- Trandafilova, Ie. F., Edelshtein, A. Ya. and Bukatchuk, P. D. 1968. Схема стратиграфії силурійських отложений (The schema of stratigraphy of Silurian deposits). In *Региональна стратиграфія Молдавської ССР (The Regional Stratigraphy of Moldavian SSR)* (Polev, P. V. and Negodaev-Nikonov, K. N., eds). Chisinau, 5–28.
- Tsegelnjuk, P. D. 1976. *Брахіоподи і стратиграфія нижнього палеозоя Волино-Подолии (Brachiopods and Stratigraphy of Lower Paleozoic of Volyn-Podillia)*. Naukova dumka, Kyiv.
- Tsegelnjuk, P. D. 1980. Стратиграфія ордовіка юго-западної окраїни Восточно-Европейської платформи (The stratigraphy of Ordovician of south-west outskirts East-European platform). *Tectonic and Stratigraphy*, **19**, 84–95.
- Tsegelnjuk, P. D. 1993. Ордовіцький період (Ordovician period). In *Геологічна історія території України. Палеозой (Geological History of the Territory of Ukraine. Palaeozoic)* (Tsegelnjuk, P. D., ed.). Naukova dumka, Kyiv, 24–34.
- Vaskâuşanu, T. 1931. Les formations siluriennes de la rive Romaine du Dniester (The Silurian formations of the Roman bank of the Dniester). *Anuarul Institutului Geologic al României*, **15**, 425–546.
- Zernetskaya, N. V. 1976. Гастроподы молодого горизонта Подолии (Gastropods of the Molodovo horizon of the Ordovician of Podillia). In *Палеонтология и стратиграфия верхнего докембрия и нижнего палеозоя юго-запада Восточно-Европейской платформы (Palaeontology and Stratigraphy of the Upper Precambrian and Lower Paleozoic of South-West Outskirts of East-European Platform)* (Shulga, P. L., ed.). Naukova dumka, Kyiv, 133–148.