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The Scientific Heritage of Volodymyr Luchytskyi and Mykola Bezborodko in the Geological Collection of the National Museum of Natural History

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The Scientific Heritage of Volodymyr Luchytskyi and Mykola Bezborodko in the Geological Collection of the National Museum of Natural History. — Reshetnyk, M. M. — The article presents the results of a scientific and historical research on the collections of Precambrian rocks. The collection was created by two outstanding petrographers, founders of petrography in Ukraine, who studied crystalline rocks that are spread across the entire Ukrainian shield. Collections of Volodymyr Lutchytsky and Mykolai Bezborodko in the Geological Museum of NMNH, NAS of Ukraine are a reflection of their outstanding theoretical and pracatical work in geology. We present here our classification of all templates of their collections by regional and petrographical characteristics. The most representative geographies have the templates in the collection of Bezborodko, while the collection of Lutischysky is concentrated on granites-rapakivi from the Zhytomyr region. The books and maps of the scientists who first described the Ukrainian shield are of great importance in understanding of the origin the Precambrian basement. Their conceptions are basic in modern geological understanding of the structure and composition of the Ukrainian Schield. These collections are part of the geochronological exhibition as an important part of geological national heritage preserved in the National Museum of Natural History.

Key words: petrology, structural geology, collection of rock samples, Ukrainian shield, granitoids.

Introduction

Today the museum collections created by important scientists of the XX century have become historiographical importance. The Geological Museum of NMNH, NAS of Ukraine conserves the collections of Volodymyr Luchytskyi and Mykola Bezborodko, who are recognized as founders of Ukrainian petrology (Щербаков, 2005). They work gave a powerful impetus to the development of petrology in our country. The materials of their research were the most ancient rocks of the Ukrainian shield. As a result, the structural and petrographic map of the Ukrainian shield was created. They opened new paragraphs in varieties of granitoids. The significant scientific heritage of V. Luchytskyi and M. Bezborodko is reflected in numerous publications.

The brief biography of Volodymyr Luchytskyi

Luchytskyi Volodymyr Ivanovych (1877–1949) in 1910 published his book “Course of petrography,” the first textbook of petrography in the Russian Empire. The last (sixth) revised edition of the textbook was issued in 1949. According to the *History of Kyiv University* (Історія Київського університету, 1959: с. 478), “it was designed for students and aspirants of geological institutes, as well as for a wide range of geologists, and was one of the most popular works of this kind in the Soviet Union.” This book was published in Russian and was translated into languages of the republics of the Union.

In pre-revolutionary times he was studying in Kyiv University, where in 1912 he defended his doctoral thesis “Rapakivi granite in Kyiv province and rocks that accompany it.” In 1913, he became a professor of Kyiv University, were he was working until 1924. During World War I (1914–1917), he took part in the first Russian military-geological organization “HidroYuZ.”

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Fig. 1. Volodymyr Luchytskyi (1877–1949), a celebrated geologist, head of Ukrheolkom, Director of the Institute of Geological Sciences during his later years, author of 200 publications, including the book "The Ukrainian crystalline shield" (Інститут геологічних наук, 1976).

Рис. 1. Володимир Лучицький (1877–1949) — відомий геолог, голова Укргеолком, останні роки життя директор Інституту геологічних наук, автор 200 публікацій, зокрема, книги «Український кристалічний масив» (Інститут геологічних наук, 1976).

After the revolution (1917), V. Luchytskyi established the Ukrainian Geological Committee, and he was the head of it until 1923. V. I. Luchytskyi published in 1923 the first maps of geology and of mineral resources in Ukraine. In 1924–1944, Luchytskyi was a professor of Moscow Mining Academy; in 1930–1941, he was the Head of the Petrography Department of Moscow Geological Institute, managed prospecting and exploration of kaolin, graphite, and fluorite. In 1941–1945, Luchytskyi became a Consultant of geological research in "Soyuzalyuminzavod" in the Urals.

From 1945 to 1949 he was the Director of the Institute of Geological Sciences and Head of the Petrography Department of Kyiv University.

Proceedings by Volodymyr Luchytskyi

His scientific work was full of topical ideas. The list of his work includes more than 200 titles and covers a wide range of geological issues.

The most significant works of V. Luchytskyi on studying of the Ukrainian shield are the following:

1) the article "On the origin of granites of southern Russia" (1910) in which he identified three genetic types of gneiss: paragneyss, ortogneyss and microgneyss;
2) the book "Petrography of Ukraine" (1934) which is actually the first publication describing Ukraine,
3) the book "Ukrainian crystalline shield" (1947) first makes a wide-ranging structural and petrographic description of the Ukrainian shield and presents its creative geological map (fig. 2). V. Luchytskyi made a detailed stratigraphic scheme of the Precambrian shield. He was the first who wrote about the wide distribution of charnockites in Ukraine, identified series in the Teterev-Bug region (Luchytsky series), and proposed the new term "kiyevit."

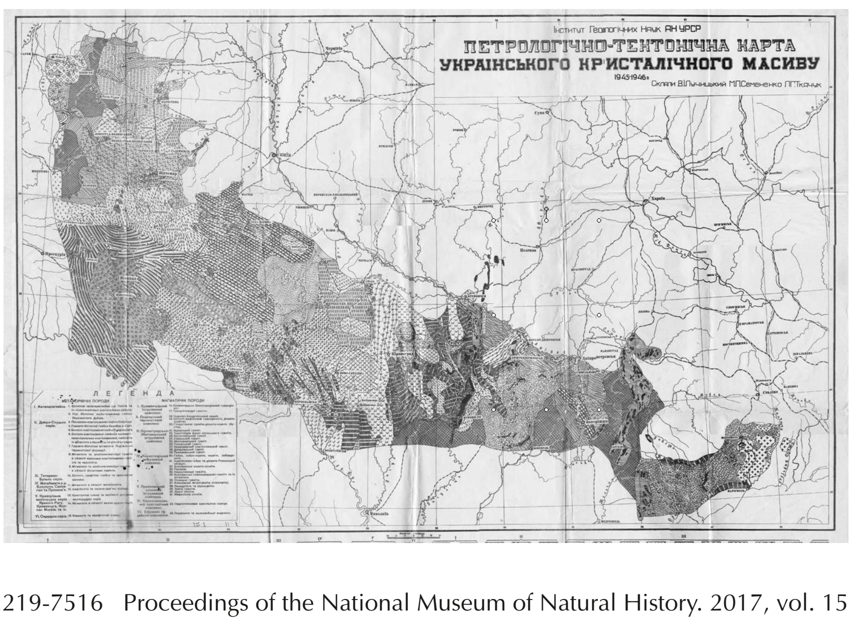


Fig. 2. Petrographic and tectonic map of the Ukrainian crystalline array created by V. Luchytskyi with co-authors. Photo from the book "Ukrainian crystalline shield" (Лучицький, 1947).

Рис. 2. Структурно-петрографічна карта Українського кристалічного масиву створеної колективом авторів на чолі з В. І. Лучицьким (Лучицький, 1947).

Volodymyr Luchytskyi's knowledge and professional activities are impressive. He was studying graphite, fluorite, and feldspar stocks in Ukraine, iron ores of Kerch (Crimea), chromite, bauxite, phosphate, manganese ores, cement raw materials, refractory clay, and kaolin. Under the leadership of V. Luchytskyi were discovered and explored deposits of Ukraine, which today make up the mineral base of economics.

Volodymyr Luchytskyi's collection in the Geological Museum

The collection of V. Luchytskyi, deposited in the Geological Museum (No. 558), is a valuable heritage of our country. It was created in 1902 and until 1932 was deposited in the mineralogical cabinet of Kyiv University. Notes about the transfer of a part of this collection in 1932, namely 72 samples to the Department of Crystalline Rocks, are recorded in the inventory book of the Geological Museum. The existence of a Department of Crystalline Rocks in the Geological Museum is not documented. But there was such a department at the Institute of Geology, therefore, we can suppose that in 1931–1932 started the process of integration of the Geological Museum (at that time an independent organization) with the Institute of Geology (Деревська, 2012). Now, collection No. 558 in the Geological Museum consists of 53 samples, mainly granites and granite rapakivi (fig. 3 a). The granite samples were collected mostly in the Korsun district (Korsun, Yablunivka, Lystvyn, and Garbuzin villages). Several samples were taken from the Zhytomyr region (banks of the Irsha River near Gorodische and Sychovka villages).

The second part of Luchytskyi's collection was established in the postwar period, in 1948. It contains 146 samples, mainly of granites, pegmatites, gneiss and xenoliths (gneiss and crystalline shales), charnockites and vein-quartz. Samples were collected mainly in the Vinnytsia region near the Pivdenny (Southern) Bug River (Vinnitsa, Gnivan, Tivriv, Sabariv, Sutisky), and near the Hnylopyat River (Hluhivtsi, Kumanivka, Vedmedivka, Zezheliv, Komsomol, Raika, Shvaykovka, Slobodysche, and Berdychiv villages). According to petrographic classification, the collection consists of the following samples: gneiss (15 samples), granites (104), contact of fine- and middle-grained granites (3), rapakivi granite (42), contact of rapakivi granite with granite (2), pegmatite (14), contact of pegmatitic core with xenoliths (1, fig. 3b), xenolith (5, obviously crystalline shales), contacts of xenolith with granite (6), charnockites (3), vein quartz trahiit (3), diabase porphyries or volynit (1), monzonite (1), metamorphosed shale (1), labradorite (1), and crystalline limestone (1).

The brief biography of Mykola Bezborodko

Mykola Ivanovych Bezborodko (1883-1942) was a petrographer-geologist (fig. 4). He was studying at the Faculty of Physics and Mathematics of Kyiv University, also graduated from the Mining University in Freiburg (Germany, 1910) and from Kharkiv University (1916). After returning to Russia, he was working in the Donetsk Polytechnic Institute and in Sverdlovsk city.

From 1926 to 1938 he was a professor at Kyiv University, head of the Department of Mineralogy and Petrography at the Institute of Geological Sciences of UkrSSR. He became a doctor of geological sciences in 1935 without defending a thesis, but according to the large number of scientific publications. In 1939, he was arrested on political motives (for

Fig. 4. Mykola Bezborodko (1883–1942), a petrographer-geologist of metamorthic rocks (Деревська, 2012).

Рис. 4. Миколай Безбородько (1883–1942) геолог-петрограф метаморфічних гірських порід (Деревська, 2012).

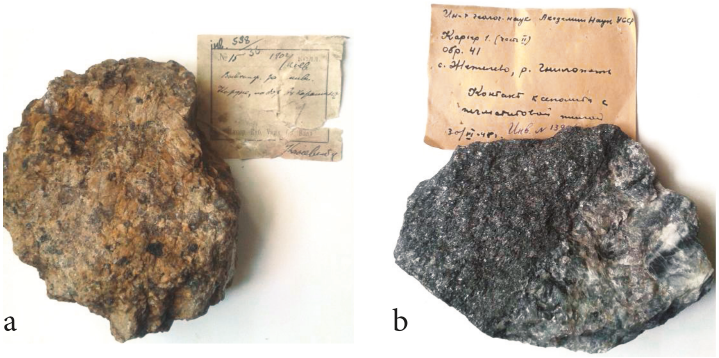
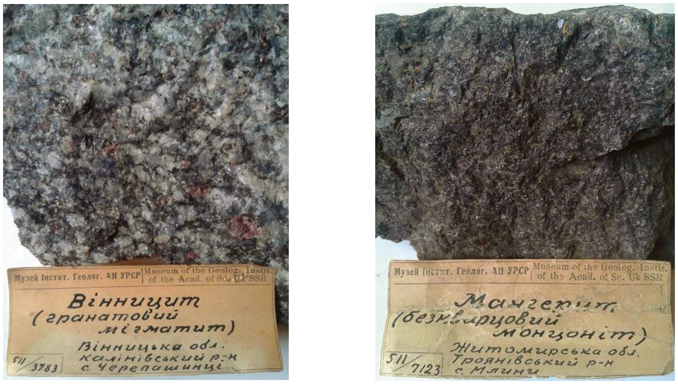


Fig. 3. Photos of samples of rapakivi granite (a) and contact of xenolith with pegmatitic core (b) from V. Luchytskyi's collection preserved in the Geological Museum.

Рис. 3. Фотографії зразків граніту рапаківі (a) та контакут ксеноліту з пегматитом (b) з колекції В. Лучицького Геологічного Музею.



a b

Fig. 5. Photos of "vinnytsyt" (a) and "manheryt" (b) from the collection of M. Bezborodko deposited in the Geological Department of the National Museum of Natural History.

Рис. 5. Фотографії зразків віннициту (a) та мангериту (b) з колекції М. І. Безбородька, що зберігається у геологічному музеї.

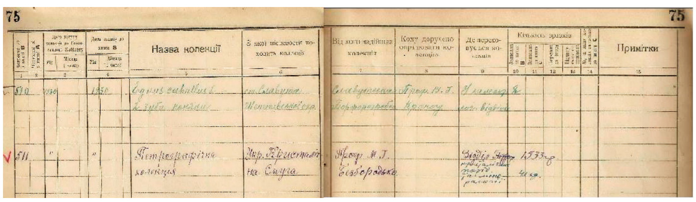


Fig. 6. Photo of the inventory book of the Geological Museum with the record of the transfer in 1930 the petrographic collection samples collected within the Ukrainian crystalline schield by M. Bezborodko.

Рис. 6. Фотографія фрагменту Інвентарної книги з записом переданої у 1930 році до Геологічного музею Петрографічної колекції зразків відібраних в межах «Української Кристалічної Смуги» професором М. Безбородько.

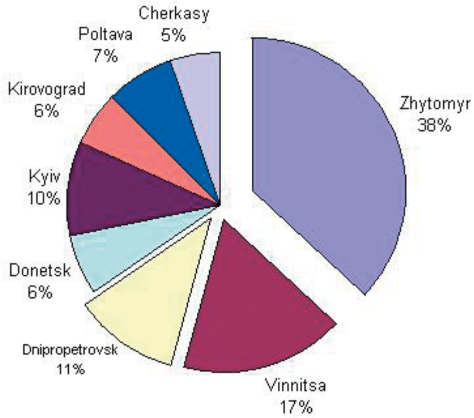


Fig. 7. Percentage of collected samples by different regions in the collection of M. Bezborodko.

Рис. 7. Процентне співвідношення регіонів відбору зразків в колекції М. Безбородька.

nationalism and concealment of mineral deposits) and interned into a labor camp in the Arkhangelsk region, where he died three years later. In 1957, he was rehabilitated posthumously.

M. Bezborodko studied granitoids in Ukraine. His most fundamental study was published in 1935 as a monograph "Petrogenesis and petrogenetic map of the Ukrainian crystalline shield". He believed that all granitoids in the Ukrainian shield have magmatic origin and the diversity of their composition is caused by different processes (including assimilation and hybridisation of magmas). According to his own opinion on the genesis of granitoids, he gave a thorough definition of the terms "dynamohranite", "shystohranite," and "tenitogranite." He proposed the division of the Ukrainian shield territory by structural, mineral and petrogenetic individuality of granites.

Proceedings by Mykola Bezborodko

M. Bezborodko was the first who identified and described 15 types of granites and 6 granodiorites, which had limited territorial extension. According to Bezborodko, territorial separation of the genetic types of granites is the result of magma rooting and gneiss roof remains rooted mass. Today the opposite opinion prevails, that is the granite magma emerged from the initial heterogeneous gneiss crust. Despite this contrast of opinions on the genesis of granites, now Precambrian geologists stratificate the basis of petrographic allocations of specific areas as Bezborodko did.

Bezborodko was a pioneer in petrography, he opened a new kind of granite, which now named enderbites (after Enderby Land). Bezborodko called them "buhites" and divided into katabuhites, mezobuhites, epibuhites (depending on % of SiO_2). He gave the names of rocks "sabarovit" (leykocratic buhite) and "vinnitsit" (garnet-biotite migmatites) discovered in the career of Sabarovskoho near Vinnytsya city, region of the Bug River (fig. 5). He named the monzonites with otropyroxene as "ukrainit." However, these terms are not expanded in the worldwide terminology of communication in order to IIWar.

Mykola Bezborodko's collection in the Geological Museum

The collection of M. Bezborodko from 1930, consisting of 1533 samples, is deposited in the Department of Petrography of the Geological Museum under inventory number 511 (fig. 6).

However, the word "petrography" was scratched off by another ink and added "crystalline rocks and minerals" instead. Such a correction could been done after 1931 when the Geological Museum began to merge with the Institute of Geology. The Geological Museum was established in 1927 as an independent scientific institution with the departments of general geology, mineralogy, petrography, paleontology, and mineralogy. Bezborodko's collection was moved to the Department of Crystalline Rocks that existed at that time at the Institute of Geology. As of today, the collection contains 268 samples: 170 deposited in the archive cabinet of Ukraine's Precambrian geochronology, 88 displayed in open-stands of the expositions of Precambrian geochronology of Ukraine, 9 displayed in the hall of Historical Geology of Ukraine, and 1 is part of the Petrography exposition.

The collection is composed of samples of granites, granodiorites, diorites, migmatites, pegmatite, aplite, rapakivi granite, charnokite, vinnitsyte, monzonites, mariupolites, syenites, gneisses, gneiss xenoliths, and shale xenoliths in crystalline schists. According to the records, Bezborodko's collection includes samples collected mainly in the central regions, while ca. 15 % of samles originated from eastern regions (fig. 7).

Locations conducted fieldwork M. Bezborodko, preserved in the samples collection 511 wide prevalent. Such a large selection of sample collection has one room, because it was listed in the book inventory at one point, and displays the results of years of field research.The petrographic collection of M. Bezborodko in the 1960s was involved into the creation of the museum's exposition dedicated to the stratigraphy of Precambrian Ukraine. Almost one third of the samples from this collection were displayed as representatives stratotype Precambrian geochronological dismembering Ukraine. In the 1960's, some rock samples of the Precambrian basement, which were kept in the collections of the Geological Museum, was dated by a new radio-isotopic method. Of course, in times of Bezborodko radioactive analysis of rocks did not exist. This example illustrates the postulate that collection of rocks should be preserved, regardless of their present value, as they may be useful in the future for other organizations and researchers to solve new problems with new methods. After the rocks have unlimited number of properties, and can carry an incomprehensible today essence of which will be revealed decades later by other technologies and products.

Conclusions

Collections of V. Luchytskyi and M. Bezborodko are a result of long-time work of these great Ukrainian scientists. Despite the 80-year-long history, their collections represent essential historical and geological interest.

Appearance of new methods in geophysics allows receiveing new information due to analysis of templates from describing collections.

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Наукова спадщина Володимира Лучицького та Миколи Безбородька у геологічних колекціях ННПМ. — Решетник, М. М. — У статті представлені результати науково-історичного дослідження створення колекцій гірських порід докембрію видатними вченими початку XX століття. Створення колекцій є частиною біографії, що підкреслюють дуже плідну польову роботу В. Лучицького та М. Безбородькаю. Здійснена класифікація зібраних ними зразків за регіонами та петрографічним складом. Найбільш широко представлені зразки колекції М. Безбородька, на відміну від колекції В. Лучицького, яка здебільшого представлена гранітами рапаківі Житомирщини. Значними для розуміння походження докембрійського фундаменту є книги та карти створені цими вченими, які першими описали Український щит. Їхні наукові концепції є основоположними для сучасних геологічних уявлень про структуру та склад Українського щита. Ці колекції є складовими геохронологічної експозиції — однієї з важливих частин національної геологічної спадщини, що зберігається у Національному науково-природничому музеї НАН України.

Ключові слова: петрографія, структурна геологія, колекції зразків гірських порід, Український щит, гранітоїди.

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