V. I. Vernadsky and national museums of natural science

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Abstract. The article examines the part of the work of the outstanding naturalist Vladimir Vernadsky, which is the least covered in the literature, i.e. scientific and organizational activities in Russian natural science museums. The collected materials make it possible to present the great scientist as a versatile and outstanding person in the field of museums, who actually revived the mineralogical collections. Due to V. Vernadsky input, the mineralogical offices (museums) of St. Petersburg and Moscow Universities as well as Mineralogical Department of the Mineralogical-Geological Museum of the Academy of Sciences turned into research centers, and then into the largest mineralogical museums. The authors consider Vernadsky’s relationship with a number of local museums, his scientist’s assistance in their work as a scientific advisor, donor and protector. A remarkable period in scientist’s biography relates to the time when he established the Academy of Sciences of Ukraine, including his plan for creating National Mineralogical Museum. Another project of Vernadsky, which received partial implementation, is the establishment of Museum for the History of Knowledge under the Commission for the History of Knowledge of the Academy of Sciences of the USSR.

1. Introduction
One of the important aspects of research, organizational and social activities of the outstanding scientist and thinker V.I. Vernadsky was a museum activity. He was well acquainted with the collections of many museums in Russia and abroad, as well as with the organization of museum work from the point of view of its natural and historical aspect. In his numerous trips and travels, the scientist devoted a lot of time to the acquaintance with museums. During the expeditions, he collected mineralogical samples to replenish museum collections, which he constantly mentioned in his diary entries and correspondence. In particular, the following fact is indicative: In the extensive list of literature to the capital work “The Experience of Descriptive Mineralogy” which “got bigger” “owing to the extended mineralogical collection of Moscow University”, out of 838 titles there are 133 catalogs and descriptions of mineralogical museums. In this article, the authors tried to give an idea of the versatile scientific and organizational activities of V.I. Vernadsky in Russian natural science museums.

2. Sources and methods
Russian literature contains a number of detailed studies concerning the long-term work of Vernadsky in the individual museums. It was these publications that served as the starting point for the preparation of this article. In addition to these publications, the authors used articles by Vernadsky, his letters, memoirs of students and colleagues. A special part of the sources was presented by research on the history of individual museums. The collected materials were compared, analyzed and taken together, which made...
It possible to present Vernadsky as a major museum figure.

3. Career of V.I. Vernadsky in museum in 1886-1911: Mineralogical rooms of St. Petersburg and Moscow Universities

Vernadsky’s career in the field of science began in the mineralogical office of St. Petersburg University, where he had been working as a custodian under the leadership of V.V. Dokuchaev from 1886 to 1890. Many major Russian geologists and mineralogists started their career path from a similar position. The young scientist enthusiastically got acquainted with museum collections, with the peculiarities of museum activities gaining necessary experience. He was engaged in the ordering and replenishment of mineralogical collections, their scientific cataloging according to a system developed by him, which three years later became the basis for processing the collections of the mineralogical office of Moscow University. Being in a long trips abroad he wrote to his wife: Knowledge ... of practical mineralogy... I need it in order to be a good custodian of the museum ... [1]. Ten years later, Vernadsky returned to his initial work experience and published a short article about the rare collection of minerals, metals and shells of the Archbishop of Yaroslavl and Rostov Nile, which was bequeathed in 1874 to the mineralogical office of St. Petersburg University. The collection mainly contained samples collected by its owner independently during his ministry in Irkutsk from where he made numerous excursions in Siberia. Vernadsky wrote: For the future mineralogy of Siberia Archbishop Nile managed to save a lot of data that would have been lost forever without him. The mineralogical collection of Archbishop Nile was not compiled by chance, but with love, and has preserved for us precious, now inaccessible monuments of Siberian mineralogy of the first half of the century [2].

The first independent work on the arrangement of the exposition of natural science collections was done by Vernadsky at the World Exhibition in Paris in 1889. V.V. Dokuchaev, who was invited to participate in it by the International Exhibition Committee, could not go and turned to his student (Vernadsky) with a request to take over the organization of the exhibition of the soil collection, which consisted of soil samples, including the famous cube of Voronezh chernozem, soil maps and diagrams, essays on soils of Russia. In time, the exhibition coincided with Vernadsky’s overseas business trip, permission for which was obtained through the efforts of Dokuchaev. Despite not very successful place that the collection occupied at the exhibition, it aroused great interest and was awarded a gold medal, and Dokuchaev was awarded a medal For the Merit in Agriculture [3].

In the fall of 1890, being invited by Professor A.P. Pavlova, Vernadsky moved to Moscow and began teaching at Moscow University. In 1892, he was appointed head of the mineralogical office (museum), which by that time had fallen into decay, which was associated with the temporary relocation of collections to the Rumyantsev Museum. One of the students of Vernadsky, S.P. Popov, wrote: ... a lot of collections were dumped in boxes, labels were confused, I had to rummage through the catalog, use all the surviving records, check the numbers pasted on the samples with the surviving catalogs. Only the enormous erudition of V.I. Vernadsky and his good acquaintance with the museums of Western Europe and in general with the museum business made it possible to bring the work to a successful end [4].

One of the results of the first years of work was precious collection of Freyesleben restoration on the basis of the discovered catalogs. It contained more than 1,000 samples collected over 30 years by the mining engineer I.K. Freyesleben, a student of the famous geologist and mineralogist A.G. Werner. The collection was acquired in 1823 by the Natural History Museum of Moscow University initiated by G.I. Fischer von Waldheim, who in 1827 and 1830 prepared catalogs of mineralogical and geological collections. Another catalog, which included a description of the Freyesleben collection and was used in its analysis was prepared by G.E. Shchurovsky and published in 1858 [5]. The authors of a detailed study on the work of Vernadsky in the Mineralogical Office of the University wrote: V.I. Vernadsky organized work in the Mineralogical Office in two directions: cataloging and systematization of collections and their replenishment [6]. By 1898, the compilation of card catalogs of the mineralogical collection was basically completed: inventory, subject for minerals and geographic for deposits, collections of crystals and meteorites were separated into separate groups, the scientific catalogs were published. When forming a systematic collection, minerals were arranged according to the system
proposed by the American scientist J.D. Dana, whom Vernadsky could meet on his foreign business trips and get a more detailed practical understanding while working at St. Petersburg University.

From 1894 to 1911 the main collection of the Office almost doubled and consisted of 20 thousand issues, becoming one of the largest in Europe [7]. The the museum collection was growing bigger due to numerous tours and trips with students around the Moscow Region, Siberia, the Urals, the Caucasus and the Crimea, which were introduced into the study program by Vernadsky (from 1896 to 1911, 65 mineralogical tours were organized) from where a huge number of samples were brought. Besides, many samples were gifts, exchanges, purchase of collections from individuals. An important milestone in the history of the Mineralogical Office was the receipt of the richest collection of minerals from the Rumyantsev Museum in 1900 by Vernadsky, which was left without a professional custodian. According to the scientist, this was one of the best collections for its time; many of its samples from dried up deposits have become unique. Vernadsky played an important role in the decision to construct a building for the Mineralogical and Geological Institutes of the University with premises for museums. Construction began after the scientist left the University. Currently this building houses the Geological Museum named after V.I. Vernadsky, Russian Academy of Sciences, which contains most of the collection of the Museum of Moscow University.

Being a good manager and organizer Vernadsky established two more educational mineralogical offices: the Moscow Higher Courses for Women, which included 900 samples, a library of 130 different editions on mineralogy and crystallography, as well as a set of demonstration models [8] and Tavria University. The latter he established jointly with V.A. Obruchev and N.I. Andrusov during a short period of residence in Crimea. After returning to Petrograd, Vernadsky repeatedly sent samples of minerals there.

4. Other activities in museum: 1906-1918
The scientist had to re-organize the most difficult work, i.e. to restore another mineralogical collection after being elected in 1906 as an adjunct of the Petersburg Academy of Sciences. Vernadsky headed the Mineralogical Department of the Geological Museum named after Peter the Great, Academy of Sciences, whose collections were in a fragmented state, and together with his staff and students began to create a new museum. Vernadsky was able to become more actively involved in the work of the museum after leaving Moscow University in 1911 and finally moving to St. Petersburg. By 1912, the museum’s mineralogical collection received the status of an independent department, which was reflected in the name - the museum became known as the Geological and Mineralogical Museum named after Peter the Great. Using the Moscow experience, the scientist organized work to identify his historical collections. Since 1907, inventory books were kept in the mineralogical department, in which the names of minerals, their place of origin, and specific features were recorded. 'These inventory books ... for different collections of the Museum are the basis for the accounting of all mineralogical material that previously existed in the form of fragments of various collections’ wrote V.I. Kryzhanovskiy the closest museum assistant and talented student of Vernadsky [9]. It was he who under the guidance of his senior colleague was involved in the analysis, definition and restoration of the collection’s labels. Together they developed a system for recording and accounting for collections, compiled inventory and card catalogs, and selected a reference library. In the course of processing, a large systematic collection of minerals and a collection of deposits were identified, where the most complete set of minerals from individual deposits was selected, as well as a collection of crystals with the selection of material for the phenomena of growth, defects, crystal intergrowths, etc., a collection of pseudomorphs and forms mineral aggregates. Very soon, the museum had become a research institute.

Vernadsky paid considerable attention to the replenishment of the collection of the department headed by him. One of the sources was the expeditions organized to the Urals and the Caucasus, Siberia and the Baikal Region, which, along with important scientific results, significantly replenished the museum’s collections. Gifts and purchases were another source of income. Thus, in 1909, the collection of the Polish exile, gold miner and collector of minerals K.A. Shishkovsky, whom Vernadsky met during his first mineralogical tour with students of Moscow University to the Urals. The collection consisted
of 100 samples, mainly of the Ural minerals. In 1912, the collection of the mining engineer I. N. Kryzhanovsky was acquired consisting of more than 4500 samples of minerals, mainly from the deposits of the Urals and Siberia. The collection was of exceptional scientific importance. Among the major acquisitions is the collection of Transbaikalia minerals donated to the museum by S.D. Kuznetsov. In 1910, it became known about the upcoming sale of a unique collection of famous public figure and connoisseur of minerals P.A. Kochubei, which was repeatedly used by Russian scientists in mineralogical research. After two years of difficult negotiations, thanks to the persistence of Vernadsky and Fersman, the collection was acquired for the Academy of Sciences. Due to its high cost, a special support of the State Duma was required.

Vernadsky’s credibility in the establishment of museums is evidenced by such facts as him becoming a member of the Agronomic Commission for the establishment of Museum of Applied Knowledge in Moscow, of Special Meeting to develop a bill on the All-Russian National Museum in commemoration of the 300th anniversary of the reign of the House of Romanov Museum, and with the outbreak of the First World War he was included to the Commission on the Protection of Historical Monuments and Scientific Collections in the Area of Military Operations [10]. It is also worth mentioning the scientist’s interest in history of the first museum in Russia. The history of Peter the Great Museum of Anthropology and Ethnography (the Kunstkamera) is described in the section of Essays on the History of Natural Science in Russia, i.e. the largest historical and scientific work of the scientist.

5. Cooperation with regional museums

V. Vernadsky maintained long-term scientific contacts with the museum in Poltava, where materials related to his work in the Poltava region were stored: a collection of 567 soil samples collected by him in the Kremenchug district of the Poltava province during Dokuchaev’s soil expeditions in 1890-1891, a map of the Kremenchug district marked with the archaeological objects and expedited to the scientists in the year of the opening of the museum, as well as the samples of marl, loess, boulder clays, which were the result of geological study of the Upper Paleolithic site in Gontsy [11]. In 1898, Vernadsky donated to the museum the mineralogical collections prepared at Moscow University. In 1918, Vernadsky organized the Poltava Society of Nature Lovers at the museum, developing its charter and program, with a special point on organizing exhibitions and museums. Over the years, he corresponded with the museum staff. In 1926, during the dramatic period of the museum’s existence, when the decision was made to transform it from a research into a political and educational one, V. Vernadsky addressed to the leaders of the All-Ukrainian Academy of Sciences, proving the uniqueness of the museum [11].

The scientist provided assistance to regional museums. He was engaged in the mineralogical collection design of the Museum of the Tavricheske zemstvo (county), and, in 1920, he headed the Committee of this Museum. He sent books as a gift for the Perm Scientific and Industrial Museum, helped to preserve the collections of the Yalta Natural History Museum during the occupation of the city by Wrangel’s troops.

6. Museum Projects for Ukrainian Academy of Sciences

The role of V. Vernadsky regarding the establishment of the Ukrainian Academy of Sciences is well known [12]. Preparing the project of research institutions at the Ukrainian Academy of Sciences, V. Vernadsky included several museums: National Museum including 8 departments, i.e. geological, mineralogical, prehistoric archeological, ethnographic, botanical, zoological, anthropological, paleontological, as well as a historical museum like museums in Nuremberg or Munich [13]. The scientist devoted a separate article to the plan aimed at the establishment of the National Mineralogical Museum at the Ukrainian Academy of Sciences, substantiating its necessity, developing a concept and outlining tasks. The museum was supposed to include a mineralogical collection and a research institute. The museum collection itself should have been completed in three main areas - minerals of Ukraine with the department of applied mineralogy, minerals of the world and a collection of meteorites [13].
7. **Leningrad period: exhibition in memory of K.M. Baer**

Another important project of the scientist was the Museum for the History of Knowledge, which, unfortunately, was unfinished [14]. Preparations for its creation began with an exhibition in memory of K.M. Baer, the first monographic historical and scientific exhibition. Its main initiator and organizer was V. Vernadsky. He proposed to prepare, due to the limited time and funds, a small exhibition “K.M. Baer and the Academy of his time”. In a short period from mid-October to December 1926, about 20 different institutions were examined: the Archives of the USSR Academy of Sciences, academic institutes, scientific societies, universities, museums, libraries of the two capitals. There were collected manuscripts, published works, family documents, memorials, natural science collections of K.M. Baer. Besides, they managed to publish a small guide.

8. **Conclusion**

One of the last activities of the outstanding scientist related to museum was the organization of transfer of the meteorite collection of recognized specialist in mineralogy and meteorology P.L. Drivert to the Committee on Meteorites of the USSR Academy of Sciences, for which Vernadsky hoped to pay from the funds he received from the Stalin Prize, which was caused by the very difficult material and physical state of his colleague.

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