

NEW EXHIBITION AT THE FERSMAN MINERALOGICAL MUSEUM “REMARKABLE MINERALS OF THE KhibINY AND LOVOZERO ALKALINE MASSIFS (KOLA PENINSULA)”

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2. **Epididymite** $\text{Na}_2\text{Be}_2\text{Si}_6\text{O}_{15} \cdot \text{H}_2\text{O}$. Complete pseudomorph of white massive **epididymite** after cluster of well-formed crystals of chkalovite $\text{Na}_2\text{BeSi}_2\text{O}_6$. The discovery of a new mineral in the Lovozero massif in 1936 which became known as chkalovite, followed by a find of a large amount of epididymite (early 1950s) have shown beryllium's ability to accumulate significantly not only in derivatives of granites but also in the massifs of agpaitic nepheline syenites. It also prompted geologists to search for industrial deposits of this rare metal in relation to the alkaline rocks, which was a success in many regions around the world. This specimen, with its magnificent pseudomorph which well preserves the shape of large chkalovite crystals, demonstrates the change in beryllium mineral forms during a transition from a "purely" pegmatite process to a low-temperature hydrothermal one. 15 x 12 cm. Mount Karnasurt, Lovozero massif. FMM No. 83333, M.F. Korobitsyn, 1985.

Specimens: Fersman Mineralogical Museum (FMM) RAS.

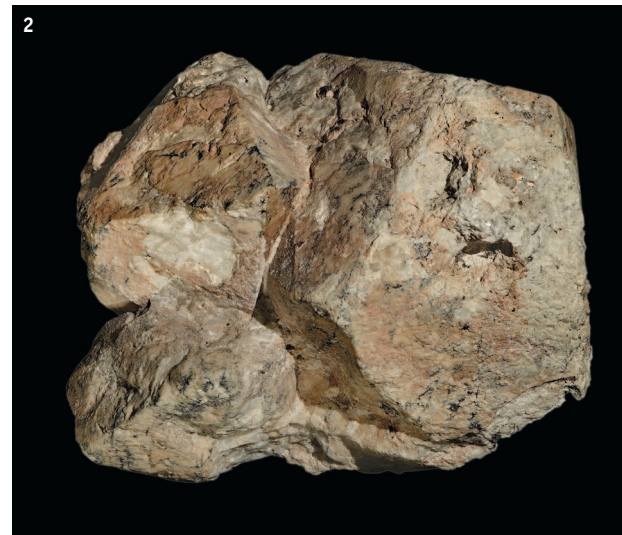
Specimens: Kola Peninsula, Russia.

Photo: Michael B. Leybov.

1. Display case No. 90 with new exposition “Remarkable Minerals of the Khibiny and Lovozero Alkaline Massifs (Kola Peninsula)” in the Main Fersman Mineralogical Museum Hall, Moscow, Russia.

At the end of 2020, the authors of this article launched a new exhibition at the Fersman Mineralogical Museum, Russian Academy of Sciences (RAS): “Remarkable minerals of the Khibiny and Lovozero alkaline massifs (Kola Peninsula).” This compact exhibition is located at display case No. 90 in the first section of the Main Hall of the museum and is part of a series of showcases devoted to the processes of mineral formation. By now, the Khibiny and Lovozero alkaline massifs at Kola Peninsula are well-known to most of *Mineralogical Almanac*'s readers. Indeed, they are some of the most outstanding and famous mineralogical sites in the world. With the 1327 km² of Khibiny and 650 km² of Lovozero areas, these are the largest intrusions of agpaitic rock on Earth. Located near to one another, these two alkaline giants are practically identical in terms of their geological age, which is around 360 million years old. Some researchers see them as a single Khibiny-Lovozero alkaline complex, despite some substantial differences in their structure, petrology and geochemistry.

These massifs host supergiant mineral deposits which have been in active exploration for almost a century and are some of the most economically significant not only for the Murmansk oblast but also for the Russian Arctic region in general. Khibiny hosts apatite deposits that have no equivalents anywhere else in the world, both in terms of their genesis and resources. Meanwhile, apatite is the main source of phosphate raw materials in Russia. Lovozero is not far behind, with its practically limitless — by



2. Caption on page 4.

3. **Natrolite** $\text{Na}_2(\text{Al}_2\text{Si}_3\text{O}_{10}) \cdot 2\text{H}_2\text{O}$. Separate prismatic crystals with pyramidal terminations. Natrolite crystals of this morphological type, size and perfect formation can only be found in the peralkaline pegmatites of the Khibiny-Lovozero complex. Left crystal: 5 x 4 cm, right crystal: 8 x 3.3 cm. Vuonnemiok River valley, Khibiny massif. FMM No. 85921 and No. 85942, collected by the museum expedition: A.B. Nikiforov and Yu.S. Kobayashv, 1986.

4. **Villiaumite** NaF. A transparent orange-red cleavage block. Villiaumite can form large transparent single crystals (individuals). With a crystal structure of the NaCl type, it can chip into the same planes of perfect cleavage as halite, with the formation of blocks in the shape of a rectangular parallelepiped. 4 x 3.5 cm. Koashva open pit, Mount Koashva, Khibiny massif. FMM No. 89837, acquisition of 1999.



¹ The inconsistency in numbers regarding the minerals first discovered in Khibiny (127) and Lovozero (113) with the arithmetical total number (221) of those discovered in the Khibiny-Lovozero complex is due to the fact that the first descriptions of 19 new minerals were carried out using material from both massifs.



human standards — complex deposits of such rare metals as niobium, tantalum and rare earth elements, with loparite as the ore mineral. Again, there is no equivalent to it in the world, while the Lovozero Mining Company is today the only active manufacturing plant in Russia to extract these metals, which are so crucial for modern industry.

The Khibiny-Lovozero alkaline complex is, without doubt, world record breaking when it comes to general mineral formation, but also the number of new minerals discovered here for the first time. During the entire history of systematic research, which goes back to 1887, more than 700 (!) minerals were recorded here, which forms 12% of the entire known mineral diversity today. More than half of these include rare species which are endemic to alkaline rocks. In 2020, the total number of new minerals described in the Khibiny-Lovozero complex for the first time was 221. It is worth noting that even when taken separately each of these alkaline massifs is still included in the top three world record breaking localities for new mineral discovery. Khibiny runs second with its 127 new mineral species, only slightly behind the Tolbachik volcano in Kamchatka (130 new minerals), while Lovozero comes third with 113 new minerals discovered¹.

It is worth noting the significant contribution of the Mineralogical Museum (now named after A.E. Fersman) of the USSR Academy of Sciences (now RAS) in studying the Khibiny-Lovozero complex and in the discovery of mineral deposits here. The names of two famous scientists that worked at the Museum should be etched in stone: Alexander Evgenievich Fersman, the initiator and leader of the Academy of Sciences' very first expeditions to Khibiny and Lovozero in 1920–1924, the organiser of all mineralogical, geochemical and petrographic research in the region between the 1920s–1930s as well as a tireless explorer of Kola; and Aleksandr Nikolaevich Labuntsov, the pioneer discoverer of the industrial deposits of Khibiny apatite.

From the 1920s to today, in what is over a century of the academic research into the Khibiny-Lovozero complex, the Mineralogical Museum's staff has contributed and continues to contribute in a significant way towards the study of