GARNET FROM WEST KEIVY (KOLA PENINSULA, RUSSIA)

Yury L. Voitekhovsky,
Geological Institute, Kola Scientific Centre, Russian Academy of Sciences,
Kola Branch, Russian Mineralogical Society,
woyt@geoksc.apatity.ru

Garnets from West Keivy are a famous curiosity of the Kola Peninsula. Gem-quality garnet is unknown here, but garnet crystals sizes are the largest in the Former Soviet Union. They are well-faced dark red, brown-red, and cherry-red crystals of almandine as dodecahedra and trisoctahedra, and are welcome additions to any mineralogical collection. Army of amateurs and professionals annually rush here, just for fun or for business, walking or with prime movers, west from the Lovozero village and southwest through the lamentably known Mar'yok swamp, from all regions of Russia, and different countries of whole world. On the one hand, it creates serious problems with Nature treasures preservation. On the other hand, how can true lovers of Kola nature be denounced? Visit one time and you will understand...

A History of the Geological Study of West Keivy

In 1928, O.A. Vorob'eva found schist in West Keivy. At the same time, deposits of abrasive garnet were discovered on Takhlituaiv Mountain (1928) by O.A. Vorob'eva, and Makzapakhk (Makzabak) Moutain (1931) by V.I. Vlodavets, Berezovaya-1 (Kruglaya) and Berezovaya-2 Mountains, and southwest of Rovozero Lake (1933) by M.D. Vagapova and T.D. Nikol'skaya. Later L.Ya. Kharitonov estimated their reserves.

Since 1931, V.I. Vlodavets, T.L. Nikol'skaya, M.D. Vagapova, L.Ya. Kharitonov, K.O. Ktatz and A.V. Perevozhikov carried out a geological survey and prospected the mineral resources. As a result, general information about the geological structure of the district was obtained, the originality of the schist was documented, and mineral deposits were discovered.

In 1932, T.L. Nikol'skaya found kyanite schist east of West Keivy. Later, P.V. Sokolov and L.Ya. Kaharitonov studied the whole Keivy series and established that kyanite schist extends along Central and Eastern Keivy. That study was managed by P.A. Borisov, who established the great economic importance of the Keivy kyanite deposits.

After the World War II, the researchers of the Kola Branch, Academy of Sciences of the USSR (present Kola Scientific Centre, Russian Academy of Sciences), under the heading of A.A. Chumakov, studied alkali granites and their effect upon the Keivy gneiss that was previously reported by O.A. Vorob'eva, T.L. Nikol'skaya, and M.D. Vagapova. In 1954–1956, S.N. Suslova in her candidate dissertation under the supervision of I.V. Bel'kov continued the study. The systematic investigation of the West Keivy schists in general, and in particular the garnet-bearing schist, was carried out thereafter under the heading of N.A. Eliseev and I.V. Bel'kov (1957, 1963).

1. Geological scheme of West Keivy (Suslova, 1960).

Legend:

– Dykes of (a) syenite and (b) dolerite and gabbro-dolerite;

– Alkaline granite;

– Amphibolites and amphibolite-mandelstein;

– Muscovite quartzite and silimanite-staurolite and kyanite-staurolite schists;

– Black kyanite fibrous and paramorphic schists (productive horizon);

– Staurolite-kyanite schists;

– Garnet-mica schists with (a) sillimanite and (b) stuaurolite-garnet schists;

– Alkaline gneiss (metasomatic rock);

– Garnet-biotite and biotite gneisses;

– Gnessic granites and granodiorites;

– (a) Trachitoid texture and (b) foliation;

–Boundarries (a) established and (b) probable;

– Areas of schists sequence:

I – Slyudyanaya (Mica) Mt. and Hills,

II – SW shore of the Rovozero Lake,

III – Bely Bychok Mt.,

IV – Kul'iok River,

V – Makzapakhk,

VI – Takhlintuaiv Mt.,

VII – Pessar'i'ok River.

Brief Geology of West Keivy

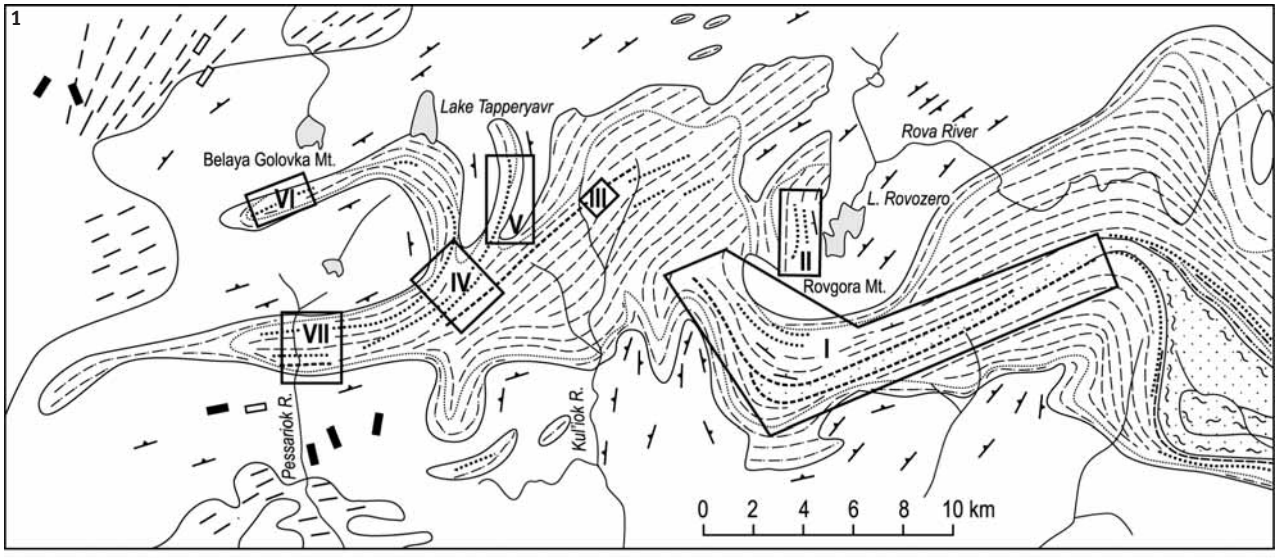
The district located in the central part of the Kola Peninsula is the West Keivy Upland. It comprises metamorphic rocks which extend as zone for 200 km from WNW to ESW (fig 1). In Central and Eastern Keivy, the metamorphic rocks are bounded by Archean granitic gneiss. In the western upland, the zone of metamorphic rocks converges. In the west, north, and south, this zone is surrounded by alkali granite that composes a pluton emplaced at the boundary between these metamorphic rocks and Archean granitic gneiss. The tectonic setting of alkali granites and metamorphic rocks is the same.

The Keivy series comprises gneiss and concordantly overlapping schists, which vary in their petrography. West Keivy is dominated by gneiss, in which schists occur as narrow discontinuous bands. Gneiss and schists host concordant and discordant bodies of metamafic rocks, which are older than the alkali granite. The gneiss, schists, and metamafic rocks are folded in the united structure.

Tectonically, West Keivy is a part of the Keivy synclinorium, whose axial plane dips steeply northward or northeasternward. The axis of the synclinorium is raised westward against the background of local plunges and rises; as a result the structure is closed. The synclinorium is complicated by near-southerly trending minor folds.

Geology, Genesis, and Reserves of Garnet Deposits

Various garnet deposits of West Keivy are similar in both geology and reserves. For example, the Takhlintuaiv deposit is located on the top of a gentle hill that is composed of garnet-mica schist (fig. 2). In comparison with the other deposit of the district, this deposit contains the most transparent and well-faced crystals of garnet, ranging from 3 to 6 cm in size, less frequently reaching 10 cm (fig. 4). The most garnet-rich zone extends for 500 m with a width 20 m. The grade of garnet in the rock is not less than 10% by volume. The garnet is classified as almandine in chemical composition with the content of the almandine end-member about 80%. According to V.I. Vlodavets, the probable reserves of the deposit are 150,000 tons of garnet.



4. **Almandine** crystals in the schists, Takhlintuaiv Mountain. Bel'kov Museum of Geology and Mineralogy, Geological Institute, Kola Science Center, Russian Academy of Sciences, Apatity. Photo: Yu.L. Voitekhovsky, 2010.

5. Two large rhombododecahendron **almandine** crystals in mica schists.
Crystal size: left – 19 cm, right 17 cm.
Makzapakhk deposit, West Keivy.
Specimen: Yu.L. Voitekhovsky. Photo: Michael B. Leybov.

6. The zone enriched in almandine at the Berezovaya-2 Mountain. Photo: Yu.L. Voitekhovsky, 2010.

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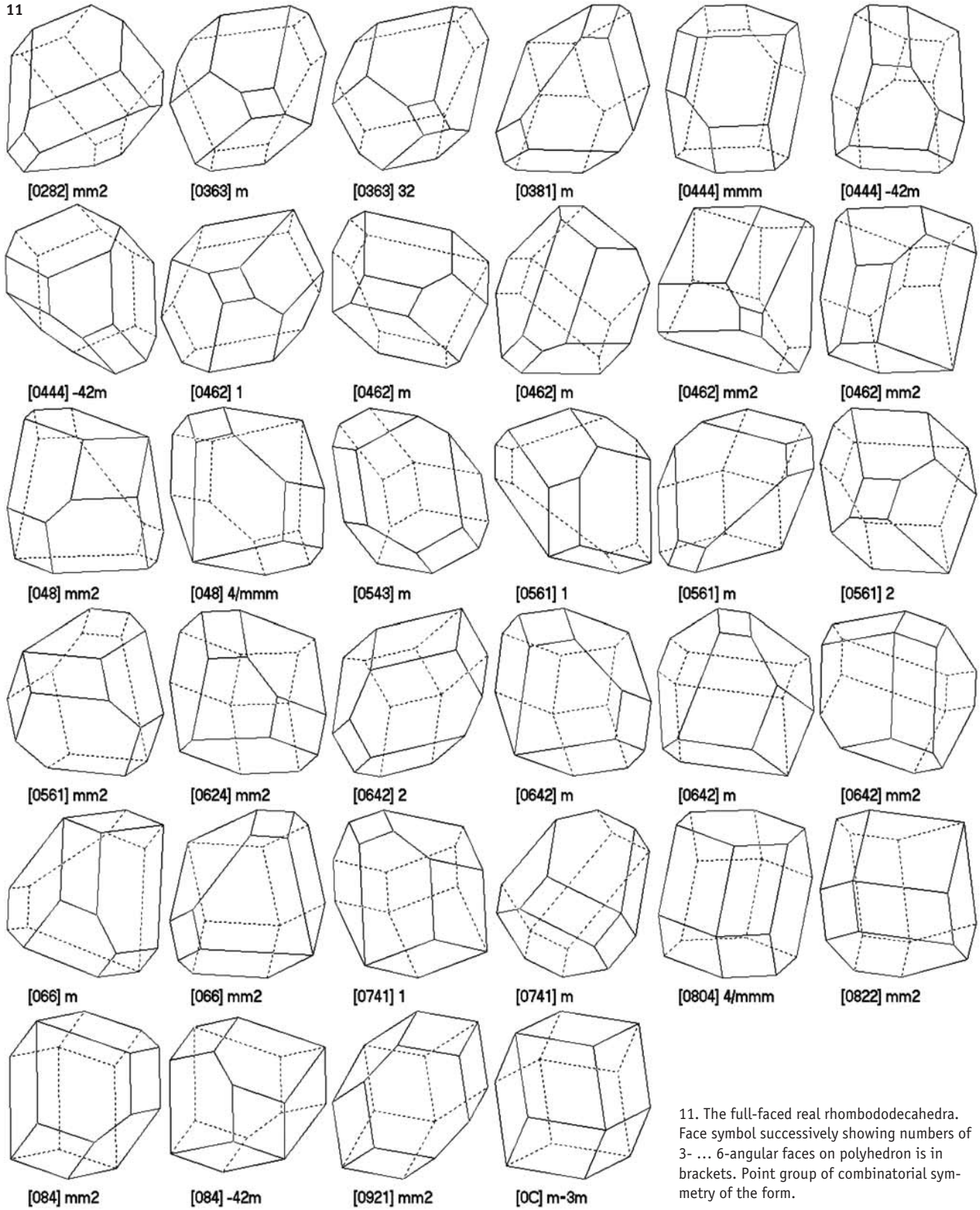

11. The full-faced real rhombododecahedra. Face symbol successively showing numbers of 3- ... 6-angular faces on polyhedron is in brackets. Point group of combinatorial symmetry of the form.