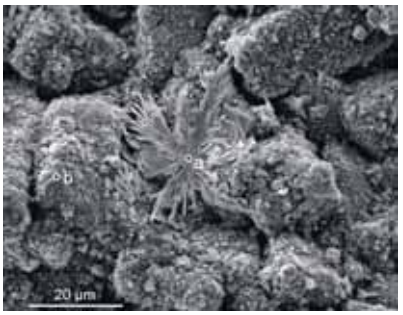


173. **Barite** split skeletal crystal (a) on **romaneshite** (b). Mednorudyanskoe deposit. Specimen: V.A. and V.I. Popovs #1179, collected by N.I. Kozin.
SEM-photo: I.A. Blinov.

growth of barite with face splitting leads to the formation of blades *(Fig. 173)*. Separate barite plates and their intergrowths form a rare powder on the faces of pyrolusite crystals. A Sr-bearing variety of the mineral was also encountered.

Gypsum is not rare for karst sediments of the Mednorudyanskoe deposit. However its earthy aggregates did not attract any notice because of fine grains and unattractive form. Gypsum was mentioned for the first time by Soloviev (1953). Gypsum from the Kozin collection is 2 cm grains among supergene minerals with limonite geodes and tiny crystals on calcite and on the crust of dark-green chalcosiderite and bluish-pink spherulites of strengite. Its EDX spectrum shows a small portion of Ba in addition to the major constituents (Ca and S).

Halotrichite occurs as white and colourless micro-crystalline clusters up—to 2-10 mm in size, as well as thin films on malachite, azurite and goethite aggregates. Halotrichite is an ephemeral mineral which can be easily washed away by water.

Chalcanthite (copper sulphate) was identified in the Mednorudyanskoe deposit by Shchurovsky (1841). We have found it as fine bluish micro-crystalline crusts on karst sandstone.

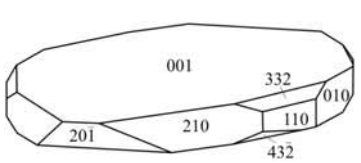
Chalcanthite is dissolved in water. It has been confirmed by X-ray diffraction with the strongest reflections (d, Å; *I*): 4.72 (100); 3.695 (94); 3.975 (83); 2.746 (42); 2.820 (37); 2.663 (36); 5.463 (35); 3.298 (32).

Phosphates

Pseudomalachite, reichenbachite, turquoise, chalcosiderite and fluorapatite are the most common phosphates at the Mednorudyanskoe deposit. Rare at this deposit, strengite, sampleite, vivianite, cornetite, and cacoxenite are of interest.

Pseudomalachite and **reichenbachite** are common phosphates in the Mednorudyanskoe oxidation zone. Pseudomalachite was previously mentioned as *"phosphorus-acidic copper," "dehydrate," "tagilite," "phosphorus-chalcite"* or *"elite"* (Shcheglov, 1824; Hermann, 1846, 1858; Nordenscheld, 1857; Sumin, Lasheva, 1952). Overall, the mid-19th century researchers have identified an abundance and diversity of copper phosphates in the Nizhniy Tagil copper mines (Nordenscheld, 1857; Hermann, 1858). The number of pseudomalachite and malachite specimens from the collection we studied is comparable. However, the overall volume of pseudomalachite is smaller. Reichenbachite is rarer (or is considered as such due to the difficulty of distinguishing it from pseudomalachite).

174. **Pseudomalachite** crystal. Mednorudyanskoe deposit. Drawing: V.A. Popov after SEM-photo



Pseudomalachite specimens at the Mednorudyanskoe deposit are some of the best in the world. Beautiful bluish green and greenish blue nodules and crusts up to 10—15 cm in size were found here. These are aggregates of small nodules, zoned spherulites and crusts on schists, brown spar, goethite and Mn oxides *(Figs. 176, 179, 192, 193)*. Breccias of zoned crusts are common. Thin layers of libethenite, malachite, opal or clay are observed within the cavities on crusts and nodules of pseudomalachite. Zones of malachite, turquoise, chrysocolla, opal and dark brown inclusions of hydrous iron phosphate are also common in pseudomalachite crusts.

175. **Reichenbachite**. 6 x 5cm. Mednorudyanskoe deposit. Specimen: I.V. Pekov #4579. Photo: M.B. Leybov.

176. **Pseudomalachite** crust and nodules fron limonite geode.2.1 cm. Mednorudyanskoe deposit. Specimen: V.A. and V.I. Popovs #702, collected by N.I. Kozin. Photo: M.B. Leybov.