

163. **Siderite** crusts on goethite nodules and cuprite grains overgrown with malachite. 2.6 cm. Mednorudyanskoe deposit. Specimen: V.A. and V.I. Popovs #355, collected by N.I. Kozin. Photo: V.A. Popov.

Ankerite (“brown spar”) was mentioned by Eremeev (1880) as part of the pyrite-chalcopyrite aggregate from the Mednorudyanskoe ore deposit (presumably as pseudomorphs after magnetite octahedra with step faces). He later reported brown spar within pseudomorphs and the relics of the original crystal were in fact “copper sulfide” (Eremeev, 1886). We have not seen ankerite.

Magnesite was mentioned by Eremeev (1880) as “bitter spar” in his visual study of the Mednorudyanskoe ore deposit aggregates. The mineral has not been noted since.

Rhodochrosite was mentioned by Vasiliev (1922) in the context of the geological research of the Nizhny Tagil mining area. Its presence has not been confirmed since, but it remains likely, judging by the large amount of supergene manganese oxides and hydroxides in some areas of karst zones at the deposit.

Siderite. It is probable that siderite was identified as brown spar along with ankerite by Eremeev and other researchers during a visual examination of Mednorudyanskoe samples. Siderite is mentioned in the list of minerals of Soloviev (1953), but it has not been described. We have presumably identified this carbonate amongst supergene minerals from polymineral nodules (Fig. 163) with goethite, opal, clay and other minerals, based on its X-ray diffraction pattern and reaction with HCl.

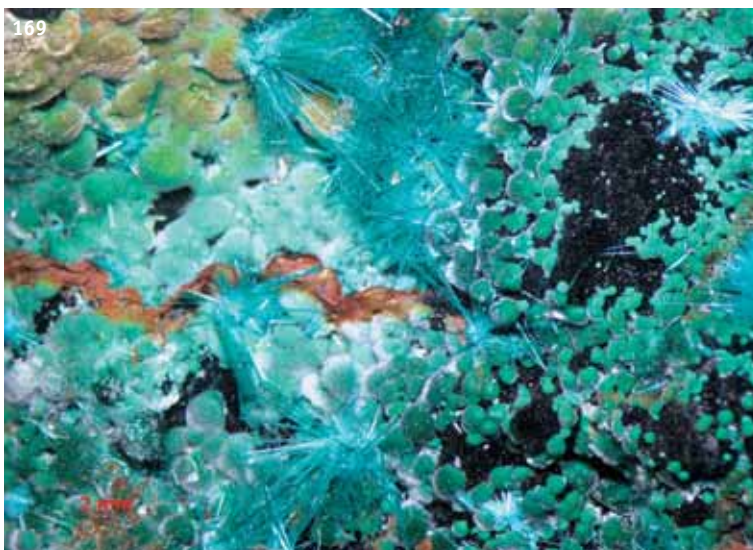
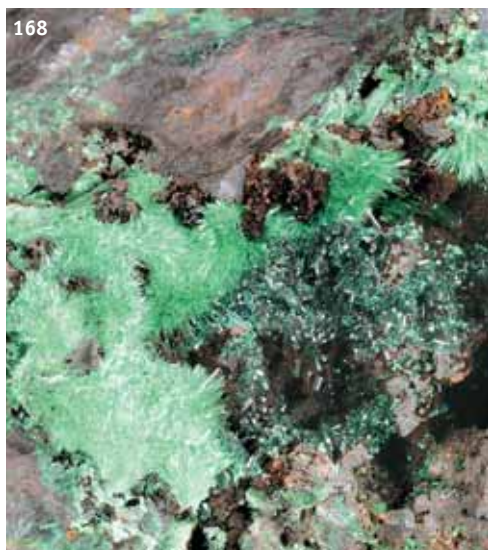
Sulphates

Brochantite is the most renowned among the Mednorudyanskoe sulphates, whereas the others are rare and lesser known.

Brochantite was identified as a new mineral by Levi (1824) in samples from the Mednorudyanskoe deposit. Soloviev (1953) reported it in the upper level of the deposit. Brochantite is represented in the collection by emerald-green and dark-green bladed, thick-tabular or elongated prismatic crystals up to 5–7 mm in size, associated with cuprite from the brown spar cavities and split and radial aggregates in the later bluish-green acicular crystals (Figs. 164–169). Split and elongated along the [001] axis crystals are more common, but these are thin

164. **Brochantite** with old label. 6 x 3.4 cm. Mednorudyanskoe deposit. Fersman Mineralogical Museum RAS #32917, L.I. Kryzhanovsky in 1928. Photo: M.B. Leybov.





165. Acicular **brochantite** in limonite geode. Image width: 2.5 cm. Mednorudnyanskoe deposit.

Specimen: V.A. and V.I. Popovs #1298, collected by N.I. Kozin. Photo: V.A. Popov.

166. Radial **brochantite** on cuprite octahedrons. Image width: 0.5 cm.

Specimen: V.A. and V.I. Popovs, collected by N.I. Kozin. Photo: V.A. Popov.

167. **Brochantite**. Image size 4 × 5 cm. Specimen: N.I. Kozin #1k. Photo: M.B. Leybov.

168. **Brochantite**. Image size 2.4 × 3.6 cm. Nizhny Tagil "Gornozavodkoi Ural" Reserve Museum. Photo: M.B. Leybov.

169. **Brochantite** (bluish green acicular crystals) associated with green malachite spherulites and black goethite. Minerals diagnosed by X-ray method. Mednorudnyanskoe deposit. Specimen and photo: A.V. Kasatkin.

and practically unsuitable for measurements. The forms of larger crystals were determined with a goniometer (Rose, 1842; Ereemeev, 1894). Crystals, similar to those described by Rose and Ereemeev, are predominant among the crystals we have seen (Fig. 170).

Early brochantite is tabular along {100} and elongated along [001] crystals with {100}, {430}, {102} faces and twins with an intergrowth surface (100) in the Kozin collection. Greenish blue nodular and fine-radial brochantite aggregates overgrow goethite, cuprite, pseudomalachite or malachite (Figs. 166–167).

The X-ray diffraction patterns of the various samples are virtually the same, with the strongest reflections (d , Å; I): 3.907 (100); 6.386 (88); 2.679 (73); 3.191 (61); 5.364 (59); 2.601 (19); 2.519 (18); 2.267 (18) (analyst Khvorov).

Brochantite crystals associated with cuprite, goethite, malachite, chalcociderite, pseudomalachite and other minerals of the Mednorudnyanskoe karst sediments are a mineralogical rarity. Many collectors would be overjoyed at such finds. Semenov (1987) quoted N.A. Belogolovyi, who escorted Duke Nikolai Maksimilianovich Leichtenberg, president of the St. Petersburg Mineralogical Society, on how delighted the Duke was when a remarkable brochantite collection was given to him.