

77. **Cuprite** crystals of Mednorudnyanskoe deposit.  
Drawing: V.A. Popov,  
(a-c) after Rose, 1842,  
(d-e) after Ponomarev, Erokhin, 2006.

78. Micrograined **cuprite** (red) with malachite in martite aggregate. 5.6 cm. Mednorudnyanskoe deposit.  
Specimen: V.A. and V.I. Popovs #44, collected by N.I. Kozin. Photo: V.A. Popov.

shows a presumed djurleite forming a partial pseudomorph after sphalerite (Fig. 76). The chemical composition of djurleite is, wt.%: 77.99 Cu, 0.45 Fe, 20.63 S; total 99.07 (analyst I.A. Blinov). The empirical formula is  $\text{Cu}_{30.52}\text{Fe}_{0.20}\text{S}_{16}$ .

**Cobaltite** occurs as a group of small white isotropic inclusions up to 1–7 microns in chalcopyrite. The chemical composition of cobaltite is, wt.%: 30–32 Co, 33–34 As, 6–8 Fe, 23–24 S, (analyst V.A. Kotlyarov). Another part of the specimen demonstrates cobalt-bearing pyrite intergrown with chalcopyrite.

**Hessite** has been identified by Blinov in 2014 from a polished section of a chalcopyrite-magnetite aggregate with pyrite, sphalerite, calcite, cobaltite and gold. The complexly shaped hessite grain, up to 2 microns in size, contacts pyrite and semi-dissolved calcite. The mineral was diagnosed for Ag and Te in its EDX spectrum.

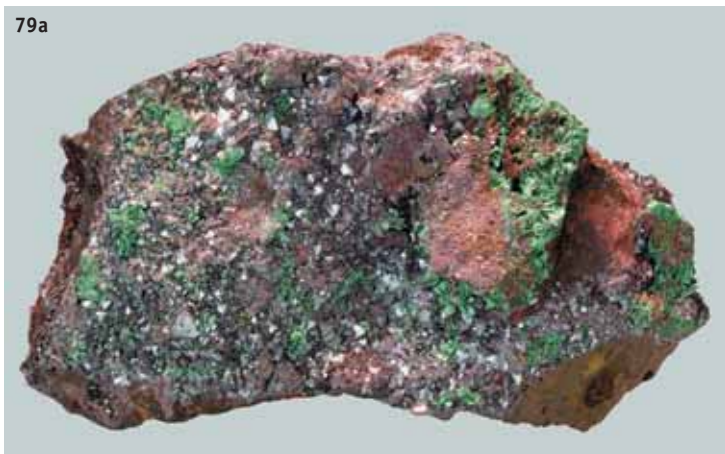
**Galena** is given in the general list of the minerals for the deposit (Soloviev, 1953), but we did not find it in our specimens.

## Oxides and Hydroxides

Copper and iron ore minerals such as cuprite, magnetite, hematite and goethite (limonite) are the most abundant of the deposit's oxides and hydroxides. Delafossite, which was discovered for the first time within the oxidized ore of the Mednorudnyanskoe deposit, is less common than manganese minerals. Quartz and opal are predominant non-metallic oxides.

**Cuprite** is the key commercial mineral of the copper ore of the Mednorudnyanskoe oxidation zone. It was mentioned here for the first time as “red copper ore” (Engelgardt, 1829) and then as “copper suboxide” (Menge,





79. **Cuprite** and **malachite** in limonite crack. (a) specimen general view, 6 cm; (b) fragment, image size 1.8 x 2 cm. Mednorudyanskoe deposit. Specimen: V.A. and V.I. Popovs #282, collected by N.I. Kozin. Photo: M.B. Leybov.

80. **Cuprite** octahedron (0.3 cm) with minor rhombic dodecahedron, tetragontrioctahedron and cube. Mednorudyanskoe deposit. Specimen and photo: D.A. Kleimenov.

81. **Cuprite**. Image width: 3 cm, specimen 7 x 6 cm. Mednorudyanskoe deposit. Natural science museum of Ilmeny State Mineralogical Preserve #5962. Photo: M.B. Leybov.

82. **Cuprite** cubic skeletal crystals. Mednorudyanskoe deposit. Specimen and photo: A.V. Kasatkin.