NEW MINERAL NAMES*

MICHAEL FLEISCHER, J. A. MANDARINO AND ADOLF PABST

Admontite*


Admontite is a magnesium borate found in the gypsum deposit of Schildmauer near Admont in Styria (Austria) in association with gypsum, anhydrite, hexahydrite, loewite, quartz, and pyrite. Chemical analysis gave MgO 10.20%, B2O3 54.50% (by difference), H2O 35.30%, corresponding closely to 2MgO·B2O3·15H2O. The mineral occurs in poorly developed colorless crystals of monoclinic symmetry, elongated parallel to c and flattened on {100}. Cell dimensions are: a = 12.68, b = 10.07, c = 11.32 (all ±0.02A). β 109° 68±1°, Z = 2, G meas 1.815, calc 1.82. Strongest lines in the X-ray powder pattern are: 12.08(9X100), 5.29(7)(211), 3.69(60), 3.48(100), 2.85(40), and 1.460(40). Because of the pseudosymmetry, the spacings could not be unambiguously indexed. The mineral occurs in the gabbro dolerite dike of the Tsepochechnyi intrusive gave Al 98%, Mg 2.1, 2.5%. X-ray study gave 2.320(10), 2.010(6.7), 1.423(4.5), 1.215(6.7). Analyses of associated phases (semiquant.) gave Al 48, Si 12, Mg 13, Cu none; and Al 70, Mg 5, Cu 27, Si none.

Discussion

This seems extremely improbable from thermodynamic considerations. M.F.

Aubertite*


Aubertite is soluble in water. X-ray study shows aubertite to be triclinic, P1, a = 6.239±0.003, b = 13.239±0.006, c = 6.284±0.003A, α = 91°52', β = 94°40', γ = 82°27' (all ±0'), Z = 1, G calc 1.83, meas 1.815. The strongest lines (70 given) are 6.25(45)(001), 5.59(44)(011), 4.83(40)(120), 4.50(100)(111), 4.24(69)(101)(120), 3.95(58)(111), 3.690(42)(121), 3.130(42)(002), 3.113(40)(210). Structural study indicates the formula to be Al(H2O)5Cu(H2O)2*(SO4)2Cl·2H2O. The mineral occurs as azure-blue crusts of corroded grains. Cleavage [010] perfect. Optically biaxial, neg., n5 (Na) α = 1.462, β = 1.482, γ = 1.495, 2V = 71°, r > v moderate, optic axis nearly perpendicular to (010).

The mineral was collected in 1961 at Quetcna, Antofagasta Province, Chile, in the zone of oxidation, associated with copiapite, amaranthite, parabutlerite, and hohrmannite. The name is for J. Aubert, assistant director, Inst. Natl. Geophysics, France, who collected the mineral. Type material is at the Univ. Pierre and Marie Curie and the Ecole Natl. Superieure des Mines, both in Paris. M. F.

Carlhintzeite*


Carlhintzeite is colorless with a white streak and vitreous luster; D meas 2.86 g/cm³, calc 2.89 g/cm³. It is non-fluorescent. Biaxial (+), 2V = 77°, calc 78°; α = 1.411, β = 1.416, γ = 1.422. Orientation: X = b, c: Z = 10°.

The mineral occurs as tufts and bundles of crystals up to 2mm long. The crystals are elongate parallel to [010] and flattened on [001]. Present are the forms [100] and [001] and the face (110). The crystals are twinned about [101]. Carlhintzeite is triclinic (pseudomonoclinic), space group C1 or C1, a = 9.48, b = 6.98, c = 9.30A, α = 91.14° β = 104.85°, γ = 90.0°, Z = 4. The strongest lines in the X-ray powder diffraction pattern are: 4.56(70), 3.69(60), 3.48(100), 2.85(40), and 1.460(40). Because of the pseudosymmetry, the spacings could not be unambiguously indexed.

The average of two closely agreeing electron microprobe analyses is: Al 10.27, Ca 29.86, F 52.1, H2O(TGA) 7.0, sum 99.23 wt%. (Note by J.A.M.: Al and Ca are given as Al2O3 and CaO, but these are typographical errors). The analytical data yield the empirical formula (based on 7 fluorine ions): Ca1.96Al0.04 F7.96·0.96H2O or, ideally, Ca3AlF7·H2O.
Carlhinteizite occurs with rockbridgeite, pyrite, strengite, and apatite on a specimen from Hagendorf, Bavaria, Germany. The name is in honor of Professor Dr. Carl Hintezi, the compiler of the Handbuch der Mineralogie. Type material is preserved at the Royal Ontario Museum, Toronto, and the Smithsonian Institution, Washington. J.A.M.

**Cupropavonite***


A sample from the Alaska mine, Colorado, contained crystals of pavonite with an exsolved pavonite-like mineral, associated with interstitial gustavite. Microprobe analyses of the exsolved mineral gave Ag 5.7, 5.9; Cu 6.2, 6.1; Pb 13.5, 13.4; Bi 0.1, 0.3; S 18.0, 17.6; sum 99.9, 100.1%, corresponding to Cu$_2$AgBi$_4$Pb$_3$S$_8$O$_{10}$.

Weissenberg study showed the mineral to be monoclinic, space group $C2/m$ or $Cn$, $a = 13.45, b = 4.02, c = 33.06A$, similar to data for pavonite, but with $c$ doubled. The X-ray pattern given (50 lines) was on a mixture of pavonite and cupropavonite, for which calculated values are given.

Optically the mineral is very similar to pavonite, with reflectance equal or slightly less. Pleochroism is weak in air, weak to distinct in oil. Anisotropy strong, with colors identical for both minerals. Etch tests negative with solutions of KOH, HgCl$_2$, KCN, FeCl$_3$, and HCl (1:1). HNO$_3$ (l: l) produced a yellow-brown film; conc. HNO$_3$ etches cupropavonite more strongly than pavonite.

**Curetonite***


Analysis gave P$_2$O$_5$, 23.39 (av. of 3 by probe), V$_2$O$_5$, 1.27 (av. of 2 by chem. and spec.), BaO 53.09 (av. of 3 by probe), Al$_2$O$_3$, 12.81 (av. of 3 by probe, 2 by chem.), TiO$_2$, 6.84 (chem.), H$_2$O 2.46 (Pend.), sum 99.86%, corresponding to Ba$_4$Al$_3$Ti$_4$PO$_{12}$OH$_8$, with O:OH nearly 1:1. Readily fusible to a gray slag. Insoluble in acids.

X-ray study shows the mineral to be monoclinic, space group $P2_1/m$ or $Cn$ for pavonite, but with $c$ doubled. The X-ray pattern given (50 lines) was on a mixture of pavonite and cupropavonite, for which calculated values are given.

The mineral occurs in a barite mine near Golconda, Nevada. The mineral is light green and has a very light green streak and a vitreous to greasy luster. No cleavage was observed; hardness is about 2.8 to 3.8. The mineral is biaxial (-), 2V 85°, $\alpha = 1.715, \beta = 1.80, \gamma = 1.87, X = b, c: Z = 2e$.

Mandarinoite*  


The mineral is light green and has a very light green streak and a vitreous to greasy luster. No cleavage was observed; hardness is about 2.1 to 2.5. The mineral is biaxial (-), 2V 85°, $\alpha = 1.715, \beta = 1.80, \gamma = 1.87, X = b, c: Z = 2e$.

Mandarinoite occurs on specimens from the oxidized zone of the Pacajake mine, Bolivia, where it is associated with penroseite, siderite, quartz, native selenium, and goethite. The mineral has also been found at the Skourotiessa mine, Cyprus, and in the El Plomo mine, near Tegucigalpa, Honduras. At the latter locality, Te is also present and the Se:Te ratio is about 7:3.

The name is for Forrest Cureton and Michael Cureton, who found the mineral. Type material will be in the Smithsonian Institution and the British Museum (Natural History). M.F.
Monteregianite


Monteregianite is colorless, white, gray, rarely mauve or pale green, has a white streak and vitreous to silky luster. Cleavage is perfect on {010}, very good on {001} and good to fair on {100}. Hardness is about 3½. D meas 2.42(2) g/cm³, calculated from the empirical formula 2.391 g/cm³, assuming Z = 4. The mineral is readily etched along cleavage planes by cold 1:1 HCl, HNO₃, and H₂SO₄. Optically biaxial (+), β = 1.513, γ = 1.517, 2V(meas) 87°, (calc) 82°, X = c, Y = a, Z = b.

Monteregianite is orthorhombic, space group Bma2 or B2ab with a = 14.014(4), b = 23.910(5) and c = 13.096(2)Å. A pronounced pseudocell exists with a and c halved and space group Pmn2₁, P2₁m, or Pm2₁b. Strongest lines in the X-ray powder diffraction pattern are: 12.00(100)(020), 7.03(100)(200), 6.02(50)(220), 4.42(100)(042), 3.45(50)(062), 3.06(50)(03440), and 2.873(80)(044).

The mineral occurs as irregular and radiating clusters of needle-like crystals, as elongate tabular crystals in parallel groups, and as irregular micaceous masses. The needle-like crystals are elongate parallel to [001] and are bounded by {010}, {001}, {100}, and occasionally {101}. The tabular crystals are also elongate parallel to [100] and flattened on [010].

Chemical analysis of one gram of hand-picked material (D.C. Mah, analyst) gave: SiO₂ 60.30, Al₂O₃ 0.50, Y₂O₃ 11.97, CaO 0.65, MgO 0.15, BaO 0.35, MnO n.d., FeO n.d., Na₂O 9.14, K₂O 0.65, MgO 0.15, BaO 0.35, MnO 1.38, K₂O 5.89, and Na₂O 0.7193. The strongest lines in the X-ray powder diffraction pattern are: 5.089(3)(110), 4.175(3)(111), 3.658(5)(002), 3.030(10)(211), 2.969(7)(112), 2.935(6)(300), and 1.965(3)(213).

Nickelbischofite


The mineral is emerald green, has a very pale green to white streak, a vitreous luster, is translucent and non-fluorescent. Hardness of about 1½; brittle with subconchoidal to conchoidal fracture and perfect {001} cleavage. The mineral is deliquescent and readily soluble in water. D meas 1.929 g/cm³, calc 1.932 g/cm³. Nickelbischofite is biaxial (+), 2V = 87°, α = 1.589, β = 1.617, γ = 1.644; weakly pleochroic with α pale green, β pale green to green, γ green; absorption scheme is given as u > B > y, but the pleochroic colors indicate γ > B > α or Z > Y > X; orientation, Y = b, X = c = +8°.

Nickelbischofite occurs as powdery coatings and as aggregates of poorly formed crystals. The crystals are up to 15mm long and are monoclinic, space group C2/m, a = 10.318, b = 7.077, c = 6.623Å, β = 122.37°, Z = 2, a:b:c = 1:0.936:1.0. Nickelbischofite is ideally, NiCl₂·6H₂O, the Ni analog of albiritonite (CoCl₂·6H₂O).

Morelandite


Morelandite occurs as irregular masses in calcite which, in turn, is intermixed with hausmannite in a specimen from Jakobsberg, Sweden. The mineral is light yellow to almost pure gray, has a white streak, and a greasy to vitreous luster. There is an extremely weak cleavage parallel to [001] and the hardness is about 4½. D meas 5.33 g/cm³; calculated from the composition and unit-cell parameters 5.30 g/cm³. Optically uniaxial (+); ω = 1.880, ε = 1.884. Morelandite is soluble in cold 1:1 HNO₃ and turns an opaque chalky white after long exposure to cold 1:1 HCl. It does not fluoresce.

The mineral is hexagonal, space group P6₃/m or, more probably, P6₃/m with a = 10.169(2), c = 7.315(2)Å; V = 655.1(3)Å³; c/a = 0.7193. The strongest lines in the X-ray powder diffraction pattern are: 5.089(3)(110), 4.175(3)(111), 3.658(5)(002), 3.030(10)(211), 2.969(7)(112), 2.935(6)(300), and 1.965(3)(213).

An electron microprobe analysis gave: CaO 8.85, FeO 0.41, BaO 33.00, MnO 0.39, PbO 24.85, P₂O₅ 2.05, As₂O₅ 2.85, Cl 0.59, F 0.00, H₂O tr., total 101.35, less O = Cl 0.83, sum 100.52 wt%. The following formula was calculated on the basis of the cell dimensions, density, and normalization to 100%: (Ba₂.25Ca₁.65Pb₁.16FeO₀₉Mn₀.06)(AsO₄)₂.56(PO₄)₀.36Cl₁.09 or, ideally, Ba₂(AsO₄)Cl. From the chemical formula and the crystallographic data, it is clear that morelandite is a member of the apatite group. No evidence of a monoclinic superstructure was found.

The name is in honor of the late Grover C. Moreland, supervisor of the sample preparation laboratory at the Smithsonian Institution. Type material is preserved at the Smithsonian Institution and at the British Museum (Natural History); National Science Museum, Tokyo; Royal Ontario Museum, Toronto; and Geological Survey of Canada, Ottawa. J.A.M.
rite, annabergite, zaratite, albrittonite, cobaltite, linneite, siegenite and nickeline in "serpentine."

The name "... indicates that the new mineral is compositionally the nickel analogue of bischofite, MgCl₂ · 6H₂O, but the two are not isostructural." Type material from Texas is deposited in the Smithsonian Institution, Washington, and the Quebec material is in the National Mineral Collection, Ottawa.

Discussion

In my opinion, the name of this mineral is totally misleading. If a name had to be given in order to relate it to another mineral why pick a mineral to which it is only chemically related? It would have made much more sense to link this mineral with albrittonite since they will be side by side in most mineralogical classifications. J.A.M.

Phuralumite* and upalite*


Analyses of phuralumite and upalite by electron microprobe (standards used: metatbernite, corundum, kyanite, and apatite) gave: (H₂O by difference) P₂O₅, 10.3, 12.3; Al₂O₃, 7.6, 4.0; UO₂, 65.9, 80.2; H₂O 16.2, 3.5, corresponding to the formulas above. The calculated formula for upalite has additional 0.6 H₂O, but the structural data indicate the formula above.

Weissenberg and rotation photographs show phuralumite to be monoclinic, space group P₂₁/a, a = 13.87, b = 20.79, c = 9.38 A, β = 112°, Z = 4; G calc 3.54, meas 3.5. The strongest X-ray lines (19 given) are 10.4(00), 15.70(70), 3.47(40), 3.07(50), 2.39(32), 1.90(20), 1.74(11).

Phuralumite occurs as lemon-yellow prismatic crystals, max. length 0.5 mm. H ≈ 3. Optically biaxial, neg., α = 1.559 (calc), β = 1.616, γ = 1.624, X = b, Y near elongation, 2Y : 40°. Pleochroic from colorless to very pale yellow on Y and Z. Does not fluoresce in UV.

Weissenberg photographs show upalite to be orthorhombic, space group Bbmc or Bba2, a = 34.68, b = 16.81, c = 13.72 A, Z = 16; G calc 3.58, meas 3.5. The strongest X-ray lines (24 given) are 8.4(100), 6.03(50), 4.24(60), 4.18(80), 3.43(80), 3.17(70), 3.08(70), 10.0 · 2, 2.90(75).

Upalite occurs as amber-yellow needles, max. length 0.33 mm. Optically biaxial, neg., α = 1.649, β = 1.666, γ = 1.676, 2V (calc) 74°, X = b, Y = a; strongly pleochroic, X colorless, Y and Z canary yellow. Does not fluoresce in UV light.

These minerals occur in the beryl–columbite pegmatite at Kobokobo, Kivu, Zaire, associated with meta-autunite, phosphoranylite, threadgoldite, and four other new aluminum uranyl phosphates. The names are for the composition. Type material is at the Royal Museum of Central Africa, Tervuren, Belgium. M.F.

Prosperite*


Rohaite*


Electron microprobe analyses were made on two samples. The averages on 7 grains and 8 grains, resp., were Ti 26.6, 27.7; Sn 41.0, 43.5; Cu 18.6, 17.8; Pb 2.0, 1.6; Fe 0.3, 0.3; S 9.3, 9.6, sum 97.8, 100.5%. These correspond to Tl₁₀₋₁₅Sb₁₃(Cu₄₋₅Fe₁₋₀₇)Pb₀₋₁₄S₂₁₅ and Tl₁₀₋₁₅Sb₁₋₁₅(Cu₄₋₅Fe₁₋₀₇)Pb₀₋₁₄S₂₁₅ or TiCu₃Sb₂O₅. Etch tests with HgCl₂, KOH, KCN, and FeCl₃ were negative, with HCl(1:1) the mineral turned slightly steel-bluish gray, with HNO₃(1:1) the polished surface is destroyed and the mineral turns black.

Prosperite occurs as a secondary mineral in vugs in partly altered sulfide ore at Tsumeb, South West Africa (Namibia). Associated minerals are chalcolite, mercurian silver, cuprite, conichalcite, adamiite, austinite, koritnigite, and other new species. Prosperite is white to colorless with a white streak and a brilliant vitreous to silky lustre. The hardness is 4½ and there is no cleavage. The mineral is non-fluorescent. D meas 4.16 g/cm³, calc 4.35 g/cm³. Optically, the mineral is biaxial (+), ²V = 1.750, ²V (meas) 1.740, ²V (calc) 1.750. Dispersion r ≥ v. Orientation in Y = b, Z: C = 27°.

The mineral occurs intergrown with chalcoite, also enclosed in antimonian silver together with loellingite, cuprostibite, and cuprite, also at the contact of cuprostibite and sphalerite, all these in a vein rich in analcime and sodalite in the ilimaussaq alkalic intrusive, south Greenland. Its grain size is 0.05 to 0.5 mm. In reflected light it is yellowish cream to dull bluish-gray, reflectance pleochroism strong in air and oil. Strongly anisotropic, yellowish-ccream to black. Optically positive. Reflectances (Rg and Rp, %):

\[
\begin{align*}
\text{Rg} & \approx 20.0, \\
\text{Rp} & \approx 25.0.
\end{align*}
\]
481 mm, 32.0, 24.5; 546, 32.4, 22.3; 590, 32.0, 21.8; 650, 31.8, 20.8. Microhardness (25g load) 88 to 103, av. 94.

The mineral alters readily to a mixture of digenite and senarmontite.

The name is for John Rose-Hansen, University of Copenhagen, where type material is preserved. M.F.

Soucekite *


Analyses by electron microprobe (standards analyzed galena and covellite and pure Bi, Cu, Pb, Se, and Te) gave Pb 33.86, 32.68; Cu 9.76, 9.93; Bi 31.71, 32.41; S 8.83, 9.25; Se 14.55, 14.55; Te 0.79, 0.51; sum 99.50, 99.33 (analyst Z. Kotrba and I. Vavrin). The first analysis corresponds to the formula Pb1.0, Cu0.99 Bi0.96 S1.78 Se1.06 Te0.94. The name is applied to material with S > Se; the analyzed sample is a selenian soulekite.

Single-crystal data could not be obtained. The X-ray pattern is similar to that of bournonite and segilmanite. Space group probably Pn21,m, by analogy. The powder pattern was indexed on F.

The mineral occurs in hydrothermal quartz–carbonate veins at Oldrichov, western Bohemia, associated with poubaite, galena–clavatite, and selenian–sulfurian rucklidgeite. Soudekite occurs as anhedral grains up to 0.01 mm across. Color lead gray, luster metal, commonly very finely polysynthetically twinned. No cleavage observed. Vickers microhardness (25mg load) 166–188, length 1 mm. Forms present are {100}, {001}, {101}, and {012}; these are also cleavage planes. Optically biaxial neg. 2V = 70°, a = 1.573 (calc), β = 1.583, γ = 1.583, elongation neg., Y = b, Z : c = 4°. Under the microscope, very pale yellow to colorless. Fluoresces green in long-wave UV, pale green in short-wave UV.

The name is for Ian M. Threadgold, University of Sydney, Australia, who described in 1960 a unnamed mineral from northern Australia that gave the same powder pattern as threadgoldite and similar optics, but also contained Ca and probably Fe. Threadgoldite is the phosphate analogue of meta-vanuralite in composition, but the latter is triclinic. M. F.

Threadgoldite *


Analysis by electron microprobe by J. Wautier gave P2O5 13.7, Al2O3 5.4, UO3 63.5, H2O (by difference) 17.4%, corresponding to 0.98Al2O3·2.04UO3·1.78P2O5. A DTA curve on 4.32 mg gave a loss of 17% from 20° to 700° C.

Weissenberg photographs showed the mineral to be monoclinic, space group Cc or C2/c, a = 20.25, b = 9.85, c = 19.75A, β = 111.4°, Z = 8; G calc 3.32, meas 3.4. The strongest X-ray lines (24 given) are 9.43(100)(200), 5.35(50)(312), 4.10(50)(312), 3.474(80)(224), 3.3666(60)(024), 2.197(60)(228), 2.428.

The mineral occurs with phuralumite and upalite (see above) as greenish-yellow micaceous tabular crystals, elongated on b, max

Unnemed Minerals

NEW MINERAL NAMES

Unnamed bismuth oxide

Microchemical and probe analyses of green spherulites showed them to have Bi as main component, with minor Cu, Fe, Ca, As, and Sb. Easily soluble in cold 1:1 HCl or HNO₃. The strongest X-ray lines (20 given) are 5.73(7, 3.44(5), 3.16(10), 2.02(5), 1.902(6). Birefringence high, ± 2.1-2.2. Elongation negative. Anomalous blue interference colors. Associated with malachite, bismutite, and mixite.

Unnamed Cu-Ca arsenate

The mineral occurs as white to pale green fibrous radiating crystals, associated with chalcophyllite and barium pharmacosiderite. Probe analysis showed it to be a copper arsenate, with Ca present, and minor Fe, Zn, and Sb. Dissolved by cold 1:1 HNO₃. The strongest X-ray lines (9 given) are 4.26(10), 3.04(8)(very diffuse), 2.97(8)(very diffuse), 2.45(9)(diffuse), 1.608(5)(very diffuse). α = 1.735, γ = 1.745.

Unnamed copper arsenate

Microchemical tests showed Cu, Fe, and As, with minor Ca and Sb. Partly dissolved by 1:1 HCl or HNO₃, mostly dissolved by hot HCl. The strongest lines (5 given) are 3.19(9), 2.75(10).

Unnamed orthorhombic FeAsO₄, monoclinic FeAsO₄

Incrustations on quartz gave an X-ray pattern that indicated the material to be a mixture of 2 known synthetic forms of FeAsO₄. Dissolved by cold 1:1 HCl, more slowly by cold 1:1 HNO₃. The strongest X-ray lines of the orthorhombic form (11 given) are 3.70(8)(O21), 3.56(10)(111), 2.65(5)(022), 2.54(7)(130), 1.495(6)(152). Probe analyses show Fe, As, and some Cu.

The strongest lines of the monoclinic phase (20 given) are 4.04(10), 3.36(7)(diffuse), 3.05(8), 2.72(5)(diffuse). Contains Fe, As, and a little Cu and Al.

Unnamed aluminum arsenate

Occurs with malachite, azurite, barium pharmacosiderite, and an unnamed aluminum arsenate of the crandallite group (see below). White, fibrous, radiating aggregates, luster silky. Contains Al and As, also traces of Ba, Ca, Cu, and Si. Soluble in 1:1 HCl. Optically biaxial, neg. α = 1.540, γ = 1.548 (both ± 0.002), 2V = 66°, ω = X-ray extinction parallel, Z = elong. The strongest X-ray lines (42 given) are 8.97(7), 7.78(10), 6.55(7), 5.92(7), 3.75(7), 3.49(8), 2.73(6)(diffuse).

Unnamed aluminum arsenate of crandallite group

Blue-green to green crusts and spherulitic aggregates on silicified sandstone contain Al, Fe, As, Ba, Ca, and Cu; formula possibly (Ba, Ca, Cu)(Al, Fe)₂⁺(H, AsO₄)₃⁻(OH)₆. Scarcely dissolved by cold 1:1 HCl or HNO₃, slowly and incompletely dissolved in hot 1:1 HCl. The strongest X-ray lines (26 given) are 3.54(8), 2.99(10), 1.913(7), 1.764(6). M. F.

NEW DATA

Häggite


Häggite was found in Eocene clays of Turkmenia and in alluvial sandstones of Karatau. Optical data are given at 14 wavelengths. X-ray data agree with those of the original description (Am. Mineral., 43, 1144–1166, 1958).

Electron probe analysis gave V 55.8%, corresponding to the composition V₂O₅. No water was present. The mineral is therefore dimorphous with scherbinaita.

Discussion

Data are inadequate to establish the composition. M. F.

Sturtite


Analysis of reddish-brown to dark brown cryptocrystalline masses in altered effusives from northeast USSR gave SiO₂ 40.50, TiO₂ 0.01, Al₂O₃ 3.80, Fe₂O₃ 4.80, MnO 23.70, CaO 2.20, alkalies none, H₂O 25.10, sum 100.11%. Amorphous by X-ray and electron diffraction study. Isotropic, n = 1.490. The DTA curve shows endothermic breaks at 120° (loss of H₂O) and at 400°C (loss of OH); heating at 1000°C gave bixbyite. The infrared absorption curve (identical to that of a sample from S. Yakutia that contained MnO₂ 17.16, MnO 1.76, MgO 17.39) shows molecular water, hydroxyl, and is similar to those of trioctahedral hydrous micas. The formula is therefore given as (Mn₁.₄₇Fe₀.₄₃Mg₀.₁₃Ca₀.₂₄Si₄O₁₀(OH)₂·H₂O).

Discussion

Type material from Broken Hill, Australia, was not examined. M. F.