NEW MINERAL NAMES*

JOHN L. JAMBOR1 AND ANDREW C. ROBERTS2

1Department of Earth and Ocean Sciences, University of British Columbia, Vancouver, British Columbia
V6T 1Z4, Canada
2Geological Survey of Canada, 601 Booth Street, Ottawa K1A 0E8, Canada

DASHKOVAITE*


Chemical analysis gave C 16.2, H 3.9, Mg 16.4, Mn (by electron microprobe) 0.2, O (by difference) 63.3, sum 100 wt%, corresponding to Mg8.76Mn0.00H7.72C2.00O5.77, ideally Mg(HCO3)0.2·H2O. The mineral occurs as white, fibrous aggregates in hydrothermal veinlets, up to 1 mm in width, wherein the fibers are up to 3 mm long and 0.01 mm wide. Soft and porous, H = 1, Dcalc = 1.74 g/cm3 for Z = 4. Microscopically colorless, biaxial positive, α = 1.465(3), β = 1.486(3), γ = 1.516(3), 2Vcalc = 81(5)°, X parallel to the elongation. By analogy with the synthetic analog, indexing of the X-ray powder pattern gave a monoclinic cell, space group P21/c, a = 8.64(1), b = 7.15(1), c = 9.38(1) Å, β = 98.0(1)°; strongest lines of the pattern (57 mm radiation) are 4.90(90,111 –), 4.64(80,002), 4.00(F1.03OH0.50), α = 9.39(1) Å, β = 10.153(8) Å, γ = 10.153(8) Å, β = 100.49(1)°. Strongest lines of the powder pattern (diffractometer, CuKα radiation) are 10.09(100,001), 5.02(13,002), 3.36(56,003), and 2.507(14,131,004).

The mineral is a rock-forming species in the upper part of an A-type granite at Suzhou, near Shanghai, eastern China. Type material is in the Geology and Mineral Resources Institute in Chengdu, and in the Geological Museum of China, at Beijing. J.L.J.

FLUOR-MAGNESIO-ARFVEDSONITE*

A.G. Bazhenov, I.L. Nedosekova, T.V. Krinova, A.B. Mironov, P.V. Kvorov (2000) Fluormagnesio-arfvedsonite Na2(MgFe2+)2MnFe3+)Σ(0.11)[Si6.83Al1.17]Σ(0.09)0.98(F1.03OH0.50)Σ(0.07)0.47H2.00, simpliﬁed as KFe2+AlSiO6F2, which is the F analog of annite. Single-crystal X-ray structure study indicated monoclinic symmetry, space group C2/m, 1M polytype, a = 5.369(8), b = 9.289(3), c = 10.153(8) Å, β = 100.49(1)°. Strongest lines of the powder pattern (diffractometer, CuKα radiation) are 10.09(100,001), 5.02(13,002), 3.363(56,003), and 2.507(14,131,004).

The mineral is a rock-forming species in the upper part of an A-type granite at Suzhou, near Shanghai, eastern China. Type material is in the Geology and Mineral Resources Institute in Chengdu, and in the Geological Museum of China, at Beijing. J.L.J.

FLUORANNITE*


The mineral occurs as euhedral to subhedral sheets and tabular crystals to more than 6 mm across, but predominantly 2–4 mm long and 1–3 mm wide. Iron-black color, submetallic luster, perfect {001} cleavage, sectile, gray streak, VHN = 109 (93.4–132), Dmeas = 3.15–3.20, Dcalc = 3.23 g/cm3 for Z = 2. Optically biaxial negative, α = 1.596, β = γ = 1.648, 2Vmeas = ~0°, 2Vcalc = 0°, Y = b; strongly pleochroic, X = pale brown, Y = dark green, Z = reddish brown. Electron microprobe and wet-chemical analyses gave K2O 8.73, Na2O 0.19, Rb2O 0.42, CaO 0.02, BaO 0.44, SrO 0.01, Fe2O3 26.19, FeO 7.86 (Fe partitioned by Mössbauer spectroscopy), MgO 1.49, MnO 0.68, Li2O 0.47, TiO2 1.29, ZnO 0.27, NiO 0.01, SiO2 34.12, Al2O3 13.89, H2O 0.91, F 3.91, O = F = 1.65, sum 99.25 wt%, corresponding to (K0.92Na0.03Rb0.02Ba0.01)[Si6.83Al1.17]Σ(0.09)0.98(F1.03OH0.50). Simplified as KFe2+AlSiO6(F2), which is the F analog of annite. Single-crystal X-ray structure study indicated monoclinic symmetry, space group C2/m, 1M polytype, a = 5.369(8), b = 9.289(3), c = 10.153(8) Å, β = 100.49(1)°. Strongest lines of the powder pattern (diffractometer, CuKα radiation) are 10.09(100,001), 5.02(13,002), 3.363(56,003), and 2.507(14,131,004).

The mineral occurs as light gray, short prismatic grains in albite-microcline fenite in the contact zone of the Ilmen alkaline massif. Wet-chemical analysis gave SiO2 56.76 TiO2 0.51, Al2O3 1.47, Fe2O3 5.76, FeO 0.79, MnO 0.29, MgO 20.10, CaO 2.86, Na2O 7.50, K2O 1.62, H2O 0.84, F = 2.80, O = F = 1.18, sum 100.12 wt%, corresponding to (Na4.41K0.29)(Na1.57Ca0.43)Σ(0.09)0.47(Mg8.41Al0.09Fe3+)Σ(0.11)Ti0.95Al0.05Σ(0.09)0.47(F1.03OH0.50)Σ(0.07)0.47H2.00, which is the F analog of magnesio-arfvedsonite. Brittle, H = 5.5–6, {110} cleavage, Dmeas = 3.09, Dcalc = 3.04 g/cm3 for Z = 2. Optically biaxial positive, α = 1.618, β = 1.629, γ = 1.632, 2Vmeas = 50–70°, c/Z = 15–16°, optic-axis plane (010), pleochroism X = yellowish, almost colorless, Y = lilac, Z = greenish blue, Z > Y > X. Indexing of the X-ray powder diffractogram (FeKα radiation) gave a monoclinic cell with a
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= 9.81(9), b = 18.01(3), c = 5.28(1) Å, β = 103.8(2)°, probable space group C2/m. Strongest lines are 8.42(34, 1110), 3.264(23, 240), 3.129(100, 310), 2.804(28, 330), and 2.708(17, 151).

The mineral is associated with perthite, microcline, albite, phlogopite, quartz, and accessory titanite, rutile,apatite,pyrite, andzircon. Type material is in the Natural Science Museum of the Ilmen State Preserve at Miass, and in the Mineralogy Department of the Saint Petersburg Mining Institute, Russia.

Discussion. Although it is written as “fluormagnesioarfvedsonite” in both the English abstract and the Russian version of the publication, the new mineral name should be fluoro-magnesioarfvedsonite to conform to the CNMMN-approved nomenclature system for the amphiboles. J.L.J.

KAPITSAITE-(Y)*


The mineral occurs as a pale pink, sheaf-like aggregate, 1 × 3 cm. The average of seven listed electron microprobe analyses (REE titrometrically, B colorimetrically, and Be by atomic absorption) is SiO₂ 34.98, Al₂O₃ 0.04, FeO 0.01, MnO 0.05, CaO 3.12, K₂O 0.87, Na₂O 0.46, P₂O₅ 1.95, BaO 38.18, Y₂O₃ 7.93, La₂O₃ 0.01, Ce₂O₃ 0.09, Pr₂O₃ 0.03, Nd₂O₃ 0.32, Sm₂O₃ 0.36, Gd₂O₃ 0.36, Dy₂O₃ 0.70, Ho₂O₃ 0.14, Er₂O₃ 0.36, Yb₂O₃ 0.87, Lu₂O₃ 0.10, Tb₂O₃ 0.03, Eu₂O₃ 0.06, CeO₂ 0.09, SrO 1.48, BaO 32.66, CuO 0.42, CoO 0.22, NiO 0.04, Al₂O₃ 0.04, FeO 0.15, MnO 24.03, Fe₂O₃ 2.92, V₂O₅ 29.26, H₂O (calc.) 3.54, sum 99.43 wt%, corresponding to (Ba0.60K0.26Pb0.12Na0.07)2.708(17,151). [Si₈B₂O₂₈F], which results in an excess positive charge of 0.52. Unless there is significant substitution of alkali for divalent cations, e.g., 0.26 K and 0.22 Na in the type material, charge balance is not possible for (Y,REE) > Ca and B <4; that is, the only charge-balanced, alkali-free end-member for a Y analog of hyalotekite is Ba₄(YCa)[Si₈B₂O₂₈F]. J.L.J.

KRETTNICHITE*


The mineral occurs as radiating aggregates, to 3 cm diameter, of dark brown platy (001) crystals, as <1 mm acicular to prismatic black crystals, and as brownish pseudohomboedral crystals showing {001}, {111}, {332}, and {331}. Adamantineruster, brown streak, H = 4 ½, excellent {001} cleavage and a distinct one at a high angle to it, nonfluorescent, D meas = 4.04, D ab = 4.51–4.81 g/cm³ for Z = 2. Electron microprobe analysis gave CaO 0.60, BaO 0.90, SrO 1.48, PbO 32.66, CuO 0.42, CoO 2.22, NiO 0.04, Al₂O₃ 0.04, FeO 0.15, MnO 24.03, Fe₂O₃ 2.92, V₂O₅ 29.26, H₂O (calc.) 3.54, sum 99.43 wt%, corresponding to (Pb0.60Sr0.14Ca0.24Ba0.03)(Mn1.70Co0.17Fe0.09Cu0.09Al0.01)(VO4)2(OH)3, ideally PbMn₅(VO₄)₂(OH)₃. In transmitted light, only thin (001) plates are transparent. Reddish brown color, distinct pleochroism towards orange; nₑ from reflectance measurements at 590 nm are 2.21 for R₁ and 2.39 for R₁. Single-crystal X-ray structure study gave monoclinic symmetry, space group C2/m; a = 9.275(7), b = 6.284(3), c = 7.682(2) Å, β = 117.97(4)° as refined from a diffractometer powder pattern (CuKα radiation) with strongest lines of 3.388(95,002), 3.270(100,112), 2.946(51,201), 2.850(49,021), 2.4910(93,112,220), and 1.6962(83,004).

The mineral, which is a new member of the tsumcorite group, occurs in the waste-rock dumps of a hydrothermal manganite-quartz vein, also containing barite, ankerite, mottramite, brackebuschite, and pyrobelonite, at Krettnich, Saarland, Germany. The new name is for the locality. Type material is in the Musée Cantonal de Géologie, Lausanne, Switzerland, and at the Natural History Museum, London, U.K. J.L.J.

LEVINSONITE-(Y)*, ZUGSHUNSTITE-(Ce)*


The minerals form part of the sulfate-rich supergene assemblage, predominantly epsomite and halotrichite-group minerals, that formed by weathering of pyritiferous phyllite at Alum Cave Bluff, Great Smoky Mountains Park, Tennessee.

LEVINSONITE-(Y)

The mineral occurs as individual prismatic crystals, elongate (101) to 1.0 mm in length, and as randomly oriented groups of a few crystals. The crystals are flattened on (101), showing {101}, {010}, and {101} ||{101} — J.A. Mandarino. Color-
less, transparent, brittle, white streak, irregular fracture, perfect {101} cleavage, H not determinable, nonfluorescent, soluble in water, $D_{\text{mol}} = 2.181 \text{ g/cm}^3$ for $Z = 2$. Optically biaxial positive, $\alpha = 1.48(1), \beta = 1.49(1), \gamma = 1.55(1), 2V_{\text{max}} = 7(3)^\circ$, orientation Y∥b, X nearly lllc, Z ∥ c = 19°. Single-crystal X-ray structure study ($R = 0.024$) indicated monoclinic symmetry, space group $P2_1/n, a = 10.289(1), b = 9.9234(1), c = 11.015(1)$ Å, $\beta = 108.50(1)^\circ$. Strongest lines of the X-ray powder pattern (114 mm Gandolfi) are $3.9(3,010), 6.28(90,111), 5.20(40,111), 4.89(60,200), 4.09(50,1-21)$. Electron microprobe analyses listed, with boron calculated as-

**ZUGSHUNSTITE-(CE)**

The mineral is associated with levinsonite-(Y), and both may occur in the same hand specimen. Electron microprobe analysis gave $\text{La}_2\text{O}_3 2.16, \text{Ce}_2\text{O}_3 13.17, \text{Pr}_2\text{O}_3 1.68, \text{Nd}_2\text{O}_3 6.50, \text{Sm}_2\text{O}_3 0.80, \text{Eu}_2\text{O}_3 0.27, \text{Gd}_2\text{O}_3 0.14, \text{CaO} 0.04, \text{Al}_2\text{O}_3 6.92, \text{Fe}_2\text{O}_3 1.11, \text{SO}_3 24.01, \text{C}_2\text{O}_3 (\text{calc.}) 10.80, \text{H}_2\text{O} (\text{calc.}) 32.41, [\text{sum} 100.01 \text{ wt\%}]$. Corresponding to (Ce 0.54 Nd 0.26 Sm 0.08 Eu 0.03 Gd 0.02) $\beta = 1.5945(5), \gamma = 1.6069(5), \delta = 1.6088(5), 2V_{\text{max}} = 45.6(1)^\circ, 2V_{\text{calc}} = 43^\circ$, strong dispersion $r > v, Y = b$. Single-crystal X-ray structure study ($R = 0.021$) indicated monoclinic symmetry, space group $P2_1/n, a = 5.250(1), b = 11.647(2), c = 9.655(2)$ Å, $\beta = 95.94(1)^\circ$, isomorphous with alluclate. Strongest lines of the X-ray powder pattern (114 mm Gandolfi, CuK$\alpha$ radiation) are 4.436(75,111), 3.521(80,122,121), 3.145(70,1122,130), 3.087(70,013), 2.905(100,131), 2.794(75,023,041), and 2.199(80,142,202).

The mineral occurs in nodules rich in apatite and Mg phosphates within a serpentine body near Tingelstadten in the Modum district of southern Norway. Formation is interpreted to be late metamorphic, under relatively low pressure and temperature. The new name is for Gunnar Raade, minerals curator at the Natural History Museum, Oslo. Type material is in the Museum national d’histoire naturelle, Paris, and in the Institute für Mineralogie, Ruhr-Universität Bochum, Germany.

**SCHIAVINATOITE**


The mineral occurs as a small portion of one tetragonal dipyramidal crystal, about 4 mm across, that is modified by a second dipyramid and a tetragonal prism. Sixteen of the 54 electron microprobe analyses listed, with boron calculated assuming B/(Nb + Ta) = 1, average Nb$_2$O$_3 33.08 (31.65–34.50),$ Ta$_2$O$_5 50.37 (48.76–51.96), B$_2$O$_3 16.60 (15.97–16.96), sum 100.05 wt\%, corresponding to (Nb$_{1.01}$Ta$_{0.99}$)BO$_4$, which is the Nb analog of behierite. Grayish pink color, vitreous luster, white streak, $H = 8$, no cleavage, nonfluorescent, $D_{\text{calc}} = 6.548$ g/cm$^3$ for $Z = 4$. Colorless in thin section, uniaxial positive $n = 2.30$. Single-crystal X-ray structure study ($R = 0.011$) indicated tetragonal symmetry, space group $I4/mmd, a = 6.219(5), c = 5.487(5)$ Å. Strongest lines of the calculated X-ray powder pattern are 4.115(100,101), 3.110(84,200), 2.481(36,211), 2.328(49,112), and 1.598(42,312).

The mineral occurs both in miarolitic cavities containing quartz, K-feldspar, tourmaline, and rhodizite, and within the massive rock of a B-rich granitic pegmatite at Antsongombato, south of Betafo, Malagasy Republic. The new mineral name is for Italian minerallogist Giuseppe Schiavinato (1915–1996). Type material is in the Museo Civico di Storia Naturale at Milan, Italy.

**RAADEITE**


Electron microprobe analyses gave MgO 55.35, FeO 0.25, MnO 0.30, CaO 0.02, P$_2$O$_5$ 28.23, As$_2$O$_3$ 0.40, SO$_2$ 0.05, SiO$_2$ 0.05, $\text{H}_2\text{O} (\text{calc.})$ 14.34, sum 98.99 wt\%, which for 12 O on an anhydrous basis corresponds to (Mg$_{8.86}$Fe$_{0.28}$Mn$_{0.04}$)$_{26.94}(P_2$0$_{16}$As$_{0.02}$)$_{22.02}$O$_{12}$; the crystal-structure determination gave (Mg$_{7.73}$Fe$_{0.08}$Mn$_{0.02}$)$_{26.82}$P$_{19}$As$_{0.02}$H$_{0.42}$O$_{16}$, ideally Mg$_8$(PO$_4$)$_2$(OH). The mineral, which has been observed only in thin section, occurs as anhedral inclusions in holtehadite, as veinlets a few tens of micrometers wide that cut althausite crystals, and as a part of fibrous coronae that replaced heneuite. Colorless, transparent, white streak, pearly luster, $D_{\text{calc}} = 2.806$ g/cm$^3$ for $Z = 2$.

Optically biaxial negative, $\alpha = 1.5945(5), \beta = 1.6069(5), \gamma = 1.6088(5), 2V_{\text{max}} = 45.6(1)^\circ, 2V_{\text{calc}} = 43^\circ$, strong dispersion $r > v, Y = b$. Single-crystal X-ray structure study ($R = 0.021$) indicated monoclinic symmetry, space group $P2_1/n, a = 5.250(1), b = 11.647(2), c = 9.655(2)$ Å, $\beta = 95.94(1)^\circ$, isomorphous with alluclate. Strongest lines of the X-ray powder pattern (114 mm Gandolfi, CuK$\alpha$ radiation) are 4.436(75,111), 3.521(80,122,121), 3.145(70,1122,130), 3.087(70,013), 2.905(100,131), 2.794(75,023,041), and 2.199(80,142,202).

The mineral occurs in nodules rich in apatite and Mg phosphates within a serpentine body near Tingelstadten in the Modum district of southern Norway. Formation is interpreted to be late metamorphic, under relatively low pressure and temperature. The new name is for Gunnar Raade, minerals curator at the Natural History Museum, Oslo. Type material is in the Museum national d’histoire naturelle, Paris, and in the Institute für Mineralogie, Ruhr-Universität Bochum, Germany.
**TELLURONEVSKITE**


The average of four listed electron microprobe analyses is Bi 67.84, Pb 0.42, Se 15.41, Te 14.58, S 1.14, sum 100.39 wt%, corresponding to Bi₂Te₅Pb₀.₀₂Se₁.₀₁S₁.₇₈ simplified as (Bi,Te)₂Te₅(Se,S)₂, ideally Bi₂Te₅Se₂. Occurs as irregular grains and poorly shaped laths and prisms, to 1 mm, and as massive aggregates to 2 mm. Steel-gray color, metallic luster, black streak, perfect {001} cleavage, commonly flattened along {001}, flexible in thin plates, VHN₁₀ = 100 (62.9–137.0), deformation lamellae common, Dₘₐₓ = 8.1(2), Dₜₐₜ = 8.08 g/cm³ for Z = 2. White with a yellow tint in reflected light, bireflectance imperceptible in air but yellowish white to gray in oil; moderately anisotropic, with polarization colors of gray to bluish gray. Reflectance percentages in air (SiC standard) are given in 20

A single particle, 20 × 65 µm and consisting of an aggregate of monocristalline acicular domains about 1 µm in length, borders argentiferous native gold extracted from organic-rich sediment of the Boiron River near Yens, canton Vaud, Switzerland. White in reflected light, nonpleochroic; in oil, strongly anisotropic with blue to brown yellow tints. The average of three listed electron microprobe analyses is Au 55.57, Ag <0.05, Cu <0.05, Sn 43.05, sum 98.62 wt%, corresponding to Au₁.₀₁Sn₁.₄₉, or AuSn₂, ideally AuSn₂. The source heavy-mineral concentrates contain numerous grains of cassiterite, but also present are particles of metallic tin and Sn-Pb alloys that are considered to be of anthropogenic origin. Several reasons are given for concluding that the AuSn₂ is natural rather than anthropogenic. J.L.J.

**New Data**

**ARMSTRONGITE**


Rietveld analysis (R_w= 2.75) of type material of armstrongite from Mongolia gave monoclinic symmetry, space group C₂, a = 14.018(1), b = 14.133(1), c = 7.840(1) Å, β = 109.40(1)°. The structure refinement confirmed a previous indication that the formula contains 3H₂O. J.L.J.

**CALCYBEBOROSILITE-(Y)**


The mineral is known only from the Dara-i-Pioz massif on the southern slope of the Altai Range in Tajikistan. Electron microprobe analysis (Be by gravimetry) gave SiO₂ 28.78, UO₂ 2.29, ThO₂ 0.62, Y₂O₃ 19.82, La₂O₃ 1.51, Ce₂O₃ 3.92, Pr₂O₃ 0.34, Nd₂O₃ 1.08, Sm₂O₃ 0.17, Gd₂O₃ 0.34, Tb₂O₃ 0.05, Dy₂O₃ 0.94, Ho₂O₃ 0.22, Er₂O₃ 1.25, Tm₂O₃ 0.23, Yb₂O₃ 1.59, Lu₂O₃ 0.17, B₂O₃ 9.81, BeO 3.72, CaO 12.91, MnO 0.80, FeO 4.02, H₂O (calc.) 2.91, P₂O₅ 0.04, F 0.24, sum 97.86 wt%, corresponding to (REE₀.₀₁Ca₀.₀₁Be₀.₀₁)[SnO₂][HO(OH)₂], where Y makes up about 70% and Ce about 10% of the REE in the formula. The simplified formula is (REE, Ca)ₓ(B, Be)ᵧ[SiO₄]₂(OH/O)₂, for Z = 2. Single-crystal X-ray structure study (Am. Mineral., 81, 1516–1517, 1996) confirmed that the mineral is isosstructural with the other members of the gadolinite group. Indexed X-ray powder data and the IR spectrum are given.

**Discussion.** In the previous report (Am. Mineral., 81, 1516–1517, 1996), formula Ca was reported to exceed the sum of REE. In the new analyses, formula Ca is also reported to be the dominant cation, with Ca > Y > Ce; because B > Be, one might infer that calcybeborosilite-(Y) is yttrian datolite (Ca₂Y₂ B₂Si₆O₁₅(OH)₂). The authors conclude, however, that calcybeborosilite-(Y) is an independent mineral species because both Ca and REE occupy the same site, and the sum of REE in the new analyses is greater than that of Ca. Hence, calcybeborosilite-(Y) is legitimately defined as a rare-earth mineral (Am. Mineral., 73, 422–423, 1988), whereas datolite is not. According to CNMNN rules, a species name is given to a rare-earth mineral whenever the REE distribution has been determined. Calcybeborosilite-(Y) is reported in Nickel and Nichols (Mineral Reference Manual, 1991) to be an accepted species on the basis of “grandfathering”; the mineral, however, is not included as a valid species in *Fleischer’s Glossary of Mineral Species* (Mandarino 1999). J.L.J.