American Mineralogist, Volume 70, pages 1329–1335, 1985

NEW MINERAL NAMES

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A complete listing of all new minerals for the year 1985 is contained in the annual index under the heading "New Minerals".

Cualstibite*

K. Walenta (1984) Cualstibite, a new secondary mineral from the Clara Mine in the Central Black Forest (FRG). Chemie der Erde, 43, 255–260 (in German).

Wet-chemical analysis of the mineral gave recalculated CuO 32.0, Al_2O_3 10.4, Sb_2O_5 36.8, H_2O 20.8, sum 100.0 wt.%, corresponding to $Cu_{5.62}Al_{2.85}Sb_{3.18}H_{32.29}O_{34}$ or idealized $Cu_6Al_3Sb_3O_{18} \cdot 16\ H_2O$ or $Cu_6Al_3(SbO_4)_3(OH)_{12} \cdot 10\ H_2O$. The presence of (SbO_4) groups has not yet been confirmed.

X-ray study shows the mineral to be trigonal, possible space groups are $P3$, $P312$, $P321$, $P3m1$, $P31m$, $P\bar{6}$, $P\bar{6}m2$ or $P\bar{6}2m$. Unit cell is $a = 9.20$, $c = 9.73$Å, Z = 1, D calc. 3.25, D meas. 3.18 ± 0.05. The strongest X-ray lines (30 given) are 4.89(100)(0002), 2.33(90)$(30\bar{3}2,10\bar{1}4)$, 4.17(80)$(11\bar{2}1,10\bar{1}2)$; 1.793(80)$(32\bar{5}1,30\bar{3}4,11\bar{2}5)$, 2.65(70)$(30\bar{3}0,11\bar{2}3)$, 1.388(50). No distinct cleavage, fracture conchoidal.

The blue-green, transparent to translucent mineral forms columnar, trigonal crystals, up to 0.05 mm long, in voids; also crustiform on barite and fluorite, radial aggregates, pseudomorphs after an unknown mineral, and massive. Associated with older cornwallite, younger arsenogoyazite, and goethite. Streak blueish white. Luster vistreous. No fluorescence. H about 2. Optically uniaxial or weakly biaxial, negative, *ns* $\omega = 1.672$, $\varepsilon = 1.644$ (both ±0.002). Pleochroism *E* ±colorless, *O* light bluegreen.

The name of the secondary mineral is for its chemical composition. Type locality is the Clara Mine, Oberwolfach, Central Black Forest (Germany). Type material is at the Institut für Mineralogie und Petrographie, Universität Stuttgart, Germany. **V.G.**

Denisovite*

Yu. P. Men'shikov, (1984) Denisovite, $(Ca_4(K_{1.4}\ Na_{0.6})_2\ Si_6O_{16}(F,OH)_2$, a new mineral from the Khibina massif. Zapiski Vses. Mineralog. Obshch., 113, 718–723 (in Russian).

Analysis by S. M. Mishina on 2 g gave SiO_2 49.83, TiO_2 0.13, Al_2O_3 0.65, Fe_2O_3 0.55, Nb_2O_5 0.14, Ta_2O_5 0.001, FeO 0.06, MgO 0.35, MnO 0.83, CaO 31.16, SrO 0.35, Na_2O 2.66, K_2O 8.94, Li_2O 0.008, Rb_2O 0.09, P_2O_5 0.04, F 3.95, H_2O^+ 1.16, H_2O^- 0.11, sum 101.06 − $(0 = F_2)$ 1.62 = 99.44%. After deducting small amounts of aegirine, biotite, yuksporite, apatite, and fluorite, this is calculated to the formula $(Ca_{3.90}Sr_{0.02}Mn_{0.09})(K_{1.35}Na_{0.63}Rb_{0.01})Si_{6.00}O_{16}\ (F_{1.07}(OH)_{0.93})$, or $(K,Na)Ca_2Si_3O_8(F,OH)$, a potassium analogue of the formula of pectolite. The DTA curve shows an endothermic effect with max. at 1020°C. When heated to 1200°C the mineral is converted into pseudowollastonite.

X-ray study shows denisovite to be monoclinic, $a = 30.92 \pm 0.07$, $b = 7.20 \pm 0.03$ $c = 18.27 \pm 0.05$Å., $\beta = 95°$, Z = 20 $(K,Na)Ca_2Si_3O_8(F,OH)$, D calc. 2.81, measured 2.76. The strongest X-ray lines (110 given) are 3.65(8)(105), 3.32(10)$(70\bar{4})$, 3.24(9)(015), 3.08(8)(10 · 0 · 0, 415) 3.03(9)(006,505), 2.79(8)(11 · 0 · 0), 2.78(8)$(72\bar{1})$, 2.75(10)(224), 2.69(8)(705).

The mineral occurs in parallel columnar aggregates up to 10–15 cm across, consisting of acicular individuals, associated with nepheline, K-feldspar, aegirine, and small amounts of fluorite, apatite, biotite, and yuksporite, in rischorrite rocks of Eveslogchorr and Yukspor Mts., Khibina massif, Kola Peninsula. Color gray with greenish tint, colorless under the microscope. Luster pearly. Fracture splintery. H 4–5. Optically biaxial, positive, *ns* $\alpha = 1.567$, $\beta = 1.568$, $\gamma = 1.576$ (all ±0.002); $2V$ could not be measured. A parting or cleavage was observed perpendicular to the elongation. The infra-red spectrum is given.

The mineral is named for Alexander Petrovich Denisov, geologist of the Geological Institute, Kola Branch, Acad. Sci. U.S.S.R. Type material is at the Fersman Mineralogical Museum, Moscow, and the Geological Museum, Apatite. **M.F.**

Khamrabaevite*

M. I. Novgorodova, R. G. Yusupov, M. T. Dmitrieva, A. I. Tsepin, A. V. Sivtsov, and A. I. Gorshkov (1984) Khamrabaevite, (Ti,V,Fe)C, a new mineral. Zapiski Vses. Mineralog. Obshch., 113, 697–703 (in Russian).

Electron microprobe analyses of 5 samples from basaltic porphyrite gave (range and average) Ti 68.44–69.50, 69.04; V 5.08–7.67, 6.74; Fe 1.08–2.11, 1.71; Si 0.09–0.12, not detd.; C 20.05 (calc.), sum 96.34–98.44%, corresponding to $(Ti_{0.90}V_{0.08}Fe_{0.02})C_{1.04}$.

The X-ray pattern obtained was that of a mixture with iron (predominant) and magnetite. The strongest lines on a scale of 10 (after correcting for the impurities) (7 lines given) 2.163(10)(200), 1.529(8)(220), 1.299(10)(311), in good agreement with data for TiC (ASTM no. 6-0614). Cubic, space group $Fm3m$, $a = 4.319 \pm 0.005$Å, Z = 8, D calc. 10.01.

Color dark gray, luster metallic, fracture irregular, no cleavage. H above 9; at 100 g load 2290-2230, at 150 g load, 2380–2390 kg/sq. mm. Reflectances are given at 15 wave lengths (nm): 440, 46.2%; 520, 47.2%; 580, 47.5%; 640, 48.4%; 720, 51%.

The mineral occurs as skeletal cubic crystals, 0.1 to 0.3 mm., in suessite of Lower Permian amygdaloidal basaltic porphyrite of the Chatkal Range, Arashan Mts., central Asia. It was also found in granodiorites in the endocontact zone of the Chinorsaisk massif, central Asia, in magnetic "spherules" consisting mainly of magnetite and native iron.

The name is for I. Kh. Khamrabaev, Russian geologist. Type material is at the Fersman Mineralogical Museum, Moscow. **M.F.**

Lapieite*

D. C. Harris, A. C. Roberts, R. I. Thorpe, and I. R. Jonasson (1984) Lapieite $CuNiSbS_3$, a new mineral species from the Yukon territory. Can. Mineral., 22, 561–564.

Analysis by electron microprobe (average of four grains) gave Cu 18.5, Ni 17.1, Fe 0.2, As 0.2, Sb 35.0, S 27.7, sum 98.7%. This

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gives the formula $Cu(Ni_{1.00}Fe_{0.01})(Sb_{0.99}As_{0.01})S_{2.97}$ on the basis of Cu = 1, or, ideally, $CuNiSbS_3$.

X-ray study shows the mineral to be orthorhombic, space group $P2_12_12_1$, a = 7.422(2), b = 12.508(3), c = 4.900(1)Å, Z = 4, D calc 4.966. The strongest X-ray lines (35 given) are 3.178(90)(031), 2.959(100)(201), 1.855(60)(161,400), 1.837(90)(232), 1.601(30)(431). Cleavage parallel to [100] fair.

The mineral occurs in a metamorphic glacial erratic consisting mainly of quartz, magnesite, spinel, and disseminated Cr-bearing mica, associated with Ni-rich pyrite, gersdorffite, polydymite, millerite, tetrahedrite, marcasite, and chalcopyrite. The mineral is opaque, has metallic luster, and forms subhedral grains to 150 μm in length. It is moderately bireflectant and pleochroic greenish gray to gray, and strongly anisotropic with very pale blue to intense yellowish pink rotation tints. H 4.5–5. Reflectance data from three randomly oriented grains are (nm R_1, R_2): (400)33.4–36.5,32.1–35.7; (420)34.0–36.7,32.2–35.8; (440)34.5–36.7,32.5–35.8; (460)34.8–36.8, 33.3–35.8; (480)34.7–36.7,34.5–35.7; (500)34.4–36.6,35.4–35.8; (520)33.9–36.4,35.7–36.5; (540)33.7–36.0,35.4–36.8; (560)33.7–35.5,34.9–36.7; (580) 33.8–34.8,34.3–36.7; (600)33.8–34.3,33.5–36.8; (620)33.4–34.4,32.8–37.0; (640)32.8–34.8,32.1–37.3; (660)32.4–35.6,31.4–37.8; (680)32.2–36.6,31.0–38.8; (700)32.1–37.9,30.9–39.8. Color values are tabulated for the three grains.

The name is for the locality, the Lapie river, Yukon Territory, Canada. Type material is in the Reference Services of the National Mineral Collection, Geological Survey of Canada, Ottawa, Canada. **D.A.V.**

Macaulayite*

M. J. Wilson, J. D. Russell, J. M. Tait, D. R. Clark, A. R. Frazer, and I. Stephen (1981) A swelling hematite/layer-silicate complex in weathered granite. Clay Minerals, 16, 261–278.

M. J. Wilson, J. D. Russell, J. M. Tait, D. R. Clark, and A. R. Frazer (1984) Macaulayite, a new mineral from North-East Scotland. Mineral. Mag., 48, 127–129.

Analysis by microprobe gave SiO_2 11.32, Al_2O_3 4.01, Fe_2O_3 84.67, for an anhydrous recast total 100%. Total water loss was 7.4%, giving the formula $(Fe^{3+}_{44.75}Al_{3.38})Si_{7.95}O_{86}(OH)_4$. The infrared spectrum shows the hydroxysilicate–hematite nature, with absorption bands at 3597, 1052, 858, 647, 520, 438, 304, and 227 cm^{-1}.

X-ray study shows the mineral to the monoclinic, C-centered unit cell $a = 5.038$, $b = 8.726$, $C = 36.342$Å, $\beta = 92°$, Z = 2, D calc. = 4.41. The strongest lines (17 given) are 36.6 (vs oriented mount)(001), 18.16 (vs oriented mount)(002), 2.720(35)(1.1.10), 2.533(100)(130,200), 1.462(35)(060,330). The basal spacing expands on glycerol and ethylene glycol treatment and contracts on heat treatment. Structurally the mineral consists of a double hematite unit bounded on both sides by silicate sheets.

The mineral occurs in the <2 μm fraction of bright red patches of a deeply weathered granite outcrop, associated with kaolinite and illite. It forms subangular platey particles, pale red or yellow, may have basal cleavage, refractive index >1.734.

The name is for the Macaulay Institute for Soil Research. Type material is at the British Museum (Natural History) and the Royal Scottish Museum. **D.A.V.**

Mantienneite*

A.-M. Fransolet, P. Oustrière, F. Fontan and F. Pillard (1984) Mantienneite, a new mineral species from the vivianite deposit of Anloua, Cameroun. Bull. Minéral., 107, 737–744 (in French).

Two wet chemical analyses corrected for admixed impurities of quartz and siderite gave P_2O_5 31.96, TiO_2 9.00, Al_2O_3 10.51, Fe_2O_3 5.63, MnO 0.15, MgO 6.51, CaO 0.30, Na_2O 0.18, K_2O 2.81, H_2O 32.95; sum 100% (H_2O by Penfield) which yields the empirical formula $(K_{0.53}Na_{0.05}O_{0.42})_{\Sigma 1.00}(Mg_{1.43}Fe^{3+}_{0.46}Ca_{0.05}Mn_{0.02})_{\Sigma 1.96}$ $(Al_{1.83}Fe^{3+}_{0.17})_{\Sigma 2.00}Ti_{1.00}(PO_4)_4(OH)_{2.96} \cdot 14.77H_2O$ or ideally $(K_{0.5}\square_{0.5})(Mg_{1.5}Fe^{3+}_{0.5})_2Al_2Ti(PO_4)_4(OH)_3 \cdot 15H_2O$. DTA and TGA results are given. This mineral is the Al-analogue of paulkerrite.

Weissenberg photographs and powder diffraction data show the mineral to be orthorhombic, space group $Pbca$, $a = 10.409(2)$, $b = 20.330(4)$, $c = 12.312(2)$Å, $V = 2.605.3(6)$Å^3, Z = 4, D calc. = 2.25, D meas. = 2.31 g/cm^3. The strongest X-ray lines (40 given) are 10.18(40)(020), 7.41(30)(111), 6.158(100)(002), 3.104(30)(251), 3.076(60)(004), 2.949(30)(104), 2.839(25)(260,252), 2.051(20)(006).

Mantienneite occurs as spheres of radiating fibers up to 1 mm in diameter. It is yellow-brown with a bright luster. The brittle fibers have a perfect {001} and a poor {010} cleavage. Its optical properties are biaxial negative; $\alpha = 1.564$, $\gamma = 1.598$, $2V = 50$ to 60°; very weak pleochroism with X = colorless and Z = very pale yellow; $X \parallel b$, $Z \parallel a$; dispersion distinct $r > v$.

The new mineral is associated with quartz, siderite and kaolinite as the matrix of sandy layers intercalated in black shales of lacustrine origin. The name honors Dr. Joseph Mantienne, B.R.G.M., Orléans, France. Type material is at the Ecole National Supérieure des Mines de Paris. **J.D.G.**

Mopungite*

S. A. Williams (1985) Mopungite, a new mineral from Nevada. Mineralogical Record, 16, 73–74.

Analysis of the mineral gave Na_2O 12.8, Sb_2O_5 65.2, H_2O 22.0, sum 100.0%. This gives the formula $Na_{1.01}Sb_{0.99}(OH)_6$, ideally $NaSb(OH)_6$. The mineral is soluble in hot water but not in cold wter. It dissolves readily in cold dilute tartaric acid, and decomposes in HCl and HNO_3. The mineral belongs to the stottite group.

X-ray study shows the mineral to be tetragonal, space group $P4_2/n$, unit cell $a = 7.994$, $c = 7.859$Å, D calc. 3.264, meas. 3.21. The strongest lines (35 given) are 4.581(100)(111), 3.985(80)(200), 1.629(50), 1.325(50), 1.265(50), 1.205(70).

The mineral occurs as an oxidation product of stibnite in quartz-fluorite–stibnite vein material from the Mopung Hills, Nevada. It forms encrustations comprising small pseudocubic crystals 0.2–0.3 mm on an edge, rarely acicular, associated with stibiconite, senarmontite, romeite, and tripuhyite. The mineral is colorless to milky white with bright glassy luster, dull frosted crystal faces, no cleavage, H = 3. Optically uniaxial, negative, ns $\varepsilon = 1.605$, $\omega = 1.614$.

The name is for the locality. Type material will be provided to the British Museum (Natural History). **D.A.V.**

Moreauite*

M. Deliens and P. Piret (1985) Uranyl and aluminum phosphates from Kobokobo. VII Moreauite, $Al_3UO_2(PO_4)_3(OH)_2 \cdot 13H_2O$, a new mineral. Bull. Minéral., 108, 9–13 (in French).

Electron microprobe analyses of five grains gave Al_2O_3 20.4, UO_3 38.9, P_2O_5 27.2 and H_2O 13.5 (difference) which yields the empirical formula $Al_{3.05}U_{1.04}P_{2.92/}H_{11.43}O_{20.72}$ on the basis of 15 oxygens in the anhydrous part. TGA gave H_2O 27 wt.% which yields the ideal formula given above for fully hydrated moreauite.

Single crustal and powder X-ray diffraction studies show the mineral to be monoclinic, space group $P2_1/c$, $a = 23.41(6)$, $b = 21.44$, $c = 18.34(3)$Å and $\beta = 92.0(1)°$, $V = 9199(33)$Å^3, Z = 16, D calc = 2.61, D meas. = 2.64 g/cm^3. The strongest X-ray diffraction lines (26 given) are: 14.02(60)(011), 11.69(80)(200), 10.80(100)(020), 9.13(70)(002), 5.43(40)(040), 4.51(40)$(\bar{1}04)$, 3.895(40)(052), 3.486(40)(044), 3.043(60)$(\bar{1}06)$, 2.931(70)(206).

Moreauite occurs as greenish yellow nodules and books of plates flattened on (100) and sometimes elongated along *b* up to 0.2 mm. It has a good {100} cleavage. Optically it is biaxial negative with: $\alpha = 1.540(3)$, $\beta = 1.552(2)$, $\gamma = 1.558(2)$ and $2V$ calc = 70°; $X \sim a^*$, $Y = b$ and $Z \sim c$; negative elongation and parallel extinction.

Moreauite is associated with furongite, ranunculite and phosphosiderite. The name honors the Belgian mineralogist, Professor Jules Moreau. The holotype and 2 cotypes are deposited at the Musée Royal de l'Afrique Centrale in Tervuren, Belgium. **J.D.G.**

Mushistonite*

N. K. Marshukova, A. B. Pavlovskii, and G. A. Sidorenko (1984) Mushistonite, $(Cu,Zn,Fe)Sn(OH)_6$, a new tin mineral. Zapiski Vses. Mineralog. Obshch., 113, 612–617 (in Russian).

An abstract of this mineral (then unnamed) was published in Am. Mineral. 65, 1069–1070 (1980). Microprobe analyses of 6 grains gave Sn 37.0–42.0, Cu 10.1–11.9, Zn 2.7–9.0, Fe 2.6–9.2, Ag none to 0.2%, giving the formula above. Cu is the major divalent cation; the mineral is a member of the schoenfliesite group. The formulas calculated do not agree with any of the 4 previously given, and some do not agree with the analyses given; for example, all show Zn > Fe; thus Fe 9.2, Zn 2.7% is calculated to give $Zn_{0.46}Fe_{0.11}$ in the formula. Readily soluble in dilute HCl.

X-ray study shows the mineral to be cubic, space group *Pn*3*m*, $a = 7.735 \pm 0.01$Å. for Zn > Fe; $a = 7.705 \pm 0.16$Å. for Fe > Zn; Z = 4. The strongest X-ray lines (10 given) are 3.880(100)(200), 2.740(50)(220), 1.729(35)(420) for Zn > Fe, 3.84(100)(200), 2.730(48)(220), 1.724(24)(420) for Fe > Zn. Hardness 4–4.4 (240–254 kg/sq. mm.), reflectance at 580 nm, 10.2 and 9.6%.

The mineral occurs in the oxidation zone of the Mushiston deposit, Tadzhikistan, U.S.S.R., associated with varlamoffite, as zoned concentric deposits, replacing stannite. The name is for the deposit. Type material is at the Fersman Mineralogical Museum, Moscow. **M.F.**

Nanekeveite

K. Chihara, M. Komatsu, and T. Mizota (1984) (abstract; title not given), International Mineralog. Assoc., 11th Meeting, Novosibirsk, 1978, vol. 1, 62. (abstract in Zapiski Vses. Mineralog. Obshch., 113, 378).

Analysis gave SiO_2 35.12, Nb_2O_5 1.42, TiO_2 12.48, ZrO_2 0.19, Al_2O_3 0.27, FeO 4.75, MgO 0.03, MnO trace, CaO trace, SrO 5.85, BaO 31.31, RE_2O_3 1.12, Na_2O 2.74, K_2O 0.94, H_2O^- 0.47, H_2O^+ 2.59, sum = 99.28 wt.%. This corresponds to $(Na_{0.97}K_{0.03})$ $(Ba_{2.76}Sr_{0.76}Na_{0.23}Fe^{3+}_{0.12}Mg_{0.01})$ $(Fe^{3+}_{0.79}Nb_{0.13}Ti_{0.13}Zr_{0.02})$ $(Si_{7.94}Al_{0.06})O_{24.66}(OH)_{3.02}$.

The mineral is orthorhombic, *Pcam* or *Pca*2, with $a = 9.777$, $b = 10.517$, and $c = 22.392$Å. X-ray powder data are not given but are stated to resemble those of joaquinite. Cleavage (001) perfect, color yellowish, H 5 1/2, D 3.62 (meas), 3.87 (calc). Optically biaxial, positive, $\alpha = 1.707$, $\gamma = 1.778$, $2V = 42$-48°, pleochroism weak, *X* and *Y* colorless, *Z* pale yellow. Occurs as aggregates up to 1 cm in a magnesioriebeckite-quartz-phlogopite-albite dike cutting serpentinite, near Ohmi, Niigata Pref., Japan, with ohmilite, benitoite, and leucosphenite. Origin of the name is not stated.

Discussion

This is apparently bario-orthojoaquinite. **M.F.**

Perlialite*

Yu. P. Men'shikov, (1984) Perlialite, $K_9Na(Ca,Sr)Al_{12}Si_{24}O_{72} \cdot 15H_2O$, a new potassian zeolite from the Khibina massif. Zapiski Vses. Mineralog. Obshch., 113, 607–612 (in Russian).

Chemical analysis by T. S. Romanova on 300 mg gave SiO_2 50.72, TiO_2 0.01, Al_2O_3 20.13, Fe_2O_3 0.92, FeO 0.21, MgO 0.07, SrO 1.65, CaO 0.96, Na_2O 0.98, K_2O 14.86, H_2O 9.52, sum 100.03%, corresponding to the formula $K_{9.07}Na_{0.91}$ $(Ca_{0.49}Sr_{0.46}Fe_{0.08})$ $(Al_{11.35}Fe^{+3}_{0.33}Mg_{0.05})$ $Si_{4.27}O_{72.12} \cdot 15.2\ H_2O$. The D.T.A. curve shows an endothermic break at 200°C, corresponding to the loss of most of the zeolitic water at 20–450°C, followed by slow loss up to 800°C. No change in X-ray pattern was found up to 900°C; at 950–1000°C it became amorphous; at 1100–1150°C, it gave the X-ray pattern of leucite.

The X-ray pattern of perlialite resembles those of the synthetic zeolites L and K, Ba-G. It is indexed on a hexagonal cell, space group *P*6/*mmm*, $a = 18.49 \pm 0.03$, $c = 7.51 \pm 0.01$Å., D. meas. = 2.14 ± 0.05, D. calc. 2.15. The strongest X-ray lines (99 given) are 16.0(10)(100), 6.0(7)(210), 4.62(10)(220), 3.94(7)(221), 3.20(9)(500), 2.674(8)(600), 1.705(7)(821), 1.545(8)(921), 1.306(10)(605).

Perlialite is white, luster pearly. Hardness 4-5. Extinction parallel, *ns* $\alpha = 1.483$, $\gamma = 1.488$ (± 0.002), elongation positive. The infra-red spectrum is given.

The mineral occurs in radiating-fibrous aggregates up to 2 cm. in diameter in nepheline-microcline and sodalite-astrophyllite veins and in nepheline-feldspar and sodalite-microcline pegmatites of Mts. Eveslogchorr and Yukspor, Khibina massif, Kola Peninsula, U.S.S.R.. Associated minerals include pectolite, kalsilite, aegirine, wadeite, and yuksporite.

The name is for *Li*ly *Al*ekseevna *Per*ekrest, instructor in mineralogy of the Kirov Mining Technical School. Type material is preserved at the Fersman Mineralogical Museum, Moscow, and the Geol. Museum, Kola branch, Acad. Sci. U.S.S.R., Apatit. **M.F.**

Petrovskaite*

G. V. Nesterenko, A. I. Kuznetsova, N. A. Pal'chik, and Yu. G. Lavrent'ev (1984) Petrovskaite, AuAg(S,Se), a new selenium-containing sulfide of gold and silver. Zapiski Vses. Mineralog. Obshch., 113, 602–607 (in Russian).

Microprobe analyses (7) gave Au 55.9–60.5, av. 58.6; Ag 29.8–33.3, av. 31.0; S 9.08–9.73, av. 9.54; Se 1.00–1.84, av. 135, sum 99.9–101.1, av. 100.5, corresponding to the average formula, $Au_{0.99}Ag_{0.96}(S_{0.99}Se_{0.06})$. The mineral does not react with $FeCl_3$, KOH, or HCl; a brown film is formed with 1 : 1 HNO_3.

The X-ray pattern is similar to that of synthetic AuAgS. It is indexed on a monoclinic cell, space group *P*2/*m*, *P*2, or *Pm*, with $a = 4.943(9)$, $b = 6.670(9)$, $c = 7.221(9)$Å., $\beta = 95.68°$, Z = 4, D calc. 9.5. Intensities of the 28 lines are not given. From the intensities given for the synthetic compound, the strongest lines of the mineral are 2.77(10)(102,112,120), 2.63(5)$(12\bar{1})$, 2.39(4)(003,201), 2.254(4)$(013,12\bar{2},21\bar{1})$.

The mineral is dark gray to black, streak dark gray, sometimes with a reddish-brown tint, luster dull, metallic. Brittle. Hardness 39.9–47.8 kg/sq.mm. = 2–2.5 Mohs. In section resembles argentite. Reflectances at 440 to 740 nm. show variation from 26.6 to 28.9% with max. at 560, min. at 680 nm.

Petrovskaite occurs in the lower part (depth 60–65 m) of the Maikain gold deposit, central Kazakhstan, as fine-grained rims (10–20 mm) on native gold, also associated with chlorargyrite.

The name is for Nina Petrovskaya, Russian mineralogist. Type material is at the Central Siberian Geological Museum, Novosibirsk. **M.F.**

P-ourayite

E. Makovicky and S. Karup-Møller (1984) Ourayite from Ivigtut, Greenland. Can. Mineral., 22, 565–575.

Analysis by electron microprobe was useful only in estimating the composition of the mineral, owing to its fine-grained character. Averaging of analyses that approximate the mineral gives Ag 12.2, Cu 0.8, Pb 26.3, Bi 44.3, S 17.0, sum 100.6%. Combined with modal and crystal chemical considerations, the empirical formula is $Pb_{2.8}Ag_{3.6}Bi_{5.6}S_{13}$. The mineral is a Ag–Pb–Bi sulfosalt of the lillianite homologous series.

Single-crystal X-ray study shows the mineral to be orthorhombic, space group *Pbnm* or *Pbn*2$_1$, $a = 13.15(2)$, $b = 44.17(4)$, $c = 4.05(2)$Å.

The mineral occurs in fine-grained ore fragments from the Ivigtut cryolite deposit. It forms very fine (100) exsolution lamellae in a matrix of *B*-centered ourayite, which is in turn associated with berryite, aikinite, galena, matildite, chalcopyrite, pyrite, native bismuth, and native gold. The mineral exhibits extinction parallel to that of the ourayite matrix.

Specimens containing the mineral are denoted as 191/1976, 29/1978 and 30/1978 in the Geological Museum, Copenhagen.

Discussion

Although the authors indicate that *P*-ourayite is merely a "working name," the mineral is not an IMA-approved species and should not have been named. **D.A.V.**

Retzian-(La)*

P. J. Dunn, D. R. Peacor, and W. B. Simmons (1984) Retzian-(La), a new mineral from Sterling Hill, Sussex County, New Jersey. Mineral. Mag., 48, 533–535.

Analysis by electron microprobe gave MnO 25.2, MgO 3.7, ZnO 1.2, As_2O_5 26.5, La_2O_3 10.6, Ce_2O_3 8.8, Nd_2O_3 8.2, Pr_2O_3 5.1, Sm_2O_3 2.2, Y_2O_3 2.5, H_2O 7.7 (est.), sum 101.7%. This gives the formula based on two divalent cations $(Mn_{1.54}Mg_{0.40}Zn_{0.06})(La_{0.28}Ce_{0.23}Nd_{0.21}Pr_{0.13}Y_{0.10}Sm_{0.05})As_{1.00}O_{4.15}(OH)_{3.70}$. The mineral is the La-dominant member of the retzian series, and ideally is $Mn_2La(AsO_4)(OH)_4$.

Single-crystal X-ray study shows the mineral to be orthorhombic, space group *Pban*, $a = 5.670(7)$, $b = 12.01(1)$, $c = 4.869(8)$Å, Z = 2, D meas. > 4.2, calc. 4.49. The strongest powder diffraction lines (32 given) are 3.51(80)(111), 2.715(100)(131), 1.848(50)(061), 1.456(40).

The mineral forms 0.5 mm euhedral pseudohexagonal crystals composed of the forms {001}, {010}, {110}, and {150}. It occurs on a fracture surface in a specimen of calcic willemite-franklinite ore. It is reddish-brown, has vitreous luster, no cleavage. H about 3–4. It does not fluoresce under UV light. Optically biaxial, positive, *ns* $\alpha = 1.766(5)$, $\beta = 1.773(5)$, $\gamma = 1.788(5)$, $2V = 82(9)°$. Dispersion strong, $r > v$; orientation $X = c$, $Y = b$, $Z = a$. Weak patchy pleochroism is pale brown to violet-brown. Absorption $Z > Y > X$.

The name is in accordance with the standard convention of naming rare-earth analogues of known species. Type material is in the Smithsonian Institution. **D.A.V.**

Sverigeite*

P. J. Dunn, D. R. Peacor, W. B. Simmons, and R. V. Gaines (1984) Sverigeite, a new tin beryllium silicate mineral from Långban, Värmland, Sweden. Geologiska Förenengens i Stockholm Förhandlingar, 106, 175–177.

Analysis by electron microprobe (except Be and H_2O) gave SiO_2 33.5, FeO 0.3, ZnO 1.2, MgO 8.1, MnO 11.8, Na_2O 6.1, BeO 9.7, SnO_2 28.5, H_2O 1.2, sum 100.4%. This gives the formula $Na_{4.18}Mg_{4.26}Mn^{2+}_{3.53}Fe^{2+}_{0.09}Zn_{0.31}Be_{8.23}Sn_{4.01}Si_{11.83}O_{48.77}H_{2.83}$. The ideal formula is $NaMgMnBe_2SnSi_3O_{12}(OH)$.

X-ray study shows the mineral to be orthorhombic, space group *Ibmm* or *Ibm*2, $a = 6.818(6)$, $b = 13.273(8)$, $c = 10.815(8)$Å, Z = 4, D calc. 3.61; meas. 3.60. The strongest lines (43 given) are 6.63(50)(020), 5.77(70)(101), 4.35(70)(121), 2.98(60)(220), 2.884(100)(202), 2.826(90)(042), 2.706(50)(004), 2.644(60)(222).

The mineral occurs on a mine dump specimen as irregular platey segregations up to 10 mm in a calcite matrix, associated with mimetite, an amphibole, and jacobsite. Crystals up to 2 mm long are elongated on [001]. The mineral is yellow, light yellow streak, H about 6.5, vitreous luster, dull crystal faces, cleavage {010} perfect. Optically biaxial, positive, *ns* $\alpha = 1.678(4)$, $\beta = 1.684(4)$, $\gamma = 1.699(4)$, $2V = 67(4)°$, dispersion strong $r > v$, pleochroism moderate X = yellow, $Y \simeq Z$ = pale yellow, absorption $X > Y \simeq Z$. Orientation $Z = b$, XY plane parallel to the prominent cleavage. The mineral does not fluoresce in UV light.

The name is for the country in which it was found. Type material is at the Smithsonian Institution. **D.A.V.**

Tuperssuatsiaite*

S. Karup-Møller and O. V. Petersen (1984) Tuperssuatsiaite, a new mineral species from the Ilímaussaq intrusion in South Greenland. Neues Jahrb. Mineral Monatsh., 501–512.

Analysis by electron microprobe gave, on average, Si 26.33, Al 0.25, Fe 14.43, Mn 4.11, Mg 0.63, Zn 0.65, Na 2.40, K 0.65, O 39.17, sum 88.62%. This gives the formula $(Na_{0.88}K_{0.14})_{\Sigma 1.02}(Fe_{2.18}Mn_{0.63}Mg_{0.22}Zn_{0.08})_{\Sigma 3.11}(Si_{7.92}Al_{0.08})_{\Sigma 8.00}O_{20}(OH)_{1.38}(OH_2)_4 \cdot 0.39H_2O$. The suggested ideal formula is $NaFe_3Si_8O_{20}(OH)_2(OH_2)_4 \cdot H_2O$. Analyses of a Zn-rich variety, with up to 20 wt.% Zn, are also given. The DTA curve shows one endothermic peak at room temperature caused by the release of absorbed water. The mineral recrystallizes around 250°C and just below 700°C. Infrared analysis shows absorption bands caused by structural H_2O and (OH), zeolitic H_2O, absorbed H_2O, and SiO_4 tetrahedra. The mineral belongs to the palygorskite group.

X-ray study shows the mineral to be monoclinic, space group *C*2/*m*, unit cell $a = 13.729(30)$, $b = 18.000(10)$, $c = 4.828(30)$Å, $\beta = 104.28(10)°$. The strongest lines (27 given) are 10.82(100)(110), 3.395(30)(131), 2.638(40)(510), 2.544(30)($44\bar{1}$), 2.510(30)(170), 2.235(30)($13\bar{2}$).

The mineral occurs in the Ilímaussaq intrusion, Greenland, as a cavity filling in late veins with adularia, natrolite and aegirine, and in late natrolite-albite bodies. It forms mm- to cm-sized red-brown fan shaped aggregates or rosettes of fine fibers. The fibers are vitreous, transparent, slightly pleochroic with parallel extinction, X and Y colorless, Z yellow-brown. Optically biaxial, positive, *ns* $\alpha \simeq 1.54$, $\beta \simeq 1.56$, $\gamma \simeq 1.58$, $2V$ large. It does not fluoresce.

The name is for the bay of Tuperssuatsiait, near the occurrence. Type material is at the Geological Museum, University of Copenhagen, Denmark. **D.A.V.**

Uchucchacuaite*

Y. Moëlo, E. Oudin, P. Picot and R. Caye (1984) Uchucchacuaite, $AgMnPb_3Sb_5S_{12}$, a new mineral of the andorite series. Bull. Minéral., 107, 597–604 (in French).

Electron microprobe analysis gave Pb 34.8, Sb 34.4, Ag 5.9, Mn 2.8, Fe 0.2, S 21.1, Se 0.3, sum 99.5% corresponding to $Ag_{0.98}(Mn_{0.91}Fe_{0.06})_{\Sigma 0.97}Pb_{3.04}Sb_{5.09}(S_{11.93}Se_{0.07})_{\Sigma 12}$ or ideally, $AgMnPb_3Sb_5S_{12}$.

The X-ray powder pattern is indexed on the basis of it being in the andorite series with orthorhombic symmetry. The lack of systematic absences indicate possible space group *Pmmm*, *P*222 or *Pmm*2 with $a = 12.67$, $b = 19.32$, $c = 4.38$Å, Z = 2, D calc. = 5.61 g/cm^3. The strongest X-ray lines (17 are given) are 3.80(30)(121), 3.49(30)(131), 3.30(100)(250), 2.90(80)(321,051), 2.75(30)(331), 2.29(10)(171), 2.19(10)(511,002), 2.08(30)(531,181).

The grey, metallic mineral occurs as anhedral grains and subhedral crystals to 200 μm. In reflected light it is anisotropic; polysynthetic twinning along one direction indicates a true monoclinic symmetry. Maximal and minimal reflectances in air [R_M,Rm(λ)]: 44.2,36.3(420); 43.9,35.0(480); 43.3,34.1(540); 42.4,33.2(600); 41.2,32.3(660); 39.7,30.8(720) and 39.2,30.0(780). The Vickers microhardness (VHN_{100}) is about 168 kg/mm^2.

The name is for the mineral deposit at Uchuc-Chacua, Peru. Type material is at the Ecole Nationale Supérieure des Mines de Paris. **J.D.G.**

unnamed Ca-analogue of agardite

A. Aruga and Nakai, I. (1985) Structure of Ca-rich agardite, $(Ca_{0.40}Y_{0.31}Fe_{0.09}Ce_{0.06}La_{0.04}Nd_{0.01})Cu_{6.19}$ $[(AsO_4)_{2.42}(HAsO_4)_{0.49}](OH)_{6.38} \cdot 3H_2O$. Acta. Cryst., C41, 161–163.

Microprobe analysis yielded Cu 48.97, As 32.22, Y 3.42, Ca 2.57, Ce 1.01, Fe 0.73, La 0.70, Nd 0.13 wt.%, with Gd = trace. This is calculated on the basis of 21 oxygens as: $(Ca_{0.40}Y_{0.31}Fe_{0.09}Ce_{0.06}La_{0.04}Nd_{0.01})Cu_{6.19}$ $[(AsO_4)_{2.42}(HAsO_4)_{0.49}](OH)_{6.38} \cdot 3H_2O$, with water assumed. The mineral occurs in pale green hexagonal crystals, space group $P6_3/m$, with $a = 13.583(2)$, and $c = 5.895(1)$Å, with Z = 2. The specimen is from Setoda, Hiroshima, Japan.

Discussion

This is an unrecognized new species, the Ca-analogue of agardite. Additional physical and paragenetical data are needed. The phase should be named in accordance with Levinson's Rules when submitted to the Commission on New Minerals and Mineral Names, I.M.A. **P.J.D.**

unnamed sulfosalts

V. V. Breskovska, N. N. Mozgova, N. S. Bortnikov, and A. I. Tsepin (1980) Chlorine-bearing sulfosalts from the Madjarovo polymetallic deposit, Bulgaria. International Mineralog. Assoc., 11th Session, Novosibirsk, Sulfosalts Vol., 83–89 (in Russian).

Compositions are given as follows: Phase A: $Pb_3Sb_8S_{14}Cl_{4.5}$; Phase B: $Pb_7Sb_8S_{16}Cl_{3.4}$; Phase C: $Pb_2Sb_2S_{4.76}Cl_{0.31}$.

N. S. Bortnikov, N. N. Mozgova, A. I. Tsepin, and V. V. Breskovska (1979) First attempt at synthesis of chlorosulfoantimonites of lead. Doklady Akad. Nauk SSSR, 244, 955–958 (in Russian).

The phases listed above were synthesized. Strongest lines of the powder pattern are: Phase A: 3.40 (100), 2.85 (50), 2.79 (45), 2.09 (50); Phase B: 3.85 (100), 3.75 (50), 3.38 (90), 2.73 (50); Phase C: 3.96 (6) 3.54 (10), 2.81 (7), 2.08 (9). **M.F.**

NEW DATA

Betpakdalite

K. Schmetzer, B. Nuber and G. Tremmel (1984) Betpakdalite from Tsumeb, Namibia: mineralogy, crystal chemistry and structure. Neues Jahrb. Mineral., Monatsh., 393–403 (in German).

Microprobe analysis of the mineral gave Na_2O 0.20–0.48, K_2O 0.51–3.52, CaO 5.21–6.10, ZnO 0.38–0.96, Fe_2O_3 11.3–12.6, WO_3 0.55–1.45, MoO_3 52.3–55.2, As_2O_5 9.0–10.1 wt.%, H_2O balance, corresponding to a crystal structure determination supported formula of $H_{6-x}[K(H_2O)_6]_x[Ca(H_2O)_6]_4[Mo_{16}As_4Fe_6O_{74}] \cdot 4H_2O$ with $O \leq x \leq 2$.

Single crystal studies show the mineral to be monoclinic, space group $C2/m$, unit cell $a = 19.44(1)$, $b = 11.096(7)$, $c = 15.25(1)$Å, $\beta = 131.28(4)°$. $R = 8.8\%$. The strongest X-ray lines (27 given) are 8.91(100)($\bar{1}$11), 7.30(50)(200), 11.49(40)(001), 3.645(40)(400). The general, structure building unit consists of Fe–O and Mo–O octahedra and an As–O tetrahedron forming an open framework structure with voids containing $[K(H_2O)_6]$, $[Ca(H_2O)_6]$ polyhedra, and with chains of Fe–As–Mo–O polyhedra parallel to (001).

The mineral forms yellow, transparent, octahedral crystals ({001}, {20$\bar{1}$}, {011}) up to 0.2 mm in size, single or aggregated on scorodite, associated with chalcocite, digenite, and quartz. Also massive or thin coatings, with hematite, quartz, scorodite, chalcocite, powellite, kaolinite, adamite, wulfenite, hidalgoite and an unknown Zn–Fe–Al-arsenate. Cleavage ∥ (001) very good. Optically biaxial, positive, $\alpha = 1.782(2)$, $\beta = 1.797(2)$, $\gamma = 1.850(2)$; *Y* parallel *b*. Optic axis angles are $2V_D = 60(1)$, $2V_{480} \sim 88$, $2V_{680} \sim 53°$; extremely inclined dispersion of the optical axes.

The mineral occurs on samples from the second oxidation zone in the Tsumeb Mine, South-West Africa (Namibia). **V.G.**

Cornubite

N. Sieber, W. Hofmeister, E. Tillmanns and K. Abraham (1984) New mineral data for copper phosphates and arsenates from Reichenbach/Odenwald. Fortschr. Miner., 62, Beiheft 1, 231–233 (in German).

Microprobe analysis of single crystals gave CuO 58.60, Al_2O_3 32.01, P_2O_5 0.25, Fe_2O_3 0.32, SiO_2 0.34, Al_2O_3 0.15, H_2O 5.27, sum 96.94 wt.%, corresponding to $Cu_{5.03}(As_{1.903}P_{0.024}Fe_{0.027}Al_{0.020}Si_{0.038})_{\Sigma 2.013}O_8(OH)_4$, or $Cu_5(OH)_4(AsO_4)_2$.

X-ray study shows the triclinic ($P\bar{1}$) mineral to have $a = 6.121(1)$, $b = 6.251(1)$, $c = 6.790(1)$Å, Z = 1; $\alpha = 92.93(1)$, $\beta = 111.30(1)$, $\gamma = 107.47(1)°$, D_x 4.85 calc.

Atomic coordinates ($R = 0.033$, F_0: 2436) and Cu–O distances smaller than 3Å are given.

Crystals are from a silicified quartz (originally barite, VG.) vein near Reichenbach in the Odenwald, Germany. **V.G.**

Edingtonite

F. Mazzi, E. Galli, and G. Gottardi (1984) Crystal structure refinement of two tetragonal edingtonites. Neues Jahrb. Mineral. Monatsh., 373–382.

Data from previous studies of the zeolite edingtonite, $Ba_2(Al_4Si_6O_{20}) \cdot 8H_2O$, are reviewed, and the results of the structure refinements of two samples, from Old Kilpatrick, Dumbartonshire, Scotland, and Ice River, British Columbia, Canada, are reported. Traditionally, edingtonite has been found to be either metrically tetragonal with biaxial optics or fully orthorhombic. It has generally been treated as an orthorhombic mineral possessing nearly perfect (Si,Al)-order.

Chemical and X-ray analyses yielded the following results for the Canadian and Scottish specimens, respectively: $(Ba_{1.82}Sr_{0.01})(K_{0.11}Na_{0.03})(Al_{3.90}Si_{6.13}O_{20})\cdot 7.30H_2O$, $a = 9.581(5)$, $c = 6.526(3)$Å, space group $P\bar{4}2_1m$; $(Ba_{1.87}Ca_{0.02})(K_{0.05}Na_{0.06})(Al_{3.88}Si_{6.12}O_{20})\cdot 6.77H_2O$, $a = 9.584(5)$, $c = 6.524(3)$Å, space group $P\bar{4}2_1m$. The strongest lines in the powder XRD pattern of the sample from Ice River, Canada are (*d* in Å, *I*/*I*o, *hkl*): 4.81(75)(020,200), 4.70(47)(111), 3.587(100)(121,211), 3.392(46)(220), 3.027(47)(130,310); 2.261(75)(330).

Structure refinements were performed in space group $P\bar{4}2_1m$ to $R = 0.03$ (1985 independent reflections) and $R = 0.039$ (2565 independent reflections) for the Ice River and Old Kilpatrick samples, respectively. In both cases, the resulting tetrahedral bond lengths were interpreted as indicators of nearly complete disorder in the (Si,Al) distribution.

Discussion

The authors conclude that two types of edingtonite occur, "orthorhombic edingtonite" and "tetragonal edingtonite". The former, exemplified by samples from Böhlet Mine, Sweden, [Galli (1976) Acta Cryst. B32, 1623] is characterized by orthorhombic cell parameters [$a = 9.539(5)$, $b = 9.652(5)$, $c = 6.512(3)$Å], splitting of the (*hkl*) and (*khl*) powder XRD peaks, apparent (Si,Al) order, and an IR spectral profile with two peaks in the range 1200–1900 cm^{-1} and one sharp peak in the range 760 cm^{-1}. The latter type of edingtonite is characterized by tetragonal metrics (within experimental error), absence of peak splitting, apparent (Si,Al) disorder, and an IR profile with five peaks in the range 1200–1900 cm^{-1} and only a small peak around 760 cm^{-1}. There is, however, no difference between the thermal curves of the two types of edingtonite, and both types are optically biaxial negative.

It should be noted that, under this system of classification, the original type specimen [described by Haidinger (1825) Edinburgh J. Sci, 3, 316] would be a "tetragonal edingtonite", while the generally accepted description of edingtonite would correspond to that of "orthorhombic edingtonite". At the same time, the authors state that their "proposal of naming the two samples studied here tetragonal edingtonites does not necessarily mean that they are absolutely tetragonal: more detailed studies could demonstrate a small deviation from the highest symmetry; their optical biaxiality is already an evidence for such a deviation." In new of these remaining uncertainties, such terms are "ordered" and "disordered" edingtonite might be considered as alternatives to "orthorhombic" and "tetragonal" edingtonite. **J.A.Z.**

Editor's Note

See also reports by M. Akizuki on origin of order-disorder in stilbite and harmotome (70; 814–828).

Englishite

P. J. Dunn, R. C. Rouse, and J. A. Nelen (1984) Englishite: new chemical data and a second occurrence, from the Tip Top pegmatite, Custer, South Dakota. Can. Mineral., 22, 469–470.

The new determination of the chemical composition of englishite from the type locality at Fairfield, Utah, and from a second occurrence at the Tip Top pegmatite, South Dakota, has resulted in a revision of the chemical formula of this species. An average of three microprobe analyses of the Utah material yielded Al_2O_3 21.5, FeO (total) 0.0, MgO 0.1, CaO 15.5, K_2O 4.0, Na_2O 1.6, P_2O_5 41.6, H_2O 15.1 (determined on a separate sample by the Penfield method), sum 99.4%. This corresponds to $Na_{1.83}K_{3.01}(Ca_{9.79}Mg_{0.09})_{\Sigma 9.88}Al_{14.94}(PO_4)_{20.77}(OH)_{7.11}\cdot 26.14H_2O$ (Z = 4), or ideally $Na_2K_3Ca_{10}Al_{15}(PO_4)_{21}(OH)_7\cdot 26H_2O$. The density calculated from this formula (2.69 g/cm^3) agrees closely with a new observed value (2.68 g/cm^3). Analyses of englishite from South Dakota yielded similar but less reliable data due to the nature of the material. Determination of the crystal structure of englishite is needed to further confirm this new empirical formula. **J.E.S.**

Letovicite

B. L. Davis and L. R. Johnson (1984) The true unit cell of ammonium hydrogen sulfate, $(NH_4)_3H(SO_4)_2$. J. Appl. Cryst., 17, 331–333.

The examination of synthetic letovicite by X-ray powder diffraction and Laue photography indicates that the unit cell is triclinic instead of monoclinic. The unit cell is $P1$ or $P\bar{1}$ with $a = 5.87(1)$, $b = 10.17(3)$, $c = 8.27(1)$Å, $\alpha = 101.1(4)$, $\beta = 111.1(1)$, $\gamma = 89.9(2)°$, $V = 450.7$Å^3, Z = 2, D calc. 1.82, D meas. 1.83 g/cm^3. Pseudohexagonal symmetry is present along [001].

Several weak peaks were noted in the powder diffraction patterns that were not reported in the powder diffraction file. The powder data collected in this study is in the JCPDS Diffraction File No. 35-1500 for ammonium hydrogen sulfate. **R.H.L.**

Lotharmeyerite

A. R. Kampf, J. E. Shigley, and G. R. Rossman (1984) New data on lotharmeyerite. Mineral. Record, 15, 223–226.

Lotharmeyerite [Am. Miner., 68, 849 (1983)] is reported from a new occurrence at the type locality, the Ojuela mine, Mapimi, Durango, Mexico. The mineral occurs as predominately tapering, blade-shaped crystals, 0.1–0.2 mm up to 1 mm in crude parallel growths.

Microprobe analyses gave CaO 11.4, 11.2, ZnO 14.2, 14.2, Mn_2O_3 18.7, 20.5; Fe_2O_3 —, —, As_2O_5 47.0, 46.7, H_2O (by difference) 8.7, 7.4, total 100.00, 100.00%. X-ray powder diffraction data is comparable to the original description.

The mineral is determined to be monoclinic, space group $C2/m$, $C2$ or Cm, $a = 9.066(4)$, $b = 6.276(2)$, $c = 7.408(2)$Å, $\beta = 116.16(3)°$. D (meas) = 4.23(5) g/cm^3, D calc. = 4.29 g/cm^3. Optically biaxial positive, $\alpha = 1.797(5)$, $\beta = 1.804(5)$, $\gamma = 1.815(5)$, $2V \approx 80°$, $r \gg v$. Strongly pleochroic with X = orange-yellow, Y = red-brown, Z = yellow-orange. **J.A.F.**

Mpororoite and anthoinite

S. Matsubara, A. Kato, and K. Nagashima (1984) Mpororoite and anthoinite from the Kara mine, Tasmania. Mineralogical Magazine, 48, 397–400.

The first occurrence of mpororoite and anthoinite from outside the African continent is reported. The two hydrous tungstates of aluminum coexist in a contact metasomatic scheelite deposit. Chemical analysis of the mixture yielded WO_3 65.92, SiO_2 3.04, Al_2O_3 13.90, Fe_2O_3 1.34, CaO trace, H_2O^+ 13.32, H_2O^- 3.12, sum 100.64%. These results indicate that Fe_2O_3 is not essential in mpororoite, that the ideal formulae of mpororoite and anthoinite, respectively, should be $WAlO_3(OH)_3 \cdot 2H_2O$ and $WAlO_3(OH)_3$, and that the unit cells must be at least doubled to meet their unit cell contents.

Discussion

The reported formulae differ from the originally proposed compositions, $(W,Al)(O,OH)_3 \cdot H_2O$ and $(W,Al)(O,OH)_3$, of mpororoite and anthoinite. Although new, augmented cell dimensions are not given, the original parameters proposed were $a = 8.27$, $b = 9.32$, $c = 16.40$Å, $\beta = 92°29'$. [Min. Record 12, 83; Am. Min. 58, 1112]. **J.A.Z.**

Richetite

P. Piret and M. Deliens (1984) New data for richetite $PbO \cdot 4UO_3 \cdot 4H_2O$. Bull. Minéral., 107, 581–585 (in French).

Richetite occurs at the Shinkolobwe uranium deposit in Shaba, Zaire. Analysis by microprobe gave PbO 16.38, UO_3 78.28 and H_2O 5.34 (by difference).

X-ray study gave triclinic $P1$ or $P\bar{1}$, $a = 20.81$, $b = 12.06$ $c = 16.30$Å, $\alpha = 103.8$, $\beta = 115.1$, $\gamma = 90.4°$, $V = 3570$Å^3 and Z = 9. A new X-ray powder pattern is given.

The mineral occurs as black, hexagonal plates with forms {001}, {110}, {110} and {010}. It is biaxial negative with $\alpha \sim 1.9$, β and $\gamma \sim 2.0$, $2V$ large, $X \parallel c^*$, $Y\Lambda[110] = 85°$, $Z\Lambda[110] = 5°$. **J.D.G.**

BOOK REVIEWS

BASALTS. A Hutchinson Ross Benchmark Book. Edited by P. C. Ragland and J. J. W. Rogers. Van Nostrand Reinhold Company Inc., New York. 430 pages. U.S. $55.00.

The editors of this 430 page basalt volume guide the readers through nearly 60 "benchmark" papers claimed to be either "widely recognized to have had a profound effect on our thinking" or expected "to be the wave of the future." The collection is grouped under seven headings covering aspects of classification, experimental work, mantle evolution, major basalt types, and tectonic environment. Mineralogy and isotope studies are lightly covered by the volume. Introductions to the various parts place the selected papers into their historical and scientific contexts. The introductions are carefully referenced and the volume contains a detailed author index.

It is a pleasure to renew old acquaintances with significant papers highlighting the development of modern classification schemes for basalts and basaltic series (Kennedy, Tilley, Macdonald, Katsura, and Kuno). The editors have also made a wise selection of experimental work related to basalt petrogenesis, many of which my generation of igneous petrologist probably have never read. Here is an opportunity to read classical papers by Bowen, Fenner, Osborn, Yoder, Tilley, Green, Ringwood, O'Hara, and Kushiro together with more recent papers by Presnall, Walker, and Stolper. These papers are commonly cited in petrological literature and an imprint seems useful. The first two sections on classification and petrogenesis occupy well over half of the entire book; the remaining are devoted to chemical mantle evolution and major basalt types.

Some readers may be search in vain for papers which they believe to have shaped our present understanding. However, the editors, taking the limited space in this volume into considerations, should not be blamed for such omissions. More serious is that the editors may be attempting to shape "the wave of the future" by including very recent papers whose content and data is still debated in the open literature (e.g., the Presnall, Walker and Stolper papers). Many papers throughout the volume are of local geological, volcanological and geochemical interest and could have been deleted without great loss (this goes in particular for three papers authored or co-authored by the second editor). It is also not clear to the reviewer why five papers on komatiite and shoshonite are included in the classification chapter when other high-magnesian and/or potasic basaltic types are totally ignored. Furthermore none of these "unusual" rocks are covered by the subsequent sections.

If this Benchmark volume on Basalts really contained all that it promised, this reviewer would have had no reservation in recommending it. However, the problem is that it does not. At the best, the editors have included excerpts and more typically only single figures and abstracts. Only 13 papers are presented in their full length. Thus, the reader is frequently referred to missing introductions, data, discussions and figures, and is unable to evaluate the conclusions. Such an evaluation is crucial for all scientific work. Interested readers would therefore have to, and hopefully will, consult their own libraries for the full text. This Benchmark volume does not fulfill its intention to be a reference for the petrologist and geochemist without access to a good library. If the editors want to present a textbook, they should be encouraged to do the full work and write an advanced textbook on basalt chemistry and genesis. They clearly demonstrate that they are capable of doing so.

The philosophy behind the editorial work on this book seems to assume that major scientific knowledge should be made easily accessible and carefully "condensed" before being offered to the researcher and advanced student. If this philosophy should be embraced in editorial work on future Benchmark volumes and in geology classrooms, we might expect that coming generations of geologists will lose their basic training in reading original scientific communications. There seem to be good reasons to discontinue that editorial practice and the publisher should be held responsible for bringing out the book. This despite the fact that reprint collections of some of the included papers certainly could be used by the petrological community (e.g., the Yoder and Tilley, Green and Ringwood, and O'Hara papers on experimental petrology). And if the publishers are searching for old papers to reprint, why not a fully annotated edition of, for example, Bowens early experimental papers? The present book cannot be recommended and in this reviewer's opinion copyright holders are urged to exercise better control over their rights.

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