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NEW MINERAL NAMES*

F. C. HAWTHORNE, K. W. BLADH, E.A.J. BURKE, E. S. GREW, R. H. LANGLEY, J. PUCIEWICZ, A. C. ROBERTS, R. A. SCHEDLER, J. E. SHIGLEY, D. A. VANKO

Baghdadite*

H.M. Al-Hermezi, D. McKie, A.J. Hall (1986) Baghdadite, a new calcium zirconium silicate mineral from Iraq. Mineral. Mag., 50, 119–123.

Analyses by electron microprobe (average of 26 analyses on four crystals) gave SiO_2 29.26, ZrO_2 27.00, TiO_2 2.11, Fe_2O_3 0.11, Al_2O_3 0.03, MgO 0.05, CaO 41.44, Na_2O 0.02, sum 100.02 wt%, corresponding to $Ca_{3.00}(Zr_{0.89}Ti_{0.11})(Si_{1.98}Fe_{0.01})O_9$, or idealized $Ca_3Zr[O_2Si_2O_7]$. The HfO_2 content of one specimen was estimated to be 0.16 wt% by reference to a zircon of known Hf content.

Single-crystal X-ray study showed the mineral to be monoclinic, space group $P2_1/a$, with $a = 10.42$, $b = 10.16$, $c = 7.36$ Å and $\beta = 91.1°$, $V = 779.04$ Å^3, Z = 4, $D_{calc} = 3.48$ g/cm^3. The strongest X-ray diffraction lines (49 listed) are 7.30(45)(110), 3.23(80)(130), 3.04(75)$(\bar{2}02)$, 2.98(85)(202), 2.88(70)(320,212), 2.84(100)(230), 1.842(30)(004), 1.724(30)$(\bar{5}22)$, 1.702(40)(522).

The mineral is a member of the wöhlerite-cuspidine group and is distinguished from other members of this group by the absence of significant F^- and OH^- ions.

Baghdadite occurs in a melilite skarn in contact with banded diorite in the Qandil Group of metamorphic rocks at Dupezeh Mountain, near Hero Town, Qala-Dizeh region, NE Iraq. Associated minerals are perovskite, calcite, wollastonite, melilite, baddeleyite, and zirconium schorlomite garnet. The grain size does not exceed 250 μm in length; separated grains have a stumpy prismatic habit. No cleavage, conchoidal fracture. Contact twins with common *b* axis. Cathodoluminescence (15 kV, 600 μA) is dull gray with greenish tint.

The mineral is colorless, with vitreous luster. H about 6, derived from VHN (50-g load) of 725–783 kg/mm^2. Slowly soluble in concentrated HCL and insoluble in concentrated HNO_3 or H_2SO_4. In thin section, baghdadite is transparent, colorless, nonpleochroic, and nondispersive. Its optical properties are biaxial positive with $\alpha = 1.652$, $\beta = 1.658$, $\gamma = 1.670$ and $2V_{meas} = 72°$; $\alpha = \mathbf{c}$, β parallel to **b**, $\gamma = \mathbf{a}$.

The name is for Baghdad, the capital of Iraq. No mention is made of the location of type material. **E.A.J.B.**

Chenite

W.H. Paar, K. Mereiter, R.S.W. Braithwaite, P. Keller, P.J. Dunn (1986) Chenite, $Pb_4Cu(SO_4)_2(OH)_6$, a new mineral, from Leadhills, Scotland. Mineral. Mag., 50, 129–35.

Electron-microprobe analysis gave PbO 74.5, CuO 7.8, SO_3 13.3, H_2O 4.4 (by difference), sum 100 wt%. Infrared spectroscopy detected no oxy-anions other than hydroxide and sulfate. Chenite's spectrum shows sharp absorptions at 3530, 3460 and 3300 cm^{-1} (O–H). The ideal formula is $Pb_4Cu(SO_4)_2(OH)_6$.

X-ray analysis revealed a triclinic, $P\bar{1}$ or $P1$, cell with $a = 5.791(1)$, $b = 7.940(1)$, $c = 7.976(1)$ Å, $\alpha = 112.02(1)$, $\beta = 97.73(1)$, $\gamma = 100.45(1)°$, Z = 1, $D_{calc} = 6.044$ g/cm^3, $D_{meas} = 5.98(2)$. The strongest lines (36 given) are 5.55(70) (100), 4.32(60) $(1\bar{1}1)$, 3.60(100) (002), 3.41(90) $(1\bar{2}0)$, 2.80(70) $(12\bar{2})$, 2.07(60) $(211, 21\bar{3}, 1\bar{3}3)$.

Chenite occurs as small (<1.5 mm) transparent to translucent, sky-blue crystals of vitreous to resinous luster. Crystals are complexly terminated prisms that are elongated along [032] or rarely twinned. Twenty forms (pinacoids) were identified of which $\{1\bar{3}2\}$, $\{\bar{2}\bar{2}1\}$ and {100} dominate; $\{\bar{1}10\}$ dominates the terminations. Mohs' hardness ≃2.5; good cleavage on {100} and traces of another on {001}.

Optically biaxial negative with $2V_{meas} = 67 \pm 1°$, $2V_{calc} = 68°$ (Na), $\alpha = 1.871(5)$, $\beta = 1.909(5)$, $\gamma = 1.927(5)$ (Na), chenite shows strong dispersion, $r \gg v$, and weak pleochroism.

The name honors Dr. T. T. Chen, mineralogist at CANMET. Type material resides in the collections of the Royal Ontario Museum, Smithsonian, University of Stuttgart, and Technical University of Vienna. Chenite occurs with caledonite, linarite, leadhillite, and susannite on oxidized galena from the Susanna mine, Leadhills, Scotland, Great Britain. **K.W.B.**

Izoklakeite*

D.C. Harris, A.C. Roberts, A.J. Criddle (1986) Izoklakeite, a new mineral species from Izok Lake, Northwest Territories. Can. Mineral., 24, 1–5.

Microprobe analyses yielded an average composition of Cu 1.0, Fe 0.2, Ag 2.0, Pb 46.6, Bi 20.5, Sb 13.3, S 17.0, sum 100.6 wt%. Based on 96 cations, the calculated formula is $Pb_{45.94}Sb_{22.30}Bi_{20.04}Ag_{3.78}Cu_{3.21}Fe_{0.73}S_{108.30}$, or ideally $2[(Cu,Fe)_2Pb_{27}(Sb,Bi)_{19}S_{57}]$. Weissenberg single-crystal techniques and X-ray powder-diffraction methods showed the mineral to be orthorhombic, space group *Pnnm* or *Pnn*2, $a = 33.88(2)$, $b = 38.02(2)$, $c = 4.070(2)$ Å, $V = 5243$ Å^3, Z = 1. The strongest lines (45 given) are 3.398(100)(780,10.0.0,2.11.0,690), 3.305(40) (3.11.0,451), 2.878(40)(751), 2.149(60)(0.15.1,13.10.0, 10.10.1), 2.038(40b)(14.10.0,2.16.1,002), and 1.745(40)(10.0.2).

The mineral occurs in millimeter-sized acicular aggregates intergrown with galena, minor pyrrhotite, and pyrite. Color lead-gray, opaque, metallic luster, gray-black streak, good cleavage parallel to **c**, distinctive conchoidal fracture. $D_{obs} = 6.47$, $D_{calc} = 6.505$ g/cm^3. Hardness (VHN_{50}) = 150–212 kg/mm^2. Weakly to moderately bireflectant from pale greenish white to darker greenish white or gray in reflected plane-polarized light. In oil the tints are unchanged, but the bireflectance is a little stronger. Distinctly anisotropic from greenish midgray to dark gray to brownish gray rotation tints. Reflectance values in air (nm, %): 470, 42.3–43.5; 540, 40.3–41.6, 550, 40.1–41.4; 590, 39.4–40.7; 650, 38.6–39.9.

The mineral is from the massive Zn-Cu-Pb sulfide deposit at Izok Lake, Northwest Territories, Canada. The name is for the locality. Type material is at the British Museum, the Geological

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* Minerals marked with asterisks were approved before publication by the Commission on New Minerals and Mineral Names of the International Mineralogical Association.

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Survey of Canada (Ottawa), and the Royal Ontario Museum (Toronto). **J.E.S.**

Johnwalkite*

P.J. Dunn, D.R. Peacor, D.B. Sturman, R.A. Ramik, W.L. Roberts, J.A. Nelen (1986) Johnwalkite, the Mn-analogue of olmsteadite, from South Dakota. Neues Jahr. Mineral. Mon., 1986, 115–120.

Microprobe analysis of the mineral gave FeO 3.3, Fe_2O_3 12.5 (oxidation state by titration), MgO 0.5, MnO 14.8, K_2O 8.6, Ta_2O_5 5.1, Nb_2O_5 21.5, P_2O_5 27.3, H_2O (water loss) 6.5, sum 100.1 wt%, yielding an ideal formula $K_2(Mn,Fe^{3+},Fe^{2+})_4(Nb,Ta)_2(PO_4)_4O_4(H_2O,OH)_4$. The chemical analysis is compared with those for re-analyzed samples of olmsteadite.

Precession and Weissenberg photographs verified that the unit cell and space group are equivalent to those of olmsteadite. Johnwalkite is orthorhombic, space group seemingly $Pb2_1m$, with a = 7.516(4), b = 10.023(8), and c = 6.502(4) Å. The five strongest powder-diffraction lines (Gandolfi camera) are 6.01(100)(110), 3.005(80)(220), 3.054(70)(130), 2.862(70)(112), 6.51(40)(001).

Johnwalkite forms up to 6-mm-long prismatic, dark reddish-brown radially arranged crystals with a vitreous luster and good {001} and {100} cleavages, and they are elongated parallel to b. H ~4 (Mohs'); $D_{meas} = 3.40$, $D_{calc} = 3.44$ g/cm³. Optically biaxial and positive, $\alpha = 1.748$, $\beta = 1.763$, $\gamma = 1.84$, $2V = 53°$. Optical orientation: $X = \mathbf{c}$, $Y = \mathbf{a}$, $Z = \mathbf{b}$; absorption $X \gg Z \gg Y$; pleochroism is strong with X = blue-green, Y = yellow to pale brown, and Z = brown.

The mineral occurs associated with amorphous Mn oxides, goethite, and numerous secondary phosphates at the Champion mine in the Expectation pegmatite, southeast of Keystone, Pennington County, South Dakota.

Johnwalkite is named in honor of Messrs. R. Johnson and F. Walkup. Type material is deposited at the Smithsonian Institution under catalogue number NMNH no. 162676. **R.A.S.**

Kalininite*

L.Z. Reznickij, E.V. Skl'arov, Z.F. Ustschapovskaya (1985) Kalininite $ZnCr_2S_4$—A new natural sulphospinel. Zapiski Vses. Mineralog. Obshch., 114, 622–627 (in Russian).

Microprobe analyses (9 on 3 specimens) gave (average) Zn 18.89, Cu 2.73, Cr 34.10, V 0.61, Sb 0.73, S 42.22, sum = 99.28 wt%, corresponding to $Zn_{0.870}Cu_{0.130}Cr_{1.977}V_{0.036}Sb_{0.019}S_{3.968}$ or ideally $ZnCr_2S_4$.

X-ray powder-diffraction pattern of the mineral is almost identical to synthetic $ZnCr_2S_4$ and yields a = 9.997 (1)–9.998(3) Å, space group $Fd3m$, Z = 8. The strongest X-ray lines (19 given) are 2.98(5)(311), 2.47(7)(400), 1.910(8)(511,333), 1.757(10)(440), 1.019(10)(844).

The mineral is black. Luster adamantine. Sometimes tarnish colors. In reflected light, isotropic, light creamy, without internal reflections. Reflectance measurements (in nm, from 440 to 680 nm, 20-nm steps): 34.4, 35.2, 35.3, 35.4, 35.4, 35.2, 35.3, 35.2, 34.8, 34.1, 33.8, 32.7, 32.5. Microhardness 468 kg/mm² (50-g load). $D_{calc} = 4.045$. Strongly magnetic. Unsoluble in HCl. Poorly wets in water.

Kalininite forms irregular, soft, slaglike aggregates up to 0.5 mm in garnet and pyroxene, often in contact with karelianite-eskolaite. The mineral occurs in diopside-quartz-calcite rocks of southern Baikal region. It is associated with diopside [up to 10–12% (Cr_2O_3 + V_2O_3)], quartz, calcite, Cr-V tremolite, goldmanite-uvarovite garnet, karelianite-eskolaite, pyrite, barite, zircon, and unnamed $CuCr_2S_4$.

The name is for the investigator of the southern Baikal area, mineralogist and petrologist P. I. Kalinin.

Type material is at the A. E. Fersman Mineralogical Museum, Akademii Nauk SSSR (Moscow). **J.P.**

Kashinite*

V.D. Begizov, E.N. Zabyalov, N.S. Rudashevskij, L.N. Vyalsov (1985) Kashinite $(Ir,Rh)_2S_3$—A new iridium and rhodium sulphide. Zapiski Vses. Mineralog. Obshch., 114, 617–622 (in Russian).

Microprobe analyses (18 given) gave Ir 75.8–52.6, Rh 1.7–22.9, S 23.9–22.7 wt%, corresponding to $(Ir,Rh)_2S_3$, Ir > Rh. Some samples from Nizhny Tagil contain Cu (0.4–0.8 wt%) and those from Soviet Far East contain Pt (0.74–0.94 wt%) and Ru (0.5 wt%). The mineral gives no reaction with standard reagents.

X-ray powder-diffraction study showed the mineral to be orthorhombic, space group $Pbcn$, a = 8.450, b = 6.001, c = 6.145 Å, Z = 4, $D_{calc} = 9.10$. The strongest X-ray lines (59 given) are 2.99(10)(211,020), 2.14(4)(022), 1.758(4)(213), 1.736(6,wide) (231), 1.136(4,wide)(442,251), 1.028(4)(451,153), 0.982(4)(216). The pattern of kashinite is identical to that of synthetic Rh_2S_3, suggesting that an isomorphous group Ir_2S_3-Rh_2S_3 exists.

The mineral is grayish-black. Luster metallic. Flinty fracture. Nonmagnetic. In reflected light, light-gray with almost invisible bireflectance. Biaxial, anisotropic with reddish-violet tints. Reflectance measurements (nm, R_1, R_2): 440, 43.7, 45.9; 460, 45.1, 45.5; 480, 46.1, 45.5; 500, 46.8, 45.6; 520, 47.2, 45.7; 540, 47.5, 45.8; 560, 47.6, 46.0; 580, 47.6, 46.2; 600, 47.4, 46.3; 620, 47.1, 46.5; 640, 46.8, 46.6; 660, 46.6, 46.8; 680, 46.3, 46.9; 700, 46.0, 47.0; 720, 45.6, 47.0; 740, 45.1, 47.1. Microhardness (average) 1529 ± 477 kg/mm² (50-g load). Brittle, weakly elastic. No cleavage.

The mineral is associated with Fe-Pt solid solutions, osmiridium, laurite, erlichmanite, chromite, and sulphides of iron, copper, iridium, and rhodium. Its grains are slightly elongated or, more rarely, isometric, with straight, smooth outlines, from 10 to 15 µm up to few tenths of 1 mm.

Kashinite occurs in the Nizhny Tagil ultrabasic massif (Ural Mts.) and in Quaternary sediments of one of the Soviet Far East ultrabasic massifs. The name is for the investigator of ore deposits of the Ural Mountains, S. A. Kashin.

Type material is at the A. E. Fersman Mineralogical Museum Akademii Nauk SSSR (Moscow) and at the MGRI Mineralogical Museum (Moscow). **J.P.**

Natalyite*

L.Z. Reznitskii, E.V. Skliarov, Z.F. Ushchapovskaia (1985) Natalyite $Na(V,Cr)Si_2O_6$—A new chromium-vanadium pyroxene from Slyudianka. Zapiski Vses. Mineralog. Obshch., 114, 630–635 (in Russian).

Analysis by electron microprobe gave (avg. of five) SiO_2 53.15, TiO_2 0.11, Al_2O_3 0.75, V_2O_3 17.97, Cr_2O_3 12.23, MgO 1.28, CaO 1.78, Na_2O 12.65, sum 99.92 wt%, yielding a formula $(Na_{0.92}Ca_{0.07})(V_{0.54}Cr_{0.36}Mg_{0.07}Al_{0.03})Si_{1.99}O_6$, ideally $Na(V,Cr)Si_2O_6$.

X-ray study showed the mineral to be monoclinic, space group

*C*2/*c*, $a = 9.58(1)$, $b = 8.72(1)$, $c = 5.27(1)$ Å, $\beta = 107.16°$, Z = 4, $D_{calc} = 3.55$. The strongest X-ray lines (42 given) are 2.96(100)($22\bar{1}$), 2.87(80)($310,31\bar{1}$), 2.52(100)($002,13\bar{1}$), 1.391(80b)($260,35\bar{2},351$).

The mineral occurs as small grains (up to 1 × 0.3 mm) in Cr- and V-rich diopside-quartz rocks of the Slyudianska Precambrian metamorphic complex. It is associated with eskolaite-karelianite, uvarovite-goldmanite garnet, Cr-V-tourmaline, pyrite, and apatite. It has a bright green color with a yellowish tinge, green streak, vitreous luster, and silky surface due to a fibrous structure. It exhibits the prism {110} and pinacoid {100} or {010}, often elongate to asbestiform parallel to [001]. Cleavage {110} is noticeable, as is a fracture parallel to (001) in acicular fragments. Optically biaxial, negative, $\alpha = 1.741(2)$, $\beta \approx \gamma = 1.762(3)$, $2V = 8–12°$. Strongly pleochroic with Z, Y = emerald green, X = greenish yellow to yellow. Microhardness is 1013–1079 kg/mm² (50-g mass), or about 7 on Mohs' scale.

The name is for the geologist Natalya Vasil'evna Frolova (1907–1960). Type material is at the Fersman Mineralogical Museum, Moscow. **D.A.V.**

Natronambulite*

S. Matsubara, A. Kato, T. Tiba (1985) Natronambulite, $(Na,Li)(Mn,Ca)_4Si_5O_{14}OH$, a new mineral from the Tanohata mine, Iwate Prefecture, Japan. Mineral. Jour., 12, 332–340.

Microprobe analysis gave SiO_2 50.39, TiO_2 0.03, FeO 0.31, MnO 38.94, MgO 1.24, CaO 3.66, Na_2O 3.55, wet-chemical analyses gave Li_2O 0.43, H_2O^+ 1.46, H_2O^- 0.54, sum 100.55 wt%, corresponding to $(Na_{0.69}Li_{0.17})_{\Sigma 0.86}(Mn_{3.32}Ca_{0.39}Mg_{0.19}Fe_{0.03})_{\Sigma 3.93}Si_{5.07}O_{14.02}(OH)_{0.98}$ (basis O = 15), or ideally, $(Na,Li)(Mn,Ca)_4Si_5O_{14}(OH)$ with Na > Li, Mn > Ca and Z = 2. This is the Na analogue of nambulite $(Li,Na)(Mn,Ca)_4Si_5O_{14}(OH)$ with Li > Na, Mn > Ca.

X-ray studies by precession methods showed that the mineral is triclinic, space group choices *P*1 or $P\bar{1}$, and has unit-cell parameters $a = 7.620$, $b = 11.762$, $c = 6.737$ Å, $\alpha = 92.81$, $\beta = 94.55$, $\gamma = 106.87°$. The strongest lines (48 given) are 7.13(47)($\bar{1}10$), 6.70(44)(001), 3.559(100)($\bar{2}20,12\bar{1}$), 3.348(40)($1\bar{3}1,002,\bar{2}01$), 3.078(45)($2\bar{2}1$), 2.972(34)($0\bar{2}2,1\bar{1}2$), and 2.506(38)($\bar{2}22,\bar{3}20$).

Natronambulite was found in the dump of the no. 3 (Matsumaezawa) orebody, Tanohata mine, Iwate Prefecture, Japan. It occurs as coarse-grained mosaic aggregates up to 7 mm across in banded zones within metamorphosed manganese ore, associated with manganoan aegirine, manganoan arfvedsonite, quartz and rhodonite, or with albite, microcline, quartz, and serandite. The color is pinkish orange, luster vitreous, streak white with a faint orange tint. H = 5½–6. Cleavage {100} and {001} perfect. D_{meas} (Berman balance) = 3.51. $D_{calc} = 3.50$ for the empirical formula. Optically biaxial positive, $\alpha = 1.706(2)$, $\beta = 1.710(2)$, $\gamma = 1.730(5)$, $2V_{(meas)}$ about 45° and $r > v$ discernible. In thin section, natronambulite has a faintly yellowish color.

The mineral is the Na analogue of nambulite and is so named. Type material has been deposited in the Department of Geology, National Science Museum, Tokyo, Japan. **A.C.R.**

Paděraite*

W.G. Mumme, L. Žák (1985) Paděraite, $Cu_{5.9}Ag_{1.3}Pb_{1.6}Bi_{11.2}S_{22}$, a new mineral of the cupro-bismutite-hodrushite group. Neues Jahr. Mineral. Mon., 1985, 557–567.

An average of six microprobe analyses of two grains gave Cu 9.45, Ag 3.26, Pb 6.71, Bi 61.40, S 18.90, sum 99.72 wt%, corresponding to $Cu_{5.5}Ag_{1.1}Pb_{1.2}Bi_{11.0}S_{22}$, or ideally $Cu_{5.9}Ag_{1.3}Pb_{1.6}Bi_{11.2}S_{22}$. Weissenberg X-ray patterns of small platelike fragments showed the mineral to be monoclinic, space group $P2_1/m$, $a = 28.44$, $b = 3.95$, $c = 17.55$ Å, $\beta = 106.1°$, $V = 1894$ Å³, Z = 2. The strongest X-ray lines (74 given) are 3.06(100)($\bar{1}16$), 3.63(74)($\bar{4}06$), 3.21(54)(207,404), 2.85(40)($\bar{1}17,307$), 2.66(38)($\bar{1}18$).

The mineral occurs in intimate microscopic intergrowths with bismuthinite-pekoite, hammarite, and several other unidentified opaque minerals. Other associated minerals include chalcopyrite, grossular, and andradite. The mineral is creamy white with moderate anisotropy between crossed polars in reflected light, but does not appear to have significantly different optical properties from its associated Bi minerals. $D_{calc} = 6.91$, color steel gray (brown to black upon surface alteration). Physical data, such as reflectance values and Vickers hardness, could not be obtained owing to the extremely fine scale of mineral intergrowth on the specimens available for study. Crystal-structure analysis showed the mineral to be closely related to hodrushite and cuprobismutite.

This assemblage of minerals occurs in a specimen labeled "rezbanyite" from Rezbanya (now Baita Bihorului), Rumania. The specimen was collected in 1874 and is now in the collection of the Mineralogical Department of Charles University. The new mineral is named in honor of Dr. K. Paděra of Charles University. **J.E.S.**

Protasite*

M.K. Pagoaga, D.E. Appleman, J.M. Stewart (1986) A new barium uranyl oxide hydrate mineral, protasite. Mineral. Mag., 50, 125–128.

Multiple analyses of a single crystal by electron microprobe gave BaO 15.0, UO_3 78.0, H_2O 7.0 (by difference and confirmed by crystal-structure determination), sum = 100.0 wt%. This gives the formula $Ba[(UO_2)_3O_3(OH)_2]\cdot 3H_2O$.

X-ray analysis and crystal-structure determination showed protasite to be monoclinic, *Pn*, with $a = 12.295(2)$, $b = 7.221(1)$, $c = 6.9558(8)$ Å, $\beta = 90.40(2)°$, Z = 2, $D_{calc} = 5.827(3)$ g/cm³. The principal X-ray lines (47 given) are 7.06(50)(010), 3.58(35)(020,310), 3.14(100)(311,012), 3.11(35)(220), 2.496(35)($022,\bar{3}12$), 2.395(25)(030), and 1.976(25)(032,610).

Associated with uraninite and uranophane, protasite occurs as intensely colored, bright orange, transparent, pseudohexagonal platelets. Crystals (0.1–0.5 mm) are flattened on {010} with good cleavage on {010}. All crystals showed sector twinning (60° rotation on [010]). The mineral is brittle with hackly fracture; luster is subadamantine. Although closely resembling fourmarierite, protasite is distinguished by its habit (thin platlets) and by striations from twinning. Optically biaxial, negative, β and γ fall between 1.79 and 1.83 (589 nm), α was not determined, $2V = 60–65°$ (Kamb's method). The acute bisectrix parallels the **b** axis (normal to the plates). Birefringence is high.

The name honors Professor Jean Protas, of the University of Nancy, for contributions to our understanding of the uranyl oxide hydrate minerals. Type material from the Shinklobowe mine, Shaba Province, Zaire, is preserved at the Smithsonian (NMNH 150832). **K.W.B.**

Ramsbeckite*

R. von Hodenberg, W. Krause, G. Schnorrer-Köhler, H. Täuber (1985) Ramsbeckite, $(Cu,Zn)_7(SO_4)_2(OH)_{10} \cdot 5H_2O$, a new mineral. Neues Jahr. Mineral. Mon., 1985, 550–556.

Analysis of the mineral gave CuO 44.5, ZnO 15.8, SO_3 17.4, H_2O 19.3 (all ±3% of the amount present), sum 97.0 wt% corresponding to $(Cu_{5.20},Zn_{1.80})(SO_4)_{2.02}(OH)_{9.96} \cdot 4.97H_2O$. It is completely soluble in dilute mineral acids. The infrared spectrum shows strong peaks at 3390, 3160, 1600, 1110, and 600 cm^{-1}.

X-ray data showed the mineral to be monoclinic, space group $P2_1/a$, unit cell $a = 16.066(5)$, $b = 15.577(3)$, $c = 7.102(2)$ Å, $\beta = 90.20(3)°$, Z = 4, $D_{calc} = 3.37$, $D_{meas} = 3.39(2)$. The strongest powder lines (93 given) are 7.090(100)(001), 3.549(25)(002), 2.694(30)(350,$\bar{2}$51,251), 2.683(22)(600), 2.516(75)($\bar{3}$51,351), 2.510(20)($\bar{6}$01,601), 2.145(25)($\bar{3}$52,352), 1.776(20)(004,$\bar{6}$03).

The mineral was found on quartz, chalcopyrite, slate, and slag, commonly associated with linarite, bronchantite, serpierite, and schulenbergite. It was collected from an abandoned adit at the Bastenberg mine near Ramsbeck, Federal Republic of Germany (type locality), and in mine dumps at four other localities in the F.R.G. It apparently formed by recent weathering of Cu- and Zn-bearing ore minerals. It forms equant to tabular (001) rhomb-shaped crystals showing {001}, {210}, and commonly {110}. No distinct cleavage, fracture conchoidal. It is green, streak light green, transparent to translucent, luster vitreous. Mohs' hardness 3.5. Optically biaxial negative. $\alpha = 1.635(5)$, $\beta = 1.675(5)$, $\gamma = 1.680(5)$, $2V_{meas} = 37.0(5)°$, $2V_{calc} = 38.0°$, $X \approx$ **c** (bright blue), $Y =$ **a** (bright blue), $Z \approx$ **b** (bright blue), $r > v$.

The name is for the town of Ramsbeck, F.R.G., near the type locality. Type material is deposited in the mineralogical collection of the University of Göttingen, F.R.G. **E.S.G.**

Rapidcreekite*

A.C. Roberts, H.G. Ansell, I.R. Jonasson, J.D. Grice, R.A. Ramik (1986) Rapidcreekite, a new hydrated calcium sulfate-carbonate from the Rapid Creek area, Yukon Territory. Can. Mineral., 24, 51–54.

Chemical analyses (electron microprobe and evolved gas) gave CaO 36.3, SO_3 26.1, CO_2 14.0, H_2O 23.6, sum 100.00 wt%, corresponding to (for S = 1) $Ca_{1.99}(SO_4)_{1.00}(CO_3)_{0.98} \cdot 4.02H_2O$. The minor (0.03–0.15 wt%) F, Cl, PO_4, and NO_3 measured by anion chromatography are attributed to contamination. The mineral dissolves slowly in 10% HCl. No evidence for HCO_3^- or OH^- was found in the infrared spectrum.

X-ray data showed the mineral to be orthorhombic, space group *Pcnb*, with $a = 15.49(1)$ $b = 19.18(1)$ $c = 6.157(4)$ Å, Z = 8, $D_{meas} = 2.21(1)$, $D_{calc} = 2.239$. The strongest X-ray powder-diffraction lines (36 given) are 7.78(100)(200), 4.31(70)(221), 3.88(70)(311,400,231), 3.11(80)(421,002), 2.917(50)(431), 2.797(60)(161), 2.555(50)(142,322), 1.899(50)(580,233).

The mineral occurs on a tributary at Rapid Creek (68°33′45″N., 136°47′30″W.), Yukon Territory, Canada, as a secondary phase on joint surfaces and bedding planes in a blocky, quartz-rich bed of sideritic iron formation. Associated minerals are gypsum, aragonite, and kulanite. Rapidcreekite forms radiating acicular crystals up to 2 mm long and elongated parallel to [001], with forms {010} and minor {100} and {001}. Mineral is white to colorless, transparent, streak white, luster vitreous, Mohs' hardness 2. Perfect {010} and good {100} cleavages. The mineral is brittle, and fracture is splintery. It is biaxial positive; $\alpha = 1.516(1)$, $\beta = 1.518(1)$, $\gamma = 1.531(1)$ Å, $2V_X$ (sic) measured 45(3)°, calculated 43°. $X =$ **c**, $Y =$ **a**, $Z =$ **b**.

The name is for Rapid Creek. The holotype specimen is housed in the National Mineral Collection at the Geological Survey of Canada (catalogue no. 64346, Systematic Reference Series). Additional specimens are preserved at the Geological Survey and at the Mineral Sciences Division, National Museum of Natural Sciences, Ottawa, Canada. **E.S.G.**

Selenostephanite*

M.M. Botova, S.M. Sandomirskaya, N.G. Tschuvikina (1985) Selenostephanite $Ag_5Sb(Se,S)_4$—A new mineral. Zapiski Vses. Mineralog. Obshch., 114, 627–630 (in Russian).

Microprobe analyses (4 reported) gave Ag 55.80, Sb 12.63, Se 29.04, S 1.44, sum 98.91 wt%, corresponding to $Ag_{5.00}Sb_{1.00}(Se_{3.56}S_{0.44})_{4.00}$. The mineral becomes dark in $FeCl_3$ and brown in concentrated HNO_3. No reaction with concentrated KCl, KOH, or HCl.

X-ray study showed the mineral to be orthorhombic, space group $P2_12_12_1$, $a = 7.86$, $b = 11.84$, $c = 8.92$ Å, Z = 4, $D_{calc} = 7.5$ g/cm³. The strongest X-ray lines (28 given) are 2.96(10)(040), 2.64(9)(222), 2.28(9)(133), 2.23(9)(004), 1.918 and 1.888 (9,wide)(341,134).

In reflected light, grayish-white with olive tint, visible bireflectance in grayish-greenish tints, brownish-gray and gray anisotropic effects. No internal reflections. Microhardness 95–115.8 kg/mm² (10- and 20-g load). Reflectances are given at 15 wavelengths (nm, R'_γ, R'_α: 420, 34.8, 33.3; 520, 36.0, 33.6; 580, 34.8, 32.6; 640, 33.0, 31.0; 700, 32.3, 30.4%.

The mineral forms irregular, interstitial 0.005–0.08-mm aggregates of platy crystals of different sizes, situated within adularia-quartz aggregates and miargyrite and often coexisting with clausthalite and electrum. Selenostephanite occurs in miargyrite and electrum-bearing quartz and adularia-quartz veins in altered acid volcanic rocks, Mesozoic-Cenozoic volcanic zone of central Tschukotka, USSR.

The name is for the composition. Type material is at the A. E. Fersman Mineralogical Museum, Akademii Nauk SSSR (Moscow) and at the CNIGRI Institute (Moscow). **J.P.**

Slawsonite*

S. Matsubara (1985) The mineralogical implication of barium and strontium silicates. Bull. Natn. Sci. Mus., Tokyo, ser. C, 11, 37–95 (specifically 63–70).

Data are reported for slawsonite from three different localities: (1) Triassic Martin Bridge Formation exposed in Wallowa County, Oregon (type locality), (2) Sarusaka, Kagami Village, Tosagun, Kochi Prefecture, Japan, and (3) Rendai, Kochi City, Kochi Prefecture, Japan. A fourth locality, Miyanotani, Hidaka Village, Kochi Prefecture, Japan, is also noted.

Oregon. Chemical analysis gave SiO_2 38.68, TiO_2 0.36, Al_2O_3 29.32, Fe_2O_3 1.14, MgO 0.25, FeO 0.02, CaO 2.26, SrO 26.60, Na_2O 0.13, K_2O 0.07, H_2O^+ 0.17, H_2O^- 0.09, total 99.09 wt%, corresponding to $(Sr_{0.82}Ca_{0.13}Mg_{0.02})_{\Sigma 0.97}(Al_{1.84}Fe^{3+}_{0.05})_{\Sigma 1.89}(Si_{2.06}Ti_{0.01})_{\Sigma 2.07}O_8$ (based on O = 8) or, ideally $SrAl_2Si_2O_8$. This is the Sr analogue of paracelsian. A crystal-structure determination [Griffen et al., Amer. Min. 62, 31–35 (1977)] gave monoclinic symmetry, space group $P2_1/a$ and cell dimensions a = 8.888(2), b = 9.344(2), c = 8.326(3) Å, β = 90.33(2)°. The color of slawsonite is medium light gray, cleavage {001} good and {100} fair. H = 5½. D_{calc} = 3.12. No observable fluorescence. Optically biaxial negative, $2V_{meas}$ = 82°, α = 1.573, β = 1.581, γ = 1.585, $\mathbf{c} \wedge Y$ = 11° and $r < v$ medium. Associated minerals are calcite, phlogopite, albite, and pyrite.

Sarusaka. Electron-microprobe analysis gave SiO_2 36.63, Al_2O_3 31.30, BaO 1.53, SrO 29.99, K_2O 0.06 total 99.51 wt%, corresponding to $(Sr_{0.95}Ba_{0.03})_{\Sigma 0.98}Al_{2.01}Si_{2.00}O_8$ (basis O = 8) or, ideally $SrAl_2Si_2O_8$. Unit-cell parameters are a = 8.910(2), b = 9.389(2), c = 8.347(4), β = 90.24(2)°. The strongest lines (70 given) of the X-ray powder pattern are 3.938(80)($\bar{2}$01,201), 3.720(35)($\bar{1}$21,121), 3.231(100)(220), 2.949(35)(130,$\bar{1}$22,122), 2.930(50)(031), 2.679(35)(311), and 2.087(40)(004). Slawsonite was found within a part of a xenolith in ultrabasic rock as white veinlets composed of radial aggregates. Tabular crystals reach 7 cm in length and are elongate [110] with forms {110} major and {001} minor. The mineral is colorless, has good cleavage (100), and fluoresces a moderately intense pinkish purple-red under shortwave UV light. H = 6–6½, D_{calc} = 3.10. Optically biaxial negative with α = 1.570(2), β = 1.582(2), γ = 1.586(2), $2V_{meas}$ = 55°, dispersion $r > v$ very weak and $\mathbf{c} \wedge Y \leq 5°$. In thin sections, colorless, untwinned slawsonite is commonly observed as a subparallel multiple growth of tablets with numerous small crystal inclusions of celsian and cymrite and sometimes xonotlite, prehnite, grossular, and diopside. Other associated phases include hydrogrossular, vesuvianite, tobermorite (11 Å), native copper, calcite, and two undetermined secondary minerals.

Rendai. Electron-microprobe analysis gave SiO_2 37.78, Al_2O_3 30.26, CaO 0.33, SrO 31.22, total 99.59 wt%, corresponding to $(Sr_{0.98}Ca_{0.02})_{\Sigma 1.00}Al_{1.93}Si_{2.04}O_8$ (basis O = 8) or, ideally $SrAl_2Si_2O_8$. Unit-cell parameters are a = 8.900(2), b = 9.366(2), c = 8.340(4) Å, β = 90.22(2)°. At Rendai, slawsonite occurs as veinlets cutting pectolite veinlets, which are developed in metamorphosed xenoliths belonging to the Ino Formation.

Discussion. This mineral still awaits a formal description from the type locality. Information that is lacking includes reason for name, deposition of type material, and a fully indexed powder pattern from the type locality. **A.C.R.**

Stronalsite*

S. Matsubara (1985) The mineralogical implication of barium and strontium silicates. Bull. Natn. Sci. Mus., Tokyo, ser. C, 11, 37–95 (specifically 73–74).

Electron-microprobe analysis gave Na_2O 11.89, K_2O 0.01, SrO 15.35, BaO 2.44, CaO 0.04, Al_2O_3 32.63, SiO_2 37.95, total 100.31 wt%, corresponding to $(Sr_{0.92}Ba_{0.10})_{\Sigma 1.02}Na_{2.38}Al_{3.97}Si_{3.92}O_{16}$ (basis O = 16) or, ideally $SrNa_2Al_4Si_4O_{16}$ with Z = 4. Stronalsite is the Sr analogue of banalsite.

X-ray study showed that the mineral is orthorhombic, space group choices *Ibam* or *Iba*2, with refined cell parameters a = 8.407(2), b = 9.886(2), c = 16.691(5) Å. The strongest XRD lines are 3.504(80)(114), 3.206(100)(024,220), 3.184(72)(213), 3.070(47)(130), 2.882(68)(132), and 2.066(48)(332,242). The powder pattern is very close to banalsite (PDF 23-651).

Stronalsite occurs as aggregates of anhedral crystals reaching 1 mm across in association with slawsonite and pectolite in veinlets cutting rodingite in a serpentinite quarry, Rendai, Kochi City, Japan. Associated vein minerals include prehnite, xonotlite, grossular, hydrogrossular, and natrolite. The mineral is white with a vitreous luster. There is no cleavage and no fluorescence under ultraviolet light. H = 6½. D_{meas} = 2.95. D_{calc} = 2.943 for $(Sr_{0.9}Ba_{0.1})Na_2Al_4Si_4O_{16}$. Optically biaxial positive, $2V_{meas}$ = 32°, α = 1.563(2), β_{calc} = 1.564, γ = 1.574(2) measured in white light. Stronalsite is colorless in thin section with optical orientation $X = \mathbf{c}$, $Y = \mathbf{a}$, and $Z = \mathbf{b}$.

The name is for the chemical composition and the analogy with banalsite. Type mineral is preserved at the National Science Museum, Tokyo, Japan.

Discussion. This does not appear to be the definitive formal description of the mineral. Information abstracted from the original IMA submission were D_{calc}, Z, and deposition of type material. Unfortunately, a complete tabulated listing of XRD powder data is not included; this is essential for a complete description of the mineral. **A.C.R.**

Taikanite*

V.V. Kalinin, A.B. Dauletkulov, A.I. Gorshkov, N.V. Troneva (1985) Taikanite—A new silicate of strontium, barium and manganese. Zapiski Vses. Mineralog. Obshch., 114, 635–641 (in Russian).

Analysis by electron microprobe (avg. of three samples) gave SiO_2 27.17, MnO 19.42, MgO 0.14, CaO 0.46, SrO 33.78, BaO 18.43, Na_2O 0.18, sum 99.58 wt%, yielding a formula $(Sr_{2.78}Ca_{0.07}Na_{0.05}Mg_{0.03})Ba_{1.03}Mn_{2.34}Si_{3.86}O_{14}$, ideally $Sr_3BaMn_2Si_4O_{14}$.

X-ray study shows the mineral to be monoclinic, space group $C2/m$, a = 7.82(3), b = 14.60(3), c = 5.15(4) Å, β = 92.50°, Z = 2, D_{calc} = 4.81, D_{meas} = 4.72. The strongest X-ray lines (27 given) are 3.270(70)(13$\bar{1}$), 2.912(100)(22$\bar{1}$), 2.832(90)(221), 2.569(80)(002,310), 1.946(60)(400,350,26$\bar{1}$).

The mineral occurs as equant grains several tenths of 1 mm in size, rarely elongate to 1.6 mm, in hydrothermal manganese ores of the Taikan Mountains in the Far East, associated with braunite and Mn-amphibole. The deposits are related to Cretaceous alkaline dikes that intruded Cambrian limestones and siliceous rocks. The mineral is greenish black, vitreous to greasy luster, brittle with conchoidal fracture. Cleavage perfect {001}. Microhardness (100-g load) is 831–1059 kg/mm². Optically biaxial, positive, α = 1.775(3), β = 1.792(calc), γ = 1.814(2), $2V$ = 74–80°. Optic plane is (010), $\mathbf{a} = X$, $\mathbf{b} = Y$, $\mathbf{c} \wedge Z$ = 44°, $\mathbf{c} \wedge X$ = 46°. Strong dispersion, $r > v$. Strongly pleochroic with Z, Y = emerald green, X = violet to black.

The name is for the Taikan Mountains. Type material is at the Fersman Mineralogical Museum, Moscow. **D.A.V.**

Ye'elimite*

S. Gross (1983–1984) Occurrence of ye'elimite and ellestadite in an unusual cobble from the "pseudo-conglomerate" of the Hatrurim basin, Israel. GSI, Current Research, 1–4.

Ye'elimite (ideal composition $Ca_4Al_6O_{12}SO_4$) has been found in the lower part of the Hatrurim Formation, in the southeastern part of Hatrurim basin, west of the Dead Sea, Israel. Microprobe analysis on two samples gave the following average values: Al_2O_3 47.84, CaO 36.56, Fe_2O_3 1.04, and SO_3 14.54; sum 99.98 wt%. This gives the formula (based on 16 oxygens): $Ca_{3.98}(Al_{5.71},Fe_{0.08})S_{1.10}O_{16}$.

The powder X-ray diffraction pattern agrees with that of a previously reported synthetic phase and was indexed on a cubic cell with a = 18.392 Å. The strongest X-ray lines that do not overlap with other phases present are 3.7542(100); 2.909(15); 3.915(10) and 6.52(4) Å. D_{calc} = 2.61 g/cm³.

The mineral is found in "cobbles" in a "pseudo-conglomerate" (the "cobbles" are fragments of high-temperature metamorphic mineral assemblages). The rock is approximately 40% larnite, 25% brownmillerite, 20% ellestadite, and 15% ye'elemite. In thin section, the mineral is colorless. Crystals normally range from 3 to 15 μm; however, larger ones (to 60 μm) have been observed. The mineral is isotropic with $n = 1.568 \pm 0.002$. The phase is known as an intermediate in the formation of cement minerals in the cement–sulfuric acid process.

Ye'elemite was found in samples heated above about 900°C, and so the mineral is considered to be in the sanidinite facies.

The name is for Har Ye'elim and Nahal Ye'elim, the most conspicuous hill and wadi in the Hatrurim basin. Type material is on deposit in the Geochemistry Department of G.S.I. and in the Department of Geology of the Hebrew University, Jerusalem.

Discussion. The last entry in the second column of Table 2 should be 9.52 not 0.52. **R.H.L.**

Zoubekite*

L. Megarskaya, D. Rykl, Z. Táborský (1986) Zoubekite, $AgPb_4Sb_4S_{10}$, a new mineral from Příbram, Czechoslovakia. Neues Jahr. Mineral. Mon., 1986, 1–7.

An average of 15 microprobe analyses yielded Ag 5.88, Cu 0.22, Pb 47.26, Zn 0.22, Fe 0.05, Sb 28.53, S 18.75, sum 100.91 wt%. The empirical formula (based on S = 10) is $(Ag_{0.93}Cu_{0.07})_{\Sigma 1.00}(Pb_{3.92}Zn_{0.10}Fe_{0.01})_{\Sigma 4.03}Sb_{3.94}S_{10.00}$, or ideally $AgPb_4Sb_4S_{10}$. The mineral is too fine-grained for a single crystal study. X-ray powder diffraction data showed the mineral to be orthorhombic, space group unknown, with a = 18.698(8), b = 6.492(3), c = 4.577(1) Å, V = 555.6(6) Å³, Z = 1. The strongest X-ray lines (10 given) are 1.797(100)(10.1.0), 2.222(80)(202), 1.325(80)(703,423), 3.070(50)(220), and 2.392(60)(611).

The mineral forms long, irregular, lath-shaped crystals (or grains) of unknown orientation. Maximum dimensions of these crystals are 0.02 × 0.5 mm. Zoubekite is associated and intergrown with sphalerite, galena, argentian tetrahedrite, diaphorite, and boulangerite. The mineral replaces diaphorite and is in turn replaced by boulangerite. Color steel gray, luster metallic, streak black, fracture uneven, no cleavage observed. D_{calc} = 5.15. H ($VHN_{15.2}$) = 154–170 kg/mm². Opaque, white with a yellowish tint in reflected light. Reflection pleochroism rather strong—white with a faint yellowish tint to light gray (in oil, to light greenish gray). Strongly anisotropic from light gray to dark gray with a faint greenish tint; in oil the colors are the same. No internal reflections observed. Reflectance in air (nm, %): 460, 38.4–44.0; 480, 38.0–43.7; 540, 37.6–43.6, 560, 37.4–43.1; 580, 36.9–42.6; 600, 36.5–41.9; 640, 35.6–40.9; 660, 35.4–40.2. Optical properties are similar to those of boulangerite.

The mineral was found in two silver ore specimens from mines in the Příbram district, Bohemia, Czechoslovakia. Both specimens were collected in the 1850s and were deposited in the Mining Museum at Příbram. The name is in honor of Academician V. Zoubek, former director of the Geological Survey and the Geological Institute of the Czechoslovak Academy of Sciences in Prague. Polished sections containing the new mineral are at the Department of Mineralogy, National Museum, Prague. **J.E.S.**

Unnamed $(Cu,Ag)_2As$

J. Nebel (1983) Silver-bearing arsenide in domeykite from Brückenberg near Zwickau. Zeit. Angew. Geol., 29, 86–89.

Electron-microprobe analysis of the mineral gave Cu 41.0, As 33.3, and Ag 25.7, sum 100.0 wt%. The mineral occurs as small, dark gray intergrowths in gray β-domeykite from the type locality of the latter at Brückenberg near Zwickau in the German Democratic Republic. X-ray diffraction patterns of the β-domeykite from this area show two additional lines at 2.07 and 1.96 Å, thought to be due to this Ag-bearing phase. X-ray photographs of element-distribution patterns emphasize the differences in composition of this new phase and the host β-domeykite. The identity of this new phase is uncertain, but possible correspondence with other Ag-bearing arsenides, such as novakite $(Cu,Ag)_4As_3$ and kutinaite Cu_2AgAs, is suggested. **J.E.S.**

Unnamed $CuCr_2S_4$

L.Z. Reznickij, E.V. Skl'arov, Z.F. Ustschapovskaya (1985) Kalininite $ZnCr_2S_4$—A new natural sulphospinel. Zapiski Vses. Mineralog. Obshch., 114, 622–627 (in Russian).

Microprobe analyses of a phase forming intergrowths in kalininite gave Cu 11.03–17.39, Zn 2.24–10.56, Cr 25.97–34.16, Sb 1.02–14.46, S 39.0–42.58, corresponding ideally to $(Cu,Zn)(Cr,Sb)_2S_4$. X-ray study was not possible owing to the small dimensions of the mineral grains.

Discussion. Apparently a new species. X-ray data needed. **J.P.**

Unnamed $Cu_2Fe_2Sn_3S_7$

E.G. Riabeva, L.S. Dubakina, T.N. Spirina (1984) A mineral of the stannite group, $Cu_2Fe_2Sn_3S_7$, from ores of the Goluboe deposit (Far East). Zapiski Vses. Mineralog. Obshch., 113, 443–445 (in Russian).

Microprobe analysis of 40–50-μm grains optically similar to stannite and associated with herzenbergite and cassiterite gave Cu 15.2, Fe 13.7, Sn 44.4, S 27.7, sum 100.0 wt%. This corresponds to $Cu_{1.88}Fe_{2.01}Sn_{3.07}S_{7.09}$. Reflectances are given at 14 wavelengths (nm, %): 440, 25.3; 520, 29.2; 580, 29.7; 640, 29.9; 700, 30.0. Microhardness 230 kg/mm² (20-g load). No X-ray data were obtained owing to small grain size. The mineral occurs in the ore deposit "Goluboe" ("Blue"), USSR Far East. **J.P.**

Unnamed Cu_3Sn, Cu_6Sn_5, and Cu-Ni-Sn

V.V. Koval'skii, O.B. Oleinikov (1985) Native metals and natural polymineralic alloys of copper, zinc, lead, tin and antimony in rocks from the "Leningrad" kimberlite pipe. Doklady Akademii Nauk SSSR, 285, 203–208.

Analysis by electron microprobe gave Pb 1.46, Sn 42.16, Cu 54.51, sum 98.13 wt%, formula close to Cu_3Sn; Pb 0.5, Sn 64.7, Cu 35.2, sum 100.4 wt% (average of four), formula close to Cu_6Sn_5; and Ni 18.83, Sn 59.57, Cu 20.19, Zn 0.12, sum 98.71 wt%. These minerals form fine-grained intergrowths with observable phase boundaries and homogeneous compositions, the aggregates reaching 0.3-mm maximum dimension. The aggregates are disseminated within xenoliths of serpentinized garnet-spinel and spinel peridotites that were sampled from the kimberlite field in the Olenek River basin. Associated phases include native Cu, Sn, Pb, Zn, Al, graphite, stistaite, cuprostibite and moissanite. **D.A.V.**

Unnamed minerals from Franklin and Sterling Hill, New Jersey

P.J. Dunn (1986) A new zinc magnesium carbonate and data for other unnamed species from Franklin and Sterling Hill, New Jersey. Mineral. Record, 17, 126–127.

Unnamed Zn-Mg carbonate

Combined results of electron-microprobe analyses, carbon analyzer (for CO_2), and Penfield method (for H_2O) gave MgO 30.9, ZnO 31.6, MnO 3.6, FeO 0.1, CaO 0.1, CO_2 12.7, H_2O^+ 16.4, H_2O^- 2.4, Cl 0.8, less O = Cl 0.2, sum 98.4 wt%, corresponding to (on the basis of 19 oxygen atoms) $Mg_{5.13}(Zn_{2.60}Mn_{0.34}Ca_{0.01}Fe_{0.01})_{\Sigma 2.96}(CO_3)_{1.93}(OH)_{12.18}Cl_{0.15}\cdot 0.98H_2O$, or idealized $Mg_5(Zn,Mn)_3(CO_3)_2(OH,Cl)_{12}\cdot H_2O$.

The mineral occurs in an extremely fine-grained mixture of at least two phases: the dominant one is described here; the minor phase may be a silico-carbonate.

The strongest X-ray diffraction lines (powder method) are 7.47(100), 5.66(20b), 3.038(20), 2.694(60), 2.614(20), 2.515(20), 1.569(40), and 1.550(4). The absence of single crystals prevents the rigorous definition of the mineral.

Many aggregates have a frothy, bulbous aspect; others have a layered appearance; those specimens not showing such features resemble clay. They occur at Sterling Hill, associated with hetaerolite, zincite, chlorophoenicite, willemite, dolomite, hodgkinsonite, and celestine. One specimen is known from Franklin, associated with sphalerite on holdenite.

The mineral is white with pearly luster, opaque in aggregates, transparent in thin section. Aggregate density is about 0.865 g/cm^3, compression by hammering yields 2.52 g/cm^3, but true density could be much higher. Completely soluble in HCl and effervesces with considerable enthusiasm, a phenomenon which differentiates the mineral from fluoborite. The mineral is weakly anisotropic, mean index of refraction $n = 1.556$. Fluoresces a weak violet under longwave UV; no fluorescence under shortwave UV.

Discussion. The description is not unambiguous. It is not clear from the text whether the X-ray diffraction lines belong to one single phase or to the aggregate: the author stated that "these diffractions are common to all studied specimens of this mineral," but also that extra reflections indicate that most specimens "may be a mixture of at least two phases." The same problem is evident from the statement that the ideal formula "is but a representation of the composition of the aggregate."

Other unnamed minerals

EDS electron-microprobe analysis indicated only Ba, Mn, and U. Powder X-ray diffraction lines are (in order of decreasing intensity) 3.28, 3.53, 2.95, 2.12, and 6.40; the pattern has some similarities to that of carnotite. The mineral occurs at Franklin as bright-yellow crystals, associated with flinkite, cahnite, jarosewichite, and hausmannite.

EDS electron-microprobe analysis indicated Zn and U as major elements; the samples are of doubtful purity. Strongest powder X-ray diffraction lines are 6.30, 2.70, and 8.40. The mineral occurs at Sterling Hill as yellow, fibrous green coatings on calcite-mica matrix.

Discussion. Is it really useful to publish data on samples of doubtful purity? Even the color description seems to be mixed up.

EDS electron-microprobe analysis showed only Zn as detectable cation; the mineral effervesces in HCl and is therefore in part a Zn carbonate. Strongest powder X-ray diffraction lines are 18.0, 9.0, 2.94, 6.00, and 1.57. The mineral occurs at Sterling Hill as white pearly spherules in vuggy franklinite-willemite ore.

EDS electron-microprobe analysis showed only Cu as a detectable cation; the mineral is readily soluble in HCl without effervescence, suggesting that it might be a hydroxide, nitrate, or oxalate. Strongest powder X-ray diffraction lines are 3.95, 4.75, 2.50, 1.72, 3.20, 1.85, 1.93, 4.35, and 2.78. The mineral occurs at Sterling Hill as bright-blue fibrous crystals with red willemite and franklinite.

Electron-microprobe analysis of black acicular crystals from Franklin shows them to be a Mn-Zn arsenate-hydroxide, consistent with a highly oxidized chlorophoenicite-like mineral. Strongest powder X-ray diffraction lines are 10.90, 3.02, 2.33, 2.509, and 1.814.

Discussion. The author refers to an earlier, more extensive description of this mineral (Amer. Mineral., 67, 1043–1047). In this description, however, it is stated that the crystals are not of a homogenous single-phase mineral. **E.A.J.B.**

Unnamed Ni carbonate

M.J. Southwood (1984) A preliminary study of the mineralogy of the nickel occurrence at Mabilikwe Hill, northern Transvaal. Council for Mineralogy and Technology (Mintek) Report, M145, 6 p.

Analysis of the mineral by electron microprobe (avg. of 8) gave MnO 0.51, NiO 56.57, MgO 0.12, FeO 0.07, SiO_2 0.04, CaO 1.01, sum 58.32 wt%. Strong heating causes the mineral to break down, chiefly to NiO, without apparent evolution of water of crystallization. If CO_2 is obtained by difference from 100%, the analysis yields $(Ni,Ca,Mn,Mg,Fe)_{0.88}CO_3$. The ideal formula is uncertain.

The mineral forms moderate-yellowish-green encrustations on millerite-violarite aggregates and is finely intergrown with calcite and quartz. It occurs in nickel mineralization hosted by strongly recrystallized limestone. Vickers hardness = 195, $D_{meas} = 3.08$. **D.A.V.**

Unnamed Pd(Bi,Sb)

M.G. Dobrovol'skaia, V.S. Malov, N.V. Vladykin (1985) Platinum and palladium minerals in charoite-bearing rocks. Doklady Akad. Nauk SSSR, 284, 438–442 (in Russian).

Analyses by electron microprobe gave Pt 0.75, 0.18; Pd 32.73, 35.37; Bi 42.44, 34.74; Cu 3.08, 2.45; Pb 0.21, 0.0; As 0.31, 0.75; Sb 19.01, 27.13; Fe n.d., 0.04; Ni n.d., 0.64; S 0.04, 0.05; sum 98.57, 101.35 wt%. It is suggested that the mineral is intermediate in the isomorphous series sobolevskite (PdBi)–sudburyite (PdSb).

In reflected light, the mineral is pinkish and weakly anisotropic. Its reflectivity is between that of sperrylite and froodite. Hardness is lower than that of sperrylite. The mineral occurs as very fine grains in bornite segregations also associated with digenite, chalcocite, and galena in charoite-bearing rocks of the Murunskii alkali massif. **D.A.V.**

New Data

Cannizzarite

N.N. Mozgova, O.V. Kuzmina, N.I. Organova, I.P. Laputina, Y.S. Borodaev, M. Fornaseri (1985) New data on sulphosalt assemblages at Vulcano (Italy). Rend. Soc. Ital. Mineral. Petrol., 40, 277–283.

Two specimens of type material of cannizzarite have been reexamined: loose, tiny acicular crystals and an aggregate of <0.5-mm-long crystals growing in a small vug of andesite. Using a combination of X-ray powder and microprobe techniques, the following five opaque minerals were identified: Se-goongarrite, Se-lillianite, Se-galenobismutite, Se-cannizzarite, and Bi-Se-bearing galena.

Microprobe analyses of the Se-cannizzarite (mean of eight grains): Pb 36.2, Bi 44.6, S 14.1, Se 4.6, Sb <0.1, sum 99.5 wt%. The analytical values of the cannizzarite are subdivided into two groups: the first group corresponds to the ideal formula $Pb_4Bi_5(S,Se)_{11.5}$ and the second to $Pb_4Bi_{4.5}(S,Se)_{10.75}$. Microprobe analyses of the other four minerals are also provided.

The authors have claimed that cannizzarite from Vulcano may be described by the formula $Pb_4Bi_{5-x}(S,Se)_{11.5-1.5x}$, where x varies from 0 to 0.5, and that the Se-cannizzarite crystals studied represent intermediate members of the cannizzarite-wittite series. **R.A.S.**

Cumengéite

F.C. Hawthorne, L.A. Groat (1986) The crystal structure and chemical composition of cumengéite. Mineral. Mag., 50, 157–162.

Crystal-structure and chemical analyses on fragments of a 2-mm single crystal from Boleo, Baja California, Mexico, yielded the following results. The mineral is tetragonal, space group *I4/mmm*, a = 15.065, c = 24.436 Å, V = 5546 Å^3, Z = 2. Structure refinements by least-squares to an R index of 7.1% for 1158 observed ($I > 2.5\ \sigma I$) reflections.

Electron-microprobe (EDS) analysis gave CuO 21.60, PbO 62.84, Cl 18.51, H_2O (calculated from structural formula) 4.63, less O = Cl 8.35, sum 99.23 wt%. The new ideal formula of cumengéite as indicated by structure analysis is then $Pb_{21}Cu_{20}Cl_{42}(OH)_{40}$. **E.A.J.B.**

Fourmariérite

P. Piret (1985) Structure cristalline de la fourmariérite, $Pb(UO_2)_4O_3(OH)_4\cdot 4H_2O$. Bull. Minéral., 108, 659–665.

X-ray diffraction analysis of material from the Shinkolobwe mine, Shaba province, Zaire, shows the mineral to be orthorhombic ($Bb2_1m$) a = 13.986(4), b = 16.400(5), c = 14.293(9) Å, Z = 8. The structural determination produced a revised formula $Pb[(UO_2)_4O_3(OH)_4]\cdot 4H_2O$. D_{calc} = 5.98 g/cm^3. **K.W.B.**

Giessenite

S. Graeser, D.C. Harris (1986) Giessenite from Giessen near Binn, Switzerland: New data. Can. Mineral., 24, 19–20.

Re-examination of material from the type locality was undertaken to clarify its chemical composition and crystallography. An average of three microprobe analyses gave Cu 1.2, Pb 47.5, Bi 29.8, Sb 4.2, S 16.5, sum 99.2 wt%. This corresponds to $Cu_{4.27}Pb_{51.75}Bi_{32.19}Sb_{7.79}S_{116.18}$ (for 96 cations), or ideally $2(Cu_2Pb_{26}(Bi,Sb)_{20}S_{57})$. Examination by the Weissenberg single-crystal technique showed the mineral to be monoclinic, space group $P2_1/n$, a = 34.51(3), b = 38.18(5), c = 4.080(8) Å, $\beta \approx$ 90°, V = 5376 Å^3. Deviation from the originally reported orthogonal symmetry is small and is only evident at high angles on overexposed Weissenberg photographs. The minerals occurring with izoklakeite are members of a Bi-Sb solid solution series. **J.E.S.**

Giessenite

E. Makovicky, S. Karup-Møller (1986) New data on giessenite from the Bjørkåsen sulfide deposit at Otoften, northern Norway. Can. Mineral., 24, 21–25.

Giessenite from the Bjørkåsen sulfide deposit at Otoften, Norway, was examined. An average of eight microprobe analyses using sulfide standards yielded Ag 0.14, Cu 0.88, Fe 0.09, Pb 48.9, Bi 31.2, Sb 3.1, S 16.4, sum 100.8 wt%, corresponding to $Ag_{0.14}Cu_{1.56}Fe_{0.18}Pb_{26.50}Bi_{16.73}Sb_{2.90}S_{57.49}$, or simplified as $Cu_{1.7}Ag_{0.1}Fe_{0.2}Pb_{26.4}Bi_{16.7}Sb_{2.9}S_{57}$. The mineral is monoclinic, space group $P2_1/n$, a = 34.34(1), b = 38.05(1), c = 4.06(1) Å, β = 90.33(5)°. Deviations of symmetry from orthorhombic *Pnnm* are definite but not conspicuous. A possible displacive phase transformation perhaps involving cation ordering on cooling is suggested as a cause of a symmetry change to monoclinic $P2_1/n$. The strongest X-ray lines (75 given) are 3.910(40)(580), 3.790(40)(490), 3.650(40)(241), 3.433(70)(10.0.0), 3.400(60)(690), and 2.152(60)(0.15.1). The material is intimately twinned on (100). The mineral represents the fourth member of the kobellite homologous series, and it is a monoclinic, Bi-rich analogue of the orthorhombic, Sb-rich izoklakeite. **J.E.S.**

Izoklakeite

M.A. Zakrzewski, E. Makovicky (1986) Izoklakeite from Vena, Sweden, and the kobellite homologous series. Can. Mineral., 24, 7–18.

Izoklakeite from a second locality at the Vena Cu-Co mine, Bergslagen metallogenic province, central Sweden, is described. An average of 19 microprobe analyses gave Cu 0.88, Fe 0.19, Ag 0.59, Pb 50.01, Bi 19.20, Sb 11.67, S 16.91, sum 99.45 wt%, corresponding to $Pb_{51.29}Sb_{20.37}Bi_{19.52}Cu_{2.94}Ag_{1.16}Fe_{0.72}S_{112.09}$ (for 96 cations), or ideally $(Cu,Fe)_2Pb_{26.5}(Sb,Bi)_{19.5}S_{57}$. The mineral is orthorhombic, space group *Pnnm*, a = 30.47(1), b = 37.98(1), c = 4.072(1) Å, V = 5269.1 Å^3, Z = 2. The strongest lines (44 given) are 3.786(60)(0.10.0,490), 3.427(100)(441,351,10.0.0), 3.312(80)(5.10.0,451), 3.042(80)(471,281,651), and 2.894(80)(751,291).

The mineral occurs as aggregates up to a few millimeters in diameter, intergrown with jaskólskiite, native bismuth, galena, pyrrhotite, and native antimony. Gray color, metallic luster, dark gray streak, gray in reflected light with weak reflection pleochroism, and moderate anisotropism without distinct colors. Hardness (VHN_{100}) = 132–146 kg/mm^2. Reacts immediately with HNO_3 (1:1), but no observable reaction noted with HCl (1:1), KOH (40%), or $FeCl_3$ (20%). D_{calc} = 6.68 g/cm^3. Reflectance values in air (nm, %) are 470, 41.1–45.1; 546, 39.0–43.0; 590, 38.4–42.3; 650, 36.7–40.2. Details of the crystal structure in the kobellite homologous series, to which izoklakeite belongs, are presented. **J.E.S.**

Metavivianite

K.A. Rodgers, J.H. Johnston (1985) Type metavivianite: Mössbauer evidence for a revised composition. Neues Jahr. Mineral. Mon., 1985, 539–542.

The authors re-examined the type specimen of metavivianite (U.S. National Museum no. 127100) by Mössbauer spectroscopy. This mineral was originally described as a hydrated phosphate of only ferrous iron. The ^{57}Fe Mössbauer spectrum was computer-fitted for five doublets, two for Fe^{2+} (36 and 2% of the total area) and three for Fe^{3+} (21, 25, and 16%). The resulting formula is $Fe^{2+}_{1.14}\,Fe^{3+}_{1.86}(PO_4)_2(OH)_{1.86}\cdot 6.1H_2O$. Thus metavivianite is a ferri-ferrous phosphate hydrate having a variable Fe^{2+}/Fe^{3+} ratio. **E.S.G.**

Nambulite

S. Matsubara, A. Kato, T. Tiba (1985) Natronambulite, $(Na,Li)(Mn,Ca)_4Si_5O_{14}OH$, a new mineral from the Tanohata mine, Iwate Prefecture, Japan. Mineral. Jour., 12, 332–340.

Two new microprobe analyses plus two recalculated analyses, combined with crystal-chemical relationships, indicated that the ideal formula for nambulite is $(Li,Na)(Mn,Ca)_4Si_5O_{14}(OH)$ with Li > Na, Mn > Ca and Z = 2. **A.C.R.**

Rancieite

E. Barrese, C. Giampaolo, O. Grubessi, A. Mottana (1986) Rancieite from Mazzano Romano (Latium, Italy). Mineral. Mag., 50, 111–118.

Electron-microprobe analyses of 16 spots gave the following average values: MnO_2 71.9, CaO 6.11, BaO 2.85, MgO 1.53, K_2O 0.86, Na_2O 0.53, SiO_2 0.41, Al_2O_3 0.14, As_2O_5 0.18, P_2O_5 0.17, TiO_2 0.21, Cl 0.12, FeO 0.06. The first six oxides were considered by the authors to be significant components of rancieite. Thermal analyses (TG, DTG, DTA) indicated H_2O 13.9, which gives a revised formula for rancieite containing 4 H_2O.

X-ray diffraction analysis produced three peaks: 7.44(100), 3.69(37), and 2.46(22). The pattern was interpreted as the product of "very poorly ordered material." IR analysis supported structural disorder.

Rancieite occurs admixed with highly disordered 10-Å halloysite in stalactites formed in fractures that cut Mn-rich tuffs. The stalactites formed by aggregation of pisolitic grains and display a colloform texture developed by light and dark bands of rancieite.

Discussion. The authors have implied that Ba is essential to their material (p. 113) yet have not included Ba in the revised formula. It seems that this mineral's composition is not adequately known. Perhaps some of those "essential" elements would be expelled from the structure of well-ordered and crystalline rancieite? **K.W.B.**

Wehrlite

B. Nagy (1983) New mineral phases in the composition of wehrlite from Nagybōrzsōny, northern Hungary. Fōldtani Kōzlōny, Bull. Hung. Geol. Soc., 113, 247–259 (Hungarian with English translation).

In an article on the discovery of the new minerals sztrokayite and kitaibelite in material originally described in toto as wehrlite, the author has described the microprobe identification of an independent wehrlite mineral within the sample and has recommended the preservation of the term "wehrlite" and rejection of the name "tsumoite."

The mineral, with a recommended formula Bi_2Te_2, has lattice constants $a = 4.42$, $c = 24.05$ Å with Z = 3. These values are intermediate between those for metallic Bi and Te. **R.A.S.**

Discredited Mineral

Pseudomesolite = Mesolite*

R. Nawaz, J.F. Malone, V.K. Din (1985) Pseudomesolite is mesolite. Mineral. Mag., 49, 103–105.

Electron-microprobe and X-ray powder and Weissenberg analysis of the type specimen of pseudomesolite and of a specimen from Oregon (also analyzed by wet-chemical methods) have shown pseudomesolite to be identical to mesolite. **R.H.L.**

NOTICE

9th International Clay Conference 1989
AIPEA—Association Internationale pour l'Étude des Argiles

The 9th International Clay Conference of AIPEA will be held in Strasbourg, France, August 28–September 2, 1989. For information, contact Dr. Hélène Paquet, Institut de Géologie, 1, rue Blessig, 67084 Strasbourg, France.