American Mineralogist, Volume 72, pages 1023–1028, 1987

NEW MINERAL NAMES*

FRANK C. HAWTHORNE, JOHN JAMBOR, KENNETH W. BLADH, ERNST A. J. BURKE, JOEL D. GRICE, DON PHILLIPS, ANDREW C. ROBERTS, ROBERT A. SCHEDLER, JAMES E. SHIGLEY

Cameronite*

A.C. Roberts, D.C. Harris, A.J. Criddle, W.W. Pinch (1986) Cameronite, a new copper-silver telluride from the Good Hope mine, Vulcan, Colorado. Can. Mineral., 24, 379–384.

Two closely matching microprobe analyses of cameronite, ideally Cu_7AgTe_{10}, give an average of Cu 24.45, Ag 6.34, Te 69.11, sum 99.90 wt%, corresponding to $Cu_{7.10}Ag_{1.09}Te_{10}$ assuming 10 Te atoms. Single-crystal X-ray study indicates tetragonal symmetry, $a = 3a' = 12.695(2)$, $c = 7c' = 42.186(6)$ Å, space groups $P4_2/mmc$, $P4_2mc$, or $P\bar{4}_2c$, $D_{calc} = 7.144$ g/cm³ for the ideal formula with Z = 16. The strongest lines (26 given) are 3.456(100)(307), 2.118(100)(33.14,600), 1.804(60)(637), 1.377(40)(63.21,907), and 1.222(40)(93.14).

In hand specimen, cameronite resembles tetrahedrite: opaque, gray, metallic, brittle, subconchoidal fracture, no cleavage, calculated Mohs' hardness 3½–4, VHN_{100} 163 (150–170), VHN_{200} (151–172). In reflected light, slightly bireflectant and pleochroic from pale gray to pale brownish gray; anisotropism distinct with colors in air from medium gray to slate gray to brownish gray. Reflectance spectra in air and in oil for six grains are given in 10-nm steps; average values in air in 50-nm steps from 400 to 700 nm for R_o, R'_e are 23.8, 28.2; 27.8, 31.6; 30.6, 33.2; 31.9, 33.5; 32.7, 33.3; 33.1, 32.8; 33.4, 32.3. Bireflectance positive from 400 to about 625 nm, negative from about 645 to 700 nm. Color indices (2856 K) in air for R_o, R'_e are x .456–.457, .447–.452; y .413–.414, .411–.412; λ_d 583–584; 546–580; P_e% 10.0–10.8; 1.9–6.3.

Cameronite masses up to 2 × 2 mm are associated with native tellurium, rickardite, vulcanite, arsenopyrite, and pyrite. The name is for E. N. Cameron, who with I. M. Threadgold originally identified and partly characterized the mineral in 1961 (Am. Mineral., 46, 258–268). Type material is in several repositories, including the National Mineral Collection at the Geological Survey of Canada, Ottawa, the British Museum (Natural History), London, and the Pinch Mineralogical Museum, Rochester, New York. **J.L.J.**

Chvaleticeite*

J. Pašava, K. Breiter, M. Huka, J. Korecký (1986) Chvaleticeite, $(Mn,Mg)SO_4 \cdot 6H_2O$, a new mineral. Neues Jahrb. Mineral. Monatsh., 121–125.

Classical chemical analyses gave MnO (by titration) 15.81, MgO (by EDTA titration) 6.41, CaO 0.04 (by AAS), FeO trace, Fe_2O_3 (by AAS) 0.10, Al_2O_3 trace, K_2O (by AAS) 0.005, Na_2O (by AAS) 0.011, SO_3 (determined gravimetrically as $BaSO_4$) 31.48, P_2O_5 trace, H_2O^+ (by modified Penfield method) 0.37, H_2O^- (by modified Penfield method) 45.22, insoluble 0.36, sum 99.81 wt%, corresponding to (on the basis of SO_3 = 1) $(Mn_{0.567}Mg_{0.405}Ca_{0.002}Fe^{+3}_{0.003})_{\Sigma 0.977}SO_4 \cdot 6.39H_2O$ or (on the basis of anhydrous O = 4) $Mn_{0.570}Mg_{0.407}Ca_{0.002}Fe^{+3}_{0.003})_{\Sigma 0.982}S_{1.005}O_4 \cdot 6.42H_2O$. The ideal formula is $(Mn,Mg)SO_4 \cdot 6H_2O$ with Mn > Mg and Z = 8. DTA-TGA analysis showed major peaks at 105 (H_2O), 310 (H_2O), 987 (SO_3), and 1000°C (SO_3). Chvaleticeite (as described, magnesian chvaleticeite) is the Mn-dominant member of the hexahydrite group.

Material suitable for single-crystal study was not found so that unit-cell parameters were calculated by analogy with hexahydrite. The mineral is monoclinic, space group $C2/c$ with a = 10.05 (2), b = 7.24 (2), c = 24.3 (1) Å, β = 98.0(2)°. The strongest lines of the Guinier powder film (32 given) are 5.45(8)($11\bar{2}$), 4.91(10)($20\bar{2}$), 4.47(8)($11\bar{4}$), 3.98(8)(114), 3.42(7)($20\bar{6}$), 3.25(8)(116), and 2.967(7)($31\bar{3}$).

Chvaleticeite forms white, relatively hard, fine-grained aggregates as well as pinkish to yellowish-green loose coatings. Grains do not exceed 0.05 mm in longest dimension and are translucent with a vitreous luster. H = 1.5. D_{meas} = 1.84, D_{calc} = 1.84. Soluble in water. Optically, only α' (= 1.457(2)) and γ' (= 1.506(2)) could be measured because of the fine-grained nature of the material. In thin section the mineral is colorless and transparent.

Chvaleticeite is a rare constituent of a sulfate-rich paragenesis within the oxidation zone of an upper Proterozoic volcano-sedimentary deposit of pyrite-manganese ores at Chvaletice, Bohemia, Czechoslovakia. It is associated with melanterite, Mg-Mn melanterite (= magnesian, manganoan melanterite), epsomite, Mg-Fe mallardite (= magnesian, ferroan mallardite), Mg-jokokuite (= magnesian jokokuite), Mg-ilesite (= magnesian ilesite), rozenite, copiapite, and gypsum. Chvaleticeite forms by dehydration of Mg-mallardite (= magnesian mallardite) and dehydrates to Mg-jokokuite (= magnesian jokokuite). The name is for the locality. Type material is deposited at the Geological Survey in Prague, Czechoslovakia.

Discussion. The use of unapproved Mg-, Mn-, and Fe-modified mineral names is deplorable. **A.C.R.**

Erlianite*

X. Feng, R. Yang (1986) Erlianite, a new vanadium- and iron-bearing silicate mineral. Mineral. Mag., 50, 285–289.

Analysis by colorimetric microanalysis yielded SiO_2 38.80, FeO 26.67, Fe_2O_3 21.26, V_2O_5 1.15, MgO 1.00, CaO 0.83, MnO 0.55, P_2O_5 0.051, K_2O 0.079, Na_2O 0.09, Al_2O_3 0.19, TiO_2 0.38, H_2O^+ 7.65, H_2O^- 0.90, sum 99.60 wt%. Major-element contents were confirmed by electron-microprobe analysis. K, Na, Ca, P, and H^- are assumed to be minor contaminants or interlayer elements. The provisional empirical formula is $(Fe^{2+}_{19.96}Fe^{3+}_{2.19}Mg_{1.33}Mn_{0.42})_{\Sigma 23.90}(Fe^{3+}_{11.32}V_{0.68})_{\Sigma 12.00}(Si_{34.73}Ti_{0.26}Al_{0.20}Fe^{3+}_{0.81})_{\Sigma 36.00}O_{90}(OH,O)_{48}$. The mineral is soluble in dilute HCl. The TGA curve is smooth, and the lack of a distinct exothermic peak shows that the water contained in the mineral escaped slowly. The water content may therefore be structural. The DTA curve exhibits three

---

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

exothermic peaks at 320, 720, and 940°C. At 320°C the crystal structure was destroyed and quartz was found; at 720°C no new phase was produced; and at 940°C the specimen was converted to quartz and hematite. Data from Mössbauer and infrared spectroscopy are also presented.

Selected-area electron-diffraction patterns gave unit-cell data of $a = 23.2$, $b = 9.2$, $c = 13.2$ Å and indicated the space group to be $Pmmn$ or $Pm2_1n$. No suitable crystals have been found for a single-crystal diffraction study. X-ray powder diffraction data show the mineral to be orthorhombic with unit cell $a = 23.20(\pm 0.01)$, $b = 9.20(\pm 0.01)$, $c = 13.18(\pm 0.01)$ Å, $V = 2813$ Å^3, and Z = 1. The strongest lines (27 given) are 11.5(100)(200,101), 3.05(50)(223,130), 2.89(60)(603,800,231), 2.61(60)(523,105,332,224), 2.52(50)(324,901,115,033,531), and 2.42(30)(424,803,614,821).

Erlianite is found at the Harhada iron mine along the Jining-Erlian railway, Inner Mongolia Autonomous Region, People's Republic of China. The mineral occurs sparingly in a fractured zone within the upper part of the deposit. Associated minerals include magnetite, minnesotaite, stilpnomelane, deerite, quartz, siderite, albite, and other phases. The distribution of erlianite is closely related to structural features, and it is often developed with red-brown stilpnomelane and dark brown minnesotaite along shear planes.

Erlianite occurs as opaque fibers, flakes, and lathlike aggregates. Color black, streak brownish gray, and luster silky. The grain size is 1–2 cm. The mineral is not fluorescent; it has two perfect cleavages on {001} and {100}. H = 3.7, $D_{meas} = 3.11$. In thin section the mineral is brown with moderate relief. Biaxial negative, $\alpha = 1.667$, $\beta = 1.674$, $\gamma = 1.679$, $2V = 56$–$59°$. The orientation is $X = b$, $Y = c$, and $Z = a$. Slightly pleochroic with Z (dark brown) $\simeq$ Y (dark brown) > X (light brown). Weak dispersion with $r < V$; either positive or negative elongation. Most elongate sections show parallel extinction, although extinction angles up to 29° have been measured. **J.E.S.**

Hochelagaite*

J.L. Jambor, A.P. Sabina, A.C. Roberts, M. Bonardi, D.R. Owens, B.D. Sturman (1986) Hochelagaite, a new calcium-niobium oxide mineral from Montreal, Quebec. Can. Mineral., 24, 449–453.

Microprobe analyses of four globules of the mineral gave CaO 6.3–7.7, SrO 0.0–1.2, Na_2O 0.0–1.3, Nb_2O_5 71.7–78.3, TiO_2 1.2–1.5, Al_2O_3 0.0–0.8, SiO_2 0.4–1.5, H_2O (by diff.) 10.3–18.9, corresponding to the formula $(Ca,Na,Sr)(Nb,Ti,Si,Al)_4O_{11} \cdot nH_2O$ (n = 8?).

Owing to the fine grain size of the mineral, single-crystal X-ray studies were not undertaken. The powder pattern was indexed on the basis of similarity of the mineral with franconite and gave $a = 19.88$, $b = 12.83$, $c = 6.44$ Å, $\beta = 93.20°$, with Z = 4. The six strongest powder-diffraction lines are 10.0(100), 3.115(80), 3.208(70), 5.39(50), 4.96(50), and 2.799(40).

Hochelagaite occurs as white globules, 150 μm across, in vugs of a dawsonite-bearing sill in the Francon limestone quarry, Montreal, Quebec. The globules mainly consist of radiating bladed crystals with a vitreous luster and white streak; H = 4. Optically negative and biaxial with $\alpha = 1.72$, $\beta = 1.81$, $\gamma = 1.82$; $2V = 35°$. Optical orientation: $Z = c$ and $X = b$ (perpendicular to the blades). $D_{meas} = 2.85$–2.94, $D_{calc} = 2.82$–2.88.

The mineral is named after the original name for Montreal (Hochelaga).

Holotype specimens are deposited in the National Mineral Collection at the Geological Survey of Canada (64285 and 64288) and at the Royal Ontario Museum (M37547, M37548). **R.A.S.**

Hydrodelhayelite*

M.D. Dorfman, M.I. Chiragov (1979) Hydrodelhayelite, a product of supergene alteration of delhayelite. New Data on Minerals of the USSR, 28, 172–175.

Chemical analysis gives SiO_2 55.53, TiO_2 0.01, Al_2O_3 8.46, Fe_2O_3 0.65, MnO 0.18, CaO 12.72, SrO 0.22, MgO 0.21, Na_2O 0.22, K_2O 6.18, F 0.00, Cl 0.15, $H_2O^+ = 9.62$, $H_2O^- = 5.85$, sum = 99.64 wt%, corresponding to the idealized formula $KCa_2(Si_7Al)O_{17}(OH)_2 \cdot 6H_2O$.

Hydrodelhayelite is orthorhombic, $a = 6.648$, $b = 23.846$, $c = 7.073$ Å, space group $Pnm2_1$, Z = 2. The strongest lines in the X-ray powder pattern are 2.923(100), 3.069(75), 2.800(55), 3.319(43), and 6.79(38).

The mineral occurs as an alteration product of delhayelite in an ijolite-urtite pegmatite of the Khibina alkaline massif; greenish-gray delhayelite alters to grayish-white hydrodelhayelite in the supergene zone. Hydrodelhayelite is grayish white with a vitreous luster; H $\approx$ 4. It has three orthogonal cleavages with {010} very perfect, {100} and {001} imperfect; $D = 2.168$ g/cm^3. It is biaxial with $\alpha = 1.503$, $\gamma = 1.518$.

The name is for the composition and its relationship to delhayelite. **F.C.H.**

Kimrobinsonite*

E.H. Nickel, B.W. Robinson (1985) Kimrobinsonite, a new tantalum mineral from Western Australia, and its association with cesstibtantite. Can. Mineral., 23, 573–576.

Electron-microprobe analysis gave Na_2O 0.7, FeO 0.4, Sb_2O_3 0.7, Ta_2O_5 78.5, Nb_2O_5 6.6. Adjusted values from CHN microanalysis gave H_2O 8.9, CO_2 4.2. The sum equals 100.0 wt%. The ideal formula is $(Ta,Nb)(OH)_{5-2x}(O,CO_3)_x$ with $x \approx 1.2$.

X-ray analysis revealed a primitive isometric cell of the perovskite type with $a = 3.812(1)$ Å, $D_{calc} = 6.865$ (law of Gladstone and Dale), Z = 1. The strongest lines (21 given) are 3.808(100)(100), 2.696(70)(110), 1.702(50)(210), 1.555(40)(211), 1.907(30)(200), and 2.202(20)(111).

Kimrobinsonite occurs in aggregates of cryptocrystalline white individuals whose luster is dull and chalky; the material has a white streak. Friable and soft (VHN 70 with a 20-g load), the mineral is isotropic.

The name honors Mr. Kim Robinson of Perth, who discovered the material in weathered pegmatite near Mt. Holland in Western Australia (32°10′S, 119°44′E). Kimrobinsonite occurs intergrown with cesstibtantite as a mass in the skeletal void of a precursor Ta-Sb mineral of unknown identity. Associated minerals in the pegmatite include montmorillonite, K-feldspar, lithium-bearing muscovite, tourmaline, and several rare element–bearing minerals. Type material resides at the Government Chemical Laboratories of Western Australia, the British Museum of Natural History, and the Smithsonian. **K.W.B.**

Laphamite*

P.J. Dunn, D.R. Peacor, A.J. Criddle, R.B. Finkelman (1986) Laphamite, an arsenic selenide analogue of orpiment, from burning anthracite deposits in Pennsylvania. Mineral. Mag., 50, 279–82.

Analysis by electron microprobe gave As 47.0, Se 43.7, S 8.7, sum 99.4 wt%. Although Se always dominated, crystals displayed variable Se:S ratios. The ideal formula is $As_2(Se,S)_3$.

X-ray analysis reveals a monoclinic lattice, $P2_1/n$, with a = 11.86(1), b = 9.756(9), c = 4.265(9), Å, β = 90.17(30)°, Z = 4, D_{calc} = 4.60, D_{meas} = 4.5(1) g/cm³. The strongest lines (42 given) are 2.833(100)$(221,22\bar{1})$, 2.773(80)$(31\bar{1},311)$, 4.87(70)(020), 2.905(60)$(30\bar{1},301)$, 1.777(50)(051,032), and 1.709(50).

Laphamite occurs as dark red, resinous, prismatic crystals (< 5 mm). The larger crystals are nearly opaque. The streak is red orange; crystals are flexible but not elastic. Cleavage on (010) is perfect. Laphamite is so malleable that hardness could only be determined as "soft." Crystals are tabular on (010), are elongate on [100], and are composed of the forms {100}, {110}, {101}, and {301}. Many of the crystals resemble resorbed solids.

In plane-polarized light (3200 K) in polished section, laphamite is moderately bireflectant from white to gray. Strong, fiery-red internal reflections and golden-yellow reflections along scratches are characteristic. On (001), anisotropism is moderate with gray tints during rotation. Reflectance in air: 400 (34.4, 42.1), 420 (33.9, 41.0), 440 (33.8, 39.9), 460 (33.8, 38.75), 480 (33.25, 37.45), 500 (32.3), 36.3), 520 (30.9, 35.1), 540 (29.5, 34.0), 560 (28.45, 33.1), 580 (27.6, 32.3), 600 (26.9, 31.55), 620 (26.4, 31.1), 640 (26.4, 30.9), 660 (26.3, 30.6), 680 (26.1, 30.4), and 700 nm (25.9, 30.1) (R_1 and R_2, respectively). Color values for the CIE illuminant C are Y%, 29.0, 33.5; λ_d 480, 478; P_e%, 9.1, 8.7 for R_1 and R_2, respectively.

Laphamite occurs with orpiment, arsenolite, and NH_4AlF_4 on a clinker found at the surface near a gas vent from a burning coal-waste dump at Burnside, Northumberland County, Pennsylvania (40°46′14″N, 76°34′12″W). The name honors Dr. David M. Laphman, former Chief Mineralogist of the Pennsylvania Geological Survey. Type material resides at the Smithsonian (catalogue no. 163039) and at the British Museum (E. 1036, BM 1984, 843). **K.W.B.**

Mathewrogersite*

P. Keller, P.J. Dunn (1986) Mathewrogersit, ein neues Bleisilikatmineral von Tsumeb, Namibia. Neues Jahrb. Mineral. Monatsh., 203–208 (in German).

Combined results of electron-microprobe analysis and elemental analyzer (for H_2O) gave PbO 57.5, MgO 0.1, FeO 1.7, CuO 0.8, Al_2O_3 5.9, GeO_2 3.9, SiO_2 26.2, H_2O 1.9, sum 98.0 wt%, corresponding (on the basis of 12 Si atoms) to $Pb_{7.08}(Fe_{0.65}Cu_{0.28}Mg_{0.07})Ge_{1.03}Al_{3.18}Si_{12}O_{41.81}H_{5.81}$, or idealized $Pb_7(Fe,Cu)GeAl_3Si_{12}O_{36}(OH,H_2O\square)_6$.

Single-crystal X-ray study with several methods shows the mineral to be hexagonal, with possible space groups $R3$, $R\bar{3}$, $R32$, $R3m$, or $R\bar{3}m$. The unit-cell parameters were calculated from 25 diffraction lines of a Debye-Scherrer pattern: a = 8.457, c = 45.970 Å, Z = 3, D_{calc} = 4.76, D_{meas} = about 4.7 g/cm³. The strongest X-ray diffraction lines (34 listed) are 15.30(70)(003), 7.68(60)(006), 4.08(50)$(113,1\bar{2}3)$, 3.257(100)$(119,1\bar{2}9)$, 2.860(50)(0.2.10), 2.766(60)$(211,1\bar{3}1, 3\bar{2}\bar{1})$, 2.439(50)$(300,3\bar{3}0)$, 2.030(70)$(131,3\bar{4}1,4\bar{1}\bar{1})$, 1.762(60)$(1.3.13,3.\bar{4}.13)$.

The mineral is a lead silicate without any structural relationship with other minerals or chemical compounds.

Mathewrogersite occurs in cavities of corroded lead-zinc ore from the Tsumeb mine, Namibia. Associated minerals are queitite, alamosite, melanotekite, kegelite, larsenite, schaurteite, anglesite, willemite, leadhillite, and mimetite. The grain size of mathewrogersite does not exceed 0.3 mm in diameter. Idiomorphic crystals are flattened along {0001} and are six-sided with possibly rhombohedral faces; the crystals form subparallel intergrowths. The mineral also occurs in radiating aggregates, up to 1 mm in diameter, of scales and blades. Perfect {0001} cleavage.

The mineral is colorless, translucent, white or pale greenish yellow, with glassy luster (weak pearly luster on cleavage planes); white streak. H about 2. Soluble in HNO_3. Its optical properties are uniaxial negative with ω = 1.810, ϵ = 1.745.

The name is for Mathew Rogers, the first prospector in Tsumeb. Type material is at the Institute of Mineralogy and Crystal Chemistry of Stuttgart (FRG) University and at the Smithsonian Institution in Washington. **E.A.J.B.**

Montroyalite*

A.C. Roberts, A.P. Sabina, M. Bonardi, J.L. Jambor, R.A. Ramik, B.D. Sturman, M.J. Carr (1986) Montroyalite, a new hydrated Sr-Al hydroxycarbonate from the Francon quarry, Montreal, Quebec. Can. Mineral., 24, 455–459.

Microprobe analyses of the mineral (TGA and EGA for H_2O and CO_2) gave Al_2O_3 28.8, SrO 27.7, CaO 1.1, CO_2 9.2, H_2O 24.6, F 11.5, less O ≡ F 4.84, sum 98.06 wt%, yielding an ideal formula $Sr_4Al_8(CO_3)_3\{(OH),F\}_{26}\cdot 10–11H_2O$.

The material was not suitable for single-crystal X-ray studies. Strongest eight lines in the powder pattern are 6.57(100), 4.00(50), 3.283(55), 3.190(50), 2.356(45b), 2.862(40), 2.551(40b), and 2.841(40). TEM reveals twin lamellae approximately 50 Å wide parallel to a net plane with translations of 7.14 and 6.55 Å and with an interrow angle of approximately 77.5°.

Montroyalite occurs as white translucent 1-mm-sized hemispheres in cavities in a silicocarbonatite sill exposed at the Francon quarry, Montreal, Quebec. Indistinct fibers radiate from the cores of these hemispheres. Individual grains are irregular to lath shaped, up to 20 μm long and 5 μm thick. Brittle. White streak. Uneven to splintery fracture and no visible cleavage. Soluble in 1:1 HCl and fluoresces white under both long- and short-wavelength ultraviolet light. H = 3.5, D_{meas} = 2.677. Montroyalite is biaxial and negative, α = 1.515, β = 1.530, γ = 1.545; $2V_{meas}$ = 80°, $2V_{calc}$ = 89°. Y nearly parallel to elongation of lath; X and Z make angles of about 45° with the plane of the lath.

Major associated minerals: albite, quartz, strontiodresserite, calcite, dawsonite, ankerite, and fluorite.

Montroyalite is named after the Monteregian hill Mont Royal, a landmark in Montreal. Type material is deposited in the Systematic Reference Series of the National Mineral Collection at the Geological Survey of Canada, Ottawa, under the catalogue numbers 64261 and 64265. **R.A.S.**

Moolooite*

R.M. Clarke, I.R. Williams (1986) Moolooite, a naturally occurring hydrated copper oxalate from Western Australia. Mineral. Mag., 50, 295–298.

Partial microchemical analysis by CHN analyzer gave C 14.10 and H 0.52% corresponding to C_2O_3 42.3 and H_2O 4.65%. A microchemical test for the oxalate radical gave a positive result. Cu and Si were detected by microprobe scan but could not be determined quantitatively owing to rapid sample degradation under the electron beam. Si is variable and attributed to intergrown opaline silica. Assuming sufficient Cu^{+2} for stoichiometry requires CuO 46.7, C_2O_3 42.3, H_2O 4.65, total 93.6 wt%. Assuming that the shortfall from 100% is due to silica impurity, the derived empirical formula is $CuC_2O_4\cdot 0.44H_2O$ and the general formula is $CuC_2O_4\cdot nH_2O$ with $0 \leq n < 1$ and Z = 1. Extensive studies of the analogous artifical compound indicate that the water is zeolitic and not essential to maintaining structural integrity.

The material is too fine grained for single-crystal study. Orthorhombic unit-cell parameters, $a = 5.35$, $b = 5.63$, $c = 2.56$ Å, were calculated with reference to the artificial compound $CuC_2O_4 \cdot 0.1H_2O$ (PDF 21-297). The strongest lines of the X-ray powder pattern (25 given) are 3.88(100)(110), 2.50(30)(120), 2.33(18)(011), 2.31(25)(101), 2.14(20)(111), 1.938(18)(220), 1.787(25)(121,300), and 1.753(30)(211).

Moolooite occurs as variable blue-green microconcretions that have a dull to waxy luster. Individual crystallites are lathlike or prismatic in shape and are less than 1 μm in size. $D_{calc} = 3.43$. The maximum refractive index, 1.95, is perpendicular to the axis of elongation. The minimum refractive index, 1.57, is parallel to the axis of elongation. The mineral dissolves in warm dilute HCl without effervescence.

Moolooite was found 12 km east of the homestead on Mooloo Downs pastoral station in the Precambrian Gascoyne province of Western Australia, Australia, approximately 1 km north of Bunbury Well, at 25°01′30″S, 116°06′30″E. The mineral was discovered on an outcrop of white glassy quartz intimately associated with sampleite, libethenite, and an unidentified mineral believed to be an oxalate. Other associated minerals are chalcopyrite, digenite, and covellite; their oxidation has produced a variety of secondary minerals including brochantite, antlerite, atacamite, gypsum, barite, and jarosite. Moolooite is believed to have formed by reaction between solutions derived from bird excreta and the soluble secondary copper minerals. A second occurrence is reported from the Sainte-Marie-aux-Mines silver mining district of Vosges Mountains, France.

The name is for the locality. Type material is preserved at Perth, Western Australia, in the mineral collection of the Government Chemical Laboratories. **A.C.R.**

Obradovicite*

J.J. Finney, S.A. Williams, R.D. Hamilton (1986) Obradovicite, a new complex arsenate-molybdate from Chuquicamata, Chile. Mineral. Mag., 50, 283–284.

Wet-chemical analysis gave Na_2O 0.56, K_2O 2.48, CuO 5.85, Fe_2O_3 10.12, As_2O_5 8.46, MoO_3 55.29, H_2O 18.33, sum 101.09 wt%. The ideal formula is $H_4(K,Na)CuFe_2(AsO_4)(MoO_4)_5 \cdot 12H_2O$, with K > Na.

X-ray analysis reveals an orthorhombic cell, *Pcnm*, with $a = 15.046$, $b = 14.848$, $c = 11.056$ Å, Z = 4, $D_{meas} = 3.55(5)$, $D_{calc} = 3.68$. The strongest lines (28 given) are 8.906(100)(101), 10.565(80)(110), 7.424(80)(020), 2.969(60)(303,050), 5.733(50)(211), and 2.898(50)(133).

Obradovicite occurs as clusters of platy, translucent, pea-green (RHS 149A) crystals (<0.1 mm) with a paler streak (RHS 149C). No twinning was observed. The most prominent forms on crystals that are elongated slightly along *c* are {100}, {110}, and {011}. The faces of {100} are striated along *c*. Mohs' hardness = 2.5; no cleavage observed. The mineral is insoluble in cold 1:1 HNO_3 but dissolves readily when heated, readily soluble in cold 1:1 HCl, rapidly turns dull brick orange in 40% KOH, and is unaffected by 20% NH_4OH.

Optically biaxial positive with $2V_Z = 81°$, $\alpha = 1.790$, $\beta = 1.798$, $\gamma = 1.811$ (Na_D line), $a = Z$, $b = X$, $c = Y$, obradovicite shows strong dispersion and weak yellow pleochroism ($Z > X = Y$). The mineral does not fluoresce under short-wavelength ultraviolet light.

Obradovicite occurs on brecciated and leached vein-quartz and on crusts of jarosite. Tiny wulfenite crystals are also associated with obradovicite. Known only from Chuquicamata, Chile, the mineral is named for Martin T. Obradovic from whose collection the type material came. Type material resides at the Colorado School of Mines Museum, the Smithsonian, and the Mining Museum in Copiapó, Chile. **K.W.B.**

Orthoserpierite*

H. Sarp (1985) Orthoserpierite $Ca(Cu,Zn)_4(SO_4)_2(OH)_6 \cdot 3H_2O$, a new mineral from the Chessy mine, France; a polymorph of serpiérite. Schweiz. Mineral. Petrogr. Mitt., 65, 1–7 (in French).

Electron-microprobe analysis gave CuO 43.61, CaO 9.33, ZnO 7.29, SO_3 21.20, H_2O (by difference) 18.57, which yields a formula (based on 17 oxygen atoms) of $Ca_{1.08}(Cu_{3.54}Zn_{0.58})_{\Sigma 4.12}S_{1.71}O_{17}H_{13.33}$.

Single-crystal and powder X-ray diffraction studies show the mineral to be orthorhombic, space group $Pca2_1$, unit cell $a = 22.10(2)$, $b = 6.20(2)$, $c = 20.39(2)$ Å, Z = 8. The strongest X-ray lines (48 given) are 10.21(100)(002), 5.10(90)(004), 3.400(90)(006,512), 3.184(50)(513), 2.610(50)(117,442,713), 2.558(50)(217,803,008), 2.511(40)(521,423,811), 2.384(60)(424), and 2.111(35)(119,426,10.03).

The mineral occurs as masses and fibrous crusts associated with gypsum, devilline, and calcite on a brecciated argillite. The sky-blue crystals have a vitreous luster and a light green streak. Tabular crystals, flattened on {001} are elongate parallel to the *b* axis and measure up to 0.2 mm. Splintery fracture. Soluble in HCl. Mauve fluorescence in LW or SW. $D_{meas} = 3.00$ g/cm³, $D_{calc} = 3.07$ g/cm³. Optically biaxial negative, $\alpha = 1.586(2)$, $\beta = 1.645(2)$, $\gamma = 1.650(2)$, $2V_{meas} = 32(2)°$, $2V_{calc} = 32°$. Dispersion distinct $r > v$. Weak pleochroism with X colorless or very pale green, Y and Z pale green. Orientation matrix $X = c$, $Y = a$, $Z = b$.

The name delineates the species as the orthorhombic polymorphic of serpierite. The holotype is preserved in the Muséum d'Histoire Naturelle de Genève. **J.D.G.**

Otjisumeite*

P. Keller, H. Hess, P.J. Dunn (1981) Otjisumeit, $PbGe_4O_9$, ein neues Mineral aus Tsumeb, Namibia. Neues Jahrb. Mineral. Monatsh., 49–55 (in German).

Analysis of two homogeneous crystals by electron microprobe gave GeO_2 64.7, PbO 35.5, sum 100.2 wt%, corresponding to $Pb^{+2}_{1.03}Ge^{+4}_{3.99}O_9$, or idealized $PbGe_4O_9$.

Single-crystal X-ray study with different methods shows the mineral to be triclinic, space group $P1$ or $P\bar{1}$, with $a = 6.945$, $b = 6.958$, $c = 9.279$ Å and $\alpha = 102.94$, $\beta = 103.05$, $\gamma = 114.77°$, Z = 2, $D_{calc} = 5.77$ g/cm³. The strongest X-ray diffraction lines (18 listed) are 5.87(30)($010,100,1\bar{1}0$), 4.20(40)($10\bar{2},0\bar{1}2,002$), 3.41(50)($1\bar{1}\bar{2},1\bar{1}2,110$), 2.95(100)($102,2\bar{1}\bar{2},1\bar{2}2,020,1\bar{2}\bar{1}$), 2.41(30)($12\bar{1},21\bar{1},2\bar{2}\bar{2},2\bar{1}2$), 2.26(30)($11\bar{4},10\bar{4},01\bar{4}$), 2.22(50)($1\bar{3}0,2\bar{3}1,3\bar{1}0,2\bar{3}0$), 1.847(40)($3\bar{2}2,11\bar{5}$), and 1.782(40)($13\bar{2},31\bar{2},1\bar{3}\bar{2},031$).

Otjisumeite could be a low-temperature modification of the synthetic hexagonal phase $PbGe_4O_9$. The mineral forms pseudohexagonal crystals, and the unit-cell parameters can be expressed in pseudohexagonal symmetry with $a' = 11.76$, $b' = 11.79$, $c' = 9.279$ Å, and $\alpha' = 89.78$, $\beta' = 89.73$, $\gamma' = 59.65°$.

Otjisumeite occurs in small replacement cavities in germanium ore from the Tsumeb mine, Namibia. The primary ore consists of tennantite, germanite, and renierite. The secondary minerals in the cavities include chalcocite, calcite, quartz, siderite, gypsum, otjisumeite, and schaurteite. The otjisumeite crystals are up to 1 mm in length and have a diameter of less than 0.1 mm; they are elongated parallel to the *c* axis, and they have a columnar to fibrous habit; they usually form radiating aggregates. Weak {001} cleavage.

The mineral is white or colorless and often translucent, with greasy luster. H about 3. Its optical properties are biaxial positive with $\alpha = 1.920$, $\beta_{calc} = 1.922$, $\gamma = 1.943$ and $2V_{meas} = 20°$; $\alpha \wedge c = 3–5°$, no dispersion.

The name is derived from the Herero indication of the locality. Type material is at the Institute of Mineralogy and Crystal Chemistry of Stuttgart (FRG) University and at the Smithsonian Institution in Washington. **E.A.J.B.**

Spheniscidite*

M.J. Wilson, D.C. Bain (1986) Spheniscidite, a new phosphate mineral from Elephant Island, British Antarctic Territory. Mineral. Mag., 50, 291–293.

Analysis by X-ray fluorescence spectrometry and pyrolysis methods yielded (after correction for SiO_2 and TiO_2 impurities) Al_2O_3 9.33, Fe_2O_3 (total Fe) 30.10, CaO 0.50, MgO 0.30, K_2O 4.45, $(NH_4)_2O$ 3.27, P_2O_5 32.42, H_2O^- (105°C) 5.84, H_2O^+ (105–1000°C) 13.79, sum 100.0 wt%. This corresponds to $((NH_4)_{0.55}K_{0.41}Ca_{0.04}Mg_{0.03})_{\Sigma 1.03}(Fe^{3+}_{1.20}Al_{0.80})_{\Sigma 2.00}P_2O_{8.05}(OH)\cdot H_2O$, or $(NH_4,K)(Fe^{3+},Al)_2(PO_4)_2(OH)\cdot 2H_2O$. The mineral is soluble in acids but insoluble in water. The DTA curve shows two marked endothermic peaks at 110 and 195°C (loss of water crystallization), and two exothermic reactions at 538 and 572°C (decomposition and recrystallization).

X-ray data show the mineral to be monoclinic, $P2_1/n$, with unit cell $a = 9.75(1)$, $b = 9.63(2)$, $c = 9.70(1)$ Å, $\beta = 102°34(7)'$, $V = 888(2)$ Å^3, and Z = 4. The strongest lines (40 given) are 6.79(100)(110), 5.99(90)($\bar{1}11$), 3.053(45)($\bar{3}11,202,\bar{1}13$), 7.62(40)($\bar{1}01$), 4.75(35)(020,200,002), and 4.26(35)(021,210).

The mineral occurs in an ornithogenic soil (associated with a penguin rookery) developed on till derived from chloritic phyllites on Elephant Island, British Antarctic Territory. The island is at the eastern end of the South Shetland Islands about 800 km southeast of Cape Horn. The mineral occurs in the soil profile as fine-grained, brown aggregates concentrated mainly in the 75–2000-μm fraction from which it was separated electromagnetically. Optical properties could not be determined in detail because of the very fine grain size of the material. In thin section the mineral is colorless with refractive indices of close to 1.7 and moderate birefringence. It is brown in color, has an earthy luster, and is very soft. $D_{calc} = 2.71$.

The name is for Sphenisciformes, the order name for penguins. Type material is preserved at the Macaulay Institute for Soil Research, Craigiebuckler, Aberdeen, Scotland, and at the British Museum (Natural History), London. **J.E.S.**

Sztrokayite, kitaibelite

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

Re-examination of previously studied material considered to be wehrlite, under the microprobe, revealed that material described over the years either as "wasserblei," "wehrlite," "pilsenite," etc. is indeed a complex mixture of Bi_2S_3, tetradymite, hessite, joseite B, Bi_2TeS_2, and bismuthinite.

Two further mineral phases have been found during the microprobe study, for which the author proposes the names *sztrokayite*, Bi_3TeS_2, and *kitaibelite*, $15Bi_2S_3\cdot 5Ag_2S\cdot PbS$. No chemical analyses or X-ray data are offered. The author also identified a single phase that is in fact wehrlite, Bi_2Te_2.

Sztrokayite is completely similar to the other Te sulfides as far as cleavage, opacity, reflection, etc., are concerned. Kitaibelite possesses a reflectivity lower than that for bismuthinite and contains gas bubbles and a few unidentified mineral inclusions. No further data are presented.

Previous work on the wehrlite problem is discussed, as well as on the Te-Bi minerals in general. **R.A.S.**

Unidentified Pt-group minerals

E. Hänninen, R. Törnroos, S.I. Lahti (1986) Stillwaterite and associated platinum group minerals from the Siikakämä layered mafic intrusion, northern Finland. Lithos, 19, 87–93.

The outer parts of a hollingworthite grain contain minute inclusions of stillwaterite, probable guanglinite, and three unidentified minerals. Microprobe (EDX) analyses of two of these give possible formulas of $(Pt,Rh,Pd)(As,S)_2$ and $(Pd,Rh,Pt)_3Pb(Bi,Te)$. Analysis of the third and largest grain, 3 × 8 μm, gave Pd 14.8, Rh 12.8, Pt 2.0, Ir 1.8, Re 0.7, Fe 11.5, Cu 1.58, S 24.3, As 15.7, sum 99.4 wt%, corresponding to $(Pd_{0.57}Rh_{0.51}Pt_{0.04}Ir_{0.04}Re_{0.01})_{\Sigma 1.17}Fe_{0.85}Cu_{1.01}S_{3.11}As_{0.86}$, approximately $CuFe(Pd,Rh)(S,As)_4$. Some of the analytical As (as well as some of the Rh in the smaller inclusions) may have been derived from the hollingworthite host.

Discussion. The authors note that the formula ratios for $CuFe(Pd,Rh)(S,As)_4$ are similar to those of unnamed $Pt(Rh,Ir)CuS_4$ described by Cabri et al. (1981, Bull. Minéral., 104, 508–525). If the Cabri et al. formula is written as $(Pt,Rh,Ir)_2CuS_4$, the equivalent formula of the largest inclusion is $(Fe,Pd,Rh)_{2.02}Cu_{1.01}(S,As)_{3.97}$. The small inclusion having the composition $(Pt,Rh,Pd)(As,S)_2$ could be platarsite. **J.L.J.**

Unnamed Sn mineral

P.J. Dunn, W.L. Roberts (1986) Unnamed tin mineral from the Etta mine. Mineral. Record, 17, Nov–Dec.

Microprobe analysis of the mineral gave SnO_2 58.2, Sb_2O_5 11.2, CuO 10.1, FeO (total Fe as FeO) 9.0, SiO_2 2.7, CaO 0.4, Al_2O_3 0.3, H_2O (by difference) 9.1, sum 100.0 wt%, yielding an ideal formula $CuFeSn_3(Sb,Si)O_7(OH)_7$.

X-ray powder-diffraction pattern of the mineral resembles that of cassiterite, but all peaks are very weak and diffuse.

The mineral is pale green with a vitreous luster and occurs in fine veinlets of transparent material (mushistonite?). **R.A.S.**

New Data

Cesstibtantite

E.H. Nickel, B.W. Robinson (1985) Kimrobinsonite, a new tantalum mineral from Western Australia, and its association with cesstibtanite. Can. Mineral., 23, 573–576.

Electron-microprobe analysis gave Na_2O 2.2, Cs_2O 6.5, FeO 0.1, Sb_2O_3 17.0, Ta_2O_5 65.3, Nb_2O_5 5.1, H_2O 1.9 (calculated to maintain electrical neutrality as OH), sum 98.1 wt%.

The material of this occurrence differs from material described elsewhere in that it is black and opaque, except in the very thinnest particles. **K.W.B.**

Ganomalite

P.J. Dunn, D.R. Peacor, J.W. Valley, C.A. Randall (1985) Ganomalite from Franklin, New Jersey, and Jakobsberg, Sweden: New chemical and crystallographic data. Mineral. Mag., 49, 579–582.

Electron-microprobe analysis of four ganomalite specimens from Franklin and seven from Jakobsberg gave, on average, SiO_2 19.46, CaO 11.17, PbO 67.69, MnO 2.18, with traces of MgO, BaO, Cl, and Al_2O_3, sum 100.5 wt%. With Mn present in a relatively constant 1 to 5 ratio with Ca, a new formula of $Pb_9Ca_5MnSi_9O_{33}$ is indicated, with Z = 1.

Preliminary crystal-structure data indicate that the Mn and Ca are ordered, as implied by the chemical analysis; ganomalite is hexagonal, space group $P3$, with $a = 9.82$ and $c = 10.13$ Å. **D.P.**

Glaucocerinite

G. Raade, C.J. Elliott, V.K. Din (1985) New data on glaucocerinite. Mineral. Mag., 49, 583–590.

Chemical analysis on the type specimens of glaucocerinite from Laurion, Greece, yields the formula $[(Zn,Cu)_5Al_3(OH)_{16}][(SO_4)_{1.5}\cdot 9H_2O]$, based on a pyroaurite-like structure.

The strongest lines in the X-ray powder pattern, indexed on a hexagonal pseudocell, are 10.9(100)(003), 5.45(90)(006), 3.63(80)(009), 2.62(60)(012), 2.46(60)(015), 2.231(50)(018), and 1.981A(50)(0.1.11). Optical data are $2V \approx 60°$, $\alpha = 1.540$, $\beta = 1.554$, $\gamma = 1.562$; $D_{meas} = 2.40 \pm 0.1$ g/cm³, $D_{calc} = 2.33$ g/cm³.

The authors also present evidence that a so-called "woodwardite" from Caernarvonshire, Wales, is a Cu analogue of glaucocerinite, and an 11-Å mineral occurring with carrboydite in Western Australia is the Ni analogue. **D.P.**

Likasite

H. Effenberger (1986) Likasite, $Cu_3(OH)_5(NO_3)\cdot 2H_2O$: Revision of the chemical formula and redetermination of the crystal structure. Neues Jahrb. Mineral. Monatsh., 101–110.

The crystal structure of likasite was determined and refined to an R index of 10.8% for 1017 reflections. The chemical formula was revised from $Cu_6(OH)_7(NO_3)_2(PO_4)$ to $Cu_3(OH)_5(NO_3)\cdot 2H_2O$. **F.C.H.**

Motukoreaite

J. Rius, F. Plana (1986) Contribution to the superstructure resolution of the double layer mineral motukoreaite. Neus Jahrb. Mineral. Monatsh., 263–272.

The average structure of motukoreaite was determined and refined to an R index of 11.4% for 336 observed reflections. The unit-cell dimensions are $a = b = 9.172$, $c = 33.51$ Å; space group $R\bar{3}m$. **F.C.H.**

Rhodizite

A. Pring, V.K. Din, D.A. Jefferson, J.M. Thomas (1986) The crystal chemistry of rhodizite: A re-examination. Mineral. Mag., 50, 163–172.

The crystal chemistry of rhodizite was re-examined using data from high-resolution electron microscopy (HREM), magic-angle-spinning nuclear magnetic resonance (MASNMR), single-crystal X-ray structure refinement, and a new chemical analysis. Material from Ambatofinandrahana, Ankarata Mountains, Madagascar (20°33′S, 46°49′E), has the formula $(K_{0.46}Cs_{0.36}Rb_{0.06}Na_{0.02})_{\Sigma 0.90}Al_{3.99}Be_4(B_{11.35}Be_{0.55}Li_{0.02})O_{28}$, is cubic with $a = 7.318(1)$ Å and has space group $P\bar{4}3\,m$. A lengthy discussion of the crystal-chemical aspects of the rhodizite structure is presented. **A.C.R.**

Rosasite

A.C. Roberts, J.L. Jambor, J.D. Grice (1986) The X-ray crystallography of rosasite from Tsumeb, Namibia. Powder Diffraction, 1, 56–57.

The unit cell of rosasite, $(Cu,Zn)_2CO_3(OH)_2$, was determined and refined to $a = 12.873(3)$, $b = 9.354(3)$, $c = 3.156(2)$ Å $\beta = 110.36(3)°$; space group $P2_1/a$. **F.C.H.**

Santafeite

P.J. Dunn, D.R. Peacor (1986) Santafeite, a re-examination and new empirical formula. Mineral. Mag., 50, 299–300.

Santafeite, originally described by Sun and Weber (1958) from the Grants uranium district, McKinley County, New Mexico, was re-examined using single-crystal and microprobe techniques. The new idealized formula, consistent with equipoint rank requirements for space group $B22_12$, is $(Mn^{2+},Fe^{3+},Al,Mg)_8(Mn^{4+},Mn^{2+})_8(Ca,Sr,Na)_{12}((VO_4),(AsO_4))_{16}(OH)_{20}\cdot 8H_2O$. A microprobe analysis yielded Al_2O_3 1.1, Fe_2O_3 1.1, MgO 0.9, CaO 5.2, SrO 8.5, Na_2O 5.0, V_2O_5 36.5, As_2O_5 3.2, MnO_2 16.5, MnO 13.3, H_2O 8.8, sum 100.1 wt%. In determining the formula, the H_2O content and the $Mn^{4+}:Mn^{2+}$ ratio reported in the original description of this mineral were used. This analysis corresponds to $(Mn^{2+}_{5.48}Fe^{3+}_{0.49}Al_{0.77}Mg_{0.80})_{\Sigma 7.54}$ $(Mn^{4+}_{6.78}Mn^{2+}_{1.22})_{\Sigma 8.00}$ $(Ca_{3.31}Sr_{2.93}Na_{5.76})_{\Sigma 12.00}((VO_4)_{14.35}(AsO_4)_{0.99})_{\Sigma 15.34}(OH)_{18.12}\cdot 8.40H_2O$ or to the simplified formula given above.

X-ray diffraction data confirmed the unit cell and space group of santafeite as originally reported, but also showed that there is significant disorder in the crystal structure. A structural analysis is needed to clarify several uncertainties regarding the structure and crystal chemistry of the mineral. **J.E.S.**

Schneiderhöhnite

F.C. Hawthorne (1985) Schneiderhöhnite, $Fe^{2+}Fe^{3+}_3As^{3+}_5O_{13}$, a densely packed arsenite structure. Can. Mineral., 23, 675–679.

from the Tsumeb mine, Namibia, yielded the following results. The mineral is triclinic, space group $P\bar{1}$, $a = 8.924$, $b = 10.016$, $c = 9.103$ Å, $\alpha = 59.91$, $\beta = 112.41$, $\gamma = 81.69°$, $V = 590.8$ Å³, Z = 2. Structure refinement to a final residual R of 4.5% on 3184 unique observed ($I > 2.5\sigma I$) reflections. The determination of the structure leads to the new formula $Fe^{2+}Fe^{3+}_3As^{3+}_5O_{13}$ instead of the previously reported $Fe^{2+}_8As^{3+}_{10}O_{23}$ (Am. Mineral., 59, 1139). A survey of recently refined arsenite minerals shows a constant geometry for the arsenite group with ⟨As–O⟩ = 1.776 Å and ⟨O–As–O⟩ = 97.2°. **E.A.J.B.**