NEW MINERAL NAMES*

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BOBKINGITE*

F.C. Hawthorne, M.A. Cooper, J.D. Grice, A.C. Roberts, N. Hubbard (2002) Description and crystal structure of bobkingite, $Cu^{2+}_5Cl_2(OH)_8(H_2O)_2$, a new mineral from New Cliffe Hill Quarry, Stanton-under-Bardon, Leicestershire, U.K. Mineral. Mag., 66, 301–311.

The mineral occurs as pale blue plates, <5 μm thick and up to 200 μm across. Electron microprobe analysis gave CuO 70.46, Cl 12.71, H_2O (from crystal-structure determination) 19.19, O ≡ Cl 2.87, sum 99.49 wt%, corresponding to $Cu_{4.99}Cl_{2.02}(OH)_8(H_2O)_2$. Crystals are tabular on {001}, which is the dominant form, and {100} and {110} are minor. Vitreous luster, transparent, brittle, pale blue streak, $H = 3$, conchoidal fracture, perfect {001} and fair {100} cleavages, nonfluorescent, $D_{calc} = 3.254$ g/cm³ for $Z = 2$. Optically biaxial negative, α = 1.724(2), β = 1.745(2), γ = 1.750(2), $2V_{meas}$ = 33(6), $2V_{calc}$ = 52°, orientation $Y = c$, $Z = b$, $X \wedge a = 22°$ in β obtuse. Distinctly pleochroic, X = pale blue, Z = pale greenish blue. Single-crystal X-ray structure study ($R = 0.026$) indicated monoclinic symmetry, space group $C2/m$; $a = 10.301(8)$, $b = 6.758(3)$, $c = 8.835(7)$ Å, β = 111.53(6)° as refined from a powder pattern (114 mm Debye–Scherrer, CuKα radiation) with strongest lines of 8.199(100,001), 5.502(100,110), 2.883 (80,310), and 2.188(50, 23$\bar{2}$).

The mineral occurs on crusts of malachite and azurite that overlie massive cuprite in oxidized waste material containing native copper hosted by quarried diorite at the New Cliffe Hill Quarry, Leicestershire, England. The new mineral name is for mineralogist Robert King (b. 1923), formerly at the Department of Geology, Leicester University, and a founding member of the Russell Society. Type material is in the Canadian Museum of Nature, Ottawa. **J.L.J.**

KRISTIANSENITE*

G. Raade, G. Ferraris, A. Gula, G. Ivaldi, F. Bernhard (2002) Kristiansenite, a new calcium–scandium–tin sorosilicate from granite pegmatite in Tørdal, Telemark, Norway. Mineral. Petrology, 75, 89–99.

G. Ferraris, A. Gula, G. Ivaldi, M. Nespolo, G. Raade (2001) Crystal structure of kristiansenite: a case of class IIB twinning by metric merohedry. Zeits. Kristallogr., 216, 442–448.

Electron microprobe analysis gave Na_2O 0.41, K_2O 0.06, CaO 18.45, Al_2O_3 0.35, Sc_2O_3 8.11, Fe_2O_3 1.98, SiO_2 40.76, TiO_2 0.08, ZrO_2 0.43, SnO_2 27.33, H_2O (by difference) 2.04, sum 100 wt%, which for 2 Si corresponds to $(Ca_{0.97}Na_{0.04})_{\Sigma 1.01}(Sn_{0.53}Sc_{0.35}Fe_{0.07}Al_{0.02}Zr_{0.01})_{\Sigma 0.98}Si_{2.00}(O_{6.41}OH_{0.67})_{\Sigma 7.08}$, simplified as $Ca_2ScSn(Si_2O_7)(Si_2O_6OH)$. The mineral occurs as colorless, white, or slightly yellowish tapered crystals, to 2 mm, and as aggregates to 2 mm across. Translucent to transparent, vitreous luster, brittle, white streak, uneven fracture, $H = 5½–6$, striated from polysynthetic twinning on {010}, nonfluorescent, $D_{meas} = >3.3$, $D_{calc} = 3.64$ g/cm³ for $Z = 4$. Mean refractive index 1.74; undulatory extinction. Single-crystal X-ray structure study ($R = 0.0242$) of a twinned crystal indicated triclinic symmetry, space group $C1$, with a reduction from monoclinic symmetry resulting mainly from cation ordering. Cell dimensions refined from a diffractometer powder pattern (CuKα$_1$ radiation) are $a = 10.007(5)$, $b = 8.401(5)$, $c = 13.327(5)$ Å, α = 90.08(4), β = 109.06(3), γ = 90.01(4)°; strongest lines are 5.18(53,1$\bar{1}$1), 3.146(100,004), 3.089(63,$\bar{2}$22), 2.901 (19,221), 2.595(34,222), and 2.142(17,$\bar{3}3\bar{1}$).

The mineral is late-stage hydrothermal, occurring in vugs in a pegmatite at Heftetjern, Tørdal, Telemark, Norway. Associated minerals are quartz, albite, apatite, stilpnomelane, scandiobabingtonite, ixiolite, hingganite-(Y), epidote, bazzite, milarite, and others. The new mineral name is for amateur mineralogist Roy Kristiansen (b. 1943), who first observed the mineral. Type material is in the Geological Museum, University of Oslo, Norway. **J.L.J.**

MANGANVESUVIANITE*

T. Armbruster, E. Gnos, R. Dixon, J. Gutzmer, C. Hejny, N. Döbelin, O. Medenbach (2002) Manganvesuvianite and tweddillite, two new Mn^{3+}-silicate minerals from the Kalahari manganese fields, South Africa. Mineral. Mag., 66, 137–150.

The mineral occurs as maroon-red prismatic crystals, up to 1.5 cm long, with {100} dominant, {110} minor, and {101} termination. One of three listed electron microprobe analyses has SiO_2 36.15, Al_2O_3 14.73, Fe_2O_3 1.12, Mn_2O_3 6.79, MgO 2.35, CaO 35.73, CuO 0.02, SrO 0.11, Na_2O 0.03, F 0.12, Cl 0.01, H_2O (calc.) 2.67, O ≡ F,Cl 0.07, sum 99.76 wt%, corresponding to a simplified formula $Ca_{19}Mn^{3+}(Al,Mn^{3+},Fe^{3+})_{10}(Mg,Mn^{2+})_2Si_{18}O_{69}(OH)_9$, which is a vesuvianite-group mineral in which the five-coordinated (Y') position is occupied by Mn^{3+}. Vitreous luster, transparent in small crystals, brittle, white streak, subconchoidal fracture, {110} twinning, $H = 6–7$, $D_{calc} = 3.404$ g/cm³. Optically uniaxial negative, ε = 1.731(1), ω =

1.719(1), strongly pleochroic, E = yellowish, O = dark red. The X-ray powder pattern (not given) is similar to those of other vesuvianite members. Single-crystal X-ray structure study (R = 0.035) indicated tetragonal symmetry, space group $P4/n$, a = 15.572(2), c = 11.824 Å.

The mineral occurs in vugs and veins and was formed by hydrothermal alteration of primary Mn ores at the Wessels and N'Chwaning II mines in the Kalahari manganese field of South Africa. At the N'Chwaning II mine the mineral is also rock-forming and is associated with grossular, xonotlite, and calcite in calc-silicate lenses. Type material (N'Chwaning II) is in the Natural History Museum, Bern, Switzerland. **J.L.J.**

NABESITE*

O.V. Petersen, G. Giester, F. Brandstätter, G. Niedermayr (2002) Nabesite, $Na_2BeSi_4O_{10}\cdot4H_2O$, a new mineral species from the Ilímaussaq alkaline complex, South Greenland. Can. Mineral., 40, 173–181.

The mineral occurs as thin, platy crystals, up to $0.2 \times 5 \times 5$ mm, which are aligned within aggregates that are up to $5 \times 10 \times 10$ mm. Electron microprobe analysis gave Na_2O 13.8 (by SEM energy dispersion), K_2O 0.34, BeO (calc.) 6.26, CaO 0.13, SiO_2 62.4, H_2O (calc.) 18.05, sum 100.98 wt%, corresponding to $(Na_{1.74}K_{0.03}Ca_{0.01})_{\Sigma1.78}Be_{0.98}Si_{4.06}O_{10}\cdot3.92H_2O$, ideally $Na_2BeSi_4O_{10}\cdot4H_2O$. Crystals are platy on {001}, modified by {100}, {010}, {111}, and {1$\bar{1}$1}. Colorless, transparent, vitreous luster, brittle, white streak, H = 5–6, good {110} and {001} cleavages, uneven fracture, nonfluorescent, D_{meas} = 2.16(2), D_{calc} = 2.21 g/cm³ for Z = 4 and the empirical formula. Optically biaxial negative, α = 1.499(1), β = 1.507(1), γ = 1.511(1), $2V_{meas}$ = 65(5), $2V_{calc}$ = 70°; orientation $X = a$, $Y = c$, $Z = b$. Single-crystal X-ray structure study (R = 0.028) indicated orthorhombic symmetry, space group $P2_12_12_1$, a = 9.722(1), b = 10.142(1), c = 12.030(1) Å as refined from a Gandolfi pattern (114 mm, Cu$K\alpha$ radiation) with strongest lines of 6.11(80B,111), 5.97(100,002), 3.09 doublet (70,310,131), 3.06(50,222,004), and 2.988 doublet (60,311).

The mineral, which is commonly partly replaced by an opal-like substance, is associated with gmelinite, neptunite, analcime, gonnardite, and lovdarite in albite-lined cavities within tugtupite-bearing albitites on the Kvanefjeld Plateau, at the northwestern extremity of the Ilímaussaq complex, South Greenland. The new mineral, which is a zeolite, is named after its chemical composition. Type material is in the Geological Museum, Copenhagen, Denmark, and in the Natural History Museum, Vienna, Austria. **J.L.J.**

OSWALDPEETERSITE*

R. Vochten, M. Deliens, O. Medenbach (2001) Oswaldpeetersite, $(UO_2)_2CO_3(OH)_2\cdot4H_2O$, a new basic uranyl carbonate mineral from the Jomac uranium mine, San Juan County, Utah, U.S.A. Can. Mineral., 39, 1685–1689.

Electron microprobe analysis gave UO_3 81.47, TGA to 170 °C gave H_2O 12.30, and CO_2 by difference is 6.23, sum 100 wt%, corresponding to $(UO_2)_{2.03}(CO_3)_{1.01}(OH)_{2.05}\cdot3.85H_2O$, ideally $(UO_2)_2(CO_3)(OH)_2\cdot4H_2O$. The mineral occurs as radiating

groups of canary-yellow prismatic crystals, each crystal about $100 \times 10 \times 2$ μm, showing {100}, {010}, and {001}. Transparent, vitreous luster, pale yellow streak, H = 2–3, parting and cleavage along the elongation, uneven fracture, nonfluorescent, soluble with effervescence in dilute HCl, D_{calc} = 4.54 and 4.50 g/cm³ for the empirical and ideal formulas and Z = 4. The infrared spectrum has absorption bands assignable to H_2O–OH and CO_3 groups. Optically biaxial negative, α = 1.583(2), β = 1.669(2), γ = 1.712(2), $2V_{calc}$ = 67.4(2)°, dispersion not observed, positive elongation, $Z \parallel a$, pleochroism X, Y, = pale yellow to colorless, Z = pale yellow. Indexing of the X-ray powder pattern (Guinier–Hägg camera, 100 mm diam., Cu$K\alpha_1$ radiation) gave monoclinic symmetry, space group $P2_1/c$, a = 4.1425(6), b = 14.098(3), c = 18.374(5) Å, β = 103.62(1)°; strongest lines are 8.95(65,002), 7.54(63,012), 4.55(96,031), 4.26(60,014), 3.46(62,015), 3.32(100,$\bar{1}$14), 3.029(85,043), and 2.273(62,062).

The mineral is associated with gypsum, cuprite, antlerite, goethite, lepidocrocite, mbobomkulite, hydrombobomkulite, and sklodowskite that occur along the bedding planes of a siltstone within the Triassic Shinarump conglomerate at the Jomac uranium mine, Brown's Rim, San Juan County, Utah. The new mineral name is for Belgian structural crystallographer Maurice Oswald Peeters (b. 1945) of the University of Leuven, Belgium. Type material is in the Royal Belgian Institute of Natural History, Brussels. **J.L.J.**

RINMANITE*

D. Holstam, K. Gatedal, K. Söderberg, R. Norrestam (2001) Rinmanite, $Zn_2Sb_2Mg_2Fe_4O_{14}(OH)_2$, a new mineral species with a nolanite-type structure from the Garpenberg Norra mine, Dalarna, Sweden. Can. Mineral., 39, 1675–1683.

The mineral occurs as mainly euhedral, prismatic crystals, elongate [001] to 0.5 mm. Electron microprobe analysis gave MgO 8.97, Al_2O_3 0.82, TiO_2 0.01, MnO 2.47, Fe_2O_3 34.33, (Fe^{3+} confirmed by Mössbauer spectroscopy), ZnO 14.24, Sb_2O_5 36.31, H_2O (calc.) 1.99, sum 99.13 wt%, which for 16 O corresponds to $(Zn_{1.58}Mn_{0.31}Mg_{0.06})_{\Sigma1.95}Sb_{2.03}[Mg_{1.95}Fe_{3.88}Al_{0.15}]_{\Sigma5.98}O_{14.01}(OH)_{1.99}$, ideally $Zn_2Sb_2Mg_2Fe_4^{3+}O_{14}(OH)_2$. Black color, opaque, submetallic luster, dark red and translucent in thin splinters, brown streak, VHN_{100} = 880 (841–907), splintery fracture, well-developed {100} cleavage, penetration twins common, D_{calc} = 5.13(1) g/cm³ for Z = 1. Optically uniaxial negative, dichroic, O = dark red, E = orange red. Reflectance percentages (SiC standard, in air) are given in 20 nm steps from 400 to 700 nm; representative values for R_O and R_E are 13.6, 12.2 (460), 12.9, 11.8 (540), 12.7, 11.7 (580), and 12.3, 11.4 (640). Single-crystal X-ray structure study (R = 0.031) indicated hexagonal symmetry, space group $P6_3mc$; a = 5.9889(4), c = 9.353(1) Å as refined from a powder pattern (diffractometer, Cu$K\alpha$ radiation) with strongest lines of 3.474(34,102), 2.994(43,110), 2.673(44,103), 2.522(100,112), 1.5170(33,205), and 1.4972(54,220).

The mineral, which is isostructural with nolanite, is associated with tremolite, manganocummingtonite, talc, franklinite, barite, and svabite in a specimen of metamorphosed skarn from the pyritiferous Zn-Pb Garpenberg Norra deposit in Hedemora,

Dalarna, south-central Sweden. The new mineral name is for Sven Rinman (1720–1792), a mining scientist considered by some to be the father of the Swedish minerals industry. Type material is in the Swedish Museum of Natural History, Stockholm. **J.L.J.**

SCHNEEBERGITE*, NICKELSCHNEEBERGITE*

W. Krause, H.-J. Bernhardt, H. Effenberger, T. Witzke (2002) Schneebergite and nickelschneebergite from Schneeberg, Saxony, Germany: the first Bi-bearing members of the tsumcorite group. Eur. J. Mineral., 14, 115–126.

The two minerals form <0.5 mm crystals, elongate [010], and crystal aggregates that are up to 1 mm. Brown to beige color, adamantine luster, transparent, brittle, pale brown steak, conchoidal fracture, tabular on {$\bar{2}$01}, showing also {001}, {101}, {$\bar{1}$01}, {$\bar{1}$02}, and {$\bar{1}$11}, nonfluorescent.

Schneebergite

Electron microprobe analysis gave CaO 2.72, NiO 9.35, CoO 13.31, PbO 0.11, Fe_2O_3 2.95, Bi_2O_3 29.01, As_2O_5 38.42, SO_3 0.11, H_2O (TGA) 4.40, sum 100.38 wt%, corresponding to $(Bi_{0.74}Ca_{0.29})_{\Sigma1.03}(Co_{1.06}Ni_{0.75}Fe_{0.22})_{\Sigma2.03}[(AsO_4)_{1.99}(SO_4)_{0.01}]_{\Sigma2.00}$ $[(OH)_{1.09}(H_2O)_{0.91}]_{\Sigma2.00}$, ideally $BiCo_2(AsO_4)_2[(H_2O)(OH)]$, which is the Bi-dominant analog of cobaltlotharmeyerite. D_{calc} = 5.28 g/cm³ for Z = 2. Optically biaxial positive, α (calc.) = 1.93, β = 1.95(1), γ = 1.98(2), $2V_{meas}$ = 85(5)°; distinct pleochroism that is variable with Fe content, Y = brown, X, Z = pale yellow; orientation Y = b, X ≈ c. Single-crystal X-ray structure study (R = 0.038) indicated monoclinic symmetry, space group C2/m; a = 9.005(1), b = 6.211(1), c = 7.440(1) Å, β = 115.19(1)° as refined from a diffractometer powder pattern (CuKα radiation) with strongest lines of 4.598(61,11$\bar{1}$), 3.193(100, 11$\bar{2}$), 2.972(92,201), 2.820(61,021), 2.702(57,31$\bar{1}$), and 2.498 (62,112,310).

Nickelschneebergite

Electron microprobe analysis gave CaO 2.68, NiO 14.75, CoO 7.98, ZnO 0.09, PbO 0.35, Fe_2O_3 2.19, Bi_2O_3 28.54, P_2O_5 0.08, As_2O_5 38.26, SO_3 <0.05, H_2O (calc.) 4.72, sum 99.64 wt%, corresponding to $(Bi_{0.73}Ca_{0.28}Pb_{0.01})_{\Sigma1.02}(Ni_{1.18}Co_{0.64}$ $Fe_{0.16})_{\Sigma1.98}(AsO_4)_{1.99}[(H_2O)_{1.10}(OH)_{0.93}]_{\Sigma2.03}$, ideally $BiNi_2(AsO_4)_2$ $[(H_2O)(OH)]$, which is the Bi-dominant analog of nickel-lotharmeyerite. D_{calc} = 5.23 g/cm³ for Z = 2. Optically biaxial negative, α (calc.) = 1.92, β = 1.95(1), γ = 1.97(2), $2V_{meas}$ = 77(5)°, weak pleochroism (variable with Fe content), Y = light brown, X, Z = pale yellow; orientation Y = b , X ≈ c. Single-crystal X-ray structure study (R = 0.044) indicated monoclinic symmetry, space group C2/m; a = 8.995(1), b = 6.207(1), c = 7.462(1) Å, β = 115.00(1)° as refined from a diffractometer pattern with strongest lines of 4.586(40,11$\bar{1}$), 3.196(100,11$\bar{2}$), 2.980(72,201), 2.821(44,021), 2.507(47,112), and 1.702 (57,22$\bar{1}$, 40$\bar{4}$, 51$\bar{1}$). Solid solution among schneebergite, nickelschneebergite, cobaltlotharmeyerite, and nickel-lotharmeyerite is probably complete.

Schneebergite and nickelschneebergite occur in oxidized dump material at the "Am Roten Berg" mining area, about 5 km southwest of Schneeberg, Saxony, Germany. Associated minerals are quartz, scorodite, barium-pharmacosiderite, ferrilotharmeyerite, preisingerite, and waylandite. Type material is in the Staatliches Museum für Mineralogie und Geologie, Dresden, Germany. **J.L.J.**

TWEDDILLITE*

T. Armbruster, E. Gnos, R. Dixon, J. Gutzmer, C. Hejny, N. Döbelin, O. Medenbach (2002) Manganvesuvianite and tweddillite, two new Mn^{3+}-silicate minerals from the Kalahari manganese fields, South Africa. Mineral. Mag., 66, 137–150.

One of four listed electron microprobe analyses has SiO_2 32.58, Al_2O_3 11.85, Fe_2O_3 3.41, Mn_2O_3 20.97, MgO 0.04, CuO 0.02, CaO 10.25, SrO 16.94, BaO 0.46, PbO 2.08, Na_2O 0.03, F 0.01, Cl 0.01, H_2O (calc.) 1.50, O ≡ F,Cl 0.01, sum 100.14 wt%, which [rounded to two decimals] approximately corresponds to $Ca_{1.01}(Sr_{0.91}Pb_{0.05}Ba_{0.02}Na_{0.01}Mg_{0.01})_{\Sigma1.00}(Mn^{3+}_{1.47}Al_{0.29}$ $Fe^{3+}_{0.24})_{\Sigma2.00}Al_{1.00}Si_{3.01}O_{12.0}(OH)$, simplified as $CaSr(Mn^{3+},$ $Fe^{3+})_2Al[Si_3O_{12}](OH)$. The mineral is in the epidote group and is characterized by Mn^{3+} predominance in two of the three octahedral structural sites, whereas in strontiopiemontite Al is predominant in two, and Mn^{3+} in the other. Dark red color, radial habit consisting of (001) blades elongate [010] that are 0.5 mm long, 0.02 mm wide, and twinned on (100); vitreous luster, brittle, brownish red streak, H = 6–7, subconchoidal fracture, perfect {001} cleavage, D_{calc} = 3.82–3.87 g/cm³. Optically biaxial positive, n = 1.825; strong pleochroism, with the blades appearing dark red parallel to b, and orange-yellow parallel to a; perpendicular to (001), the blades are magenta to red. Single-crystal X-ray structure study (R = 0.059) indicated monoclinic symmetry, space group $P2_1/m$; a = 8.932(5), b = 5.698(4), c = 10.310(5) Å, β = 114.56(4)° as refined from a diffractometer pattern (CuKα radiation) with strongest lines of 3.513(50,21$\bar{1}$), 2.936(100,11$\bar{3}$), 2.854(40,020), 2.703 (80,300), 2.586(80,202), 2.182(80,40$\bar{1}$), and 2.149 (40,221).

The mineral is associated with braunite and sérandite-pectolite in calc-silicate rocks formed by hydrothermal alteration of Mn ore at the Wessels mine, Kalahari manganese field, South Africa. The new mineral name is for Samuel M. Tweddill, first curator (from 1897 to 1915) of the Museum of the Geological Survey, at Pretoria, Republic of South Africa. Type material is in the Natural History Museum, Bern, Switzerland. **J.L.J.**

VERBEEKITE*

A.C. Roberts, W.H. Paar, M.A. Cooper, D. Topa, A.J. Criddle, J. Jedwab (2002) Verbeekite, monoclinic $PdSe_2$, a new mineral from the Musonoi Cu-Co-Mn-U mine, near Kolwezi, Shaba Province, Democratic Republic of Congo. Mineral. Mag., 66, 173–179.

The largest grain is anhedral, about 200 × 200 μm, and has been extensively replaced by oosterboschite. Electron microprobe analysis gave Pd 39.6, Cu 0.5, Se 58.8, sum 98.9 wt%, corresponding to $Pd_{0.99}Cu_{0.02}Se_{1.99}$, ideally $PdSe_2$. Black color, metallic luster, opaque, brittle, black streak, uneven fracture, VHN_5 = 490–610, H = ~5½ , D_{calc} = 7.211 g/cm³ for the ideal

formula and $Z = 2$. Gray in reflected light, nonpleochroic, no or negligible bireflectance, moderately anisotropic with brown rotation tints. Representative reflectance percentages (WTiC standard) for R_1 and R_2 in air and in oil are, respectively, 50.80, 52.30, 37.00, 38.40 (470 nm), 51.85, 52.90, 37.75, 38.30 (546), 52.20, 53.55, 38.50, 38.60 (589), and 52.40, 54.00, 38.80, 39.60 (650). Single-crystal X-ray study indicated monoclinic symmetry, space group $C2$, Cm, or $C2/m$; $a = 6.657(2)$, $b = 4.129(2)$, $c = 4.440(1)$ Å, $\beta = 92.83(3)°$ as refined from a powder pattern (114 mm Debye–Scherrer, Cu$K\alpha$ radiation) with strongest lines of 4.423(30,001), 3.496(30,110), 2.718(100,111), 1.955 (50,310), and 1.896(50,$\bar{1}$12).

The mineral is associated with trogtalite, digenite, and covellite as a low-temperature primary phase that is partly replaced by supergene oosterboschite in a Se-rich sulfide lens at the Musonoi mine, near Kolwezi, Shaba Province, Democratic Republic of Congo (formerly Zaire). The mineral also occurs as a 25 µm grain enclosed in gold from Hope's Nose, Torquay, Devon, England. The new mineral name is for Théodore Verbeek (1927–1991), who did the initial studies of the Se-bearing lens. Type material is in the Natural History Museum, London, UK. **J.L.J.**

Fe-Cr SULFIDE

Y. Lin, A. El Goresy (2002) A comparative study of opaque phases in Quingzhen (EH3) and MacAlpine Hills 88136 (EL3): Representatives of EH and EL parent bodies. Meteoritics Planet. Sci., 37, 577–599.

The mineral occurs in the Quingzhen enstatite chondrite as inclusions within kamacite; clusters of grains are $<50 \times 120$ µm, and individual grains are <20 µm. Electron microprobe analysis gave Ca 0.04, Cr 33.1, Fe 20.7, Ti 0.09, Zn 0.10, Na 0.06, S 41.5, sum 95.6 wt%; the presence of oxygen was detected, suggesting that H_2O or OH may account for the low analytical total. The atomic ratio of Fe:Cr:S approximates 1:2:4. Strongly anisotropic in reflected light, resembling daubreelite (but with a greenish tint) in reflectivity. Electron microprobe analyses of two other Cr sulfides (also with H_2O or OH) gave, respectively, Cr 39.2, 35.3, Fe 0.68, 0, Ti 0.05, 0.08, Zn 0.05, 0, Na 0.81, 1.72, K 0.20, 0.34, S 48.3, 42.9, sum 89.4, 80.3 wt%. **J.L.J.**

Zn₂(Fe,Cu)S₃

B.J. Kulange, Y. Kajiwara, K. Komuro (2002) Cu-Fe bearing zinc sulfide from Laloki stratabound massive sulfide deposit, Papua New Guinea: Chemical characterization. Resource Geol., 52, 67–72.

The mineral occurs in unmetamorphosed Paleocene massive sulfides, dominated by pyrite and marcasite, at the Laloki deposit, about 25 km east of Port Moresby, Papua New Guinea. Grains are anhedral, opaque, optically homogeneous, and up to 150 µm across. Bluish-greenish gray in reflected light, no perceptible anisotropy. Despite the optical homogeneity, the grains vary in composition, but total Cu + Fe is relatively constant. Of the 19 listed electron microprobe analyses, those with the lowest and highest Cu contents are, respectively, Zn 47.30,

46.28, Cu 0.08, 8.85, Fe 18.31, 10.88, Mn 0.21, 0.10, Cd 0.11, 0.10, S 34.33, 34.01, sum 100.34, 100.22 wt%, corresponding to $Zn_{10.25}Fe_{4.65}Cu_{0.02}S_{15}$ and $Zn_{10.17}Fe_{2.80}Cu_{2.00}S_{15}$, simplified as $Zn_2(Fe,Cu)S_3$. Specimens are in the Geology Department, University of Papua New Guinea. **J.L.J.**

Cu₂Pd₃Se₄, (Pd,Cu,Hg)₁.₁₆Se

E.H. Nickel (2002) An unusual occurrence of Pd, Pt, Au, Ag, and Hg minerals in the Pilbara region of Western Australia. Can. Mineral., 40, 419–433.

Electron microprobe analysis gave Cu 16.83, Ag 0.92, Pd 40.09, Se 41.33, sum 99.17 wt%, which is almost identical to the requirements for $Cu_2Pd_3Se_4$, the Cu analog of chrisstanleyite. Yellow in reflected light, weak bireflectance, moderate anisotropy, optically indistinguishable from associated chrisstanleyite. The microprobe compositions show Ag/(Ag + Cu) variable from 0.02 to 0.87, indicative of a solid solution between chrisstanleyite and the Cu analog.

Electron microprobe analysis of another mineral gave Cu 10.3, Ag 2.7, Hg 25.5, Pd 23.8, Pt 3.0, Se 37.6, sum 102.9 wt%, corresponding to $(Pd_{0.47}Cu_{0.34}Hg_{0.27}Ag_{0.05}Pt_{0.03})_{\Sigma1.16}$Se, close to that of palladseite (cubic $Pd_{17}Se_{15}$). The mineral occurs as yellow prismatic crystals of unstated size, yellow in reflected light, strongly anisotropic. The mineral is closely associated with umangite, and the analog of chrisstanleyite is associated with naumannite and chalcomenite, in a malachite-rich assemblage at the Copper Hills deposit, a polymetallic vein-type occurrence in the East Pilbara region of Western Australia. **J.L.J.**

NEW DATA

CLARAITE

K. Walenta (1999) On the lattice constants of claraite. Der Erzgräber, 13, 20–22 (in German).

The unit cell of claraite was previously recognized to be pseudohexagonal, possibly triclinic (*Am. Mineral.*, 68, p. 471, 1983). New indexing of the powder pattern (57.3 mm camera, Fe$K\alpha$ radiation) gave a triclinic cell with $a = 14.28$, $b = 8.03$, $c = 7.27$ Å, $\alpha = 79.16$, $\beta = 107.90$, $\gamma = 99.68°$, $D_{calc} = 3.34$ g/cm³ for $Z = 4$. Strongest lines in the pattern are 13.47(100,100), 7.84(90,010), 5.17(60,$\bar{2}$11), 3.65(80,120,021), and 2.96 (60,410,$\overline{21}$2, $\overline{41}$1). J.L.J.

HÖGBOMITE, NIGERITE, TAAFFEITE

T. Armbruster (2002) Revised nomenclature of högbomite, nigerite, and taaffeite minerals. Eur. J. Mineral., 14, 389–395.

The minerals of the högbomite, nigerite, and taaffeite groups form polysomatic series composed of spinel (*S*) and nolanite (*N*) modules. The spinel module is ideally $T_2M_4O_8$, and the nolanite module is ideally $TM_4O_7(OH)$, where T and M represent tetrahedrally and octahedrally coordinated cations. The taaffeite-group minerals are Be-bearing, and in them the nolanite module is ideally $BeTM_4O_8$, which is distinguished as *N'*. The composition of each mineral is therefore dependent on

(1) the composition of the spinel module, (2) the composition of the nolanite module, and (3) the number of spinel and nolanite modules in the structure. Subgroup minerals have a prefix in accordance with the dominant divalent cation in the spinel module; hence, Zn = "zinco," Mg = "magnesio," and Fe = "ferro." The CNMMN-approved nomenclature is given in Table 1. The new nomenclature system was devised partly because some of the previously designated polytypes are not polytypes. **J.L.J.**

TABLE 1. Nomenclature of the högbomite, nigerite, and taaffeite minerals

Old Name	New Name
Högbomite group Ti > Sn	
högbomite-8H	magnesiohögbomite-2N2S $P6_3mc$; a = 5.73, c = 18.39Å
högbomite-10T	magnesiohögbomite-2N3S $P\bar{3}m$1; a = 5.72, c = 23.0
högbomite-24R	magnesiohögbomite-6N6S $R\bar{3}m$; a = 5.70, c = 55.8
zincohögbomite-8H	zincohögbomite-2N2S $P6_3mc$; a = 5.71, c = 18.33
zincohögbomite-16H	zincohögbomite-2N6S $P6_3mc$; a = 5.73, c = 37.10
Nigerite group Sn > Ti	
nigerite-6T	ferronigerite-2N1S $P\bar{3}m$1 a = 5.72, c = 13.69
nigerite-24R	ferronigerite-6N6S $R\bar{3}m$; a = 5.73, c = 55.60
pengzhizhongite-6T	magnesionigerite-2N1S $P\bar{3}m$1; a = 5.69, c = 13.78
pengzhizhongite-24R	magnesionigerite-6N6S $R\bar{3}m$; a = 5.69, c = 55.12
Taaffeite group T₂ = Be + T	
taaffeite	magnesiotaaffeite-2N2S $P6_3mc$; a = 5.69, c = 18.34
musgravite	magnesiotaaffeite-6N'6S $R\bar{3}m$; a = 5.68, c = 41.10
pehrmanite	ferrotaaffeite-6N3S $R\bar{3}m$; a = 5.70, c = 41.16

LEIFITE

E. Sokolova, D.M.C. Huminicki, F.C. Hawthorne, A.A. Agakhanov, L.A. Pautov, E.S. Grew (2002) The crystal chemistry of telushenkoite and leifite, ANa$_6$[Be$_2$Al$_3$Si$_{15}$O$_{39}$F$_2$], A = Cs, Na. Can. Mineral., 40, 183–192.

Single-crystal X-ray structure study (R = 0.029) of leifite from Mont Saint-Hilaire, Quebec, gave trigonal symmetry, space group $P\bar{3}m$1, a = 14.361(1), c = 4.8570(5) Å, Z = 1. The ideal formula is ANa$_6$[Be$_2$Al$_3$Si$_{15}$O$_{39}$F$_2$], where A = Na in leifite. One of the listed electron-microprobe analyses of Mont Saint-Hilaire samples has 2.00 wt% K$_2$O, and if all K is in A, then the composition is that of the unnamed K analog of leifite. **J.L.J.**

VINCENTITE

M. Tarkian, K.-H. Klaska, E.F. Stumpfl (2002) New data on vincentite. Can. Mineral., 40, 457–461.

Two new electron microprobe analyses of type vincentite gave Pd 61.63, 60.31, Pt 14.91, 16.70, As 7.51, 6.99, Sb 7.42, 9.18, Te 7.89, 7.12, sum 99.36, 100.30 wt%, corresponding to $(Pd_{2.64}Pt_{0.35})_{\Sigma2.99}(As_{0.45}Sb_{0.28}Te_{0.28})_{\Sigma1.01}$ and $(Pd_{2.59}Pt_{0.39})_{\Sigma2.98}(As_{0.43}Sb_{0.34}Te_{0.25})_{\Sigma1.02}$, thereby confirming that the previously uncertain formula is (Pd,Pt)$_3$(As,Sb,Te). Representative reflectance percentages for R_1 and R_2 (WTiC standard, air) are 38.8, 43.1 (470 nm), 45.4, 51.3 (546), 48.0, 54.2 (589), and 50.8, 55.9 (650). Indexing of a microdiffractometer powder pattern (Cr$K\alpha$ radiation) gave monoclinic symmetry, a = 11.226(3), b = 6.318(2), c = 8.047(2) Å, β = 100.95(4)°; D_{calc} = 10.86 g/cm^3 for Z = 8. Strongest lines are 1.838 (60,600), 1.800(100,$\bar{6}$02), 1.775(90,$\bar{4}$04), 1.758(80,$\bar{4}$23), and 1.745(80,331). **J.L.J.**

NOTICE

The modern literature contains numerous results from electron microprobe analyses of phases whose compositions are implied to represent new minerals. Analytical results unaccompanied by additional data for the unnamed phases will not be included in New Mineral Names.