NEW MINERAL NAMES*

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Crerarite*

N.J. Cook, S.A. Wood, W. Gebert, H.-J. Bernhardt, O. Medenbach (1994) Crerarite, a new Pt-Bi-Pb-S mineral from the Cu-Ni-PGE deposit at Lac Sheen, Abitibi-Témiscamingue, Québec, Canada. Neues Jarhb. Mineral. Mon., 567–575.

The mineral occurs as anhedral grains, mostly <50 μm in diameter, in an amphibolite boulder near the Lac Sheen Cu-Ni-PGE deposit near Belleterre, southwestern Quebec. Electron microprobe analysis (mean for three largest grains) gave Pt 10.14, Pd 0.03, Ni <0.05, Te 0.03, Bi 65.26, Pb 13.85, S 10.55, Se 0.86, Fe 0.08, Cu 0.09, sum 101.11 wt%, corresponding to $Pt_{1.02}Pd_{0.01}Bi_{6.04}Pb_{1.29}Fe_{0.03}$-$Cu_{0.03}S_{6.36}Se_{0.21}Te_{0.01}$, simplified as $(Pt,Pb)Bi_3(S,Se)_{4-x}$. The mineral is opaque, metallic luster; white-gray in reflected light in air, with a slight bluish tint in oil, isotropic, perfect cubic cleavage, softer than chalcopyrite. Reflectance percentages in air and in oil are given in 20-nm steps from 400 to 700 nm. Single-crystal X-ray structure study (R = 0.049) gave cubic symmetry, space group $Fm3m$, a = 5.86(5) Å, D_{calc} = 7.75 g/cm³ for Z = 1; NaCl structural type, structural formula $Pb_{0.5}Pt_{0.5}Bi_3S_{3.185}Se_{0.105}$. Strongest lines of the X-ray powder pattern (nine lines listed, Gandolfi camera Cu radiation) are 3.37(50,111), 2.94(100,200), 2.07(30,220), and 1.472(50,400).

The new name is for David Crerar (1945–1994) of Princeton University. The mineral is associated with chalcopyrite, pyrrhotite, pentlandite, sphalerite, galena, chlorite, actinolite, quartz, and michenerite (one grain), and occurs typically at the contact between chalcopyrite and the silicate matrix. Type material is in the Royal Ontario Museum, Toronto, and in the Mineralogisches Museum, Bayerische Julius-Maximilians Universität Würzburg, Germany. **J.L.J.**

Effenbergerite*

G. Giester, B. Rieck (1994) Effenbergerite, $BaCu[Si_4O_{10}]$, a new mineral from the Kalahari Manganese Field,

South Africa: Description and crystal structure. Mineral. Mag., 58, 663–670.

The mineral occurs as transparent, subhedral, blue plates up to 8 × 8 × 0.1 mm. Electron microprobe analysis gave BaO 32.48, CuO 16.52, SiO₂ 50.76, corresponding to $Ba_{1.00}Cu_{0.98}[Si_{3.99}O_{10}]$. Heating to 950 °C showed no significant weight loss. Pale blue streak, H = 4–5, brittle, subconchoidal fracture, perfect {001} and poor {110} cleavages, nonfluorescent; forms {100} {110}, {102} occasionally present, and {001} always; luster vitreous on cleavage faces, resinous on crystal faces; D_{meas} = 3.57(2), D_{calc} = 3.52 g/cm³ for Z = 4; insoluble in most acids. Optically uniaxial negative, ω = 1.633(2), ϵ = 1.593(2), weak dispersion $r > v$, strongly pleochroic with O = intense blue, E = pale blue to colorless. Single-crystal X-ray structure study (R = 0.014) indicated tetragonal symmetry, space group $P4/ncc$, a = 7.442(2), c = 16.133(5) Å, isostructural with gillespite and cuprorivaite. Strongest lines of the powder pattern (diffractometer, Cu radiation) are 8.0624(100,002), 4.0325(39,004), 3.5443(29,104), 3.1998(44,114), 2.3943(41,116), and 2.0169(34,008).

The mineral occurs with pectolite, native copper, calcite, quartz, clinozoisite, and other minerals in hypogene veinlets, 0.1–1 mm wide, which are in a matrix of braunite, sugilite, and hausmannite from an ore body in the Wessels mine, northwestern Cape Province, South Africa. The new name is for mineralogist Herta S. Effenberger, University of Vienna, Austria. Type material is in the Institut für Mineralogie und Kristallographie, University of Vienna, and in the Smithsonian Institution, Washington, DC. **J.L.J.**

Eugenite*

A. Piestrzyński, W. Tylka (1992) Silver amalgams from the Sieroszowice copper mine, Lubin-Sieroszowice district, SW Poland. Mineral. Polonica, 23(1), 17–24.

H. Kucha (1986) Eugenite, $Ag_{11}Hg_2$—A new mineral from Zechstein copper deposits in Poland. Mineral. Polonica, 17(2), 3–10.

Electron microprobe analysis of four grains identified by X-ray diffraction patterns gave (maximum and minimum Ag, respectively) Ag 76.20, Hg 22.80, S 0.10, sum 99.10 wt%, and Ag 69.00, Hg 28.20, S 0.10, sum 97.30

wt%, corresponding to $Ag_{11.00}Hg_{1.78}$ and $Ag_{11.00}Hg_{2.39}$, ideally $Ag_{11}Hg_2$. Occurs in grains up to 4 mm, $H_{15} = 96.2$ (85.8–106) kg/mm^2, $D_{meas} = 10.75(3)$, $D_{calc} = 10.45$ g/cm^3 for $Z = 4$. In reflected light, white with a faint yellow tinge, isotropic, reflectance percentages (WC standard) 80.1 (546 nm), 82.7 (589), and 85.6 (656). Electron diffraction patterns indicated cubic symmetry, space group $I\bar{4}3m$, $a = 10.02(2)$ Å; some of the patterns showed the presence of a minor component that has a primitive unit cell (P). Strongest lines of the powder pattern (114- and 180-mm Debye-Scherrer, Co radiation) are 2.37(100,330,411), 2.10(80,332), 1.457(70,631,444,P700), 1.240(70,811,741,P810), 1.193(60,653), 1.033(50,932), 0.950(80,765), and 0.925(80,961).

The mineral is associated with calcite, gypsum, and hematite in the dolomite portion of the Zechstein copper deposit at the Lubin mine, Poland. The new name is for Eugen F. Stumpfl, Mining University, Leoben, Austria. Type material is in the Institute of Geology and Mineral Deposits, Cracow, Poland. **J.L.J.**

Mikasaite*

H. Miura, K Niida, T. Hirama (1994) Mikasaite, (Fe^{3+}, Al)$_2$(SO$_4$)$_3$, a new ferric sulphate mineral from Mikasa city, Hokkaido, Japan. Mineral. Mag., 58, 649–653.

The mineral occurs as a sublimate around a fracture from which gas at >300 °C emerges from buried coal seams. Wet-chemical and electron microprobe analyses gave Fe_2O_3 24.3, Mn_2O_3 0.5, Al_2O_3 4.3, SO_3 46.8, H_2O^- 23.0, sum 98.9 wt%, corresponding to $(Fe_{1.56}Al_{0.44}Mn_{0.03})_{\Sigma2.03}(SO_4)_{3.00}$ on the basis of $3SO_4$; the H_2O is nonessential as indicated by heating experiments and comparison with the anhydrous synthetic analogue. Occurs as aggregates of white to light brown hollow spheres averaging about 100 μm in diameter and with a shell thickness of 1–5 μm. White to light brown streak, deliquescent. Optically uniaxial positive, $\omega = 1.504(2)$, $\epsilon = 1.518(3)$; becomes amorphous and isotropic upon adsorption of H_2O. The X-ray powder pattern (diffractometer, Cu radiation) is in good agreement with that of synthetic hexagonal $Fe_2(SO_4)_3$ and millosevichite (the Al analogue), and by analogy $a = 8.14(1)$, $c = 21.99(8)$ Å, space group $R\bar{3}$; strongest lines are 5.99(28,012), 4.35(23,104), 3.56(100,113), 2.97(20,024), 2.72(20,116), and 2.64(11,211).

The new name is for the locality. Type material is in the Department of Geology and Mineralogy, Hokkaido University, Sapporo, Japan. Associated minerals, if present, are not reported. **J.L.J.**

Pseudorutile*

I.E. Grey, J.A. Watts, P. Bayliss (1994) Mineralogical nomenclature: Pseudorutile revalidated and neotype given. Mineral. Mag., 58, 597–600.

Pseudorutile may have the general formula $Fe_{2\pm x}^{3+}Ti_3$-$O_{9-x}(OH)_{3x}$ and is ideally $Fe_2^{3+}Ti_3O_9$. Opaque, magnetic, $D = \sim 3.8$ g/cm^3, color variable from black to intermediate shades of brown, red, and gray; generally occurs as a fine-grained alteration product of ilmenite. Hexagonal symmetry, space group $P322$, $a = 14.375$, $c = 4.615$ Å. The neotype specimen, from South Neptune Island, South Australia, gives an X-ray powder pattern (diffractometer, CuKα$_1$ radiation) with sharp substructure lines and six diffuse asymmetrical lines, the latter attributed to an incommensurate superstructure. Strongest lines are 2.481(80,100), 2.1830(70,101), 1.6860(100,102), and 1.4324(25,110); substructure $a = 2.8667(5)$, $c = 4.5985(9)$ Å. Neotype material is in the Museum of Victoria, Melbourne, Australia.

Discussion. See also arizonite, discredited. **J.L.J.**

Saliotite*

B. Goffé, A. Baronnet, G. Morin (1994) Saliotite, a new high-pressure, low-temperature metamorphic phyllosilicate with regular 1:1 interstratification of cookeite and paragonite layers. Eur. J. Mineral., 6, 897–911 (in French, English abs.).

The mineral occurs in metapelitic schists mainly as deformed lamellae, up to 1 × 0.1 mm, intergrown with pyrophyllite, paragonite, cookeite, and calcite with relict aragonite; also as rosettes to 0.55 mm in diameter in quartz, and intergrown with cookeite in calcite veins. Electron microprobe analyses (mean of 14) gave Na_2O 2.79, K_2O 0.41, CaO 0.25, Li_2O (ion microprobe) 1.67, FeO 0.47, MgO 0.05, Al_2O_3 43.65, SiO_2 41.22, H_2O (by difference) 9.49, sum 100 wt%, corresponding to $Li_{0.5}$-$Na_{0.41}K_{0.04}Ca_{0.02}Fe_{0.03}Mg_{0.01}Al_{3.8}Si_{3.1}O_{9.86}(OH)_5$, ideally $Li_{0.5}Na_{0.5}Al_3[Si_3Al]O_{10}(OH)_5$. White to colorless, nonfluorescent, low hardness and tenacity, perfect {001} cleavage, $D_{calc} = 2.75$ g/cm^3 for $Z = 4$. Optically biaxial negative, positive elongation, α and $\beta = >1.58$ to <1.59, $\gamma = >1.59$ to <1.60, birefringence 0.007, $2V_{meas} = 30$–50°, orientation $Y = \sim\mathbf{a}$, $Z = \mathbf{b}$, $X \wedge \mathbf{c} = 4$°, nonpleochroic. HRTEM and SAD patterns indicate the presence of a regular, ordered 1:1 interstratification of cookeite and paragonite; the unit cell is monoclinic, polytype $1M$, space group $C2/m$, $a = 5.158(1)$, $b = 8.914(3)$, $c = 23.83(2)$ Å, $\beta = 94.23(4)$° as refined from a Gandolfi pattern (Cu radiation) having strongest lines at 11.89(70,002), 4.75(50,005), 4.456(90,020,$\bar{1}$10), 4.325(90,111), 2.547(100,131), 2.476(70,202,$\bar{1}$33), 1.623(50,313,$\bar{1}$.1.14), and 1.486(90,060,0.0.16,$\bar{3}$32,330). The pattern remains unchanged after glycolation or after heating from 300 °C to 400 °C to 500 °C at successive 2-h intervals.

The mineral occurs in Permo-Triassic metapelites of the Alpujarrides nappes in the Sierra Alhamilla, Andalusia, southeastern Spain. P-T stability conditions are estimated as 280–330 °C and 8 kbar. The new name is for geologist Pierre Saliot, Ecole Normale Supérieure de Paris. Type material is in the Ecole des Mines de Paris. **J.L.J.**

Schwertmannite*

J.M Bigham, L. Carlson, E. Murad (1994) Schwertmannite, a new iron oxyhydroxysulphate from Pyhäsalmi, Finland, and other localities. Mineral. Mag., 58, 641–648.

The mineral is a poorly crystalline, yellowish brown, ochreous precipitate from acid, sulfate-rich waters. Readily soluble in 5-M HCl or 0.2-M ammonium oxalate. Chemical analysis and static heating to 100 and 800 °C gave Fe_2O_3 62.6, SO_3 12.7, CO_2 1.5, H_2O^+ 12.9, H_2O^- 10.2, sum 99.9 wt%, corresponding to $Fe_{16}O_{16}(OH)_{9.6}$-$(SO_4)_{3.2} \cdot 10H_2O$, generalized as $Fe_{16}O_{16}(OH)_y(SO_4)_z \cdot nH_2O$ where $16 - y = 2z$ and $2 \leq z \leq 3.5$. The mineral typically consists of needles 2–4 nm thick and 60–90 nm long, which are in spherical to ellipsoidal aggregates 200–500 nm in diameter. The X-ray powder pattern consists of eight broad peaks at 4.86(37,200,111), 3.39(46,310), 2.55(100,212), 2.28(23,302), 1.95(12,412), 1.66(21,522), 1.51(24,004), and 1.46(18,204,542); the indexing is based on a tetragonal cell with $a = 10.66(4)$, $c = 6.04(1)$ Å, probable space group $P4/m$, possibly hollandite-akaganéite structure type, $D_{calc} = 3.77$–3.99 g/cm^3 for $Z = 1$. DTA and TGA shows an endothermic reaction from 100–300 °C (20–25% weight loss) corresponding to vaporization of sorbed H_2O and structural $OH-H_2O$; an exothermic peak appears at 540–580 °C and an endothermic reaction at 650–710 °C; hematite is present as a product preceding the exothermic reaction, and the reaction probably results from crystallization of $Fe_2(SO_4)_3$, which breaks down at ~700 °C (last endotherm).

The mineral is known synthetically and from more than 40 localities in Europe, North America, and Australia. All occurrences are related to the surface or near-surface oxidation of metal sulfides; optimum conditions for formation are pH 3–4.5 and SO_4 concentrations of 1000–3000 mg/L. Typical associates are jarosite, natrojarosite, goethite, and ferrihydrite. The purest sample found to date is from the Pyhäsalmi base-metal mine, Province of Oulu, Finland (type locality), at which schwertmannite occurs as crusts on stones inundated by acidic drainage from a mound of concentrate sand. The new name is for Udo Schwertmann (b. 1927), Technical University of Munich. Cotype specimens are in the Geological Museum, University of Helsinki, Finland. **J.L.J.**

Wycheproofite*

W.D. Birch, A. Pring, D.J.M Bevan, Kharisun (1994) Wycheproofite: A new hydrated sodium aluminium zirconium phosphate from Wycheproof, Victoria, Australia, and a new occurrence of kosnarite. Mineral. Mag., 58, 635–639.

Electron microprobe and CHN analyses gave Na_2O 6.36, K_2O 0.44, CaO 0.66, FeO 0.36, MnO 0.21, Al_2O_3 12.03, Cs_2O_3 0.03, ZrO_2 32.43, HfO_2 1.24, P_2O_5 35.85, SiO_2 0.23, H_2O 9.0, F 0.34, $O \equiv F$ 0.14, sum 99.04 wt%, corresponding to $(Na_{0.81}Ca_{0.05}K_{0.04})_{\Sigma 0.90}(Al_{0.93}Fe_{0.02}Mn_{0.01})_{\Sigma 0.96}$ $(Zr_{1.03}Hf_{0.02})_{\Sigma 1.05}(P_{1.99}Si_{0.01})_{\Sigma 2.00}$ $[(OH)_{1.87}F_{0.07}]_{\Sigma 1.94} \cdot 1.0H_2O$, simplified as $NaAlZr(PO_4)_2(OH)_2 \cdot H_2O$. Occurs as pale pinkish orange to pale brownish orange aggregates consisting of fibrous grains, each 5–10 μm thick and up to several millimeters long. Vitreous to pearly luster, transparent, colorless streak, nonfluorescent, $H = 4$–5, rough fracture, no cleavage, $D_{meas} = 2.81$–2.83, $D_{calc} = 2.81$ g/cm^3 for $Z = 6$. Optically length slow, parallel extinction, nonpleochroic; $n = 1.64$ parallel to fibers, 1.62 normal to them. Indexing of the X-ray powder pattern (Guinier, Cu$K\alpha$ radiation), and partial electron-diffraction results, gave a triclinic cell with $a = 10.926(5)$, $b = 10.986(5)$, $c = 12.479(9)$ Å, $\alpha = 71.37(4)$, $\beta = 77.39(4)$, $\gamma = 87.54(3)°$. Strongest lines of the powder pattern are 8.865(40,101), 4.128(80,1$\bar{2}$1), 3.711(65,023), 3.465(60,030), 3.243(35,$\bar{1}$32), and 2.603(100,040).

The mineral occurs in a cavity in a pegmatite vein in granite at Wycheproof, northwestern Victoria, Australia. The pegmatite contains several phosphates, including two others of Zr. Type material is in the Museum of Victoria, Melbourne, Australia. **J.L.J.**

PGE oxides

T. Augé, O. Legendre (1994) Platinum-group element oxides from the Pirogues ophiolitic mineralization, New Caledonia: Origin and significance. Econ. Geol., 89, 1454–1468.

The minerals occur as inclusions in chromite crystals from chromitite, or as grains in concentrates from nearby alluvial deposits, at the southwestern tip of New Caledonia. The most common primary associates are Pt-Fe alloys, cooperite, and laurite, and rarely bowieite, malanite, and cuprorhodsite.

(Pt,Fe)O?

Electron microprobe analyses of Pt-Fe oxides gave a large compositional range, with O variable from 1.0 to 10.4 wt%. Analysis of the grain with the highest O content gave Pt 71.45, Pd 5.13, Rh 0.21, Ir 0.13, Fe 12.68, Cr 0.04, Mn 0.24, Ni 0.52, Cu 0.03, O 10.38, sum 100.80 wt%, corresponding to $(Pt_{0.57}Fe_{0.36}Pd_{0.07})_{1.00}O_{0.99}$; this grain is present as a zone, about 15 μm wide, in a larger grain of complex texture and intergrowth. The Pt-Fe oxides in general occur as subhedral or round grains, typically <20 μm, creamy white color, good polish, high reflectance; strong anisotropy, with polarization colors from brownish beige to gray with tints of green or pink. The oxides also occur as grains showing a granular internal structure and weak to moderate anisotropy, and as concretion-like layers showing strong anisotropy.

(Rh,Fe,Ir)₃O?

Occurs as a small grain, 15 μm in largest dimension. Low reflectance, and weak anisotropy without distinct color. Electron microprobe analysis gave Rh 47.04, Pd

2.78, Ir 21.20, Pt 0.64, Cr 0.55, Mn 0.13, Fe 20.99, Ni 0.02, Cu 0.40, O 6.04, sum 99.80 wt%, corresponding to $(Rh_{1.46}Fe_{1.11}Ir_{0.35}Pd_{0.06})_{\Sigma2.98}O_{1.02}$ for four atoms.

(Fe,Rh,Pt)O?

Two grains were found in alluvial mineralization. One is a compositionally homogeneous grain, 30×50 μm; reflectance variable from pale gray to creamy white, anisotropy very strong, with colors from steel blue to yellowish beige. Microprobe analysis gave Rh 33.65, Ir 1.81, Pt 12.76, Mn 0.06, Fe 35.30, Ni 0.12, Cu 0.11, O 17.10, sum 100.90 wt%, corresponding to $(Fe_{0.62}Rh_{0.32}Pt_{0.07}Ir_{0.01})_{\Sigma1.02}O_{0.98}$. Analysis of the other grain, which is 40 μm in largest dimension, corresponds to $(Rh_{0.41}Fe_{0.36}Pt_{0.23}Ir_{0.01})_{\Sigma1.01}O_{0.99}$.

(Pt,Fe,Rh,Ir)O?

Occurs as a 7×14 μm grain in alluvium and as a 65×125 μm grain in chromitite. The larger grain has a core with a bluish gray color, a reflectance close to that of pyrite, and medium anisotropy from steel blue to yellow. The rim has lower reflectance, yellowish color; very strong anisotropy, with colors from beige to steel blue. Analyses of the core and rim gave, respectively, Rh 10.61, 13.34, Pd 0.06, 0.29, Ir 14.77, 19.45, Pt 34.11, 46.20, Mn 0.09, 0.34, Fe 20.38, 8.53, Ni 0.24, 0.06, Cu 6.58, 1.99, O 12.92, 10.29, sum 99.75, 100.48 wt%, corresponding to $(Fe_{0.45}Pt_{0.21}Rh_{0.13}Ir_{0.09}Cu_{0.13})_{\Sigma1.01}O_{0.99}$ and $(Pt_{0.36}Fe_{0.23}Rh_{0.20}Ir_{0.16}Cu_{0.05}Mn_{0.01})_{\Sigma1.01}O_{0.99}$.

(Ru,Mn,Fe)(O,OH)₃?

Occurs in chromitite as a grain 80×30 μm. In reflected light, brownish gray color similar to that of chromite; isotropic. Microprobe analysis (average of seven) gave Ru 39.8, Mn 10.9, Fe 5.4, Ir 2.3, Rh 1.2, Os 1.0, Ni 0.5, Cu 0.5, Pd 0.2, Pt 0.2, Cr 0.2, O 37.7, sum 99.9 wt%, corresponding to $(Ru_{0.52}Mn_{0.27}Fe_{0.12}Ir_{0.02}Rh_{0.01}Ni_{0.01})_{\Sigma0.95}O_{3.05}$ if valences are 6^+ for Ir, Ru, Os, and Mn, 4^+ for Pt, Pd, and Rh, and 3^+ for Fe. If OH is present, the hypothetical formula may be $(Ru,Fe)_{0.75}Mn_{0.25}(O,OH)_3$. **J.L.J.**

Soucekite-like mineral

Yu.M. Dymkov, B.I. Ryzhov, V.D. Begizov, L.S. Dubakina, E.N. Zav'yalov, V.G. Ryabeva, N.V. Tsvetkova (1991) Mgriite, bismuth petrovicite, and associated selenides in carbonate veins of the Erzgeberge. Novye Dannye Mineral., 37, 81–101 (in Russian).

The selenides occur in the Shlema-Alberoda U deposit, eastern Germany. Petrovicite associated with clausthalite and berzelianite contains up to 28 wt% Bi, corresponding to $Cu_{2.7}Bi_{1.55}Pb_{0.85}Hg_{0.40}Se_5$. Exsolution pseudomorphs after a mineral of bulk composition R_3Se_2 consist predominantly of a greenish, light blue mineral similar to berzelianite, and of uniformly distributed, extremely fine-grained inclusions of an unidentified pinkish mineral of higher hardness. Electron microprobe analysis of the

pseudomorphs gave the approximate composition $Cu_{2.11-2.62}Pb_{0.27-0.34}Bi_{0.18-0.24}Ag_{0.06-0.08}Se_3$, and X-ray powder patterns are possibly compatible with that of berzelianite plus extra lines. The R_3S_2 bulk composition may represent a mixture of berzelianite and a new mineral similar to S-free soucekite. **N.N.P.**

Thorium silicate

K.A. Lazebnik, N.V. Zayakina, V.F. Makhotko (1994) A new thorium silicate from carbonatites of the Syrenevyi Kamen' deposit. Doklady Akad. Nauk, 334, 735–738 (in Russian).

A thorium silicate conditionally named "thorsite" was described by K.A. Lazebnik et al. (*Typomorphism and Geochemical Features of Endogenic Minerals of Yakutia*, 1985, Yakutsk, 132–142) but was not voted on by the CNMMN because of the lack of X-ray data. The mineral occurs sparingly in calcite carbonatites of the Murun alkalic massif, where it is associated with aegerine, potassium feldspar, quartz, tinaksite, titanite, apatite, dalyite, and thorite. Grains of the mineral, liberated by dissolution of the carbonatite in HCl, are light yellow, transparent, and have relict faces of a tetragonal prism. Luster is vitreous, $H = 3-4$, no cleavage, $D_{meas} = 2.82(3)$ g/cm³, weak yellowish green fluorescence in ultraviolet light (365 nm). Strongly radioactive, completely metamict, $n = 1.537(2)$. Heating tests and the infrared spectrum indicated two types of H_2O, one released at <100 °C, and the other at 800–900 °C. Electron microprobe analyses gave (average and range for 32 points on nine grains): SiO_2 41.60 (40.43–42.69), ThO_2 37.33 (36.21–38.73), CaO 4.11 (3.57–4.92), BaO 3.29 (2.66–3.91), SrO 0.65 (0.59–0.74), H_2O (by difference) 13.02 (10.44–15.23) wt%, corresponding to $Th_{1.82}(Ca_{0.94}Ba_{0.27}Sr_{0.08})_{\Sigma1.29}[Si_{8.89}O_{22}](OH)_{1.13} \cdot 9.35H_2O$, ideally $Th_2(Ca,Ba)[Si_9O_{22}](OH)_2 \cdot nH_2O$. The X-ray powder pattern (57-mm camera, Fe radiation) of material heated to 900 °C has strongest lines of 3.05(100), 2.86(90), and 2.163(40); these and the 13 additional but weaker lines listed are close to those of huttonite. Heating of metamict ekanite also leads to the formation of huttonite, but the temperature required for crystallization is considerably lower (650 °C). **N.N.P.**

New Data

Bilibinskite, bogdanovite

E.M. Spiridonov (1991) Composition and structure of the bilibinskite-bogdanovite mineral group. Novye Dannye Mineral., 37, 138–145 (in Russian).

Supergene plumbotellurides and antimony plumbotellurides with high Au contents (bilibinskite, bezsmertnovite, bogdanovite, and similar minerals) are too fine-grained to obtain single-crystal X-ray structure data to resolve formulas. It can be inferred, by analogy with known

structures, that these minerals have superstructures that are based on the cubic structure of gold and in which Au-Cu-Fe-Ag occupy one position, and Te-Pb-Sb-Bi occupy another. The possibility that O contents are significant is not in accord with the reflection colors and high reflectance of these minerals, and a proposed layered structure does not fit well with their anisotropic hardness.

Discussion. For the inferred structure of bogdanovite, see also *Am. Mineral.,* 76, p. 2026 (1991). **N.N.P.**

Briartite

N.N. Mozgova, S.N. Nenasheva, Yu.S. Borodaev, A.I. Tsepin, T.A. Kalinina (1994) New data on briartite. Doklady Akad. Nauk, 335, 780–783 (in Russian).

A specimen, labeled germanite from southeast Africa, which is in the Fersman Mineralogical Museum, Moscow, and which is probably from Tsumeb, Namibia, was found to contain briartite having a high and variable Cu content. Grains of the mineral occur within renierite, have inclusions of renierite, and coexist with tennantite and chalcopyrite. In reflected light the mineral is violet gray, with weak bireflectance and no pleochroism; strongly anisotropic without color changes. Reflectance dispersion curves are almost horizontal, without the distinct maximum in the interval 450–650 nm as is characteristic for type briartite. Eight electron microprobe analyses by three laboratories gave a formula range of $Cu_{2.13-2.21}(Zn_{0.66-0.78}Fe_{0.18-0.29})_{\Sigma 0.90-0.97}(Ge_{0.78-0.85}As_{0.0-0.02}Ga_{0.11-0.19})_{\Sigma 0.93-1.01}S_{3.90-3.98}$. The increase in Cu content is accompanied by increases in Me/S.

Discussion. The results are in accord with formula Zn > Fe, as in the original description, whereas several compilations indicate the formula to have Fe > Zn. **N.N.P.**

Ferritungstite

T.S. Ercit, G.W. Robinson (1994) A refinement of the structure of ferritungstite from Kalzas Mountain, Yukon, and observations on the tungsten pyrochlores. Can. Mineral., 32, 567–574.

Single-crystal X-ray structure study ($R = 0.0195$) of ferritungstite showed it to be isostructural with pyrochlore, cubic, space group $Fd3m$, $a = 10.352(1)$ Å. Electron microprobe analysis gave Na_2O 0.16, K_2O 2.16, CaO 0.73, Fe_2O_3 9.99, WO_3 77.1, H_2O (calc.) 8.45, sum 99.20 wt%, corresponding to the structural formula $[(H_2O)_{0.59}Ca_{0.06}Na_{0.02}]_{\Sigma 0.67}(W_{1.46}Fe_{0.54}^{3+})_{\Sigma 2.00}[O_{4.70}(OH)_{1.30}]_{\Sigma 6.00}[(H_2O)_{0.80}K_{0.20}]_{\Sigma 1.00}$; the new ideal formula is $(W,Fe_2^{3+})(O,OH)_6 \cdot p H_2O$, where $p \leq 1.75$. **J.L.J.**

Mgriite, chameanite

Yu.M. Dymkov, B.I. Ryzhov, V.D. Begizov, L.S. Dubakina, E.N. Zav'yalov, V.G. Ryabeva, M.V. Tsvetkova (1991) Mgriite, bismuth petrovicite, and associ-

ated selenides in carbonate veins of the Erzgeberge. Novye Dannye Mineral., 37, 81–101 (in Russian).

The X-ray powder pattern of mgriite is in good agreement with data for Cu_3AsS_3, the latter a discrete phase in the synthetic system As_2S_3–Cu_2Se. The unit cell is cubic, $a = 11.07$ Å. Chameanite from the type locality (Chaméane, France) gives an X-ray pattern similar to that of mgriite, and the composition $(Cu,Fe)_4As(Se,S)_4$ for chameanite seems to be that of impure mgriite.

Discussion. It has been suggested that the formula of mgriite is (Se,Cu,As), with $a = 5.5$–5.8 Å (*Am. Mineral.,* 76, p. 2026, 1991). Further clarification of the formula and nature of both mgriite and chameanite is required. **N.N.P.**

Richelsdorfite

H. Sarp, B. Dominik, P.-J. Chiappero (1994) New occurrence (Triembach–Le Val, Vosges, France): Revision of optical constants and X-ray powder diagram of richelsdorfite, $Ca_2Cu_5Sb[Cl(OH)_6 (AsO_4)_4] \cdot 6H_2O$. Schweiz. Mineral. Petrogr. Mitt., 74, 273–277 (in French, English abs.).

Richelsdorfite from Triembach has a composition in good agreement with the original formula. Single-crystal X-ray study gave $a = 14.078(9)$, $b = 14.207(8)$, $c = 13.49(2)$ Å, $\beta = 101.06(8)°$, $D_{meas} = 3.3$, $D_{calc} = 3.33$ g/cm^3 for $Z = 4$. Strongest lines of the powder pattern (114-mm Gandolfi, Cu radiation) are 13.2(100,001), 6.26(30,021), 4.963(30,220), 4.413(25,003,$\overline{3}$11), 3.132(90,$\overline{2}$41,$\overline{3}$32), 2.841(30,402), 2.776(35,150), 2.706(25,510,151), and 1.775(35,642,080). Optically biaxial negative, $\alpha = 1.640(2)$, $\beta = 1.692(2)$, $\gamma = 1.694(2)$, $2V_{meas} = 10$–15°, $2V_{calc} = 21.6°$, orientation $\mathbf{a} = \beta$, $\mathbf{b} = \gamma$; strongly pleochroic from colorless (α) to blue (β, γ). **J.L.J.**

Schulenbergite

W.G. Mumme, H. Sarp, P.J. Chiappero (1994) A note on the crystal structure of schulenbergite. Archs Sci. Genève, 47(2), 117–124.

Schulenbergite from the Harz Mountains, Germany, was originally described as $(Cu,Zn)_7(SO_4,CO_3)_2(OH)_{10} \cdot 3H_2O$, with small amounts of carbonate and Cu:Zn = ~1.3:1. Electron microprobe analysis of a similar mineral from the Cap Garonne mine, Var, France, gave an average (nine analyses) and range of CuO 53.18 (50.97–54.50), ZnO 11.39 (9.43–12.73), CoO 0.84 (0.59–1.03), NiO 0.78 (0.52–1.06), SO_3 15.13 (13.26–16.64), H_2O (by difference) 18.68 (14.81–19.89) wt%, corresponding to $Cu_{5.7}Zn_{1.3}(SO_4)_{1.8}(OH)_{10.4} \cdot 3H_2O$. Optically uniaxial negative, $\epsilon = 1.666$, $\omega = 1.707$, strongly pleochroic. Single-crystal X-ray study showed the mineral to be trigonal, space group $P3$ or $P\overline{3}$, $a = 8.211(2)$, $c = 7.106(2)$ Å; although this cell is in good agreement with the original, the Cap Garonne mineral shows this to be only a subcell of a much larger, but undetermined, true cell in which

both a and c are multiples of the subcell. Strongest lines of the powder pattern are 7.11(100), 3.554(60), 3.179(60), 2.687(80), 2.513(90), 2.143(35), and 1.777(35). Comparison of the new results and those of the type material are needed to determine whether the two are the same mineral. **J.L.J.**

Tilasite

V. Bermanec (1994) Centro-symmetric tilasite from Nežilovo, Macedonia: A crystal structure refinement. Neues Jahrb. Mineral. Mon., 289–294.

Single-crystal X-ray structure study ($R = 0.0279$) of tilasite showed the space group to be $C2/c$ rather than Cc (*Am. Mineral.*, 57, 1880–1884, 1972). Previously reported positive pyroelectric effects are considered to be anomalous rather than symmetry-related. **J.L.J.**

Varlamoffite

G.A. Sidorenko, V.V. Korovushkin, A.I. Gorshkov, E.S. Rudnitskaya, Yu.P. Dikov, L.V. Kaukova, A.V. Sivtsov (1993) The mineral nature of varlamoffite. Mineral. Zhurnal, 15(4), 94–101 (in Russian).

Varlamoffite occurs as a secondary mineral in the oxidation zones of some tin deposits, and at some localities is one of the main economic minerals of Sn. Varlamoffite samples from several deposits were studied using a variety of methods, including radiography, analytical electron microscopy, Mössbauer, infrared, and X-ray electron spectroscopy, thermal analysis, solubility in acids, and phase chemical analysis. Specimens from the Tigrinoye deposit were investigated by all of the methods. X-ray powder diagrams (diffractometer) showed the presence of diffraction lines at 3.35(100,110), 2.63(90,101), 1.75(50,211), and 1.67 Å (30,220), corresponding to a cassiterite-like structure with a smaller cell size. Structurally incorporated Fe is variable, and the generalized formula is $Sn_{1-x}Fe_xO_{2-x}(OH)_x$. Varlamoffite from the Tigrinoye deposit has an average composition corresponding to $Sn_2FeO_5(OH)$.

Discussion. The results seem to validate a previously ill-defined species and should be submitted to the CNMMN for a formal redefiniton of the mineral. **N.N.P.**

Wickenburgite

A.E. Lam, L.A. Groat, M.A. Cooper, F.C. Hawthorne (1994) The crystal structure of wickenburgite, $Pb_3CaAl[AlSi_{10}O_{27}](H_2O)_3$, a sheet structure. Can. Mineral., 32, 525–532.

Single-crystal X-ray structure study ($R = 0.031$) of wickenburgite from the Potter–Cramer mine near Wickenburg, Arizona, gave trigonal symmetry, new space group $P31c$, $a = 8.560(3)$, $c = 20.190(6)$ Å, and the new formula $Pb_3CaAl_2Si_{10}O_{27}(H_2O)_3$, $Z = 2$. **J.L.J.**