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NEW MINERAL NAMES*

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Bismutopyrochlore*

N.V. Chukanov, A.M. Skrigitil', O.V. Kuz'mina, A.Ye. Zadov (1999) Bismutopyrochlore $(Bi,U,Ca,Pb)_{1+x}(Nb,Ta)_2O_6(OH)\cdot nH_2O$—a new mineral from the Mika pegmatite vein (Eastern Pamirs). Zapiski Vseross. Mineral. Obshch., 128(4), 36–41 (in Russian).

The average of three electron microprobe analyses gave Na_2O 0.33, MgO 0.28, Al_2O_3 0.42, K_2O 0.48, CaO 2.57, TiO_2 0.32, MnO 0.16, Fe_2O_3 1.74, Nb_2O_5 34.17, Ta_2O_5 8.55, PbO 5.99, Bi_2O_3 14.61, Sb_2O_3 1.23, UO_2 14.02, La_2O_3 0.18, Ce_2O_3 0.27, ThO_2 0.37, LOI (presumed to be H_2O) 14.6, sum 100.29 wt%; F, Y, Zn, Ba, Sr below detection. The empirical formula is $(Bi_{0.37}U_{0.30}Ca_{0.27}Pb_{0.16}Na_{0.06}K_{0.06}Sb_{0.05}Mn_{0.01}Ce_{0.01}La_{0.01}Th_{0.01})_{\Sigma 1.31}(Nb_{1.53}Ta_{0.23}Fe_{0.13}Al_{0.05}Mg_{0.04}Ti_{0.02})_{\Sigma 2.00}O_{6.1}(OH)_{0.9}\cdot 4.3H_2O$. Fragments of a crystal show {111}, {110}, and {211}, with the octahedron dominant. Black color, greenish brown in thin edges, $H \approx 5$, $D_{meas} = 4.97(2)$ g/cm^3. Optically isotropic, $n = 2.10(5)$. Strongly radioactive and metamict, amorphous. The many absorption bands in the infrared spectrum include those at 450, 490, 620, 845, 1640, and 3300 cm^{-1}. After heating at 700 °C for 4 h, a powder pattern typical of that for pyrochlore is obtained; isometric, $a = 10.41(2)$ Å. Strongest lines (16 lines given, diffractometer, Fe$K\alpha$ radiation) are 2.967(100,222), 2.614(70,224), 1.848(90,044), 1.569(90,262), and 1.195 (80B,662). The compatibility calculated from the Gladstone–Dale relationship is 0.020 (excellent).

The mineral formed on lepidolite in miarolitic cavities in the Mika pegmatite vein, which is in the central part of Rangkul' Highlands, Eastern Pamirs, Tajikistan. Other minerals in the cavities are microcline, albite, quartz, schorl, elbaite, topaz, muscovite, apatite, fluorite, calcite, barite, beryl, cassiterite, and hambergite. The new name is for the composition and relationship to pyrochlore. Type material is in the Fersman Mineralogical Museum, Moscow, Russia. **E.S.G.**

Coskrenite-(Ce)*

D.R. Peacor, R.C. Rouse, E.J. Essene (1999) Coskrenite-(Ce), $(Ce,Nd,La)_2(SO_4)_2(C_2O_4)\cdot 8H_2O$, a new rare-earth oxalate mineral from Alum Cave Bluff, Tennessee: characterization and crystal structure. Can. Mineral., 37, 1453–1462.

Electron microprobe analysis gave La_2O_3 4.6, Ce_2O_3 25.9, Pr_2O_3 2.1, Nd_2O_3 13.3, Sm_2O_3 1.0, Eu_2O_3 0.8, Gd_2O_3 0.3, Y_2O_3 0.1, SO_3 22.6, F_2 0.3, C_2O_3 (calc.) 10.2, H_2O (calc.) 20.4, sum 100.0 wt%, corresponding to $(Ce_{1.06}Nd_{0.56}La_{0.20}Pr_{0.09}Sm_{0.04}Eu_{0.03}Gd_{0.01}Y_{0.01})_{\Sigma 2.00}(SO_4)_2(C_2O_4)\cdot 8H_2O$. Occurs as aggregates of tabular, wedge-shaped, euhedral crystals, flattened on {100}, with {100} and {001}, and up to 0.7 mm in width. Cream-colored, or pale pink under incandescent light and pale blue under fluorescent light; transparent, vitreous luster, colorless streak, brittle, perfect {001} cleavage, H not determinable, $D_{calc} = 2.881$ g/cm^3 for $Z = 1$, nonfluorescent, readily soluble in water. Optically biaxial negative, $\alpha = 1.544(4)$, $\beta = 1.578(4)$, $\gamma = 1.602(4)$, $2V_{meas} = 65(10)$, $2V_{calc} = 69(3)°$, medium dispersion $r > v$, $Z \wedge c = 21°$ in the plane of the cleavage. Single-crystal X-ray structure study ($R = 0.050$) indicated triclinic symmetry, space group $P\bar{1}$, $a = 6.007(1)$, $b = 8.368(2)$, $c = 9.189(2)$ Å, $\alpha = 99.90(2)$, $\beta = 105.55(2)$, $\gamma = 107.71(2)°$. Strongest lines of a 114 mm Gandolfi powder pattern are 8.52(70,001), 6.72(60,01$\bar{1}$), 5.48(100,1$\bar{1}$0), 4.26(50,002,01$\bar{2}$), and 3.84(60,020,110).

The mineral is associated with epsomite and 'hair salts' (principally apjohnite) in soil sheltered by an overhanging steep cliff at Alum Cave Bluff, Tennessee. The new name is for geologist T. Dennis Coskren (b. 1942) of Columbia, Maryland, whose work was instrumental in the discovery of the mineral. Type samples are in the U.S. National Museum of Natural History, and in the Department of Geological Sciences of the University of Michigan. **J.L.J.**

Ferrokinoshitalite*

S. Guggenheim, H.E. Frimmel (1999) Ferrokinoshitalite, a new species of brittle mica from the Broken Hill mine, South Africa: structural and mineralogical characterization. Can. Mineral., 37, 1445–1452.

The mineral occurs as dark green, tabular crystals, up to 0.2 mm across, in a garnet- and amphibole-rich siliceous facies of

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* Before publication, minerals marked with an asterisk were approved by the Commission on New Minerals and Mineral Names, International Mineralogical Association.

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banded iron-formation that encloses massive sulfide orebodies. The seven listed electron microprobe analyses have a mean of K_2O 3.18, Na_2O 0.26, SrO 0.07, BaO 14.14, MgO 5.84, MnO 1.14, FeO 24.27, Fe_2O_3 2.35, Al_2O_3 15.80, TiO_2 2.68, SiO_2 28.86, sum 100.01 wt%, which for 11 oxygen atoms and F + OH = 2 corresponds to $(Ba_{0.47}K_{0.34}Na_{0.04})_{\Sigma 0.85}(Fe^{2+}_{1.72}\ Mg_{0.74}Mn_{0.08}$ $(Fe^{3+}_{0.15}Ti_{0.17})_{\Sigma 2.87}(Si_{2.44}Al_{1.56})_{\Sigma 4.00}O_{10}(OH_{1.35}F_{0.65})_{\Sigma 2.00}$, ideally $BaFe^{2+}_3Al_2Si_2O_{10}(OH)_2$. Vitreous luster, translucent, brittle, green streak, H = 3, perfect {001} cleavage, nonfluorescent, soluble in H_2SO_4 and in HF, insoluble in HCl, D_{meas} = 3.69(8), D_{calc} = 3.59 g/cm^3 for Z = 2. Optically biaxial negative, $2V_{est}$ = 20°, $n\beta_{est}$ = 1.680, mean n = 1.6939, strongly pleochroic, X = grass green, Y = dark brown-green, Z = dark greenish gray-brown, $X << Z < Y$. Single-crystal X-ray structure study (R = 0.032) indicated monoclinic symmetry, space group $C2/m$, 1M polytype; a = 5.372(5), b = 9.325(9), c = 10.060(8) Å, β = 100.67(8)° as refined from a Gandolfi pattern (114 mm, Fe$K\alpha$ radiation) with strongest lines of 2.65(100,$13\bar{1}$,200), 2.176(40,$13\bar{3}$,202), 1.659(25,$13\bar{5}$,$31\bar{3}$,204,311,006), 1.555 (30,060,$33\bar{1}$), and 1.529(25,$20\bar{6}$).

The mineral, which is the Fe^{2+}-dominant analog of kinoshitalite, is associated principally with quartz, magnetite, spessartine-rich garnet, apatite, sillimanite, gahnite, and sulfides at the Broken Hill mine, near Aggeneys, Cape Province, South Africa. Type material is in the Department of Geological Sciences at the University of Cape Town, South Africa. **J.L.J.**

Kuzmenkoite*

N.V. Chukanov, I.V. Pekov, N.I. Golovina, A.E. Zadov, V.V. Nedel'ko (1999) Kuzmenkoite $K_2(Mn,Fe)(Ti,Nb)_4[Si_4O_{12}]_2(OH)_4 \cdot 5H_2O$—a new mineral. Zapiski Vseross. Mineral. Obshch., 128(4), 42–50 (in Russian).

Electron microprobe analysis (average of 10 points) gave SiO_2 43.61, TiO_2 25.78, Nb_2O_5 4.82, FeO 1.18, MnO 4.06, MgO 0.31, BaO 1.17, Na_2O 0.64, K_2O 7.33, LOI (presumed to be H_2O) 10.93, sum 99.90 wt%, which for Si = 16 corresponds to $(K_{3.43}Na_{0.46}Ba_{0.17})_{\Sigma 4.06}(Mn_{1.26}Fe_{0.36}Mg_{0.17})_{\Sigma 1.79}(Ti_{7.11}Nb_{0.81})_{\Sigma 7.92}$ $[Si_4O_{12}]_4[(OH)_{7.70}O_{0.30}] \cdot 9.54H_2O$. Crystals, up to 1.5 mm long, show the pinacoids {010}, {100}, {001}, {$\bar{2}01$}, and {$\bar{3}01$}, and rhombic prisms {110} and {021}. Colorless to yellow to dark orange color, white streak, transparent, vitreous luster, imperfect cleavages in several unspecified directions, uneven fracture, $H \approx 5$, D_{meas} = 2.67(2), D_{calc} = 2.63(1) g/cm^3 for Z = 1 and the Si = 16 formula. Optically biaxial positive, α = 1.683(1), β = 1.687(2), γ = 1.775(2), $2V_{calc}$ = 26(9)°, moderate dispersion $r > v$. Pleochroism α = colorless, β = yellow, γ = colorless. The infrared spectrum has many absorption bands, including diagnostic ones at 1104, 1655, 1610, and 3250 cm^{-1}. Single-crystal X-ray structure study (R = 0.041) indicated monoclinic symmetry, space group $C2/m$, a = 14.369(3), b = 13.906(3), c = 7.812(1) Å, β = 117.09(2)°. Strongest lines in the powder pattern (28 lines given, 57 mm camera, Fe$K\alpha$ radiation) are 7.00(90,001,020), 6.33(80,$20\bar{1}$), 4.86(70,021,111), 3.17(100, 400,$42\bar{1}$,$40\bar{2}$), 3.08(50,022,041,240), 2.58(40,$24\bar{2}$,$20\bar{3}$,051), 2.47(40,$40\bar{3}$,042), and 1.551(40,$84\bar{3}$,$17\bar{3}$,$82\bar{4}$).

The mineral, which occurs in minute cavities in albitized murmanite-bearing lujavrites on Mt. Flora (north ridge of Mt. Selsurt) in the northern part of the Lovozero massif, Kola Peninsula, Russia, is a late hydrothermal phase associated with natrolite, labuntsovite, calciohilairite, vinogradovite, and carbonate-fluorapatite. Minerals formed earlier are aegirine, albite, eudialyte, lorenzenite, murmanite, magnesio-arfvedsonite, microcline, and nepheline. The mineral also occurs as pseudomorphs of murmanite. The name is for Russian geochemist and mineralogist M.V. Kuz'menko (1918–1995). Type material is in the Fersman Mineralogical Museum, Moscow, Russia.

Discussion. The mineral was referred to as the Mn analog of labuntsovite by Golovina et al. (1998, *Doklady Akad. Nauk*, 362, 350–352), who refined its crystal structure (see New Mineral Names, *Am. Mineral.*, 84, 1197–1198). However, kuzmenkoite is not an exact analog of labuntsovite because it lacks a site occupied primarily by Na in that mineral. **E.S.G.**

Magnesiofoitite*

F.C. Hawthorne, J.B. Selway, A. Kato, S. Matsubara, M. Shimizu, J.D. Grice, J. Vajdak (1999) Magnesiofoitite, $\square(Mg_2Al)Al_6(Si_6O_{18})(BO_3)_3(OH)_4$, a new alkali-deficient tourmaline. Can. Mineral., 37, 1439–1443.

Electron microprobe analysis gave Na_2O 0.70, MgO 6.15, FeO 0.97, Al_2O_3 40.17, B_2O_3 (calc.) 11.09, SiO_2 38.27, H_2O (calc.) 3.82, sum 101.17 wt%, corresponding to $(\square_{0.79}Na_{0.21})(Mg_{1.44}Fe_{0.13}Al_{1.42})_{\Sigma 2.99}Al_6(Si_6O_{18})(BO_3)_3(OH)_4$, which is the Mg analog of foitite. The mineral occurs as felted to radial aggregates, to 1 mm across, wherein fibrous crystals are up to 15 µm wide and 1 mm long. Pale bluish gray color, brittle, no cleavage, H = about 7, D_{calc} = 2.995 g/cm^3 for Z = 3. Optically uniaxial negative, ω = 1.624, ε 1.650; moderate pleochroism, O = gray-blue, E pale lavender, $O > E$. Indexing of an X-ray powder pattern (Gandolfi camera, Cu$K\alpha$ radiation) gave, by analogy with other members of the tourmaline group, trigonal symmetry, probable space group $R3m$, a = 15.884(4), c = 7.178(3) Å; strongest lines are 4.211(90,211), 3.969(100,220), 2.949 (70,122), and 2.567(100,051).

The mineral is associated with hematite, pyrite, rutile, and quartz on fracture and void surfaces in altered andesitic to dacitic volcanic rocks at Kyonosawa, Mitomi-mura, Yamanaski-ken Prefecture, Honshu, Japan. The new name refers to the relationship to foitite. Type material is in the Canadian Museum of Nature, Ottawa, and in the Royal Ontario Museum, Toronto, Canada. **J.L.J.**

Mozgovaite*

F. Vurro, A. Garavelli, C. Garbarino, Y. Moëlo, Y.S. Borodaev (1999) Rare sulfosalts from Vulcano, Aeolian Islands, Italy. II. Mozgovaite, $PbBi_4(S,Se)_7$, a new mineral species. Can. Mineral., 37, 1499–1506.

The mineral occurs as slender prismatic crystals, up to 200

× 20 μm in the holotype. One of seven listed electron microprobe analyses gave Pb 13.31, Cd 0.62, Bi 64.32, S 16.77, Se 1.96, sum 96.98 wt%, corresponding to $(Pb_{0.83}Cd_{0.07})_{\Sigma 0.90}Bi_{3.99}(S_{6.78}Se_{0.32})_{\Sigma 7.10}$. Silvery gray color, metallic luster, VHN_{10} = 116, D_{calc} = 6.26(6) g/cm^3 for Z = 6. White in reflected light, nonpleochroic, weakly bireflectant, rather strongly anisotropic without color effects. Reflectance percentages are given from 420 to 700 nm in 20 nm steps; representative values for R_1 and R_2 (Si standard, air) are 40.1, 36.0 (440 nm), 40.2, 35.8 (460), 40.6, 35.3 (540), 40.6, 35.1 (560), 40.6, 35.0 (580), 40.3, 35.0 (600), 40.1, 34.8 (640), and 40.1, 34.9 (660). The X-ray powder pattern (57 mm Gandolfi, Fe radiation) is similar to that of a synthetic, orthorhombic phase, space group *Bbmm*; by analogy, the calculated cell parameters are a = 13.18(6), b = 37.4(2), c = 4.05(3) Å. Strongest lines are 3.80(100,280,121), 3.58(30,141), 3.30(30,400), 2.95(40B,321), and 2.34 (40B,0.16.0).

The mineral is associated with bismuthinite, galenobismutite, cannizzarite, and lillianite, and was deposited as a high-temperature (>600 °C) fumarolic product at the La Fossa crater on the island of Vulcano. The new name is for Russian mineralogist Nadezhda N. Mozgova (b. 1931). Type material is at the University of Bari, Bari, Italy. **J.L.J.**

Orlandiite* and $Pb_4CuCl_3(SeO_3)_3(OH)$

I. Campostrini, C.M. Gramaccioli, F. Demartin (1999) Orlandiite, $Pb_3Cl_4(SeO_3){\cdot}H_2O$, a new mineral species, and an associated lead–copper selenite chloride from the Baccu Locci mine, Sardinia, Italy. Can. Mineral., 37, 1493–1498.

The mineral occurs as colorless to white, elongate (to 0.1 mm) tabular crystals, invariably twinned on {010}. Vitreous to silky luster, brittle, perfect {010} cleavage, nonfluorescent, D_{calc} = 5.66 g/cm^3 for Z = 2, mean index of refraction 1.96. Electron microprobe analysis gave PbO 74.18, ZnO 0.35, CdO 0.11, CuO 0.39, FeO 0.42, Cl 14.35, SeO_2 12.31, SO_2 0.20, H_2O (calc.) 2.34, O ≡ Cl 3.24, sum 101.41 wt%, corresponding to $Pb_3(Cl_{3.68}OH_{0.32})_{\Sigma 4.00}(SeO_3){\cdot}H_2O$. The infrared spectrum shows sharp bands at 3410–3160 and 1586 cm^{-1} (OH and H_2O), and at 788 and 724 cm^{-1} (selenite group). Single-crystal X-ray structure study (R = 0.042) showed the mineral to be triclinic, space group $P\bar{1}$; a = 8.146(12), b = 8.428(22), c = 9.241(22) Å, α = 62.32(21), β = 71.64(17), γ = 75.22(19)° as refined from a Gandolfi powder pattern (114 mm, Cu$K\alpha$ radiation) with strongest lines of 4.000(100,002), 3.818(55,201), 3.731(44,122), 3.258(75,$\bar{1}$21), 3.188(75,$\bar{2}$01), and 2.103(40). The new name is for mineralogist Paolo Orlandi (b. 1946) of the University of Pisa. Type material is in the Department of Earth Sciences at the Università degli Studi, Milan, Italy.

$Pb_4CuCl_3(SeO_3)_3(OH)$

The mineral occurs as lemon-yellow aggregates of platy crystals associated with chalcomenite and orlandiite. The plates, each up to 10 μm long and 2 μm thick, form aggregates 100 μm in diameter. Nonfluorescent, D_{calc} = 5.25 g/cm^3 for Z = 2, mean index of refraction 1.83. Electron microprobe analysis gave PbO 61.26, ZnO 1.75, CdO 1.44, CuO 4.29, FeO 0.40, Cl 8.41, SeO_2 24.84, SO_2 0.14, H_2O (calc.) 0.11, O ≡ Cl 1.88, sum 100.76 wt%, corresponding to $(Pb_{3.74}Cd_{0.15})_{\Sigma 3.89}(Cu_{0.73}Zn_{0.29}Fe_{0.08})_{\Sigma 1.10}Cl_3[(Se_{1.02}S_{0.01})_{\Sigma 1.03}O_3]_3(OH_{0.77}Cl_{0.23})$. The infrared spectrum shows sharp absorption bands at 3700–2900 cm^{-1} (OH), and at 810 and 738 cm^{-1} (selenite). Indexing of the X-ray powder pattern (diffractometer, Cu$K\alpha$ radiation) gave triclinic symmetry, a = 8.290(8), b = 10.588(13), c = 13.587(15) Å, α = 124.47(8), β = 110.60(9), γ = 63.26(9)°. Strongest lines are 11.100(76,001), 8.279(100,010), 7.344(70,100), 6.674 (80,110), and 5.788(65,101). Orlandiite and the associated minerals occur in the oxidation zone of the abandoned Baccu Locci mine near Villaputzu, southeastern Sardinia. The ore consisted of veins of galena and arsenopyrite, and the principal oxidation minerals are anglesite, azurite, brochantite, gypsum, and linarite. **J.L.J.**

Potassicferrisadanagaite*

A.G. Bazhenov, L.F. Bazhenova, T.V. Krinova, P.V. Khvorov (1999) Potassicferrisadanagaite $(K, Na)Ca_2(Fe^{2+}, Mg)_3(Fe^{3+}, Al)_2[Si_5Al_3O_{22}](OH)_2$—a new mineral species in the amphibole group (Ilmen Mountains, South Urals). Zapiski Vseross. Mineral. Obshch., 128(4), 50–55 (in Russian).

Wet-chemical analysis (1 of 4) gave SiO_2 33.24, TiO_2 1.58, Al_2O_3 18.25, Fe_2O_3 9.25, FeO 16.13, MnO 1.83, MgO 2.31, CaO 10.04, Na_2O 1.78, K_2O 3.20, F 0.80, H_2O^+ 1.30, O ≡ F 0.47, sum 99.38 wt%, corresponding for 24 (O, OH, F) to $(K_{0.65}Na_{0.27})_{\Sigma 0.92}(Ca_{1.72}Na_{0.28})_{\Sigma 2.00}(Fe^{2+}_{2.15}Mg_{0.55}Mn_{0.25})_{\Sigma 2.95}(Fe^{3+}_{1.11}Al_{0.75}Ti_{0.19})_{\Sigma 2.05}[Si_{5.31}Al_{2.69}O_{22}](OH_{1.39}F_{0.40}O_{0.21})_{\Sigma 2.00}$. Where fine-grained, the mineral shows the {110} prism and {001} pinacoid faces; where 0.3–0.5 mm (locally up to 2 cm across), it forms poikilitic crystals. Black color, grayish green streak, transparent only in the thin edges, vitreous luster, good {110} cleavage, uneven to conchoidal fracture, H = 5½–6, D_{meas} = 3.44, D_{calc} = 3.41 g/cm^3 for Z = 2. Optically biaxial negative, α = 1.696, γ = 1.715, $2V \approx 45°$; strong absorption and low birefringence hindered precise measurement of optical constants. $Y = b$, $c \wedge Z \approx 20°$. Pleochroism α = brownish yellow, β = brownish green, γ = bluish green, $Z > Y >> X$. Monoclinic, space group $C2/m$, a = 9.94(2), b = 18.08(3), c = 5.38(1) Å, β = 105.5(2)°. Strongest lines in the powder pattern (44 lines given, diffractometer, Fe$K\alpha$ radiation) are 8.44(90,110), 3.405 (25,131), 3.285(30,240), 3.145(100,310), 2.823(26,330), 2.722(52,151), 2.606(27,061), and 2.579(25,20$\bar{2}$)

The mineral is a rock-forming constituent of plagiosyenite, alkaline syenite, and in a few cases, nepheline syenite exposed along the eastern contact of the Ilmen Mountains Miaskite Massif in the southern Urals, Russia. It is associated with plagioclase (An_{26-34}), perthitic and cryptoperthitic alkali feldspar, nepheline, grossular-andradite, apatite, titanite, and allanite. The name is for the composition and relationship to sadanagaite. Type material is in the Natural Science Museum of the Ilmen State Reserve at Miass, and in the Fersman Mineralogical Museum, Moscow, Russia. **E.S.G.**

Zálesíite*

J. Sejkora, T. Řídkošil, V. Šrein (1999) Zálesíite, a new mineral of the mixite group, from Zálesí, Rychlebské hory Mts., Czech Republic. Neues Jahrb. Mineral. Abh., 175, 105–124.

Electron microprobe analysis gave CaO 5.46, CuO 46.46, Y_2O_3 1.50, Al_2O_3 0.26, La_2O_3 0.10, As_2O_5 34.27, P_2O_5 0.37, H_2O (TGA) 11.95, sum 100.37 wt%, corresponding to $(Ca_{0.81}Y_{0.13}Al_{0.05}La_{0.01})_{\Sigma 1.00}(Cu_{5.75}Ca_{0.15})_{\Sigma 5.90}[(AsO_4)_{1.94}(PO_4)_{0.05}(AsO_3OH)(OH)_6]\cdot 3.03H_2O$. The mineral forms aggregates, to 5 mm across, of semitransparent to transparent hexagonal crystals, up to 100 µm long and 10 µm wide, showing {100}, {001}, and twinning on {100}; also occurs as powdery coatings, cross-fiber veinlets, and tufts of acicular crystals. Pale green color, vitreous to resinous luster, white streak, $H = 2–3$, $D_{meas} = 3.49(3)$, $D_{calc} = 3.50$ g/cm^3 for $Z = 2$, nonfluorescent, slowly soluble in dilute HCl. Optically uniaxial positive, $\omega = 1.688(2)$, $\varepsilon = 1.765(2)$; weakly pleochroic, O = pale yellow-green, E = pale green, $E > O$. Indexing of the X-ray powder pattern, by analogy to other members of the mixite group, gave hexagonal symmetry, probable space group $P6_3/m$, $a = 13.571(1)$, $c = 5.880(1)$ Å; strongest lines (diffractometer, Cu$K\alpha$ radiation) are 11.64(100,100), 4.431(41,111,210), 3.254(22,130), 2.9347(42, 221,400), 2.6932(29,112,320,230), and 2.5624(30,140).

The mineral, which is the Ca- and As-dominant member of the mixite group, occurs as an oxidation product of chalcopyrite and Co arsenides at the Zálesí (formerly Valdek) uranium deposit near Javorník, northern Moravia, Czech Republic. Among the numerous associated minerals are chrysocolla, malachite, clinoclase, conichalcite, tyrolite, uranophane, and zeunerite. The new mineral name is for the locality. Type material is in the Natural History Museum, National Museum Prague, and in the Museum of the Bohemian Paradise, in Turnov, Czech Republic. **J.L.J.**

Pd_9PbO_{10}, $Pb_4V_2O_9$

A.Y. Barkov, T.A.A. Halkoaho, A.C. Roberts, A.J. Criddle, R.F. Martin, H. Papunen (1999) New Pd-Pb and Pb-V oxides from a bonanza-type PGE-rich, nearly BMS-free deposit in the Penikat layered complex, Finland. Can. Mineral., 37, 1507–1524.

Six listed electron microprobe analyses of a mineral occurring in subhedral to anhedral grains up to 0.3 mm across, and which seems to be a replacement of zvyagintsevite, average PdO 80.38, PbO 18.92, sum 99.30 wt%, corresponding to $Pd_{8.86}Pb_{1.14}O_{10}$, generalized either as Pd_9PbO_{10} or (Pd,Pb)O. In reflected light, the mineral is gray and shows no bireflectance or anisotropy. Reflectance percentages in air and in oil are given in 20 nm steps from 400 to 700 nm; representative values for R_1 and R_2 in air are 23.3, 23.8 (460 nm), 21.5, 22.1 (540), 21.2, 21.7 (560), 20.7, 21.3 (580), and 19.9, 20.4 (640). No indications of OH or H_2O groups are present in the infrared spectrum. The X-ray powder pattern has strongest lines at 2.69(100), 2.35(30), 2.04(10), 1.68(10), 1.55(10), 1.44(10), and 1.33 Å (10).

Also present is a veinlet, about 4 µm wide, for which one of the five listed analyses gave PbO 83.31, V_2O_5 16.16, sum 99.47 wt%, corresponding to $Pb_{4.11}V_{1.96}O_9$, possible equivalent to the synthetic compound $Pb_4V_2O_9$.

The oxide minerals occur in the Kirakkajuppura PGE deposit in the Penikat complex, and are concluded to be of hydrothermal origin. The principal PGM in the deposit are zvyagintsevite, vysotskite-braggite, and the Pd-Pb oxide. **J.L.J.**

β-Starkeyite

N.V. Zayakina, K.A. Lazebnik (1999) Tetrahydrate magnesium sulfate from western Yakutiya. Zapiski. Vseross. Mineral. Obshch., 128(4), 99–101 (in Russian).

Two wet-chemical analyses gave MgO 20.91, 20.51, SO_3 42.38, 41.73, H_2O 36, 38 (thermal analysis), sum 98.29, 100.24 wt%, corresponding to $Mg_{0.99}(SO_4)_{1.01}\cdot 3.89H_2O$ and $Mg_{1.01}(SO_4)_{0.99}\cdot 4.01H_2O$. Endothermic effects at 140 and 365 °C by DTA correspond to the greatest weight loss during heating. The mineral forms a nearly monomineralic friable aggregate with a pseudocolumnar texture and dull luster. White color, $H \approx 1–1\frac{1}{2}$, easily soluble in water, alcohol, and acids, $D_{meas} = 1.96$, $D_{calc} = 2.026$ g/cm^3 for $Z = 4$. Optically biaxial(?), $\alpha' = 1.470$, $\gamma' = 1.475$. No single-crystal data. Inferred to be triclinic, $a = 7.858(8)$, $b = 13.80(2)$, $c = 5.859(6)$ Å, $\alpha = 90.5$, $\beta = 92.9$, $\gamma = 93.0°$. Strongest lines in the powder pattern (56 lines given, Cu$K\alpha$ radiation) are 5.300(100,$\bar{1}20$), 4.622(69,030), 3.981(60,$\bar{1}21$) 3.930(88,200), 3.178(93,201), 3.126(62,$\bar{2}1\bar{1}$), 3.046(50,$\bar{2}21$), and 2.576(62,$12\bar{2}$)

The mineral was found at an unspecified locality in western Yakutiya, Russia. No details of the occurrence are available. Rare quartz and greenish brown mica are present in the mass. The specimen is housed in the Geological Museum of Yakutsk State University.

Discussion. The XRD pattern differs from that of synthetic starkeyite in PDF 24–720. The mineral is stable in air, but when ground it is converted to starkeyite. For this reason, it is provisionally called "β-starkeyite" because it is inferred to be a polymorphic, less stable form of $MgSO_4\cdot 4H_2O$. **E.S.G.**

Tetragonal $NaAlSi_3O_8$

P. Gillet, M. Chen, L. Dubrovinsky, A. El Goresy (2000) Natural $NaAlSi_3O_8$-hollandite in the shocked Sixiangkou meteorite. Science, 287, 1633–1636.

An analog of albite, $NaAlSi_3O_8$, is known as a high-pressure synthetic phase that has a hollandite-type structure. Black veins, 0.1 to 2 mm wide, which were formed by shock melting in the Sixiangkou chondrite, contain garnet, wüstite, ringwoodite, and zones of feldspathic composition ("maskelynite"). High-magnification SEM images of the feldspathic material revealed the presence of a network of typically submicrometer lamellae; Raman spectra showed the presence of broad peaks characteristic of $NaAlSi_3O_8$ glass, and sharp peaks corresponding to those of the hollandite-structure analog of feldspar. An X-ray microdiffraction pattern of a single grain, with maximum dimension ~60 µm, consists mainly of the hollandite-type mineral (14 lines listed) and a small amount of majorite garnet; strongest lines are at 6.5461(110), 4.6334(200), 2.9314(130), and 2.0315 Å (301). The diffraction pattern corresponds to that of a tetragonal hollandite structure with *a* = 9.263(3), *c* = 2.706(3), D_{calc} = 3.80 g/cm^3. Electron microprobe analysis of the material of feldspathic composition gave Na_2O 9.24, K_2O 1.46, CaO 2.20, MgO 0.34, FeO 0.75, Al_2O_3 21.65, SiO_2 65.21, sum 99.85 wt%, corresponding to $Na_{0.79}Ca_{0.10}K_{0.08}Fe_{0.03}Mg_{0.02}Si_{2.89}Al_{1.08}O_8$. **J.L.J.**

NEW DATA

Masuyite

P.C. Burns, J.M. Hanchar (1999) The structure of masuyite, $Pb[(UO_2)_3O_3(OH)_2](H_2O)_3$, and its relationship to protasite. Can. Mineral., 37, 1483–1491.

Single-crystal X-ray structure study (R = 0.063) of masuyite from the Shinkolobwe uranium mine, Shaba Province, Democratic Republic of Congo, gave monoclinic symmetry, space group *Pn*, *a* = 12.241(3), *b* = 7.008(2), *c* = 6.983(2) Å, β = 90.402(4)°, D_{calc} = 6.394 g/cm^3 for Z = 2. The formula corresponds to that of the Pb analog of protasite, but masuyite has an additional cation site in its structure. **J.L.J.**

Tadzhikite

E.P. Reguir, A.R. Chakhmouradian, M.D. Evdokimov (1999) The mineralogy of a unique baratovite- and miserite-bearing quartz–albite–aegirine rock from the Dara-I-Pioz complex, northern Tajikistan. Can. Mineral., 37, 1369–1384.

Tadzhikite occurs abundantly in fractures as optically uniform fibrous aggregates up to 150 µm across. Electron microprobe analyses indicated that the aggregates consist of two intricately intergrown variations, one rich in light REE, and the other rich in Y. If the general formula of tadzhikite is taken as $Ca_2(Ca,Y)_2(Ti,Fe^{3+})(REE,\square)[B_4Si_4O_{16}(O,OH)_6](OH)_2$ (*Am. Mineral.*, 84, p. 994, 1999), three of the five listed analyses show a large predominance of Ce in the position for REE. For the other two analyses, after filling $Ca_2(Ca,Y)_2$, the predominant ion in the REE position is Y. The analyses thus correspond to “tadzhikite-(Ce)” and “tadzhikite-(Y)”, although neither is an approved mineral name.

Discussion: The analyses also show both Ti > Fe^{3+} and Fe^{3+} > Ti for “tadzhikite-(Ce)”, and Fe^{3+} > Ti for “tadzhikite-(Y)”. Moreover, in the structure paper by Hawthorne et al. (*Can. Mineral.*, 36, 817–822, 1998), Y slightly exceeds Ca at the (Ca,Y) site. **J.L.J.**

ERRATA

In the abstract of jamesite (*Am. Mineral.*, 85, p. 266, 2000), the arsenate in the formula should read $(AsO_4)_4$. For choloalite (*Am. Mineral.*, 85, p. 629, 2000) the formula should read $CuPbTe_2^{2+}O_6$.