New Mineral Names*

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Artsmithite*

A.C. Roberts, M.A. Cooper, F.C. Hawthorne, R.A. Gault, J.D. Grice, A.J. Nikischer (2003) Artsmithite, a new Hg^{1+}–Al phosphate–hydroxide from the Funderburk prospect, Pike County, Arkansas, U.S.A. Can. Mineral., 41, 721–725.

Electron microprobe analysis gave Hg_2O 78.28, Al_2O_3 5.02, P_2O_5 11.39, H_2O (calc.) 1.63, sum 96.32 wt%, from which the structure-derived formula corresponds to $Hg_{4.00}^{1+}Al_{1.05}P_{1.71}$ $O_{8.74}H_{1.78}$, generalized as $Hg_4Al(PO_4)_{2-x}(OH)_{1+3x}$, where $x = 0.26$. The mineral occurs as a matted nest of randomly scattered fibres, elongate [001] and some >1 mm in length, with length:width >100:1. Colorless, to white in aggregates, transparent, vitreous luster, white to cream-colored streak, H not determinable, no cleavage, irregular fracture, nonfluorescent, $D_{calc} = 6.40$ g/cm³ for $Z = 4$. Optically biaxial positive, $n =$ >1.80, $2V_{meas} = {\sim}60°$, parallel extinction, length slow, $Z \approx c$. Single-crystal X-ray structure study indicated monoclinic symmetry, space group $C2/c$; $a = 17.007(7)$, $b = 9.070(4)$, $c = 7.013(5)$ Å, $\beta = 101.30(5)°$ as refined from an X-ray powder pattern (114 mm Debye–Scherrer, Cu$K\alpha$ radiation) with strongest lines of 8.326(100,200), 4.739(50,310), 2.979(80,202), 2.952(50,$\bar{4}$02), 2.784(80,600), 2.660(75,330), and 1.755 (50,640,$\bar{2}$04).

The mineral is a weathering product associated with quartz, goethite, dickite, and cinnabar; the Hg was likely derived from cinnabar, and the P from fluorapatite, both of which occur in the host sandstone or quartzite at the prospect, which is approximately 13 km north of Murfreesboro, Pike County, Arkansas. The new mineral name is for Arthur E. Smith (b. 1935) of Houston, Texas, who collected the holotype specimen, now housed in the National Mineral Collection at the Geological Survey of Canada, Ottawa. **J.L.J.**

Clinobarylite*

N.V. Chukhanov, I.V. Pekov, R.K. Rastsvetaeva, G.V. Chilov, A.E. Zadov (2003) Clinobarylite, $BaBe_2Si_2O_7$, a new mineral from the Khibiny massif, Kola Peninsula. Zap. Vseross. Mineral. Obshch., 132(1), 29–37 (in Russian, English abs.).

The mineral, as is indicated by the name, is a non-orthogonal dimorph of (orthorhombic) barylite. Electron microprobe

analysis gave BaO 47.66, SiO_2 36.38, BeO (by AA) 14.90, sum 98.94 wt%, corresponding to $Ba_{1.03}Be_{1.97}Si_{2.00}O_{7.00}$. The mineral forms radial aggregates and platy to prismatic crystals that are elongate [001] and up to $1 \times 4 \times 20$ mm, typically flattened on {100} or less commonly on {010}. Observed forms are {100}, {010}, {201}, and {$\bar{2}$01}, with less common {610}, {101}, and {$\bar{1}$01}. Colorless, transparent, vitreous luster, brittle, $H = 6½$, perfect {100} and less perfect {001} and {101} cleavages, $D_{meas} = 3.97(7)$, $D_{calc} = 4.05$ g/cm³ for $Z = 2$. Optically biaxial positive, $\alpha = 1.698(3)$, $\beta = 1.700(3)$, $\gamma = 1.705(5)$, $2V_{meas}$ $= 70(10)$, $2V_{calc} = 65°$, orientation $Z = b$, $X \wedge a = 6°$, $Y \wedge c = 5$–6°. Single-crystal X-ray structure study ($R = 0.052$) indicated monoclinic symmetry, space group Pm, $a = 11.618(3)$, $b = 4.904(1)$, $c = 4.655(1)$ Å, $\beta = 89.94(2)°$. Strongest lines of the X-ray powder pattern (diffractometer, Fe$K\alpha$ radiation) are $3.389(84,011)$, $3.249(45,111,11\bar{1})$, $3.043(40,310)$, $2.926(55,211,21\bar{1})$, $2.458(100,020)$, and $2.335(48,002)$.

The mineral occurs with natrolite, aegirine, microcline, catapleiite, fluorapatite, titanite, fluorite, annite, astrophyllite, and others in alkaline pegmatite veins at Yukspor Mountain, southern part of the Khibiny alkaline massif, Kola Peninsula, Russia. Type material is in the Fersman Mineralogical Museum, Moscow, Russia. **J.L.J.**

Eveslogite*

Yu.P. Menshikov, A.P. Khomaykov, G. Ferraris, E. Belluso, A. Gula, E.A. Kulchitskaya (2003) Eveslogite, $(Ca,K,Na,Sr,Ba)_{48}$ $[(Ti,Nb,Fe,Mn)_{12}(OH)_{12}Si_{48}O_{144}](F,OH,Cl)_{14}$, a new mineral from the Khibiny alkaline massif, Kola Peninsula, Russia. Zap. Vseross. Mineral. Obshch., 132(1), 59–67 (in Russian, English abs.).

The mineral occurs as fibrous grains, up to 0.05 mm across and 5 cm long, that form plicated aggregates. Light brown or yellow-brown color, vitreous to silky luster, white streak, brittle, splintery fracture, $H = 5$, perfect {001} and {010} cleavages, $D_{meas} = 2.85$, $D_{calc} = 2.93$ g/cm³ for the empirical formula and $Z = 4$, insoluble in HCl and HNO_3 at room temperature. Optically biaxial negative, $\alpha = 1.631(2)$, $\beta = 1.641(2)$, $\gamma = 1.647(2)$, $2V_{calc} = 82°$, $a = X$, $c = Y$, $b \wedge Z = 5°$ in obtuse γ, pleochroism Y and $Z =$ pale yellow, $X =$ colorless. Wet chemical analysis gave Na_2O 4.59, K_2O 8.53, Rb_2O 0.20, CaO 18.60, SrO 2.75, BaO 2.84, MnO 1.00, FeO 0.88, Fe_2O_3 0.23, Al_2O_3 0.32, SiO_2 41.96, TiO_2 6.52, ZrO_2 0.35, Nb_2O_5 6.56, Ta_2O_5 0.25, H_2O 2.85, F 2.72, Cl (electron microprobe) 0.42, O ≡ F,Cl 1.24, sum 100.33 wt%, which for Si + Al = 48 corresponds to $(Ca_{22.60}K_{12.32}Na_{10.08}$ $Sr_{1.80}Ba_{1.28}Rb_{0.16})_{\Sigma48.24}(Ti_{5.56}Nb_{3.36}Mn_{0.96}Fe_{0.84}^{2+}Fe_{0.20}^{3+}Zr_{0.20}Ta_{0.08})_{\Sigma11.20}$ $(Si_{47.56}Al_{0.44})_{\Sigma48}[O_{139.36}(OH)_{20.64}F_{9.76}Cl_{0.80}]_{\Sigma170.56}$, simplified as in the title. The presence of OH–H_2O is evident in the IR spec-

trum. Electron diffraction patterns and indexing of the powder pattern (diffractometer, $CuK\alpha$ radiation) indicated monoclinic symmetry, possible space group $P2/m$, $a = 14.069(3)$, $b = 24.937(5)$, $c = 44.31(2)$ Å, $\gamma = 95.02(4)°$; strongest lines are 12.33(51,020), 6.199(42,040), 3.127(65,$\overline{4}$26), 3.110(52,$\overline{3}$64), 2.990(59,2.3.12), 2.940(45,$\overline{2}$4.1.2), and 2.835(100,428). The structure is astrophyllite-like.

The mineral is associated with nepheline, K-feldspar, biotite, fluorapatite, shcherbakovite, eudialyte, and astrophyllite in a veinlet that cuts nepheline syenite at Mt. Eveslogchorr, Khibiny alkaline massif, Kola Peninsula, Russia. The new mineral name alludes to the locality. Type material is in the Fersman Mineralogical Museum, Moscow, Russia. **J.L.J.**

GLAGOLEVITE*

M.V. Seredkin, N.I. Organova, S.V. Krivovichev, T. Armbruster, M.M. Moiseev, N.V. Chukanov, V.M. Chukanova, P.C. Burns, I.M. Marsiy, B.B. Zvyagin, N.N. Kononkova, A.V. Sivtsov (2003) Glagolevite, $NaMg_6[Si_3AlO_{10}](OH,O)_8 \cdot H_2O$, a new mineral. Zap. Vseross. Mineral. Obshch., 132(1), 67–75 (in Russian, English abs.).

Electron microprobe analysis gave Na_2O 3.94, MgO 37.23, FeO 0.38, MnO 0.11, Al_2O_3 13.36, SiO_2 29.24, H_2O (TGA) 14.5, sum 98.76 wt%, corresponding to $Na_{0.75}(Mg_{5.50}Fe_{0.03}Mn_{0.01}Al_{0.46})_{\Sigma6.00}(Si_{2.90}Al_{1.10})_{\Sigma4.00}O_{10}(OH_{7.88}O_{0.12})_{\Sigma8.00} \cdot 0.85H_2O$ for Mg + Fe + Mn + Al + Si = 10, ideally $NaMg_6Si_3AlO_{10}(OH)_8 \cdot H_2O$. The mineral occurs as poikilitic grains up to 3 cm, wherein the inclusions are of vesuvianite. Colorless, transparent, vitreous to pearly luster, indistinct to stepped fracture, perfect {001} cleavage, flexible plates, $H = 3–5$, $D_{meas} = 2.66$, $D_{calc} = 2.61$ g/cm^3 for the empirical formula, partly soluble in 10% HCl at room temperature; the IR spectrum differs from that of clinochlore. Optically biaxial positive, α and β similar at about 1.569(2), $\gamma = 1.571(2)$, $2V_{meas} = 17(3)°$, dispersion not observed, $Z \approx c$. Single-crystal X-ray structure study ($R = 0.117$) indicated triclinic symmetry, space group $C1$, $a = 5.354$, $b = 9.263$, $c = 14.653$ Å, $\alpha = 89.86$, $\beta = 96.844$, $\gamma = 90.03°$. Strongest lines of the powder pattern (Guinier camera, $CuK\alpha$ radiation) are 7.266(30,002), 4.629(30,020,1$\overline{1}$0, 110), 2.992(40,11$\overline{4}$), 2.597(60,131,20$\overline{2}$,1$\overline{3}$1), 2.556(100,201,1$\overline{3}$2,13$\overline{2}$), 2.457(50,132,1$\overline{3}$2,20$\overline{3}$), and 1.544(100,3$\overline{3}$1,33$\overline{1}$,060). The structure is similar to that of chlorite but differs in the presence of Na and disorder of the silicate layers relative to those of the brucite layers.

The mineral is associated with pectolite, monticellite, diopside, phlogopite, andradite, calcite, olivine, magnetite, and vesuvianite in a phlogopite deposit within the Kovdor massif, Kola Peninsula, Russia. The new mineral name is for Russian mineralogist A.A. Glagolev. Type material is in the Fersman Mineralogical Museum, Moscow, Russia. **J.L.J.**

KOCHITE*

C.C. Christiansen, R.A. Gault, J.D. Grice, O. Johnsen (2003) Kochite, a new member of the rosenbuschite group from the Werner Bjerge alkaline complex, East Greenland. Eur. J. Mineral., 15, 551–554.

The mineral occurs as brownish, lath-shaped to acicular grains, elongate [010], in parallel to subparallel aggregates up to 0.3 × 1.0 mm. Electron microprobe analysis gave Na_2O 10.33, CaO 21.39, SrO 0.12, MgO 0.01, MnO 4.92, FeO 1.08, Al_2O_3 0.05, V_2O_3 0.03, Y_2O_3 0.39, La_2O_3 0.25, Ce_2O_3 0.57, SiO_2 31.55, TiO_2 8.44, ZrO_2 12.12, HfO_2 0.09, Nb_2O_5 1.86, Ta_2O_5 0.02, F 6.83, O ≡ F 2.88, sum 97.71 wt%, corresponding to $(Na_{1.70}Sr_{0.02})_{\Sigma1.72}(Na_{2.77}Ca_{1.23})_{\Sigma4.00}(Ca_{3.40}Na_{0.60})_{\Sigma4.00}(Mn_{1.06}Ca_{0.82}Y_{0.05}Ce_{0.05}La_{0.02})_{\Sigma2.00}(Zr_{1.40}Fe_{0.23}Ca_{0.36}Hf_{0.01})_{\Sigma2.00}(Ti_{1.61}Nb_{0.21}Zr_{0.10}Al_{0.05}V_{0.03})_{\Sigma2.00}(Si_2O_7)_4F_4(O_{2.39}F_{1.48})_{\Sigma3.87}$, ideally $Na_2(Na,Ca)_4Ca_4(Mn,Ca)_2Zr_2Ti_2(Si_2O_7)_4(O,F)_4F_4$. Transparent, vitreous luster, brittle, $H = 5$, perfect {100} cleavage, uneven fracture, $D_{meas} = 3.32(1)$, $D_{calc} = 3.31$ g/cm^3 for $Z = 1$. Optically biaxial positive, $\alpha = 1.684(2)$, $\beta = 1.695(4)$, $\gamma = 1.718(2)$, $2V_{meas} = 73(2)$, $2V_{calc} = 70°$, orientation $X = c$, $Z \wedge [100] = \sim20°$, weak pleochroism, X = colorless, Z = pale yellow. Single-crystal X-ray structure study ($R = 0.04$) indicated triclinic symmetry, space group $P\overline{1}$, $a = 10.032(2)$, $b = 11.333(2)$, $c = 7.202(1)$ Å, $\alpha = 90.192(4)$, $\beta = 100.334(5)$, $\gamma = 111.551(4)°$. Strongest lines of the X-ray powder pattern (114 mm Gandolfi, $CuK\alpha$ radiation) are 3.028(60,211), 2.908(100,1$\overline{2}$2, 2$\overline{2}$2), 2.600(80,040), 1.868(60,4$\overline{2}$2,5$\overline{2}$2), and 1.670(50,340).

The mineral, which is the Ti, Mn analog of rosenbuschite, is associated with nepheline, alkali feldspar, and låvenite at Hvide Ryg, a mountain of nepheline syenite in the Werner Bjerge range along the eastern coast of Greenland. The new mineral name is for Danish geologist Lauge Koch (1892–1964), who mapped Werner Bjerge. Type material is in the Geological Museum, University of Copenhagen, Denmark. **J.L.J.**

SAILAUFITE*

M. Wildner, E. Tillmanns, M. Andrut, J. Lorenz (2003) Sailaufite, $(Ca,Na,\square)_2Mn_3O_2(AsO_4)_2(CO_3) \cdot 3H_2O$, a new mineral from Hartkoppe hill, Ober-Sailof (Spessart Mountains, Germany), and its relationship to mitridatite-group minerals and pararobertsite. Eur. J. Mineral., 15, 555–564.

The mineral occurs as tightly intergrown, dark red-brown to black, tabular crystals, commonly mammilary, with the aggregates typically <0.5 mm. Electron microprobe analysis gave Na_2O 1.76, CaO 11.80, Mn_2O_3 38.20, As_2O_5 34.92, sum 86.68 wt%, corresponding to $(Ca_{1.35}Na_{0.42}\square_x)Mn_{2.84}As_{2.13}O_{10}(CO_3) \cdot 3H_2O$, ideally $CaNaMn_3O_2(AsO_4)_2(CO_3) \cdot 3H_2O$. The presence of CO_3 groups and H_2O was confirmed by IR and Raman spectroscopy, and by the crystal-structure determination. Vitreous luster, brown streak, $H = 3½$, brittle, uneven to conchoidal fracture, perfect {001} cleavage, nonfluorescent, slowly soluble in HCl, $D_{calc} = 3.356$ g/cm^3 for $Z = 6$. Optically biaxial negative, $\alpha = 1.757(5)$, β and γ = >1.8 (616 nm), $2V_{meas} = 32(3)°$, orientation $X = \sim c^*$, $Y = b$, $Z = \sim a$. Single-crystal X-ray structure study ($R_1 = 0.045$) indicated monoclinic symmetry, space group Cm; $a = 11.267(2)$, $b = 19.717(3)$, $c = 8.949(1)$ Å, $\beta = 100.22(1)°$ as refined from a powder pattern (diffractometer, $CuK\alpha$ radiation) with strongest lines of 8.7856(100,001), 5.6524(27,130), 2.9342(75,003), 2.7702(36,400), and 2.2016(55,004). The structure is closely related to that of mitridatite.

The mineral occurs as a late-stage hydrothermal product associated with hausmannite, arseniosiderite, kutnohorite, dolomite, quartz, and calcite in veins of Mn ore in a rhyolite at

Hartkoppe hill, north of Ober-Sailauf, northwestern Bavaria, Germany. Another occurrence is with manganlotharmeyerite, tilasite, and calcite in veinlets within massive braunite ore at the Starlera deposit in the Eastern Alps of Switzerland. The new mineral name refers to the type locality. Type material is in the Institut für Mineralogie und Kristallographie der Universität Wien, Vienna, Austria. **J.L.J.**

SHIROKSHINITE*

I.V. Pekov, N.V. Chukanov, G. Ferraris, G. Ivaldi, D.Yu. Pushcharovsky, A.E. Zadov (2003) Shirokshinite, $K(NaMg_2)Si_4O_{10}F_2$, a new mica with octahedral Na from Khibiny massif, Kola Peninsula: descriptive data and structural disorder. Eur. J. Mineral., 15, 447–454.

The mineral, ideally $K(NaMg_2)Si_4O_{10}F_2$, is the Na-dominant analog of tainiolite, $K(LiMg_2)Si_4O_{10}F_2$. Electron microprobe analysis gave K_2O 10.18, Na_2O 7.01, MgO 19.17, MnO 0.23, FeO 1.54, Al_2O_3 0.24, TiO_2 0.16, SiO_2 57.64, F 9.19, O ≡ F 3.87, sum 101.49 wt%, corresponding to $(K_{0.90}Na_{0.02})_{\Sigma0.92}$ $(Na_{0.92}Mg_{1.97}Fe_{0.09}Mn_{0.01}Ti_{0.01})_{\Sigma3.00}(Si_{3.98}Al_{0.02})_{\Sigma4.00}O_{9.995}F_{2.01}$. The IR spectrum confirms the absence of OH. Crystals are hexagonal [001] prismatic, typically skeletal, up to $0.8 \times 1 \times 2.5$ mm, and grouped in sheaflike clusters up to 2.5 mm. Colorless to pale gray, or with a greenish tint, transparent to translucent, white streak, vitreous to pearly luster, perfect {001} cleavage, flexible but not elastic, $H = 2\frac{1}{2}$, probable forms {010}, {110}, and {001}, nonfluorescent, $D_{calc} = 2.922$ g/cm³ for $Z = 2$. Optically biaxial negative, $\alpha = 1.526(1)$, $\beta = 1.553(2)$, $\gamma = 1.553(2)$, $2V_{meas} = -5(5)°$, $2V_{calc} = 0°$, $Y = b$, $Z = \sim a$, $X \wedge c = 3(2)°$. Single-crystal X-ray structure study ($R = 0.13$) indicated monoclinic symmetry, space group $C2/m$, polytype $1M$, $a = 5.269(2)$, $b = 9.071(2)$, $c = 10.178(4)$ Å, $\beta = 100.03(3)°$. Strongest lines of the powder pattern (57 mm Debye–Scherrer, Fe$K\alpha$ radiation) are 10.0(70,001), 3.67(60,11$\bar{2}$), 3.36(90,022,003), 2.41(100,201,13$\bar{2}$), 2.14(60,202,13$\bar{3}$), 1.665(80,204,13$\bar{5}$), 1.522(100,20$\bar{6}$,135,33$\bar{1}$,060), and 1.359(60,20$\bar{7}$,136,046).

The mineral occurs on microcline and kupletskite crystals in cavities within a hyperalkaline pegmatite also containing aegirine, natrolite, lorenzenite, calcite, remondite-(Ce), donnayite-(Y), mckelveyite-(Y), and galena. The pegmatite is at the underground Kirovskii apatite mine, Kukisvumchorr Mountain, Khibiny alkaline massif, Kola Peninsula, Russia. The new mineral name is for Russian geologist Nikolay V. Shirokshin (b. 1809), who in 1835 published the first geological data for the Khibiny massif. Type material is in the Fersman Mineralogical Museum, Moscow, Russia. **J.L.J.**

(CA,CE)SC(TI,FE,AL)$_{20}$O$_{38}$

C. Canet, P. Alfonso, J.-C. Melgarejo, S. Jorge (2003) V-rich minerals in contact-metamorphosed Silurian sedex deposits in the Poblet area, southwestern Catalonia, Spain. Can. Mineral., 41, 561–579.

One of five listed electron microprobe analyses has TiO_2 60.40, Al_2O_3 2.18, Sc_2O_3 3.52, Cr_2O_3 1.50, V_2O_3 20.35, Fe_2O_3 6.47, MnO 0.60, MgO 0.41, CaO 2.56, Ce_2O_3 0.47, Na_2O 0.03, sum 98.49 wt%, corresponding to $(Ca_{0.77}Ce_{0.05}Na_{0.02})_{\Sigma0.84}$

$Sc_{0.86}(Ti_{12.78}V_{4.59}Fe^{3+}_{1.52}Al_{0.72}Cr_{0.33}Mg_{0.17}Mn_{0.14})_{\Sigma20.25}O_{38}$, suggested to be close to the general formula of the crichtonite group. In reflected light, low reflectance similar to that of sphalerite, with a brownish hue. The mineral is common throughout the deposit, occurring as roughly subhedral tabular crystals <100 μm across in anorthite-rich metapelitic hornfels containing goldmanite, coulsonite, and other minerals rich in Ti, V, and Cr. **J.L.J.**

K, TI ANALOG OF ILÍMAUSSITE-(CE)

S.V. Krivovichev, V.N. Yakovenchuk, T. Armbruster, Y.A. Pakhomovskiy, W. Depmeir (2003) Crystal structure of the K, Ti analogue of ilímaussite-(Ce),$(Ba,K,Na,Ca)_{11–12}$ $(REE,Fe,Th)_4(Ti,Nb)_6(Si_6O_{18})_4(OH)_{12}\cdot4.5H_2O$: revision of structure model and structural formula. Z. Kristallogr., 218, 392–396.

Single-crystal X-ray structure study ($R_1 = 0.077$) of the mineral, from Yukspor Mountain, Khibiny massif, Kola Peninsula, Russia, gave rhombohedral symmetry, space group $R32$, $a = 10.708(2)$, $c = 60.073(11)$ Å, and the newly derived formula given in the title.

Discussion. The revision refers to the crystal structure presented in *Doklady Chemistry*, 388, 9–13, 2003. The full description of the new mineral has not yet been published, but the data refer to mineral IMA No. 2002–043. **J.L.J.**

NEW DATA

ALACRANITE

P. Bonazzi, L. Bindi, F. Olmi, S. Menchetti (2003) How many alacranites do exist? A structural study of non-stoichiometric $As_8S_{9–x}$ crystals. Eur. J. Mineral., 15, 283–288.

Compositional and X-ray data, including single-crystal structure studies, indicate that alacranite corresponds to As_8S_9, monoclinic, space group $P2/c$, whereas the high-temperature form corresponds to As_4S_4, has a smaller cell volume, and crystallizes with the space group $C2/c$. The As_8S_9 ($P2/c$) mineral is concluded to be alacranite, *sensu stricto*, whereas the As_4S_4 mineral (*Am. Mineral.*, 87, p. 357, 2002) is considered to be a new species. **J.L.J.**

ARSENIOPLEITE

K.T. Tait, F.C. Hawthorne (2003) Refinement of the crystal structure of arseniopleite: confirmation of its status as a valid species. Can. Mineral., 41, 71–77.

Electron microprobe analysis and single-crystal X-ray structure study ($R = 0.023$) of a specimen of arseniopleite from the originally described material (Sjö mine, Örebro, Sweden) gave monoclinic symmetry, space group $I2/a$, $a = 6.8113(6)$, $b = 13.0358(11)$, $c = 11.3245(10)$ Å, $\beta = 100.25(3)°$, formula $(Ca_{0.68}Na_{0.32})_{\Sigma1.00}(Na_{0.32}Pb^{2+}_{0.06}Ba_{0.01})_{\Sigma0.39}Mn^{2+}(Mn^{2+}_{1.21}Mg_{0.52}Fe^{3+}_{0.27})_{\Sigma2.00}$ $(As_{2.98}P_{0.02})O_{12}$. The end-member formula for arseniopleite corresponds to $CaNaMn^{2+}Mn^{2+}_2As_3O_{12}$ whereas that of caryinite is $CaNaCaMn^{2+}_2As_3O_{12}$. **J.L.J.**

ASTROPHYLLITE GROUP

P.C. Piilonen, A.E. Lalonde, A.M. McDonald, R.A. Gault, A.O. Larsen (2003) Insights into astrophyllite-group minerals. 1. Nomenclature, composition and development of a standardized general formula. Can. Mineral., 41, 1–26.

P.C. Piilonen, A.M. McDonald, A.E. Lalonde (2003) Insights into astrophyllite-group minerals. II. Crystal chemistry. Can. Mineral., 41, 27–54.

The compositions of 135 samples of astrophyllite-group minerals from 15 localities, and single-crystal X-ray structure refinements of 20 crystals from various localities, indicate a general formula $A_2BC_7D_2T_8O_{26}(OH)_4X_{0-1}$, where A = K, Rb, Cs, H_3O, H_2O, Na, or □; B = Na or Ca; C = Mn, Fe^{2+}, Fe^{3+}, Na, Mg, or Zn; D = Ti, Nb, or Zr; T = Si or Al; X= F, OH, O or □. Mössbauer spectroscopy indicated that Fe^{2+} is by far the dominant state for Fe. The group is divided into the astrophyllite subgroup (Fe > Mn) and the kupletskite subgroup (Mn > Fe) as shown in Table 1. The single-crystal X-ray refinements gave similar triclinic unit cells, space group $P\bar{1}$, for astrophyllite, kupletskite, and niobokupletskite, but one specimen of kupletskite, from Lepke-Nelm, Lovozero massif, Russia, gave a monoclinic cell, space group $C2/c$ (*Am. Mineral.*, 87, p. 768, 2002). **J.L.J.**

TABLE 1. Formulas for astrophyllite-group minerals

Astrophyllite subgroup	
astrophyllite	$K_2Na(Fe^{2+},Mn)_7Ti_2Si_8O_{26}(OH)_4F$
magnesium astrophyllite	$K_2Na[Na(Fe,Mn)_4Mg_2]\Sigma_7Ti_2Si_8O_{26}(OH)_4\square$
niobophyllite	$K_2Na(Fe^{2+},Mn)_7(Nb,Ti)_2Si_8O_{26}(OH)_4(F,O)$
zircophyllite	$K_2(Na,Ca)(Mn,Fe^{2+})_7(Zr,Nb)_2Si_8O_{26}(OH)_4F$
Fe-dominant analog of zircophyllite*	$K_2(Na,Ca)(Fe^{2+},Mn)_7(Zr,Nb)_2Si_8O_{26}(OH)_4F$
hydroastrophyllite	$(H_3O,K)_2Ca(Fe^{2+},Mn)_{5-6}Ti_2Si_8O_{26}(OH)_4F$
Kupletskite subgroup	
kupletskite	$K_2Na(Mn,Fe^{2+})_7(Ti,Nb)_2Si_8O_{26}(OH)_4F$
niobokupletskite	$K_2Na(Mn,Fe^{2+})_7(Nb,Zr,Ti)_2Si_8O_{26}(OH)_4(O,F)$
cesium kupletskite	$(Cs,K)_2Na(Mn,Fe,Li)_7(Ti,Nb)_2Si_8O_{26}(OH)_4F$

* Unnamed, but one of the compositions plots well into the field for this mineral.

BERGENITE

A.J. Locock, P.C. Burns (2003) The crystal structure of bergenite, a new geometrical isomer of the phosphuranylite group. Can. Mineral., 41, 91–101.

Single-crystal X-ray structure study ($R_1 = 0.05$) of bergenite from the type locality in Germany gave monoclinic symmetry, space group $P2_1/c$, $a = 10.092(1)$, $b = 17.245(2)$, $c = 17.355(2)$ Å, $\beta = 113.678(2)°$, $D_{calc} = 4.82$ g/cm³ for $Z = 2$ and the formula $Ca_2Ba_4[(UO_3)_2O_2(PO_4)_2]_3(H_2O)_{16}$. The unit cell and formula are new. **J.L.J.**

EUDIALYTE GROUP

O. Johnsen, G. Ferraris, R.A. Gault, J.D. Grice, A.R. Kampf, I.V. Pekov (2003) The nomenclature of the eudialyte-group minerals. Can. Mineral., 41, 785–794.

Minerals in the eudialyte group are trigonal, $a \approx 14$, $c \approx 30$ Å (rarely 60 Å), and have the space groups $R\bar{3}m$, $R3m$, and $R3$. The general formula is $[N(1)N(2)N(3)N(4)N(5)]_3[M(1a)M(1b)]_3 M(2)_3M(3)M(4)Z_3[Si_{24}O_{72}]O'_4X_2$, wherein X = Cl, F, OH, or CO_3. The principle that any new element prevalent in any site gives rise to an independent species has been adhered to, except for X. Thus, as pointed out by the authors, who constituted the Eudialyte Nomenclature Subcommittee established by the CNMMN, thousands of minerals species in the eudialyte group are theoretically possible. The CNMMN has approved the conventional unique-name system for the group, and nine new mineral names, approved by the CNMMN but for which descriptions have not yet been published, are given in the paper. **J.L.J.**

SIMMONSITE

K.C. Ross, R.H. Mitchell, A.R. Chakhmouradian (2003) The crystal structure of synthetic simmonsite, Na_2LiAlF_6. J. Solid State Chem., 172, 95–101.

Rietveld refinement of X-ray data ($R_{Bragg} = 0.0315$) for synthetic simmonsite gave a monoclinic cell with $a = 5.2842(1)$, $b = 5.3698(1)$, $c = 7.5063(2)$ Å, $\beta = 89.98(1)°$. Comparison of data for the natural and synthetic analogs indicates that they have the space group $P2_1/n$. **J.L.J.**

TORBERNITE, ZEUNERITE, METATORBERNITE, METAZEUNERITE

A.J. Locock, P.C. Burns (2003) Crystal structures and synthesis of the copper-dominant members of the autunite and meta-autunite groups: torbernite, zeunerite, metatorbernite and metazeunerite. Can. Mineral., 41, 489–502.

Single-crystal X-ray structure study of synthetic torbernite ($R_1 = 0.037$), $Cu[(UO_2)(PO_4)]_2(H_2O)_{12}$, and for zeunerite ($R_1 = 0.036$), $Cu[(UO_2)(PO_4)]_2(H_2O)_{12}$, indicated that both are tetragonal, space group $P4/nnc$, with respective cell dimensions a 7.0267(4), 7.71797(3), $c = 20.807(2)$, 20.857(1) Å. Metatorbernite ($R_1 = 0.034$), $Cu[(UO_2) (PO_4)]_2(H_2O)_8$, and metazeunerite ($R_1 = 0.031$), $Cu[(UO_2)(AsO_4)]_2(H_2O)_8$, are tetragonal, space group $P4/n$, $a = 6.9756(5)$, 7.1094(1), $c = 17.349(2)$, 17.416(1) Å. The data resolve previous uncertainties about unit cells and the space-group assignments. **J.L.J.**

URANOSPHAERITE

K.-A. Hughes, P.C. Burns, U. Kolitsch (2003) The crystal structure and crystal chemistry of uranosphaerite, $Bi(UO_2)O_2OH$. Can. Mineral., 41, 677–685.

Single-crystal X-ray structure study ($R_1 = 0.0286$) of uranosphaerite from the Clara mine, Black Forest, Germany, gave monoclinic symmetry, space group $P2_1/n$, $a = 7.559(2)$, $b = 7.811(2)$, $c = 7.693(2)$ Å, $\beta = 92.88(3)°$, $D_{calc} = 7.731$ for $Z = 4$. Similar results were obtained from a synthesized crystal; the derived formula is $Bi(UO_2)O_2(OH)$, which differs from that commonly reported. **J.L.J.**

YUKSPORITE

Yu.P. Menshikov, A.P. Khomyakov, G. Ferraris, E. Belluso, A. Gula, E.A. Kulchitskaya (2003) Eveslogite, $(Ca,K,Na,Sr,Ba)_{48}[(Ti,Nb,Fe,Mn)_{12}(OH)_{12}Si_{48}O_{144}](F,OH,Cl)_{14}$, a new mineral from the Khibiny alkaline massif, Kola Peninsula Russia. Zap. Vseross. Mineral. Obshch., 132(1), 59–67 (in Russian, English abs.).

Electron diffraction patterns of yuksporite showed the mineral to be triclinic, $P\bar{1}$, rather than orthorhombic (*Am. Mineral.*, 71, 1547–1548, 1986); $a = 16.50(5)$, $b = 25.21(4)$, $c = 21.11(3)$ Å, $\alpha = 100.4(3)$, $\beta = 110.0(4)$, $\gamma = 90.4(1)°$, $Z = 2$. The strongest lines of the powder pattern (Murum massif) are $6.219(55,0\bar{4}1)$, $3.104(90,080,4\bar{4}\bar{4})$, $2.999(90,37\bar{3},3\bar{7}1)$, $2.915(70,37\bar{1},3\bar{3}6)$, and $2.796(100,37\bar{5})$. The published chemical data are reinterpreted as corresponding to $(K,Na)_{12}(Ca,Na,Sr,Ba)_{40}[(Ti,Fe)_{12}(OH)_{18}Si_{48}O_{144}](OH,F,Cl)_{16}$. **J.L.J.**

ZIPPEITE GROUP

P.C. Burns, K.M. Deely, L.A. Hayden (2003) The crystal chemistry of the zippeite group. Can. Mineral., 41, 687–706.

Single-crystal X-ray structure study ($R_1 = 0.0330$) of synthetic zippeite gave monoclinic symmetry, space group $C2$, $a = 8.7524(4)$, $b = 13.9197(7)$, $c = 17.6972(8)$ Å, $\beta = 104.178(1)°$, $Z = 4$; the results, and a re-interpretation of previous structure data (*Am. Mineral.*, 81, p. 770, 1996), yield a formula revised to $K_3(H_2O)_3(UO_2)_4(SO_4)_2O_3(OH)$. Synthetic sodium-zippeite ($R_1 = 0.0688$) is monoclinic, $P2_1/n$, $a = 17.6425(11)$, $b = 14.6272(9)$, $c = 17.6922(11)$ Å, $\beta = 104.461(1)°$, $Z = 4$, and corresponds to $Na_5(H_2O)_{12}(UO_2)_8(SO_4)_4O_5(OH)_3$. Synthetic magnesium-zippeite ($R_1 = 0.0239$), zinc-zippeite ($R_1 = 0.0457$) and cobalt-zippeite ($R_1 = 0.0555$) are monoclinic, space group $C2/m$, approximate $a = 8.65$, $b = 14.2$, $c = 17.7$ Å, $\beta = 104.1°$, $Z = 8$, and correspond to $M(H_2O)_{3.5}(UO_2)_2(SO_4)O_2$ in which M is Mg, Co, and Zn, respectively. **J.L.J.**

ERRATA

In the abstracts for calcioburbankite and lovozerite (*Am. Mineral.*, 88, p. 934), the page numbers given as 1009–1013 for calcioburbankite and 1019–1029 for lovozerite incorrectly refer to the original Russian publication (*Kristallografiya*) and should be changed to read 929–937 and 937–941, respectively, for the journal cited in the abstracts. We thank J. Ferraiolo for pointing out the error. **J.L.J.**