

NEW MINERAL NAMES

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Biehlite*

J. Schlüter, K.-H. Klaska, G. Adiwidjaja, K. Friese, G. Gebhard (2000) Biehlite, (Sb,As)₂MoO₆, a new mineral from Tsumeb, Namibia. *Neues Jahrb. Mineral. Mon.*, 234–240.

Electron microprobe analysis gave Sb₂O₃ 60.99, MoO₃ 33.76, As₂O₃ 4.95, sum 99.70 wt%, corresponding to (Sb_{1.79}³⁺,As_{0.21})Mo_{1.00}⁶⁺O_{6.00}. The mineral occurs as white fibers and felty aggregates. The fibers are elongate [001], up to 1 cm long, but are only a few micrometers in diameter. Translucent, silky luster, soft, flexible, white streak, nonfluorescent, resistant to dilute HCl but rapidly soluble in concentrated HCl, $D_{\text{calc}} = 5.23$ g/cm³ for $Z = 4$. Single-crystal X-ray structure study ($R = 0.065$) indicated monoclinic symmetry, space group $C2/c$, $a = 18.076(5)$, $b = 5.920(5)$, $c = 5.083(5)$ Å, $\beta = 96.97(1)^\circ$. Strongest lines of the powder pattern (diffractometer, CuK α radiation) are 5.622(65,110), 3.376(30,311), 3.104(61,311), 2.990(100,600), 2.960(100,020), and 2.104(42,620). The mineral is associated with anglesite and wulfenite on a fine-grained Cu ore in the oxidation zone of the Tsumeb mine, Tsumeb, Namibia. The new mineral name is for mineralogist Friedrich Karl Biehl (b. 1887), who was the first to do scientific work on the mineralogy of the Tsumeb deposit. Type material is in the Mineralogical Museum of the University of Hamburg, Germany. **J.L.J.**

Cerchiarite*

R. Basso, G. Lucchetti, L. Zefiro, A. Palenzona (2000) Cerchiarite, a new natural Ba–Mn–mixed-anion silicate chloride from the Cerchiara mine, northern Apennines, Italy. *Neues Jahrb. Mineral. Mon.*, 373–384.

The mineral occurs as individual grains and radial aggregates with quartz, pectolite, orientite, and calcite in fractures that are up to a few millimeters in width. Individual grains are prismatic to acicular, up to 0.1 mm wide and 2 mm long, elongate [001], and the aggregates are up to 3 mm in diameter. Deep green color, transparent, vitreous luster, brittle, pale green streak, uneven fracture, no cleavage or parting, $VHN_{50} = 296$

(285–304), nonfluorescent, $D_{\text{meas}} = 3.62$, $D_{\text{calc}} = 3.70$ g/cm³ for the empirical formula and $Z = 2$. Optically uniaxial, positive elongation, $\omega = 1.745(5)$, $\epsilon = 1.765(5)$. Electron microprobe analysis gave BaO 43.29, Mn₂O₃ 19.57, Fe₂O₃ 2.09, Al₂O₃ 1.02, SiO₂ 26.18, Cl 3.93, O \equiv Cl 0.89, sum 95.19 wt%, corresponding to Ba_{3.93}(Mn_{3.45}Fe_{0.36}Al_{0.28}) $\Sigma_{4.09}$ Si_{6.06}H_{6.06}O_{24.46}Cl_{1.54}, simplified as Ba₄Mn₄Si₆(O,OH,Cl)₂₆. Single-crystal X-ray structure study ($R = 0.050$) indicated tetragonal symmetry, space group $I4/mmm$, $a = 14.223(6)$, $c = 6.141(4)$ Å as refined from a Guinier pattern (CuK α radiation) in which the strongest lines (I_{obs} , I_{calc}) are 10.15(M,88,110), 4.417(M,49,211), 3.319(S,75,321), 3.01(VS,100,411), 2.619(S,74,222), and 2.577(M,62,501).

The mineral occurs at the Cerchiara manganese (braunite) mine, Val di Vara, eastern Liguria, Italy. The new name refers to the type locality. Type material is in the Dipartimento per Studio del Territorio e delle sue Risorse, Università di Genova, Italy. **J.L.J.**

Henrymeyerite*

R.H. Mitchell, V.N. Yakovenchuk, A.R. Chakhmouradian, P.C. Burns, Y.A. Pakhomovsky (2000) Henrymeyerite, a new hollandite-type Ba–Fe titanate from the Kovdor complex, Russia. *Can. Mineral.*, 38, 617–626.

Electron microprobe analysis gave BaO 18.25, TiO₂ 67.78, FeO 9.20, Nb₂O₅ 1.00, Ce₂O₃ 0.56, La₂O₃ 0.50, Na₂O 0.40, SiO₂ 0.37, K₂O 0.05, CaO 0.02, sum 98.13 wt%, corresponding to (Ba_{0.96}Na_{0.10}K_{0.01}REE_{0.05}) $\Sigma_{1.12}$ (Ti_{6.82}Fe_{1.03}Nb_{0.06}Si_{0.04}) $\Sigma_{7.95}$ O₁₆, simplified as BaFe²⁺Ti₇O₁₆. The mineral occurs as black, acicular crystals, up to 200 μ m long and several tens of micrometers in thickness, with probable forms {100}, {110}, and {101}. Opaque, adamantine luster, brittle, reddish brown streak, $H_{\text{est}} = 5-6$, $D_{\text{meas}} = 4.0(1)$, $D_{\text{calc}} = 4.20(1)$ g/cm³. Grayish brown in reflected light, weak brownish bireflectance; reflectance percentages (SiC standard, air) are given in 20 nm steps from 420 to 720 nm; representative values for R_{ω} and R_{ϵ} are 12.2, 13.4 (440), 11.9, 12.8 (480), 11.6, 12.6 (540), 11.4, 12.7 (580), and 11.3, 13.8 (660). Single-crystal X-ray structure study ($R = 0.027$) indicated tetragonal symmetry, space group $I4/m$, $a = 10.219(3)$, $c = 2.963(1)$ Å. The Ba and vacancies in the tunnels in the structure are completely disordered, thus differing from the ‘Ba-Ti hollandite’ that occurs in the Tian Shan Mountains (*Am. Mineral.*, 79, p. 188). An X-ray powder pattern was unobtainable; strongest lines of the calculated pattern are 3.232(100,310,130), 2.486(34,211,121), 2.236(40,301), 1.901(31,411,141), 1.598(33,521,251), 1.405(26,541,451), and strongest lines for a synthetic sample are 3.19(100), 2.227(40), 1.891(29), and 1.587(31).

The mineral is associated with dolomite, fluorapatite, tetra-

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

ferriphlogopite, rimkorolgit, catapleite, collinsite, and pyrite in a single vug in a carbonatite vein, 20 to 30 cm wide, at the Kovdor alkaline ultramafic complex, Kola Peninsula, Russia. The new name is for Prof. Henry O.A. Meyer (1937–1995). Type material is in the Geological Museum of the Kola Science Center in Apatity, Russia. **J.L.J.**

Niobokupletskite*

P.C. Piilonen, A.E. Lalonde, A.M. McDonald, R.A. Gault (2000) Niobokupletskite, a new astrophyllite-group mineral from Mont Saint-Hilaire, Quebec, Canada: description and crystal structure. *Can. Mineral.*, 38, 627–639.

The holotype occurs as anhedral to subhedral, platy to tabular, light beige to yellow epitaxial overgrowths, to $>0.5 \times 0.2$ mm, on kupletskite. Habits observed for other grains are compact fibrous, light yellow-brown overgrowth on coarse-grained kupletskite, and very fine-grained, sheaf-like aggregates of silvery brown acicular crystals. Vitreous luster, brittle, uneven to splintery fracture, perfect {001} cleavage, $H = 3-4$, nonfluorescent, $D_{\text{meas}} = >3.325$, $D_{\text{calc}} = 3.46$ g/cm³ for $Z = 1$. Optically biaxial positive, $\alpha = 1.718(1)$, $\beta = 1.733(1)$, $\gamma_{\text{calc}} = 1.750$, $2V_{\text{meas}} = 87(2)^\circ$, $Z = c$, X and Y in the (001) plane; pleochroism $X \approx Y =$ light yellow-orange, $Z =$ red-brown. The average of three electron microprobe analyses listed for the holotype is Na₂O 2.62, K₂O 5.97, Rb₂O 0.82, Cs₂O 0.12, MgO 0.15, MnO 26.37, FeO 2.64, ZnO 4.08, Al₂O₃ 1.14, TiO₂ 1.34, ZrO₂ 3.43, Nb₂O₅ 12.13, Ta₂O₅ 0.63, SiO₂ 31.85, F 0.14, H₂O (calc) 2.48, O \equiv F 0.06, sum 95.85 wt%, corresponding to $(\text{K}_{1.84}\text{Rb}_{0.13}\text{Cs}_{0.01})_{\Sigma 1.98}\text{Na}_{0.95}(\text{Mn}_{5.40}\text{Zn}_{0.73}\text{Fe}_{0.53}\text{Na}_{0.28}\text{Mg}_{0.05})_{\Sigma 6.99}(\text{Nb}_{1.33}\text{Zr}_{0.40}\text{Ti}_{0.24}\text{Ta}_{0.04})_{\Sigma 2.01}(\text{Si}_{7.71}\text{Al}_{0.32})_{\Sigma 8.03}\text{O}_{26}(\text{OH})_{4.00}(\text{O}_{0.89}\text{F}_{0.11})_{\Sigma 1.00}$, ideally $\text{K}_2\text{Na}(\text{Mn,Zn,Fe})_7(\text{Nb,Zr,Ti})_2\text{Si}_8\text{O}_{26}(\text{OH})_4(\text{O,F})$. Single-crystal X-ray structure study ($R = 0.0597$) indicated triclinic symmetry, space group $P\bar{1}$, $a = 5.4303(9)$, $b = 11.924(2)$, $c = 11.747(2)$ Å, $\alpha = 112.927(3)$, $\beta = 94.750(3)$, $\gamma = 103.175(3)^\circ$. Strongest lines of the powder pattern (114 Debye–Scherrer, $\text{CuK}\alpha$ radiation) are 10.707(100,001), 3.536(50,003,111), 2.793(40, $\bar{1}\bar{1}3,142$), 2.677(30, $\bar{2}11$), and 2.587(40,130,143).

The mineral, which is the Nb analog of kupletskite, is associated with kupletskite, aegirine, albite, analcime, calico-ancylite-(Ce), calcite, catapleite, epididymite, fluorite, and other minerals in nepheline syenite pegmatitic at the Poudrette quarry at Mont Saint-Hilaire, Quebec. Type material is in the Canadian Museum of Nature, Ottawa. **J.L.J.**

Walkilldellite-(Fe)*

H. Sarp, G. Mari, P.-J. Chiappero (1999) Walkilldellite-Fe, $(\text{Ca,Cu})_4\text{Fe}_6[(\text{As,Si})\text{O}_4]_4(\text{OH})_8 \cdot 18\text{H}_2\text{O}$, a new mineral from the Roua mine (Alpes-Maritimes, France). *Riviera Scientifique*, 12, 5–12 (in French, English abs.).

The mineral occurs as brown-yellow spherules, 0.1 mm in diameter, consisting of extremely thin radiating plates, tabular

on {001}. Translucent, vitreous to resinous luster, light brown streak, $H = 2-3$, fragile, perfect {001} cleavage, nonfluorescent, soluble in HCl, $D_{\text{meas}} = 3.0(1)$, $D_{\text{calc}} = 2.92(2)$ g/cm³ for $Z = 1$. Optically uniaxial negative, $\omega = 1.750$, ϵ not determinable, strongly pleochroic, $O =$ brown, $E =$ light brown-yellow. Electron microprobe analysis gave CaO 13.68, CuO 2.04, FeO 27.25, SiO₂ 1.27, As₂O₅ 30.03, H₂O by difference 25.73, sum 100 wt%, corresponding to $(\text{Ca}_{3.69}\text{Cu}_{0.39})_{\Sigma 4.08}\text{Fe}_{5.74}(\text{As}_{3.97}\text{Si}_{0.32})_{\Sigma 4.29}\text{O}_{16.3}(\text{OH})_{8.17} \cdot 17.53\text{H}_2\text{O}$, ideally $(\text{Ca,Cu})_4\text{Fe}_6[(\text{As,Si})\text{O}_4]_4(\text{OH})_8 \cdot 18\text{H}_2\text{O}$. The X-ray powder pattern (114 mm Gandolfi, $\text{CuK}\alpha$ radiation) is similar to that of walkilldellite, and by analogy $a = 6.548(5)$, $c = 23.21(2)$ Å, hexagonal, space group $P6_3/mmc$, $P6_3mc$, or $P6_2c$. Strongest lines are 11.600(100,002), 5.670(80,100), 3.275(70,110), 2.760(15,202), and 1.641(25,307).

The mineral, which is the Fe analog of walkilldellite, occurs as an oxidation product at the Roua mine and at another nearby deposit. Among the associated minerals are cuprite, native copper and silver, algodonite, domeykite, koutekite, olivenite, kolfanite, janggunit, and malachite. The type material from Roua is in the Muséum d'Histoire naturelle de Genève in Geneva, Switzerland.

Dicussion. According to J.D. Grice, Chairman of the CNMMN, the name approved by the CNMMN is walkilldellite-(Fe) rather than walkilldellite-Fe. **J.L.J.**

Titanium

Jing Chen, Jiliang Lee, Jun Wu (2000) Native titanium inclusions in the coesite eclogites from Dabieshan, China. *Earth Planet. Sci. Lett.*, 177, 237–240.

The mineral occurs as inclusions, ~ 10 μm, in garnet from a coesite-bearing eclogite in an ultrahigh-pressure metamorphic complex near Yingshan County, Dabieshan, China. Energy-dispersion analysis, calculated to 100 wt%, gave Ti 95.98, Fe 1.59, O 2.43, corresponding to $\text{Ti}_{91.74}\text{Fe}_{1.30}\text{O}_{6.96}$. The mineral has a submetallic luster that is attributed to a thin, surficial oxidation film, thus accounting for the O in the analysis. In reflected light, the mineral is brown. Electron diffraction patterns indicated tetragonal symmetry, $a = 4.24$, $c = 2.73$ Å, thereby differing from the hexagonal native titanium reported as occurring in granite (*Am. Mineral.*, 76, p. 1435). **J.L.J.**

Pd₃As, Pd₅As₂, Pd₃Ni₂As₃

T.L. Grokhovskaya, G.F. Bakaev, E.P. Shelepina, M.I. Lapina, I.P. Lapatina, G.N. Muravitskaya (2000) PGE mineralization in the Vuruchuaivench gabbronorite massif, Monchegorsk pluton (Kola Peninsula, Russia). *Geol. Ore Deposits*, 42, 133–146,

Electron microprobe analyses are given for Pd₃As ('guanglinite'), Pd₅As₂, Pd₃Ni₂As₃, and gersdorffite with up to 31.5 wt% Pt. Other than grain sizes, no physical or optical properties are given.

Discussion. Pd₃As, Pd₅As₂, and Pd₃Ni₂As₃ have been reported from other localities, and both Pd₃As and Pd₅As₂ have previously been referred to as ‘guanglinite’. The new microprobe analysis of the latter gave Pd 73.21, Rh 0.02, Cu 0.89, Ni 2.67, Fe 0.32, As 24.57 wt%, which is close to Pd₉As₄. **J.L.J.**

Fe₃Si₇

Wenji Bai, P.T. Robinson, Quinsong Fang, Jingsui Yang, Binggang Yan, Zhongming Zhang, Xu-Feng Hu, Mei-Fu Zhou, J. Malpas (2000) The PGE and base-metal alloys in the podiform chromitites of the Luobusa ophiolite, southern Tibet. *Can. Mineral.*, 38, 585–598.

One of five similar analyses listed has Si 55.26, Fe 44.74, normalized to 100 wt%, corresponding to Fe_{2.89}S_{7.11}. The silicide forms subrounded grains, to 0.5 mm, some with fritted margins. **J.L.J.**

CuPbBi₇S₁₂ and Cu_{0.33}Pb_{0.33}Bi_{7.67}S₁₂

C.L. Ciobanu, N.J. Cook (2000) Intergrowths of bismuth sulphosalts from the Ocna de Fier Fe-skarn deposit, Banat, Southwest Romania. *Eur. J. Mineral.*, 12, 899–917.

One of five listed electron microprobe analyses has Cu 3.17, Pb 10.55, Bi 68.36, S 18.16, sum 100.24 wt%, corresponding to Cu_{1.06}Pb_{1.08}Bi_{6.96}S_{12.05}, ideally CuPbBi₇S₁₂. The mineral, which is referred to as ‘Phase 70’, is a bismuthinite derivative whose composition is intermediate to those of gladite and pekoite. Phase 70 occurs as lobate grains, to at least 10 μm across, characterized in oil immersion by high reflectance, strong and distinct green-mauve bireflectance, and intense, bright anisotropy. The mineral is associated with bismuthinite and numerous Bi sulfosalts, among them another bismuthinite derivative called ‘Phase 88.6’, for which one of six listed microprobe analyses gave Cu 1.00, Pb 3.22, Bi 75.57, S 18.17, sum 97.96 wt%, corresponding to Cu_{0.33}Pb_{0.33}Bi_{7.67}S_{12.02}, ideally Cu_{0.33}Pb_{0.33}Bi_{7.67}S_{12.00}. The mineral is strongly anisotropic and occurs as laths that are a few micrometers wide and up to 50 μm long. **J.L.J.**

Cu_{1.6}Pb_{1.6}Bi_{6.4}S₁₂

D. Topa, T. Balić-Žunić, E. Mackovicky (2000) The crystal structure of Cu_{1.6}Pb_{1.6}Bi_{6.4}S₁₂, a new 44.8 Å derivative of the bismuthinite – aikinite solid-solution series. *Can. Mineral.*, 38, 611–616.

The mineral occurs as independent grains and as exsolution lamellae at the Felbertal scheelite deposit, Austria. Electron microprobe analysis gave Cu 4.65, Fe 0.05, Pb 15.97, Bi 61.58, S 17.79, sum 100.04 wt%, corresponding to Pb_{1.64}Bi_{6.38}S_{11.97}. Single-crystal X-ray structure study ($R = 0.047$) indicated orthorhombic symmetry, space group $Pmc2_1$, $a = 4.0074(9)$, $b = 44.81(1)$, $c = 11.513(3)$ Å, $D_{\text{calc}} = 6.904$ g/cm³ for $Z = 4$. The mineral is a new derivative of the aikinite-bismuthinite series. **J.L.J.**

Cu₂Pb₆Bi₈S₁₉

D. Topa, E. Mackovicky, T. Balić-Žunić, P. Berlepsch (2000) The crystal structure of Cu₂Pb₆Bi₈S₁₉. *Eur. J. Mineral.*, 12, 825–833.

Electron microprobe analysis of a grain from the Felbertal scheelite deposit, Austria, gave Cu 3.56, Ag 1.10, Pb 29.94, Cd 0.43, Bi 48.27, S 16.80, sum 100.10 wt%, corresponding to Cu_{2.02}Ag_{0.37}Pb_{5.21}Cd_{0.14}Bi_{8.33}S_{18.94} for 35 atoms, simplified as Cu₂Pb₆Bi₈S₁₉. Single-crystal X-ray structure study ($R = 0.05$) indicated monoclinic symmetry, space group $C2/m$, $a = 27.64$, $b = 4.05$, $c = 20.74$ Å, $\beta = 131.26^\circ$, $D_{\text{calc}} = 6.948$ g/cm³ for $Z = 2$. The mineral, which has also been reported to occur at Algaré, Portugal (*Am. Mineral.*, 81, p. 1016) forms a homologous series with junoite. **J.L.J.**

Pd-Sb oxide, Pd-Bi-Sb oxide, Pd-Bi oxide

N.D. Tolstykh, A.P. Krivenko, Y.G. Lavrent'ev, O.N. Tolstykh, V.N. Korolyuk (2000) Oxides of the Pd-Sb-Bi system from the Cheney massif (Aldan Shield, Russia). *Eur. J. Mineral.*, 12, 431–440.

Pd-Sb oxide

One of the 19 analyses listed for a Pd-Sb-O mineral has Fe 3.99, Cu 0.75, As 0.29, Bi 0.13, S 0.06, Pd 52.48, Sb 31.03, O 7.69, sum 96.42 wt%. A plot of the analyses on a Pd-Sb-O ternary diagram shows that the content of O progressively increases from Pd₅Sb₂ (stibiopalladinite) to a maximum that approximates Pd₅Sb₂O₄ [which requires Pd 63.37, Sb 29.01, O 7.62 wt%]. The grains are euhedral to subhedral, 20–70 μm, and occur in chalcopyrite as inclusions with a hexagonal outline; $VHN_{20} = 124$. In reflected light, gray-brown color, weakly to moderately anisotropic, no pleochroism or cleavage, reflectance percentages 21.0 to 25.8 at 470 nm, and 26.0 to 33.7 at 589 nm. The oxidation products are present in a heavy-mineral concentrate of massive chalcopyrite in the exocontact of the Cheney anorthosite-gabbronorite massif in the western part of the Aldan Shield, Russia. Directly associated minerals are sudburyite, sperrylite, froodite, Au-Ag alloys, and relict stibiopalladinite.

Pd-Sb-Bi oxide

Also present in the same sample in which the above oxide(s) occur is a Pd-Sb-Bi oxide for which one of the three analyses listed has Fe 0.62, Cu 0.50, Bi 20.69, Pd 43.63, Sb 25.23, S 0.11, O 8.82, sum 99.60 wt% [which corresponds approximately to Pd₃(Sb,Bi)₂O₄]. Compositions range from approximately Pd₂(Sb,Bi)O to Pd(Sb,Bi)O₂. These grains form gray rims, 10–30 μm wide, on Bi-bearing sudburyite. $VHN_5 = 81$, weakly anisotropic, reflection percentages for the above analyzed grain are 23.4 at 470 nm, and 27.9 at 589 nm.

Pd-Bi oxide

Nineteen microprobe analyses are listed, most showing only Pd, Bi, and O to be present. Oxygen content ranges from 6.55 to 12.47 wt%, and the compositions plot along a trend line from Bi₂O₃ to Pd. The Pd-Bi oxide forms rims, and rare pseudomorphs, on froodite in chalcopyrite-rich, exocontact impregnation ores. Gray, weakly anisotropic, reflection percentages 16.8–20.9 at 470 nm, 18.1–19.4 at 589 nm, $VHN_5 = 156$.

The origin of the various oxides is attributed to non-supergene processes. The Pd-Sb oxide was formed by alteration of stibiopalladinite, the Pd-Sb-Bi oxide by alteration of Bi-bearing sudburyite, and the Pd-Bi oxide was derived from froodite. **J.L.J.**

Monoclinic CaCO₃

Zhongyue Shen, Ying Ye, Ganglie Lü, Huaiyang Zhou, Weiwei Ding (2000) Discovery of a possible natural CaCO₃ (II) mineral. *Scientia Geol. Sinica*, 35, 107–110 (in Chinese, English abs.).

Chemical analysis gave Na₂O 0.55, K₂O 0.10, CaO 47.20, MgO 6.26, SrO 0.37, V₂O₅ 0.04, Fe₂O₃ 0.04, Al₂O₃ 0.11, P₂O₅ 0.05, SiO₂ 0.14, CO₂ 44.14, sum 100.00 wt%, corresponding to (Ca_{0.839}Mg_{0.155}Sr_{0.004})CO₃. Rietveld analysis indicated monoclinic symmetry, space group $P2_1/c$, $a = 6.290(2)$, $b = 4.934(2)$, $c = 7.979(3)$ Å, $\beta = 107.571(2)^\circ$, $D_{\text{meas}} = 2.76$, $D_{\text{calc}} = 2.82$ g/cm³ for $Z = 4$, $H = 4$. Strongest lines of the X-ray powder pattern are 2.994(100,200,11 $\bar{2}$), 2.4655(15,020,112), 1.8861(25,31 $\bar{2}$), and 1.8514 (15, 22 $\bar{2}$, 114). The data are in good agreement with those for the synthetic analog, which can be formed at high pressure (15 kbar) and room temperature. The natural compound occurs in surface sediment in the South China Sea, and is stated to be part of a coral body that formed in a deep-water environment with a relatively high hydrostatic pressure.

Discussion. The origin seems to have been strictly organic, thus disqualifying the compound as a mineral. **J.L.J.**

P-rich natroalunite

G.S. Ripp, S.V. Kanakin, M.N. Shcherbakova (1998) Phosphate mineralization in metamorphosed high-alumina rocks of Ichetuyskoye ore occurrence. *Zapiski Vseross. Mineral. Obshch.*, 127(6), 98–108 (in Russian, English abs.).

G.S. Ripp, S.V. Kanakin (1998) Phosphate minerals in the metamorphosed high-alumina rocks of the Ichetui occurrence, Transbaikal region. *Doklady Earth Sciences*, 359, 233–235.

Numerous electron microprobe analyses are listed for strontian natroalunite in which part of the SO₄ is substituted by PO₄. The mineral assemblage consists of lazulite with variable amounts of scorzalite, trolleite, augelite, monazite, and members of the alunite supergroup (crandallite, florencite-(Ce), woodhouseite, and svanbergite).

Discussion. The paper by Ripp and Kanakin (1998) was abstracted in *Am. Mineral.*, 84, p. 1687. The unidentified alunite-type mineral can be indexed with the typical alunite cell of $a = \sim 6.97$, $c = \sim 16.6$ Å if it is assumed that the diffrac-

tion lines at 3.256, 3.209, and 3.058 are from lazulite contamination. Three analyses listed by Ripp et al. (1998) are Na- and SO₄-dominant, but with PO₄ = >25 mol%, thus placing the minerals in an unnamed compositional field of the current CNMNM-approved nomenclature system. **J.L.J.**

Hydronium-bearing eudialyte

I.A. Ekimenkova, R.K. Rastsvetaeva, I.V. Chukanov (2000) Crystal structure of the oxonium-bearing analog of eudialyte. *Dokl. Akad. Nauk*, 371, 625–628 (in Russian).

Electron microprobe analysis (not given) corresponds to Na_{8.1}K_{0.3}Sr_{0.5}Ca_{3.3}REE_{0.5}Mn_{1.4}Fe_{2.1}²⁺Zr_{3.4}Ti_{0.1}Si₂₄O_{68.3}Cl_{0.3} $\cdot n$ H₂O, where $n \sim 10$. Single-crystal X-ray structure study ($R = 0.037$) indicated trigonal symmetry, space group $R3m$, $a = 14.167(2)$, $c = 30.081(2)$ Å, $D_{\text{calc}} = 2.83$ g/cm³ for $Z = 3$. The structural formula corresponds to $\{(Ca_{3.3}Mn_{1.4}REE_{0.5}Na_{0.45}Sr_{0.35})_{\Sigma 6}Zr_3[Si_5O_9]_2[Si_9O_{24}(OH,O)_3]_2\}\{(Zr_{0.32}Nb_{0.07}Ti_{0.07})_{\Sigma 0.46}(Si_{6.30}Zr_{0.08}Nb_{0.05}Ti_{0.03})_{\Sigma 0.44}[Fe_{2.10}^{2+}Na_{0.90}]_{\Sigma 3.00}(Na_{8.28}K_{0.30}Sr_{0.15})_{\Sigma 8.73}(H_3O)_{3.27}(OH)_{5.16}Cl_{0.26}\cdot 2H_2O\}$. The mineral, which is Si-poor relative to other members of the eudialyte group, occurs in grains up to 1 cm in the Karnasurt pegmatite, Lovozero massif, Kola Peninsula, Russia. **J.L.J.**

New Data

Barstowite

H. Kutzke, H. Klapper, S. Merlino, M. Pasero, N. Perchiazzi, G. Eggert (2000) The crystal structure of barstowite, Pb₄Cl₆(CO₃) \cdot H₂O, determined on crystals from Etruscan slags and from a Late-Hellenistic shipwreck. *Zeits. Kristallogr.*, 215, 110–113.

Single-crystal X-ray structure study ($R = 0.023$) gave monoclinic symmetry, $a = 4.2043(8)$, $b = 9.199(2)$, $c = 16.663(3)$ Å, $\beta = 91.82(1)^\circ$, and the newly specified space group $P2_1/m$. **J.L.J.**

Buckhornite

H. Effenberger, F.J. Culetto, D. Topa, W.H. Paar (2000) The crystal structure of synthetic buckhornite, [Pb₂BiS₃][AuTe₂]. *Zeits. Kristallogr.*, 215, 10–16.

Single-crystal X-ray structure study ($R = 0.101$) of synthetic buckhornite confirmed the orthorhombic symmetry, $a = 4.108(3)$, $b = 12.308(9)$, $c = 9.331(6)$ Å, $Z = 2$, $D_{\text{calc}} = 8.25$ g/cm³, and established the space group as $Pmmm$. The formula of buckhornite is $[(Pb_2Bi)_{\Sigma 3}S_3][(Te_2Au)_{\Sigma 3}]$ whereas that of nagyágite is $[(Pb_3(Pb,Sb))_{\Sigma 6}S_6][(Te,Au)_3]$. The minerals are member of a homologous series. Ordering of the Au and Te atoms occurs only in buckhornite. **J.L.J.**

Franzinite

P. Ballirano, E. Bonaccorsi, A. Maras, S. Merlino (2000) The crystal structure of franzinite, the ten-layer mineral of the cancrinite group. *Can. Mineral.*, 38, 657–668.

Single-crystal X-ray structure study ($R = 0.0596$) of franzinite from Sacrofano, Latium, Italy, gave $a = 12.916(1)$, $c = 26.543(3)$ Å, space group $P321$. The structural formula is $[\text{Na}_{21.5}(\text{Ca},\text{K})_{8.6}\text{Ca}_{9.9}][\text{Si}_{30}\text{Al}_{30}\text{O}_{120}](\text{SO}_4)_{10} \cdot 2\text{H}_2\text{O}$, from which the new ideal formula, requiring 50 positive charges by the cations, is $(\text{Na},\text{K})_{30}\text{Ca}_{10}[\text{Si}_{30}\text{Al}_{30}\text{O}_{120}](\text{SO}_4)_{10} \cdot 2\text{H}_2\text{O}$. **J.L.J.**

Perraultite

I.V. Pekov, Yu.V. Belovitskaya, P.M. Kartashov, N.V. Chukanov, N.A. Yamnova, Yu.K. Egorov-Tismenko (2000) New data on perraultite (the Azov Sea region). *Zapiski Vseross. Mineral. Obshch.*, 128(3), 112–120 (in Russian, English abs.).

Electron microprobe and wet-chemical (H_2O , $\text{Fe}^{2+}/\text{Fe}^{3+}$) analyses of perraultite from a new occurrence, the Mariupol nepheline syenite in the eastern Azov Sea region of the Ukraine, gave Na_2O 2.76, K_2O 1.67, CaO 1.48, SrO 0.05, BaO 10.64, MgO 0.04, MnO 19.28, FeO 12.06, Fe_2O_3 0.75, Al_2O_3 0.03, SiO_2 27.72, TiO_2 17.83, ZrO_2 1.09, Nb_2O_5 1.24, Ta_2O_5 0.11, H_2O 1.79, F 2.18, $\text{O} \equiv \text{F}$ 0.92, sum 99.80 wt%, corresponding to $\text{Na}_{1.54}\text{K}_{0.61}\text{Ca}_{0.46}\text{Sr}_{0.01}\text{Ba}_{1.20}\text{Mg}_{0.02}\text{Mn}_{4.70}\text{Fe}_{2.51}^{2+}\text{Fe}_{0.16}^{3+}\text{Al}_{0.01}\text{Ti}_{3.86}\text{Zr}_{0.15}\text{Nb}_{0.17}\text{Ta}_{0.01}\text{Si}_{8.00}\text{O}_{32.38}(\text{OH})_{3.44}\text{F}_{1.99}$, simplified as $(\text{Na},\text{Ca})(\text{Ba},\text{K})(\text{Mn},\text{Fe})_4(\text{Ti},\text{Nb})_2\text{Si}_4\text{O}_{16}(\text{OH},\text{F},\text{O})_3$ for $Z = 8$. Single-crys-

tal X-ray structure study ($R = 0.062$) indicated monoclinic symmetry, space group $C2$, $a = 10.371(2)$, $b = 13.841(4)$, $c = 24.272(6)$ Å, $\beta = 121.19(2)^\circ$. The crystal structure is similar to that of bafertsite and hejtmanite, but with c doubled in perraultite. In the same crystallographic setting, jinshajiangite has $a = 10.732$, $b = 13.847$, $c = 24.245$ Å, $\beta = 121.21^\circ$, and the formula can be written as $(\text{Na},\text{Ca})(\text{Ba},\text{K})(\text{Fe},\text{Mn})_4\text{Ti}_2\text{Si}_4\text{O}_{16}(\text{F},\text{O},\text{OH})_{2-3}$, which is the Fe- and F-dominant analog of perraultite. Thus, it is proposed that the four minerals belong to a distinct family (group) represented by bafertsite **J.L.J.**

Yoshimuraite

A.M. McDonald, J.D. Grice, G.Y. Chao (2000) The crystal structure of yoshimuraite, a layered Ba–Mn–Ti silicophosphate, with comments on five-coordinated Ti^{4+} . *Can. Mineral.*, 38, 649–656.

Single-crystal X-ray structure study ($R = 0.03$) of yoshimuraite from Taguchi mine, Aichi Prefecture, Japan, gave triclinic symmetry, space group $P\bar{1}$, $a = 5.386(1)$, $b = 6.999(1)$, $c = 14.748(3)$ Å, $\alpha = 89.98(1)$, $\beta = 93.62(2)$, $\gamma = 95.50(2)^\circ$, $Z = 2$. Electron microprobe analysis gave BaO 39.08, SrO 3.01, MnO 15.15, TiO_2 8.12, Fe_2O_3 8.04, MgO 0.18, SiO_2 17.00, P_2O_5 4.21, H_2O (calc) 1.23, sum 99.94 wt%, which for $\text{O} = 13$ on the basis of the crystal-structure analysis, corresponds to $(\text{Ba}_{1.95}\text{Sr}_{0.28})_{\Sigma 2.23}(\text{Mn}_{1.64}\text{Fe}_{0.49}\text{Mg}_{0.03})_{\Sigma 2.16}(\text{Ti}_{0.78}\text{Fe}_{0.22})_{\Sigma 1.00}\text{O}(\text{Si}_2\text{O}_7)[(\text{P}_{0.46}\text{S}_{0.34}\text{Si}_{0.17})_{\Sigma 0.97}\text{O}_4](\text{OH})$. The new ideal formula is $\text{Ba}_2\text{Mn}_2\text{TiO}(\text{Si}_2\text{O}_7)(\text{PO}_4)(\text{OH})$. **J.L.J.**