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NEW MINERAL NAMES*

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Charmarite*, quintinite*, caresite*

G.Y. Chao, R.A. Gault (1997) Quintinite-2*H*, quintinite-3*T*, charmarite-2*H*, charmarite-3*T*, and caresite-3*T*, a new group of carbonate minerals related to the hydrotalcite-manasseite group. Can. Mineral., 35, 1541–1549.

The minerals have the general formula $M^{2+}_4Al_2(OH)_{12}(CO_3)\cdot 3H_2O$; thus M:Al = 4:2, whereas it is 6:2 in the hydrotalcite-manasseite group. M = Mn in the charmarite structures, Mg in those of quintinite, and Fe in that of caresite. Extensive Mg-Fe solid solution has been found in some of the Mg and Fe minerals. All of the minerals are transparent, vitreous luster, white streak, brittle, perfect {001} cleavage, uneven fracture, $H = \sim 2$, nonfluorescent. Single-crystal X-ray studies indicated that the 2*H* and 3*T* structures both have strong subcells with $a' = \sim 3.05$ Å, $c' = c$. Type material of all minerals is in the Canadian Museum of Nature, Ottawa, and in the Royal Ontario Museum, Toronto.

Charmarite

The 2*H* polytype occurs as tabular hexagonal crystals showing {0001} and $\{10\bar{1}0\}$, to 0.5 mm across and commonly stacked along [0001] to form pagoda-like aggregates; also as mica-like plates. Orange-brown, pale brown, pale blue, or colorless. Optically uniaxial negative, $\omega = 1.587(1)$, $\epsilon = 1.547(1)$; weak pleochroism, with *O* = colorless, *E* = pale blue in blue varieties, and *O* = orange-brown, *E* = very pale brown in orange-brown varieties. Electron microprobe analysis (H_2O and CO_2 by TGA–EGA) gave MgO 0.10, FeO 0.58, MnO 47.07, Al_2O_3 17.21, CO_2 7.30, H_2O 26.70, F 0.10, O ≡ F 0.04, sum 99.02 wt%, close to the requirements for the ideal formula $Mn_4Al_2(OH)_{12}CO_3\cdot 3H_2O$. $D_{meas} = 2.47(1)$, $D_{calc} = 2.50$ g/cm³ for $Z = 4$. Single-crystal X-ray study indicated hexagonal symmetry, space group $P6_322$, $a = 10.985(5)$, $c = 15.10(2)$ Å as refined from a Gandolfi pattern (114 mm, Cu*K*α radiation) with strongest lines of 7.53(100,002), 3.768(60,004), 2.578(50,222), 2.221(40,224), 1.856(40,226), and 1.552(40,602). The mineral occurs as a late-stage hydrothermal product in miarolitic cavities and in pegmatitic bodies in nepheline syenite at the Demix and Poudrette quarries, Mont Saint-Hilaire, Quebec.

The 3*T* polytype occurs as orange-brown to pale brown, thin {0001} plates, and as stacked tabular crystals that taper to give the overall appearance of a nail. The most common forms are {0001} and $\{10\bar{1}0\}$. Optically uniaxial negative, $\omega = 1.587(1)$, ϵ undetermined, pleochroism *O* = brown, *E* = pale brown. Electron microprobe analysis gave MnO 46.53, Fe_2O_3 0.26, Al_2O_3 16.49, CO_2 (calc.) 7.20, H_2O (calc.) 26.54, sum 97.02 wt%, corresponding to $Mn_{4.01}(Al_{1.98}Fe_{0.02})(OH)_{12}CO_3\cdot 3H_2O$ assuming stoichiometric CO_2, H_2O, and OH. $D_{meas} = 2.48(1)$, $D_{calc} = 2.50$ g/cm³ for $Z = 6$. Single-crystal X-ray study indicated trigonal symmetry, space group $P3_112$, or $P3_212$, $a = 10.985(3)$, $c = 22.63(3)$ Å as refined from a Gandolfi pattern (114 mm, Cu*K*α radiation) with strongest lines of 7.55(100,003), 3.770(90,006), 2.670(70,222), 2.346(70,225), and 1.973(60,228). The 3*T* polytype occurs with charmarite-2*H* at the Demix quarry, Mont Saint-Hilaire, Quebec. Charmarite is named for Charles H. (b. 1917) and Marcelle (b. 1918) Weber, amateur mineralogists who found the 2*H* form of the mineral.

Quintinite

The 2*H* polytype occurs as deep orange-red, orange, and pale brown, equant crystals to 5 mm across, and as prismatic crystals to 3 mm length, showing {0001} and an {*hkil*} trapezohedron with or without $\{10\bar{1}0\}$. Optically uniaxial positive, $\omega = 1.533(1)$, $\epsilon = 1.533(1)$; pleochroism *O* = yellow, *E* = lighter yellow. Electron microprobe analysis gave MgO 33.19, FeO 0.74, Fe_2O_3 1.15, Al_2O_3 20.52, CO_2 (calc.) 9.17, H_2O (calc.) 33.80, sum 98.57 wt%, corresponding to $(Mg_{3.95}Fe_{0.05})(Al_{1.93}Fe_{0.07})(OH)_{12}CO_3\cdot 3H_2O$ assuming stoichiometric CO_2, H_2O, and OH. Single-crystal X-ray study indicated hexagonal symmetry, space group $P6_322$, $a = 10.571(1)$, $c = 15.139(7)$ Å as refined from a 114 mm Gandolfi pattern (Cu*K*α radiation) with strongest lines of 7.63(100,002), 3.785(100,004), and 1.825(20,226).

The 3*T* polytype occurs as pale to bright yellow, hexagonal crystals tabular on {0001} and up to 1 mm across, that commonly form rosettes, some in epitaxial growth with donnayite-(Y). Common forms are {0001} and $\{10\bar{1}0\}$. $D_{meas} = 2.14(1)$, $D_{calc} = 2.14$ g/cm³ for $Z = 6$. Optically uniaxial positive and negative, $\omega = 1.533(1)$, $\epsilon = 1.533(1)$; typically nonpleochroic, but may show greenish pleochroism if Fe is high. Electron microprobe analysis gave MgO 34.08, FeO 0.29, Fe_2O_3 0.80, Al_2O_3 21.14, CO_2 (calc.) 9.35, H_2O (calc.) 34.43, sum 100.09

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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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wt%, close to the requirements for the ideal formula $Mg_4Al_2(OH)_{12}CO_3 \cdot 3H_2O$. Single-crystal X-ray study indicated trigonal symmetry, space group $P3_112$ or $P3_212$, a = 10.558(2), c = 22.71(3) Å as refined from a 114 Gandolfi pattern (Cu$K\alpha$ radiation) with strongest lines of 7.57(100,003), 3.778(90,006), 2.570(40,222), 2.281(40,225), and 1.932(40,228). The 3*T* polytype occurs at the Demix quarry at Mont Saint-Hilaire, and the 2*H* polytype occurs in vugs in dolomitic carbonatite at the Jacupiranga mine, São Paulo, Brazil. The new name is for mineral micromounter Quintin Wight (b. 1935) of Ottawa, Ontario.

Caresite

The mineral occurs as crystals tabular on {0001}, and as pyramidal crystals, to 0.5 mm, that form irregular aggregates. Crystals show {0001} and {$10\bar{1}0$}, generally with a form resembling a hexagonal pyramid. Electron microprobe analysis gave MgO 1.42, FeO 43.13, MnO 1.71, Al_2O_3 17.68, CO_2 (calc.) 7.42, H_2O (calc.) 28.33, sum 98.69 wt%, corresponding to $(Fe_{3.56}Mg_{0.21}Mn_{0.14})_{\Sigma 3.91}Al_{2.06}(OH)_{12}CO_3 \cdot 3H_2O$ assuming CO_2, H_2O, and OH stoichiometry. D_{meas} = 2.59(1), D_{calc} = 2.59 g/cm³ for Z = 6. Yellow to orange-brown color, some grains with a green-black coating (authors' communication to J.A. Mandarino, June 1998). Optically uniaxial negative, ω = 1.599(1), ϵ = 1.570(1). Single-crystal X-ray study indicated trigonal symmetry (3*T* polytype), space group $P3_112$, or $P3_212$, a = 10.805(3), c = 22.48(3) Å as refined from a 114 mm Gandolfi pattern (Cu$K\alpha$ radiation) with strongest lines of 7.49(100,003), 3.746(50,006), 2.625(40,222), 2.314(40,225), and 1.948(40,228). The mineral occurs in the Poudrette quarry at Mont Saint-Hilaire, and at the former Corporation quarry on Mont Royal, the latter also one of the Monteregian Hills. The new name is for Stephen (b. 1909) and Janet (b. 1921) Cares, who found the mineral. **J.L.J.**

Chrisstanleyite*

W.H. Paar, A.C. Roberts, A.J. Criddle, D. Topa (1998) A new mineral, chrisstanleyite, $Ag_2Pd_3Se_4$, from Hope's Nose, Torquay, Devon, England. Mineral. Mag., 62, 257–264.

Electron microprobe analysis of five grains gave a mean of Ag 25.3, Cu 0.17, Pd 37.5, Se 36.4, sum 99.37 wt%, corresponding to $(Ag_{2.01}Cu_{0.02})_{\Sigma 2.03}Pd_{3.02}Se_{3.95}$. The mineral occurs as anhedral grains up to several hundred micrometers in polycrystalline aggregates; silvery metallic gray color, metallic luster, opaque, black streak, brittle, VHN_{100} = 395 (371–421), H = 5, D_{calc} = 8.308 g/cm³ for Z = 2. In reflected light, slightly pleochroic from light buff to slightly gray-green buff, no internal reflection, weak to moderate bireflectance; moderate anisotropism, with rotation tints from rose-brown to gray-green to pale bluish gray to dark steel-blue. Characteristically polysynthetically and parquet-like twinned. Reflectance percentages (WTiC standard) for R_1 and R_2, in air and in oil, respectively, are 39.7, 47.2, 26.2, 34.4 (470 nm), 43.1 48.8, 29.3, 35.14 (546), 44.3, 49.4, 30.4, 35.55 (589), 44.4, 49.2, 31.0, 35.6 (650). Single-crystal X-ray study indicated monoclinic symmetry, space group $P2_1/m$ or $P2$, a = 6.350(6), b = 10.387(4), c = 5.683(3) Å as refined from a powder pattern (114 mm Debye–Scherrer, Co$K\alpha$ radiation). Strongest lines are 2.868(50b,031,$\bar{1}31$), 2.742(100,$\bar{1}21$), 2.688(80,$\bar{2}21$), 2.367(50,140), 1.956(100,$\bar{3}12$,150), and 1.829(30,$\bar{2}13$,042).

The mineral is associated with gold, fischesserite, clausthalite, and several other selenides that occur as inclusions and network veinlets in one of several steeply dipping calcite veins, 4–6 cm wide, that cut flat-lying Devonian limestone. The new name is for Chris J. Stanley of The Natural History Museum, London. Type material is in the Institut für Mineralogie (University), Salzburg, Austria, and in The Natural History Museum, London, U.K. **J.L.J.**

Turkestanite*

L.A. Pautov, A.A. Agakhanov, Ye.V. Sokolova, Y.K. Kabalov (1997) Turkestanite $Th(Ca,Na)_2(K_{1-x}\square_x)Si_8O_{20} \cdot nH_2O$—a new mineral with doubled fourfold silicon-oxygen rings. Zap. Vseross. Mineral. Obshch., 126(6), 45–55 (in Russian).

Wet-chemical and atomic absorption analysis of Dara-i-Pioz material gave SiO_2 54.58, Al_2O_3 0.03, Fe_2O_3 0.10, MnO 0.01, ThO_2 23.43, UO_2 1.93, REE_2O_3 1.50 (La 24.4, Ce 39.1, Pr 5.0, Nd 21.0, Sm 3.5, Gd 2.7, Y + Yb 3.6, Dy 1.5 wt% of ΣREE), PbO 0.94, CaO 7.56, Na_2O 2.89, K_2O 4.54, F 0.20, H_2O 1.76, O ≡ F 0.08, sum 99.39 wt%, corresponding to $(Th_{0.78}REE_{0.08}U_{0.06}Pb_{0.04}Fe_{0.01})_{\Sigma 0.97}(Ca_{1.19}Na_{0.82})_{\Sigma 2.01}(K_{0.85}\square_{0.15})_{\Sigma 1.00}(Si_{7.99}Al_{0.01})_{\Sigma 8.00}O_{12}(O_{7.75}OH_{0.16}F_{0.09})_{\Sigma 8.00} \cdot 0.78H_2O$ for Si + Al = 8.00. Occurs as prisms, 0.5 to 5 mm across, showing {100}, {001}, and rarely {101}. At the Jelisu massif, the mineral forms deformed {100} prisms, 2 to 50 mm across, rarely with {101} pyramids. Apple-green (Dara-i-Pioz) to various shades of brown (Jelisu), translucent, vitreous luster, poor {111} cleavage, H = 5½–6, D_{meas}= 3.36(2), D_{calc} = 3.39 g/cm³ for Z = 2 (Dara-i-Pioz material). Optically uniaxial negative, ω = 1.611(2), ϵ = 1.606(2). The infrared spectrum is typical for ring silicates and has strong absorption bands at 449, 591, 1040, and 1097 cm⁻¹, and also has a broad band at about 3460 cm⁻¹ attributable to H_2O. Rietveld refinement indicated tetragonal symmetry, space group $P4/mcc$, a = 7.5789(2), c = 14.7038(4) Å. The powder pattern (38 lines given for Jelisu, 33 for Dara-i-Pioz, diffractometer, Fe$K\alpha$ radiation) has strongest lines (Dara-i-Pioz) at 7.59(23,010), 7.40(20,002), 5.36(40,110), 5.31(70,012), 3.40(100,120), 3.33(65,014), 2.654(59,024), and 2.175(25,224).

The mineral occurs in albitized Upper Carboniferous sandy shales in the contact aureole of the Jelisu massif, which is a massif consisting largely of albitized nepheline syenites, near the headwaters of the Khojaachkan River, Kyrgyzstan. The mineral was also found in a boulder of microcline, pectolite, quartz, aegirine, and calcite near the alkaline to subalkine intrusions of the Dara-i-Pioz massif (about 55 km WSW of Jelisu), Tien Shan, Tajikistan. The name is for the region—Turkestan Ridge. Type material is in the Museum of the Ilmen Reserve, Miass, and in the Fersman Mineralogical Museum, Moscow, Russia.

Discussion. The mineral is isostructural with steacyite and differs in that Ca > Na; also related to ekanite, but not isostructural with it. **E.S.G.**

Vuoriyarvite*

V.V. Subbotin, A.V. Voloshin, Ya.A. Pakhomovskiy, A.Yu. Bakhchisaraytsev, D.Yu. Pushcharovsky, R.K. Rastsvetayeva, T.N. Nadezhina (1998) Vuoriyarvite $(K,Na)_2(Nb,Ti)_2Si_4O_{12}(O,OH)_2 \cdot 4H_2O$—a new mineral from carbonatites of the Vuoriyarvi massif (Kola Peninsula). Doklady Akad. Nauk, 358(4), 517–519 (in Russian).

An average of ten electron microprobe analyses gave for a single grain (range for three grains) SiO_2 36.80 (36.60–37.30), TiO_2 0.81 (0.68–1.08), Nb_2O_5 37.50 (37.40–37.60), Fe_2O_3 0.03 (0.03–0.05), CaO 0.02 (0–0.05), BaO 3.18 (2.93–3.68), Na_2O 2.80 (2.70–3.00), K_2O 7.30 (7.00–7.50), H_2O by difference 11.56 (10.46–11.96), sum 100 wt%, corresponding to $(K_{1.01}Na_{0.59}Ba_{0.14})_{\Sigma 1.74}(Nb_{1.84}Ti_{0.07})_{\Sigma 1.91}(Si_2O_6)_2O_{1.68} \cdot 4.19H_2O$ for Si = 4. Occurs as tabular crystals up to 3 mm long, showing {*h*01} and pinacoids {001} and {100}. Dull white color, white streak, translucent, vitreous luster, brittle, uneven fracture, no cleavage, weak parting perpendicular to the elongation, $H = 4½$, $VHN_{30} = 315–435$, nonfluorescent, insoluble in dilute HCl and H_2SO_4, $D_{meas} = 2.95(2)$, $D_{calc} = 3.02(1)$ g/cm^3 for $Z = 4$. Optically biaxial positive, $\alpha = 1.649(2)$, $\beta = 1.655(3)$, $\gamma = 1.759(3)$, $2V = 20(5)°$, weak dispersion $r < v$, negative elongation, $Z = c$, $X = b$. The most intense absorption bands in the infrared spectrum are at 468, 690, 938, 1090, 1135, 1645, and 3400 cm^{-1}. Single-crystal X-ray structure study ($R = 0.055$) gave monoclinic symmetry, space group *Cm*, $a = 14.692(4)$, $b = 14.164(4)$, $c = 7.859(3)$ Å, $\beta = 117.87(2)°$. Strongest lines of the X-ray powder pattern (42 lines reported, Fe$K\alpha$ and Cr$K\alpha$ radiation) are 7.10(90,020), 4.98(60,021), 3.262(100,$\bar{4}$21), 3.151(80b,041), 2.956(60,112), 2.549 (40,$\bar{4}$41), and 1.723(40,$\bar{4}$63,463,$\bar{7}$14,$\bar{8}$23,$\bar{8}$21). The mineral occurs in veins of dolomite-calcite carbonatite that cut pyroxenites of the Vuoriyarvi alkali-ultramafic massif, Kola Peninsula, Russia. The mineral formed from hydrothermal alteration of pyrochlore, and is associated with calcite, dolomite, strontianite, ewaldite, serpentine- and apatite-group minerals, pyrrhotite, pyrite, chalcopyrite, and sphalerite. The name is for the locality: Vuoriyarvi Lake and massif. Type material is in the Fersman Mineralogical Museum, Moscow, Russia.

Discussion. The mineral is structurally related to labuntsovite and nenadkevichite. **E.S.G.**

$Ir(As,Se,S)_2$

N.D. Tolstykh, A.P. Krivenko, L.N. Pospelova (1997) Unusual compounds of iridium, osmium, and ruthenium with selenium, tellurium and arsenic from the placers of the Zolotaya River (western Sayan). Zap. Vseross. Mineral. Obshch., 126(6), 23–34 (in Russian).

The minerals, which were recovered from placers in the Zolotaya River, western Sayan, Russia, are interpreted to have formed by hydrothermal alteration of ultramafic rocks in the Kurtushinbin ophiolite belt by metasomatic processes associated with quartz-gold mineralization. Four electron microprobe analyses gave Ir 55.40–56.40, Ru 0.19–0.70, Pt 0.55–0.90, Rh 0.13–0.22, Fe 0.20–0.29, As 17.61–18.41, Te 1.67–1.72, S 3.00–3.52, Se 18.15–19.27, sum 98.51–99.91 wt%, corresponding to $(Ir_{0.97}Ru_{0.01}Pt_{0.01}Rh_{0.01}Fe_{0.01})_{\Sigma 1.01}(As_{0.81}Se_{0.77}S_{0.36}Te_{0.04})_{\Sigma 1.98}$ for the composition with the highest Ir + As content. The mineral forms light gray, irregular segregations (130 μm in one case) in iridium intergrown with quartz containing fine-grained inclusions of gold. The mineral contains fine-grained inclusions of iridium and osmium.

Discussion. Also reported are $(Ir,Os)Te_2$ and $(Ir,Os)(S,As,Te)_2$. These and other associated minerals were abstracted in *Am. Mineral.*, 82, 1261–1264 (1997). **E.S.G.**

Ag_3BiSe_3

A. Pring (1998) Selenides and sulfides from Iron Monarch, South Australia. Neues Jahrb. Mineral. Mon., 36–48.

Electron microprobe analysis of a single grain of unstated size gave Cu 1.22, Ag 41.13, Bi 29.94, Se 29.94, S 0.07, sum 102.3 wt%, corresponding to $Ag_3Cu_{0.15}Bi_{1.00}Se_{2.98}S_{0.02}$. The mineral is associated with several selenides, principally eucairite, naumannite, and bohdanowiczite, in a hydrothermal barite lense within Early Proterozoic sedimentary hematite ore. **J.L.J.**

Na-K chloride

S.V. Malinko, V.T. Dubinchuk, A.Ye. Lisitsyn (1997) A sodium-potassium chloride intergrown in studenitsite in borate ores of Serbia. Zap. Vseross. Mineral. Obshch., 126(5), 78–83 (in Russian, English abs.).

Four SEM microbeam analyses gave K 14.9–19.2, Na 4.3–7.0 wt%, with Na varying inversely with K. The mineral is presumed to be a chloride as it is partly soluble in water at room temperature, is completely soluble on heating, and is associated with halite. The mineral is present on grains of studenitsite as rims, several hundredths of millimeters wide; also fills thread-like cracks and pores in studenitsite, or is intergrown with ulexite. TEM examination showed platy-prismatic crystals tenths of micrometers in length. Uniaxial negative, positive elongation, extinction angle 40°, $n = <1.53$, low birefringence. Electron diffraction patterns indicated monoclinic symmetry, $a = 9.11$, $b = 22.71$, $c = 24.08$ Å, $\beta = 86°$. The powder pattern (diffractometer, Cu$K\alpha$ radiation, 26 lines given) has strongest lines of 7.99(100,003), 6.73(30,12$\bar{1}$), 6.27(10,122), 5.67(9,131), 3.12(10,235), 2.60(10,33$\bar{3}$), 2.009(9,443), and 1.956(20,44$\bar{4}$). The mineral occurs in a core of B-bearing rocks from the volcanogenic-sedimentary Podrdzhsky Potok and Piskanya deposits near the town of Balevats on the Ibar River, about 280 km south of Belgrade, Serbia. Associated minerals are studenitsite, halite, ulexite, colemanite, and unnamed $CaB_3O_4(OH)_3$, the last approved as IMA mineral No. 95-020. **E.S.G.**

Monoclinic astrophyllite

Nicheng Shi, Zhesheng Ma, Guowu Li, N.A. Yamnova, D.Yu. Puscharovsky (1998) Structure refinement of monoclinic astrophyllite. Acta Crystallogr., B54, 109–114.

Electron microprobe analysis (not given) of prismatic crystals from the Khibina alkaline massif, Kola Peninsula, Russia, corresponds to $(K_{1.750}\ Ca_{0.032})_{\Sigma 1.782}\ Na_{2.015}\ (Fe^{2+}_{2.604}Mn_{1.077})_{\Sigma 3.681}\ Mg_{1.851}\ Ti_{1.812}\ [(Si_{3.919}\ Al_{0.076})_{\Sigma 3.995}\ O_{12}]_2\ [(OH)_{5.980}\ F_{0.072})]_{\Sigma 6.052}$, simplified as $K_2NaNa(Fe,Mn)_4Mg_2Ti_2[Si_4O_{12}]_2(OH)_4(OH,F)_2$. Straw-yellow color, vitreous luster, H = 3½–4, perfect {100} cleavage, D_{calc} = 3.172 g/cm^3 for $Z = 2$. Optically biaxial negative, $\alpha = 1.660(2)$, $\beta = 1.702(2)$, $\gamma = 1.725(2)$, $2V = 75°$, $Z \wedge c = 5°$, $Y = b$. Single-crystal X-ray structure study ($R = 0.057$) indicated monoclinic symmetry, space group $A2$, a = 10.370(3), b = 23.129(5), c = 5.322(1) Å, β = 99.55(2)°. **J.L.J.**

New Data

Basaluminite–felsöbányaite

L. Farkas, F. Pertlik (1997) Crystal structure determinations of felsöbányaite and basaluminite, $Al_4(SO_4)(OH)_{10}\cdot 4H_2O$. Acta Mineral. Petrog. Szeged., 38, 5–15.

The formulas for both felsöbányaite and basaluminite are generally given as $Al_4(SO_4)(OH)_{10}\cdot 5H_2O$. Single-crystal X-ray structure study ($R = 0.101$) of felsöbányaite from the type locality indicated monoclinic symmetry, space group $P2_1$, a = 13.026(1), b = 10.015(1), c = 11.115(1) Å, β = 104.34(1)°, $Z = 4$. Single-crystal X-ray study of basaluminite from Sussex, England, gave a = 12.954(5), b = 10.004(6), c = 11.064(9) Å, β = 104.1(1)°, space group $P2_1$, $Z = 4$. The composition of the minerals is concluded to be $Al_4(SO_4)(OH)_{10}\cdot 4H_2O$, and basaluminite is considered to be a microcrystalline variety of felsöbányaite, with the latter name having priority by almost a century.

Discussion. The data have not been submitted to the CNMMN for discreditation of basaluminite. **J.L.J.**

Thorosteenstrupine

I.V. Pekov, I.A. Yekimenkova, N.N. Kononkova (1997) Thorosteenstrupine from the Lovozero massif and the isomorphic series steenstrupine-(Ce)–thorosteenstrupine. Zap. Vseross. Mineral. Obshch., 126(6), 35–44 (in Russian, English abs.).

Twelve electron microprobe analyses of three grains of holotype thorosteenstrupine (from the Fersman Mineralogical Museum, Moscow, Russia) gave SiO_2 29.8–34.0, Al_2O_3 0.7–1.8, Fe_2O_3 0.7–2.6, MnO 6.5–8.5, CaO 4.7–6.4, ThO_2 31.0–40.5, Y_2O_3 0–4.4, La_2O_3 0.4–1.6, Ce_2O_3 0–3.0, Nd_2O_3 0–1.0, F 0.6–2.0, O ≡ F 0.3–0.8, sum 86.3–91.3 wt%, the average for Si = 18 corresponding to $(Ca_{3.44}\ Y_{0.48})_{\Sigma 3.92}\ (Th_{4.58}\ REE_{0.54})_{\Sigma 5.12}\ (Mn_{3.70}\ Al_{0.77}Fe_{0.65})_{\Sigma 5.12}\ Si_{18}\ (O,OH,F)_{\sim 60}\cdot n\ H_2O$. Electron microprobe analysis of the most Th-rich spot in the mineral from the new occurrence, (Lovozero massif) gave SiO_2 33.9, TiO_2 0.6, P_2O_5 3.5, Fe_2O_3 1.4, MnO 8.7, CaO 2.6, SrO 0.6, Na_2O 0.6, ThO_2 34.3, La_2O_3 3.8, Ce_2O_3 8.6, Nd_2O_3 2.0, sum 100.6 wt%, which for Si + P = 18 corresponds to $(Ca_{1.37}Si_{0.14}Na_{0.50})_{\Sigma 2.01}(Th_{3.81}REE_{2.59})_{\Sigma 6.40}(Mn_{3.60}Ti_{0.21}Fe_{90.57})_{\Sigma 4.38}\ (Si_{16.22}P_{1.38})_{\Sigma 18}(O,OH,F)_{\sim 60}$. The following general formula is proposed for thorosteenstrupine as the low-P, Th analog of steenstrupine: $Na_{0-5}Ca_{1-3}(Th,REE)_6(Mn,Fe,Al,Ti)_{4-5}\ (Si_6O_{18})_2[(Si,P)O_4]_6(OH,F,O)_x\cdot nH_2O$. Compositions of the Lovozero material range continuously from steenstrupine $(REE_{5.40}Th_{0.89})$ to thorosteenstrupine (above), and individual grains are compositionally heterogeneous. The steenstrupine-thorosteenstrupine minerals occur as well-developed isometric crystals, typically of rhombohedral-pinacoidal habit, and as rounded grains up to 2 mm across. The minerals appear fresh, transparent, red-brown, and are optically isotropic and amorphous to X-rays.

The holotype occurrence is in alkalic metasomatic veins at Chergilen, Khabarovsk region, eastern Siberia, Russia (originally given as ‘‘Siberia’’—see *Am. Mineral.*, 48, 433–434, 1963). The second locality is the Karnasurt underground mine in the Lovozero alkaline massif, Kola Peninsula, Russia, at which the steenstrupine minerals are intergrown with ussingite in the selvages of a pegmatite veinlet, up to 5 cm wide, that cuts foyaite. Minerals in the veinlet are aegirine, sodalite, vuonnemite, serandite, nordite-(Ce), natisite, kazakovite, and cobaltoan löllingite.

Discussion. The identify of the Lovozero mineral with the type (Chergilen) mineral is based on similarity of composition and appearance. No crystallographic data are available because the minerals are metamict. The analyses suggest that possible charge-balanced substitutions introducing Th are Th + Si → REE + P, and Th + Ca → 2REE, as in monazite-cheralite-huttonite, but the role of Na, F, H, and other constituents in various substitutions is not evident. **E.S.G.**

‘‘Tsumcorite group’’

W. Krause, K. Belendorff, H.-J. Bernhardt, C. McCammon, H. Effenberger, W. Mikenda (1998) Crystal chemistry of the tsumcorite-group minerals. New data on ferrilotharmeyerite, tsumcorite, thometzekite, mounanaite, helmutwinklerite, and a redefinition of gartrellite. Eur. J. Mineral., 10, 179–206.

The ‘‘tsumcorite-group’’ minerals have been determined to have the general formula Me(1)Me(2)$(XO_4)_2(OH,H_2O)_2$ in which Me(1) is typically Pb or Ca, Me(2) is typically Fe, Mn, Cu, Zn, Co, or Ni, with Fe always present as Fe^{3+}, and X is typically As.

Gartrellite

Electron microprobe analysis of type gartrellite from Ashburton Downs, Australia, gave PbO 36.53, CaO <0.05, Fe_2O_3 10.33, Al_2O_3 0.11, ZnO 0.21, CuO 14.02, As_2O_5 33.11, P_2O_5 <0.05, V_2O_5 <0.05, SO_3 1.68, H_2O (calc.) 4.47, sum 100.47 wt%; Fe_2O_3 ranged from 7.18 to 12.08 wt%, and Cu from 12.69 to 16.86 wt%. Microprobe analyses of samples from other localities showed up to 11.40 wt% ZnO, but CO_2 was not detected in any samples. The general formula of gartrellite is concluded to be $Pb(Cu,Zn)(Fe^{3+},Zn,Cu)(AsO_4)_2(OH,H_2O)_2$. Rietveld and X-ray powder pattern refinements gave triclinic symmetry, $a = 5.460(1)$, $b = 5.653(1)$, $c = 7.589(2)$ Å, $\alpha = 67.68(1)$, $\beta = 69.27(1)$, $\gamma = 70.04(1)°$.

Ferrilotharmeyerite, lotharmeyerite

Ferrilotharmeyerite is monoclinic, space group $C2/m$. Optically biaxial positive, $\alpha = 1.83(1)$, $\beta_{calc} = 1.835$, $\gamma = 1.87(1)$, $2V = 40(2)°$, $X = b$, $Y \wedge c = 22°$, strong dispersion $r > v$, strong pleochroism with X = orange, Y = yellow, Z = colorless. The structural formula corresponds to $Ca(Fe^{3+},Zn)_2(AsO_4)_2(OH,H_2O)_2$. By analogy, the formula of lotharmeyerite is $Ca(Mn^{3+},Zn)_2(AsO_4)_2(OH,H_2O)_2$.

Thometzekite

The mean of 20 electron microprobe analyses (and ranges where given) of cotype thometzekite gave PbO 36.10, Fe_2O_3 0.32 (0.00–0.66), Al_2O_3 0.55 (0.21–1.17), ZnO 5.52 (4.12–8.63), CuO 19.44 (16.14–20.87), As_2O_5 24.77 (22.03–29.19), SO_3 9.00 (6.04–10.96), H_2O (calc.) 4.72, sum 100.42 wt%, corresponding to $Pb_{0.99}(Cu_{1.50}Zn_{0.41}Al_{0.07}Fe_{0.02})_{\Sigma 2.00}[(AsO_4)_{1.32}(SO_4)_{0.92}]_{\Sigma 2.01}[(OH)_{0.74}(H_2O)_{1.23}]_{\Sigma 1.97}$. Single-crystal X-ray structure study ($R = 0.046$) indicated monoclinic symmetry, space group $C2/m$, $a = 9.077(8)$, $b = 6.300(8)$, $c = 7.661(8)$ Å, $\beta = 116.99(8)°$, $D_{calc} = 5.21$ g/cm^3 for $Z = 2$.

Mounanaite

Electron microprobe analysis of type mounanaite confirmed the formula, but single-crystal X-ray structure study ($R = 0.065$) indicated monoclinic symmetry, space group $C2/m$, $a = 9.294(8)$, $b = 6.166(7)$, $c = 7.713(8)$ Å, $\beta = 115.57(6)°$, $D_{calc} = 4.88$ g/cm^3 for $Z = 2$.

Tsumcorite

Single-crystal X-ray structure study and Mössbauer spectra of tsumcorite indicated that its general formula is $Pb(Zn_{2-x}Fe^{3+}_x)(AsO_4)_2(OH)_x(H_2O)_{2-x}$, with $x \leq 1$. For mawbyite, $x > 1$.

Discussion. The redefinition of gartrellite was approved by the CNMMN. The redefinition explains the previously peculiar reference to phosphogartrellite as the P analog of gartrellite even though the formulas of the two minerals apparently differed in more than P-As substitution (*Am. Mineral.,* 83, p. 1117, 1998). **J.L.J.**

Zeolites

D.S. Coombs (Chairman) et al. (1997) Recommended nomenclature for zeolite minerals: Report of the Subcommittee on Zeolites of the International Mineralogical Association, Commission on New Minerals and Mineral Names. Can. Mineral., 35, 1571–1606.

The following are highlights from the report, including changes in nomenclature or in recommended formulas. (1) Separate species are recognized in topologically distinctive compositional series in which different extra-framework cations are the most abundant in atomic proportions. To name these, the appropriate chemical symbol is attached by a hyphen to the series name as a suffix, except for harmotome, pollucite, and wairakite. (2) Differences in space-group symmetry and in order–disorder relationships in zeolites having the same topologically distinctive framework do not in general provide adequate grounds for recognition of separate species. (3) Zeolite species are not to be distinguished solely on the ratio Si:Al except for heulandite (Si:Al <4.0) and clinoptilolite (Si:Al 4.0). (4) Dehydration, partial hydration, and overhydration are not sufficient grounds for the recognition of separate species of zeolites. (5) Use of the term ‘‘ideal formula’’ should be avoided in referring to a simplified or averaged formula of a zeolite.

barrerite, recommended formula $Na_2[Al_2Si_7O_{18}]\cdot 6H_2O$

bellbergite $(K,Ba,Sr)_2Sr_2Ca_2(Ca,Na)_4[Al_{18}Si_{18}O_{72}]\cdot 30H_2O$

brewsterite (series) $(Sr,Ba)_2[Al_4Si_{12}O_{32}]\cdot 10H_2O$; new names brewsterite-Sr, brewsterite-Ba

chabazite (series) $(Ca_{0.5},Na,K)_4[Al_4Si_8O_{24}]\cdot 12H_2O$; new names chabazite-Ca, chabazite-Na, chabazite-K

clinoptilolite (series) $(Na,K,Ca_{0.5},Sr_{0.5},Ba_{0.5},Mg_{0.5})_6[Al_6Si_{30}O_{72}]\cdot \sim 20H_2O$; new names clinoptilolite-K, clinoptilolite-Na, clinoptilolite-Ca

cowlesite $Ca[Al_2Si_3O_{10}]\cdot 5.3H_2O$

dachiardite (series) $(Ca_{0.5},Na,K)_{4-5}[Al_{4-5}Si_{20-19}O_{48}]\cdot 13H_2O$; new names dachiardite-Ca, dachiardite-Na

epistilbite $(Ca,Na_2)[Al_2Si_4O_{12}]\cdot 4H_2O$

erionite (series) $K_2(Na,Ca_{0.5})_8[Al_{10}Si_{26}O_{72}]\cdot 30H_2O$; new names erionite-Na, erionite-K, erionite-Ca

faujasite (series) $(Na,Ca_{0.5},Mg_{0.5},K)_x[Al_xSi_{12-x}O_{24}]\cdot 16H_2O$; new names faujasite-Na, faujasite-Ca, faujasite-Mg

ferrierite (series) $(K,Na,Mg_{0.5},Ca_{0.5})_6[Al_6Si_{30}O_{72}]\cdot 8H_2O$; new names ferrierite-Mg, ferrierite-K, ferrierite-Na

garronite $NaCa_{2.5}[Al_6Si_{10}O_{32}]\cdot 14H_2O$

gmelinite (series) $(Na_2,Ca,K_2)_4[Al_8Si_{16}O_{48}]\cdot 22H_2O$; new names gmelinite-Na, gmelinite-Ca, gmelinite-K

gobbinsite $Na_5[Al_5Si_{11}O_{32}]\cdot 12H_2O$

gonnardite $(Na,Ca)_{6-8}[(Al,Si)_{20}O_{40}]\cdot 12H_2O$

harmotome $(Ba_{0.5},Ca_{0.5},K,Na)_5[Al_5Si_{11}O_{32}]\cdot 12H_2O$

heulandite (series) $(Ca_{0.5},Sr_{0.5},Ba_{0.5},Mg_{0.5},Na,K)_9[Al_9Si_{27}O_{72}]\cdot{\sim}24H_2O$; new names heulandite-Ca, heulandite-Sr, heulandite-Na, heulandite-K

laumontite $Ca_4[Al_8Si_{16}O_{48}]\cdot 18H_2O$

levyne (series) $(Ca_{0.5}Na,K)_6[Al_6Si_{12}O_{36}]\cdot 17H_2O$; new names levyne-Ca, levyne-Na

mazzite $(Mg_{2.5}K_2Ca_{1.5})[Al_{10}Si_{26}O_{72}]\cdot 30H_2O$

merlinoite $K_5Ca_2[Al_9Si_{23}O_{64}]\cdot 22H_2O$

mesolite $Na_{16}Ca_{16}[Al_{48}Si_{72}O_{240}]\cdot 4H_2O$

offretite $CaKMg[Al_5Si_{13}O_{36}]\cdot 16H_2O$

paulingite (series) $(K,Ca_{0.5},Na,Ba_{0.5})_{10}[Al_{10}Si_{32}O_{84}]\cdot 27–44H_2O$; new names paulingite-K, paulingite-Ca

phillipsite (series) $(K,Na,Ca_{0.5},Ba_{0.5})_x[Al_xSi_{16-x}O_{32}]\cdot 12H_2O$; new names phillipsite-Na, phillipsite-K, phillipsite-Ca

pollucite $(Cs,Na)[AlSi_2O_6]\cdot nH_2O$

stilbite (series) $(Ca_{0.5},Na,K)_9[Al_9Si_{27}O_{72}]\cdot 28H_2O$; new names stilbite-Ca, stilbite-Na

Discreditations: Herschelite = chabazite-Na; leonhardite = H_2O-poor laumontite; svetlozarite = dachiardite-Ca; wellsite = phillipsite-Ca and harmotome. **J.L.J.**