The Canadian Mineralogist
Vol. 42, pp. 215-246 (2004)

NEW MINERALS

JOSEPH A. MANDARINO[§]

94 Moore Avenue, Toronto, Ontario M4T 1V3, Canada

Artsmithite

$Hg^{1+}_4Al(PO_4)_{2-x}(OH)_{1+3x}$ (x = 0.26)

MONOCLINIC

Locality: The Funderburk prospect (Lat. 34.177° N, Long. 93.659° W), north of Cowhide Cove road, Cowhide Cove Recreation area, on Lake Greeson, approximately 13 km north of Murfreesboro, Pike County, Arkansas, USA.

Occurrence: In fractures in the Jackfork sandstone, with cinnabar, quartz and dickite and other mercury minerals (calomel, eglestonite, mercury, metacinnabar, montroydite, terlinguaite).

General appearance: A matted nest (approximately 3 × 1 mm) of randomly scattered fibrous to acicular crystals.

Physical, chemical and crystallographic properties: *Luster*: stated to be vitreous, but the optical data indicate adamantine. *Diaphaneity*: transparent. *Color*: colorless. *Streak*: off-white to cream. *Luminescence*: nonfluorescent. *Hardness*: could not be determined. *Tenacity*: needles are flexible. *Cleavage*: none. *Fracture*: irregular. *Density*: could not be measured, 6.37 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *C*2/*c*, *a* 17.022, *b* 9.074, *c* 7.015 Å, β 101.20°, *V* 1062.9 Å^3, *Z* = 4, *a*:*b*:*c* = 1.8759:1:0.7731. Morphology: no forms could be identified. Twinning: none mentioned. ***X-ray powder-diffraction data***: 8.326(100)(200), 4.739(50)(310), 2.979(80)(202), 2.952(50)($\bar{4}$02), 2.784(80)(600), 2.660(75)(330), 1.755(50)(640,$\bar{2}$04). ***Optical data***: Biaxial (+), indices of refraction could not be measured, but the mean value calculated from the Gladstone–Dale relationship is 1.94 to 1.99, 2*V*(meas.) approximately 60°, dispersion $r < v$, distinct; parallel extinction and length slow with $Z \approx c$. ***Chemical analytical data***: One set of electron-microprobe data (with H_2O calculated by stoichiometry): Hg_2O 78.28, Al_2O_3 5.02, P_2O_5 11.39, H_2O (1.63), Total (96.32) wt.%. Empirical formula: $Hg_{3.97}Al_{1.04}(PO_4)_{1.70}(OH)_{1.91}$. ***Relationship to other species***: None apparent.

Name: After Arthur ("Art") E. Smith (b. 1935), who collected the mineral.

Comments: IMA No. 2002–039.

ROBERTS, A.C., COOPER, M.A., HAWTHORNE, F.C., GAULT, R.A., GRICE, J.D. & NIKISCHER, A.J. (2003): Artsmithite, a new Hg^{1+}–Al phosphate–hydroxide from the Funderburk prospect, Pike County, Arkansas, U.S.A. *Canadian Mineralogist* **41**, 721-725.

[§] j.a.mandarino@sympatico.ca

Bobjonesite

$V^{4+}O(SO_4)(H_2O)_3$

MONOCLINIC

Locality: The North Mesa 5 mine, SW ¼ of section 35, and the adjacent eastern edge of section 34, Township 24 South, Range 11 East, Emery County, Utah, USA.

Occurrence: In a silicified tree in the Shinarump conglomerate. The tree has a rim of coal 6 to 25 mm thick. Associated minerals are: ferricopiapite, kornelite, rozenite, szomolnokite, sulfur, montroseite, anorthominasragrite, orthominasragrite, minasragrite and an unidentified yellow-green hydrated Fe–V sulfate.

General appearance: Crusts and efflorescences with individual grains << 1 mm.

Physical, chemical and crystallographic properties: The mineral is unstable in all but the driest air and hydrates easily. Consequently, some of the following properties were determined from synthetic material. *Luster*: vitreous. *Diaphaneity*: Not given, but probably transparent to translucent. *Color*: pale blue. *Streak*: pale blue. *Luminescence*: nonfluorescent in ultraviolet light. *Hardness*: approximately 1. *Tenacity*: not given. *Cleavage*: not observed. *Fracture*: not given. *Density*: could not be measured because of the instability of the mineral, 2.28 g/cm^3 (calc.). ***Crystallography***: Monoclinic, $P2_1/n$, a 7.394, b 7.411, c 12.0597 Å, β 106.55°, V 633.5 Å^3, Z = 4, a:b:c = 0.9977:1:1.6272. Morphology: no forms were mentioned. Twinning: none mentioned. ***X-ray powder-diffraction data***: 6.962(11)($\bar{1}$01), 6.255(11)(011), 5.795(100)(002), 5.408(37)(101), 4.571(20)(012), 3.881(48)($\bar{1}$03), 3.498(90)(112), 3.423(10)(013). ***Optical data***: Biaxial (+), α 1.555, β 1.561, γ 1.574, 2V(meas.) 72°, 2V(calc.) 69°; dispersion not mentioned; nonpleochroic; $X = b$, $Y \approx a$, $Z \wedge c \approx 19°$ in obtuse angle β. ***Chemical analytical data***: Because of the instability of the mineral, an electron-microprobe analysis could not be carried out. The ideal formula requires: VO_2 38.21, SO_3 36.88, H_2O 24.91, Total 100.00 wt.%. ***Relationship to other species***: Anorthominasragrite (triclinic), orthominasragrite (orthorhombic) and minasragrite (monoclinic) are polymorphs of the higher hydrate $V^{4+}O(SO_4)(H_2O)_5$.

Name: After Robert (Bob) Jones (b. 1926), of Cave Creek, Arizona, USA, in recognition of his enormous contribution to the mineralogical community.

Comments: IMA No. 2000–045A. The crystal structure has been determined.

SCHINDLER, M., HAWTHORNE, F.C., HUMINICKI, D.M.C., HAYNES, P., GRICE, J.D. & EVANS, H.T., JR. (2003): Bobjonesite, $V^{4+}O(SO_4)(H_2O)_3$, a new mineral species from Temple Mountain, Emery County, Utah, U.S.A. *Canadian Mineralogist* **41**, 83-90.

Borocookeite

$Li_{1+3x}Al_{4-x}(BSi_3)O_{10}(OH,F)_8$

MONOCLINIC

Locality: The Sosedka and Mokhovaya pegmatite veins, Malkhan pegmatite field, Krasny Chikoy area, Chita region, Russia.

Occurrence: In pockets of pegmatites. Associated minerals are: elbaite, lepidolite, danburite, boron-rich muscovite, laumontite, quartz and albite.

General appearance: Massive nearly monomineralic aggregates or thin (0.5 to 2 mm) crusts and snow-like coatings on other minerals.

Physical, chemical and crystallographic properties: *Luster*: greasy. *Diaphaneity*: given as "not transparent", so presumably translucent. *Color*: light gray with a pinkish or yellowish hue. *Streak*: light pinkish gray. *Luminescence*: not given. *Hardness*: 3. *Tenacity*: given as "not elastic". *Cleavage*: {001} perfect. *Fracture*: not observed. *Density*: 2.62 g/cm^3 (meas.), 2.68 g/cm^3 (calc.). ***Crystallography***: Monoclinic, space group not given but probably *Cc* by analogy with cookeite, *a* 5.110, *b* 8.856, *c* 14.080 Å, β 96.93°, *V* 632.2 Å^3, *Z* = 2, *a*:*b*:*c* = 0.5768:1:1.5881. Morphology: no forms were mentioned. Twinning: none mentioned. ***X-ray powder-diffraction data***: 7.05(50)(002), 4.71(70)(003), 3.512(100)(004), 2.807(20)(005), 2.332(14)(006), 2.304(16)(202), 1.946(17)(204). ***Optical data***: Biaxial (+), α 1.574, β 1.580, γ 1.591, 2*V* could not be measured, 2*V*(calc.) 73°; dispersion not determined; nonpleochroic; *Z* = elongation. ***Chemical analytical data***: Analysis by wet chemistry (B_2O_3, BeO, H_2O, F), flame photometry (Li_2O, Rb_2O, Cs_2O) and electron microprobe (SiO_2, TiO_2, Al_2O_3, FeO, MnO, MgO, CaO, K_2O, Na_2O) gave (after deduction of about 2 wt.% quartz and recalculation to 100 wt.%): Li_2O 4.65, Na_2O 0.01, K_2O n.d., Rb_2O 0.004, Cs_2O 0.005, BeO 0.05, MgO 0.04, CaO 0.08, MnO 0.07, FeO 0.06, B_2O_3 4.06, Al_2O_3 41.77, SiO_2 34.19, TiO_2 0.02, H_2O 14.28, F 1.22, sum 100.51, less O=F 0.51, Total 100.51 wt.%. Empirical formula: $(Li_{1.59}Ca_{0.08}Mg_{0.01}Mn_{0.01})_{\Sigma 1.69}Al_{3.68}(Si_{2.90}Al_{0.50}B_{0.59}Be_{0.01})_{\Sigma 4.00}O_{9.59}$ $[(OH)_{8.08}F_{0.33}]_{\Sigma 8.41}$. ***Relationship to other species***: It is the boron-dominant analogue of cookeite.

Name: Recalls the relationship to cookeite.

Comments: IMA No. 2000–013.

ZAGORSKY, V.Y., PERETYAZHKO, I.S., SAPOZHNIKOV, A.N., ZHUKHLISTOV, A.P. & ZVYAGIN, B.B. (2003): Borocookeite, a new member of the chlorite group from the Malkhan gem tourmaline deposit, central Transbaikalia, Russia. *American Mineralogist* **88**, 830-836.

Brinrobertsite

An ordered, mixed-layer dioctahedral pyrophyllite–smectite

MONOCLINIC

Locality: 750 m northeast of Penrhyn castle, near Bangor, North Wales, UK.

Occurrence: In a metabentonite within a sequence of dark gray mudstones. Associated minerals are: quartz and a chlorite-group mineral.

General appearance: Anhedral grains in aggregates up to 0.02 mm across. Individual grains are less than 1 μm.

Physical, chemical and crystallographic properties: *Luster*: dull to vitreous. *Diaphaneity*: translucent. *Color*: gray to yellowish gray. *Streak*: gray. *Luminescence*: not mentioned. *Hardness*: close to 1. *Tenacity*: not given. *Cleavage*: {001} as observed by TEM. *Fracture*: not given. *Density*: could not be measured or calculated. ***Crystallography***: Monoclinic or pseudo-monoclinic, d_{100} 5.2, *b* 9.1, d_{001} 24 to 25 Å. Morphology: no forms were observed. Twinning: none observed. ***X-ray powder-diffraction data***: Air dried: 22.29(48)(001), 10.99(100)(002), 7.32(2)(003), 5.48(7)(004), 4.47(3)(005), 3.17(33)(007), 2.22(<1)(00.10), 2.01(4)(00.11), 1.84(1)(00.12). Glycol-solvated: 26.80(100)(001), 13.21(33)(002), 9.02(9)(003), 6.66(2)(004), 5.30(7)(005), 4.48(3)(006), 3.82(1)(007), 3.33(20)(008), 2.97(3)(009), 2.66(1)(00.10), 2.46(<1)(00.11), 2.22(<1)(00.12), 2.04(1)(00.13), 1.91(2)(00.14). ***Optical data***: none available. ***Chemical analytical data***: Five sets of XRF data are given. One of these consists of: SiO_2 74.82, Al_2O_3 12.01, TiO_2 0.17, Fe_2O_3 7.66, MgO 1.03, CaO 0.17, Na_2O 1.03, K_2O 0.31, MnO 0.06, P_2O_5 0.02, LOI 3.01, Total 100.30 wt.%. ***Relationship to other species***: It is made up of pyrophyllite-like and smectite-like units.

Name: After Dr. Brin Roberts, Birkbeck College, University of London, UK.

Comments: IMA No. 1997–040B. Descriptions of interstratified minerals lack many of the usual mineralogical data, but the minerals are considered valid species. The designation "RI" in the reference stands for "Reichweite Illite".

DONG, H., PEACOR, D.R., MERRIMAN, R.J. & KEMP, S.J. (2002): Brinrobertsite, a new RI interstratified pyrophyllite/smectite-like clay mineral: characterization and geological origin. *Mineralogical Magazine* **66**, 605-617.

Calderonite

$Pb_2Fe^{3+}(VO_4)_2(OH)$

MONOCLINIC

Localities: Las Colmenitas and Los Llanos mine, 2 km northwest of Santa Marta village (Lat. 38° 37'N, Long. 6° 36'E), Badajoz province, Spain. It also occurs at the La Muda mine, in Azuaga (Lat. 38° 20'20"N, Long. 5° 47'30"E), Badajoz province, Spain, at the Venus mine, Sierra Gorda, Argentina, and at the Nepomucene mine, Annaberg, Austria.

Occurrence: In the upper oxidation zone of the two Pb–Zn hydrothermal deposits. Associated minerals are: vanadinite and descloizite. Other minerals not directly associated with calderonite are: wulfenite, mimetite, cerussite, beudantite, adamite, hemimorphite, smithsonite, chalcophanite, silver, quartz and Ca–Fe carbonates.

General appearance: Scattered clusters of idiomorphic prismatic crystals up to 1 mm long.

Physical, chemical and crystallographic properties: *Luster*: vitreous to resinous. *Diaphaneity*: semi-transparent to translucent. *Color*: deep orange to red brown. *Streak*: red orange. *Luminescence*: nonfluorescent. *Hardness*: between 3 and 4. *Tenacity*: not given. *Cleavage*: not given. *Fracture*: splintery. *Density*: not given, 6.08 g/cm^3 (calc.) by the abstractor. ***Crystallography***: Monoclinic, $P2_1/m$, a 7.647, b 6.094, c 8.900 Å, β 112.0°, V 384.5 Å^3, Z = 2, a:b:c = 1.2548:1:1.4605. Morphology: no forms were listed, but the SEM photograph shows several forms. Twinning: none mentioned. ***X-ray powder-diffraction data***: 4.893(43)(011), 4.166(34)(002), 3.401(21)($\bar{2}$02), 3.242(100)($\bar{2}$11), 3.058(25)(020), 2.980(48)($\bar{1}$03), 2.746(48)(003), 2.449(20)(022). ***Optical data***: Biaxial (+), indices of refraction not given (the mean index of refraction calculated by the abstractor from the Gladstone–Dale relationship is 2.25), $2V$(meas.) 86° given as $2V_x$, which indicates biaxial (–), dispersion strong; pleochroism: X light greenish yellow, Y: brown, Z reddish brown; orientation not given. ***Chemical analytical data***: Mean of twenty-one sets of electron-microprobe data (H_2O by TGA): PbO 61.80, CaO 0.03, BaO 0.32, CuO 0.67, ZnO 0.09, Al_2O_3 0.11, Fe_2O_3 10.12, Mn_2O_3 <0.01, SiO_2 0.33, V_2O_5 23.86, As_2O_5 0.13, P_2O_5 0.57, H_2O 1.91, Total 99.94 wt.%. Empirical formula: $(Pb_{1.95}Ba_{0.01})_{\Sigma 1.96}(Fe^{3+}_{0.89}Cu_{0.06}Al_{0.02}Zn_{0.01})_{\Sigma 0.98}(V_{1.85}P_{0.06}Si_{0.01}As_{0.01})_{\Sigma 1.96}O_{7.51}(OH)_{1.49}$. Ideally, $Pb_2Fe^{3+}(VO_4)_2(OH)$. ***Relationship to other species***: It is the Pb-, Fe^{3+}-, VO_4-dominant member of the brackebuschite group and, therefore, the Fe^{3+}-dominant analogue of brackebuschite and the Pb-dominant analogue of gamagarite.

Name: After Salvador Calderón (1852–1911), Professor of Geology of the Central University in Madrid and head of the Mineralogical section of the Natural Sciences Museum there.

Comments: IMA No. 2001–022.

DEL TÁNAGO, J.G., LA IGLESIA, Á., RIUS, J. & FERNÁNDEZ SANTÍN, S. (2003): Calderonite, a new lead–iron–vanadate of the brackebuschite group. *American Mineralogist* **88**, 1703-1708.

Cattiite

$Mg_3(PO_4)_2•22H_2O$

TRICLINIC

Locality: Zhelezny mine, Kovdor Massif, Kola Peninsula, Russia.

Occurrence: In cavities in dolomite carbonatite. Associated minerals are: dolomite, bakhchisaraitsevite, nastrophite, magnetite, sjögrenite and carbonate-fluorapatite.

General appearance: Crystalline masses up to 1.5 cm.

Physical, chemical and crystallographic properties: *Luster*: vitreous, pearly on cleavages. *Diaphaneity*: transparent. *Color*: colorless. *Streak*: white. *Luminescence*: not observed. *Hardness*: 2. *Tenacity*: not mentioned. *Cleavage*: {001} perfect. *Fracture*: uneven. *Density*: 1.65 g/cm^3 (meas.), 1.64 g/cm^3 (calc.). ***Crystallography***: Triclinic, $P\bar{1}$, a 6.932, b 6.925, c 16.154 Å, α 82.21, β 89.70, γ 119.51°, V 666.3 Å^3, Z = 1, a:b:c = 1.0010:1:2.3327. Morphology: {001}. Twinning: none mentioned. ***X-ray powder-diffraction data***: 7.98(100)(002), 5.32(63)(003), 3.19(45)(1$\bar{1}$4), 2.896(33)(202), 2.867(30)($\bar{2}$22), 2.728(32)(1$\bar{1}$5), 2.658(37)(006). ***Optical data***: Biaxial (–), α 1.459, β 1.470, γ 1.470, 2V(meas.) 25°, 2V(calc.) 0°; dispersion $r < v$, weak; nonpleochroic; $X \wedge c$ = 80°, $Y \wedge a$ = 10°, $Z \wedge c$ = 90°, optic axial plane close to (001). ***Chemical analytical data***: A wet-chemical analysis of a 243.5 mg sample (H_2O by weight loss at 1000° C) gave: MgO 18.0, FeO 0.1, P_2O_5 21.8, H_2O 60.8, Total 100.7 wt.%. Empirical formula: $(Mg_{2.92}Fe_{0.01})_{\Sigma 2.93}(PO_4)_{2.01}•22.05H_2O$. ***Relationship to other species***: It is the natural -1*A*2 polytype of synthetic $Mg_3(PO_4)_2•22H_2O$.

Name: After Michele Catti (b. 1945), Professor of Physical Chemistry, University of Milano Bicocca, Italy, for his contributions to the crystal chemistry of hydrated oxysalts.

Comments: IMA No. 2000–032.

BRITVIN, S.N., FERRARIS, G., IVALDI, G., BOGDANOVA, A.N. & CHUKANOV, N.V (2002): Cattiite, $Mg_3(PO_4)_2•22H_2O$, a new mineral from Zhelezny mine (Kovdor Massif, Kola Peninsula, Russia). *Neues Jahrbuch für Mineralogie, Monatshefte*, 160-168.

Čejkaite

$Na_4(UO_2)(CO_3)_3$

TRICLINIC

Locality: The Geschieber vein, Svornost mine, Jáchymov, northwestern Bohemia, Czech Republic.

Occurrence: An efflorescence on a calcite vein with disintegrated uraninite in a single specimen. Secondary associated minerals are andersonite and schröckingerite, but they are not in direct contact with čejkaite.

General appearance: An earthy efflorescence consisting of crystals from 0.2 to 0.6 μm.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: not observed. *Color*: pale yellow to beige. *Streak*: light yellow. *Luminescence*: fluoresces weak yellow to yellow-green in short- and long-wave ultraviolet light. *Hardness*: could not be determined. *Tenacity*: could not be determined. *Cleavage*: could not be determined. *Fracture*: could not be determined. *Density*: 3.67 g/cm^3 (meas.), 3.77 g/cm^3 (calc.). ***Crystallography***: Triclinic, *P*1 or $P\bar{1}$, *a* 9.291, *b* 9.292, *c* 12.895 Å, α 90.73, β 90.82, γ 120.00°, *V* 963.7 Å^3, *Z* = 4, *a*:*b*:*c* = 0.9999:1:1.3878. Morphology: no forms were identified, but individual crystallites display indistinct hexagonal morphology in TEM images. Twinning: none mentioned. ***X-ray powder-diffraction data***: 8.022(92)($1\bar{1}0$,010,100), 5.080(57)($\bar{1}02$,$0\bar{1}2$), 5.024(60)($\bar{1}12$,$1\bar{1}2$), 4.967(68)(012,102), 4.639(100)($1\bar{2}0$,$2\bar{1}0$,110), 3.221(63)(004), 2.681(60)($3\bar{3}0$,$\overline{1}\,\overline{1}4$,030,300). ***Optical data***: could not be determined owing to the extremely small grain-size. The mean index of refraction derived from Gladstone–Dale calculations is 1.5825, which is consistent with the mean index of refraction measured for the trigonal polymorph of $Na_4(UO_2)(CO_3)_3$. ***Chemical analytical data***: A combination of ICP–MS and thermal analysis (with CO_2 by difference) gave: Na_2O 21.39, MgO 0.15, FeO 0.53, UO_3 53.93, CO_2 (24.00), Total (100.00) wt.%. Empirical formula: $(Na_{3.77}Fe_{0.04}Mg_{0.02})_{\Sigma 3.83}(UO_2)_{1.03}(CO_3)_{2.98}$. ***Relationship to other species***: It is structurally similar to synthetic trigonal $Na_4(UO_2)(CO_3)_3$.

Name: After Jiří Čejka (b. 1929), former Director of the Museum of Natural History of the National Museum in Prague, in recognition of his numerous contributions to the crystal chemistry of uranium minerals.

Comments: IMA No. 1999–045.

ONDRUŠ, P., SKÁLA, R., VESELOVSKÝ, F., SEJKORA, J. & VITTI, C. (2003): Čejkaite, the triclinic polymorph of $Na_4(UO_2)(CO_3)_3$ – a new mineral from Jáchymov, Czech Republic. *American Mineralogist* **88**, 686-693.

Clinobarylite

$BaBe_2Si_2O_7$

MONOCLINIC

Locality: Mount Yukspor, Khibina massif, Kola Peninsula, Russia.

Occurrence: In four alkaline pegmatite veins. Associated minerals are: natrolite, aegirine, microcline, catapleiite, fluorapatite, titanite, fluorite, galena, sphalerite, strontianite, annite, astrophyllite, lorenzenite, labuntsovite-Mn, kuzmenkoite-Mn, cerite-(Ce), edingtonite, ilmenite and calcite.

General appearance: Platy to prismatic crystals (up to 20 × 4 × 1 mm) and radiating aggregates.

Physical, chemical and crystallographic properties: *Luster*: strong, vitreous. *Diaphaneity*: transparent. *Color*: colorless. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: 6½. *Tenacity*: brittle. *Cleavage*: {100} perfect, {001} and {101} less perfect. *Fracture*: uneven. *Density*: 3.97 g/cm^3 (meas.), 4.10 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *Pm*, *a* 11.618, *b* 4.904, *c* 4.655 Å, β 89.94°, *V* 265.2 Å^3, *Z* = 2, *a*:*b*:*c* = 2.3691:1:0.9492. Morphology: {100}, {010}, {201}, {$\bar{2}$01}; less common forms are {610}, {101}, {$\bar{1}$01}. Twinning: micro-twinning about [010]. ***X-ray powder-diffraction data***: 3.389(84)(011), 3.249(45)(111,11$\bar{1}$), 3.043(40)(310), 2.926(55)(211,21$\bar{1}$), 2.458(100)(020), 2.335(48)(002). ***Optical data***: Biaxial (+), α 1.698, β 1.700, γ 1.705, 2*V*(meas.) 70°, 2*V*(calc.) 65°; dispersion not observed; nonpleochroic; $X \wedge a = 6°$, $Y \wedge c$ 5.5°, $Z = b$. ***Chemical analytical data***: Mean of four sets of electron-microprobe data (BeO by atomic emission): BaO 47.66, BeO 14.90, SiO_2 36.38, Total 98.94 wt.%. Empirical formula: $Ba_{1.03}Be_{1.97}Si_{2.00}O_{7.00}$. ***Relationship to other species***: It has a dimorphic relationship with barylite (orthorhombic).

Name: Reflects the relationship to barylite.

Comments: IMA No. 2002–015.

CHUKANOV, N.V., PEKOV, I.V., RASTSVETAEVA, R.K., CHILOV, G.V. & ZADOV, A.E. (2003): Clinobarylite, $BaBe_2Si_2O_7$, a new mineral from Khibiny massif, Kola Peninsula. *Zapiski Vserossiyskogo Mineralogicheskogo Obshchestva* **132**(1), 29-37 (in Russ.).

Eveslogite

$(Ca,K,Na,Sr,Ba)_{48}[(Ti,Nb,Fe,Mn)_{12}(OH)_{12}Si_{48}O_{144}](F,OH,Cl)_{14}$

MONOCLINIC

Locality: Mount Eveslogchorr, Khibina alkaline massif, Kola Peninsula, Russia.

Occurrence: As a monomineralic veinlet cross-cutting poikilitic nepheline syenite. Associated minerals are: nepheline, potassium feldspar, biotite, shcherbakovite, astrophyllite, fluorapatite.

General appearance: Subparallel intergrowths of fine-fibrous crystals (up to 0.005 mm thick and 5 cm long); aggregates 10 to 15 cm across.

Physical, chemical and crystallographic properties: *Luster*: silky. *Diaphaneity*: translucent. *Color*: light brown, yellow. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: 5. *Tenacity*: brittle. *Cleavage*: {001} perfect (mica-like), {010} good. *Fracture*: splintery or fibrous. *Density*: 2.85 g/cm^3 (meas.), 2.91 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *P*2/*m* (?), *a* 14.069, *b* 24.937, *c* 44.31 Å, γ 95.02°, *V* 15,486 Å^3, *Z* = 4, *a*:*b*:*c* = 0.5642:1:1.7769. Morphology: {001}, flattened on {001} and elongate along [100]. Twinning: none observed. ***X-ray powder-diffraction data***: 12.33(51)(020), 6.199(42)(040), 3.127(65)($\bar{4}$26), 3.110(52)($\bar{3}$64), 2.990(59)(2.3.12), 2.940(45)($\bar{2}$.4.12), 2.835(100)(428). ***Optical data***: Biaxial (–), α 1.631, β 1.641, γ 1.647, 2*V*(meas.) 82°, 2*V*(calc.) 75°; dispersion not observed; pleochroism marked, *X* colorless, *Y* and *Z* yellow, $Z \approx Y > X$; $X \approx a$, $Y \wedge c = 5°$ in obtuse angle β, $Z = b$ (the authors give $X \approx a$, $Y = c$, $Z \wedge b = 5°$ in obtuse angle γ, but this is not possible in a monoclinic crystal). ***Chemical analytical data***: A 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, Al_2O_3 0.32, Fe_2O_3 0.23, TiO_2 6.52, ZrO_2 0.35, Nb_2O_5 6.56, Ta_2O_5 0.25, SiO_2 41.96, H_2O 2.85, F 2.72, Cl 0.42, sum 101.57, less O = F + Cl 1.24, Total 100.33 wt.%. Empirical formula: $(Ca_{22.46}K_{12.27}Na_{10.03}Sr_{1.80}Ba_{1.25})_{\Sigma 47.81}(Ti_{5.53}Nb_{3.34}Mn_{0.95}Fe^{2+}_{0.83}Fe^{3+}_{0.20}Zr_{0.19}Rb_{0.14}Ta_{0.08})_{\Sigma 11.26}(OH)_{12.00}(Si_{47.30}Al_{0.43})_{\Sigma 47.73}[O_{138.08}(OH)_{9.42}F_{9.70}Cl_{0.80}]_{\Sigma 158.00}$. ***Relationship to other species***: It is a mixed-layered titanosilicate with an astrophyllite-like structure.

Name: After the locality.

Comments: IMA No. 2001–023A.

MENSHIKOV, YU.P., KHOMYAKOV, A.P., FERRARIS, G., BELLUSO, E., GULA, A. & KULCHITSKAYA, E.A. (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. *Zapiski Vserossiyskogo Mineralogicheskogo Obshchestva* **132**(1), 59-67 (in Russ.).

Ferrohögbomite-2*N*2*S*

$(Fe^{2+}{}_3ZnMgAl)_{\Sigma 6}(Al_{14}Fe^{3+}Ti^{4+})_{\Sigma 16}O_{30}(OH)_2$

HEXAGONAL

Locality: Aïn Taïba, at the northwestern edge of Grand Erg Oriental, Sahara Desert, Algeria (Lat. 30° 16.44'N, Long. 5° 48.94'E, 227 m above sea level). The mineral also has been found at the following localities: Lusaka, Zambia; Strangways Range, central Australia; Benson mine, Adirondack Mountains, New York, USA; Prince Olav Coast, eastern Antarctica.

Occurrence: At the type locality (Aïn Taïba), the mineral was found in an isolated rock. Associated minerals are: hematite, ilmenite, pseudorutile, magnetite and hercynite.

General appearance: Euhedral grains up to 0.3 mm along grain boundaries and in fissures within ilmenite, pseudorutile and hematite. Some grains are closely associated with hercynite.

Physical, chemical and crystallographic properties: *Luster*: adamantine. *Diaphaneity*: translucent. *Color*: reddish brown. *Streak*: brownish. *Luminescence*: nonfluorescent. *Hardness*: 6 to 7. *Tenacity*: brittle. *Cleavage*: {001} pronounced. *Fracture*: conchoidal. *Density*: could not be measured because the mineral is intergrown with other minerals, 4.04 g/cm^3 (calc.). ***Crystallography***: Hexagonal, $P6_3mc$, a 5.712, c 18.317 Å, V 517.6 Å^3, Z = 1, c:a = 3.2068. Morphology: no forms were observed. Twinning: by merohedry with the inversion center as the twin operation. ***X-ray powder-diffraction data***: 2.867(38)(110), 2.608(66)(016), 2.433(91)(114), 2.058(34)(025), 1.601(60)(126,003), 1.557(35)(034), 1.478(78)(0.2.10), 1.434(100)(220). See Comments. ***Optical data***: Uniaxial (–), indices of refraction could not be measured (material of similar composition has ω 1.852, ε 1.827), pleochroic from orange-brown to yellow. ***Chemical analytical data***: Mean of 32 sets of electron-microprobe data (Fe_2O_3 and FeO calculated from total FeO to give charge balance; H_2O calculated to give 2H): MgO 3.27, CaO 0.02, MnO 0.25, FeO 16.35, NiO 0.05, ZnO 5.88, Al_2O_3 59.28, Cr_2O_3 0.09, Fe_2O_3 8.05, Ga_2O_3 0.25, SiO_2 0.04, TiO_2 5.04, SnO_2 0.38, H_2O (1.42), Total (100.37) wt.%. Empirical formula: $(Fe^{2+}{}_{2.91}Zn_{0.93}Mg_{1.04}Mn_{0.05}Ni_{0.01}Al_{1.06})_{\Sigma 6.00}$ $(Al_{13.84}Fe^{3+}{}_{1.29}Ti_{0.81}Ga_{0.03}Sn_{0.03}$ $Cr^{3+}{}_{0.02}Si_{0.01})_{\Sigma 16.03}$ $O_{28.98}(OH)_{2.02}$. ***Relationship to other species***: It is the Fe^{2+}-dominant, -2*N*2*S* polysome of the högbomite group.

Name: Given in compliance with the approved nomenclature of the högbomite group. This mineral formerly was known as "högbomite-8*H*".

Comments: IMA No. 2001–048. The X-ray powder-diffraction data were calculated and compare very well with data measured for material of similar composition.

HEJNY, C., GNOS, E., GROBETY, B. & ARMBRUSTER, T. (2002): Crystal chemistry of the polysome ferrohögbomite-2*N*2*S*, a long-known but newly defined mineral species. *European Journal of Mineralogy* **14**, 957-967.

Ferrosaponite

$Ca_{0.3}(Fe^{2+},Mg,Fe^{3+})_3(Si,Al)_4O_{10}(OH)_2 \bullet 4H_2O$

MONOCLINIC

Locality: Levoberezhye Iceland spar deposit, Nizhnyaya Tunguska River, Evenkiya, Siberia, Russia.

Occurrence: A hydrothermal mineral associated with pillow basalt lavas. Associated minerals are: calcite, pyrite, "chalcedony", mordenite, heulandite-Ca and stilbite-Ca.

General appearance: Spherulites up to 2 mm in diameter in transparent calcite.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: translucent. *Color*: dark green. *Streak*: green. *Luminescence*: nonfluorescent. *Hardness*: 2. *Tenacity*: sectile. *Cleavage*: {001} perfect. *Fracture*: uneven. *Density*: 2.49 g/cm^3 (meas.), 2.39 g/cm^3 (calc.) [see Comments]. ***Crystallography***: Monoclinic, space group unknown but probably a *C*-cell [see Comments], *a* 5.365, *b* 9.337, *c* 14.65 Å, β 94.9°, *V* 731 Å^3, *Z* = 2, *a*:*b*:*c* = 0.5746:1:1.5690. Morphology: no forms were mentioned. Twinning: none observed. ***X-ray powder-diffraction data***: 7.37(90)(002), 4.72(90)(020), 3.80(80)(112), 3.03(100)(031), 2.585(90)(201), 2.429(90)(006), 1.549(90)(060). ***Optical data***: Biaxial (–), α 1.282 [see Comments], β 1.641, γ 1.642, 2*V*(meas.) 5°, dispersion not observed; pleochroic brown, *Z* > *Y*; *X* ≈ *c*. ***Chemical analytical data***: Mean of five sets of electron-microprobe data (with H_2O by TGA): Na_2O 0.21, K_2O 0.07, MgO 6.62, CaO 3.31, FeO 21.23, Al_2O_3 9.95, Fe_2O_3 8.78, SiO_2 33.15, H_2O 17.92, Total 101.24 wt.%. Empirical formula: $(Ca_{0.31}Na_{0.04}K_{0.01})_{\Sigma 0.36}$ $(Fe^{2+}{}_{1.54}M_{0.85}Fe^{3+}{}_{0.45})_{\Sigma 2.84}$ $(Si_{2.87}Al_{1.01}Fe^{3+}{}_{0.12})_{\Sigma 4.00}O_{9.67}(OH)_{2.33} \bullet 4.00H_2O$. ***Relationship to other species***: It is a member of the smectite group, specifically the Fe^{2+}-dominant analogue of saponite.

Name: Reflects the relationship to saponite.

Comments: IMA No. 2002–028. There are some inconsistencies in this description: (1) the authors give the calculated density as 2.435 g/cm^3, but using the given unit-cell and chemical data, a value of 2.39 g/cm^3 is calculated; (2) the authors state that the unit cell probably is *P*-centered, but by analogy with saponite, it should be *C*-centered; (3) the α index of refraction is given as 1.448, and stated to have been calculated by the Gladstone–Dale relationship, but no explanation of how this was done is given; the value α 1.282 was calculated here from β, γ and 2*V*.

CHUKANOV, N.V., PEKOV, I.V., ZADOV, A.E., CHUKANOVA, V.N. & MÖKKEL, S. (2003): Ferrosaponite $Ca_{0.3}(Fe^{2+},Mg,Fe^{3+})_3(Si,Al)_4O_{10}(OH)_2 \bullet 4H_2O$, the new trioctahedral smectite. *Zapiski Vserossiyskogo Mineralogicheskogo Obshchestva* **132**(2), 68-74 (in Russ.).

Galgenbergite-(Ce)

$Ca(REE)_2(CO_3)_4 \bullet H_2O$

TRICLINIC

Locality: The railroad tunnel Galgenberg, Jassing, between Leoben and St. Michael, Styria, Austria (Lat. 47° 20'48"N, Long. 15° 2'19"E, altitude 570 m above sea level).

Occurrence: In small fissures of an albite–chlorite schist. Associated minerals are: calcite, siderite, pyrite and kaolinite.

General appearance: Rosette aggregates about 1 mm in diameter composed of idiomorphic crystals about 0.6 mm long.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent to translucent. *Color*: colorless to white. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: not determined owing to the small size of crystals. *Tenacity*: brittle. *Cleavage*: {001} perfect. *Fracture*: splintery. *Density*: could not be measured, 3.99 g/cm^3 (calc.). ***Crystallography***: Triclinic, $P\bar{1}$, a 6.388, b 6.386, c 12.388 Å, α 96.54, β 100.85, γ 100.51°, V 482.2 Å^3, Z = 2, a:b:c = 1.0003:1:1.9399. Morphology: {001}, {101}, {010}, tabular on {001}. Twinning: none observed. ***X-ray powder-diffraction data***: 5.901(59)($0\bar{1}1$), 5.049(100)(101), 4.695(38)($0\bar{1}2$), 4.468(38)($1\bar{1}1$), 3.899(49)($\bar{1}12$), 3.229(33)($\bar{1}\bar{1}3$), 3.125(45)($0\bar{2}1$), 3.0051(65)(004). ***Optical data***: Biaxial (–), α 1.635, β 1.725, γ 1.750, 2V(calc.) 53°; dispersion not measurable; nonpleochroic; $X \wedge a$ = 119°, $Y \wedge a$ = 46°, $Z \wedge a$ = 121°; $X \wedge b$ = 62°, $Y \wedge b$ = 120°, $Z \wedge b$ = 137°; $X \wedge c$ = 37°, $Y \wedge c$ = 59°, $Z \wedge c$ = 73°. ***Chemical analytical data***: Mean of six sets of electron-microprobe data (H_2O and CO_2 calculated here to give 1 H_2O and 4 CO_3, as indicated by the crystal-structure determination): CaO 9.22, Ce_2O_3 28.11, La_2O_3 11.36, Nd_2O_3 11.52, Pr_2O_3 3.38, CO_2 (29.13), H_2O (2.98), Total (95.70) wt.%. Empirical formula: $Ca_{0.99}(Ce_{1.04}La_{0.42}Nd_{0.41}Pr_{0.12})_{\Sigma 1.99}(CO_3)_{4.00} \bullet 1.00H_2O$. ***Relationship to other species***: It is chemically similar to various Ca–REE-carbonates, but the structure is different.

Name: Recalls the locality.

Comments: IMA No. 1997–036. Only an extended abstract of this description has been published (see below), but Prof. Dr. Franz Walter (Universität Graz) kindly supplied additional information. The crystal structure has been solved.

HOLLERER, C.E. (1998): $Ca(REE)_2(CO_3)_4 \bullet H_2O$, ein neues Mineral aus der Steiermark, Österreich. *Mitteilungen der Österreichische Mineralogischen Gesellschaft* **143**, 200-201.

WALTER, F. (2003): personal communication.

Glagolevite

$NaMg_6[Si_3AlO_{10}](OH,O)_8 \bullet H_2O$

TRICLINIC

Locality: Kovdor phlogopite quarry, Kovdor massif, Kola Peninsula, Russia.

Occurrence: Associated minerals are: vesuvianite, pectolite, monticellite, diopside, phlogopite, andradite, apatite, magnetite, olivine, calcite.

General appearance: Massive aggregates (up to several cm); platy grains 1 to 15 mm.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: colorless. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: 3 to 5. *Tenacity*: sectile. *Cleavage*: {001} perfect. *Fracture*: uneven. *Density*: 2.66 g/cm^3 (meas.), 2.73 g/cm^3 (calc.). ***Crystallography***: Triclinic, *C*1, *a* 5.354, *b* 9.263, *c* 14.653 Å, α 89.86, β 96.844, γ 90.03°, *V* 721.5 Å^3, *Z* = 2, *a*:*b*:*c* = 0.5780:1:1.5819. Morphology: {001}, habit tabular on {001}. Twinning: none observed. ***X-ray powder-diffraction data***: 7.266(50)(002), 4.629(30)(020,1$\bar{1}$0,110), 2.992(40)(11$\bar{4}$), 2.597(60)(131,20$\bar{2}$,1$\bar{3}$1), 2.556(100)(201,1$\bar{3}\bar{2}$,13$\bar{2}$), 2.457(50)(132,1$\bar{3}$2,20$\bar{3}$), 1.544(100)(2$\bar{3}\bar{1}$,33$\bar{1}$,060). ***Optical data***: Biaxial (+), α 1.569, β(calc.) 1.569, γ 1.571, 2*V*(meas.) 17°; dispersion not observed; nonpleochroic; $Z \approx c$. ***Chemical analytical data***: Mean of four sets of electron-microprobe data (H_2O by TGA): Na_2O 3.94, MgO 37.23, MnO 0.11, FeO 0.38, Al_2O_3 13.36, SiO_2 29.24, H_2O 14.5, Total 98.76 wt.%. Empirical formula: $Na_{0.76}(Mg_{5.55}Al_{0.49}Fe_{0.03}Mn_{0.01})_{\Sigma 6.08}[(Si_{2.92}Al_{1.08})_{\Sigma 4.00}O_{10.00}][(OH)_{7.67}O_{0.33}]_{\Sigma 8.00} \bullet 1.00H_2O$. ***Relationship to other species***: It is chemically related to clinochlore, but is a new structure-type.

Name: After A.A. Glagolev (1927–1993), Russian petrographer who worked at Kovdor for many years.

Comments: IMA No. 2001–064.

SEREDKIN, M.V., ORGANOVA, N.I., KRIVOVICHEV, S.V., ARMBRUSTER, T., MOISEEV, M.M., CHUKANOV, N.V., CHUKANOVA, V.N., BURNS, P.C., MARSIY, I.M., ZVYAGIN, B.B., KONONKOVA, N.N. & SIVTSOV, A.V. (2003): Glagolevite, $NaMg_6[Si_3Al_{10}](OH,O)_8 \bullet H_2O$, a new mineral. *Zapiski Vserossiyskogo Mineralogicheskogo Obshchestva* **132**(1), 67-75 (in Russ.).

Graulichite-(Ce)

$CeFe^{3+}_3(AsO_4)_2(OH)_6$

TRIGONAL

Locality: Hourt, 2 km north of Vielsalm, in the southeastern border region of the Stavelot Massif, Ardennes, Belgium.

Occurrence: In quartzites associated minerals with: arsenopyrite, scorodite, mimetite, pharmacosiderite, barium-pharmacosiderite and goethite.

General appearance: Spherical aggregates 80 to 150 μm in diameter, made up of rhombohedral crystals 50 to 80 μm across.

Physical, chemical and crystallographic properties: *Luster*: resinous. *Diaphaneity*: transparent. *Color*: light green to brownish. *Streak*: not given. *Luminescence*: nonfluorescent. *Hardness*: not given. *Tenacity*: not given. *Cleavage*: none. *Fracture*: irregular. *Density*: greater than 3.9 g/cm^3 (meas.), 4.40 g/cm^3 (calc.). ***Crystallography***: Trigonal, $R\bar{3}m$, *a* 7.260, *c* 16.77 Å, *V* 765.5 Å^3, *Z* = 3, *c*:*a* = 2.3099. Morphology: {102}, {101}. Twinning: none mentioned. ***X-ray powder-diffraction data***: 5.906(25)(101), 3.636(40)(110), 3.052(100)(113), 2.792(30)(006), 2.239(35)(107), 1.968(25)(303), 1.817(35)(220). ***Optical data***: Uniaxial (–), mean *n* close to 1.97, pleochroism light green to yellowish. ***Chemical analytical data***: Mean of 33 sets of electron-microprobe data (with H_2O calculated to give OH + H_2O = 6): CaO 0.03, SrO 0.24, BaO 3.95, PbO 0.07, Al_2O_3 3.09, Fe_2O_3 30.65, La_2O_3 2.26, Ce_2O_3 15.73, Nd_2O_3 2.08, SiO_2 0.03, P_2O_5 0.03, As_2O_5 31.20, H_2O (8.37), Total (97.79) wt.%. Empirical formula: $(Ce_{0.66}Ba_{0.18}La_{0.10}Nd_{0.09}Sr_{0.02})_{\Sigma 1.05}$ $(Fe^{3+}_{2.65}Al_{0.42})_{\Sigma 3.07}$ $[(As_{1.88}S_{0.01}\square_{0.11})_{\Sigma 2.00}O_{8.00}]$ $[(OH)_{5.62}(H_2O)_{0.40}]_{\Sigma 6.02}$. ***Relationship to other species***: It is a member of the crandallite group and the Fe^{3+}-dominant analogue of arsenoflorencite-(Ce), $CeAl_3(AsO_4)_2(OH)_6$.

Name: After Jean-Marie Graulich (1920–2001), mining engineer and honorary director of the Geological Survey of Belgium, in recognition of his contributions to the knowledge of the geology of the Stavelot Massif.

Comments: IMA No. 2002–001.

HATERT, F., LEFÈVRE, P., PASERO, M. & FRANSOLET, A.-M. (2003): Graulichite-(Ce), a new arsenate mineral from the Stavelot Massif, Belgium. *European Journal of Mineralogy* **15**, 733-739.

Greifensteinite

$Ca_2Be_4(Fe^{2+},Mn)_5(PO_4)_6(OH)_4 \bullet 6H_2O$

MONOCLINIC

Locality: Greifenstein, Saxony, Germany.

Occurrence: In a Li-rich granitic pegmatite. Associated minerals are: albite, K-feldspar, roscherite, viitaniemiite, childrenite, quartz, apatite, herderite, elbaite and montmorillonite.

General appearance: Radiating aggregates up to 5 mm.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: dark olive green. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: 4½. *Tenacity*: brittle. *Cleavage*: {100} good. *Fracture*: uneven. *Density*: 2.93 g/cm^3 (meas.), 2.93 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *C*2/*c*, *a* 15.903, *b* 11.885, *c* 6.677 Å, β 94.68°, *V* 1257.8 Å^3, *Z* = 2, *a*:*b*:*c* = 1.3381:1:0.5618. Morphology: {100} and {110}, habit prismatic. Twinning: none observed. ***X-ray powder-diffraction data***: 9.48(10)(110), 5.94(8)(020), 4.82(6)(310), 3.96(9)(400), 3.068(6)(510), 2.982(7)(202), 2.783(8)(240), 2.638(7)(600). ***Optical data***: Biaxial (–), α 1.624, β 1.634, γ 1.638, 2*V*(meas.) 80°, 2*V*(calc.) 64°; dispersion not observed; pleochroic, *X* light blue-green, *Y* light-green, *Z* brown to green; *X* = *b*. ***Chemical analytical data***: Mean of five sets of electron-microprobe data (H_2O by TGA): BeO 9.24, MgO 0.34, CaO 9.98, MnO 5.56, FeO 22.42, Al_2O_3 1.05, P_2O_5 38.36, H_2O 13.6, Total 100.55 wt.%. Empirical formula: $Ca_{1.96}Be_{4.07}$ $(Fe^{2+}_{3.44}Mn_{0.86}Al_{0.23}Mg_{0.09})_{\Sigma 4.62}$ $(PO_4)_{5.96}(OH)_{3.65} \bullet 6.50H_2O$. ***Relationship to other species***: It is the Fe^{2+}-dominant member of the roscherite group.

Name: Recalls the type locality.

Comments: IMA No. 2001–044.

CHUKANOV, N.V., MÖCKEL, S., RASTSVETAEVA, R.K. & ZADOV, A.E. (2002): Greifensteinite $Ca_2Be_4(Fe^{2+},Mn)_5(PO_4)_6(OH)_4 \bullet 6H_2O$ – a new mineral from Greifenstein, Saxony. *Zapiski Vserossiyskogo Mineralogicheskogo Obshchestva* **131**(4), 47-52 (in Russ.).

RASTSVETAEVA, R.K., GURBANOVA, O.A. & CHUKANOV, N.V. (2002): Crystal structure of greifensteinite, $Ca_2Be_4(Fe^{2+},Mn)_5(PO_4)_6(OH)_4 \bullet 6H_2O$. *Doklady Chemistry* **383**, 78-81.

Magnesiostaurolite

$\square_4Mg_4Al_{16}(Al_2\square_2)Si_8O_{40}[(OH)_2O_6]$

MONOCLINIC

Locality: The Dora–Maira massif, especially in the Vallone di Gilba, Val Varaita, Western Alps, Italy.

Occurrence: As inclusions in pyrope megablasts from coesite-bearing metamorphic terrane. Associated minerals are: pyrope, talc, clinochlore, kyanite, rutile, magnesiodumortierite, corundum, magnesiochloritoid, ellenbergerite, chlorite.

General appearance: Anhedral isolated grains from a few tens to 250 μm across.

Physical, chemical and crystallographic properties: Most of the following properties refer to the mineral in thin section or are inferred. *Luster*: probably vitreous to resinous. *Diaphaneity*: transparent. *Color*: colorless. *Streak*: probably white. *Luminescence*: nonfluorescent. *Hardness*: probably 7 to 7½. *Tenacity*: probably brittle. *Cleavage*: not observed. *Fracture*: not observed. *Density*: could not be measured, 3.54 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *C*2/*m*, *a* 7.8706, *b* 16.5411, *c* 5.6323 Å, β 90.007°, *V* 733.3 Å^3, *Z* = 1, *a*:*b*:*c* = 0.4758:1:0.3405. Morphology: no forms were mentioned. Twinning: none, but a "tweed" texture was observed between crossed nicols. ***X-ray powder-diffraction data***: 4.139(23.6)(040), 3.516(21.6)(131), 3.001(20.3)(221), 2.678(38.0)(151), 2.390(50.4)(132), 2.370(32.8)(330), 2.356(24.0)(311), 1.968(100.0)(062), 1.511(23.3)(192), 1.407(23.0)(004), 1.391(81.8)(246), 1.377(21.8)(0.12.0). ***Optical data***: Biaxial (sign unknown), mean *n* 1.709, 2*V*(meas.) close to 90°; nonpleochroic; orientation unknown. ***Chemical analytical data***: Mean of three sets of electron-microprobe data: Li_2O 0.90, MgO 7.77, FeO 0.72, ZnO 0.10, Al_2O_3 57.45, SiO_2 30.66, TiO_2 0.18, H_2O 2.30, Total 100.08 wt.%. Empirical formula: $\square_{3.12}Mg_{0.72}Fe_{0.16})_{\Sigma 4.00}(Mg_{1.85}Li_{0.94}Zn_{0.02}\square_{1.19})_{\Sigma 4.00}$ $(Al_{15.96}Ti_{0.04})_{\Sigma 16.00}$ $(Al_{1.58}Mg_{0.45}\square_{1.97})_{\Sigma 4.00}$ $(Si_{7.96}Al_{0.04})_{\Sigma 8.00}O_{40.04}[(OH)_{3.98}O_{4.02}]_{8.00}$. ***Relationship to other species***: It is the Mg-dominant analogue of staurolite and zincostaurolite.

Name: Recalls the relationship to staurolite.

Comments: IMA No. 1992–035.

CHOPIN, C., GOFFÉ, B., UNGARETTI, L. & OBERTI, R. (2003): Magnesiostaurolite and zincostaurolite: mineral description with a petrogenetic and crystal-chemical update. *European Journal of Mineralogy* **15**, 167-176.

Magnesiotantalite

$(Mg,Fe)(Ta,Nb)_2O_6$

ORTHORHOMBIC

Locality: Lipovka pegmatite field, Rezh district, Central Urals, Russia.

Occurrence: Intergrowths of magnesiotantalite, ferrotantalite, ferrocolumbite and uranium-bearing microlite form rims on manganotantalite crystals in andesine–calcite nests in a deeply desilicated granite pegmatite that cross-cuts serpentinite near its contact with marble. Other associated minerals are: dravite–uvite series, chrysoberyl, phlogopite, magnesiohornblende–edenite series, cordierite, phenakite, clinochlore, among others.

General appearance: Flattened irregular grains up to 0.4 mm and segregations up to 0.7 mm.

Physical, chemical and crystallographic properties: *Luster*: semimetallic to metallic. *Diaphaneity*: opaque. *Color*: black. *Streak*: brown-red. *Hardness*: VHN_{50} 489 kg/mm^2, Mohs 5½. *Tenacity*: brittle. *Cleavage*: not observed. *Fracture*: uneven. *Density*: 6.7 g/cm^3 (meas.), 6.79 g/cm^3 (calc.). ***Crystallography***: Orthorhombic, *Pbcn*, *a* 14.335, *b* 5.735, *c* 5.058 Å, *V* 415.8 Å^3, *Z* = 4, *a*:*b*:*c* = 2.4996:1:0.8820. Morphology: no forms were observed, flattened on {010}? Twinning: none observed. ***X-ray powder-diffraction data***: 3.67(60)(310,111), 2.96(100)(311), 1.774(60)(330), 1.746(50)(602), 1.728(70)(621), 1.545(50)(910), 1.462(90)(911,332). ***Optical data***: In reflected light: light gray, weak anisotropism, very weak bireflectance, nonpleochroic. $R_{max.}$, $R_{min.}$:

(15.20, 14.02) 400 nm	(15.18, 13.69) 410 nm	(15.05, 13.49) 420 nm
(14.79, 13.27) 430 nm	(14.53, 12.95) 440 nm	(14.28, 12.76) 450 nm
(13.97, 12.82) 460 nm	(13.75, 12.95) **470** nm	(13.58, 13.05) 480 nm
(13.44, 13.13) 490 nm	(13.33, 13.20) 500 nm	(13.25, 13.22) 510 nm
(13.23, 13.19) 520 nm	(13.25, 13.18) 530 nm	(13.32, 13.20) 540 nm
(13.41, 13.19) **546** nm	(13.47, 13.28) 550 nm	(13.67, 13.45) 560 nm
(13.94, 13.67) 570 nm	(14.25, 13.94) 580 nm	(14.57, 14.24) **589** nm
(14.58, 14.25) 590 nm	(14.90, 14.58) 600 nm	(15.18, 14.90) 610 nm
(15.41, 15.16) 620 nm	(15.56, 15.32) 630 nm	(15.61, 15.31) 640 nm
(15.55, 15.15) **650** nm	(15.41, 14.83) 660 nm	(15.22, 14.48) 670 nm
(15.00, 14.12) 680 nm	(14.88, 13.93) 690 nm	(14.76, 13.76) 700 nm

Chemical analytical data: Mean of five sets of electron-microprobe data: MgO 5.27, MnO 0.82, FeO 6.71, TiO_2 0.38, Nb_2O_5 24.19, Ta_2O_5 61.86, Total 99.23 wt.%. Empirical formula: $(Mg_{0.56}Fe_{0.40}Mn_{0.05})_{\Sigma 1.01}(Ta_{1.20}Nb_{0.78})_{\Sigma 1.98}O_{6.00}$. ***Relationship to other species***: It is the Mg- and Ta-dominant member of the columbite group.

Name: Recalls the relationship to ferrotantalite and manganotantalite.

Comments: IMA No. 2002–018.

PEKOV, I.V., YAKUBOVICH, O.V., SHCHERBACHEV, D.K. & KONONKOVA, N.N. (2003): Magnesiotantalite, $(Mg,Fe)(Ta,Nb)_2O_6$, the new columbite–tantalite group mineral from desilicated granite pegmatites of Lipovka (the central Urals) and its genesis. *Zapiski Vserossiyskogo Mineralogicheskogo Obshchestva* **132**(2), 49-59 (in Russ.).

Marécottite

$Mg_3(H_2O)_{18}[(UO_2)_4O_3(OH)(SO_4)_2](H_2O)_{10}$

TRICLINIC

Locality: La Creusaz uranium prospect near the village of Les Marécottes, Canton Valais, Western Alps, Switzerland.

Occurrence: In hydrothermal breccia veins. Associated minerals are: uraninite, gypsum, rabejacite, johannite and some other new uranium species.

General appearance: Diamond-shaped platelets up to 500 μm long grouped into rosettes.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: yellow-orange. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: about 3. *Tenacity*: very brittle. *Cleavage*: {011} perfect. *Fracture*: not given. *Density*: the mineral sinks in Clerici solution with a density of 4.03 g/cm^3, 3.86 g/cm^3 (calc.). ***Crystallography***: Triclinic, $P\bar{1}$, *a* 10.815, *b* 11.249, *c* 13.851 Å, α 66.224, β 72.412, γ 69.955°, *V* 1422.1 Å^3, *Z* = 1, *a*:*b*:*c* = 0.9614:1:1.2313. Morphology: {011} is the prominent form. Twinning: results in two twinned individuals with the composition plane corresponding to the long axis of the crystal and perpendicular to {011}. ***X-ray powder-diffraction data***: 9.46(100)(0$\bar{1}$1), 8.63(20)(101), 4.73(80)(022), 3.44(80)(01$\bar{3}$,310), 3.39(70)(321,0$\bar{2}$2), 2.88(30)(303) and several other spacings with intensity 20. ***Optical data***: Biaxial (sign not given), the indices of refraction measured in the (011) face range from 1.735 to 1.750, pleochroism fair from pale-yellow to orange-yellow in the (011) face. ***Chemical analytical data***: Mean of eight sets of electron-microprobe data (with H_2O calculated): MgO 2.03, MnO 1.15, SO_3 8.95, UO_3 66.36, H_2O (14.73), Total (93.22) wt.%. Empirical formula: $(Mg_{1.79}Mn_{0.58})_{\Sigma 2.37}(UO_2)_{8.24}(SO_4)_{3.97}(OH)_{2.00}O_{5.64}\bullet 28.02H_2O$. ***Relationship to other species***: It is related to magnesium-zippeite.

Name: Recalls the locality.

Comments: IMA No. 2001–056. The paper gives the species name without an acute accent on the first "e"; it has been corrected here.

BRUGGER, J., BURNS, P.C. & MEISSER, N. (2003): Contributions to the mineralogy of acid drainage of uranium minerals: marecottite and the zippeite-group. *American Mineralogist* **88**, 676-685.

Nikischerite

$NaFe^{2+}{}_6Al_3(SO_4)_2(OH)_{18}\bullet 12H_2O$

TRIGONAL

Locality: Huanuni tin mine, about 50 km southeast of Oruro City, Dalence Province, Oruro Department, Bolivia.

Occurrence: Nikischerite does not occur in the cassiterite-bearing veins themselves, but rather in a later, low-temperature paragenesis filling fault zones that cut across the cassiterite veins. Associated minerals are: pyrite, pyrrhotite, siderite and cronstedtite in a brownish clay matrix.

General appearance: Small micaceous plates (up to 4 mm) forming isolated radiating balls comprised of stacked plates and aggregates up to almost 1 cm across. A second occurrence, found in the early 1990s, consists of dull, tabular aggregates on vivianite crystals.

Physical, chemical and crystallographic properties: *Luster*: dull to greasy. *Diaphaneity*: transparent to translucent. *Color*: Georgian green (RHS #139B), darker at the edges of aggregates and approaches grayish white at the cores. *Streak*: pale grayish green. *Luminescence*: nonfluorescent. *Hardness*: 2. *Tenacity*: brittle. *Cleavage*: {001} perfect. *Fracture*: irregular. *Density*: 2.33 g/cm^3 (meas.), 2.34 g/cm^3 (calc.). ***Crystallography***: Trigonal, $R\bar{3}$, *a* 9.352, *c* 33.08 Å, *V* 2505 Å^3, *Z* = 3, *c*:*a* = 3.5372. Morphology: {001}. Twinning: none observed. ***X-ray powder-diffraction data***: 10.980(100)(003), 5.539(60)(006), 4.311(20)(113), 3.674(50)(009), 2.624(25)(033), 2.425(30)(036), 2.176(20)(039), 1.932(30)(0.3.12). ***Optical data***: Uniaxial (–), ω 1.560, ε could not be determined, nonpleochroic. ***Chemical analytical data***: Mean of an unspecified number of sets of electron-microprobe data (with H_2O calculated to give 42 H): Na_2O 2.43, FeO 43.59, Al_2O_3 14.35, SO_3 13.54, H_2O (35.06), Total (108.97) wt.%. Empirical formula: $Na_{0.85}Fe^{2+}{}_{6.55}Al_{3.04}(SO_4)_{1.83}(OH)_{19.41}\bullet 11.30H_2O$. ***Relationship to other species***: It is the Fe^{2+}-dominant analogue of shigaite, $NaMn^{2+}{}_6Al_3(SO_4)_2(OH)_{18}\bullet 12H_2O$, and motukoreaite, $NaMg_6Al_3(SO_4)_2(OH)_{18}\bullet 12H_2O$.

Name: After Anthony (Tony) J. Nikischer (b. 1949), amateur mineralogist and mineral dealer of Peekskill, New York.

Comments: IMA No. 2001–039. Tony Nikischer kindly provided some of the data not given in the paper.

HUMINICKI, D.M.C., HAWTHORNE, F.C., GRICE, J.D., ROBERTS, A.C. & JAMBOR, J.L. (2003): Nikischerite, a new mineral from the Huanuni tin mine, Dalence Province, Oruro Department, Bolivia. *Mineralogical Record* **34**, 155-158.

HUMINICKI, D.M.C. & HAWTHORNE, F.C. (2003): The crystal structure of nikischerite, $NaFe^{2+}{}_6Al_3(SO_4)_2(OH)_{18}(H_2O)_{12}$, a mineral of the shigaite group. *Canadian Mineralogist* **41**, 79-82.

Paratsepinite-Ba

$(Ba,Na,K)_{2-x}(Ti,Nb)_2(Si_4O_{12})(OH,O)_2 \bullet 4H_2O$

MONOCLINIC

Locality: Lepkhe–Nelm Mountain, Lovozero massif, Kola Peninsula, Russia.

Occurrence: A hydrothermal mineral in an alkaline pegmatite. Associated minerals are: microcline, aegirine, nepheline, magnesio-arfvedsonite, eudialyte, lorenzenite, lamprophyllite, catapleiite, titanite, vinogradovite, tundrite-(Ce), apatite, neptunite, tsepinite-Na, kuzmenkoite-Zn, korobitsynite.

General appearance: Long, prismatic crystals (up to 5 mm) in cavities and as aggregates.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: brown. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: 5. *Tenacity*: brittle. *Cleavage*: not observed. *Fracture*: uneven. *Density*: 2.88 g/cm^3 (meas.), 2.95 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *C*2/*m*, *a* 14.551, *b* 14.001, *c* 15.702 Å, β 117.58°, *V* 2835 Å^3, *Z* = 8, *a*:*b*:*c* = 1.0393:1:1.1215. Morphology: no forms were observed. Twinning: none observed. ***X-ray powder-diffraction data***: 7.11(10)(020), 4.08(8)(310), 3.95(10)(202,20$\bar{4}$), 3.24(9)(400,40$\bar{4}$), 3.11(8)(042,024), 2.403(8)(60$\bar{2}$), 1.914(9)(20$\bar{8}$), 1.634(8)(75$\bar{5}$). ***Optical data***: Biaxial (+), α 1.667, β 1.674, γ 1.770, 2*V*(meas.) 30°, 2*V*(calc.) 32°; dispersion not observed; pleochroism not observed; $X \approx c$, $Y = b$, $Z \wedge a = 28°$ in obtuse angle β. ***Chemical analytical data***: Mean of five sets of electron-microprobe data (H_2O by TGA): Na_2O 1.80, K_2O 1.69, CaO 0.51, MnO 1.25, SrO 1.96, BaO 11.02, Al_2O_3 0.22, SiO_2 38.86, TiO_2 17.73, Nb_2O_5 11.60, H_2O 12.85, Total 99.50 wt.%. Empirical formula: $(Ba_{0.46}Na_{0.37}K_{0.23}Sr_{0.12}Mn_{0.11}Ca_{0.06})_{\Sigma 1.35}(Ti_{1.41}Nb_{0.55})_{\Sigma 1.96}(Si_{4.10}Al_{0.03})_{\Sigma 4.13}O_{12.39}[(OH)_{1.80}O_{0.20}]_{\Sigma 2.00} \bullet 3.62H_2O$. ***Relationship to other species***: It is a member of the labuntsovite group with Ba-dominant; the *c* parameter is twice that of tsepinite-Na.

Name: Recalls the relationship to tsepinite-Na.

Comments: IMA No. 2002–006.

CHUKANOV, N.V., PEKOV, I.V., ZADOV, A.E., ROZENBERG, K.A., RASTSVETAEVA, R.K., KRIVOVICHEV, S.V. & LEVITSKAYA, L.A. (2003): New minerals tsepinite-K $(K,Ba,Na)_2(Ti,Nb)_2(Si_4O_{12})(OH,O)_2 \bullet 3H_2O$ and paratsepinite-Ba $(Ba,Na,K)_{2-x}(Ti,Nb)_2(Si_4O_{12})(OH,O)_2 \bullet 4H_2O$ and their relationship with other labuntsovite group minerals. *Zapiski Vserossiyskogo Mineralogicheskogo Obshchestva* **132**(1), 38-51 (in Russ.).

CHUKANOV, N.V., PEKOV, I.V. & KHOMYAKOV, A.P. (2002): Recommended nomenclature for labuntsovite-group minerals. *European Journal of Mineralogy* **14**, 165-173.

Mineralogical Almanac
New publications of the 2003

♦ Geology of Gems *by Eugenii Kievlenko.*
Edited by Dr. Art Soregaroli. First English Edition.
468 pages. 136 color plates, 128 b/w drawings, hard cover. Price: US$98

The book contains detailed and comprehensive information about gem localities over the world, and their geological setting. The book is full of geological illustrations, which make the text easily understandable. In addition we included 136 color photographs of all the main gems, mentioned in the book, taken by the best mineral photographers of the world. The book is of great value both for collectors and professionals.

♦ Mineralogical Almanac, vol. 6. Crystal growth & development: interpreted from a Mineral's Present Form. *by Boris Z. Kantor.* pp. 128, color plates – 142, b & w drawings – 72. Price: US$45

This volume devoted to basic ideas of mineral ontogeny, which is a branch of Mineralogy dealing with mineral forms, their origination and transformation. This book is for those mineral collectors and amateurs who seek a deeper knowledge of minerals and want to learn about mineral structure, origin, and history from a mineral's crystal form. More than one hundred color photos of minerals together with numerous sketches give the reader a lot of new information about mineral formation. The text, color photographs and drawings are done by a prominent Russian mineral collector and writer Boris Z. Kantor.

♦ Natural Mineral Forms by *V.I. Stepanov and A.A.Godovikov.*
Editor-in-Chief Margarita I. Novgorodova. Publisher Fersman Mineralogical Museum Russian Academy of Science. 64 pages, soft cover, full color, 141 color plates. Price: US$35

The book involves systematization and description of various mineral forms known in the nature. This is the first published well-illustrated course that tracks the evolution of the crystal perfectness over the wide range of mineralization conditions. It proceeds from almost ideal crystals to highly defective ones, which can be rightly identified as both individual forms and aggregates. Regularly and irregularly formed aggregates of minerals are also considered.

For the first time in English

♦ New Data on Minerals, volume 38.

Editor-in-Chief Margarita I. Novgorodova. Publisher Fersman Mineralogical Museum Russian Academy of Science. 172 pages, soft cover, 66 color plates. Price: US$29

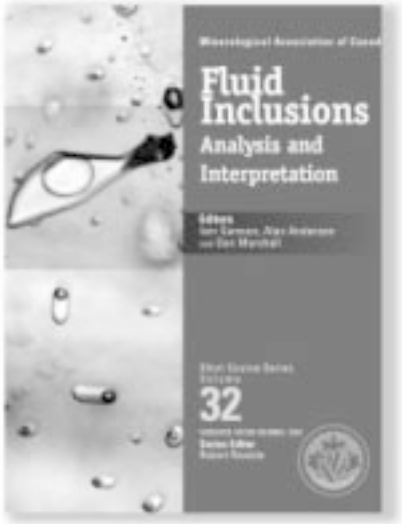
This is the title of science annual magazine, which 38 volume have recently appeared after eleven years of interruption. This volume contains articles on mineralogy (including descriptions of new mineral species and new finds of minerals), Mineralogical Museums and Collections.
The volume is of interest for mineralogists, geochemists, geologists, museum curators, and collectors.
Subscription price: one year - US$26; two years - US$50.

♦ *Appear soon!* Mineralogical Almanac, vol. 7. Kukisvumchor Deposit (Khibiny, Kola Peninsula) by *Igor V. Pekov and Alexander Podlesnyi.* pp. 164, . Subscription price: US$35

The Khibiny Massif is the world largest alkaline pluton. It is definitely included into the top ten brightest mineralogical objects. The huge apatite deposits of the Khibiny massif have been developed for more than seventy years. The industrial development of the Khibiny started with the discovery of the Kukisvumchorr Deposit. The Apatitovyi Mine (renamed Kirovskii Mine in 1935), the first mine in the USSR to the north of the Arctic Circle, started its operation in 1929. The underground mine and surrounding quarries uncovered many pegmatite and hydrothermalite bodies with a very diverse mineralization. These formations accompany the highly alkaline rocks and apatite ores of the Kukisvumchorr. For the last two decades, the most interesting mineralogical specimens were extracted from the deep levels of the deposit.

All prices includes delivery by ordinary mail.
You can make order or subscribe online www.minbook.com or by e-mail minbooks@online.ru
Payment: please mail check payable to Mineralogical Almanac to **Mr. Terry Huizing**, our Representative in USA and Canada:
Mr. Terry Huizing, 5341 Thrasher Dr. Cincinnati OH 452 USA

www.minbook.com ♦ minbooks@online.ru



ORDER YOUR COPY NOW

Short-Course Volume 32

Fluid Inclusions: Analysis and Interpretation

COVERS all the basic and many advanced aspects of the analysis and interpretation of fluid inclusions:

- what information and data can be obtained from them
- what approaches and techniques can be used to analyze fluid inclusions
- how data are processed and interpreted
- where the limitations and pitfalls of the various techniques lie.

The accompanying CD-ROM includes fluid inclusion modelling software and figures from the short-course volume.

ISBN 0-921294-32-8
SC32, approx. 300 pages, 2003

US$45 (outside Canada) CDN$45 (in Canada)

(Member Price US$36/CAN$36)

Mineralogical Association of Canada
Association minéralogique du Canada

P.O. Box 78087
Meriline Postal Outlet
1460 Merivale Road
Ottawa ON Canada
K2E 1B1
Tel. & fax : (613) 226-4651
canmin.mac.ottawa@synpatico.ca

Please send_____copy(ies) of *Fluid Inclusions: Analysis and Interpretation*, $45* each _____

*** CDN$ in Canada. Other countries US$.** **-20 % discount for members** _____

Total _____

Method of payment Prices include shipping by surface mail and handling

❑ **Cheque** ❑ **Money order** ❑ **Credit card**

I authorize the Mineralogical Association of Canada to charge the **TOTAL AMOUNT DUE** to my: ❑ Visa ❑ MasterCard ❑ EuroCard

Number / / / / Expiry Date / | Membership # |

Date / / **Total $** Signature

Name Institution

Address

City Prov./State Country

Postal/Zip Code Tel. ( ) Fax ( )

E-mail

ORDER ONLINE www.mineralogicalassociation.ca

Mineralogical Association of Canada

Publication Order Form 2004

You can send your order by mail, fax or e-mail. You can also order online. Please read the following instructions carefully.

Prices

The prices quoted are in **Canadian dollars for orders shipped within Canada and in US dollars for orders shipped in the USA and overseas.** This difference in price allows us to cover the extra costs of shipping international orders by surface mail. Postage and handling charges are included.

Shipping Options Available

All orders will be shipped by surface mail unless requested otherwise.

Airmail shipping available at an additional cost of $10 for up to 1 kg plus $10 for each additional kg of weight.

Courier shipping available with customers account

Customer account number _____

Name of courier _____

Methods of payment

CHEQUES OR MONEY ORDERS

Make cheques or money orders payable to the Mineralogical Association of Canada, in Canadian funds for orders within Canada; in US funds for US and international orders.

CREDIT CARDS

We accept Mastercard, Visa and Eurocard. **International orders will be charged the Canadian equivalent of the US price.**

Bank draft: Please contact our business office.
Prepayment required for orders over $200.

Send your order to

Mineralogical Association of Canada
P.O. Box number 78087, Meriline Postal Outlet
1460 Merivale Road, Ottawa, Ontario CANADA K2E 1B1
Phone and fax : (613) 226-4651 E-mail : canmin.mac.ottawa@sympatico.ca

A. The Canadian Mineralogist Thematic Issues ISSN 0008-4476

	Title	Qty	Price	Member	Total
TI 40-2	The Cabri Issue		$40	$32.00	
TI 39-2	Phase Equilibria in Basaltic Systems & Ore-forming Processes...		$38	$30.40	
TI 38-2	Tectonometamorphic Studies in the Canadian Shield – Part II		$38	$30.40	
TI 37-2	Mineral Scale Processes in Met. Pet.: The Kretz Volume		$38	$30.40	
TI 36-6	XRD and Electron-Microscopy Investigations of Layer Silicates		$38	$30.40	
TI 36-2	Granitic Pegmatites: The Černý–Foord Volume		$38	$30.40	
TI 35-5	Tectonometamorphic Studies in the Canadian Shield – Part I		$38	$30.40	
TI 35-2	Nature and Origin of Primitive Magmas...		$38	$30.40	
TI 34-2	Alkaline Rocks: Petrology and Mineralogy		$38	$30.40	
TI 33-2	Microbeam Techniques in the Earth Sciences		$38	$30.40	
TI 30-3	Granitic Pegmatites		$38	$30.40	
TI 29-4	Quantitative Methods in Petrology		$38	$30.40	
TI 28-3	Advances in the Study of Platinum-Group Elements		$38	$30.40	
TI 26-3	Seafloor Hydrothermal Mineralization		$32	$25.60	
TI 22-1	Ore Deposits and Related Petrology of Mafic – Ultramafic Suites		$11	$8.80	
TI 21-2	Crystal Chemistry of Amphiboles		$11	$8.80	
TI 20-3	High-Grade Metamorphism		$9	$7.20	

Total A $ _____

B. Special Publications Series

SP-6	Mineral Species Discovered in Canada by László Horváth		$45	$36	
SP-5	The Health Effects of Chrysotile Asbestos, R.F. Nolan et al.(ed.)		$38	$30.40	
SP-4	New Minerals 1995–1998, L.A. Mandarino		$22	$17.60	
SP-3	Atlas of Micromorphology of mineral alterations and Weathering, I. Delvigne US		$125	$100	
SP-2	Glossary of Mineral Synonyms, J. de Fourestier		$50	$40	
SP-1	Encyclopedia of Mineral Names, W.H. Blackburn & W.H. Dennen		$40	$32	
	The Nomenclature of Minerals: A Compilation of IMA Reports		$15	$12	

Total B $ _____

C. Short-Course Volumes

	Title	Qty	Price	Member	Total
SC 32	Fluid Inclusions, I. Samson et al. (eds.)		$45	$36.00	
SC 31	Environmental Aspects of Mine Wastes L.L. Jambor (ed.)		$50	$40.00	
SC 30	Synchrotron Radiation, G.S. Henderson & D.R. Baker (eds.)		$40	$32.00	
SC 29	Laser-Ablation-ICPMS in the Earth Sciences, P. Sylvester (ed.)		$38	$30.40	
SC 28	Fluids and Basin Evolution, K. Kyser (ed.)		$38	$30.40	
SC 27	Ore and Environmental Mineralogy, L.J. Cabri & D.J. Vaughan (eds.)		$38	$30.40	
SC 26	Mineralized Intrusion-related Skarn Systems..., D.R. Lentz (ed.)		$48	$38.40	
SC 25	Biological-Mineralogical Interactions, I.M. McIntosh & L.A. Groat (eds.)		$38	$30.40	
SC 24	Undersaturated Alkaline Rocks..., R.H. Mitchell (ed.)		$38	$30.40	
SC 23	Experiments at High Pressure and Application...		$27	$21.60	
SC 20	Low Temperature Thermochronology		$27	$21.60	
SC 19	Applications of Radiogenic Isotope Systems...		$27	$21.60	
SC 18	Fluids in Tectonically Active Regimes of the Continental Crust		$27	$21.60	
SC 16	Image Analysis Applied...		$16	$12.80	
SC 15	Burial Diagenesis		$22	$17.60	
SC 14	Heat, Metamorphism and Tectonics		$22	$17.60	
SC 13	Stable Isotope Geochemistry of Low Temperature Fluids		$22	$17.60	
SC 12	Silicate Melts		$16	$12.80	
SC 11	Applications of Electron Microscopy in the Earth Sciences		$16	$12.80	
SC 9	Sediment-Hosted Stratiform Lead-Zinc Deposits		$16	$12.80	
SC 5	Neutron Activation Analysis in the Geosciences		$16	$12.80	
SC 4	Mineralogical Techniques of Asbestos Determination		$11	$8.80	
SC 2	Application of Thermodynamics to Petrology and Ore Deposits		$11	$8.80	

Total C $ _____

Complete shipping information at back.

Total A Thematic Issues

Total B Special Publications Series

Total C Short-Course Volumes

PUBLICATIONS – GRAND TOTAL $ _____

Mineralogical Association of Canada

Membership Application or Renewal Form 2004

MEMBERSHIP

- ❑ Ordinary membership $90
- ❑ Student membership* $30
- ❑ Retired membership $30
- ❑ Life membership $1,800

Canada: CAN$ funds;
Outside Canada: US$ funds or equivalent

Includes printed version and electronic access

INSTITUTIONAL MEMBERSHIP corp./libraries

- ❑ Printed version and site-license electronic access $390

Canada: CAN$ funds;
Outside Canada: US$ funds or equivalent

Membership dues 2004 _____

Back dues for year(s) _____ _____
(at current annual rate)

Abstracts CD-ROM volume GAC-MAC ($10) _____

I enclose a donation to the MAC Foundation _____
(Official receipt will be issued)

PUBLICATIONS – Grand total _____

TOTAL _____

If you do not wish to receive the printed version of the journal, check here ❑

A password is needed to access the online version. Passwords issued in 2003 will be automatically renewed when your renewal is processed.

To request a password, send an email message to mac.amc1@sympatico.ca

* Student status certified by:

Name _____

Department _____

Signature _____

Membership fee includes:

- ✓ Six issues of *The Canadian Mineralogist*, including a timely thematic issue.
- ✓ Free electronic access to *The Canadian Mineralogist*.
- ✓ Three Newsletters a year.
- ✓ 20% discount on our short-course volumes and special publications.
- ✓ Special discount on registration fee at our annual meeting, held jointly with the Geological Association of Canada.

❑ **Renewal membership #** _____

❑ **New application**

PLEASE COMPLETE INFORMATION

Name (first name – initials – surname) _____

Institution/Company _____

Mailing Address _____

City _____

Prov./State _____ Country _____ Postal code _____

Telephone _____ Fax _____

E-mail _____

METHOD OF PAYMENT Mail or fax to (613) 226-4651

Canadian funds for Canadian orders, US funds for non-Canadian orders.

❑ Cheque ❑ Money order ❑ Credit card

For payment by bank draft, contact the business office.

CREDIT CARD: All credit card charges will be in Canadian (or Canadian equivalent) funds.

I authorize the Mineralogical Association of Canada to charge the TOTAL AMOUNT DUE _____

to my: ❑ VISA ❑ MasterCard ❑ EuroCard

Number _____ Expiry Date ____/____

Name _____

Signature _____

Mineralogical Association of Canada
Association minéralogique du Canada

Payable to: **Mineralogical Association of Canada**
Postal Box Number 78087,
Meriline Postal Outlet,
1460 Merivale Road, Ottawa, Ontario,
CANADA K2E 1B1
E-mail: canmin.mac.ottawa@sympatico.ca
Phone and fax : (613) 226-4651

Order online: **www.mineralogicalassociation.ca**

We acknowledge the financial support of the Government of Canada, through the Publications Assistance Program (PAP), toward our mailing costs.

PUBLICATIONS MAIL AGREEMENT NO. 40011842 • REGISTRATION NO. 09397
RETURN UNDELIVERABLES CANADIAN ADDRESSES TO CIRCULATION DEPT.
330-123 MAIN STREET, TORONTO ON M5W 1A1

Email: **circdept@publisher.com**