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NEW MINERALS

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Anorthominasragrite

$V^{4+}O(SO_4 \bullet 5H_2O$

TRICLINIC

Locality: North Mesa mine group (west ½, southwest ¼ of section 35, Township 224 South, Range 11 East), Temple Mountain mining district, Emery County, Utah, USA.

Occurrence: In a silicified tree approximately 46 cm wide by 30 cm high surrounded by a rim of coal 6 to 25 mm thick. Associated minerals are: orthominasragrite and bobjonesite.

General appearance: Crusts and spherical granular aggregates (<1 mm across) of irregular grains (<0.1 mm).

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: not stated, but probably transparent. *Color*: pale blue. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: approximately 1. *Tenacity*: not given. *Cleavage*: none. *Fracture*: not given. *Density*: could not be measured, 2.12 g/cm^3 (calc.). ***Crystallography***: Triclinic, $P\bar{1}$, a 7.548, b 7.805, c 7.821 Å, α 79.03°, β 71.94°, γ 65.31°, V 397.1 Å^3, Z = 2, a:b:c = 0.9671:1:1.0020. Morphology: no forms were observed. Twinning: none mentioned. ***X-ray powder-diffraction data***: 7.053(80)(010), 6.617(100)(100), 5.314(30)(011), 4.116(80)($\bar{1}$10), 3.712(80)(121,002,211), 3.206(70)(221), 2.934(50)(1$\bar{1}$2,$\bar{1}$02), 2.555(30)(131). ***Optical data***: Biaxial (+), α 1.548, β 1.555, γ 1.574, 2V(meas.) 86°, 2V(calc.) 63°; dispersion not mentioned; nonpleochroic; $X \wedge c \approx 18°$ in obtuse angle β, $Y \approx a$, $Z \wedge b \approx 19°$ in obtuse angle γ. ***Chemical analytical data***: Electron-microprobe data: VO_2 33.93, SO_3 30.78, H_2O (35.52), Total (100.23) wt.%. Empirical formula: $V_{1.04}O_{1.08}(SO_4)_{0.98} \bullet 5.00H_2O$. ***Relationship to other species***: It is the triclinic polymorph of $V^{4+}O(SO_4 \bullet 5H_2O$; minasragrite is monoclinic, and orthominasragrite is orthorhombic.

Name: Reflects the relationship to minasragrite and orthominasragrite.

Comments: IMA No. 2001–040.

COOPER, M.A., HAWTHORNE, F.C., GRICE, J.D. & HAYNES, P. (2003): Anorthominasragrite, $V^{4+}O(SO_4(H_2O)_5$, a new mineral species from Temple Mountain, Emery County, Utah, U.S.A.: description, crystal structure and hydrogen bonding. *Canadian Mineralogist* **41**, 959-980.

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Carbokentbrooksite

$(Na,\square)_{12}(Na,Ce)_3Ca_6Mn_3Zr_3Nb(Si_{25}O_{73})(OH)_3(CO_3)\bullet H_2O$

TRIGONAL

Locality: Dara-i-Pioz alkaline massif, Tajikistan.

Occurrence: In the quartz core of a zoned pegmatite. Associated minerals are: zirsilite-(Ce), quartz, microcline, aegirine, stillwellite-(Ce), ekanite, polylithionite, pyrochlore, fluorite, calcite and galena.

General appearance: As zoned rhombohedral crystals up to 2 cm across, with a carbokentbrooksite core and a zirsilite-(Ce) rim.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: yellow. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: 5. *Tenacity*: brittle. *Cleavage*: not observed. *Fracture*: conchoidal. *Density*: 3.14 g/cm^3 (meas.), 3.10 g/cm^3 (calc.). ***Crystallography***: Trigonal, *R*3*m*, *a* 14.239, *c* 30.039 Å, *V* 5274 Å^3, *Z* = 3, *c*:*a* = 2.1096. Morphology: {101}, {102}, {010}, {001}. Twinning: none mentioned. ***X-ray powder-diffraction data***: 6.39(25)(014), 4.30(24)(025), 3.394(23)(035), 3.204(38)(028), 3.155(35)(127), 3.019(34)(042), 2.970(83)(135), 2.849(100)(044), 2.590(30)(039). ***Optical data***: Uniaxial (–), ω 1.645, ε 1.635, non-pleochroic. ***Chemical analytical data***: Electron-microprobe data: Na_2O 10.17, K_2O 0.51, CaO 10.61, SrO 1.42, MnO 5.41, FeO 2.22, La_2O_3 1.79, Ce_2O_3 2.97, Pr_2O_3 0.24, Nd_2O_3 0.76, Y_2O_3 0.43, SiO_2 45.55, TiO_2 0.41, ZrO_2 11.07, Nb_2O_5 3.55, H_2O 1.18, Cl 0.29, CO_2 0.29, sum 99.36, less O = Cl 0.06, Total 99.30 wt.%. Empirical formula: $(Na_{9.48}Ca_{0.94}K_{0.36})_{\Sigma 10.78}$ $(Na_{1.39}Sr_{0.45}Ce_{0.60}La_{0.36}Nd_{0.15}Pr_{0.05})_{\Sigma 3.00}(Ca_{5.32}Mn_{0.55}Y_{0.13})_{\Sigma 6.00}(Zr_{2.97}Ti_{0.03})_{\Sigma 3.00}(Nb_{0.88}Ti_{0.14})_{\Sigma 1.02}Si_{25.11}O_{73.62}[(OH)_{4.34}Cl_{0.27}]_{\Sigma 4.61}(CO_3)_{0.59}$. ***Relationship to other species***: It is a member of the eudialyte group.

Name: Recalls the relationship with kentbrooksite.

Comments: IMA No. 2002–056. The indexing of the powder pattern in the paper is somewhat different from that given here.

KHOMYAKOV, A.P., DUSMATOV, V.D., FERRARIS, G., GULA, A., IVALDI, G. & NECHELYUSTOV, G.N. (2003): Zirsilite-(Ce), $(Na,\square)_{12}(Ce,Na)_3Ca_6Mn_3Zr_3Nb(Si_{25}O_{73})(OH)_3(CO_3)\bullet H_2O$ and carbokentbrooksite, $(Na,\square)_{12}(Na,Ce)_3Ca_6Mn_3Zr_3Nb(Si_{25}O_{73})(OH)_3(CO_3)\bullet H_2O$, two new eudialyte group minerals from Dara-i-Pioz alkaline massif, Tajikistan. *Zapiski Vserossiyskogo Mineralogicheskogo Obshchestva* **132**(5), 40-51 (in Russ.).

Diversilite-(Ce)

$Na_2(Ba,K)_6Ce_2Fe^{2+}Ti_3[Si_3O_9]_3[SiO_3OH]_3(OH,H_2O)_9$

TRIGONAL

Locality: Mt. Yukspor, Khibina alkaline massif, Kola Peninsula, Russia.

Occurrence: In a strongly mineralized rischorrite – ijolite – urtite pegmatite. Associated minerals are: nepheline, sodalite, K-feldspar, natrolite, pectolite, aegirine, shcherbakovite, lamprophyllite, magnesium astrophyllite, delindeite, wadeite, umbite and kostylevite.

General appearance: A fan-shaped intergrowth (2 to 3 mm) of subhedral platy crystals (1 to 2 mm).

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent to translucent. *Color*: yellowish orange. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: 5. *Tenacity*: brittle. *Cleavage*: not observed. *Fracture*: conchoidal. *Density*: 3.68 g/cm^3 (meas.), 3.75 g/cm^3 (calc.). ***Crystallography***: Trigonal, $R\bar{3}$, a 10.713, c 60.67 Å, V 6030 Å^3, Z = 6, c:a = 5.6632. Morphology: {001}. Twinning: none observed. ***X-ray powder-diffraction data***: 10.12(27)(006), 3.236(100)(1.1.15), 3.094(21)(300), 2.654(38)(223), 2.642(44)(3.0.12), 2.234(19)(2.2.15), 2.026(61)(0.0.30). ***Optical data***: Uniaxial (+), ω 1.705, ε 1.708, pleochroism strong, O pale yellow, E yellowish orange. ***Chemical analytical data***: Mean of three sets of electron-microprobe data: Na_2O 2.76, K_2O 5.81, CaO 0.10, MnO 1.09, FeO 3.10, SrO 0.42, BaO 24.85, La_2O_3 4.84, Ce_2O_3 6.72, Pr_2O_3 0.74, Nd_2O_3 1.21, Sm_2O_3 0.16, SiO_2 32.46, TiO_2 9.17, Nb_2O_5 1.62, H_2O 6.15, Total 101.20 wt.%. Empirical formula: $Na_{2.00}(Ba_{3.64}K_{2.77})_{\Sigma 6.41}(Ce_{0.92}La_{0.67}Nd_{0.16}Pr_{0.10}Sm_{0.02}Mn_{0.16}Sr_{0.09}Ca_{0.04})_{\Sigma 2.16}(Fe_{0.97}Mn_{0.03})_{\Sigma 1.00}(Ti_{2.58}Nb_{0.27}Mn_{0.15})_{\Sigma 3.00}Si_{12.12}O_{36.36}[(OH)_{7.97}(H_2O)_{3.67})_{\Sigma 11.64}$. The crystallochemical formula is $Na_2(Ba,K)_6Ce_2FeTi_3[Si_3O_9]_3[SiO_3OH]_3(OH,H_2O)_9$. ***Relationship to other species***: It is chemically similar to ilímaussite-(Ce) and joaquinite-(Ce).

Name: From the Latin *diver*sus (heterogeneous) and *sil*icate, reflecting its main structural features and its composition.

Comments: IMA No. 2002–043.

KHOMYAKOV, A.P., NECHELYUSTOV. G.N., RASTSVETAEVA, R.K. & MA ZHESHENG (2003): Diversilite-(Ce), $Na_2(Ba,K)_6Ce_2Fe^{2+}Ti_3[Si_3O_9]_3[SiO_3OH]_3(OH,H_2O)_9$, a new silicate with heterogeneous tetrahedral complexes from the Khibina alkaline massif, Kola Peninsula, Russia. *Zapiski Vserossiyskogo Mineralogicheskogo Obshchestva* **132**(5), 34-39 (in Russ.).

Ganterite

$[Ba_{0.5}(Na,K)_{0.5}]Al_2(Si_{2.5}Al_{1.5}O_{10})(OH)_2$

MONOCLINIC

Locality: The Berisal Complex, Wasenhorn, Simplon Region, Switzerland.

Occurrence: In schists associated with muscovite, quartz, epidote-group minerals, zircon and apatite. Also in zoisite–celsian gneiss associated with margarite and quartz.

General appearance: Average grain-size 0.5 × 0.15 × 0.01 mm.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: presumably transparent. *Color*: light grey to silver. *Streak*: white. *Luminescence*: nonfluorescent, but shows very strong general fluorescence under a green argon laser (514.5 nm). *Hardness*: VHN_{100} 260 kg/mm^2, corresponding to Mohs 4 to 4½. *Tenacity*: flexible. *Cleavage*: {001} perfect. *Fracture*: laminated. *Density*: 3.11 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *C*2/*c*, *a* 5.212, *b* 9.046, *c* 19.978 Å, β 95° 48', *V* 937.6 Å^3, *Z* = 4, *a*:*b*:*c* = 0.5762:1:2.2085. Morphology: no forms were observed. Twinning: none mentioned. ***X-ray powder-diffraction data***: 4.481(71)(110), 3.887(76)($\bar{1}$13), 3.737(77)(023), 3.495(71)($\bar{1}$14), 2.602(95)(130,$\bar{1}$31), 2.571(100)($\bar{2}$02,131), 1.5054(91)(060,2.0.10). ***Optical data***: Biaxial (–), α 1.600 (calc.), β 1.619, γ 1.622, 2*V*(meas.) 42.5°, dispersion not given; nonpleochroic; orientation not given. ***Chemical analytical data***: Mean of 32 sets of electron-microprobe data gave: Na_2O 1.91, K_2O 3.02, MgO 0.86, CaO 0.03, MnO 0.03, FeO 0.69, BaO 15.54, Al_2O_3 36.5, SiO_2 37.47, TiO_2 0.73, H_2O 3.90, Total 100.68 wt.%. Empirical formula: $(Ba_{0.44}K_{0.28}Na_{0.27})_{\Sigma 0.99}(Al_{1.84}Mg_{0.09}Fe_{0.04}Ti_{0.04})_{\Sigma 2.01}[(Si_{2.72}Al_{1.28})_{\Sigma 4.00}O_{10.11}](OH)_{1.89}$. ***Relationship to other species***: It is the Ba- and Al-dominant member of the mica group.

Name: After the Gantertal, a famous valley in the region in which the mineral was found.

Comments: IMA No. 2000–033.

GRAESER, S., HETHERINGTON, C.J. & GIERÉ, R. (2003): Ganterite, a new barium-dominant analogue of muscovite from the Berisal Complex, Simplon Region, Switzerland. *Canadian Mineralogist* **41**, 1271-1280.

Hillite

$Ca_2(Zn,Mg)(PO_4)_2 \bullet 2H_2O$

TRICLINIC

Locality: Reaphook Hill, South Australia, Australia.

Occurrence: In a gossan-like mass covering unmetamorphosed, poorly sorted argillaceous siltstones of the Lower Cambrian Parachilna Formation. Associated minerals are: scholzite, tarbuttite, parahopeite, zincian collinsite, switzerite and phosphophyllite.

General appearance: Euhedral, doubly terminated crystals and clusters (up to 50 μm long).

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent to translucent. *Color*: colorless or grey with a greenish or bluish tint. *Streak*: not given, probably white. *Luminescence*: greenish yellow fluorescence in short-wave UV. *Hardness*: 3½. *Tenacity*: not given. *Cleavage*: {010} and {001} perfect. *Fracture*: not given. *Density*: 3.16 g/cm^3 (meas.), 3.16 g/cm^3 (calc.). ***Crystallography***: Triclinic, $P\bar{1}$, *a* 5.736, *b* 6.767, *c* 5.462 Å, α 97.41°, β 108.59°, γ 107.19°, *V* 186.05 Å^3, *Z* = 1, *a*:*b*:*c* = 0.8476:1:0.8072. Morphology: no forms were mentioned. Twinning: none mentioned. ***X-ray powder-diffraction data***: 6.24(34)(010), 3.512(16)(011,$\bar{1}\bar{1}$1), 3.230(22)(1$\bar{2}$0), 3.130(37)(020), 3.038(40)(101), 2.690(100)($\bar{1}$21,$\bar{1}$02), 1.668(22)(2$\bar{1}$3). ***Optical data***: Biaxial (+), α 1.635, β 1.650, γ 1.667, 2*V*(calc.) 83°; dispersion not given; nonpleochroic; orientation not given. ***Chemical analytical data***: Mean of fifteen sets of electron-microprobe data (with H_2O calculated to give $2H_2O$): Na_2O 0.11, MgO 4.34, CaO 30.36, FeO 0.04, ZnO 14.79, P_2O_5 40.85, H_2O (10.23), Total (100.72) wt.%. Empirical formula: $(Ca_{1.91}Na_{0.01})_{\Sigma 1.92}(Zn_{0.64}Mg_{0.38})_{\Sigma 1.02}(PO_4)_{2.03} \bullet 2.00H_2O$. ***Relationship to other species***: It is the Ca- and Zn-dominant member of the fairfieldite group.

Name: After Dr. Roderick Hill (b. 1949), Chief of the Mineral Research Division, CSIRO, Melbourne, Australia, who first described the mineral and recognized it as a potentially new species. ***Comments***: IMA No. 2003–005.

YAKUBOVICH, O.V., MASSA, W., LIFEROVICH, R.P., GAVRILENKO, P.G., BOGDANOVA, A.N. & TUISKU, P. (2003): Hillite, a new member of the fairfieldite group: description and crystal structure. *Canadian Mineralogist* **41**, 981-988.

Ikranite

$(Na,H_3O)_{15}(Ca,Mn,REE)_6Fe^{3+}{}_2Zr_3(\square,Zr)(\square Si)Si_{24}O_{66}(O,OH,Cl)\bullet nH_2O$

TRIGONAL

Locality: Mount Karnasurt, Lovozero alkaline massif, Kola Peninsula, Russia.

Occurrence: In peralkaline pegmatites. Associated minerals are: aegirine, microcline, lorenzenite, nepheline, lamprophyllite, murmanite and arfvedsonite.

General appearance: Grains up to 3 cm.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: brownish yellow. *Streak*: yellowish white. *Luminescence*: nonfluorescent. *Hardness*: 5. *Tenacity*: brittle. *Cleavage*: none. *Fracture*: conchoidal. *Density*: 2.82 g/cm^3 (meas.), 2.63 g/cm^3 (calc.). ***Crystallography***: Trigonal, *R*3*m*, *a* 14.167, *c* 30.081 Å, *V* 5228.5 Å^3, *Z* = 3, *c*:*a* = 2.1233. Morphology: no forms were mentioned. Twinning: none mentioned. ***X-ray powder-diffraction data***: 6.41(41)(104), 4.30(91)(205), 4.09(36)(116), 3.521(57)(027), 3.205(44)(208), 2.963(92)(315), 2.841(100)(404), 2.588(37)(039). ***Optical data***: Uniaxial (+), ω 1.612, ε 1.615, pleochroism colorless to yellow, weak. ***Chemical analytical data***: Mean of three sets of electron-microprobe data: Na_2O 7.95, K_2O 0.44, CaO 6.29, MnO 3.40, FeO 0.38, SrO 1.61, Fe_2O_3 4.80, La_2O_3 0.62, Ce_2O_3 1.53, Nd_2O_3 0.19, SiO_2 48.91, TiO_2 0.37, ZrO_2 13.94, HfO_2 0.28, Nb_2O_5 0.28, H_2O 7.70, F 0.10, Cl 0.89, sum 99.68, less O = F + Cl 0.24, Total 99.44 wt.%. Empirical formula: $Na_{7.12}K_{0.26}Ca_{3.11}Sr_{0.43}Ce_{0.26}La_{0.11}Nd_{0.03}Mn_{1.33}Fe^{2+}{}_{0.15}Fe^{3+}{}_{1.67}Zr_{3.14}Ti_{0.13}Hf_{0.04}Nb_{0.06}Cl_{0.70}F_{0.15}Si_{22.5N8}H_{23.71}O_{75.15}$. ***Relationship to other species***: It is a member of the eudialyte group.

Name: Recalls the Russian acronym IKRAN (*Institut Kristallografii Rossiskoy Akadameii Nauky*). ***Comments***: IMA No. 2000–010.

CHUKANOV, N.V., PEKOV, I.V., ZADOV, A.E., KOROVUSHKIN, V.V., EKIMENKOVA, I.A. & RASTSVETAEVA, R.K. (2003): Ikranite, $(Na,H_3O)_{15}$ $(Ca,Mn,REE)_6Fe^{3+}{}_2Zr_3$ $(\square,Zr)(\square Si)$ $Si_{24}O_{66}(O,OH,Cl)\bullet nH_2O$ and raslakite, $Na_{15}Ca_3Fe_3(Na,Zr)_3Zr)_3(Si,Nb)(Si_{25}O_{73})$ $(OH,H_2O)_3(Cl,OH)$, the new eudialyte-group minerals from Lovozero massif, Kola Peninsula. *Zapiski Vserossiyskogo Mineralogicheskogo Obshchestva* **132**(5), 22-33 (in Russ.).

RASTSVETAEVA, R.K. & CHUKANOV, N.V. (2003): Ikranite: composition and structure of a new mineral of the eudialyte group. *Crystallogr. Rep.* **48**(5), 717-720.

Kozoite-(La)

$La(CO_3)(OH)$

ORTHORHOMBIC

Locality: Mitsukoshi, Hizen-cho, Saga Prefecture, Japan.

Occurrence: In cavities of alkali olivine basalt. Associated minerals are: kozoite-(Nd), lanthanite-(Nd), kimuraite-(Y), lokkaite-(Y), calcite, aragonite and opal (variety hyalite).

General appearance: Spherical aggregates less than 1 mm in diameter.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: presumably transparent. *Color*: extremely pale purple to white. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: could not be determined. *Tenacity*: could not be determined. *Cleavage*: could not be determined. *Fracture*: not given. *Density*: could not be determined, 4.16 g/cm^3 (calc.). ***Crystallography***: Orthorhombic, *Pmcn*, *a* 4.986, *b* 8.513, *c* 7.227 Å, *V* 306.7 Å^3, *Z* = 2, *a*:*b*:*c* = 0.5857:1:0.8489. Morphology: no forms were observed. Twinning: none mentioned. ***X-ray powder-diffraction data***: 5.54(32)(011), 4.31(100)(110,020), 3.69(72)(111,021), 2.93(57)(121,102), 2.33(50)(131), 2.06(48)(221), 1.994(35)(212). ***Optical data***: could not be determined, but the abstractor calculated the mean index of refraction from the Gladstone–Dale relationship as 1.730. ***Chemical analytical data***: Mean of four sets of electron-microprobe data with (CO_2 and H_2O calculated): CaO 6.30, SrO 1.36, La_2O_3 35.55, Ce_2O_3 0.00, Pr_2O_3 4.68, Nd_2O_3 17.60, Sm_2O_3 1.15, Eu_2O_3 0.00, Gd_2O_3 1.49, Tb_2O_3 0.00, Dy_2O_3 0.09, Er_2O_3 0.04, Y_2O_3 3.88, CO_2 (23.17), H_2O (5.87), Total (101.19) wt.%. Empirical formula: $(La_{0.41}Ca_{0.21}Nd_{0.20}Y_{0.07}Pr_{0.05}Sr_{0.02}Gd_{0.02}Sm_{0.01})_{\Sigma 0.99}$ $(CO_3)_{1.00}[(OH)_{0.74}(H_2O)_{0.25}]_{\Sigma 0.99}$. ***Relationship to other species***: It is a member of the ancylite group, specifically the La-dominant analogue of kozoite-(Nd).

Name: Recalls the relationship with kozoite-(Nd).

Comments: IMA No. 2002–054.

MIYAWAKI, R., MATSUBARA, S., YOKOYAMA, K., IWANO, S., HAMASAKI, K & YUKINORI, I. (2003): Kozoite-(La), La(CO_3)(OH), a new mineral from Mitsukoshi, Hizen-cho, Saga Prefecture, Japan. *Journal of Mineralogical and Petrological Sciences* **98**, 137-141.

Kukharenkoite-(La)

$Ba_2(La,Ce)(CO_3)_3F$

MONOCLINIC

Locality: Kirovsky mine, Mount Kukisvumchorr, Khibina massif, Kola Peninsula, Russia.

Occurrence: In late hydrothermal assemblages in cavities of two pegmatites. In the Hilairitovoye pegmatite, holotype material is associated with: microcline, albite, calcite, nenadkevichite, hilairite, catapleiite, strontianite, donnayite-(Y), synchysite-(Ce), pyrite, among others; in a pectolite – aegirine – microcline vein, other associated minerals are: natrolite, calcite, neodymian ewaldite, among others.

General appearance: Flattened prismatic to needle-like crystals up to 0.5 mm long.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: colorless, white, pale green. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: about 4. *Tenacity*: brittle. *Cleavage*: not observed. *Fracture*: uneven. *Density*: could not be measured, 4.60 g/cm^3 (calc.). ***Crystallography***: Monoclinic, $P2_1/m$, a 13.396, b 5.111, c 6.672 Å, β 106.628°, V 437.7 Å^3, Z = 2, $a:b:c$ = 2.6210:1:1.3054. Morphology: {010}, {$\bar{2}$01}, {100} and {001}. Twinning: rotation about [100] forming trillings. ***X-ray powder-diffraction data***: 4.01(100)(11$\bar{1}$,201), 3.27(100)(310,40$\bar{1}$,20$\bar{2}$), 2.54(50)(020,112), 2.14(80)(221,51$\bar{2}$,600), 1.998(80)(42$\bar{1}$,22$\bar{2}$,511,31$\bar{3}$), 1.370(20)(910,42$\bar{4}$,712,71$\bar{4}$). ***Optical data***: Biaxial (–), α 1.581, β 1.715, γ 1.715, 2V (meas.) 5°, 2V (calc.) 0°; dispersion not observed; nonpleochroic; $X \wedge a$ = 9° in acute angle β, $Y = b$, $Z \wedge c$ = 26° in obtuse angle β; the drawing of the optical orientation given in the paper does not appear to be correct. ***Chemical analytical data***: Mean of nine sets of electron-microprobe data (with CO_2 calculated to give 3CO_3; actually, 2.97): Na_2O 0.23, K_2O 0.27, CaO 0.99, SrO 2.38, BaO 44.10, La_2O_3 11.18, Ce_2O_3 5.36, Pr_2O_3 0.87, Nd_2O_3 0.76, CO_2 (21.30), ThO_2 9.41, F 3.38, sum (100.23), less O = F 1.42, Total (98.81) wt.%. Empirical formula: $(Ba_{1.76}Sr_{0.14}K_{0.04})_{\Sigma 1.94}$ $(La_{0.42}Th_{0.22}Ce_{0.20}Ca_{0.11}Na_{0.05}Pr_{0.03}Nd_{0.03})_{\Sigma 1.06}(CO_3)_{2.97}F_{1.09}$. ***Relationship to other species***: It is the La-dominant analogue of kukharenkoite-(Ce).

Name: Recalls the relationship to kukharenkoite-(Ce).

Comments: IMA No. 2002–019. The empirical formula derived here differs slightly from that given in the paper.

PEKOV, I.V., CHUKANOV, N.V., KONONKOVA, N.N., ZADOV, A.E. & KRIVOVICHEV, S.V. (2003): Kukharenkoite-(La), $Ba_2(La,Ce)(CO_3)_3F$, a new mineral from Khibina Massif, Kola Peninsula. *Zapiski Vserossiyskogo Mineralogicheskogo Obshchestva* **132**(3), 55-64 (in Russ.).

KRIVOVICHEV, S.V., ARMBRUSTER, T. & PEKOV, I.V. (2003): Cation frameworks in the structure of natural fluorcarbonates of barium and the rare-earth elements: crystal structure of kukharenkoite-(La), $Ba_2(La,Ce)(CO_3)_3F$. *Zapiski Vserossiyskogo Mineralogicheskogo Obshchestva* **132**(3), 65-72 (in Russ.).

Kupčíkite

$Cu_{3.4}Fe_{0.6}Bi_5S_{10}$

MONOCLINIC

Locality: In orebodies K7 and K8 of the Felbertal scheelite deposit, Tauern Window of the Alps, Austria.

Occurrence: Associated minerals are: quartz, chalcopyrite, pyrrhotite, molybdenite, sphalerite, bismuth, makovickyite, cupromakovickyite, hodrushite, cuprobismutite and derivatives of the bismuthinite–aikinite series.

General appearance: Elongate aggregates up to 0.5 mm.

Physical, chemical and crystallographic properties: *Luster*: metallic. *Diaphaneity*: opaque. *Color*: grey. *Streak*: not given, but presumably grey. *Hardness*: VHN_{50} 192 kg/mm^2, corresponding to about 3½ on the Mohs scale. *Tenacity*: brittle. *Cleavage*: not observed. *Fracture*: uneven. *Density*: could not be measured, 6.42 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *C*2/*m*, *a* 17.512, *b* 3.9103, *c* 12.869 Å, β 108.56°, *V* 835.4 Å^3, *Z* = 2, *a*:*b*:*c* = 4.4784:1:3.2911. Morphology: no forms were mentioned. Twinning: none mentioned. ***X-ray powder-diffraction data***: 6.028(4)(201), 3.596(7)(401), 3.213(4)($\bar{2}$04), 3.128(10)(112), 3.071(7)($\bar{3}$12), 2.683(5)(113). ***Optical data***: In reflected light: greyish white, anisotropism moderate in air and strong in oil, bireflectance perceptible in air and moderate in oil, pleochroism weak in air white with bluish tints and enhanced in oil. R_1 & R_2 in air: 33.55, 40.56% (470 nm), 33.92, 41.14% (546 nm), 34.16, 41.35% (589 nm), 34.20, 41.32% (650 nm). ***Chemical analytical data***: Mean of six sets of electron-microprobe data: Cu 13.22, Ag 0.04, Cd 0.14, Pb 0.09, Fe 2.09, Sb 0.08, Bi 64.64, S 19.94, Total 100.24 wt.%. Empirical formula: $(Cu_{3.35}Fe_{0.60})_{\Sigma 3.95}(Bi_{4.98}Cd_{0.02}Sb_{0.01}Pb_{0.01}Ag_{0.01})_{\Sigma 5.03}S_{10.02}$. ***Relationship to other species***: Closely structurally related to cuprobismutite and hodrushite.

Name: After Vladimir Kupčík (1934–1990), Professor of Mineralogy at the University of Bratislava and the University of Göttingen, for his outstanding contributions to the crystal chemistry of sulfosalts.

Comments: IMA No. 2001–017. The crystal structure has been solved.

TOPA, D., MAKOVICKY, E., BALIĆ-ŽUNIĆ, T. & PAAR, W.H. (2002): Kupčíkite, $Cu_{3.4}Fe_{0.6}Bi_5S_{10}$, a new Cu–Bi sulfosalt from Felbertal, Austria, and its crystal structure. *Canadian Mineralogist* **41**, 1155-1166.

Paravinogradovite

$Na_2Ti_3Fe^{3+}(Si_2O_6)_2(Si_3AlO_{10})(OH)_4 \bullet H_2O$

TRICLINIC

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

Occurrence: In miarolitic cavities in a nepheline–feldspar pegmatite. Associated minerals are: albite, carbonate-fluorapatite, ancylite-(Ce), natrolite, aegirine, a glauconite-like mineral, nordstrandite, anatase, fluorite, galena, cerussite and vinogradovite.

General appearance: Fan-shaped aggregates of columnar and acicular crystals up to 1.0 cm long.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent to translucent. *Color*: colorless to white. *Streak*: white. *Luminescence*: fluoresces weak yellow-green under 240-400 nm radiation. *Hardness*: 5. *Tenacity*: brittle. *Cleavage*: {001} perfect and {010} indistinct. *Fracture*: splintery. *Density*: 2.77 g/cm^3 (meas.), 2.74 g/cm^3 (calc.). ***Crystallography***: Triclinic, *P*1, *a* 5.246, *b* 8.734, *c* 12.968 Å, α 70.32, β 79.01, γ 89.90°, *V* 547.65 Å^3, *Z* = 1, *a*:*b*:*c* = 0.6006:1:1.4848. Morphology: no forms were mentioned. Twinning: none mentioned. ***X-ray powder-diffraction data***: 11.9(58)(001), 5.98(35)(002), 5.88(65)(0$\bar{1}$1,012), 4.35(38)(121,102), 3.182(100)(0$\bar{1}$3,014), 3.085(29)(123), 2.735(21)(1$\bar{2}$2,030). ***Optical data***: Biaxial (–), α 1.707, β 1.741, γ 1.755, 2*V* (meas.) 64°, 2*V* (calc.) 64°; dispersion *r* > *v*; nonpleochroic; *X* ∧ *a* = 30°, *Z* ≈ *b*. ***Chemical analytical data***: Mean of eighteen sets of electron-microprobe data (BeO calculated by stoichiometry, H_2O by Penfield method): Na_2O 7.77, K_2O 0.87, MgO 0.13, BeO 0.76, Al_2O_3 6.12, Fe_2O_3 4.11, SiO_2 43.54, TiO_2 29.59, Nb_2O_5 0.50, H_2O 6.23, Total 99.62 wt.%. Empirical formula: $(Na_{2.28}K_{0.17})_{\Sigma 2.45}(Ti_{3.37}Fe_{0.47}Nb_{0.03}Mg_{0.03})_{\Sigma 3.90}(Si_{6.59}Al_{1.09}Be_{0.28})_{\Sigma 7.96}O_{22.00}(OH)_{3.74} \bullet 1.27H_2O$. ***Relationship to other species***: It is chemically and structurally related to vinogradovite.

Name: Recalls the relationship to vinogradovite.

Comments: IMA No. 2002–033.

KHOMYAKOV, A.P., KULIKOVA, I.E., SOKOLOVA, E., HAWTHORNE, F.C. & KARTASHOV, P.M. (2003): Paravinogradovite, $(Na,\wedge)_2[(Ti^{4+},Fe^{3+})_4\{Si_2O_6\}_2\{Si_3AlO_{10}\}(OH)_4]H_2O$, a new mineral species from the Khibina alkaline massif, Kola Peninsula, Russia: description and crystal structure. *Canadian Mineralogist* **41**, 989-1002.

Percleveite-(Ce)

$(Ce,La,Nd)_2Si_2O_7$

TETRAGONAL

Locality: The Bastnäs Fe–Cu–REE deposit, Skinnskatteberg, Västmanland, Sweden (Lat. 59° 51'N, Long. 15° 35'E).

Occurrence: Known from a single old specimen in the Swedish Museum of Natural History. Associated minerals are: cerite-(Ce), bastnäsite-(Ce), magnetite, chalcopyrite and a clinoamphibole close to the borderline between actinolite and tremolite. Rarer associates are: allanite-(Ce), törnebohmite-(Ce), scheelite and quartz.

General appearance: Anhedral grains (up to 0.5 mm) across in aggregates several mm wide.

Physical, chemical and crystallographic properties: *Luster*: greasy to resinous. *Diaphaneity*: transparent in thin section. *Color*: yellowish gray to white. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: about 6. *Tenacity*: not given but probably brittle. *Cleavage*: {001} imperfect. *Fracture*: not given. *Density*: could not be measured, 5.20 g/cm^3 (calc.). ***Crystallography***: Tetragonal, $P4_1$, a 6.7805, c 24.689 Å, V 1135.1 Å^3, Z = 8, c:a = 3.6412. Morphology: no forms were observed. Twinning: none mentioned. ***X-ray powder-diffraction data***: 3.271(31)(202), 3.135(27)(203), 3.121(24)(116), 3.084(100)(008), 3.011(18)(211), 2.846(22)(213), 2.034(19)(219). ***Optical data***: Uniaxial (+), ω 1.840, ε 1.846, nonpleochroic. ***Chemical analytical data***: Mean of four sets of electron-microprobe data: MgO 0.00, CaO 0.10, Al_2O_3 0.00, Fe_2O_3 0.01, Y_2O_3 2.93, La_2O_3 14.66, Ce_2O_3 31.36, Pr_2O_3 3.41, Nd_2O_3 12.97, Sm_2O_3 2.69, Gd_2O_3 2.26, Dy_2O_3 0.53, Ho_2O_3 0.07, Er_2O_3 0.21, Yb_2O_3 0.04, SiO_2 26.55, Total 97.79 wt.%. Empirical formula: $(Ce_{0.87}La_{0.41}Nd_{0.35}Y_{0.12}Pr_{0.09}Sm_{0.07}Gd_{0.06}Dy_{0.01}Ca_{0.01})_{\Sigma 1.99}Si_{2.01}O_{7.00}$. ***Relationship to other species***: None apparent.

Name: After Per Theodor Cleve (1840–1905), professor of chemistry at Uppsala University and the discoverer of the elements holmium and thulium. "Cleveite", a REE-bearing variety of uraninite, was named after him by Nordenskiöld in 1878.

Comments: IMA No. 2002–023.

HOLTSTAM, D., NORRESTAM, R. & ANDERSSON, U.B. (2003): Percleveite-(Ce) – a new lanthanide disilicate mineral from Bastnäs, Skinnskatteberg, Sweden. *European Journal of Mineralogy* **15**, 725-731.

Raslakite

$Na_{15}Ca_3Fe_3(Na,Zr)_3Zr)_3(Si,Nb)(Si_{25}O_{73})(OH,H_2O)_3(Cl,OH)$

TRIGONAL

Locality: Mount Karnasurt, Lovozero alkaline massif, Kola Peninsula, Russia.

Occurrence: In peralkaline pegmatites. Associated minerals are: microcline, aegirine, nepheline, lamprophyllite, kazakovite, terskite and fluorcaphite.

General appearance: Grains up to 3 cm.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: brownish red. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: 5. *Tenacity*: brittle. *Cleavage*: none. *Fracture*: conchoidal. *Density*: 2.95 g/cm^3 (meas.), 2.92 g/cm^3 (calc.). ***Crystallography***: Trigonal, *R*3, *a* 14.229, *c* 30.019 Å, *V* 5263.5 Å^3, *Z* = 3, *c*:*a* = 2.1097. Morphology: no forms were mentioned. Twinning: none mentioned. ***X-ray powder-diffraction data***: 5.72(35)(202), 4.311(66)(205), 4.095(37)(116), 3.209(58)(208), 3.023(40)(119), 2.974(86)(315), 2.853(100)(404), 2.592(34)(039). ***Optical data***: Uniaxial (+), ω 1.608, ε 1.611, pleochroism colorless to brown, weak. ***Chemical analytical data***: Mean of five sets of electron-microprobe data: Na_2O 15.97, K_2O 0.48, MgO 0.28, CaO 5.64, MnO 2.01, FeO 5.02, SrO 0.69, Al_2O_3 0.26, La_2O_3 0.44, Ce_2O_3 0.87, Nd_2O_3 0.42, SiO_2 49.10, TiO_2 0.37, ZrO_2 15.07, HfO_2 0.43, Nb_2O_5 0.71, H_2O 1.35, Cl 1.34, sum 100.45, less O = Cl 0.30, Total 100.15 wt.%. Empirical formula: $Na_{15.88}K_{0.31}Ca_{3.10}Sr_{0.21}Mg_{0.21}Fe_{2.15}Mn_{0.87}Ce_{0.16}La_{0.08}Nd_{0.08}Ti_{0.14}Zr_{3.77}Hf_{0.06}Nb_{0.16}Al_{0.16}Si_{25.19}Cl_{1.17}H_{4.62}O_{75.83}$. ***Relationship to other species***: It is a member of the eudialyte group.

Name: After the Raslak cirques near Mount Kedykverpakhk.

Comments: IMA No. 2002–067.

CHUKANOV, N.V., PEKOV, I.V., ZADOV, A.E., KOROVUSHKIN, V.V., EKIMENKOVA, I.A. & RASTSVETAEVA, R.K. (2003): Ikranite, $(Na,H_3O)_{15}(Ca,Mn,REE)_6Fe^{3+}{}_2Zr_3(\square,Zr)(\square,Si)Si_{24}O_{66}(O,OH,Cl)\bullet nH_2O$ and raslakite, $Na_{15}Ca_3Fe_3(Na,Zr)_3Zr)_3(Si,Nb)(Si_{25}O_{73})(OH,H_2O)_3(Cl,OH)$, the new eudialyte group minerals from Lovozero massif, Kola Peninsula. *Zapiski Vserossiyskogo Mineralogicheskogo Obshchestva* **132**(5), 22-33 (in Russ.).

Sailaufite

$(Ca,Na,\square)_2Mn^{3+}{}_3O_2(AsO_4)_2(CO_3)\bullet 3H_2O$

MONOCLINIC

Locality: Hartkoppe Hill, north of Ober–Sailauf, Spessart Mountains, northwest Bavaria, Germany. Starlera manganese deposit in the Eastern Alps, Switzerland.

Occurrence: In veins of manganese ore in rhyolite. Associated minerals are: hausmannite, arseniosiderite, kutnohorite, dolomite, quartz, calcite and manganoan calcite. In a second occurrence in the lower parts of the quarry, the mineral is associated with rhodochrosite, brandtite, tilasite and dolomite. A third occurrence is in the Starlera manganese deposit in the Eastern Alps, Switzerland, where the mineral is associated with manganlotharmeyerite, tilasite and calcite.

General appearance: Strongly intergrown tabular crystals forming aggregates mostly <0.5 mm.

Physical, chemical and crystallographic properties: *Luster*: given as vitreous, but the optical data indicate adamantine. *Diaphaneity*: presumably transparent to translucent. *Color*: dark red-brown to black. *Streak*: brown. *Luminescence*: nonfluorescent. *Hardness*: about 3½. *Tenacity*: brittle. *Cleavage*: {001} perfect. *Fracture*: uneven to conchoidal. *Density*: could not be measured, 3.33 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *Cm*, *a* 11.253, *b* 19.628, *c* 8.932 Å, β 100.05°, *V* 1942.6 Å^3, *Z* = 6, *a*:*b*:*c* = 0.5733:1:0.4551. Morphology: no forms were mentioned. Twinning: present, but not described. ***X-ray powder-diffraction data***: 8.7856(100)(001), 5.6524(27)(130), 2.9342(75)(003), 2.8847(19)(331), 2.8169(20)(33$\bar{2}$), 2.7702(36)(400), 2.5144(20)(133), 2.2016(55)(004). ***Optical data***: Biaxial (–), α 1.757, β 1.806, γ 1.811, 2*V*(meas.) 32°, 2*V*(calc.) 31°; dispersion not given; pleochroism not given; $X \wedge c = 10°$ in obtuse angle β, $Y = b$, $Z \approx a$. ***Chemical analytical data***: A single set of electron-microprobe data gave: Na_2O 1.76, CaO 11.80, Mn_2O_3 38.20, As_2O_5 34.92, Total 86.68 wt.%. In order to get a formula consistent with the structure, these chemical data require CO_2 6.90 and H_2O 8.48, which gives a total of 102.06 wt.% (calculations done by the abstractor). Empirical formula (based on 16 atoms of oxygen including one CO_3 and $3H_2O$) $(Ca_{1.34}Na_{0.36})_{\Sigma 1.70}Mn_{3.09}O_{2.24}(AsO_4)_{1.94}(CO_3)_{1.00}\bullet 3.00H_2O$. ***Relationship to other species***: It is structurally related to mitridatite, $Ca_2Fe^{3+}{}_3O_2(PO_4)_3\bullet 3H_2O$, and pararobertsite $Ca_2Mn^{3+}{}_3O_2(PO_4)_3\bullet 3H_2O$.

Name: After the locality.

Comments: IMA No. 2000–005.

WILDNER, M., TILLMANNS, E., ANDRUT, M. & LORENZ, J. (2003): Sailaufite, $(Ca,Na,\square)_2Mn_3O_2(AsO_4)_2(CO_3)\bullet 3H_2O$, a new mineral from Hartkoppe Hill, Ober–Sailauf (Spessart Mountains, Germany), and its relationship to mitridatite-group minerals and pararobertsite. *European Journal of Mineralogy* **15**, 555-564.

Santabarbaraite

$Fe^{3+}_3(PO_4)_2(OH)_3 \bullet 5H_2O$

AMORPHOUS

Locality: Valdarno Superiore (Upper Arno River Valley), Santa Barbara mining district, Tuscany, Italy. Beneath the Wannon Falls, about 7 km west of Hamilton, Victoria, Australia.

Occurrence: In clays at both localities. It is associated with metavivianite at the type locality.

General appearance: At the type locality, as concretionary nodules (up to 6 cm in diameter) with cavities filled by aggregates (up to 3 mm across) of submillimetric pseudocrystals with the morphology of vivianite. Some of the aggregates show a core of metavivianite. At Wannon Falls, it occurs as pseudomorphs after vivianite crystals up to 9 cm across.

Physical, chemical and crystallographic properties: *Luster*: vitreous to greasy. *Diaphaneity*: translucent. *Color*: brown or light brown in hand specimens, but yellow-amber under the microscope. *Streak*: yellow-amber. *Luminescence*: nonfluorescent. *Hardness*: was not determined. *Tenacity*: brittle. *Cleavage*: nothing distinct, but shows a good parting parallel to the original perfect cleavage of vivianite. *Fracture*: not given. *Density*: 2.42 g/cm^3 (meas.). ***Crystallography***: Amorphous. Morphology: No forms were observed. Twinning: none observed. ***X-ray powder-diffraction data***: None. ***Optical data***: Isotropic, *n* 1.695. ***Chemical analytical data***: Mean of thirty sets of electron-microprobe data (with H_2O by TGA): MgO 0.61, Mn_2O_3 2.23, Fe_2O_3 43.97, P_2O_5 29.48, H_2O 23.90, Total 100.19 wt.%. Empirical formula: $(Fe_{2.71}Mn_{0.14}Mg_{0.07})_{\Sigma 2.92}(PO_4)_{2.05}(OH)_{2.54} \bullet 5.26H_2O$. ***Relationship to other species***: None apparent.

Name: After the mining district of the type locality and after the Christian martyr Santa Barbara, the patron saint of miners. who was born in Nicomedia, now Jzmid (Turkey) in the IVth century AD.

Comments: IMA No. 2000–052A.

PRATESI, G., CIPRIANI, C., GIULI, G. & BIRCH, W.D. (2003): Santabarbaraite: a new amorphous phosphate mineral. *European Journal of Mineralogy* **15**, 185-192.

Shirokshinite

$K(NaMg_2)Si_4O_{10}F_2$

MONOCLINIC

Locality: The +252 meter level of the Kirovskii apatite mine, Kukisvumchorr Mountain, Khibina alkaline massif, Kola Peninsula, Russia.

Occurrence: In a small hyperalkaline pegmatite embedded in rischorrite near the contact with nepheline–apatite rock. Associated minerals are: microcline, kupletskite, aegirine, natrolite, lorenzenite, calcite, remondite-(Ce), donnayite-(Y), mckelveyite-(Y) and galena.

General appearance: Coarse, hexagonal prismatic crystals up to 2.5 × 1 × 0.8 mm grouped in sheaf-like clusters up to 2.5 mm. The crystals are usually skeletal and look like hollow "cases" and snowflakes.

Physical, chemical and crystallographic properties: *Luster*: pearly to vitreous. *Diaphaneity*: transparent to translucent. *Color*: colorless to pale grayish sometimes with a greenish tint. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: 2½. *Tenacity*: flexible but almost inelastic. *Cleavage*: {001} perfect. *Fracture*: laminated. *Density*: could not be measured, 2.91 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *C*2/*m*, *a* 5.269, *b* 9.092, *c* 10.198 Å, β 100.12°, *V* 481.0 Å^3, *Z* = 2, *a*:*b*:*c* = 0.5795:1:1.1216. Morphology: {010}, {110}, {001} and possibly {11$\bar{1}$}. Twinning: none mentioned. ***X-ray powder-diffraction data***: 10.0(70)(001), 3.67(60)(11$\bar{2}$), 3.36(90)(022,003), 2.59(90)(20$\bar{1}$,130,200,13$\bar{1}$), 2.41(100)(201,13$\bar{2}$), 2.14(60)(202,13$\bar{3}$), 1.665(80)(204,13$\bar{5}$), 1.522(100)(20$\bar{6}$,135, 33$\bar{1}$,060), 1.359(60)(20$\bar{7}$,136,046). ***Optical data***: Biaxial (–), α 1.526, β 1.553, γ 1.553, 2*V*(meas.) 5°, 2*V*(calc.) 0°; dispersion not observed; nonpleochroic; $X \wedge c$ = 3° in obtuse angle β, $Y = b$, $Z \wedge a$ = 7° in obtuse angle β (corrected here by abstractor). ***Chemical analytical data***: Mean of three sets of electron-microprobe data: Na_2O 7.01, K_2O 10.18, MgO 19.17, MnO 0.23, FeO 1.54, Al_2O_3 0.24, SiO_2 57.64, TiO_2 0.16, F 9.19, sum 105.36, less O = F 3.87, Total 101.49 wt.%. Empirical formula: $(K_{0.90}Na_{0.02})_{\Sigma 0.92}(Mg_{1.97}Na_{0.92}Fe_{0.09}Mn_{0.01}Ti_{0.01})_{\Sigma 3.00}(Si_{3.98}Al_{0.02})_{\Sigma 4.00}O_{9.99}F_{2.01}$. ***Relationship to other species***: It is a member of the mica group, specifically, the Na-dominant analogue of tainiolite, $K(LiMg_2)Si_4O_{10}F_2$.

Name: After Russian geologist Nikolay Vasilievich Shirokshin (1809–?), a Captain in the Russian Mining Corps who was the first investigator of the Khibina alkaline massif.

Comments: IMA No. 2001–063. This is the -1*M* polytype.

PEKOV, I.V., CHUKANOV, N.V., FERRARIS, G., IVALDI, G., PUSHCHAROVSKY, D.YU & ZADOV, A.E. (2003): Shirokshinite, $K(NaMg_2)Si_4O_{10}F_2$, a new mica with octahedral Na from Khibiny massif, Kola Peninsula: descriptive data and structural disorder. *European Journal of Mineralogy* **15**, 447-454.

Sphaerobertrandite

$Be_3SiO_4(OH)_2$

MONOCLINIC

Locality: (1) Mannepakhk Mtn., (2) Kuftnyun Mtn. and Sengischorr Mtn., Lovozero massif, Kola Peninsula, Russia. (3) Yukspor Mtn., Khibina massif, Kola Peninsula, Russia. (4) Ilímaussaq alkaline complex, South Greenland. (5) Lepkhe–Nelm ("Nepkha") Mtn., Lovozero massif, Kola Peninsula, Russia. (6) Hsianghualing, People's Republic of China. (7) Tuften larvikite quarry, Tvedalen, Larvik, Norway. (8) Mørje II larvikite quarry, 2 km north-northwest of Tuften quarry, Tvedalen, Larvik, Norway.

Occurrence: (1) In a large, schlieren-like pegmatite in eudialyte lujavrite near the margin of poikilitic nepheline–sodalite syenites; associated minerals are: microcline, eudialyte, nepheline, sodalite, lorenzenite, lamprophyllite, murmanite, arfvedsonite, aegirine, analcime, natrolite, albite, mangan-neptunite, fluorite, thorite, sérandite, epididymite and beryllite. (2) In several pegmatites related to naujaite and tawite at upper Tavaiok River; associated with microcline, nepheline, sodalite, arfvedsonite, aegirine, eudialyte, murmanite, lamprophyllite, lorenzenite, sphalerite, polylithionite, epididymite, natrolite, analcime, albite, mangan-neptunite, fluorapatite, kuzmenkoite-Mn, organovaite-Mn, vinogradovite, thorite, chabazite-Ca, monazite-(Ce) and rhabdophane-(Ce). (3) In a single large specimen of epididymite. (4) In pegmatites with epididymite inside pseudomorphs after chkalovite at Qeqertaussaq, northern coast of Kangerluarsuk fjord. (5) With epididymite in pseudomorphs after chkalovite in pegmatite. (6) As a product of hydrothermal alteration of a greisen-like metasomatic assemblage with hsianghualite and bromellite. (7) In pegmatite dikes with hambergite, analcime, calcite, chiavennite and montmorillonite. (8) With hambergite.

General appearance: Compact spherulites and aggregates, finely crystalline crusts and spherulites. These are usually made up of small crystals (up to 0.5 × 0.2 × 0.05 mm).

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent to translucent. *Color*: colorless, yellow, brownish, grayish, beige. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: 5. *Tenacity*: brittle. *Cleavage*: {001} perfect. *Fracture*: uneven. *Density*: 2.46 g/cm^3 (meas.), 2.53 g/cm^3 (calc.). ***Crystallography***: Monoclinic, $P2_1/c$, a 5.081, b 4.639, c 17.664 Å, β 106.09°, V 400.0 Å^3, Z = 4, a:b:c = 1.0953:1:3.8077. Morphology: {001}, {012}, {102}, {10$\bar{2}$}, flattened on {001} and elongate along [100]. Twinning: invariably twinned by pseudo-merohedry, producing a strongly pseudo-orthorhombic unit cell. ***X-ray powder-diffraction data***: 4.885(90)(100), 4.236(62)(004), 3.161(100)(111,11$\bar{3}$), 2.836(70)(104), 2.538(55)(20$\bar{2}$), 2.318(90)(020), 2.174(55)(10$\bar{8}$,11$\bar{7}$). ***Optical data***: Biaxial (–), α 1.597, β 1.607, γ 1.616, $2V$(meas.) 70°, $2V$(calc.) 86°; dispersion not observed; nonpleochroic; X or $Y \wedge a = -10°$, $Z = c$. ***Chemical analytical data***: Analysis (Be by wet-chemical means, Si by electron microprobe, and H_2O by TGA) gave: BeO 45.88, SiO_2 38.46, H_2O 12.54, Total 96.88 wt.%. Empirical formula: $Be_{2.89}Si_{1.01}O_{3.81}(OH)_{2.19}$. ***Relationship to other species***: None apparent.

Name: Recalls the typical spherulitic morphology of aggregates and the chemical similarity to bertrandite, $Be_4Si_2O_7(OH)_2$.

Comments: Grandfathered. The mineral was first described by Semenov in 1957, but was not accepted as a valid species by many mineralogists. The Commission on New Minerals and Mineral Names of the International Mineralogical Association decided that the mineral is valid and should have the status of grandfathered.

PEKOV. I.V., CHUKANOV, N.V., LARSEN, A.O., MERLINO, S., PASERO, M., PUSHCHAROVSKY, D.YU., IVALDI, G., ZADOV, A.E., GRISHIN, V.G., ÅSHEIM, A., TAFTØ, J. & CHISTYAKOVA, N.I. (2003): Sphaerobertrandite, $Be_3SiO_4(OH)_2$: new data, crystal structure and genesis. *European Journal of Mineralogy* **15**, 157-166.

Surkhobite

$(Ca,Na)(Ba,K)(Fe^{2+},Mn)_4Ti_2(Si_4O_{14})O_2(F,OH,O)_3$

MONOCLINIC

Locality: In the Surkhob River basin, Dara-i-Pioz massif, Alai Ridge, Tajikistan.

Occurrence: In a rare-metal-enriched syenite pegmatite. Associated minerals are: aegirine, microcline, albite, quartz, amphibole, annite, bafertisite, astrophyllite, zircon, fluorite, polylithionite, stillwellite-(Ce), sogdianite, tadzhikite.

General appearance: Platy crystals up to 1 mm and grains up to 2 × 1 × 0.4 cm.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: translucent. *Color*: brownish red. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: VHN 259 kg/mm^2 perpendicular to (001) and 482 kg/mm^2 on (001), Mohs 4½. *Tenacity*: brittle. *Cleavage*: {001} perfect. *Fracture*: uneven. *Density*: 3.84 g/cm^3 (meas.), 3.83 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *C*2, *a* 10.723, *b* 13.826, *c* 20.791 Å, β 95.00°, *V* 3071 Å^3, *Z* = 8, *a*:*b*:*c* = 0.7756:1:1.5038. Morphology: {001}, habit platy. Twinning: on (001). ***X-ray powder-diffraction data***: 10.39(20)(002), 3.454(100)(006), 3.186(15)(312), 2.862(15)(225), 2.592(70)(008), 2.074(40)(048), 1.728(15)(602, $\bar{3}$.3.10). ***Optical data***: Biaxial (–), α 1.790(calc.), β 1.858, γ 1.888, 2*V*(meas.) 65°; dispersion $r < v$, strong; pleochroism *X* yellow, *Y* orange, *Z* bright yellow, absorption $Y > Z \geq X$; $X = b$, $Z \wedge a = 34°$. ***Chemical analytical data***: A wet-chemical analysis gave: Na_2O 1.57, K_2O 1.30, CaO 4.74, MnO 12.75, FeO 13.00, SrO 0.06, BaO 14.45, Al_2O_3 1.10, Fe_2O_3 3.47, SiO_2 26.68, TiO_2 14.00, ZrO_2 2.40, Nb_2O_5 1.00, H_2O 1.17, F 4.06, sum 101.75, less O = F 1.71, Total 100.04 wt.%. Empirical formula: $(Ca_{0.75}Na_{0.45})_{\Sigma 1.20}(Ba_{0.83}K_{0.24}Sr_{0.01})_{\Sigma 1.08}(Fe^{2+}_{1.60}Mn_{1.59}Fe^{3+}_{0.38}Al_{0.19})_{\Sigma 3.76}(Ti_{1.55}Zr_{0.17}Nb_{0.07})_{\Sigma 1.79}(Si_{3.93}O_{14.24})O_{1.72}[F_{1.89}(OH)_{1.15}]_{\Sigma 3.04}$. ***Relationship to other species***: It is closely related to jinshajiangite and perraultite.

Name: After the Surkhob River at the type locality.

Comments: IMA No. 2002–037.

ESKOVA, E.M., DUSMATOV, V.D., RASTSVETAEVA, R.K., CHUKANOV, N.V. & VORONKOV, A.A. (2003): Surkhobite, $(Ca,Na)(Ba,K)(Fe^{2+},Mn)_4Ti_2(Si_4O_{14})O_2(F,OH,O)_3$, a new mineral from the Alai Ridge, Tajikistan. *Zapiski Vserossiyskogo Mineralogicheskogo Obshchestva* **132**(2), 60-67 (in Russ.).

ROZENBERG, K.A., RASTSVETAEVA, R.K. & VERIN, I.A. (2003): Crystal structure of surkhobite: new mineral from the family of titanosilicate micas. *Crystallography Reports* **48**, 384-389.

Tillmannsite

$(Ag_3Hg)(V,As)O_4$

TETRAGONAL

Locality: Roua copper occurrences, upper Var valley (Daluis gorge), at the western margin of the Barrot Dome, Alpes-Maritimes, France.

Occurrence: It is a secondary alteration mineral and is associated with pecoraite, vésigniéite, olivenite, kolfanite, janggunite, chlorargyrite, cuprite, copper, silver, mercurian silver, domeykite, djurleite and algodonite in small geodes.

General appearance: Aggregates up to 0.2 mm in diameter made up of pseudo-octahedral crystals up to 50 μm across.

Physical, chemical and crystallographic properties: *Luster*: adamantine. *Diaphaneity*: translucent. *Color*: red to brownish red. *Streak*: brownish red. *Luminescence*: nonfluorescent. *Hardness*: could not be determined. *Tenacity*: very brittle. *Cleavage*: none. *Fracture*: conchoidal. *Density*: could not be measured, 7.71 g/cm^3 (calc.). ***Crystallography***: Tetragonal, $I\bar{4}$, *a* 7.727, *c* 4.648 Å, *V* 277.5 Å^3, *Z* = 2, *c*:*a* = 0.6015. Morphology: pseudo-octahedral with {111}, {110}, {100}, {101} and minor {001}. Twinning: by contact on (100). ***X-ray powder-diffraction data***: 5.45(25)(110), 2.772(100)(211), 2.324(30)(002), 2.254(20)(301), 1.740(15)(411), 1.683(15)(312). ***Optical data***: Uniaxial (+), $\omega \approx 2.3$, $\varepsilon \approx 2.5$, pleochroism intense, O orange-brown, E intense red-orange. ***Chemical analytical data***: Mean of fourteen sets of electron-microprobe data: Ag 49.82, Hg 30.40, V 5.32, As 4.23, O 9.90, Total 99.67 wt.%. Empirical formula: $Ag_{2.98}Hg_{0.98}V_{0.67}As_{0.36}O_{4.00}$. ***Relationship to other species***: None apparent.

Name: After Professor Ekkehart Tillmanns (b. 1941), Institute of Mineralogy and Crystallography, Vienna, Austria.

Comments: IMA No. 2001–010.

SARP, H., PUSHCHAROVSKY, D.YU., MACLEAN, E.J., TEAT, S.J. & ZUBKOVA, N.V. (2003): Tillmannsite, $(Ag_3Hg)(V,As)O_4$, a new mineral: its description and crystal structure. *European Journal of Mineralogy* **15**, 177-180.

Tsepinite-Ca

$(Ca,K,Na,\square)_2(Ti,Nb)_2(Si_4O_{12})(OH,O)_2 \bullet 4H_2O$

MONOCLINIC

Locality: Lovchorrite mine, Hackman Valley, Yukspor Mountain, Khibina massif, Kola Peninsula, Russia.

Occurrence: In the hydrothermally altered zone of a large aegirine – nepheline – K-feldspar pegmatite. Associated minerals are: microcline, aegirine, natrolite, kentbrooksite, kupletskite, Mn-rich lamprophyllite, fluorapatite, catapleiite, ancylite-(Ce), ancylite-(La), fluorapophyllite, leucophanite and chabazite-Ca.

General appearance: Coarse long-prismatic to needle-shaped crystals up to $0.2 \times 0.6 \times 5$ mm. They occur as sheaf-like clusters up to 2×6 mm and chaotic open-work aggregates up to 1 cm.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: colorless to white and pale brownish. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: 5. *Tenacity*: brittle. *Cleavage*: not observed. *Fracture*: uneven. *Density*: 2.73 g/cm^3 (meas.), 2.77 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *C*2/*m*, *a* 14.484, *b* 14.191, *c* 7.907 Å, β 117.26°, *V* 1445 Å^3, *Z* = 4, *a*:*b*:*c* = 1.0206:1:0.5572. Morphology: by analogy with tsepinite-Na, the major forms probably are {100} and {001}. Twinning: none mentioned. ***X-ray powder-diffraction data***: 7.02(60)(020,001), 6.38(40)(20$\bar{1}$), 3.53(45)(131), 3.16(100)(041,022), 2.62(45)(20$\bar{3}$,202), 2.51(85)(44$\bar{1}$,40$\bar{3}$,042), 1.718(50)(46$\bar{3}$,461,44$\bar{4}$,442,081), 1.450(40)(48$\bar{3}$,481). ***Optical data***: Biaxial (+), α 1.666, β 1.676, γ 1.780, 2*V*(meas.) 30°, 2*V*(calc.) 36°; dispersion $r < v$, very weak; nonpleochroic; *Y*= *b*. ***Chemical analytical data***: Mean of ten sets of electron-microprobe data: Na_2O 1.32, K_2O 2.23, CaO 5.29, MnO 0.16, FeO 0.04, ZnO 0.12, SrO 3.01, BaO 3.52, Al_2O_3 0.04, SiO_2 41.06, TiO_2 21.95, Nb_2O_5 9.08, H_2O 13.30, Total 101.12 wt.%. Empirical formula: $(Ca_{1.12}K_{0.56}Na_{0.51}Sr_{0.35}Ba_{0.27}Mn_{0.03}Zn_{0.02}Fe_{0.01})_{\Sigma 2.87}(Ti_{3.27}Nb_{0.81})_{\Sigma 4.08}(Si_{8.14}Al_{0.01})_{\Sigma 8.15}O_{24.42}[(OH)_{2.45}O_{1.55}]_{\Sigma 4.00} \bullet 7.57H_2O$. ***Relationship to other species***: It is a member of the labuntsovite group.

Name: Recalls the relationship to tsepinite-Na. The suffix is in accord with the IMA-approved nomenclature for the group.

Comments: IMA No. 2002–020.

PEKOV, I.V., CHUKANOV, N.V., FERRARIS, G., GULA, A., PUSHCHAROVSKY, D.YU. & ZADOV, A.E. (2003): Tsepinite-Ca, $(Ca,K,Na,\square)_2(Ti,Nb)_2(Si_4O_{12})(OH,O)_2 \bullet 4H_2O$, a new mineral of the labuntsovite group from the Khibiny alkaline massif, Kola Peninsula – novel disordered sites in the vuoriyarvite-type structure. *Neues Jahrbuch für Mineralogie, Monatshefte*, 461-480.

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

Tsumgallite

GaO(OH)

ORTHORHOMBIC

Locality: Tsumeb mine, Tsumeb, Namibia.

Occurrence: In vugs of rich germanite ore. Associated minerals are: söhngeite, zincian siderite, chalcocite and quartz.

General appearance: Very thin platelets up to 40 × 40 μm and 0.5 to 1 μm thick.

Physical, chemical and crystallographic properties: *Luster*: pearly. *Diaphaneity*: translucent. *Color*: pale greenish yellow to beige. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: soft. *Tenacity*: not given. *Cleavage*: {010} perfect. *Fracture*: not given. *Density*: could not be determined, 5.08 g/cm^3 (calc.). ***Crystallography***: Orthorhombic, *Pbnm*, *a* 4.512, *b* 9.772, *c* 2.967 Å, *V* 130.8 Å^3, *Z* = 4, *a*:*b*:*c* = 0.4617:1:0.3036. Morphology: only {010} was observed. Twinning: none mentioned. ***X-ray powder-diffraction data***: 4.089(100)(110), 2.632(33)(130), 2.530(22)(021), 2.404(100)(111), 1.767(14)(211), 1.690(26)(221), 1.538(21)(151,160), 1.478(16)(250). ***Optical data***: Biaxial, no other data could be determined. The mean index of refraction calculated from the Gladstone–Dale relationship is 1.97. ***Chemical analytical data***: Mean of fifteen sets of electron- microprobe data (with H_2O calculated to give 1 OH): ZnO 0.78, Ga_2O_3 78.13, Fe_2O_3 3.99, GeO_2 4.01, SiO_2 1.07, H_2O (8.77), Total (96.75) wt.%. Empirical formula: $(Ga_{0.86}Fe_{0.05}Ge_{0.04}Si_{0.02}Zn_{0.01})_{\Sigma 0.98}O_{1.00}(OH)_{1.00}$. ***Relationship to other species***: It is the Ga-dominant member of the diaspore group.

Name: Recalls the type locality and the chemical composition.

Comments: IMA No. 2002–011.

SCHLÜTER, J., KLASKA, K.-H., ADIWIDJAJA, G. & GEBHARD, G. (2003): Tsumgallite, GaO(OH), a new mineral from the Tsumeb mine, Tsumeb, Namibia. *Neues Jahrbuch für Mineralogie, Monatshefte*, 521-527.

Vasilyevite

$(Hg_2)^{2+}{}_{10}O_6I_3Br_2Cl(CO_3)$

TRICLINIC

Locality: Clear Creek mercury mine, New Idria district, San Benito County, California, USA.

Occurrence: In vugs in a brecciated silicate–carbonate rock composed of quartz and ferroan magnesite. Associated minerals in adjacent vugs are: mercury, eglestonite, montroydite, cinnabar and an undefined Hg oxyhalide.

General appearance: Anhedral masses less than 0.5 mm.

Physical, chemical and crystallographic properties: *Luster*: adamantine to metallic. *Diaphaneity*: opaque but translucent on thin edges. *Color*: silvery grey to black to dark red-black. *Streak*: red-brown. *Luminescence*: nonfluorescent. *Hardness*: approximately 3. *Tenacity*: very brittle. *Cleavage*: none. *Fracture*: uneven. *Density*: could not be measured, 9.80 g/cm^3 (calc.). ***Crystallography***: Triclinic, $P\bar{1}$, *a* 9.344, *b* 10.653, *c* 18.265 Å, α 93.262, β 90.548, γ 115.422°, *V* 1638.3 Å^3, *Z* = 2, *a*:*b*:*c* = 0.8771:1:1.7145. Morphology: no forms were observed. Twinning: none observed. ***X-ray powder-diffraction data***: 7.645(60)($\bar{1}1\bar{1}$), 4.205(80)(01$\bar{4}$), 3.296(50)($\bar{1}$15,105), 3.132(90)(12$\bar{3}$,$\bar{1}$3$\bar{3}$), 2.894(100)($\bar{3}$12,$\bar{3}$2$\bar{2}$), 2.722(80)(124), 2.629(50)(130,$\bar{1}$40). ***Optical data***: In reflected light: grey, distinct anisotropism, weak bireflectance, nonpleochroic. R_1, R_2; $^{im}R_1$, $^{im}R_2$: (28.6, 29.5; 13.0, 13.9%) 470 nm, (26.2, 27.1; 11.1, 11.8%) 546 nm, (24.6, 25.7; 10.2, 10.9%) 589 nm, (22.8, 24.0; 9.1, 9.8%) 650 nm. ***Chemical analytical data***: Electron-microprobe data and crystal-structure data gave: Hg_2O 89.1, I 7.0, Br 2.5, Cl 0.6, CO_2 0.8, S 0.1, sum 100.1, less O = I + Br + Cl + S 0.88, Total 99.22 wt.%. Empirical formula: $Hg^{1+}{}_{20.82}O_{6.86}I_{2.69}Br_{1.52}Cl_{0.82}S_{0.15}(CO_3)_{0.89}$. ***Relationship to other species***: none apparent.

Name: After Vladimir Ivanovich Vasilyev (b. 1929), of the Institute of Geology of the Siberian Branch of the Russian Academy of Sciences, Novosibirsk, Russia.

Comments: IMA No. 2003–016.

ROBERTS, A.C., COOPER, M.A., HAWTHORNE, F.C., STIRLING, J.A.R., PAAR, W.H., STANLEY, C.J., DUNNING, G.E. & BURNS, P.C. (2003): Vasilyevite, $(Hg_2)^{2+}{}_{10}O_6I_3Br_2Cl(CO_3)$, a new mineral species from the Clear Creek Claim, San Benito County, California. *Canadian Mineralogist* **41**, 1167-1172.

COOPER, M.A. & HAWTHORNE, F.C. (2003): The crystal structure of vasilyevite, $(Hg_2)^{2+}{}_{10}O_6I_3(Br,Cl)_3(CO_3)$. *Canadian Mineralogist* **41**, 1173-1181.

Vitimite

$Ca_6B_{14}O_{19}(SO_4)(OH)_{14}\bullet 5H_2O$

MONOCLINIC

Locality: The Solongo boron deposit, Vitim River basin, southern part of the Vitimskoe plateau, Buryatia, Transbaikal Region, Russia (350 km north of the town of Ulan–Ude). The mineral was found in drill core from a depth of 129.4 m. Also found in the Novofrollovskoe copper deposit, Polar Urals, Russia.

Occurrence: It is a low-temperature hydrothermal mineral in veinlets. Associated minerals are: at Solongo: calcite, priceite, federovskite, kurchatovite, ludwigite, magnetite, sphalerite and pyrite; at Novofrollovskoe: calcite, uralborite and serpentine.

General appearance: Fibrous aggregates 0.2 mm thick with fibers up to 0.2 mm long.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: white. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: 1½. *Tenacity*: sectile. *Cleavage*: not observed. *Fracture*: uneven. *Density*: 2.29 g/cm^3 (meas.), 2.24 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *P*2/*m*, *P*2 or *Pm*, *a* 14.10, *b* 19.53, *c* 14.05 Å, β 120.0°, *V* 3350.6 Å^3, *Z* = 4, *a*:*b*:*c* = 0.7220:1:0.7194. Morphology: no forms were observed. Twinning: none observed. ***X-ray powder-diffraction data***: 12.2(10)(100,001), 4.42(4)(230,032), 3.45(5)($\bar{3}$33), 3.036(6)(400,004), 2.911(4)($\bar{4}$24,420), 2.720(7)($\bar{1}$71,170,071), 2.108(4)(343), 1.992(5)(403,$\bar{6}$26,541,304,$\bar{4}$17). ***Optical data***: Biaxial (–), α 1.532, β 1.537, γ 1.540, 2*V*(meas.) 75°, 2*V*(calc.) 75°; dispersion $r > v$, medium; nonpleochroic; orientation given as $Z \wedge b = 5°$, but in the monoclinic system, one of the directions of principal vibration must coincide with *b*. ***Chemical analytical data***: Mean of six sets of electron-microprobe data (H_2O by TGA): CaO 31.25, B_2O_3 43.51, SO_3 7.16, H_2O 18.9, Total 100.82 wt.%. Empirical formula: $Ca_{6.24}B_{14.00}O_{19.48}(SO_4)_{1.00}(OH)_{13.52}\bullet 4.99H_2O$. ***Relationship to other species***: None apparent.

Name: After the locality.

Comments: IMA No. 2001–057.

CHUKANOV, N.V., PEKOV, I.V., MALINKO, S.V., ZADOV, A.E. & DUBINCHUK, V.T. (2002): Vitimite, $Ca_6B_{14}O_{19}(SO_4)(OH)_{14}\bullet 5H_2O$, a new mineral, and conditions of its formation in Solongo deposit, Buryatia. *Zapiski Vserossiyskogo Mineralogicheskogo Obshchestva* **131**(4), 41-46 (in Russ.).

Watatsumiite

$KNa_2LiMn_2V_2Si_8O_{24}$

MONOCLINIC

Locality: Tanohata mine, Iwate Prefecture, Japan.

Occurrence: In a metamorphosed manganese ore deposit. Associated minerals are: quartz, K-feldspar, sérandite, potassicleakeite, suzukiite, roscoelite, vanadian aegirine, copper, chalcopyrite and yarrowite.

General appearance: Short, prismatic crystals less than 0.8 mm long and massive aggregates less than 2 mm in diameter.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: yellowish green. *Streak*: white with a greenish tint. *Luminescence*: not mentioned. *Hardness*: VHN_{100} 707 to 946 kg/mm^2, Mohs 5 to 6. *Tenacity*: brittle. *Cleavage*: poor, direction not given. *Fracture*: conchoidal. *Density*: could not be measured, 3.24 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *Cc*, *a* 16.450, *b* 12.492, *c* 9.995 Å, β 115.32°, *V* 1857 Å^3, *Z* = 4, *a*:*b*:*c* = 1.3168:1:0.8001. Morphology: stated to be prismatic, elongate along [001] and terminated by pyramidal faces; no forms were mentioned. Twinning: none mentioned. ***X-ray powder-diffraction data***: 9.58(84)(110), 4.52(85)(002), 3.52(63)(131), 3.19(100)(330,$\bar{1}$32), 2.94(90)($\bar{2}$23), 2.90(66)(222,510), 2.49(93)($\bar{4}$41,$\bar{6}$21). ***Optical data***: Biaxial (+), α 1.686, β 1.694 (calc.), γ 1.720, 2*V*(meas.) 60°; dispersion not given; pleochroism moderate with yellowish tint to pale yellowish green; orientation not given. ***Chemical analytical data***: Mean of six sets of electron-microprobe data and laser-ablation microprobe – inductively coupled plasma – mass spectrometry: Li_2O 1.6, Na_2O 7.10, K_2O 4.89, MgO 1.61, CaO 0.03, MnO 12.28, FeO 0.35, BaO 0.88, SiO_2 52.64, TiO_2 3.13, VO_2 15.10, Total 99.61 wt.%. Empirical formula: $(K_{0.94}Ba_{0.05})_{\Sigma 0.99}Na_{2.08}Li_{0.97}(Mn_{1.57}Mg_{0.36}Fe_{0.04})_{\Sigma 1.97}(V_{1.66}Ti_{0.36})_{\Sigma 2.02}Si_{7.97}O_{24.00}$. ***Relationship to other species***: It is a member of the neptunite group, specifically the V-dominant analogue of mangan-neptunite.

Name: After Watatsumi, the Japanese god of the sea; neptunite was named for Neptune, the Roman god of the sea.

Comments: IMA No. 2001–043.

MATSUBARA, S., MIYAWAKI, R., KUROSAWA, M. & SUZUKI, Y. (2003): Watatsumiite, $KNa_2LiMn_2V_2Si_8O_{24}$, a new mineral from the Tanohata mine, Iwate Prefecture, Japan. *Journal of Mineralogical and Petrological Sciences* **98**, 142-150.

Zincostaurolite

$\square_4Zn_4Al_{16}(Al_2\square_2)Si_8O_{40}[(OH)_2O_6]$

MONOCLINIC

Locality: Zermatt valley, Western Alps, Switzerland.

Occurrence: In a metabauxite pocket of the Mesozoic Barrhorn series. Associated minerals are: muscovite, staurolite *s.l.*, kyanite, margarite, cookeite, chloritoid, diaspore, paragonite, gahnite, rutile, apatite, pyrite, zircon, allanite, a REE–Al phosphate (florencite ?), ankerite, tourmaline, pyrophyllite and kaolinite.

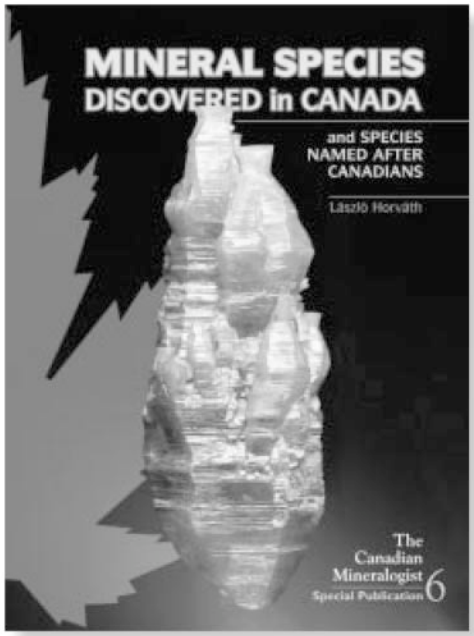
General appearance: Prismatic crystals up to 3 mm long.

Physical, chemical and crystallographic properties: *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, 3.78 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *C*2/*m*, *a* 7.853, *b* 16.534, *c* 5.639 Å, β 90.00°, *V* 732.2 Å^3, *Z* = 1, *a*:*b*:*c* = 0.4750:1:0.3411. Morphology: {010}, in parallel growth with {100} of kyanite. Twinning: mostly untwinned. ***X-ray powder-diffraction data***: 3.001(60.6)(221), 2.678(70.5)(151), 2.390(86.6)($\bar{1}$32), 2.363(46.2)(330), 2.349(44.6)($\bar{3}$11), 1.968(61.4)(062), 1.964(47.8)(400), 1.391(100.0)($\bar{4}$62). ***Optical data***: Biaxial (+), α 1.722, γ 1.734, nonpleochroic; *Z* = *c*. ***Chemical analytical data***: Mean of three sets of electron-microprobe data: Li_2O 0.45, MgO 0.45, MnO 0.01, FeO 1.40, ZnO 11.82, Al_2O_3 54.12, SiO_2 28.47, TiO_2 0.11, H_2O 1.96, Total 98.79 wt.%. Empirical formula: $(\square_{3.77}Mg_{0.10}Fe_{0.13})_{\Sigma 4.00}$ $(Li_{0.51}Zn_{2.45}Fe_{0.20}\square_{0.84})_{\Sigma 4.00}$ $(Al_{15.98}Ti_{0.02})_{\Sigma 16.00}$ $(Al_{1.94}Mg_{0.09}\square_{1.97})_{\Sigma 4.00}$ $Si_{8.00}O_{39.98}[(OH)_{3.67}O_{4.33}]_{\Sigma 8.00}$. ***Relationship to other species***: It is the Zn-dominant analogue of staurolite and magnesiostaurolite.

Name: Recalls the relationship to staurolite.

Comments: IMA No. 1992–036.

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.



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