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NEW MINERALS

JOSEPH A. MANDARINO[§]

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

Agardite-(Ce)

$CeCu_6(AsO_4)_3(OH)_6 \bullet 3H_2O$

HEXAGONAL

Locality: The Clara mine, central Black Forest, Germany.

Occurrence: Associated minerals are: barite, quartz, goethite and cornwallite.

General appearance: Acicular crystals up to 0.5 mm long and almost 0.01 mm thick; commonly in radiating aggregates.

Physical, chemical and crystallographic properties: *Luster*: vitreous, in part silky. *Diaphaneity*: transparent to translucent. *Color*: light green to yellowish green. *Streak*: greenish to pale yellow. *Luminescence*: nonfluorescent. *Hardness*: about 3. *Tenacity*: not given, probably brittle. *Cleavage*: not observed. *Fracture*: not given. *Density*: 3.70 g/cm^3 (meas.), 3.67 g/cm^3 (calc.). ***Crystallography***: Hexagonal, $P6_3/m$, a 13.59, c 5.89 Å, V 942.1 Å^3, Z = 2, c:a = 0.4334. Morphology: {100} and rare {001}. Twinning: none mentioned. ***X-ray powder-diffraction data***: 11.88(10)(100), 4.47(8)(111,120), 3.56(8)(211), 3.26(5)(301,310), 2.95(8)(002,221,400), 2.70(5)(112,320), 2.57(5)(410), 2.46(9)(212,321). ***Optical data***: Uniaxial (+), ω 1.725, ε 1.810, pleochroism O yellowish green, E green. ***Chemical analytical data***: Electron-microprobe data (with H_2O by difference): CaO 1.21, CuO 42.91, Fe_2O_3 0.39, Y_2O_3 0.91, La_2O_3 2.32, Ce_2O_3 4.99, Nd_2O_3 2.38, Sm_2O_3 0.56, Eu_2O_3 0.26, Gd_2O_3 0.52, Dy_2O_3 0.18, SiO_2 0.96, As_2O_5 30.91, SO_3 0.40, H_2O (11.10), Total (100.00) wt.%. Empirical formula: $(Ce_{0.32}Ca_{0.22}La_{0.15}Nd_{0.15}Y_{0.08}Sm_{0.03}Gd_{0.03}Eu_{0.02}Dy_{0.01})_{\Sigma 1.01}$ $(Cu_{5.62}Fe_{0.05})_{\Sigma 5.67}$ $(As_{2.80}Si_{0.17}S_{0.05})_{\Sigma 3.02}$ $O_{12.08}(OH)_{5.02} \bullet 3.90H_2O$. ***Relationship to other species***: It is the Ce- and AsO_4-dominant member of the mixite group.

Name: Reflects the relationship to the other members of the agardite series: agardite-(La) and agardite-(Y).

Comments: IMA No. 2003–030. The species has been known since 1970, but was not submitted to the CNMMN for approval until 2003.

WALENTA, K. (1970): Mineralien der Chloritil-Mixitegruppe mit Seltenen Erden von Fundorten im Schwarzwald. *Chemie der Erde* **29**, 36-47.

WALENTA, K. & THEYE, T. (2004): Agardit-(Ce) von der Grube Clara im mittleren Schwarzwald. *Aufschluss* **55**, 17-23.

§ *E-mail address*: j.a.mandarino@puffin.net

Alumino-magnesiohulsite

$Mg_2(Al,Mg,Sn)O_2(BO_3)$

MONOCLINIC

Locality: Along the Tas–Khayakhtakh Ridge, Chersky Mountain system, about 250 km east of Verkhoyansk, Republic of Sakha–Yakutia, Russian Federation. The exact locality is near the mouth of the Kebirin'ya Creek, a northern tributary of Dogdo River (lat. 67.5° N, long. 139° E).

Occurrence: In a kotoite marble. Associated minerals are: calcite, kotoite, forsterite, clinohumite, spinel, ludwigite, pertsevite, szaibelyite and brucite.

General appearance: Euhedral to subhedral stout prisms up to 90 μm long within aggregates of ludwigite.

Physical, chemical and crystallographic properties: Most of the usual physical properties could not be determined because the entire study was carried out on a single thin section. *Luster*: probably adamantine. *Diaphaneity*: transparent in thin section. *Color*: brown to blue-green in thin section. *Streak*: unknown. *Luminescence*: unknown. *Hardness*: unknown. *Tenacity*: unknown. *Cleavage*: unknown. *Fracture*: unknown. *Density*: 3.84 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *P*2/*m*, *a* 5.3444, *b* 3.0300, *c* 10.506 Å, β 94.46°, *V* 169.29 Å^3, *Z* = 2, *a*:*b*:*c* = 1.7605:1:3.4673. Morphology: no forms were observed. Twinning: consists of narrow lamellae parallel to {*h*0*l*}. ***X-ray powder-diffraction data***: Not given, but presumably similar to other members of the hulsite group. ***Optical data***: Biaxial (+), α' 1.78, β 1.782 (calc. here), γ' 1.805, 2*V*(meas.) 33°, pleochroism *X* brown, *Y* brown, *Z* blue-green; *X* = *b*. ***Chemical analytical data***: Mean of four sets of electron-microprobe data: MgO 33.94, CaO 0.11, MnO 0.42, FeO 15.97, B_2O_3 17.07, Al_2O_3 15.86, TiO_2 0.75, SnO_2 11.88, Total 96.00 wt.%. Empirical formula: $(Mg_{1.55}Fe_{0.45})_{\Sigma 2.00}$ $(Al_{0.63}Mg_{0.17}Sn_{0.16}Mn_{0.01}Ca_{0.01}Ti_{0.02})_{\Sigma 1.00}$ $B_{1.00}O_{5.00}$. ***Relationship to other species***: It is a member of the hulsite group.

Name: Reflects the composition and relationship to hulsite.

Comments: IMA No. 2002–038.

PERTSEV, N.N., SCHREYER, W., ARMBRUSTER, T., BERNHARDT, H.-J. & MEDENBACH, O. (2004): Alumino-magnesiohulsite, a new member of the hulsite group, in kotoite marble from east of Verkhoyansk, Sakha–Yakutia, Russia. *European Journal of Mineralogy* **16**, 151-161.

Ankinovichite

$(Ni,Zn)Al_4(VO_3)_2(OH)_{12}\bullet 2H_2O$

MONOCLINIC

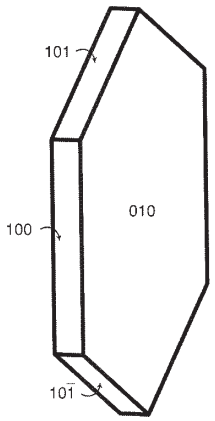
Locality: (1) Kara–Tau ridge at Kurumsk, 15 km south-southeast of Aksumbe, Kazakhstan (Lat. 44° 20' N, Long. 67° 38' E) and (2) Kara–Chagyr mountain, on the east side of the Isfairamsai river, near Valakish, 6 km south of Uch–Kurgon, Kyrgyzstan (Lat. 40° 10' N, Long. 72° 06' E).

Occurrence: (1) In vanadium-bearing schists. Associated minerals are: alvanite, volborthite, goethite and carnotite. (2) In cavities of quartz breccia. Associated minerals are: quartz, nickelalumite, kolovratite, volborthite, allophane, metatyuyamunite, roscoelite, gypsum and tangeite.

General appearance: (1) tabular elongate crystals up to 0.5 mm. (2) V-shaped twins up to 0.5 mm.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: bluish light green to colorless. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: 2½ to 3, VHN_5 68 kg/mm^2. *Tenacity*: brittle. *Cleavage*: {010} perfect. *Fracture*: uneven. *Density*: 2.48 g/cm^3 (meas.), 2.44 g/cm^3 (calc.). ***Crystallography***: Monoclinic, $P2_1/n$, a 17.8098, b 5.1228, c 8.8665 Å, β 92.141°, V 808.4 Å^3, Z = 2, $a:b:c$ = 3.4766:1:1.7308. Morphology: no forms were mentioned, but the SEM photos show what appear to be {010}, {100}, {101} and $\{10\bar{1}\}$. Twinning: mentioned, but not identified. ***X-ray powder-diffraction data***: 8.89(100)(200), 7.83(100)(101), 3.354(40)(012), 3.266(50)(501), 1.904(70)($\bar{6}$21), 1.680(40)(820), 1.605(50)(623), 1.481(80w)($\bar{6}$53). ***Optical data***: Biaxial (+) (the sign is given as negative, but the indices of refraction indicate that it is positive), α 1.653, β 1.677, γ 1.706, 2V(meas.) 86°, 2V(calc.) 86°; dispersion $r < v$, strong; nonpleochroic; elongation positive, parallel extinction. ***Chemical analytical data***: Mean of eight sets of electron-microprobe data (H_2O by difference): FeO 0.35, NiO 7.19, CuO 0.20, ZnO 4.20, Al_2O_3 33.79, SiO_2 0.67, V_2O_5 27.98, H_2O (25.62), Total (100.00) wt.%. Empirical formula: $(Ni_{0.57}Zn_{0.31}Fe_{0.03}Cu_{0.01})_{\Sigma 0.92}(Al_{3.94}Si_{0.07})_{\Sigma 4.01}(VO_3)_{1.83}(OH)_{12.11}\bullet 2.40H_2O$. ***Relationship to other species***: It is the Ni-dominant analogue of alvanite, $(Zn,Ni)Al_4(VO_3)_2(OH)_{12}\bullet 2H_2O$.

Name: After Ekaterina Alexandrovina Ankinovich (1911–1991) and her husband Stepan Gerasimovitch Ankinovich (1912–1985). They are well-known for her work on the mineralogy of vanadium-bearing schists of Middle Asia and for his work on the geology of Kara–Tau Ridge and other regions of Kazakhstan and Russia.



Comments: IMA No. 2002–063. The drawing produced here is based on the SEM photos in the paper.

KARPENKO, V.Y., PAUTOV, L.A., SOKOLOVA, E.V., HAWTHORNE, F.C., AGAKHANOV, A.A., DIKAYA, T.V. & BEKENOVA, G.K. (2004): Ankinovichite, the nickel analogue of alvanite, a new mineral from Kurumsak (Kazakhstan) and Kara–Chagyr (Kyrgyzstan). *Zapiski Vserossiyskogo Mineralogicheskogo Obshchestva* **133**(2), 59-70 (in Russ.).

Aurivilliusite

$Hg^{2+}Hg^{1+}OI$

MONOCLINIC

Locality: A small prospect pit near the long-abandoned Clear Creek mercury mine, New Idria district, San Benito County, California, USA.

Occurrence: In a cm-wide quartz vein. Associated minerals are: an undefined Hg–O–I phase, mercury, cinnabar, edgarbaileyite, quartz and magnesite.

General appearance: Irregular, thin patches from 10 μm to 0.5 mm.

Physical, chemical and crystallographic properties: *Luster*: metallic. *Diaphaneity*: opaque. *Color*: dark grey-black. *Streak*: dark red-brown. *Hardness*: unknown. *Tenacity*: brittle. *Cleavage*: {100} distinct. *Fracture*: uneven. *Density*: could not be measured, 8.96 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *C*2/*c*, *a* 17.580, *b* 6.979, *c* 6.693 Å, β 101.71°, *V* 804.0 Å^3, *Z* = 8, *a*:*b*:*c* = 2.5190:1:0.9590. Morphology: only {100} was observed. Twinning: present. ***X-ray powder-diffraction data***: 8.547(70)(200), 3.275(100)(002), 2.993(80)($\bar{2}$21), 2.873(80)(600), 2.404(50b)($\bar{6}$02,421,$\bar{2}$22), 1.878(50)($\bar{2}$23). ***Optical data***: In reflected light: resembles cinnabar, is extremely light-sensitive, shows no internal reflections and exhibits a "red light" coalescing phenomenon. No quantitative data could be determined. ***Chemical analytical data***: Mean of five sets of electron-microprobe data: HgO 40.10, Hg_2O 38.62, Cl 0.06, Br 0.22, I 22.76, sum 101.76, less O = Cl + Br + I 1.47, Total 100.29 wt.%. Empirical formula: $Hg^{2+}_{1.00}Hg^{1+}_{1.00}(I_{0.97}Br_{0.01}Cl_{0.01})_{\Sigma 0.99}$. ***Relationship to other species***: Related chemically to terlinguaite, $Hg^{2+}Hg^{1+}OCl$.

Name: After Karin Aurivillius (1920–1982), chemist-crystallographer at the University of Lund, Sweden, who determined the crystal structure of numerous synthetic Hg-compounds.

Comments: IMA No. 2002–022.

ROBERTS, A.C., STIRLING, J.A.R., CRIDDLE, A.J., DUNNING, G.E. & SPRATT, J. (2004): Aurivilliusite, $Hg^{2+}Hg^{1+}OI$, a new mineral species from the Clear Creek claim, San Benito County, California, USA. *Mineralogical Magazine* **68**, 241-245.

Bario-olgite

$Ba(Na,Sr,REE)_2Na(PO_4)_2$

TRIGONAL

Locality: Mt. Kedykverpakhk, Lovozero alkaline massif, Kola Peninsula, Russia.

Occurrence: In the hyperagpaitic "Palitra" pegmatite. Associated minerals are: manaksite, natrosilite, villiaumite, aegirine, ussingite, sodalite, sérandite, chkalovite, vuonnemite, among others.

General appearance: Grains up to 1.5 × 1 cm; rarely as pyramidal prismatic crystals.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: light green. *Streak*: white. *Luminescence*: not mentioned. *Hardness*: 4 to 4½. *Tenacity*: brittle. *Cleavage*: not observed. *Fracture*: not given. *Density*: 4.00 g/cm^3 (meas.), 3.99 g/cm^3 (calc.). ***Crystallography***: Trigonal, *P*3, *a* 5.549, *c* 7.032 Å, *V* 187.5 Å^3, *Z* = 1, *c*:*a* = 1.2673. Morphology: {100}, {$\bar{1}$00}, {101}, {$\bar{1}$01}, {10$\bar{1}$}, {$\bar{1}$0$\bar{1}$}. Twinning: none mentioned. ***X-ray powder-diffraction data***: 7.044(22)(001), 3.964(60)(011), 2.839(100)(012), 2.774(100)(110), 2.344(20)(003), 1.984(40)(202), 1.611(26)(122). ***Optical data***: Uniaxial (–), ω 1.628, ε 1.623, nonpleochroic. ***Chemical analytical data***: Mean of twelve sets of electron-microprobe data: Na_2O 14.78, K_2O 0.87, CaO 0.32, MnO 0.39, SrO 16.57, BaO 31.17, La_2O_3 2.41, Ce_2O_3 1.90, Pr_2O_3 0.10, Nd_2O_3 0.16, SiO_2 0.08, P_2O_5 31.77, Total 100.52 wt.%. Empirical formula: $(Na_{1.07}K_{0.04}La_{0.03}Ce_{0.02}Ca_{0.01}Mn_{0.01})_{\Sigma 1.18}$ $(Ba_{0.46}Sr_{0.36})_{\Sigma 0.82}(PO_4)$. ***Relationship to other species***: It is the Ba-dominant analogue of olgite, $Na(Sr,Ba)PO_4$.

Name: Refers to the composition and relationship to olgite.

Comments: IMA No. 2003–002. The empirical formula given in the paper is quite different from that of olgite and has been changed here.

PEKOV, I.V., CHUKANOV, N.V., KULIKOVA, I.M., ZUBKOVA, N.V., KROTOVA, O.D., SOROKINA, N.I. & PUSHCHAROVSKY, D.YU. (2004): New mineral bario-olgite, $Ba(Na,Sr,REE)_2Na[PO_4]_2$ and its crystal structure. *Zapiski Vserossiyskogo Mineralogicheskogo Obshchestva* **133**(1), 41-49 (in Russ.).

Catalanoite

$Na_2H(PO_4)•8H_2O$

ORTHORHOMBIC

Locality: Laguna de Santa Maria, about 5 km east of the Argentina–Chile border, in the Andean Puna, Los Andes Department, Salta Province, Argentina (Lat. 24° 06' S, Long. 67° 23' W) and 4,575 m above sea level.

Occurrence: It is an evaporite mineral formed in a desert playa lake. Associated minerals are: trona, gaylussite and halite.

General appearance: Minute crystals less than 50 and up to 500 μm.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: colorless. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: 2. *Tenacity*: fragile. *Cleavage*: none. *Fracture*: uneven. *Density*: could not be measured, 1.74 g/cm^3 (calc.). ***Crystallography***: Orthorhombic, *Ibca*, *a* 11.488, *b* 11.647, *c* 16.435 Å, *V* 2199 Å^3, *Z* = 8, *a*:*b*:*c* = 0.9863:1:1.4111. Morphology: two habits, bipyramidal and tabular; {100}, {010}, {*hkl*}, {*h'k'l'*}. Twinning: none mentioned. ***X-ray powder-diffraction data***: 5.779(40)(112), 4.897(43)(211), 4.731(62)(022), 3.751(81)(213), 2.8763(77)(400), 2.7820(100)(141), 2.7443(74)(042), 2.7281(39)(314), 1.9909(38)(523). ***Optical data***: Biaxial (–), α 1.443, β 1.457, γ 1.458, 2*V*(meas.) 29.6°, 2*V*(calc.) 29.7°; dispersion *r* > *v*, strong; nonpleochroic; orientation, *X* = *a*, *Y* = *b*, *Z* = *c*. ***Chemical analytical data***: AAS, TGA and MOAS (molecular optical absorption spectroscopy) gave: Na_2O 22.37, P_2O_5 24.87, H_2O 53.38, Total 100.62 wt.%. Empirical formula: $Na_{2.06}H_{0.94}(PO_4)_{1.00}•8.00H_2O$. ***Relationship to other species***: None apparent.

Name: After Luciano R. Catalano (1890–1970), well-known Argentine economic geologist and pioneer in the study of Andean salars in the Puna.

Comments: IMA No. 2002–008.

RUIZ, T.V. & SUREDA, R.J. (2002): Hallazgo de Catalanoíta, $Na_2H[PO_4]•8H_2O$ – *Ibca*, en la costra salina superficial de un yacimiento evaporítico de carbonato de sodio, laguna de Santa Maria, Puna de Salta, Argentina. *Acta del XV Congreso Geologicó Argentino, El Calafate, 2002* **1**, 465-469.

Filatovite

$K(Al,Zn)_2(As,Si)_2O_8$

MONOCLINIC

Locality: The second cinder cone of the North Breach of Great fissure Tolbachik eruption (GFTE), Kamchatka Peninsula, Russia.

Occurrence: A product of fumarolic activity. Gas temperatures in the fumarole were ~410 to 420° C. Associated minerals are: alumoklyuchevskite, lammerite, johillerite, sylvite, arsenatian orthoclase, hematite and tenorite.

General appearance: Prismatic crystals up to 0.3 mm and intergrowths of crystals.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: colorless. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: 5 to 6. *Tenacity*: brittle. *Cleavage*: {100} good. *Fracture*: not given. *Density*: could not be measured accurately because of many gaseous inclusions, 2.91 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *I*2/*c*, *a* 8.772, *b* 13.370, *c* 14.690 Å, β 115.994°, *V* 1549.1 Å^3, *Z* = 8, *a*:*b*:*c* = 0.6561:1:1.0987. Morphology: {001} and {010} are mentioned with respect to the optical orientation. Twinning: none mentioned. ***X-ray powder-diffraction data***: 4.329(70)($\bar{2}$02), 3.897(70)($\bar{1}$30), 3.364(100)($\bar{2}$20,$\bar{2}$04,040), 3.300(50)(004), 3.066(40)(132), 2.981(60)(042), 2.646(40)($\bar{2}$42). ***Optical data***: Biaxial (–), α 1.532, β 1.535, γ 1.537, 2*V*(meas.) 60°, 2*V*(calc.) 78°; dispersion not given; presumably nonpleochroic; $X \sim a$, $Y \wedge c$ 26° in obtuse angle β, $Z = b$. ***Chemical analytical data***: Mean of several sets of electron-microprobe data: Na_2O 0.63, K_2O 12.85, FeO 0.28, CuO 0.83, ZnO 3.85, Al_2O_3 27.33, SiO_2 12.35, P_2O_5 1.63, As_2O_5 40.60, Total 100.35 wt.%. Empirical formula: $(K_{0.92}Na_{0.07})_{\Sigma 0.99}$ $(Al_{1.81}Zn_{0.16}Cu_{0.04}Fe_{0.01})_{\Sigma 2.02}$ $(As_{1.20}Si_{0.70}P_{0.08})_{\Sigma 1.98}O_{8.00}$. ***Relationship to other species***: It is an AsO_4-dominant member of the feldspar group.

Name: After Stanislav K. Filatov (b. 1940), Professor, Department of Crystallography, St. Petersburg State University, St. Petersburg, Russia.

Comments: IMA No. 2002–052.

VERGASOVA, L.P., KRIVOVICHEV, S.V., BRITVIN, S.N., BURNS, P.C. & ANANIEV, V.V. (2004): Filatovite, $K[(Al,Zn)_2(As,Si)_2O_8]$, a new mineral species from the Tolbachik volcano, Kamchatka Peninsula, Russia. *European Journal of Mineralogy* **16**, 533-536.

FILATOV, S.K., KRIVOVICHEV, S.V., BURNS, P.C. & VERGASOVA, L.P. (2004): Crystal structure of filatovite, $K[(Al,Zn)_2(As,Si)_2O_8]$, the first arsenate of the feldspar group. *European Journal of Mineralogy* **16**, 537-543.

Haineaultite

$(Na,Ca)_5Ca(Ti,Nb)_5(Si,S)_{12}O_{34}(OH,F)_8 \bullet 5H_2O$

ORTHORHOMBIC

Locality: Poudrette Quarry, Mont Saint-Hilaire, Rouville County, Quebec, Canada.

Occurrence: (1) In an unusual breccia or altered marble xenoliths; associated minerals are quartz, a labuntsovite-group mineral, calcite, a sodic amphibole and an unknown mineral (possibly the Ti-dominant analogue of lemoynite). (2) In vugs in altered marble xenoliths; associated minerals are pectolite, fluorapophyllite, vesuvianite, tainiolite, albite, fluorite, calcite, microcline, aegirine and minor amounts of analcime, steacyite, monteregianite-(Y), leucosphenite, mangan-neptunite, ancylite-(Ce), an alkali amphibole, a eudialyte-group mineral, sodalite, stillwellite-(Ce), vinogradovite, götzenite, pyrite, molybdenite, galena, sphalerite and hibschite.

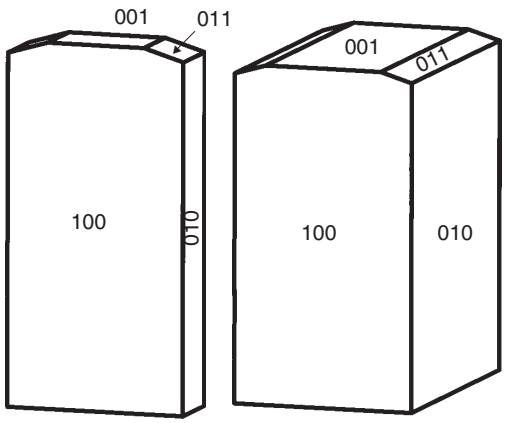
General appearance: Prismatic or bladed crystals elongate on [001] up to 6 mm long.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent to translucent. *Color*: (1) pale orange, (2) lemon-yellow, tan or off-white. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: 3 to 4. *Tenacity*: brittle. *Cleavage*: {100}, {010} and {001} distinct to good. *Fracture*: blocky to splintery. *Density*: 2.23 g/cm^3 (calc.). ***Crystallography***: Orthorhombic, *C*222, *a* 7.204, *b* 23.155, *c* 6.953 Å, *V* 1159.8 Å^3, *Z* = 1, *a*:*b*:*c* = 0.3111:1:0.3003. Morphology: {100}, {010}, {001}, {011}. Twinning: none observed. ***X-ray powder-diffraction data***:11.564(100)(020), 6.932(90)(001,110), 3.052(75)(240), 2.977(70)(042), 5.258(40)(130), 4.446(40)(041), 2.582(40)(152,062). ***Optical data***: Biaxial (+), α 1.599, β 1.610, γ 1.696, 2*V*(meas.) 38°, 2*V*(calc.) 41°; dispersion none noted; nonpleochroic; orientation, *X* = *b*, *Y* = *c*, *Z* = *a*. ***Chemical analytical data***: Mean of sixteen sets of electron-microprobe data (H_2O calculated) gave: Na_2O 4.70, K_2O 2.09, MgO 0.07, CaO 9.99, MnO 0.25, FeO 0.49, SiO_2 42.70, TiO_2 18.86, ZrO_2 0.31, Nb_2O_5 5.56, SO_3 2.60, H_2O (10.11), F 0.17, sum (97.40), less O = F 0.07, Total (97.33) wt.%. Empirical formula: $(Na_{2.42}Ca_{1.85}K_{0.71})_{\Sigma 4.98}$ $Ca_{1.00}$ $(Ti_{3.67}Nb_{0.67}Fe_{0.11}Mn_{0.06}Zr_{0.04}Mg_{0.03})_{\Sigma 4.58}$ $(Si_{11.35}S_{0.52})_{\Sigma 11.87}O_{33.97}$ $[(OH)_{7.86}F_{0.14}]_{\Sigma 8.00} \bullet 5.04H_2O$. ***Relationship to other species***: None apparent.

Name: After Gilles Haineault (b. 1946), of St-Mathieu-de-Beloeil, Quebec, Canada, a well-known collector and dealer of minerals from Mont Saint-Hilaire.

Comments: IMA No. 1997–015.

MCDONALD, A.M. & CHAO, G.Y. (2004): Haineaultite, a new hydrated sodium calcium titanosilicate from Mont Saint-Hilaire, Quebec: description, structure determination and genetic implications. *Canadian Mineralogist* **42**, 769-780.



Herbertsmithite

$Cu_3Zn(OH)_6Cl_2$

TRIGONAL

Locality: (1) Mina Los Tres Presidentes, Sierra Gorda, Chile (type locality). Also from (2) the Kali Kafi mine, Anarak, Iran and from (3) the Chah Khouni mine, Anarak, Iran.

Occurrence: (1) On a white quartzite. Associated minerals are: flattened gypsum crystals, radiating needles of opal pseudomorphs and minor dioptase. (2) In "limonite" gossan with wulfenite crystals, hemimorphite, chrysocolla and rosasite. (3) On joint surfaces of metamorphosed dolomitic limestone coated with "limonite" and associated with hemimorphite, chrysocolla, iranite, diaboleite and calcite.

General appearance: (1) Scattered to richly clustered coatings of complex rhombohedra (mostly 0.5 to 1 mm in diameter), or somewhat larger flattened crystals and aggregates in parallel growth. (2) Grains mostly <0.1 mm across in confused aggregates. (3) Crystals with indistinct faces mostly ~0.1 mm across and aggregates of such crystals. Some crystals are thin and curved in form up to 0.5 mm across.

Physical, chemical and crystallographic properties: *Luster*: given as vitreous, but the indices of refraction indicate adamantine. *Diaphaneity*: presumably transparent to translucent. *Color*: various shades of green. *Streak*: probably green. *Luminescence*: not given. *Hardness*: 3 to 3½. *Tenacity*: not given, probably brittle. *Cleavage*: {101} good. *Fracture*: not given. *Density*: 3.75 to 3.95 g/cm^3 (meas.), 3.76 g/cm^3 (calc.). ***Crystallography***: Trigonal, $R\bar{3}m$, a 6.834, c 14.075 Å, V 569.3 Å^3, Z = 3, c:a = 2.0596. Morphology: rhombohedra were observed, but the Miller indices are not given. Twinning: none observed. ***X-ray powder-diffraction data***: 5.466(55)(101), 4.702(14)(003), 2.764(100)(113), 2.730(13)(202), 2.266(36)(204), 1.820(13)(303), 1.709(18)(220). ***Optical data***: Uniaxial (–), ω 1.825, ε 1.817, pleochroism green to greenish blue, weak with absorption O > E. ***Chemical analytical data***: Electron-microprobe data (H_2O by TGA): CuO 56.1, ZnO 18.2, H_2O 12.5, Cl 17.2, sum 104.0, less O = Cl 3.9, Total 100.1 wt.%. Empirical formula: $Cu_{3.03}Zn_{0.96}(OH)_{5.95}Cl_{2.08}$. ***Relationship to other species***: It is chemically and structurally related to atacamite and paratacamite.

Name: After G.F. Herbert Smith (1872–1953), of the British Museum (Natural History), who discovered paratacamite.

Comments: IMA No. 2003–041.

BRAITHWAITE, R.S.W., MEREITER, K., PAAR, W.H. & CLARK, A.M. (2004): Herbertsmithite, $Cu_3Zn(OH)_6Cl_2$, a new species, and the definition of paratacamite. *Mineralogical Magazine* **68**, 527-539.

Hubeite

$Ca_2Mn^{2+}Fe^{3+}[Si_4O_{12}(OH)]\bullet 2H_2O$

TRICLINIC

Locality: Daye mine, near Huangshi, Hubei Province, People's Republic of China.

Occurrence: Associated minerals are: inesite, natroapophyllite, fluorapophyllite, quartz, ilvaite, pyrite and calcite.

General appearance: Radiating aggregates (less than 5 mm across) of intergrown crystals (up to 1 mm).

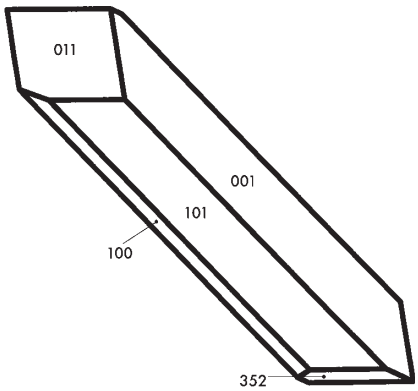
Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: not given, but probably transparent to translucent. *Color*: dark brown to pale brown. *Streak*: pale orange-brown. *Luminescence*: nonfluorescent. *Hardness*: 5½. *Tenacity*: brittle. *Cleavage*: {001} good. *Fracture*: conchoidal. *Density*: 3.02 g/cm^3 (meas.), 3.01 g/cm^3 (calc.). ***Crystallography***: Triclinic, $P\bar{1}$, *a* 9.960, *b* 13.87, *c* 6.562 Å, α 133.19°, β 101.50°, γ 66.27°, *V* 601 Å^3, *Z* = 2, *a*:*b*:*c* = 0.7181:1:0.4731. Morphology: dominant {001} and {101}; minor {100}, {0$\bar{1}$1} and {35$\bar{2}$}. Twinning: none mentioned. ***X-ray powder-diffraction data***: 9.072(100)($\bar{1}$00), 8.238(90)(1$\bar{1}$0), 5.000(30)(1$\bar{2}$0), 3.192(30)(230), 3.126(70)(320), 3.095(70)(1$\bar{4}$2), 2.781(60)($\bar{2}$20), 2.695(30)(1$\bar{5}$2), 1.993(30)(331), 1.627(30)(1$\bar{5}$4,13). ***Optical data***: Biaxial (–), α 1.667, β 1.679, γ 1.690, 2*V*(meas.) 89°, 2*V*(calc.) 87°; dispersion not given; pleochroism strong, *X* yellow-brown with a greenish tint, *Z* dark yellow-brown, absorption *Z* > *X*; *X* ∧ *b* = 20° in obtuse γ, *Y* ∧ *c* = 13° in acute α, *Z* = *a*. ***Chemical analytical data***: Mean of 25 sets of electron-microprobe data (H_2O calculated to give 1 OH and 2H_2O): MgO 0.29, CaO 21.91, MnO 11.34, Al_2O_3 0.38, Fe_2O_3 13.94, SiO_2 44.39, H_2O (8.32), Total (100.57) wt.%. Empirical formula: $Ca_{2.00}(Mn_{0.87}Ca_{0.12})_{\Sigma 0.99}$ $(Fe^{3+}{}_{0.95}Al_{0.04})_{\Sigma 0.99}$ $Si_{4.00}(OH)_{1.00}\bullet 2.00H_2O$. ***Relationship to other species***: None apparent.

Name: After Hubei Province.

Comments: IMA No. 2000–022. In the optical data, the sign is given as indeterminate because 2*V* is close to 90°; however, 2*V* calculated from the indices of refraction is –87°. Mark Cooper kindly provided the data for the crystal drawing.

HAWTHORNE, F.C., COOPER, M.A., GRICE, J.D., ROBERTS, A.C., COOK, W.R., JR. & LAUF, R.J. (2002): Hubeite, a new mineral from the Daye mine near Huangshi, Hubei Province, China. *Mineralogical Record* **33**, 465-471.

COOPER, M.A. & HAWTHORNE, F.C. (2004): The crystal structure of hubeite, a novel sorosilicate mineral. *Canadian Mineralogist* **42**, 825-834.



Larisaite

$Na(H_3O)(UO_2)_3(SeO_3)_2O_2 \bullet 4H_2O$

MONOCLINIC

Locality: Repete mine, near Blanding, San Juan County, Utah, USA.

Occurrence: In sedimentary rock. Associated minerals are: quartz, haynesite, andersonite, wölsendorfite, uranophane, gypsum, calcite and montmorillonite.

General appearance: Coarse lamellar crystals up to 1 mm and rosettes up to 2 mm.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent or translucent. *Color*: canary yellow. *Streak*: yellow. *Luminescence*: green for 250 nm. *Hardness*: 1. *Tenacity*: sectile. *Cleavage*: {010} perfect. *Fracture*: uneven. *Density*: could not be measured, 4.46 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *Pm*, *a* 6.981, *b* 17.249, *c* 7.646 Å, β 90.04°, *V* 920.64 Å^3, *Z* = 2. Morphology: {010} is the dominant form. Twinning: none observed. ***X-ray powder-diffraction data***: 8.63(43)(002), 7.67(100)(010), 7.02(33)(011,100), 3.85(40)($\bar{1}$13,020,113), 3.176(33)($\bar{2}$10), 3.107(77)(211), 2.874(53)(006,$\bar{1}$15), 1.342(33)(338,$\bar{2}$.2.11). ***Optical data***: Biaxial (–), α 1.597, β 1.770, γ 1.775, 2*V*(meas.) 20°, 2*V*(calc.) 18°; dispersion *r* < *v*, strong; pleochroism *X* light green, *Y* yellow, *Z* yellow; *X* = *b*, *Z* is the elongation direction. ***Chemical analytical data***: Mean of three sets of electron-microprobe data: Na_2O 2.04, K_2O 0.69, CaO 0.23, SeO_2 18.12, UO_3 72.19, H_2O 7.64, Total 100.91 wt.%. Empirical formula: $(Na_{0.81}K_{0.18}Ca_{0.05})_{\Sigma 1.04}(H_3O)_{0.73}(UO_2)_{3.09}O_{2.00}(SeO_3)_{2.00} \bullet 4.10H_2O$. ***Relationship to other species***: None apparent.

Name: After Larisa Nikolaevna Belova (1923–1998), Russian mineralogist and crystallographer. ***Comments***: IMA No. 2002–061. The unconventional space group *P*11*m* and the unit-cell parameters *a* 6.981, *b* 7.646, *c* 17.249 Å, β 90.04° are given in the paper. Those data have been changed here to the conventional space-group, which required the *b* and *c* axes to be interchanged.

CHUKANOV, N.V., PUSHCHAROVSKY, D.YU., PASERO, M., MERLINO, S., BARINOVA, A.V., MÖCKEL, S., PEKOV, I.V., ZADOV, A.E. & DUBINCHUK, V.T. (2004): Larisaite, $Na(H_3O)(UO_2)_3(SeO_3)_2O_2 \bullet 4H_2O$, a new uranyl selenite mineral from Repete mine, San Juan County, Utah, U.S.A. *European Journal of Mineralogy* **16**, 367-374.

Leogangite

$Cu_{10}(AsO_4)_4(SO_4)(OH)_6 \bullet 8H_2O$

MONOCLINIC

Locality: A mine dump of the Danielstollen, in the Schwarzleo valley about 10 km west-southwest of Leogang, Salzburg, Austria. The cotype is from a mine dump of the Inschlagalm in the same area.

Occurrence: In ore-bearing dolomite breccia. In addition to dolomite, associated minerals are: olivenite, malachite, tennantite, pyrite.

General appearance: Aggregates of platelets up to 0.1 mm long, 0,05 mm wide and <0.01 mm thick.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: green with a bluish tint. *Streak*: light green. *Luminescence*: nonfluorescent. *Hardness*: could not be determined. *Tenacity*: brittle. *Cleavage*: {100} perfect, parting {010} and {001}. *Fracture*: not given. *Density*: could not be measured, given as 3.55 g/cm^3 (calc.), but calculated here as 3.48 g/cm^3. ***Crystallography***: Monoclinic, *C*2/*c*, *a* 21.770, *b* 12.327, *c* 10.720 Å, β 92.85°, *V* 2873 Å^3, *Z* = 4, *a*:*b*:*c* = 1.7660:1:0.8696. Morphology: only {100} was identified, elongate along [010]. Twinning: none observed. ***X-ray powder-diffraction data***: 10.85(100)(200), 5.44(50)(400), 4.90(30)(20$\bar{2}$), 3.728(30)(402), 3.625(50)(600), 3.090(40)(023), 2.672(40)(042), 2.630(60)(513,20$\bar{4}$), 1.618(30)(15$\bar{5}$). ***Optical data***: Biaxial (–), α 1.590, β 1.740, γ 1.744, 2*V*(meas.) 18°, 2*V*(calc.) 17°; dispersion *r* > *v*, weak; pleochroism *X* blue-green, *Y* and *Z* pale green; *X* ∧ *a* = 3°, *Y* = *b*, *Z* = *c*. ***Chemical analytical data***: Mean of five sets of electron-microprobe data (H_2O by difference): CuO 51.1, SO_3 5.1, As_2O_5 29.7, SiO_2 0.2, H_2O (13.9), Total (100.0) wt.%. Empirical formula: $Cu_{9.67}[(As_{3.89}Si_{0.05})_{\Sigma 3.94}O_{15.76}(SO_4)_{0.96}(OH)_{5.55} \bullet 8.84H_2O$. ***Relationship to other species***: None apparent.

Name: After the locality.

Comments: IMA No. 1998–032. The abstractor's empirical formula based on 34 atoms of oxygen is slightly different from that presented in the paper, which appears to be based on 34.89 atoms of oxygen.

LENGAUER, C.L., GIESTER, G. & KIRCHNER, E. (2004): Leogangite, $Cu_{10}(AsO_4)_4(SO_4)(OH)_6 \bullet 8H_2O$, a new mineral from the Leogang mining district, Salzburg province, Austria. *Mineralogy and Petrology* **81**, 187-201.

Lepkhenelmite-Zn

$Ba_2Zn(Ti,Nb)_4[Si_4O_{12}]_2(O,OH)_4 \bullet 7H_2O$

MONOCLINIC

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

Occurrence: A hydrothermal mineral in cavities of a eudialyte – aegirine – feldspar pegmatite. Associated minerals are: lamprophyllite, natrolite, halloysite, ranciéite, kuzmenkoite-Zn, tsepinite-Na, paratsepinite-Ba, vinogradovite, apatite, among others.

General appearance: Coarse, flattened prismatic crystals up to 7 × 2.5 × 0.5 mm and crystal clusters up to 1 × 0.5 cm.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: pale brown. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: ~ 5. *Tenacity*: brittle. *Cleavage*: not observed. *Fracture*: uneven. *Density*: 2.96 g/cm^3 (meas.), 3.04 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *Cm*, *a* 14.381, *b* 13.889, *c* 7.793 Å, β 117.52°, *V* 1380.4 Å^3, *Z* = 2, *a*:*b*:*c* = 1.0354:1:0.5611. Morphology: {100}, {001}. Twinning: none mentioned. ***X-ray powder-diffraction data***: 6.95(37)(020,001), 6.39(10)(20$\bar{1}$,200), 4.912(6)(021), 3.194(100)(42$\bar{1}$,40$\bar{2}$,400), 3.101(22)(041,022), 3.050(8)(24$\bar{1}$,240), 2.906(6)(42$\bar{2}$,420), 2.585(6)(24$\bar{2}$,241). ***Optical data***: Biaxial (+), α 1.683, β 1.692, γ 1.795, 2*V*(meas.) 25°, 2*V*(calc.) 34°; dispersion not observed; pleochroism very weak, *X* and *Z* colorless, *Y* very pale yellowish brown; orientation *Y* = *b*. ***Chemical analytical data***: Electron-microprobe data (H_2O by TGA): Na_2O 0.59, K_2O 1.98, MgO 0.02, CaO 1.16, MnO 0.81, FeO 0.21, ZnO 3.66, SrO 1.79, BaO 11.04, Al_2O_3 0.42, SiO_2 37.01, TiO_2 18.56, Nb_2O_5 10.60, H_2O 11.80, Total 99.65 wt.%. Empirical formula: $(Ba_{0.91}K_{0.53}Ca_{0.26}Na_{0.24}Sr_{0.22})_{\Sigma 2.16}(Zn_{0.57}Mn_{0.14}Fe_{0.04}Mg_{0.01})_{\Sigma 0.76}(Ti_{2.94}Nb_{1.01})_{\Sigma 3.95}(Si_{7.80}Al_{0.10})_{\Sigma 7.90}O_{24.00}[O_{1.38}(OH)_{2.62}]_{\Sigma 4.00} \bullet 6.98H_2O$. ***Relationship to other species***: It is a member of the labuntsovite group.

Name: After the locality and dominance of Zn in the *D* structural site.

Comments: IMA No. 2003–003.

PEKOV, I.V., CHUKANOV, N.V., SHILOV, G.V., KONONKOVA, N.N. & ZADOV, A.E. (2003): Lepkhenelmite-Zn, $Ba_2Zn(Ti,Nb)_4[Si_4O_{12}]_2(O,OH)_4 \bullet 7H_2O$ – a new mineral of the labuntsovite group and its crystal structure. *Zapiski Vserossiyskogo Mineralogicheskogo Obshchestva* **133**(1), 49-59 (in Russ.).

Lindbergite

$Mn(C_2O_4)•2H_2O$

MONOCLINIC

Locality: In the Lavra da Boca Rica granite pegmatite, Sapucaia do Norte, Galiléa County, Minas Gerais, Brazil. In addition to the type locality, the mineral has been found at the following localities: Parsettens, Grisons, Switzerland; Lecht mines, Banffshire, Scotland, UK; Morefield pegmatite, Amelia, Virginia, USA; Clara mine, Oberwolfach, Wolfach Valley, Baden-Württemberg, Germany; Ortenberg near Offenburg, Germany; and Gremmelsbach near Triberg, Germany. A natural origin has not been established for the last locality.

Occurrence: Associated minerals are: triphylite, phosphosiderite, frondelite, strengite, cyrilovite, bermanite, rockbridgeite, huréaulite, tavorite, reddingite, heterosite, laueite and unidentified minerals.

General appearance: Short prismatic crystals 0.1 to 0.3 mm long and aggregates 0.1 mm thick made up of interlocking platelets up to 0.03 mm long.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: white to greyish white. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: 2½. *Tenacity*: crumbly. *Cleavage*: {010} perfect. *Fracture*: not given. *Density*: 2.10 g/cm^3 (meas.), 2.30 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *C*2/*c*, *a* 11.995, *b* 5.632, *c* 9.967 Å, β 128.34°, *V* 528.1 Å^3, *Z* = 4, *a*:*b*:*c* = 2.1298:1:1.7697. Morphology: {100}, {*hk*0}, {010}, {0*kl*}. Twinning: on (010). The forms noted here are interpreted as being the result of pseudomorphs after the trihydrate, $Mn(C_2O_4)•3H_2O$. ***X-ray powder-diffraction data***: 4.855(26)($\bar{1}$11), 4.803(100)($\bar{2}$02), 4.699(84)(200), 3.907(23)(002), 3.622(22)(111), 2.996(58)($\bar{4}$02), 2.679(14)($\bar{1}$13), 2.652(12)(112). ***Optical data***: Biaxial (–), α 1.424, β 1.550, γ 1.65, 2*V*(meas.) 80°, 2*V*(calc.) 77°; dispersion not detectable or *r* > *v*, very weak; nonpleochroic; $Y \wedge c = 20°$. ***Chemical analytical data***: Mean of ten sets of electron-microprobe data (C_2O_3 and H_2O by CHN analyzer): Na_2O 0.21, MnO 39.99, Al_2O_3 0.24, C_2O_3 34.90, H_2O 19.62, Total 94.96 wt.%. Empirical formula: $(Mn_{1.09}Na_{0.01}Al_{0.01})_{\Sigma 1.11}(C_{1.87}O_{3.90})•2.10H_2O$. ***Relationship to other species***: It is the Mn-dominant member of the humboldtine group.

Name: After Marie Louise Lindberg (b. 1918), of the United States Geological Survey. She described the following new species from the nearby Sapucaia quarry: frondelite, faheyite, moraesite, barbosalite and tavorite.

Comments: IMA No. 2003–029.

ATENCIO, D., COUTINHO, J.M.V., GRAESER, S., MATIOLI, P.A. & MENEZES, L.A.D., JR. (2004): Lindbergite, a new Mn oxalate dihydrate from Boca Rica mine, Galiléa, Minas Gerais, Brazil. *American Mineralogist* **89**, 1087-1091.

Magnesiosadanagaite

$NaCa_2[Mg_3(Al,Fe^{3+})_2]Si_5Al_3O_{22}(OH)_2$

MONOCLINIC

Locality: Kasuga-mura, Gifu Prefecture, central Japan.

Occurrence: In a granitic contact aureole. Associated minerals are: phlogopite, titanite, calcite, pyrrhotite, chalcopyrite, scapolite, apatite, chlorite, pyrite, spinel, pentlandite, and ilmenite.

General appearance: Prismatic crystals up to 3 mm long.

Physical, chemical and crystallographic properties: *Luster*: not stated but presumably vitreous. *Diaphaneity*: probably transparent to translucent. *Color*: brownish black. *Streak*: reddish brown. *Luminescence*: presumably nonfluorescent. *Hardness*: VHN_{100} 665 to 792 kg/mm^2, Mohs 5½ to 6. *Tenacity*: brittle. *Cleavage*: {110} perfect. *Fracture*: uneven. *Density*: measured value not given, 3.18 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *C*2/*m*, *a* 9.869, *b* 17.933, *c* 5.322 Å, β 105.29°, *V* 908.6 Å^3, *Z* = 2, *a*:*b*:*c* = 0.5503:1:0.2968. Morphology: no forms were mentioned. Twinning: none mentioned. ***X-ray powder-diffraction data***: 8.38(100)($1\bar{1}0$), 3.11(80)(310), 2.70(80)(151), 2.58(75)(061), 2.56(90)($\bar{2}02$), 2.34(80)($\bar{3}51$,$\bar{4}21$), 1.587(70)(600,$\bar{1}53$). ***Optical data***: Biaxial (+), α 1.674, β 1.683 (calc.), γ 1.694, 2*V*(meas.) 85°, pleochroism *X* pale yellow, *Y* yellowish brown, *Z* reddish brown; *Y* = *b*, *Z* ∧ *c* = 20°. ***Chemical analytical data***: Electron-microprobe data: Na_2O 3.33, K_2O 0.49, MgO 13.4, CaO 12.5, MnO 0.18, FeO 6.22, Al_2O_3 20.9, Fe_2O_3 0.60, Cr_2O_3 0.01, SiO_2 37.1, TiO_2 2.70, H_2O 1.92, F 0.29, Cl 0.02, sum 99.66, less O = F + Cl 0.13, Total 99.53 wt.%. Empirical formula: $(Na_{0.94}K_{0.09})_{\Sigma 1.03}$ $Ca_{1.95}(Mg_{2.91}Fe^{2+}_{0.76}Al_{0.90}Ti_{0.30}Fe^{3+}_{0.07}Mn_{0.02})_{\Sigma 4.96}$ $(Si_{5.40}Al_{2.60})_{\Sigma 8.00}O_{22.00}[(OH)_{1.86}F_{0.13})_{\Sigma 1.99}$. ***Relationship to other species***: It is a member of the amphibole group.

Name: Recalls the composition and relationship to sadanagaite, and is given in accordance with the IMA-approved nomenclature of the amphibole group.

Comments: IMA No. 2002–051.

BANNO, Y., MIYAWAKI, R., MATSUBARA, S., MAKINO, K., BUNNO, M., YAMADA, S. & KAMIYA, T. (2003): Magnesiosadanagaite, a new member of the amphibole group from Kasuga-mura, Gifu Prefecture, central Japan. *European Journal of Mineralogy* **16**, 177-183.

Maleevite

$BaB_2Si_2O_8$

ORTHORHOMBIC

Locality: The Dara-i-Pioz glacier, Alai range, Tien Shan, Garmskii district, northern Tajikistan.

Occurrence: In boulders of pegmatite. Associated minerals are: quartz, microcline, aegirine, arfvedsonite, polylithionite, reedmergnerite, cesium-kupletskite, hyalotekite, albite, dusmatovite, pyrochlore, tadzhikite, tienshanite, sogdianite, stillwellite-(Ce), leucosphenite, leucophanite, willemite, danburite, zektzerite, berezanskite, baotite, cappelenite-(Y) and an unknown Y–Ca silicate.

General appearance: Subhedral equant crystals 0.5 to 2 mm in diameter and rarely as tabular grains.

Physical, chemical and crystallographic properties: *Luster*: vitreous, slightly greasy. *Diaphaneity*: transparent. *Color*: colorless. *Streak*: white. *Luminescence*: fluoresces bright blue in short-wave UV light. *Hardness*: VHN_{50} 1018 kg/mm^2, Mohs 7. *Tenacity*: brittle. *Cleavage*: none. *Fracture*: uneven. *Density*: 3.78 g/cm^3 (meas.), 3.79 g/cm^3 (calc.). ***Crystallography***: Orthorhombic, *Pnma*, *a* 8.141, *b* 8.176, *c* 9.038 Å, *V* 601.5 Å^3, *Z* = 4, *a*:*b*:*c* = 0.9957:1:1.1054. Morphology: no forms were mentioned. Twinning: none mentioned. ***X-ray powder-diffraction data***: 6.07(6)(011), 3.62(10)(210), 3.39(6)(121), 2.83(5)(013), 2.481(4)(131), 2.021(7)(033). ***Optical data***: Biaxial (–), α 1.649, β 1.656, γ 1.656, 2*V*(meas.) 5°, 2*V*(calc.) 0°; dispersion not given; nonpleochroic; orientation not given. ***Chemical analytical data***: Electron-microprobe data (with B_2O_3 calculated): BaO 43.64, PbO 0.42, B_2O_3 (19.92), SiO_2 34.86, Total (98.84) wt.%. Empirical formula: $(Ba_{0.99}Pb_{0.01})_{\Sigma 1.00}\ B_{1.99}Si_{2.01}O_{8.00}$. ***Relationship to other species***: It is the Ba-dominant member of the danburite group.

Name: After the Bulgarian mineralogist Mikhail Naidenovitch Maleev (b. 1940).

Comments: IMA No. 2002–027.

PAUTOV, L.A., AGAKHANOV, A.A., SOKOLOVA, E. & HAWTHORNE, F.C. (2004): Maleevite, $BaB_2Si_2O_8$, and pekovite, $SrB_2Si_2O_8$, new mineral species from the Dara-i-Pioz alkaline massif, northern Tajikistan: description and crystal structure. *Canadian Mineralogist* **42**, 107-119.

Manganokukisvumite

$Na_6MnTi_4Si_8O_{28}•4H_2O$

ORTHORHOMBIC

Locality: Poudrette Quarry, Mont Saint-Hilaire, Rouville County, Quebec, Canada.

Occurrence: In small cavities in an albite-rich syenite breccia associated with aegirine, microcline, albite, annite, chalcopyrite, pyrite, pyrrhotite, natrolite, labuntsovite-Mn, titanite, calcite, a chlorite-group mineral, magnetite, fluorapatite, elpidite and sodalite.

General appearance: Extremely thin, flattened, sword-shaped crystals up to 0.5 mm long. It typically forms radiating, fan-shaped groups of crystals.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: colorless. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: 5½ to 6. *Tenacity*: sectile, slightly flexible. *Cleavage*: none apparent. *Fracture*: splintery. *Density*: 2.86 g/cm^3 (meas.), 2.88 g/cm^3 (calc.). ***Crystallography***: Orthorhombic, *Pccn*, *a* 29.05, *b* 8.612, *c* 5.220 Å, *V* 1305.9 A^3, *Z* = 2. *a*:*b*:*c* = 3.3732:1:0.6061. Morphology: flattened on {100} and elongate parallel to [001]. The only observed forms are {100} and {010} and a prism that could not be measured (Abstractor's note: this possibly is {021}). Twinning: none observed. ***X-ray powder-diffraction data***:14.47(100)(200), 6.43(20)(310), 4.83(10)(600), 3.743(10)(710), 3.025(40)(910), 2.881(20)(521), 2.591(10)(721), 2.458(10)(402) and 2.146(10)(930). ***Optical data***: Biaxial (–), α 1.657 (calc.), β 1.744, γ 1.792, 2*V*(meas.) 70°; dispersion none; nonpleochroic; orientation, *X* = *a*, *Y* = *b*, *Z* = *c*. ***Chemical analytical data***: Mean of two sets of electron-microprobe data: Na_2O 15.61, K_2O 0.21, MgO 0.26, CaO 0.08, MnO 5.48, FeO 0.57, Al_2O_3 0.16, Ce_2O_3 0.18, SiO_2 41.74, TiO_2 26.90, Nb_2O_5 0.68, H_2O (6.25) (calculated by stoichiometry), Total (98.12) wt.%. The empirical formula, based on O = 32, is: $(Na_{5.81}K_{0.05}Ca_{0.02}Ce_{0.01})_{\Sigma 5.89}$ $(Mn_{0.89}Fe_{0.09}Mg_{0.07}Al_{0.04})_{\Sigma 1.09}$ $(Ti_{3.88}Nb_{0.06})_{\Sigma 3.94}Si_{8.01}O_{28.00}•4.00H_2O$. ***Relationship to other species***: It is the Mn-dominant analogue of kukisvumite and is closely related to lintisite.

Name: Recalls the relationship with kukisvumite.

Comments: IMA No. 2002–029.

GAULT, R.A., ERCIT, T.S., GRICE, J.D. & VAN VELTHUIZEN, J. (2004): Manganokukisvumite, a new mineral species from Mont Saint-Hilaire, Quebec. *Canadian Mineralogist* **42**, 781-785.

Moskvinite-(Y)

$Na_2K(Y,REE)[Si_6O_{15}]$

ORTHORHOMBIC

Locality: Dara-i-Pioz glacial moraine, Alaisky mountain ridge, Tajikistan.

Occurrence: In a coarse-grained reedmergnerite pegmatite. Associated minerals are: shibkovite, nordite-(Ce), leucophanite, microcline, hyalotekite, telyushenkoite, kentbrooksite, polylithionite and albite.

General appearance: Equant grains up to 2 mm.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: colorless. *Streak*: white. *Luminescence*: fluoresces violet. *Hardness*: 5. *Tenacity*: brittle. *Cleavage*: absent. *Fracture*: uneven. *Density*: 2.91 g/cm^3 (meas.), 2.92 g/cm^3 (calc.). ***Crystallography***: Orthorhombic, *Ibmm*, *a* 10.623, *b* 14.970, *c* 8.552 Å, *V* 1360.0 Å^3, *Z* = 4, *a*:*b*:*c* = 0.7096:1:0.5713. Morphology: no forms were mentioned. Twinning: none mentioned. ***X-ray powder-diffraction data***: 5.32(35)(200), 4.98(100)(121), 3.45(50)(310), 3.26(85)(141), 3.05(75)(240,222), 1.754(42)(103), 2.490(45)(251, 060,242). ***Optical data***: Biaxial (+), α 1.555, β 1.558, γ 1.566, 2*V*(meas.) 64°, 2*V*(calc.) 63°; dispersion *r* > *v*. See Comments. ***Chemical analytical data***: Mean of six sets of electron-microprobe data: Na_2O 10.66, K_2O 7.50, Y_2O_3 14.63, Nd_2O_3 0.29, Sm_2O_3 0.54, Gd_2O_3 1.13, Tb_2O_3 0.43, Dy_2O_3 2.76, Ho_2O_3 0.66, Er_2O_3 1.17, SiO_2 60.34, Total 100.11 wt.%. Empirical formula: $Na_{2.05}K_{0.95}(Y_{0.77}Dy_{0.09}Gd_{0.04}Er_{0.04}Ho_{0.02}Sm_{0.02}Tb_{0.01}Nd_{0.01})_{\Sigma 1.00}Si_{6.00}O_{15.00}$. ***Relationship to other species***: None apparent.

Name: After A.V. Moskvin (1897–1974), prominent Russian geologist and a member of the Pamirs–Tajikskaya expedition.

Comments: IMA No. 2002–031. In the optical data, the authors state that the mineral is biaxial negative, but the indices of refraction indicate it is biaxial positive as noted above.

AGAKHANOV, A.A., PAUTOV, L.A., SOKOLOVA, E.V., HAWTHORNE, F.C. & KARPENKO, V.Y. (2003): Moskvinite-(Y), $Na_2K(Y,REE)[Si_6O_{15}]$, a new mineral. *Zapiski Vserossiyskogo Mineralogicheskogo Obshchestva* **132**(6), 15-21 (in Russ.).

SOKOLOVA, E., HAWTHORNE, F.C., AGAKHANOV, A.A. & PAUTOV, L.A. (2003): The crystal structure of moskvinite-(Y), $Na_2K(Y,REE)[Si_6O_{15}]$, a new silicate mineral with $[Si_6O_{15}]$ three-membered double rings from the Dara-i-Pioz moraine, Tien-Shan Mountains, Tajikistan. *Canadian Mineralogist* **41**, 513-520.

Nabalamprophyllite

$Ba(Na,Ba)Na_3Ti(Ti_2O_2Si_4O_{14})(OH,F)_2$

MONOCLINIC

Localities: Inagli alkaline-ultrabasic massif, Yakutia, Russia. Also in the Kovdor alkaline-ultrabasic massif, Kola Peninsula, Russia.

Occurrence: At the Inagli locality, found in a peralkaline pegmatite associated with albite, orthoclase, pyroxene, batisite, innelite, neptunite, leucosphenite, strontium apatite, among others. At the Kovdor locality, found in calcium-enriched peralkaline pegmatites associated with pyroxenes, orthoclase, cancrinite, nepheline, pectolite, natrolite, thomsonite-Ca, Zr- and Ti-silicates, lueshite, cafetite, among others.

General appearance: Coarse prismatic crystals up to 10 cm long at Inagli and 1 cm long at Kovdor.

Physical, chemical and crystallographic properties: *Luster*: vitreous to adamantine. *Diaphaneity*: translucent. *Color*: brown to yellowish. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: 3. *Tenacity*: brittle. *Cleavage*: {100} perfect. *Fracture*: uneven. *Density*: 3.58 g/cm^3 (meas.), 3.57 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *P*2/*m*, *a* 19.741, *b* 7.105, *c* 5.408 Å, β 96.67°, *V* 753.4 Å^3, *Z* = 2, *a*:*b*:*c* = 2.7785:1:0.7612. Morphology: {100} and, presumably, {010} and {130}. Twinning: none observed. ***X-ray powder-diffraction data***: 9.87(96)(200), 3.75(65)(31$\bar{1}$), 3.45(90)(311,510), 3.275(78)(600), 3.040(41)(51$\bar{1}$), 2.797(100)(221), 2.610(43)(42$\bar{1}$,710), 2.143(40)(020,22$\bar{2}$,621). ***Optical data***: Biaxial (+), α 1.750, β 1.756 (calc.), γ 1.799, 2*V*(meas.) 40°, dispersion *r* > *v*, strong; pleochroism weak, greenish brown; Y = *b*, Z ∧ *a* = 10°. See Comments. ***Chemical analytical data***: Mean of twenty sets of electron-microprobe data (F by wet analysis and H_2O by TGA): Na_2O 11.14, K_2O 0.94, MgO 0.34, CaO 0.36, MnO 1.10, SrO 0.65, BaO 24.12, Al_2O_3 0.44, Fe_2O_3 0.78, SiO_2 28.75, TiO_2 27.80, H_2O 1.83, F 1.18, sum 99.43, less O = F 0.50, Total 98.93 wt.%. Empirical formula: $Ba_{1.00}(Ba_{0.29}Mn_{0.13}Na_{0.11}Sr_{0.05}Ca_{0.05})_{\Sigma 0.63}(Na_{2.84}K_{0.16})_{\Sigma 3.00}(Ti_{0.85}Fe_{0.08}Mg_{0.07})_{\Sigma 1.00}Ti_{2.00}O_{2.00}(Si_{3.92}Al_{0.07})_{\Sigma 3.99}O_{13.83}[(OH)_{1.66}F_{0.51}]_{\Sigma 2.17}$. ***Relationship to other species***: It is a member of the lamprophyllite group.

Name: Recalls the relationship to lamprophyllite.

Comments: IMA No. 2001–060. The calculated value of β is erroneously given as 1.684; the correct value calculated here is given above.

CHUKANOV, N.V., MOISEEV, M.M., PEKOV, I.V., LAZEBNIK, K.A., RASTSVETAEVA, R.K., ZAYAKINA, N.V., FERRARIS, G. & IVALDI, G. (2004): Nabalamprophyllite, Ba(Na,Ba){$Na_3Ti[Ti_2O_2Si_4O_{14}](OH,F)_2$}, a new layer titanosilicate of the lamprophyllite group from Inagli and Kovdor alkaline-ultrabasic massifs, Russia. *Zapiski Vserossiyskogo Mineralogicheskogo Obshchestva* **133**(1), 59-72 (in Russ.).

Nevadaite

$(Cu^{2+},\square,Al,V^{3+})_6[Al_8(PO_4)_8F_8](OH)_2 \bullet 22H_2O$

ORTHORHOMBIC

Locality: The Gold Quarry mine, near Carlin, Eureka County, Nevada, USA.

Occurrence: Associated minerals are: fluellite, wavellite, intermediate members of the strengite–variscite series and hewettite; rarer species are anatase, kazakhstanite, leucophosphite, tinticite, torbernite, and tyuyamunite.

General appearance: radiating clusters to 1 mm of prismatic crystals. Individual crystals are elongate on [001] with a length:width ratio of >10:1 and a maximum diameter of ~30 μm. It also occurs as spherules and in druses.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: not given, but probably transparent to translucent. *Color*: pale green to turquoise blue. *Streak*: pale powder-blue. *Luminescence*: nonfluorescent. *Hardness*: ~3. *Tenacity*: brittle. *Cleavage:* none. *Fracture:* conchoidal. *Density:* 2.54 g/cm^3 (meas.), 2.55 g/cm^3 (calc.). ***Crystallography***: Orthorhombic, $P2_1mn$, a 12.123, b 18.999, c 4.961 Å, V 1142.8 Å^3, Z = 1, $a:b:c$ = 0.6391:1:0.2611. Morphology: no forms were mentioned. Twinning: none mentioned. ***X-ray powder-diffraction data***: 6.077(10)(200), 5.618(9)(130), 9.535(8)(020), 2.983(6)(241), 3.430(4)(041), 2.661(4)(061), 1.844(4)(352). ***Optical data***: Biaxial (–), α 1.540, β 1.548, γ 1.553, $2V$(meas.) 76°, $2V$(calc.) 76°; dispersion not mentioned; pleochroism X pale greenish blue, Y very pale greenish blue, Z blue, absorption $Z >> X > Y$; orientation, $X = c$, $Y = a$, $Z = b$. ***Chemical analytical data***: Mean of two sets of electron-microprobe data (H_2O calculated): CuO 9.24, ZnO 0.11, Al_2O_3 27.07, Fe_2O_3 0.07, P_2O_5 32.54, H_2O (23.48), F 9.22, sum (105.97), less O = F 3.88, Total (102.09) wt.%. Empirical formula: $(Cu^{2+}_{2.01}Zn_{0.02}V^{3+}_{0.98}Fe^{3+}_{0.02}Al_{1.20})_{\Sigma 4.23}$ $Al_{8.00}(PO_4)_{7.95}F_{8.41}(OH)_{2.40} \bullet 21.38H_2O$. ***Relationship to other species***: None apparent.

Name: After the state that contains the locality.

Comments: IMA No. 2002–035.

COOPER, M.A., HAWTHORNE, F.C., ROBERTS, A.C., FOORD, E.E., ERD, R.C., EVANS, H.T., JR. & JENSEN, M.C. (2004): Nevadaite, $(Cu^{2+},\square,Al,V^{3+})_6[Al_8(PO_4)_8F_8](OH)_2(H_2O)_{22}$, a new phosphate mineral species from the Gold Quarry mine, Carlin, Eureka County, Nevada: description and crystal structure. *Canadian Mineralogist* **42**, 741-752.

Pekovite

$SrB_2Si_2O_8$

ORTHORHOMBIC

Locality: The Dara-i-Pioz glacier, Alai range, Tien Shan, Garmskii district, northern Tajikistan.

Occurrence: In a rock consisting mainly of quartz with subordinate pectolite, aegirine, stillwellite-(Ce), polylithionite, leucosphenite and reedmergnerite; rarely turkestanite, galena, calcite, kapitsaite-(Y), neptunite, sugilite, baratovite, bismuth, sphalerite, fluorite, pyrochlore, fluorapatite and zeravshanite occur in the rock.

General appearance: Anhedral equant crystals 0.05 to 2 mm in diameter, commonly intergrown with pectolite, quartz, strontian fluorite and aegirine.

Physical, chemical and crystallographic properties: *Luster*: vitreous, slightly greasy. *Diaphaneity*: transparent. *Color*: colorless. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: VHN_{100} 953 kg/mm^2, Mohs 6½ to 7. *Tenacity*: brittle. *Cleavage*: none. *Fracture*: uneven. *Density*: 3.35 g/cm^3 (meas.), 3.36 g/cm^3 (calc.). ***Crystallography***: Orthorhombic, *Pnma*, *a* 8.155, *b* 7.919, *c* 8.921 Å, *V* 576.1 Å^3, *Z* = 4, *a*:*b*:*c* = 1.0298:1:1.1265. Morphology: no forms were mentioned. Twinning: none mentioned. ***X-ray powder-diffraction data***: 5.94(6)(011), 3.62(10)(210), 3.51(9)(112), 3.31(8)(121), 3.01(6)(202), 2.786(9)(103,013,122), 2.706(6)(221), 1.982(7W)(232,040). ***Optical data***: Biaxial (–), α 1.597, β 1.627 (calc.), γ 1.632, 2*V*(meas.) 43°; dispersion $r < v$, moderate; nonpleochroic; orientation not given. ***Chemical analytical data***: Electron-microprobe data (with B_2O_3 calculated): CaO 0.38, SrO 34.15, B_2O_3 (23.39), SiO_2 41.56, Total (99.48) wt.%. Empirical formula: $(Sr_{0.97}Ca_{0.02})_{\Sigma 0.99}B_{1.97}Si_{2.03}O_{8.00}$. ***Relationship to other species***: It is the Sr-dominant member of the danburite group.

Name: After Igor Viktorovich Pekov (b. 1967), of the Department of Geology, Moscow State University, Moscow, Russia, in recognition of his contributions to the mineralogy of alkaline rocks and to the systematics of minerals.

Comments: IMA No. 2002–027.

PAUTOV, L.A., AGAKHANOV, A.A., SOKOLOVA, E. & HAWTHORNE, F.C. (2004): Maleevite, $BaB_2Si_2O_8$, and pekovite, $SrB_2Si_2O_8$, new mineral species from the Dara-i-Pioz alkaline massif, northern Tajikistan: description and crystal structure. *Canadian Mineralogist* **42**, 107-119.

Petewilliamsite

$(Ni,Co)_{30}(As_2O_7)_{15}$

MONOCLINIC

Locality: Johanngeorgenstadt, Saxony, Germany.

Occurrence: In a fine-grained quartz specimen. Associated minerals are: quartz, nickeline, bismuth, bunsenite, aerugite, xanthiosite, rooseveltite, paganoite and two undefined arsenates.

General appearance: Scattered patches of mm-sized aggregates; subhedral equant grains up to 0.5 mm.

Physical, chemical and crystallographic properties: *Luster*: given as vitreous, but the index of refraction indicates adamantine. *Diaphaneity*: translucent. *Color*: dark violet-red to dark brownish red. *Streak*: pale reddish brown to pale purplish brown. *Luminescence*: nonfluorescent. *Hardness*: not determined, but soft. *Tenacity*: brittle. *Cleavage*: none observed. *Fracture*: uneven. *Density*: could not be measured, 4.90 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *C*2, *a* 33.256, *b* 8.4818, *c* 14.191 Å, β 104.145°, *V* 3884.6 Å^3, *Z* = 2, *a*:*b*:*c* = 3.9209:1:1.6731. The preceding data are for the supercell. The relationship between the subcell and supercell is: *a* (subcell) = 1/5 *a* (supercell), *b* (subcell) = *b* (supercell), *c* (subcell) = 1/3 *c* (supercell) Morphology: no forms were identified. Twinning: none observed. ***X-ray powder-diffraction data***: 4.235(30)(020), 3.118(100)(513,023), 3.005(60)($\bar{1}\bar{1}$0.3), 2.567(50)($\bar{1}\bar{1}$0.2.0), 1.637(50)(536), 1.507(30b)(553,15.3.3, $\bar{2}\bar{0}$.0.6). ***Optical data***: In reflected light: dark grey, no anisotropy, no bireflectance, nonpleochroic, orange to multicolored internal reflections. R: (9.59%) 470 nm, (9.32%) 546 nm, (9.27%) 589 nm, (9.33%) 650 nm. *n* 1.88 at 589 nm. ***Chemical analytical data***: Mean of three sets of electron-microprobe data: CaO 0.17, FeO 0.04, NiO 19.45, CoO 18.39, CuO 3.40, As_2O_5 60.32, Total 101.77 wt.%. Empirical formula: $(Ni_{14.66}Co_{13.82}Cu_{2.41}Ca_{0.17}Fe_{0.03})_{\Sigma 31.09}(As_{1.97}O_{7.00})_{15.00}$. ***Relationship to other species***: It is the only known natural pyroarsenate.

Name: After Peter ("Pete") Allan Williams (b. 1950), Professor, Minerals and Materials Group, School of Science, Food and Horticulture, University of Western Sydney, Penrith South DC, New South Wales, Australia, for his contributions to mineralogy.

Comments: IMA No. 2002–059.

ROBERTS, A.C., BURNS, P.C., GAULT, R.A., CRIDDLE, A.J. & FEINGLOS, M.N. (2004): Petewilliamsite, $(Ni,Co)_{30}(As_2O_7)_{15}$, a new mineral from Johanngeorgenstadt, Saxony, Germany: description and crystal structure. *Mineralogical Magazine* **68**, 231-240.

Potassic-carpholite

$(K,\square)(Li,Mn^{2+})_2Al_4Si_4O_{12}(OH)_4(F,OH)_4$

ORTHORHOMBIC

Locality: Most likely from the Falls Creek area of the Sawtooth Mountains, Boise County, Idaho, USA.

Occurrence: In a miarolitic cavity in the Sawtooth granite batholith. Associated minerals are: microcline, quartz, albite, beryl, topaz, bertrandite, hellandite, zinnwaldite, fluorite, hematite and apatite.

General appearance: Irregular tufts of radiating acicular to fibrous needles about 2 mm across. The needles are 20 to 40 μm across and about 500 μm long.

Physical, chemical and crystallographic properties: *Luster*: silky. *Diaphaneity*: not given but probably transparent. *Color*: white to straw yellow. *Streak*: white. *Luminescence*: nonfluorescent. *Hardness*: ~5. *Tenacity*: not given. *Cleavage*: {010} perfect. *Fracture*: not given. *Density*: 3.08 g/cm^3 (meas.), 3.06 g/cm^3 (calc.). ***Crystallography***: Orthorhombic, *Ccca*, *a* 13.715, *b* 20.302, *c* 5.138 Å, *V* 1430.6 Å^3, *Z* = 4, *a*:*b*:*c* = 0.6755:1:0.2531. Morphology: no forms were mentioned; elongation parallel to [100]. Twinning: none observed. ***X-ray powder-diffraction data***: 5.705(100)(220), 3.819(80)(221), 3.433(80)(400), 3.048(90)(331), 2.744(80)(421), 2.613(100)(351,261), 2.050(80)(621), 1.467(80)(173,5.11.1), 1.452(80)(0.14.0). ***Optical data***: Biaxial (–), α 1.578, β 1.592, γ 1.598, 2*V*(meas.) 57°, 2*V*(calc.) 66°; dispersion not given; pleochroism weak, *X* pale yellow, *Y* = *Z* colorless, absorption *X* > *Y*, *Z*; orientation, *X* = *b*, *Y* = *a*, *Z* = *c*. ***Chemical analytical data***: Mean of an unstated number of sets of electron-microprobe data: Li_2O 1.34, Na_2O 0.51, K_2O 4.07, MgO 0.04, MnO 13.37, FeO 1.44, Al_2O_3 29.38, SiO_2 36.73, TiO_2 0.10, H_2O 7.24, F 7.47, sum 101.69, less O = F 3.14, Total 98.55 wt.%. Empirical formula: $(\square_{1.89}Na_{0.11})_{\Sigma 2.00}(K_{0.58}\square_{0.42})_{\Sigma 1.00}$ $(Mn_{1.26}Fe_{0.13}Li_{0.60}Mg_{0.01})_{\Sigma 2.00}Al_{3.85}Si_{4.08}O_{12.00}(OH)_{4.00}[F_{2.63}(OH)_{1.37}]_{\Sigma 4.00}$. ***Relationship to other species***: It is the K-dominant member of the carpholite group.

Name: Recalls the compoposition and relationship to carpholite.

Comments: IMA No. 2002–064. Information on the likely location of the holotype specimen was provided by C. van Laer.

TAIT, K.T., HAWTHORNE, F.C., GRICE, J.D., JAMBOR, J.L & PINCH, W.W. (2004): Potassic-carpholite, a new mineral from the Sawtooth batholith, Boise County, Idaho, U.S.A. *Canadian Mineralogist* **42**, 121-124.

Tarkianite

$(Cu,Fe)(Re,Mo)_4S_8$

CUBIC

Locality: The Hitura Ni–Cu–PGE mine, Nivala, western central Finland.

Occurrence: With primary sulfides and PGM. Associated minerals are: pyrrhotite, pentlandite, valleriite, chalcopyrite, cubanite, mackinawite. chromite, sperrylite, michenerite, irarsite, froodite and hollingworthite.

General appearance: Idiomorphic grains less than 75 μm.

Physical, chemical and crystallographic properties: *Luster*: metallic. *Diaphaneity*: opaque. *Color*: black. *Streak*: black. *Hardness*: VHN_{15} 561 kg/mm^2, Mohs 5½ to 6. *Tenacity*: brittle. *Cleavage*: not given. *Fracture*: irregular. *Density*; could not be measured, 7.27 g/cm^3 (calc.). ***Crystallography***: Cubic, $F\bar{4}3m$, *a* 9.563 Å, *V* 874.5 Å^3, *Z* = 4. Morphology: forms were observed in polished sections, but could not be identified. Twinning: none mentioned. ***X-ray powder-diffraction data***: 5.531(100)(111), 2.885(90)(311), 2.389(90)(400), 2.194(70)(331), 1.952(60)(422), 1.841(90)(511), 1.690(80)(440). ***Optical data***: Isotropic. In reflected light: light grey (light brown-grey under oil immersion). R, ^{im}R: (38.02, 20.91%) 470 nm, (38.87, 21.76%) 546 nm, (39.18, 21.84%) 589 nm, (39.30, 22.12%) 650 nm. ***Chemical analytical data***: Mean of 34 sets of electron-microprobe data: Cu 5.48, Ni 0.09, Fe 0.59, Co 0.08, Mo 12.32, Re 53.61, Os 0.84, S 26.77, Total 99.78 wt.%. Empirical formula: $(Cu_{0.83}Fe_{0.10}Co_{0.01}Ni_{0.01})_{\Sigma 0.95}(Re_{2.76}Mo_{1.23}Os_{0.04})_{\Sigma 4.03}S_{8.01}$. ***Relationship to other species***: None apparent.

Name: After Mahmud Tarkian (b. 1941), Professor, University of Hamburg, Germany, in recognition of his important contributions to ore mineralogy, and his early work to characterize this species.

Comments: IMA No. 2003–004. The density and empirical formula calculated here are slightly different from those given in the paper. Note that the labels on the two curves in Figure 2 are interchanged.

KOJONEN, K.K., ROBERTS, A.C., ISOMÄKI, O.-P., KNAUF, V.V., JOHANSON, B. & PAKKANEN, L. (2004): Tarkianite, $(Cu,Fe)(Re,Mo)_4S_8$, a new mineral species from the Hitura mine, Nivala, Finland. *Canadian Mineralogist* **42**, 539-544.

Taseqite

$Na_{12}Sr_3Ca_6Fe_3Zr_3NbSi_{25}O_{73}(O,OH,H_2O)_3Cl_2$

TRIGONAL

Locality: On the top of the Taseq Slope in the northern part of the Ilímaussaq alkaline complex, Narsap Kommunea, South Greenland.

Occurrence: In cavities in a single small (up to 1 mm wide) late-stage, hydrothermal albite vein no longer than a few hundred meters. Associated minerals are: albite, aegirine, analcime, ancylite-(La), calcite, catapleiite, dolomite, ferrobustamite, fluorapatite, hemimorphite, pectolite, sphalerite, strontianite, an apophyllite-group mineral, an unidentified REE-silicate and an ancylite mineral with Nd dominant.

General appearance: Individual crystals 0.05 by 0.25 to 0.5 by nearly 3 mm and clusters of several crystals.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: transparent. *Color*: clove to yellowish brown, also lemon yellow. *Streak*: white to light brownish. *Luminescence*: nonfluorescent. *Hardness*: 5½. *Tenacity*: brittle. *Cleavage*: {001} fair. *Fracture*: uneven. *Density*: 3.24 g/cm^3 (meas.), 3.19 g/cm^3 (calc.). ***Crystallography***: Trigonal, *R*3*m*, *a* 14.286, *c* 29.99 Å, *V* 5300.7 Å^3, *Z* = 3, *c*:*a* = 2.0993. Morphology: {001}, {00$\bar{1}$}, {110}, {100}, {010}, {101}, {012}, {01$\bar{1}$} and {10$\bar{2}$} all nearly equally developed; {021} and {20$\bar{2}$} are less common. Platy on {001}. Twinning: none mentioned. ***X-ray powder-diffraction data***: 11.49(5)(101), 9.51(9)(012), 3.43(9)(131, 223), 3.19(8)(208), 2.98(10)(315), 2.86(10)(404). ***Optical data***: Uniaxial (–), ω 1.6494, ε 1.6378, nonpleochroic. ***Chemical analytical data***: Mean of three sets of electron-microprobe data (H_2O by stoichiometry): Na_2O 7.71, K_2O 0.23, CaO 8.19, MnO 3.02, FeO 3.92, SrO 13.98, Y_2O_3 0.28, Ce_2O_3 0.08, SiO_2 41.64, ZrO_2 9.89, SnO_2 0.13, HfO_2 0.32, Nb_2O_5 4.38, Ta_2O_5 0.24, H_2O (0.59), Cl 1.91, sum (96.51), less O = Cl 0.43, Total (96.08) wt.%. Empirical formula: $(Na_{8.80}Sr_{4.77}K_{0.17}Ce_{0.02})_{\Sigma 13.76}$ $(Ca_{5.16}Mn_{0.59}Y_{0.09})_{\Sigma 5.84}$ $(Fe_{1.93}Mn_{0.92})_{\Sigma 2.85}$ $(Zr_{2.84}Nb_{0.11}Hf_{0.05})_{\Sigma 3.00}$ $(Nb_{1.06}Ta_{0.04}Sn_{0.03})_{\Sigma 1.13}$ $Si_{24.51}O_{73.00}$ $[O_{1.53}(OH)_{0.75}(H_2O)_{0.73}]_{\Sigma 3.01}[Cl_{1.91}(OH)_{0.09}]_{2.00}$. ***Relationship to other species***: It is a member of the eudialyte group.

Name: After the locality.

Comments: IMA No. 2002–055.

PETERSEN, O.V., JOHNSEN, O., GAULT, R.A., NIEDERMAYR, G. & GRICE, J.D. (2004): Taseqite, a new member of the eudialyte group from the Ilímaussaq alkaline complex, South Greenland. *Neues Jahrbuch für Mineralogie, Monatshefte*, 83-96.

Trattnerite

$(Fe,Mg)_2(Mg,Fe)_3(Si_{12}O_{30})$

HEXAGONAL

Locality: In a quarry near the village of Wilhelmsdorf, south-southeast of Bad Gleichenberg, eastern Styria, Austria (Lat. 46° 50'20" N, Long. 15° 55'30" E).

Occurrence: In small cavities of a silica-rich xenolith in a haüyne nephelinite lava flow. Associated minerals are: sanidine, plagioclase, quartz, tridymite, hematite, orthopyroxene, clinopyroxene and clinoamphibole.

General appearance: Hypidiomorphic, short prismatic to tabular and rarely long prismatic crystals up to 1 mm.

Physical, chemical and crystallographic properties: *Luster*: vitreous. *Diaphaneity*: translucent. *Color*: deep blue to yellowish green. *Streak*: white. *Luminescence*: presumably nonfluorescent. *Hardness*: could not be determined because of the small size of the crystals. *Tenacity*: brittle. *Cleavage*: {001} good and {100} poor. *Fracture*: not given. *Density*: could not be measured, 2.69 g/cm^3 (calc.). ***Crystallography***: Hexagonal, *P*6/*mmc*, *a* 10.05, *c* 14.338 Å, *V* 1254.1 Å^3, *Z* = 2, *c*:*a* = 1.4267. Morphology: {100}, {001}, {101}, {111}. Twinning: none mentioned. ***X-ray powder-diffraction data***: 8.7(97)(100), 7.17(100)(002), 5.535(96)(102), 5.026(61)(110), 4.352(53)(200), 4.115(37)(112), 3.207(85)(211), 2.767(38)(204). ***Optical data***: Uniaxial (–), ω 1.589, ε 1.586, pleochroism strong, O deep blue, E yellowish green. ***Chemical analytical data***: Mean of 17 sets of electron-microprobe data: Na_2O 0.03, K_2O 0.33, MgO 9.75, CaO 0.02, MnO 0.56, FeO 2.12, ZnO 0.36, Al_2O_3 0.21, Fe_2O_3 15.60, SiO_2 70.80, TiO_2 0.07, Total 99.85 wt.% (FeO and Fe_2O_3 calculated from total Fe). Empirical formula: $(K_{0.07}Na_{0.03})_{\Sigma 0.10}$ $(Mg_{2.46}Fe^{3+}_{1.99}Fe_{0.30}Mn_{0.08}Zn_{0.05}Al_{0.04}Ti_{0.01})_{\Sigma 4.93}$ $Si_{12.00}O_{30.00}$. ***Relationship to other species***: It is a member of the milarite group.

Name: After Walter Trattner, a mineral collector with excellent knowledge of the mineralogy of the area in which the species was found.

Comments: IMA No. 2002–002.

POSTL, W., WALTER, F., HAUZENBERGER, C. & BOJAR, H.-P. (2004): Trattnerite, $(Fe,Mg)_2(Mg,Fe)_3[Si_{12}O_{30}]$, a new mineral of the milarite group: mineral data and crystal structure. *European Journal of Mineralogy* **16**, 375-380.

Zincospiroffite

$Zn_2Te_3O_8$

MONOCLINIC

Locality: The Zhongshangou gold deposit in Chongli County, Hebei Province, People's Republic of China.

Occurrence: It is a product of secondary oxidation of calaverite, with which it is intimately associated. Other associated species are: sphalerite, pyrite, quartz, gold and hematite.

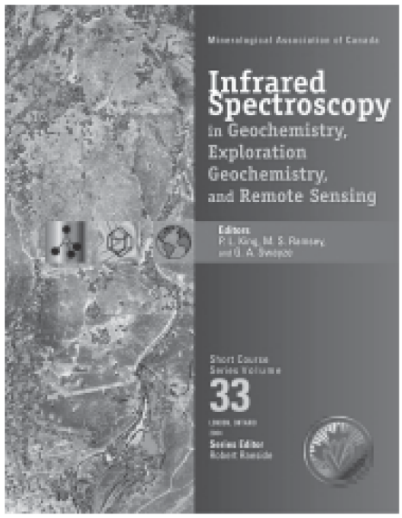
General appearance: Micrometric films coating calaverite or in irregular aggregates replacing calaverite. There are three aggregates of crystallites covering an area of 400–4000 μm^2; the largest aggregate is 15×350 μm^2.

Physical, chemical and crystallographic properties: *Luster*: given as vitreous, but probably adamantine. *Diaphaneity*: translucent. *Color*: gray. *Streak*: dark green. *Luminescence*: not mentioned, but probably nonfluorescent. *Hardness*: could not be measured, but is quite soft. *Tenacity*: brittle. *Cleavage*: not given. *Fracture* uneven. *Density*: could not be measured, 5.62 g/cm^3 (calc.). ***Crystallography***: Monoclinic, *C*2/*c* (by analogy with synthetic $Zn_2Te_3O_8$ and spiroffite), *a* 12.72, *b* 5.15, *c* 11.82 Å, β 99.2°, *V* 764.57 Å^3, *Z* = 4, *a*:*b*:*c* = 2.4699:1:2.2951. Morphology: no forms were observed. Twinning: none observed. ***X-ray powder-diffraction data***: 4.758(w)(110), 3.240(w)(31$\bar{1}$), 2.928(m)(113), 2.820(w)(20$\bar{4}$), 2.155(w)(023,511), 1.985(w)(223), 1.599(w)(42$\bar{5}$). ***Optical data***: In reflected light: gray, weak anisotropism, weak bireflectance, weak pleochroism, no internal reflections. R_{min} and R_{max}: (7.0, 7.5%) 470 nm, (7.1, 7.3%) 546 nm, (6.1, 6.2%) 589 nm, (4.4, 5.0%) 650 nm. See Comments. ***Chemical analytical data***: Mean of six sets of electron-microprobe data: ZnO 24.57, PbO 1.64, MgO 0.24, TeO_2 71.90, minor FeO and SeO_2, total 98.89 wt.%. Empirical formula: $(Zn_{1.97}Pb_{0.05}Mg_{0.04}Fe_{0.02})_{\Sigma 2.08}(Te_{2.94}Se_{0.01})_{\Sigma 2.95}O_{8.00}$. ***Relationship to other species***: It is the Zn-dominant analogue of spiroffite, $(Mn,Zn)_2Te_3O_8$.

Name: Recalls the relationship to spiroffite.

Comments: IMA No. 2002–047. The mean index of refraction calculated here from the Gladstone–Dale relationship is 2.06, which compares favorably to 1.99 for spiroffite.

ZHANG PEI-HUA, ZHU JIN-CHU, ZHAO ZHEN-HUA, GU XIANG-PING & LIN JIN-FU (2004): Zincospiroffite, a new tellurite mineral from the Zhongshangou gold deposit, Hebei Province, People's Republic of China. *Canadian Mineralogist* **42**, 763-768.



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P.O. Box 78087
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