New mineral names*

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ALLOCHALCOSELITE*


The new mineral species allochalcocelite has been found among lead and copper selenite-chloride exhalative products associated with the fumaroles of the second cinder cone of the northern breach of the Great Tolbachik Fissure Eruption, Kamchatka Region, Russia that took place in 1975–1976. Associates include cotunnite, sophiite, ilinskite, georgbokiite, and burnsite. The mineral strongly resembles georgbokiite, except for its more elongated morphology and brighter color. Grain size is less than 0.1 mm and the total amount of material collected makes up only a few tens of millimeters. It is dark brown with a brown streak and adamantine luster, is brittle, has a Mohs hardness of only a few tens of millimeters. It is dark brown with a brown streak and adamantine luster, is brittle, has a Mohs hardness of only a few tens of millimeters. It is dark brown with a brown streak and adamantine luster, is brittle, has a Mohs hardness of only a few tens of millimeters. It is dark brown with a brown streak and adamantine luster, is brittle, has a Mohs hardness of only a few tens of millimeters. It is dark brown with a brown streak and adamantine luster, is brittle, has a Mohs hardness of only a few tens of millimeters. It is dark brown with a brown streak and adamantine luster, is brittle, has a Mohs hardness of only a few tens of millimeters. It is dark brown with a brown streak and adamantine luster, is brittle, has a Mohs hardness of only a few tens of millimeters. It is dark brown with a brown streak and adamantine luster, is brittle, has a Mohs hardness of only a few tens of millimeters. It is dark brown with a brown streak and adamantine luster, is brittle, has a Mohs hardness of only a few tens of millimeters. It is dark brown with a brown streak and adamantine luster, is brittle, has a Mohs hardness of only a few tens of millimeters. It is dark brown with a brown streak and adamantine luster, is brittle, has a Mohs hardness of only a few tens of millimeters. It is dark brown with a brown streak and adamantine luster, is brittle, has a Mohs hardness of only a few tens of millimeters. It is dark brown with a brown streak and adamantine luster, is brittle, has a Mohs hardness of only a few tens of millimeters. It is dark brown with a brown streak and adamantine luster, is brittle, has a Mohs hardness of only a few tens of millimeters. It is dark brown with a brown streak and adamantine luster, is brittle, has a Mohs hardness of only a few tens of millimeters. It is dark brown with a brown streak and adamantine luster, is brittle, has a Mohs hardness of only a few tens of millimeters. It is dark brown with a brown streak and adamantine luster, is brittle, has a Mohs hardness of only a few tens of millimeters. It is dark brown with a brown streak and adamantine luster, is brittle, has a Mohs hardness of only a few tens of millimeters. It is dark brown with a brown streak and adamantine luster, is brittle, has a Mohs hardness of only a few tens of millimeters. It is dark brown with a brown streak and adm...
single-crystal X-ray diffraction methods, using a crystal 0.18 × 0.03 × 0.03 mm, to R1 = 0.033 for 9656 reflections. The mineral is monoclinic, P2_{1}/c, a = 6.505(7), b = 6.744(2), c = 18.561(4) Å, β = 108.75(2)°, V = 771.1(2) Å³, Z = 4. D_{calc} = 4.76 g/cm³, μ = 13.91 mm⁻¹. The strongest lines on the X-ray diffraction pattern (DRON UM-1, and Fe-filtered CoKα radiation, 24 lines) include 4.54(30,110), 4.41(40,102), 4.28(20,104), 4.16(30,111), 3.68(30,014), 3.61(40,114), 3.30(50,021), 3.14(40,022), 3.02(20,204), 2.92(100,006,212), 2.76(20,214), 2.67(30,024), 2.65(50,202,124), 2.23(50,116,031), 2.15(20,30–2), 2.10(30,125), 2.04(20,218), 1.652(20,042). Biraite-(Ce) displays an unprecedented structure type and has no mineral or synthetic analogs. It is the second known example of a mixed-anion compound.


K. Walenta, T. Theye (2005) A new cobalt mineral from the Geological Museum of Lausanne, Switzerland (MGL 65200 to 65205). Cotypes are stored at the National Museum of Natural History, Paris France (MNHN 203.64 to 203.66). T.S.E.

2COO·As_{2}O_{5}·SiO_{2}·2H_{2}O

Cleusonite is found in metamorphic rocks of the central Swiss Alps. The type locality consists of Oligocene-Miocene alpine cleft veins near Cleuson, Val de Nendaz, Valais. The following minerals are also found in the veins: quartz, chlorite, calcite, albite, microcline, tourmaline, fluorapatite, zircon, ilmenite, hematite, titanite, pyrite, chalcopyrite, tennantite, rutile, chrichtonite, monazite-(Ce), and gold. Clausthalite, chalcopyrite, and hematite, titanite, pyrite, chalcopyrite, tennantite, rutile, crichtonite, monazite-(Ce), and gold. Cleusonite has a white streak, is transparent, and shows vitreous luster. It is magnetic. Density is 4.74(4) (meas.), 4.93(12) (corr. for volume expansion with metamictization). 5.02(6) (calc., unheated) and 5.27 g/cm³ (calc., heated crystals). Crystals are complex; major forms include {011} > {100}, {110} > {012} > {101}, {104}. Most crystals are twinned on planes parallel to {011}; interpretation twins based on ~30° rotations about {011} are common. The average chemical analysis by EMPA, XPS, FTIR, TGA, and wet spectro-colorimetry is AlO_{2} 0.16, TiO_{2} 44.55, V_{2}O_{5} 0.83, MnO 0.08, FeO 18.13, Fe_{2}O_{3} 8.81, ZnO 0.33, SrO 0.6, PbO 9.34, UO_{2} 10.07, UO_{2}, 4.12, H_{2}O 1.11, total 98.33 wt%. The formula per 22 cations and 38 anions with O:OH calculated for charge balance is (Pb_{0.89}Sr_{0.12})_{31.0}(U_{0.10}^{4+}U_{0.40}^{6+})_{32.09}(Fe_{1.0}^{2+}V_{1.0}^{3+}Zn_{0.09})_{32.09}(Ti_{1.0}^{4+}Fe_{2.0}^{3+}V_{3.0}^{5+})_{38}Mn_{3.0}Al_{3.0}O_{27.0}OH_{1.0}HO_{1.2}.

Cleusonite is a new member of the crichtonite group, the first member of the group with U dominant at the β position of the formula. It is hexagonal, R3̅, a 10.576(5), c 21.325(5) Å (single crystal, unheated), or a 10.385(2), c 20.900(7) Å (same crystal, heated at 800 °C for 18 h). The strongest lines in the diffraction pattern of the unheated sample are (d Å, 1/λ; hkl): (3.31, 19; 122), (2.957, 16; 116), (2.820, 100; 303), (2.450, 38; 312), (2.137, 21; 226), (2.081, 15; 1010), (1.485, 33; 342). The strongest lines in the pattern of the heated sample are: (6.83, 51; 012), (5.18, 52; 110), (3.406, 96; 024), (3.064, 46; 205), (2.995, 53; 300), (2.893, 100; 116), (2.851, 69; 214), (2.245, 55; 134). The name of the mineral is for the type locality. Holotype crystals are stored at the Geological Museum of Lausanne, Switzerland (MGL 65200 to 65205). Cotypes are stored at the National Museum of Natural History, Paris France (MNHN 203.64 to 203.66). T.S.E.
Ferr winchite


The mineral occurs as large, anhedral grains up to 3 mm embedded in scorzalite. It is transparent, dark-green to bronze color, has a resinous luster, a greenish-brown streak, is non-fluorescent, brittle, shows perfect {101} and good {101} cleavages, and has a Mohs hardness of 4. Ferrorosemaryite is biaxial negative, \( \alpha = 1.730(5) \), \( \beta = 1.758(7) \), and \( \gamma = 1.775(5) \), pleochroism \( X = \) dark green, \( Z = \) dark brown, \( 2V_{\text{max}} 82(1)° \). The dispersion is strong, \( r < v \).

Electron microprobe analyses (WDS, average of 9 analyses) gave \( \text{P}_2\text{O}_5, 46.00 \), \( \text{Al}_2\text{O}_3, 9.12 \), \( \text{Fe}_2\text{O}_3, 21.01 \), \( \text{FeO} \) 11.10, \( \text{MgO} \) 0.19, \( \text{MnO} \) 7.96, \( \text{CaO} \) 0.44, \( \text{Na}_2\text{O} \) 2.85, \( \text{K}_2\text{O} \) 0.01, sum 98.68 wt\%.

The \( 5\text{Fe} \) Mössbauer spectrum and gave 63% Fe³⁺ and 37% Fe²⁺. The Mössbauer spectrum (85 K) of ferrorosemaryite was fit with three Fe³⁺ doublets and two Fe²⁺ doublets, with hyperfine parameters in good agreement with those for other alluaudite-type compounds. The infrared spectrum of ferrorosemaryite also shows similarities with other alluaudite-type compounds, with stretching vibrational modes of \( \text{PO}_4 \) tetrahedra at 1200–900 cm⁻¹, \( \text{PO}_4 \) bending vibrations, \( \text{AlO}_4 \), and \( \text{FeO}_4 \) stretching vibrational modes between 650 and 400 cm⁻¹, and a band at 3375 cm⁻¹ corresponding to the stretching vibration of \( \text{OH}^- \) groups at the apex of \( \text{HPO}_4^\text{–} \) tetrahedra.

The structure of ferrorosemaryite was refined by single-crystal X-ray diffraction methods on a 0.10 × 0.15 × 0.20 mm crystal using starting atomic coordinates of ferrowyllieite [Moore and Molin-Case (1974), Am. Mineral., 59, 280–290], \( R_t = 0.0243 \) for 2072 reflections with \( F > 4\sigma(F) \). Ferrorosemaryite is monoclinic, \( P_2_1/n \), \( a = 11.883(1), b = 12.347(1), c = 6.297(3) \), \( \beta = 114.353(6)° \), \( V = 838.5(1) \). The strongest lines on the powder X-ray diffraction pattern include 8.102(30,110), 6.167(50,020), 5.382(40,200), 4.054(45,220), 3.448(65,310), 3.011(40,112), 2.867(15,002), 2.821(20,312), 2.785(15,222), 2.693(75,400), 2.677(100,240), 2.468(20,420), 2.123(15,510), 2.050(15,313,531), and 1.910(15,313,531). The crystal structure of ferrorosemaryite is isomorphous with other phosphates of the wylieite group and consists of kinked chains of edge-sharing octahedra stacked parallel to \{101\}. These chains are made up of (Fe₆Al)O₄ pairs linked by highly distorted FeO₄ octahedra. Chains are connected in the \( b \) direction by the PO₄ tetrahedra to form sheets perpendicular to \{010\} and channels parallel to \( c \) which contain large \( X \) cations (Mn, Na). Ferrorosemaryite is the Fe³⁺ analog of rosemaryite, \( \text{NaFe}_{2+}^{3+}\text{Al(PO}_4)^2_\text{–} \) and the Fe²⁺ analog of ferrowyllieite, \( \text{NaFe}^{2+}\text{Al(PO}_4)^2_\text{–} \).

Ferrorosemaryite was found in the Rubindi-Kabilizì pegmatite, located 3 km NW of Muhoro village, south of the Rubindi river, 50 km west of Kigali, Rwanda. The pegmatite cuts...
across dark-gray schists and quartzites of the Mesoproterozoic Kibuye formation. Very little remains of pegmatites in the Ga-
tumba field, once mined for its cassiterite and columbite-tantalite ore, except open pits and barren dumps. Along with quartz, green mica, and feldspar, the mineral is associated with scorzalite, trolite, montebasite, bertrandite, brazillitane, and accessory augelite, trilite, and lacroixite. Its name is for being the \( \text{Fe}^{3+} \)–
analog of rosemaryite (IMA no. 2003-063). Type material has been deposited at the Laboratory of Mineralogy, University of Liège, Belgium (catalog no. 20326). P.C.P.

**Holfertite**


The structure of the new mineral holfertite has been published before its complete description as a new mineral (Mineralogical Record, in press 2006), and therefore an abstract is presented here. Holfertite is found on hematite and topaz crystals in cavities and fractures in rhylolite from Searle Canyon, Thomas Range, Utah, U.S.A. The mean of 10 and 14 electron microprobe analyses gave, respectively: CaO 3.01, 2.29; UO\textsubscript{3} 75.97, 76.03; TiO\textsubscript{2} 13.02, 11.89; FeO\textsubscript{0.47}, 0.44; K\textsubscript{0.31}, 0.30; H\textsubscript{2}O 8.59, 8.27 (calculated for 3 \( \text{H}_2\text{O} \) groups pfu), sum 101.34, 99.22 wt%. If the general formula of holfertite is considered instead to contain 0.67 \( \text{OH} \) and 3 \( \text{H}_2\text{O} \) pfu, then the calculated \( \text{H}_2\text{O} \) content corresponds to 9.51 and 9.19 wt%, and the sums are 102.29 and 100.14 wt%, respectively. On the basis of 10.5 \( \text{O} \) pfu (OH not present), the analytical data correspond to the formulae \( \text{U}^{6+}_{1.74}\text{Ti}^{4+}_{1.03}\text{Ca}_{0.27} \text{Fe}^{3+}_{3.00} \text{O}_{7.17}(\text{OH})_{0.67}(\text{H}_2\text{O})_3 \) and \( \text{U}^{6+}_{1.75}\text{Ti}^{4+}_{1.03}\text{Ca}_{0.28}\text{Fe}_{3.00} \text{K}_{0.04}\text{O}_{7.5} \) (H\textsubscript{2}O\textsubscript{3}), respectively. Ideally \( \text{U}^{6+}_{1.75}\text{Ca}_{0.34}\text{Fe}^{3+}_{3.00} \text{O}_{7.17}(\text{OH})_{0.67}(\text{H}_2\text{O})_3 \). The infrared spectrum and the relationship between the empirical formula and calculated density gives 1.571.

Single crystal studies were impossible due to the small crystal size. Juangodoyite is monoclinic, \( P2_1/a \), with refined unit-cell parameters from the powder diffraction pattern and Rietveld refinement (\( R_p = 0.0470, R_{wp} = 0.0617, S = 1.55, R_{exp} = 0.0825 \), \( a = 6.171(4), b = 8.171(5), c = 6.645(4) \) \( \AA \), \( \beta = 116.23(2)^\circ \), \( V = 255.33(15) \) \( \text{Å}^3 \), \( Z = 2, D_{calc} = 2.984 \) g/cm\(^3\)). The strongest lines on the X-ray diffraction pattern (Philips X’pert powder diffractometer, CuK\( \alpha \) radiation, 46 lines) include 5.056(66,001), 4.575(57,110), 4.298(37,011), 4.285(75,111), 3.284(18,120), 2.907(32,111), 2.666(100,112), 2.619(65,210), 2.450(33,211), 2.390(25,131), 1.893(16,041), 1.799(16,310). Juangodoyite is identical to the synthetic compound, sodium bis(carbonato) cuprate(II) and represents a new mineral structure type.

The mineral was discovered in the oxidation zone of the Santa Rosa mine in the Atacama desert in northern Chile, near the city of Iquique. The deposit is a polymetallic vein that was mined for silver, copper, and lead minerals. Juangodoyite is associated with chalcomonite, malachite, calcite, anhydrite, trona, nahcolite, and two other unknown minerals. The mineral is named for Juan Godoy, who discovered the Chañarcillo silver mine in 1832. The type material has been deposited at the Mineralogical Museum of the University of Hamburg, Germany (no catalog number included). R.R.

**Oxykinoshitalite**

L.N. Kogarko, Y.A. Uvarova, E. Sokolova, F.C. Hawthorne, L. Ottolini, J.D. Grice (2005) Oxykinoshitalite, a new species of...
Oxykinoshitalite, the only analog of kinoshitalite, is brittle, \( H = 2\frac{1}{2} \), bright orange to brown in color, with a brown streak, vitreous luster, perfect (001) cleavage, and a splintery fracture. The mineral is strongly pleochroic, with \( X \) pale brown, \( Y \approx Z \) deep red-brown, \( X^* = c^* \) (in \( \beta \) obverse), \( Y = b \), \( Z^* = a^* \) (in \( \beta \) obverse) with absorption \( X < Y \) and \( Z \). It is biaxial positive, \( \alpha \) 1.708(1), \( \beta \) 1.710(1), \( \gamma \) 1.719(1), 2\( \rho \) 56(2)\(^\circ\), 2\( V \), 51\(^\circ\).

The mean of electron microprobe analyses and ion microprobe analyses (for \( H \), \( Li \), and \( B \)) of the crystal studied by X-ray structure refinement is SiO\(_2\), 26.96, TiO\(_2\), 11.63, Al\(_2\)O\(_3\), 15.48, Fe\(_2\)O\(_3\), 0.90, FeO 11.37, MnO 0.12, MgO 10.58, BaO 13.91, CaO 0.15, K\(_2\)O (Ba0.48K0.43Na0.07Ca0.01)

\[ \text{Ba(V2)(Si2Al2)O10(OH)2} \]

ferrokinoshitalite Ba(Fe\(^{2+}\))

\[ \text{ganterite} \ (\text{Ba 0.5(Na,K)0.5}(\text{Al2})(\text{Si2.5Al1.5})\text{O10(OH)2}) \]

and

\[ \text{Al1.60Fe}^{3+} \]

The mineral

The mineral to be the potassium analog of kentbrooksite, and has the usual features of the eudialyte structure; however, unlike kentbrooksite (Na\(_2\)), it has K dominant at the 11-coordinated A site ["Na4" by the nomenclature of Johnsen et al. (2003)].

\[ \text{NA1.265MN2+3.00PO4}^{2-\delta} \]


A potentially new member of the willite group has been hydrothermally synthesized at 400 °C, 10 MPa over a duration of 20 days using a mixture of MnO\(_2\), NaH\(_2\)PO\(_4\), and NaCl in a weight ratio of 1:1:1. The resultant crystals are dark cherry-red. Chemical analyses (average of five analyses) gave Na\(_2\)O 6.76, MnO 34.18, MnO\(_2\), 16.53, P\(_2\)O\(_5\), 42.66, total 100.13 wt%, corresponding to Na\(_{1.60}\)Mn\(_{3.00}\)PO\(_4\) on the basis of (PO\(_4\))\(_3\). No physical or optical data was given.

The crystal structure of the synthetic product (0.14 × 0.08 × 0.04 mm crystal) was solved by direct methods and refined against \( F^2 \) data to \( R = 0.0277 \) for 1723 reflections with \( I > 2\sigma(I) \). It is monoclinic, \( P2_1/c \), \( a = 6.5296(6), b = 12.653(1), c = 10.952(1) \), \( \beta = 97.18(1)\(^\circ\), \( V = 897.68(11) \) \( \text{Å}^3 \), \( Z = 4 \), \( D_{calc} = 3.736 \) g/cm\(^3\). The framework structure is based on a cationic framework of edge-sharing Mn octahedra with PO\(_4\) tetrahedra which strengthen the framework by shared-vertices. Sodium atoms occupy the interstices and channels parallel to \( a \). It differs from other members of the willite group by the fact that it contains Mn\(^{4+}\) in the position usually occupied by either Al or Fe\(^{3+}\).

\[ \text{P.C.P.} \]

**Simferite* and Unknown Phosphate Mineral**


The “new” mineral species simferite (IMA 89-16) was discovered in drill core that intersected a granitic pegmatite of the albite-spodumene class, taken about 25 km from Berdyansk in the southeastern Zaporizhzhya (Zaporoz'ye) Region, Ukraine. The pegmatite lies among ma-xenoliths, nepheline syenites, and pegmatite rocks that experienced regional metamorphic grades of greenschist to amphibolite facies. Contact metasomatism converted some of these amphibolites.
(tremolitites) to a narrow (<20 cm thick), nearly monomineralic phlogopite selvage along the hanging-wall contact of the pegmatite, and locally enriched the pegmatite melt in Mg, Fe, and Mn. Simiferite formed as a result of this enrichment, and occurs within a near-contact albite-oligoclase zone, less than 5 cm from the contact with the phlogopite selvage. Although the direct mineralogical associates of simiferite are not described, the general mineralogy of the albite-oligoclase zone is quartz, oligoclase, albite, and muscovite, with small quantities of phlogopite, tourmaline, apatite, diopside, “hortonolite,” tantalum-niobium oxides, ilmenite, and lollingite. Simiferite physically resembles almandine-andradite, occurring as dark red to nearly black, somewhat isotropic grains to 3 mm in size. It is more rarely found as crystals to 0.1 mm bound by {001}, {100}, {110}, and poorly expressed (120) faces. Streak cinnamon brown, glassy to greasy luster. The prominent cleavage direction is (100), with poor (100). Fracture is uneven and rough to conchoidal. The mineral shows negative elongation, and straight extinction with respect to cleavage traces that mutually intersect at 87–90°. The optic plane is (100); the orientation matrix is α = Y, b = Z, c = X. Intense pleochroism: Z yellow to reddish yellow, Y brownish yellow to brown, Y light brown to brownish red. Absorption is X > Y > Z. Dispersion of the optic axial angle is strong, r > v. Compositional variability is manifested in variable optical and physical properties: α = 1.690–1.704, β = 1.702–1.716, γ = 1.712–1.726, and 2V = 54° to 60° (white light); Dmax = 3.22 to 3.27 g/cm³ and Dcalc = 3.25 g/cm³. Twinning is widespread, most commonly as simple interpenetration twins. The optical Z axes of each twin member coincide, whereas the angle between the other pairs of X and Y axes is 10°. Microindentation hardness is 457 kg/mm². Single-crystal diffractometry gave a = 5.45–5.35 Å, MgO 15.78–12.36, FeO 16.87–17.39, MnO 0.44, CaO 0.33, MgO 1.06, CuO 2.11, CoO 0.18, sum 96.86 wt. %, corresponding to the empirical formula (La0.095Ca0.209Sc0.153)1.973Mg0.933Sc0.604Ti0.195Co0.085)1.058Si1.058O3.058 (based on 45 cations and 72 O atoms). The ideal formula for stavelotite-(La) is La₉Mn₄[Fe₃⁺(Mn³⁺,Fe³⁺,Mn⁴⁺)]₂[Si₂O₇]₆O₃₂(Cu²⁺Mn³⁺). Stavelotite-(La) is a minor accessory mineral in a quartz vein in the Stavelot Massif at Le Coreux, 1 km north of Salmchâteau along the western flanks of the Salm river valley. The mineral is black, opaque, with a metallic luster, no cleavage or fracture, and hardness was not determined. In transmitted light, it is a dark reddish brown color. Stavelotite-(La) occurs as rounded to rectangular, equidimensional masses 10–160 μm in diameter consisting of anhedral single crystals or two or more untwinned individual crystals. In reflected light, stavelotite-(La) is gray and shows very weak to weak birefringence, and very weak pleochroism. Under cross-polarized light, it shows very weak anisotropism and complete extinction. Brown, weak internal reflections are only visible in oil. Reflectance percentages for Rmin and Rmax in air (and in oil) are 13.6, 14.4 (3.0, 3.7) (470 nm), 13.2, 13.9 (2.9, 3.5) (546 nm), 13.0, 13.7 (2.8, 3.4) (589 nm), 12.8, 13.4 (2.7, 3.2) (650 nm), respectively.

Electron microprobe analyses (WDS, average of 65 analyses) gave SiO₂ 20.17, TiO₂ 0.44, MnO 4.83, MnO 6.37, MnO 3.67, MnO 5.99, Al₂O₃ 3.30, Fe₂O₃ 13.08, Sc₂O₃ 1.47, La₂O₃ 1.87, Nd₂O₃ 3.39, SrO 0.44, CaO 0.33, MgO 1.06, CuO 2.11, CoO 0.18, sum 96.86 wt. %, corresponding to the empirical formula (La0.095Ca0.209Sc0.153)1.973Mg0.933Sc0.604Ti0.195Co0.085)1.058Si1.058O3.058 (based on 45 cations and 72 O atoms). The crystal structure of stavelotite-(La) was solved by direct methods and refined on a single crystal 100 × 100 × 30 μm in size which was drilled out of a thin section, R₁ = 0.100 for 2839 reflections with F > 4σ(Fo). Stavelotite-(La) is trigonal, space group P3₁, with a = 11.525(2), c = 33.347(9) Å, V = 3836 Å³, Z = 3, Dcalc = 4.489 g/cm³. The strongest lines in the powder pattern are (d Å, I%): 11.116(18,003), 5.446(31,112–), 3.1873(19,033,303), 2.7789(470 nm), 2.7232(100,224), 2.7302(29,228), 2.6878(28,2.16), and 2.6635(40,600). Stavelotite-(La) is a sorosilicate with a densely packed complex crystal structure that is related to the lângbanite structure type [Moore et al. (1991), Am. Mineral., 76, 1408–1425]. It consists of four different polyhedral layers stacked parallel to c: (1) eight-coordinated distorted Mn⁴⁺ which share edges with strongly distorted Mn³⁺ tetragonal bipyramids with one square planar site for Cu²⁺; (2) regular Mn³⁺ and Mn⁴⁺ octahedra with undirectional SiO₄ tetrahedra; (3) edge-sharing SiO₄ tetrahedra oriented in two opposing directions connecting layers 2 and 4, forming Si₂O₇ groups, as well as [8]-coordinated La; and (4) similar to layer 2 but with inverted SiO₄ tetrahedra. Stavelotite-(La) occurs as a late-stage, minor accessory phase in a late quartz vein cross-cutting deep purple, highly oxidized manganiferous Ordovician phyllites at Le Coreux, 1 km north of Salmchâteau, Belgium. It is associated with albite, braunite, hematite, hollandite-striomelitite, Kanonite, Mn-oxides, and...
muscovite. The name is for the Stavelot Massif in the Belgian Ardennes Mountains, and Stavelot, which is a historical town in eastern Belgium (IMA no. 2004-014). Type material has been deposited at the Mineralogical Collection of the Institut für Geologie, Mineralogie und Geophysik, Ruhr-Universität Bochum, Germany (catalog no. 25169). P.C.P.

**Ungavaite**


Ungavaite occurs as grains from 36 to 116 μm in diameter in heavy-mineral concentrates derived from drill-core rejects. The mineral is somewhat malleable, hardness not given, opaque, dark gray with undetermined streak, and metallic luster. Cleavage appears absent, and fracture was not observed. In plane-polarized light unavaite is bright creamy white with no internal reflections. The mineral shows weak bireflectance, no pleochroism, and weak anisotropy, with rotation tints that are effected light ungavaite is bright creamy white with no internal reflections. The mineral shows weak bireflectance, no pleochroism, and weak anisotropy, with rotation tints that are

Electron microprobe analysis and IR spectroscopy indicate the chemical composition (but lacks subordinate F found in fukalite). The structure was solved by direct methods and difference Fourier techniques to Rmin = 0.063. The structure refinement detected 4 Ca positions, 4 half-occupied Si positions, 1 C position, 8 O positions, 2 half-occupied O positions, 2 (OH) positions and 2 H positions. The Ca–O polyhedra are [6]- and [7]-coordinated. Ca1 and Ca4 are coordinated by bifurcated octahedra (6 O + 1 OH). Statistically, half of Ca2 and Ca3 are coordinated by capped octahedra (5 O + 2 OH); the other half, octahedra (4 O + 2 OH). The Ca-O polyhedra share edges and show strong columnar characteristics despite whether the columns are cross-linked to form weak, corrugated layers hosting the bifurcated octahedra or strong, corrugated, tilleyite-like layers hosting the capped octahedra/octahedra. The SiO₄ tetrahedra of the structure are corner-linked to form batisite-like single chains along a. The model has two statistical distributions of chains, each half-occupied over the whole of the crystal. The silicate chains serve to cross-link the Ca-O layers, passing through hexagonal channels in the layers; carbonate groups serve to reinforce linkages between the layers. The mineral belongs to the C-S-H class of compounds, a major component of Portland cement. The authors state that although the crystal structure of fukalite is unknown, they believe that their mineral is its diphasic based on structural limitations associated with (the currently accepted) fukalite cell with αfukalite = bfinv.2

**Discussion.** It would seem that the taxonomic concepts presented in this paper have not yet been submitted to the IMA. T.S.E.

**NEW DATA**

**Aspidolite**

Aspidolite, the Na analog of phlogopite, occurs as light brown crystals interleaved with and rimmed by phlogopite plates from 0.1 to 1.2 mm long. It has a white streak, a perfect (001) cleavage, is elastic, and has an estimated Mohs hardness of 2–3. It is optically biaxial negative with positive elongation and Z \parallel cleavage. It is pleochroic with X = colorless to yellow, Y = Z = pale yellowish brown.

Electron microprobe analyses of aspidolite gave (representative analysis) SiO2 37.0, TiO2 0.96, Al2O3 22.7, FeO 4.12, MgO 22.1, CaO 0.04, Na2O 6.79, K2O 0.97, F 0.16, H2Ocalc 4.26, sum 99.0 wt.%, corresponding to (Na0.90K0.10)Σ1.00(Mg22.77Al0.33Fe2+0.20(Ti6.08)Σ3.08Si3.26Al1.42)Σ4.00O10(OH1.97F0.03)Σ2.00. The crystal structure of aspidolite was investigated by high-resolution TEM by Kogure et al. (2005).

Cumengéite is Cu20Pb21Cl42(OH)40·6H2O. The H2O molecule centered at (0, 1/2, 0) is a pseudo-inoctahedral entity, and the Cl(II) site is a mono-capped square antiprism.

Aspidolite at Kasuga-mura occurs as both aspidolite-1A and aspidolite-1M. The unit-cell parameters for both polytypes were refined from X-ray powder diffraction data (Gandolfi camera, 114.6 mm, CuKα radiation). Aspidolite-1A is triclinic, \( \alpha = 5.289(6) \), \( c = 9.892(9) \) \( \AA \), \( \alpha = 94.45(9) \), \( \beta = 97.74(9) \), \( \gamma = 90.0(1) ^\circ \), \( V = 473.4(9) \) \( \AA^3 \). Aspidolite-1M is monoclinic, \( a = 5.291(8) \), \( b = 9.16(2) \), \( c = 10.12(2) \) \( \AA \), \( \beta = 105.1(1)^\circ \), \( V = 473(1) \) \( \AA^3 \). The X-ray powder diffractionogram obtained for the sample represents a mixture of aspidolite-1A, aspidolite-1M, phlogopite-1A, and phlogopite-1M. The pattern was indexed based on calculated patterns for phlogopite and assumed crystal models of aspidolite-1A and aspidolite-1M (Kogure et al. 2004, *Eur. J. Mineral.*, 16, 891–897). The strongest lines for aspidolite-1A (22 lines given) include 9.73(80,100), 4.57(40,020,110,110), 3.26(40,003), 2.62(100,201,131,200), 2.55(30,023,113,113,113), and 2.45(20,132,201). The strongest lines for aspidolite-1M (17 lines given) include 9.77(100,001), 4.59(25,020), 4.46(15,110), 3.74(15,112), 3.33(15,022), 3.26(50,003), 2.97(15,131,112), 2.61(100,131,130), 2.55(25,202,200), 2.45(20,132), 2.19(20,133,132), and 2.05(15,204,202). The crystal structure of aspidolite was investigated by high-resolution TEM by Kogure et al. (2004, *Eur. J. Mineral.*, 16, 891–897).

Aspidolite is the Na analog of phlogopite. It was found in waste rock in the Kawai pit of the Kasuga mine. The rock has a total thickness of 0.3 to 1.2 mm long. It has a white streak, perfect (001) cleavage, is elastic, and has an estimated Mohs hardness of 2–3. It is optically biaxial negative with positive elongation and Z \parallel cleavage. It is pleochroic with X = colorless to yellow, Y = Z = pale yellowish brown.

Electron microprobe analyses of aspidolite gave (representative analysis) SiO2 37.0, TiO2 0.96, Al2O3 22.7, FeO 4.12, MgO 22.1, CaO 0.04, Na2O 6.79, K2O 0.97, F 0.16, H2Ocalc 4.26, sum 99.0 wt.%, corresponding to (Na0.90K0.10)Σ1.00(Mg22.77Al0.33Fe2+0.20(Ti6.08)Σ3.08Si3.26Al1.42)Σ4.00O10(OH1.97F0.03)Σ2.00. The crystal structure of aspidolite was investigated by high-resolution TEM by Kogure et al. (2005).
less iron than that of the type material \((\text{Ca}_{0.63}\text{Fe}_{0.56}\text{V}_{1.96}\text{W}_{3.89}\text{H}_{12.52}\text{O}_{24})\). An idealized formula \(\text{CaO} \cdot \text{V}_2\text{O}_5 \cdot 4\text{WO}_3 \cdot 6\text{H}_2\text{O}\) is suggested. A re-interpretation of the X-ray powder diffraction data of type rankachite suggests a monoclinic unit-cell (possible space groups \(P2_1\) and \(P2_1/m\)) with \(a = 10.62\), \(b = 8.16\), \(c = 5.50\) Å, \(\beta = 98^\circ\), and \(V = 471.99\) Å\(^3\) \(\left(D_x = 4.46\right)\) for the type material and \(a = 10.73\), \(b = 8.18\), \(c = 5.50\) Å, \(\beta = 97^\circ\), and \(V = 479.14\) Å\(^3\) \(\left(D_x = 4.34\right)\) for the Fe-poor variety \((Z = 1)\). The increased unit-cell parameters of the Fe-poor variety are explained by higher Ca and lower Fe contents. Optical properties: \(\alpha = 1.735(5)\), straight extinction, anomalous blue-green interference colors. The crystals are elongate along \([001]\) and flattened on either \([100]\) or \([010]\). Strong lines (weak ones not given) of the indexed powder pattern of the Fe-poor variety (57.3 mm camera, FeK\(\alpha\) radiation, intensities visually estimated): 10.69 (10) 100; 5.46 (9) 001; 4.09 (8) 020, 201; 3.56 (9) 300; 3.27 (8) 021, 310; 3.07 (8) 121; 2.68 (8) 320, 311; 1.927 (7) 032, 3\&overline{2}. A re-indexed powder pattern of type rankachite is also given; strongest lines are: 10.64 (10) 100; 5.44 (7) 001; 4.57 (6) 101; 4.35 (5) 3\&overline{1}1; 4.08 (6) 020, 201; 3.51 (6) 300; 3.26 (6) 021, 211; 3.04 (6) 121; 2.63 (6) 130, 400, 311; 1.920 (5) 032.

**Discussion.** The authors do not mention an earlier brief comment on a successful crystal-structure solution of rankachite, proof of its monoclinic symmetry, the tetravalent character of the V, and a layer structure with intercalated Ca\(^{2+}\) ions and water molecules [U. Kolitsch, G. Götzinger (2000) Einige Neufunde aus der Grube Clara im mittleren Schwarzwald: Eulytin, Namibit, Volborthit, Gearksutit, Spertiniit, Monazit-(La), Protasit, Saintfeldit, Cyanotrichit und Vauquelinit. Der Erzgräber, 14, 33–47 (in German)]. U.K.