

## New Mineral Names\*

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### CAVOITE\*

R. Basso, G. Lucchetti, A. Martinelli, A. Palenzona (2003) Cavoite, CaV<sub>3</sub>O<sub>7</sub>, a new mineral from the Gambatesa mine, northern Apennines, Italy. *Eur. J. Mineral.*, 15, 181–184.

Electron microprobe analysis gave CaO 17.76, MnO 0.70, K<sub>2</sub>O 0.35, VO<sub>2</sub> 76.80, SiO<sub>2</sub> 4.31, sum 99.92 wt%, corresponding to (Ca<sub>0.95</sub>Mn<sub>0.05</sub>K<sub>0.02</sub>)<sub>Σ1.00</sub>(V<sub>2.79</sub>Si<sub>0.22</sub>)<sub>Σ3.01</sub>O<sub>7</sub>, ideally CaV<sub>3</sub>O<sub>7</sub>. The mineral occurs as radial aggregates consisting of acicular to elongate prismatic crystals up to 0.28 mm long and 2 μm wide. Colorless, transparent, vitreous luster, brittle, *H* not determinable, no cleavage or parting, *D*<sub>calc</sub> = 3.51 g/cm<sup>3</sup> for the empirical formula and *Z* = 4. High R.I., perhaps ~2. Electron diffraction patterns are consistent with the structure for the synthetic analog, which is orthorhombic, space group, *Pnam*; *a* = 10.42(2), *b* = 5.28(2), *c* = 10.34(2) Å as refined from an X-ray powder pattern (57 mm Gandolfi, CrKα radiation) with strongest lines of 5.16(M,200), 3.45(W,211,112), 3.00(S,212), 2.88(W,013,203), 1.85(M,024), and 1.56(W,612,033,216).

The mineral occurs in microcavities in massive layers of caryopile and rhodochrosite within braunite layers at the Gambatesa mine, near Reppia, Liguria, northern Italy. The new mineral name alludes to the chemical composition. Type material is at the Università de Genova, Italy. **J.L.J.**

### FERRIALLANITE-(CE)\*

P.M. Kartashov, G. Ferraris, G. Ivaldi, E. Sokolova, C.A. McCammon (2002) Ferriallanite-(Ce), CaCeFe<sup>3+</sup>AlFe<sup>2+</sup>(SiO<sub>4</sub>)(Si<sub>2</sub>O<sub>7</sub>)O(OH), a new member of the epidote group: description, X-ray and Mössbauer study. *Can. Mineral.*, 40, 1641–1648.

Electron microprobe analysis gave CaO 10.33, FeO<sub>total</sub> 25.79, FeO (calc.) 8.83, Fe<sub>2</sub>O<sub>3</sub> (calc.) 18.99 (FeO 8.43, Fe<sub>2</sub>O<sub>3</sub> 20.09 by wet chemistry), MnO 1.34, Al<sub>2</sub>O<sub>3</sub> 6.26, La<sub>2</sub>O<sub>3</sub> 4.90, Ce<sub>2</sub>O<sub>3</sub> 11.66, Pr<sub>2</sub>O<sub>3</sub> 1.46, Nd<sub>2</sub>O<sub>3</sub> 4.82, TiO<sub>2</sub> 1.84, SiO<sub>2</sub> 28.09, H<sub>2</sub>O (calc.) 1.48, sum 100 wt%, corresponding to (Ca<sub>1.12</sub>Ce<sub>0.43</sub>La<sub>0.18</sub>Nd<sub>0.17</sub>Pr<sub>0.05</sub>)<sub>Σ1.96</sub>(Fe<sub>1.44</sub><sup>3+</sup>Fe<sub>0.75</sub><sup>2+</sup>Al<sub>0.59</sub>Ti<sub>0.14</sub>Mn<sub>0.12</sub>)<sub>Σ3.04</sub>[(Si<sub>2.84</sub>Al<sub>0.16</sub>)<sub>Σ3.00</sub>O<sub>11</sub>]O(OH)<sub>1.01</sub>, with the ideal formula as in the title. The mineral occurs as an aggregate of subhedral grains that are up to 1 × 2 mm. Black color, translucent, brittle, brown streak, resinous luster, conchoidal to uneven fracture, no cleavage or parting, *H* = 6, nonfluorescent, *D*<sub>meas</sub> = 4.22, *D*<sub>calc</sub> = 4.21 g/cm<sup>3</sup> for the empiri-

cal formula and *Z* = 2. Optically biaxial negative, α = 1.825(2), β = 1.855(5), γ = 1.880(5), 2*V*<sub>calc</sub> = 83°, strong dispersion *r* < *v*, *Z* = dark red-brown, *Y* = brown, *X* = greenish gray, *Z* > *Y* > *X*. Single-crystal X-ray structure study (*R* = 0.026) indicated monoclinic symmetry, space group *P2<sub>1</sub>/m*, *a* = 8.962(2), *b* = 5.836(2), *c* = 10.182(2) Å, β = 115.02(1)°. Strongest lines of the powder pattern (Guinier, CuKα radiation) are 2.93(65,  $\bar{1}$ 13), 2.72(80, 120, 013), 2.63(60,  $\bar{3}$ 11), 2.18(100, 122,  $\bar{1}$ 23), and 2.14(80, 221,  $\bar{4}$ 03).

The mineral occurs within masses of zircon, quartz, and kainosite-(Y) in an alkaline granitic pegmatite at Mount Ulyn Khuren in the Khaldzan Buragtag peralkaline granite massif, 55 km NE of the city of Kobdo, Mongolian People's Republic. The new name indicates that the mineral is the Fe<sup>3+</sup> analog of allanite-(Ce), ideally CaCeFe<sup>2+</sup>Al<sub>2</sub>(SiO<sub>4</sub>)(Si<sub>2</sub>O<sub>7</sub>)O(OH). Type material is in the Fersman Mineralogical Museum, Moscow, Russia. The authors also give a microprobe analysis for an analog corresponding to CaCeFe<sup>2+</sup>Fe<sup>3+</sup>(SiO<sub>4</sub>)(Si<sub>2</sub>O<sub>7</sub>)O(OH). **J.L.J.**

### KEILITE\*

M. Shimizu, H. Yoshida, J.A. Mandarino (2002) The new mineral species keilite, (Fe,Mg)S, the iron-dominant analogue of niningerite. *Can. Mineral.*, 40, 1687–1692.

One of six listed electron microprobe analyses has Fe 39.57, Mg 10.36, Mn 3.43, Ca 1.86, Cr 1.98, Zn 0.30, Ti 0.09, Cu 0.01, S 41.46, sum 99.06 wt%, corresponding to (Fe<sub>0.55</sub>Mg<sub>0.33</sub>Mn<sub>0.05</sub>Ca<sub>0.04</sub>Ce<sub>0.03</sub>)<sub>Σ1.00</sub>S, simplified as (Fe,Mg)S. The mineral occurs as opaque grains up to several hundred micrometers across, *D*<sub>calc</sub> = 3.59–3.67 g/cm<sup>3</sup> for *Z* = 4. Optically isotropic, with reflectance percentages (SiC standard) 26.0–27.2 in air, and 11.7–12.2 in oil for the above composition; reflectance increases with increasing Fe content. The reported X-ray powder-diffraction pattern has two lines: 2.584(200) and 1.829(220), indexed by analogy with niningerite, yielding *a* = 5.17 Å. Solid solution between niningerite (Mg,Fe)S and keilite (Fe,Mg)S, and the existence of the Fe-dominant species now called keilite have been known for many years, but the Fe-dominant species was not named. The mineral occurs in several enstatite meteorites, and makes up 11 vol% of the Abee (Abee, Alberta, Canada) enstatite chondrite, which is designated the type material and is housed in the Hawaii Institute of Geophysics and Planetology at Honolulu. The new mineral name is for meteoriticist Klaus Keil (b. 1934) of that institution. **J.L.J.**

### MAGNESIOSTAUROLITE\*, ZINCOSTAUROLITE\*

C. Chopin, B. Goffe, L. Ungaretti, R. Oberti (2003) Magnesiostauroilite and zincostauroilite: mineral description

\* Before publication, minerals marked with an asterisk were approved by the Commission on New Minerals and Mineral Names, International Mineralogical Association.

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with a petrogenetic and crystal-chemical update. *Eur. J. Mineral.*, 15, 167–176.

### Magnesiostauroilite

Electron and ion microprobe analyses gave SiO<sub>2</sub> 30.66, Al<sub>2</sub>O<sub>3</sub> 57.45, TiO<sub>2</sub> 0.18, FeO 0.72, MgO 7.77, ZnO 0.10, Li<sub>2</sub>O 0.90, H<sub>2</sub>O (calc.) 2.30, sum 100.08 wt%, corresponding to  $(\square_{3.12}\text{Mg}_{0.72}\text{Fe}_{0.16}^{3+})_{\Sigma 4}(\text{Mg}_{1.86}\square_{1.18}\text{Li}_{0.94}\text{Zn}_{0.02})_{\Sigma 4}(\text{Al}_{15.96}\text{Ti}_{0.04})_{\Sigma 16.00}(\square_{1.97}\text{Al}_{1.58}\text{Mg}_{0.45})_{\Sigma 4}(\text{Si}_{7.96}\text{Al}_{0.04})_{\Sigma 8.00}\text{O}_{40}[\text{O}_{4.02}(\text{OH})_{3.98}]_{\Sigma 8.00}$ , ideally  $\square_4\text{Mg}_4\text{Al}_{16}(\text{Al}_2\square_2)\text{Si}_8\text{O}_{40}[\text{O}_6(\text{OH})_2]$ . The mineral occurs as anhedral inclusions, to 250  $\mu\text{m}$ , in pyrope megablasts. Colorless and transparent in thin section, vitreous to resinous luster, white streak,  $H = 7-7\frac{1}{2}$ ,  $D_{\text{calc}} = 3.54 \text{ g/cm}^3$ , not twinned. Optically biaxial,  $2V = \sim 90^\circ$ . Single-crystal X-ray structure study indicated monoclinic symmetry, space group  $C2/m$ ,  $a = 7.8706(5)$ ,  $b = 16.5411(16)$ ,  $c = 5.6323(3)$  Å,  $\beta = 90.007(4)^\circ$ . Strongest lines of the calculated X-ray powder pattern are 2.678(38,151), 2.390(50,132), 2.370(33,330), 1.968(100,062), and 1.391(82,462). The mineral occurs with talc, clinocllore, rutile, magnesiochloritoid, and kyanite, or armouring corundum, within pyrope in the coesite-bearing Dora-Maira massif, Italian Western Alps.

### Zincostauroilite

The mineral occurs as zoned prismatic crystals up to 3 mm long. Electron and ion microprobe analyses gave SiO<sub>2</sub> 28.47, Al<sub>2</sub>O<sub>3</sub> 54.12, TiO<sub>2</sub> 0.11, FeO 1.40, MgO 0.45, MnO 0.01, ZnO 11.82, Li<sub>2</sub>O 0.45, H<sub>2</sub>O (calc.) 1.96, sum 98.79 wt%, corresponding to  $(\square_{3.77}\text{Fe}_{0.13}^{3+}\text{Mg}_{0.10})_{\Sigma 4}(\text{Zn}_{2.45}\square_{0.84}\text{Li}_{0.51}\text{Fe}_{0.20}^{2+})_{\Sigma 4}(\text{Al}_{15.98}\text{Ti}_{0.02})_{\Sigma 16.00}(\square_{1.96}\text{Al}_{1.95}\text{Mg}_{0.09})_{\Sigma 4}\text{Si}_8\text{O}_{40}[\text{O}_{4.33}(\text{OH})_{3.67}]$ , ideally  $\square_4\text{Zn}_4\text{Al}_{16}(\text{Al}_2\square_2)\text{Si}_8\text{O}_{40}[\text{O}_6(\text{OH})_2]$ . Colorless in thin section, with physical properties similar to those of magnesiostauroilite. Optically biaxial positive,  $\alpha = 1.722(2)$ ,  $\gamma = 1.734(2)$ ,  $Z = c$ , nonpleochroic. Single-crystal X-ray structure study ( $R = 0.025$ ) indicated monoclinic symmetry, space group  $C2/m$ ,  $a = 7.853(6)$ ,  $b = 16.534(9)$ ,  $c = 5.639(5)$  Å,  $\beta = 90.00(8)^\circ$ . Strongest lines of the calculated X-ray powder pattern are 3.001(61,221), 2.678(71,151), 2.390(87,  $\bar{1}32$ ), 1.968(61,062), and 1.391(100,  $\bar{4}62$ ). The mineral is associated with kyanite, muscovite, margarite, chloritoid, gahnite, and either quartz or diaspore in an argillite (metabauxite) deposited as a karst fill within marbles in the Zermatt Valley, Swiss Western Alps.

The new mineral names refer to the composition and relationship to staurolite. Type material is in the Ecole des Mines de Paris, France. **J.L.J.**

### MANGANLOTHARMEYERITE\*

J. Brugger, S.V. Krivovichev, U. Kolitsch, N. Meisser, M. Andrut, S. Ansermet, P.C. Burns (2002) Description and crystal structure of manganlotharmeyerite,  $\text{Ca}(\text{Mn}^{3+}, \square, \text{Mg})_2\{\text{AsO}_4, [\text{AsO}_2(\text{OH})_2]\}_2(\text{OH}, \text{H}_2\text{O})_2$ , from the Starlera Mn deposit, Swiss Alps, and a redefinition of lotharmeyerite. *Can. Mineral.*, 40, 1597–1608.

The mineral occurs as elongate platy crystals and aggregates, to 1 mm length, in open fissures in massive braunite ore. Individual, homogeneous grains are  $\leq 100 \mu\text{m}$ . Electron micro-

probe analysis gave Na<sub>2</sub>O 0.08, MgO 3.95, CaO 12.42, SrO 0.20, NiO 1.07, CoO 0.19, ZnO 0.58, Al<sub>2</sub>O<sub>3</sub> 0.27, Mn<sub>2</sub>O<sub>3</sub> 16.70, Fe<sub>2</sub>O<sub>3</sub> 0.91, As<sub>2</sub>O<sub>5</sub> 53.41, V<sub>2</sub>O<sub>5</sub> 0.67, H<sub>2</sub>O (calc.) 8.84, sum 99.3 wt%, corresponding to  $(\text{Ca}_{0.94}\text{Sr}_{0.01}\text{Na}_{0.01})_{\Sigma 0.96}(\text{Mn}_{0.90}^{3+}\square_{0.52}\text{Mg}_{0.41}\text{Ni}_{0.06}\text{Fe}_{0.05}^{3+}\text{Zn}_{0.03}\text{Al}_{0.02}\text{Co}_{0.01})_{\Sigma 2.00}(\text{As}_{1.97}\text{V}_{0.03})_{\Sigma 2.00}\text{H}_{4.16}\text{O}_{10}$ , simplified as  $\text{Ca}(\text{Mn}^{3+}, \square, \text{Mg})_2\{\text{AsO}_4, [\text{AsO}_2(\text{OH})_2]\}_2(\text{OH}, \text{H}_2\text{O})_2$ , which takes into account the substitution of  $[\text{AsO}_2(\text{OH})_2]$  for  $[\text{AsO}_4]$ . The mineral is brown-red to dark reddish orange, adamantine luster, transparent to translucent, brittle, irregular fracture, light brown streak, distinct  $\{001\}$  cleavage,  $H = 3$ ,  $D_{\text{meas}} = 3.77(2)$ ,  $D_{\text{calc}} = 3.75(2) \text{ g/cm}^3$  for the empirical formula and  $Z = 2$ . Optically biaxial positive,  $\alpha = 1.785(2)$ ,  $\beta = 1.814(5)$ ,  $\gamma = 1.854(5)$ ,  $2V_{\text{meas}} = 85$ ,  $2V_{\text{calc}} = 82.4^\circ$ , weak dispersion  $r < v$ , pleochroism not stated. Single-crystal X-ray structure study ( $R_1 = 0.025$ ) indicated monoclinic symmetry, space group  $C2/m$ ,  $a = 9.043(1)$ ,  $b = 6.2314(7)$ ,  $c = 7.3889(9)$  Å,  $\beta = 116.392(2)^\circ$ , isotypic with the tsumcorite structure. The strongest lines of the X-ray powder pattern (114 mm Gandolfi, FeK $\alpha$  radiation) are 4.93(80,110), 3.182(100,  $\bar{1}12$ ), 2.927(70,201), 2.822(70,021), 2.718(80,  $\bar{3}11$ ), 2.555(100,  $\bar{2}21, \bar{3}12$ ), and 2.134(70,202,221).

The mineral is associated with calcite, tilasite, and sailaufite (IMA mineral 2000–005) in hydrothermal discordant veinlets within massive braunite ore at the Starlera manganese deposit, Val Ferrera, eastern Swiss Alps. The new mineral name alludes to the Mn<sup>3+</sup> dominance within the lotharmeyerite subgroup of the tsumcorite group. Type material is in the Musée géologique cantonal, Lausanne, Switzerland.

### Lotharmeyerite

The cation composition of the Me2 site is the main guide for the naming of the lotharmeyerite subgroup, wherein Me = Ca and X = As. Lotharmeyerite was originally described as  $\text{CaZnMn}^{3+}(\text{AsO}_4)_2(\text{OH})\cdot 2\text{H}_2\text{O}$  and was subsequently revised to  $\text{Ca}(\text{Mn}^{3+}, \text{Zn})_2(\text{AsO}_4)_2(\text{OH}, \text{H}_2\text{O})_2$ , but the original and new analyses have shown that Zn > Fe. Therefore, in the general formula  $\text{Ca}(\text{Me})_2(\text{AsO}_4)_2(\text{OH}, \text{H}_2\text{O})$ , the mineral with Me dominated by Zn is lotharmeyerite, the mineral with the Mg dominance is cabalzarite, and that with the Mn<sup>3+</sup> dominance is manganlotharmeyerite. The CNMMN has approved the revised nomenclature. **J.L.J.**

### HEXAGONAL PENTLANDITE

Hui-Fang Liu (2002) Hexagonal pentlandite and sylvite inclusions in diamond from Liaoning. *Dizhi Keji Qingbao*, 21(2), 51–54 (in Chinese, English abs.).

The mineral occurs as an inclusion, 60 × 75  $\mu\text{m}$ , in an octahedron of diamond that also contains inclusions of sylvite and a Ca chloride. The morphology of the sulfide mineral is stout tabular, showing  $\{001\}$  and a hexagonal dipyramid  $\{h0l\}$ . One of seven similar listed electron microprobe analyses has Fe 31.06, Ni 34.18, Co 0.44, S 33.17, sum 98.85 wt%, corresponding to  $(\text{Ni}_{4.50}\text{Fe}_{4.30}\text{Co}_{0.06})_{\Sigma 8.86}\text{S}_8$ . The Raman spectrum (illustrated) differs substantially from that of pentlandite. The diamond is from Liaoning Province, northeastern China. **J.L.J.**

**CUBIC AgBiS<sub>2</sub>**

K. Walenta (2002) Cubic AgBiS<sub>2</sub> from the Silberbrünnle mine at Gegenbach in the Central Black Forest. *Aufschluss*, 53, 238–240 (in German).

The mineral occurs in quartz as gray-black anhedral grains, to about 0.3 mm, that contain only Ag, Bi, and S, with Ag:Bi = 1.02:1. The X-ray powder pattern (57 mm camera, FeK $\alpha$  radiation) has six listed lines, indexed on a cubic cell with  $a = 5.703 \text{ \AA}$ : 3.290(80,111), 2.853(100,200), 2.014(80,220), 1.721(50,311), 1.640(20,222), and 1.276(10,420). The mineral is considered to be distinct from maltildite, which is hexagonal. **J.L.J.**

**K,Na SULFIDES**

A.P. Khomyakov, M.G. Dobrovolskaya, A.I. Tsepin, D.K. Shcherbachev (2003) New data on K,Na-bearing sulfides of copper and iron from the Khibiny massif. *Doklady Earth Sciences*, 389, 219–222.

For one of seven electron microprobe analyses listed, and the range for the seven, results are K 0.69 (0.61–0.77), Na 0.13 (n.d.–0.13), Cu 44.82 (44.82–47.70), Fe 19.39 (17.42–19.39), As n.d. (n.d.–0.09), S 33.65 (32.14–33.65), sum 98.74 (96.99–98.74) wt%, possibly corresponding to (Cu<sub>0.96</sub>K<sub>0.04</sub>)(Fe<sub>0.6</sub>Cu<sub>0.4</sub>)(S<sub>1.98</sub>O<sub>0.02</sub>). Lilac-yellow to gray in reflected light, weak bireflectance and anisotropy, brittle,  $VHN_5 = 140$ , perfect lamellar cleavage. Reflectance percentages are given in 20 nm steps from 400 to 700 nm; representative values for  $R_1$  and  $R_2$  in air (SiC standard) are 12.6, 12.7 (460), 15.4, 16.2 (540), 18.0, 19.1 (580), and 23.6, 24.8 (660). The mineral is intergrown with djerfisherite.

An associated Na-bearing sulfide is also lilac-gray to yellow in reflected light, but lacks bireflectance and anisotropy. Perfect lamellar cleavage, brittle,  $VHN_5 = 57$ ,  $D_{\text{meas}} = 3.36(2) \text{ g/cm}^3$ , representative reflectance percentages for  $R_1$  and  $R_2$  in air: 16.2, 15.8 (460), 23.7, 24.2 (540), 27.6, 28.0 (580), and 32.4, 31.7 (660). One of seven listed electron microprobe analyses, and the range for the seven, has Na 1.64 (1.37–3.91), K 0.32 (0.27–0.38), Cu 34.02 (29.76–37.26), Fe 17.22 (16.93–18.10), As 0.26 (0.03–0.38), S 28.01 (23.52–30.32), sum 81.70 (75.27–88.69) wt%, possibly corresponding to Cu(Fe<sub>0.75</sub>Cu<sub>0.27</sub>)(S<sub>1.99</sub>As<sub>0.01</sub>)(NaOH)<sub>0.29</sub>(KOH)<sub>0.02</sub> and possibly with H<sub>2</sub>O to account for low totals.

Both minerals give a chalcopyrite-type X-ray pattern with diffuse diffraction lines and insignificant differences between the two: 3.05(100,112), 2.654(20,020), 1.870(90,024), 1.596(50,132), 1.328(10,040), 1.214(20,332), and 1.082(30,244), from which  $a = 5.304(4)$ ,  $c = 10.51(2) \text{ \AA}$ .

The minerals occur in a hyperagpaitic pegmatite, specifically its “salt” core containing villiaumite, natrite, thermonatrite, and natrophosphate, that is exposed in a quarry at Koashva Mountain, Khibiny massif, Russia. The sulfides occur as yellowish and brownish bronze poorly tabular grains, up to 3 mm across, that split easily into fine flakes along the lamination.

**Discussion.** See also *Am. Mineral.*, 88, p. 934 (2003), which summarizes results for other alkali-bearing Cu-Fe sulfides from the same locality. **J.L.J.**

**Cu<sub>5</sub>Fe<sub>6</sub>Pb<sub>6</sub>Bi<sub>2</sub>S<sub>21</sub>**

Yu.S. Borodaev, N.N. Mozgova, S.V. Ezhov, S.M. Gandhi, A. Mookherjee (2002) Textural and mineralogical characteristics of metamorphosed ore from the Rangpo polymetallic deposit (Sikkim, India). *Vestnik Mosk. Universit. Seriya 4, Geol.*, (3), 37–48 (in Russian).

The mineral occurs as grains, to 0.1 mm, intergrown with mica in a complex metamorphic assemblage that includes boulangerite, meneghinite, and kobellite. White in reflected light, similar to galena but strongly anisotropic. One of two listed and similar microprobe analyses has Cu 10.58, Ag 0.01, Fe 10.87, Pb 40.84, Sn 0.07, Sb 0.48, Bi 12.61, As 0.05, S 21.92, Se 0.44, Te 0.04, sum 97.91 wt%, corresponding to Cu<sub>5.08</sub>Fe<sub>5.92</sub>Pb<sub>6.00</sub>(Bi<sub>1.84</sub>Sb<sub>0.12</sub>As<sub>0.04</sub>)<sub>22.00</sub>(S<sub>20.84</sub>Se<sub>0.16</sub>)<sub>221.00</sub>, simplified as Cu<sub>5</sub>Fe<sub>6</sub>Pb<sub>6</sub>Bi<sub>2</sub>S<sub>21</sub>. **J.L.J.**

**(Cr,V)<sub>2</sub>Ti<sub>2</sub>O<sub>7</sub>, (Cr,V)<sub>2</sub>Ti<sub>4</sub>O<sub>11</sub>**

A.A. Koneva (2002) Cr–V oxides in metamorphic rocks, Lake Baikal, Russia. *Neues Jahrb. Mineral. Mon.*, 541–550.

One of three listed, and another of five listed, electron microprobe analyses have, respectively, TiO<sub>2</sub> 52.15, 68.92, Cr<sub>2</sub>O<sub>3</sub> 16.40, 8.47, V<sub>2</sub>O<sub>5</sub> 29.32, 21.79, FeO 0.52, 0.14, Al<sub>2</sub>O<sub>3</sub> 0.68, 0.43, sum 99.07, 99.75 wt%, corresponding to (V<sub>1.22</sub>Cr<sub>0.67</sub>Al<sub>0.04</sub>Fe<sub>0.02</sub>)<sub>Σ1.95</sub>Ti<sub>2.04</sub>O<sub>7</sub> and (V<sub>1.36</sub>Cr<sub>0.52</sub>Al<sub>0.04</sub>Fe<sub>0.01</sub>)<sub>Σ1.93</sub>Ti<sub>4.05</sub>O<sub>11</sub>, simplified as (V,Cr)<sub>2</sub>Ti<sub>2</sub>O<sub>7</sub> and (V,Cr)<sub>2</sub>Ti<sub>4</sub>O<sub>11</sub>. Both have considerable Cr-for-V substitution, and the sesquioxide has both Cr > V and V > Cr. The minerals occur as inclusions, up to 10  $\mu\text{m}$ , associated with berdesinskiite, schreyerite, and olkhonskite in rutile in high-grade metamorphic carbonate and quartzitic rocks at Lake Baikal, Russia. **J.L.J.**

**FE-DOMINANT REEVESITE**

Z. Maksimović, G. Pantó, G. Nagy (2002) Iron-rich reevesite from the Ni-Fe ores of Mt. Radočelo, Serbia, a possible new member of the hydrotalcite subgroup. *Acta Geol. Hungarica*, 45, 373–383.

The mineral occurs as aggregates, up to 300  $\mu\text{m}$  across, and as thin veinlets in strongly weathered serpentinite. One of nine listed electron microprobe analyses, for which formula Fe<sup>2+</sup> is predominant and Ni + Mg ranges from 1.97 to 0.24, has MgO 0.08, total Fe as FeO 55.29, NiO 18.88, Al<sub>2</sub>O<sub>3</sub> 0.28, Cr<sub>2</sub>O<sub>3</sub> 0.12, SiO<sub>2</sub> 1.18, H<sub>2</sub>O + CO<sub>2</sub> (by difference) 24.17, C detectable, sum 100 wt%, corresponding to (Fe<sub>4.03</sub>Ni<sub>1.97</sub>)<sub>26.00</sub>(Fe<sub>1.56</sub>Al<sub>0.03</sub>Cr<sub>0.01</sub>)<sub>22.00</sub>(CO<sub>3</sub>)(OH)<sub>16</sub>·4H<sub>2</sub>O; the cation composition lowest in Ni corresponds to (Fe<sub>3.76</sub>Ni<sub>0.13</sub>Mg<sub>0.11</sub>)(Fe<sub>1.56</sub>Cr<sub>0.02</sub>). X-ray diffractometry of bulk ore samples showed the presence of talc and magnetite, plus non-overlapped peaks at 7.60 and 3.80  $\text{\AA}$  that correspond to data for reevesite. **J.L.J.**

**MONTMORILLONITE, FE-DOMINANT**

S. Petit, J. Caillaud, D. Righi, J. Madejová, F. Eläss, H.M. Köster (2002) Characterization and crystal chemistry of an Fe-rich montmorillonite from Ölberg, Germany. *Clay Minerals*, 37, 283–297.

H.M. Köster, U. Ehrlicher, H.A. Gilg, R. Jordan, E. Murad, K. Onnich (1999) Mineralogical and chemical characteristics of five nontronites and Fe-rich smectites. *Clay Minerals*, 34, 579–599.

The sample is a greenish clay in strongly altered peridotite nodules within fresh Pleistocene basalt at Ölberg, near Hundsangen, Rhineland-Palatinate, Germany. Chemical analysis of the <0.2  $\mu\text{m}$  fraction gave  $\text{Na}_2\text{O}$  2.80,  $\text{K}_2\text{O}$  0.10,  $\text{CaO}$  0.08,  $\text{MgO}$  6.15,  $\text{FeO}$  0.92,  $\text{NiO}$  0.32,  $\text{Al}_2\text{O}_3$  4.81,  $\text{Fe}_2\text{O}_3$  17.0,  $\text{TiO}_2$  0.18,  $\text{SiO}_2$  50.8, sum 83.85 wt%, corresponding to  $(\text{Na}_{0.42}\text{K}_{0.01})(\text{Fe}_{0.98}^{3+}\text{Mg}_{0.71}\text{Al}_{0.37}\text{Fe}_{0.06}^{2+}\text{Cr}_{0.03}^{3+}\text{Ni}_{0.02}^{2+})_{\Sigma 2.17}\text{O}_{10}(\text{OH})_2$ . The X-ray diffractogram corresponds to that of smectite, and the IR spectrum is similar to that of nontronite. Analytical electron microscopy of individual particles showed that two compositional populations are present (45 structural formulas are tabulated), one corresponding to  $\text{M}_{0.19}^{+}(\text{Fe}_{1.11}^{3+}\text{Mg}_{0.86}\text{Al}_{0.24})_{\Sigma 2.21}(\text{Si}_{3.99}\text{Al}_{0.01})$ , and the other to  $\text{M}_{0.28}^{+}(\text{Fe}_{1.10}^{3+}\text{Mg}_{0.74}\text{Al}_{0.34})_{\Sigma 2.18}(\text{Si}_{3.90}\text{Al}_{0.10})$ . The particles with little tetrahedral Al (the first population) form a minor part of the sample, have  $\text{Fe}^{3+}$  as the dominant octahedral cation, and are concluded to be a good representation of the  $\text{Fe}^{3+}$ -dominant analog of montmorillonite. **J.L.J.**

#### FE-DOMINANT SEPIOLITE

V.N. Chukanova, I.V. Pekov, N.V. Chukanov, A.E. Zadov (2002) Iron-rich analogue of sepiolite and the conditions of its formation in the contact aureole of the Lovozero alkaline massif. *Geochem. Internat.*, 40, 1225–1229.

The mineral occurs as flattened aggregates (2–3 mm) of cream-colored fibres at Flora Mountain in the contact aureole of the Lovozero alkaline massif, Kola Peninsula, Russia. Electron microprobe analysis (percentages not given) corresponds to  $\text{Ca}_{0.02}(\text{Fe}_{2.23}\text{Mn}_{1.06}\text{Mg}_{0.52}\text{Zn}_{0.17}\text{Ti}_{0.08})_{\Sigma 4.06}(\text{Si}_{5.94}\text{Al}_{0.06})_{\Sigma 6.00}\text{O}_{15}[(\text{OH})_{1.74}\text{O}_{0.26}]_{\Sigma 2.00}n\text{H}_2\text{O}$ . Optically biaxial positive,  $\alpha = 1.557$ ,  $\beta = 1.560$ ,  $\gamma = 1.597$ , pleochroism  $X = \text{pale brown}$ ,  $Z = \text{light brown}$ ,  $Z > X$ . Indexing of the X-ray powder pattern (diffractometer,  $\text{CuK}\alpha$  radiation, nine lines listed) gave  $a = 13.53$ ,  $b = 26.70$ ,  $c = 5.130$  Å; strongest lines are 12.19 (100,110), 3.72(30,260,051), 3.33(90,080,311), and 2.53 (80,371,470). Studies of several other specimens showed that a Mg–Fe series is present, and that the optical properties and IR spectrum change systematically with composition. The mineral occurs as a late-stage, low-temperature hydrothermal product in small cavities and interstices in an aegirine-narsarsukite-quartz assemblage with associated yofortierite, opal, and apatite.

**Discussion.** The same mineral has been reported from elsewhere, but with a less detailed description (*Am. Mineral.*, 73, p. 445, 1988). **J.L.J.**

#### NEW DATA

##### AJOITE

J.J. Pluth, J.V. Smith (2002) Arizona porphyry copper/hydrothermal deposits II: Crystal structure of ajoite,  $(\text{K} + \text{Na})_3\text{Cu}_{20}\text{Al}_3\text{Si}_{29}\text{O}_{76}(\text{OH})_{16}\sim 8\text{H}_2\text{O}$ . *Proceed. National Acad. Sci. USA*, 99, 11002–11005.

Single-crystal synchrotron X-ray structure study of a  $60 \times 15 \times 5$   $\mu\text{m}$  grain of ajoite from the type locality gave a triclinic unit cell with  $a = 13.634(5)$ ,  $b = 13.687(7)$ ,  $c = 14.522(7)$  Å,  $\alpha = 110.83(1)$ ,  $\beta = 107.21(1)$ ,  $\gamma = 105.68(1)^\circ$ ,  $R = 0.125$ . The space group was identified as  $P\bar{1}$  and the formula (*Am. Mineral.*, 66, 201–203, 1981) was slightly revised to that given in the title. Diffraction spots are streaked. The structure has Si–Al and Na–K disorder, and the predominance of the specific A<sup>+</sup> cation is uncertain. **J.L.J.**

##### TRIPUHYITE

P. Berlepsch, T. Armbruster, J. Brugger, A.J. Criddle, S. Graeser (2003) Tripuhyite,  $\text{FeSbO}_4$ , revisited. *Mineral. Mag.*, 67, 31–46.

Electron microprobe analyses of a type specimen of tripuhyite, from Tripuhy, Minas Gerais, Brazil, and of tripuhyite from Falotta, Grisons, Switzerland, gave  $\text{Sb}_2\text{O}_5$  69.3, 62.3,  $\text{Fe}_2\text{O}_3$  30.0, 34.3, sum 99.3, 99.6 wt%, respectively, corresponding to  $\text{Fe}_{0.935}\text{Sb}_{1.065}\text{O}_4$  and  $\text{Fe}_{1.055}\text{Sb}_{0.945}\text{O}_4$ , ideally  $\text{Fe}^{3+}\text{Sb}^{5+}\text{O}_4$  rather than  $\text{FeSb}_2\text{O}_6$ . Single-crystal X-ray structure study of the type material ( $R = 0.0361$ ) gave  $a = 4.625(4)$ ,  $c = 3.059(5)$  Å, tetragonal, space group  $P4_2/mnm$ ,  $Z = 1$ , rutile structure type with Fe and Sb disordered over the cationic sites. The new formula and the structure type redefining tripuhyite were approved by the CNMNM. **J.L.J.**

#### DISCREDITED MINERAL

##### Squawcreekite

P. Berlepsch, T. Armbruster, J. Brugger, A.J. Criddle, S. Graeser (2003) Tripuhyite,  $\text{FeSbO}_4$ , revisited. *Mineral. Mag.*, 67, 31–46.

Squawcreekite was described in 1991 as a new mineral with the composition  $(\text{Fe}_{0.29}^{3+}\text{Sb}_{0.29}^{5+}\text{Sn}_{0.28}\text{Ti}_{0.13}\text{Al}_{0.01})_{\Sigma 1.00}\text{O}_2$ , ideally  $\text{FeSbO}_4$ . The redefinition of tripuhyite (in preceding abstracts) as  $\text{FeSbO}_4$  and the identical properties of tripuhyite and squawcreekite indicate that the two minerals are one species. The historical priority belongs to tripuhyite, which was named in 1891, and the CNMNM has therefore approved the discreditation of squawcreekite. **J.L.J.**