

## NEW MINERAL NAMES\*

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### Arsenowaylandite

B. Scharm, M. Scharmová, M. Kundrát (1994) Crandalite group minerals in the uranium ore district of northern Bohemia (Czech Republic). *Věstník Českého geol. ústavu*, 69(1), 79–85.

Electron microprobe analysis (one of three listed, all calculated to 100 wt%), gave Bi<sub>2</sub>O<sub>3</sub> 34.59, SrO 0.83, Al<sub>2</sub>O<sub>3</sub> 22.76, Fe<sub>2</sub>O<sub>3</sub> 0.51, As<sub>2</sub>O<sub>5</sub> 31.20, P<sub>2</sub>O<sub>5</sub> 1.90, (H<sub>2</sub>O)<sub>calc</sub> 8.13, corresponding to (Bi<sub>0.987</sub><sup>3+</sup>Sr<sub>0.053</sub>)<sub>Σ1.040</sub>(Al<sub>2.967</sub>Fe<sub>0.043</sub>)<sub>Σ3.010</sub>[(AsO<sub>4</sub>)<sub>1.804</sub>(PO<sub>4</sub>)<sub>0.169</sub>]<sub>Σ1.973</sub>(OH)<sub>6</sub>, ideally BiAl<sub>3</sub>(AsO<sub>4</sub>)<sub>2</sub>(OH)<sub>6</sub>, which is the As analogue of waylandite. The mineral occurs as fine-grained polymineralic intergrowths associated with waylandite and numerous other phosphates and arsenates of the crandalite group, predominantly crandalite and goyazite, which occur as interstitial cements in uraniumiferous Cretaceous sandstones of northern Bohemia.

**Discussion.** An analysis is also given for arsenoflorentite-(Nd), which is another unapproved name (*Am. Mineral.*, 78, p. 672, 1993). An oddity is that, although the name arsenowaylandite is introduced, the authors state in two places that data are insufficient for a submission to the CNMMN (which is a prerequisite to the introduction of a new name). J.L.J.

### Barium-zinc alumopharmacosiderite

H. Sarp, P.-J. Chiappero, G. Favreau (1994) Barium-zinc pharmacosiderite from the Cap Garonne mine (Var, France). *Archs Sci. Genève*, 47, 45–50 (in French, English abs.).

The mineral occurs as colorless to yellow, euhedral, pseudocubic crystals up to 0.3 mm along an edge, associated with weilerite, mansfieldite, zeunerite, metazeunerite, cornubite, parnauite, and olivenite at the Cap Garonne mine, Var, France. Transparent, vitreous luster,  $H = 2.5$ , imperfect {100} and {001} cleavages, irregular fracture, insoluble in dilute HCl, nonfluorescent,  $D_{\text{meas}} = 2.8$ ,  $D_{\text{calc}} = 2.82$  g/cm<sup>3</sup> for  $Z = 8$ . Crystals are commonly zoned and divided into sectors; optically biaxial negative,  $\alpha = 1.560(2)$ ,  $\beta \approx \gamma = 1.572(2)$ . The mineral is unstable under an electron microprobe beam; one analysis (and

the extremes for ten analyses) gave Al<sub>2</sub>O<sub>3</sub> 26.67 (26–30.47), As<sub>2</sub>O<sub>5</sub> 41.71 (34.38–41.71), BaO 6.88 (5.73–9.87), K<sub>2</sub>O 0.86 (0.06–1.99), ZnO 2.68 (0.73–4.68), CuO 0.76 (0.33–2.03), Fe<sub>2</sub>O<sub>3</sub> 0.97 (0–6.74), H<sub>2</sub>O (by difference) 19.47 (16.7–24.2), sum 100 wt%, corresponding to (Ba<sub>0.33</sub>-K<sub>0.14</sub>)<sub>Σ0.47</sub>(Zn<sub>0.25</sub>Cu<sub>0.08</sub>)<sub>Σ0.33</sub>(Al<sub>3.91</sub>Fe<sub>0.09</sub>)(AsO<sub>4</sub>)<sub>2.71</sub>(OH)<sub>5.38</sub> · 5.41H<sub>2</sub>O, ideally (Ba,K)<sub>0.5</sub>(Zn,Cu)<sub>0.5</sub>(Al,Fe)<sub>4</sub>(AsO<sub>4</sub>)<sub>3</sub> · 5H<sub>2</sub>O. Single-crystal X-ray study indicated tetragonal symmetry, space group  $I\bar{4}2m$ ,  $a = 15.476(2)$ ,  $c = 15.675(4)$  Å by refinement from a Guinier powder pattern (CuK $\alpha_1$  radiation) with strongest lines of 7.824(100,002), 7.736(100,200), 3.916(40,004), 3.868(50,400), 3.165(50,422), and 2.754(60,404).

**Discussion.** No discussion of the nomenclature is presented, and the new name and data have not been submitted to the CNMMN for a vote. J.L.J.

### Dorallcharite\*

T. Balić Žunić, Y. Moëlo, A. Lončar, H. Micheelsen (1994) Dorallcharite, Tl<sub>0.8</sub>K<sub>0.2</sub>Fe<sub>3</sub>(SO<sub>4</sub>)<sub>2</sub>(OH)<sub>6</sub>, a new member of the jarosite-alunite family. *Eur. J. Mineral.*, 6, 255–263.

The mineral forms golden yellow, fine-grained, earthy masses, some of which are associated with colloform, brownish, compact masses of an amorphous iron manganese arsenate-sulfate. Electron microprobe analysis (mean of seven listed) gave Tl<sub>2</sub>O 24.28, K<sub>2</sub>O 1.23, Fe<sub>2</sub>O<sub>3</sub> 39.54, SO<sub>3</sub> 26.52, As<sub>2</sub>O<sub>5</sub> 1.19, (H<sub>2</sub>O)<sub>calc</sub> 7.59, sum 100.35 wt%; after deduction of As and excess Fe, the simplified formula is (Tl<sub>0.81</sub>K<sub>0.19</sub>)Fe<sub>3</sub>(SO<sub>4</sub>)<sub>2</sub>(OH)<sub>6</sub>. The earthy masses consist of pseudocubic to pseudooctahedral crystals that are probably rhombohedra, 1–8  $\mu\text{m}$  across. Yellow streak, distinct {0001} cleavage,  $D_{\text{calc}} = 3.85$  g/cm<sup>3</sup> for  $Z = 3$ . Colorless in transmitted light, brownish yellow and non-pleochroic in aggregates, uniaxial negative,  $\omega = 1.822$ ,  $\epsilon = 1.768$ . Rietveld refinement ( $R_w = 5.86\%$ ) indicated hexagonal symmetry, space group  $R\bar{3}m$ ,  $a = 7.3301(3)$ ,  $c = 17.6631(7)$  Å. Strongest lines of the powder pattern (Guinier, CuK $\alpha_1$  radiation) are 5.947(87,101), 3.666(34,110), 3.112(100,021,113,015), 2.9877(22,202), 2.5773(21,024), 1.9912(29,033,125), and 1.8329(23,220).

The mineral occurs as an oxidation product in the Allchar deposit, Republic of Macedonia. Known also as a synthetic, where K-Tl substitution is complete. The new name alludes to the type locality and the golden yellow

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

color (doré in French). Type material is in the Geological Museum of Copenhagen, Denmark. **J.L.J.**

### Karasugite\*

O.V. Petersen, A.P. Khomyakov, E.S. Leonardsen, H.I. Micheelsen, O. Johnsen (1994) Karasugite, Sr-CaAl[F<sub>5,8</sub>(OH)<sub>1,2</sub>]<sub>7</sub>, a new mineral species from the Karasug Fe-REE-barite-fluorite deposit, Tannu-Ola Range, south Siberia, Russia. *Neues Jahrb. Mineral. Mon.*, 209–216.

Electron microprobe analysis gave Na 0.43, Al 9.13, K 0.33, Ca 13.05, Sr 29.12, F 40.20, O 7.05, sum 99.31 wt%,  $H_{\text{calc}}$  0.44, corresponding to Sr<sub>1.05</sub>Ca<sub>0.92</sub>K<sub>0.02</sub>Na<sub>0.05</sub>Al<sub>0.96</sub>[F<sub>5,8</sub>(OH)<sub>1,2</sub>], ideally SrCaAl[F<sub>5,8</sub>(OH)<sub>1,2</sub>], or SrCaAlF<sub>6</sub>(OH). Occurs as colorless rosettes to 1.5 × 1.5 × 1.0 mm, consisting of bladed crystals to 0.25 × 0.10 × 0.003 mm, elongate [001]. Transparent, vitreous luster, white streak, brittle, splintery fracture, twinned (100), *H* not determinable, cleavage or parting {100}, nonluminescent,  $D_{\text{meas}}$  = 3.06–3.11,  $D_{\text{calc}}$  = 3.206 g/cm<sup>3</sup> for *Z* = 4. Optically biaxial positive,  $2V_{\alpha_{\text{meas}}}$  = 94.5,  $2V_{\alpha_{\text{calc}}}$  = 94°,  $\alpha$  = 1.4240(5),  $\beta$  = 1.4320(5),  $\gamma$  = 1.4415(5), *Y* = **b**, *X:c* ≈ 7°, no dispersion. Single-crystal X-ray study indicated monoclinic symmetry, space group *P*2<sub>1</sub>/*c*, *a* = 8.215(5), *b* = 11.989(3), *c* = 6.076(3) Å,  $\beta$  = 96.22(1)° as refined from a Gandolfi pattern (Cu radiation) with strongest lines of 6.76(70,110), 4.25(100,021), 3.64(80,121), 3.15(70,131), 3.06(80,221), 3.03(70,131,002), 2.840(70,221), and 2.125(80,151,042).

The mineral is associated with fluorite, quartz, barytocelestine (=barian celestine?), and gearsutite on limonite and hematite ore from the oxidation zone of the Karasug Fe REE barite and fluorite deposit near the village of Karasug, south Siberia, Russia. Type material is in the Geological Museum, Copenhagen, Denmark, and in the Fersman Mineralogical Museum, Moscow. **J.L.J.**

### Kieftite\*

R.T.M. Dobbe, W.J. Lustenhouwer, M.A. Zakrzewski, D. Goubitz, J. Fraanje, H. Schenk (1994) Kieftite, CoSb<sub>3</sub>, a new member of the skutterudite group from Tunaberg, Sweden. *Can. Mineral.*, 32, 179–183.

Electron microprobe analyses gave Co 12.8, Ni 0.7, Fe 0.3, Cu 0.2, Sb 85.8, Cl 0.3, sum 100.1 wt%, corresponding to (Co<sub>0.91</sub>Ni<sub>0.05</sub>Fe<sub>0.02</sub>Cu<sub>0.02</sub>)<sub>21.00</sub>(Sb<sub>2.97</sub>Cl<sub>0.03</sub>)<sub>23.00</sub>, ideally CoSb<sub>3</sub>. Opaque, metallic luster, tin white color, gray streak, brittle, conchoidal fracture. Occurs as subhedral to euhedral, equant crystals to 400 μm across, showing {100}, {110}, and {111};  $VHN_{100}$  = 464 (420–514),  $D_{\text{meas}}$  = 7.2,  $D_{\text{calc}}$  = 7.63 g/cm<sup>3</sup> for *Z* = 8. In reflected light, tin white in air and in oil, isotropic, reflectance percentages 59.0 at 470 nm, and 58.7 at 546, 589, and 650 nm. Single-crystal X-ray structure study (*R* = 0.045) indicated cubic symmetry, space group *Im*3, *a* = 9.0411(3) Å. Strongest lines of the powder pattern (114-mm Gandolfi, Co radiation) are 2.86(100,310), 2.42(60,321), 2.02(80,420), 1.77(60,510), 1.55(60,530), 1.331(70,631), 1.186(60B,730),

1.052(60,750), 0.933(80,932), and 0.913(60B,770), in good agreement with data for synthetic CoSb<sub>3</sub>.

The mineral occurs in chalcopyrite associated with bornite, galena, native bismuth, native silver, dyscrasite, gudmundite, and tetrahedrite in the Cu-Co sulfide ores of the Tunaberg skarn deposits near Nyköping, Sweden. The new name is for mineralogist Cornelis Kieft (b. 1924). Type material is in the Instituut voor Aardwetenschappen, Vrije Universiteit, Amsterdam, the Netherlands. **J.L.J.**

### Samfowlerite\*

R.C. Rouse, D.R. Peacor, P.J. Dunn, Shu-Chun Su, P.H. Chi, H. Yeates (1994) Samfowlerite, a new Ca Mn Zn beryllosilicate mineral from Franklin, New Jersey: Its characterization and crystal structure. *Can. Mineral.*, 32, 43–53.

The mineral occurs as crystals in andradite-lined vugs in franklinite and willemite ore from Franklin, Sussex County, New Jersey. Electron and ion microprobe analyses gave CaO 34.1, MgO 0.2, MnO 9.3, ZnO 9.5, BeO 5.6, SiO<sub>2</sub> 36.9, F 1.0, H<sub>2</sub>O (by difference) 3.8, O = F 0.4, sum 100 wt%, corresponding to (Ca<sub>27.8</sub>Mg<sub>0.2</sub>)<sub>230.0</sub>Mn<sub>6.0</sub>Zn<sub>3.3</sub>Be<sub>10.2</sub>Si<sub>28.09</sub>O<sub>113.0</sub>F<sub>2.4</sub>H<sub>19.3</sub>. Single-crystal X-ray structure study (*R* = 0.043) indicated that the Be value obtained by ion probe is low, and the structurally derived formula is Ca<sub>28</sub>Mn<sub>6</sub>Zn<sub>4</sub>(Zn<sub>1.5</sub>Be<sub>2.5</sub>)Be<sub>12</sub>(SiO<sub>4</sub>)<sub>12</sub>(Si<sub>2</sub>O<sub>7</sub>)<sub>8</sub>(OH)<sub>12</sub>. Occurs as colorless crystals, each about 0.05 mm across, in clusters to 0.5 mm in diameter; vitreous luster, white streak, *H* = ≤3,  $D_{\text{meas}}$  = 3.28(5),  $D_{\text{calc}}$  = 3.29–3.31 g/cm<sup>3</sup> for *Z* = 2, weak red fluorescence in long-wave and short-wave ultraviolet radiation. Optically biaxial negative,  $\alpha$  = 1.674(3),  $\beta$  = 1.680(3),  $\gamma$  = 1.681(3),  $2V$  = 29.0(1)°, dispersion not observed, *Y* = **b**, *X* ∧ *a* = 44°, *Z* ∧ *c* = 29°. Monoclinic symmetry, space group *P*2<sub>1</sub>/*c*, *a* = 9.068(2), *b* = 17.992(2), *c* = 14.586(2) Å,  $\beta$  = 104.86(1)°. Strongest lines of the powder pattern (114-mm Gandolfi, Cu radiation) are 2.863(100,321,053), 2.771(40,125), 2.653(50,251), 2.388(50,334,172), 2.272(30,172,234,402,155), and 1.832(30,374).

The mineral is associated predominantly with garnet, willemite, barite, clinocllore, and leucophoenicite. The name is for Samuel Fowler (1799–1844), in recognition of his promotion of scientific study of the Franklin deposits. Type material is in the Smithsonian Institution, Washington, DC. **J.L.J.**

### Tangeite\*

R. Basso, L. Zefiro (1994) Mineral nomenclature: Status of calciovollborthite and tangeite. *Neues Jahrb. Mineral. Mon.*, 205–208.

The name tangeite was introduced by Fersman in 1925 for a mineral of composition CaCu(OH)VO<sub>4</sub>, from Tyuya Muyun, Ferghana, Turkestan. The mineral is a well-defined member of the adelite group and has been found in

numerous specimens from the type Ferghana locality. The ideal formula for tangeite requires CuO 33.77, CaO 23.80, V<sub>2</sub>O<sub>5</sub> 38.60, H<sub>2</sub>O 3.83 wt%.

Tangeite has generally been regarded as synonymous with calciovolborthite, but the original analysis of calciovolborthite in 1848 gave CuO 44.15, CaO 12.28, V<sub>2</sub>O<sub>5</sub> 36.58, H<sub>2</sub>O 4.62 wt% (plus 1% others). The type locality is Friedrichsroda, Thuringia, but to date all specimens of so-called calciovolborthite from this locality have been found to be vésignieite, BaCu<sub>3</sub>(VO<sub>4</sub>)<sub>2</sub>(OH)<sub>2</sub>. The CNMMN has accepted the proposal that tangeite has the composition CaCu(OH)VO<sub>4</sub> and is distinct from the originally described calciovolborthite from Thuringia. The status of calciovolborthite requires clarification by examination of type material from Thuringia. J.L.J.

#### Yanomamite\*

N.F. Botelho, G. Roger, F. d'Yvoire, Y. Moëlo, M. Volfinger (1994) Yanomamite, InAsO<sub>4</sub>·2H<sub>2</sub>O, a new indium mineral from topaz-bearing griesen in the Goiás Tin Province, Brazil. *Eur. J. Mineral.*, 6, 245–254.

Electron microprobe analysis gave In<sub>2</sub>O<sub>3</sub> 45.80, Fe<sub>2</sub>O<sub>3</sub> 1.11, Al<sub>2</sub>O<sub>3</sub> 0.21, As<sub>2</sub>O<sub>5</sub> 40.10, H<sub>2</sub>O (by difference) 12.78, sum 100 wt%, corresponding to (In<sub>0.94</sub>Fe<sub>0.04</sub>Al<sub>0.01</sub>)AsO<sub>4</sub>·2.02H<sub>2</sub>O. Occurs as pale green to yellow-green, euhedral, dipyrnidal crystals to 0.2 mm, always coated by a film of scorodite; intimately intergrown with scorodite in aggregates to 1 cm. Vitreous luster, white streak, *VHN*<sub>25</sub> = 631 (571–743), soluble in strong HCl or H<sub>2</sub>SO<sub>4</sub>, *D*<sub>calc</sub> = 3.876(3) g/cm<sup>3</sup> for *Z* = 8. Colorless in transmitted light, biaxial positive, 2*V* = 55–76°, average *n* = 1.65, orientation *X* = **a**, *Y* = **c**, *Z* = **b**. Single-crystal X-ray study indicated orthorhombic symmetry, space group *Pbca*, *a* = 10.446(6), *b* = 9.085(4), *c* = 10.345(6) Å as refined from the powder pattern; strongest lines (CoKα<sub>1</sub> radiation) are 5.70(70,111), 4.53(100,020,210), 4.163(50,021), 3.874(60,121), 3.250(60,122), and 3.110(50,311), in good agreement with data for synthetic InAsO<sub>4</sub>·2H<sub>2</sub>O.

The mineral occurs in quartz + topaz griesen veins associated with topaz-, albite-, and lithian mica-bearing granite in the Mangabeiro tin deposit, Goiás State, Brazil. The deposit contains several In-bearing minerals, including sphalerite with up to 11 wt% In. The maximum In content found in scorodite overgrowths is 6 wt% In<sub>2</sub>O<sub>3</sub>, corresponding to Fe<sub>0.90</sub>In<sub>0.10</sub>; maximum Fe substitution in yanomamite is In<sub>0.85</sub>Fe<sub>0.15</sub>, suggesting a possible miscibility gap. The origin of yanomamite is thought to be related to a hydrothermal event rather than later oxidation. The new name relates to the Yanomami Indians of the Amazon. Type material is in the museum of the Ecole Nationale Supérieure des Mines de Paris, France, and in the Mineralogical Collection of the Instituto de Geociências, Universidade de Brasília, Brazil. J.L.J.

#### Bi<sub>4</sub>Se<sub>3</sub>

A. Piestrzyński (1992) Bi<sub>4</sub>Se<sub>3</sub>, a new unnamed mineral from the Kupferschiefer, Polish Lowland: Preliminary report. *Mineral. Polonica*, 23(2), 35–42.

Electron microprobe analysis (one of ten similar analyses listed) gave Bi 74.16, Cu 3.19, Ag 0.12, Se 22.44, S < 0.05, sum 99.91 wt%, corresponding to (Bi<sub>3.495</sub>Cu<sub>0.494</sub>Ag<sub>0.011</sub>)<sub>24.000</sub>Se<sub>2.799</sub>. Cu ranges from 1.42–3.86 wt% and is stated as “probably a physical admixture.” The mineral occurs as isolated, irregular grains or plates to 100 μm and as intergrowths with clausthalite, covellite, and Se-bearing chalcocite. In reflected light, creamy white with a distinct yellow tint, weak birefractance, distinct to strong anisotropism with polarization effects from dark brown to dark, reflectance estimated at 53–55%.

**Discussion.** Cu is present in all ten analyses and is incorporated in all the author's calculations to arrive at the ideal formula Bi<sub>4</sub>Se<sub>3</sub>. Laitakarite Bi<sub>4</sub>(Se,S)<sub>3</sub> is stated to be a S-rich variety of the new phase; if so, the purported new phase may be a cuprian S-poor laitakarite. X-ray study is needed. J.L.J.

#### CuFe<sub>3</sub>S<sub>4</sub>

M. Wintenberger, G. André, C. Garcin, P. Imbert, G. Jéhanno, Y. Fouquet, A. Wafik (1994) Intermediate valency, Verwey transition and magnetic structures of a new mineral, Cu<sub>1-x</sub>Fe<sub>3+x</sub>S<sub>4</sub>, resulting from the ageing of isocubanite. *J. Magnetism Magnetic Materials*, 132, 31–45.

A sample of isocubanite (CuFe<sub>2</sub>S<sub>3</sub>) from the Mid-Atlantic Ridge at 23°N transformed after a few months to a mixture of similar amounts of chalcopyrite and a phase of composition close to CuFe<sub>3</sub>S<sub>4</sub>. The mixture is an orthogonal network of alternate lamellae, each about 0.5 μm wide. The CuFe<sub>3</sub>S<sub>4</sub>-like phase is deduced to be pseudocubic with a tetragonal superstructure, probable space group *I*4̄2*m*, *a* = 5.326, *c* = 10.564 Å. J.L.J.

#### AgFeS<sub>2</sub>, Ag<sub>9</sub>(Sb,As)Te<sub>2</sub>S<sub>4</sub>, Au-Pb-Te-Sb-S mineral

Xiaomao Zhang, P.G. Spry (1994) Petrological, mineralogical, fluid inclusion, and stable isotope studies of the Gies gold-silver telluride deposit, Judith Mountains, Montana. *Econ. Geol.*, 89, 602–627.

Electron microprobe analysis (one of two listed) gave Ag 47.47, Fe 25.33, S 26.95, sum 99.75 wt%, corresponding to Ag<sub>1.05</sub>Fe<sub>1.08</sub>S<sub>2.00</sub>. The mineral occurs as inclusions, < 20 μm, in hessite and pyrite in a veinlet 50 μm wide. Yellow color, moderate reflectance, isotropic or weakly anisotropic.

Microprobe analysis (one of two listed) of a second unidentified mineral gave Cu 1.94, Ag 62.65, Sb 6.66, As 0.87, Te 19.55, S 8.44, sum 99.78 wt%, corresponding to Ag<sub>8.76</sub>Cu<sub>0.46</sub>Sb<sub>0.82</sub>As<sub>0.18</sub>Te<sub>2.31</sub>S<sub>3.91</sub>, approximating (Ag, Cu)<sub>9</sub>(Sb,As)(S,Te)<sub>6</sub>; in the other analysis the ratio of Sb to As = 0.51:0.49. Occurs as anhedral grains, 5–10 μm in length, coexisting with hessite and tetrahedrite. Reflectance ~20–25%, gray with a brownish tint, isotropic to weakly anisotropic.

Two analyses of a mineral referred to as nagyagite gave Au 7.46, 5.53, Pb 57.13, 68.55, Te 17.30, 12.89, Sb 8.02, 1.42, S 10.39, 10.43, sum 100.29, 98.82 wt%; for S + Te

= 11, these respectively correspond to  $\text{Au}_{0.91}\text{Pb}_{6.60}\text{-Sb}_{1.58}\text{Te}_{3.24}\text{S}_{7.76}$  and  $\text{Au}_{0.72}\text{Pb}_{8.55}\text{Sb}_{0.29}\text{Te}_{2.61}\text{S}_{8.39}$ . Occurs with sylvite, altaite, and galena.

**Discussion.** See the abstract for nagyagite in *New Data*, in which it is proposed that the ideal formula for nagyagite is  $\text{Pb}_5\text{Au}(\text{Sb,Bi})\text{Te}_2\text{S}_6$ . For  $\text{Te} + \text{S} = 8$ , the above analyses correspond to  $\text{Pb}_{4.80}\text{Au}_{0.66}\text{Sb}_{1.15}\text{Te}_{2.36}\text{S}_{5.64}$  and  $\text{Pb}_{6.22}\text{-Au}_{0.52}\text{Sb}_{0.21}\text{Te}_{1.90}\text{S}_{6.10}$ . For the unnamed phases, a mineral with the composition  $\text{AgFeS}_2$  has been reported to occur in Cumbria, England, but the color is gray-buff (*Am. Mineral.*, 73, p. 1497, 1988). A mineral with the composition  $\text{Ag}_9(\text{Sb,As})\text{Te}_2\text{S}_4$  also occurs in the Långdal deposit, Boliden, Sweden (*Am. Mineral.*, 76, p. 670, 1991). J.L.J.

### CoAl<sub>2</sub>O<sub>4</sub>

Jingfeng Guo, W.L. Griffin, S.Y. O'Reilly (1994) A cobalt-rich spinel inclusion in a sapphire from Bo Ploi, Thailand. *Mineral. Mag.*, 58, 247–258.

A composite inclusion in a greenish blue sapphire consists of glass and a deep blue, transparent, isotropic Co- and Al-rich phase up to  $150 \times 250 \mu\text{m}$ ; as well, small euhedra of the Co-Al phase occur in glass at the periphery of the inclusion. Electron microprobe analysis (one of 16 listed, all with  $\text{CoO} > 19 \text{ wt}\%$ ) gave  $\text{TiO}_2$  0.67,  $\text{Al}_2\text{O}_3$  49.61,  $\text{Cr}_2\text{O}_3$  11.57,  $\text{FeO}$  9.55,  $\text{MgO}$  6.04,  $\text{CoO}$  22.38, sum 99.82 wt%, corresponding to  $(\text{Co}_{0.523}\text{Mg}_{0.262}\text{-Fe}_{0.233})_{\Sigma 1.018}(\text{Al}_{1.703}\text{Cr}_{0.266}\text{Ti}_{0.015})_{\Sigma 1.984}\text{O}_4$ , ideally  $(\text{Co, Mg, Fe})(\text{Al, Cr})_2\text{O}_4$ , which is the Al analogue of cochromite. The sapphire is from the Bo Ploi, alluvial-eluvial deposits, which are about 130 km west of Bangkok, and which are Thailand's major producer of sapphires. The source rock is Cenozoic nepheline hawaiiite. J.L.J.

### Ce<sub>4</sub>O<sub>5</sub>F<sub>2</sub>, (Ce,La)OF

Z. Johan, V. Johan (1994) REE oxyfluorides from the Cinovec granitic cupola, Czech Republic. *C. Rendu Acad. Sci. Paris, Ser. II*, 318, 1333–1340 (in French, extended English abs.).

The minerals occur as intimately intergrown aggregates interstitial to quartz and zinnwaldite in drill core from the Cinovec (Zinnwald) granite cupola. Aggregates are up to  $200 \mu\text{m}$ . The three minerals composing the aggregates are  $(\text{La,Ce})\text{F}_{2.72}\text{O}_{0.13}$ , whose hexagonal cell parameters of  $a = 7.134$  and  $c = 7.365 \text{ \AA}$  approximate those of fluorite, and the following two phases.

### Ce<sub>4</sub>O<sub>5</sub>F<sub>2</sub>

Electron microprobe analysis (four analyses listed) gave  $\text{ThO}_2$  3.91,  $\text{La}_2\text{O}_3$  3.66,  $\text{Ce}_2\text{O}_3$  75.93,  $\text{Pr}_2\text{O}_3$  1.56,  $\text{Nd}_2\text{O}_3$  6.55,  $\text{Sm}_2\text{O}_3$  2.13,  $\text{Dy}_2\text{O}_3$  0.10,  $\text{Y}_2\text{O}_3$  0.49,  $\text{CaO}$  2.02,  $\text{F}$  6.22,  $\text{O} \equiv \text{F}$  2.62, sum 99.95 wt%, corresponding to  $(\text{Ce}_{0.769}\text{-Nd}_{0.065}\text{Ca}_{0.060}\text{La}_{0.037}\text{Th}_{0.025}\text{Sm}_{0.020}\text{Pr}_{0.016}\text{Y}_{0.007}\text{Dy}_{0.001})\text{O}_{1.210}\text{-F}_{0.544}$  for  $\Sigma_{\text{cations}} = 1$ , ideally  $\text{Ce}_4\text{O}_5\text{F}_2$ . In the composite X-ray pattern of the aggregates (23 lines listed), lines at 3.160(100), 2.739(40), 1.934(50), and 1.649(40) and four weaker ones are assigned to a fluorite-type cubic cell with

$a = 5.470(8) \text{ \AA}$ ; the possibility of a hexagonal or tetragonal superstructure is not excluded.

### (Ce,La)OF

Electron microprobe analysis (two analyses listed) gave  $\text{ThO}_2$  4.20,  $\text{La}_2\text{O}_3$  15.70,  $\text{Ce}_2\text{O}_3$  58.28,  $\text{Pr}_2\text{O}_3$  3.01,  $\text{Nd}_2\text{O}_3$  8.38,  $\text{Sm}_2\text{O}_3$  2.10,  $\text{Dy}_2\text{O}_3$  0.11,  $\text{Y}_2\text{O}_3$  0.26,  $\text{CaO}$  2.03,  $\text{F}$  11.24,  $\text{O} \equiv \text{F}$  4.73, sum 100.61 wt%, corresponding to  $(\text{Ce}_{0.605}\text{La}_{0.164}\text{Nd}_{0.085}\text{Ca}_{0.062}\text{Pr}_{0.031}\text{Th}_{0.027}\text{Sm}_{0.021}\text{Y}_{0.004}\text{-Dy}_{0.001})\text{O}_{0.978}\text{F}_{1.008}$ , ideally  $(\text{Ce,La})\text{OF}$ . Eighteen lines of the composite X-ray pattern are assigned to this phase, which is indexed with a bastnäsite-type hexagonal cell,  $a = 7.007(10)$ ,  $c = 9.840(15) \text{ \AA}$ ,  $D_{\text{calc}} = 6.25 \text{ g/cm}^3$ ,  $Z = 9$ . J.L.J.

### Na-Mg-Ca borate-carbonate

L.F. Aristarain (1992) A new hydrated borate-carbonate from Tincalayu, Salta, Argentina. *Revista del Museo de La Plata*, 11(103), 57–64 (in Spanish, English abs.).

The mineral occurs as disseminated crystal inclusions, to  $10 \times 30 \times 100 \mu\text{m}$ , in borax and kernite at the Tincalayu borax mine, Salta, Argentina. Crystals are euhedral tabular, flattened {010} and bounded by {101} and minor {100}; elongate [101], to equant tabular. Colorless, transparent, vitreous luster,  $H = 3$ , perfect {010} and good {101} cleavages,  $D_{\text{meas}} = 2.15 \text{ g/cm}^3$ ; soluble with effervescence in 1:1 HCl and gives a strong reaction for B. Optically biaxial positive,  $\alpha = 1.503(1)$ ,  $\beta = 1.523(1)$ ,  $\gamma = 1.559(1)$ ,  $2V = 75^\circ$ , dispersion  $r < v$ ; orientation  $Z = \mathbf{a}$ ,  $X = \mathbf{b}$ ,  $Y = \mathbf{c}$ . Single-crystal X-ray study indicated orthorhombic symmetry, possible space group *Pccm*,  $a = 9.85(2)$ ,  $b = 13.54(2)$ ,  $c = 8.01(2) \text{ \AA}$ . Strongest lines of the powder pattern (114-mm Debye-Scherrer, Cu radiation) are 7.94(100,110), 3.95(60,031), 3.83(50,012), 3.54(80,221,343), 3.32(80,230), 2.10(60,402,043), 2.04(50,313,342), 1.92(50,024), and 1.85(50,204). The mineral is thought to be a hydrated borate-carbonate of Na or Na-Mg-Ca. J.L.J.

### Ni carbonates

E.H. Nickel, J.F.M. Clout, B.J. Gartrell (1994) Secondary nickel minerals from Widgiemooltha, Western Australia. *Mineral. Record*, 25, 283–291.

Among the secondary Ni minerals formed by oxidation of a komatiite-hosted nickel sulfide deposit near Widgiemooltha are two unnamed Ni carbonates. Electron microprobe and CHN analyses of one mineral gave NiO 45.1, MgO 1.3,  $\text{CO}_2$  34.1,  $\text{H}_2\text{O}$  21.5, sum 102.0 wt%, possibly corresponding to  $(\text{Ni,Mg})_5(\text{HCO}_3)_2(\text{CO}_3)_4 \cdot 8.4\text{H}_2\text{O}$  for  $(\text{Ni,Mg}) = 5$ . Occurs as bluish green cross-fiber veinlets,  $D_{\text{meas}} = \text{variable to } 3.24 \text{ g/cm}^3$ ; optically length slow,  $n = 1.66$  parallel to fiber length and 1.65 normal to it. The X-ray powder pattern is similar to that of widgiemoolthalite, but the composition differs.

Electron microprobe and CHN analyses of vitreous, emerald green coatings gave NiO 60.2, MgO 0.4, CaO

0.7, CO<sub>2</sub> 27.3, SO<sub>3</sub> 1.2, H<sub>2</sub>O 12.0, sum 101.8 wt%, possibly corresponding to Ni<sub>4</sub>(CO<sub>3</sub>)<sub>3</sub>(OH)<sub>2</sub>·2.5H<sub>2</sub>O. Optical isotropic,  $n = 1.61$ . The X-ray pattern has only a few diffuse lines: 5.95(100), 3.33(50), 2.58(10), 2.42(10), 2.25(20), 2.10(30), and 1.97(10) Å. **J.L.J.**

### New Data

#### Kulanite

M. Cooper, F.C. Hawthorne (1994) Refinement of the crystal structure of kulanite. *Can. Mineral.*, 32, 15–19.

Single-crystal X-ray structure study ( $R = 0.021$ ) of kulanite showed it to be monoclinic, space group  $P2_1/m$ ,  $a = 9.014(1)$ ,  $b = 12.074(1)$ ,  $c = 4.926(1)$  Å,  $\beta = 100.48(1)^\circ$ ,  $Z = 2$ . The symmetry is new (see also *Am. Mineral.*, 75, p. 245, 1990). **J.L.J.**

#### Kuznetsovite

L.P. Solovyeva, S.V. Tsybulya, V.A. Zabolotny, N.A. Palchik (1990) Determination and profile refinement of the crystal structure of kuznetsovite, Hg<sub>3</sub>Cl[AsO<sub>4</sub>] from powder X-ray diffraction data. *Proceedings 14th Conf. Applied Crystallogr.*, 1, 167–172.

Kuznetsovite is cubic,  $a = 8.4013(2)$  Å, space group  $P2_13$ . The formula is revised from Hg<sub>6</sub>As<sub>2</sub>Cl<sub>2</sub>O<sub>9</sub> to Hg<sub>3</sub>Cl(AsO<sub>4</sub>).

**Discussion.** With the new formula,  $Z$  is doubled to 4;  $D_{\text{calc}} = 8.691$  g/cm<sup>3</sup>, in good agreement with  $D_{\text{meas}} = 8.64$ – $8.82$  (*Am. Mineral.*, 66, p. 110, 1981). **J.L.J.**

#### Mackinawite, smythite

R.E. Krupp (1994) Phase relations and phase transformations between the low-temperature iron sulfides mackinawite, greigite, and smythite. *Eur. J. Mineral.*, 6, 265–278.

Sixteen electron microprobe analyses of smythite and ten analyses of mackinawite from the Moschellandsberg mercury deposit, southwestern Germany, gave Ni + Cu + Co + Cr contents from <1.5 wt% to less than the limits of detection; the results confirm that incorporation of Ni in these minerals is not essential and that their formulas can be written as Fe<sub>9</sub>S<sub>8</sub> or FeS<sub>1-x</sub> for mackinawite and Fe<sub>13</sub>S<sub>16</sub> for smythite. **J.L.J.**

#### Nagyagite

Z. Johan, I. Dódoný, P. Morávek, J. Pašava (1994) Buckhornite, Pb<sub>2</sub>AuBiTe<sub>2</sub>S<sub>3</sub>, from the Jílové gold deposit, Czech Republic. *C. Rendu Acad. Sci. Paris, Ser. II*, 318, 1225–1231 (in French, extended English abs.).

Nagyagite occurs as lamellar subhedral crystals in intimate intergrowth with buckhornite in a quartz gangue containing pyrite, tellurobismuthite, altaite, galena, calaverite, and native gold at the Bohuliby mine, Jílové gold district, Czech Republic. Reflected-light optical properties of nagyagite and buckhornite are similar, and the two are not mutually distinguishable in polished section. Electron microprobe analyses of nagyagite (mean of 14) gave Pb 56.58, Au 10.41, Bi 2.87, Sb 5.66, Te 14.27, S 10.27, sum 100.06 wt%, corresponding to Pb<sub>3.055</sub>Au<sub>0.978</sub>(Sb<sub>0.861</sub>Bi<sub>0.254</sub>)<sub>21.115</sub>Te<sub>2.070</sub>S<sub>5.930</sub>, ideally Pb<sub>5</sub>Au(Sb,Bi)Te<sub>2</sub>S<sub>6</sub>. The formula is new, and it is suggested that Te and S occupy distinct structural sites. **J.L.J.**

#### Parisite-(Ce)-42R, 48R, 16H

Guangming Yang, Xiuling Wu, Zhaolu Pan (1993) A TEM study of new polytypes 42R, 48R and 16H existing in parisite. *Acta Mineralogica Sinica*, 13(4), 331–334 (in Chinese, English abs).

TEM and lattice-image studies of a crystal of parisite-(Ce) from the M rare-earth deposit at Changbei, southwestern Sichuan Province, China, revealed the presence of the 6R polytype and the new polytypes 42R ( $c = 59.346$  Å), 48R ( $c = 67.824$ ), and 16H ( $c = 22.608$ ). **J.L.J.**

#### Discredited Mineral

##### Staringite\*

L.A. Groat, A. Putnis, S.A. Kissin, T.S. Ercit, F.C. Hawthorne, R.V. Gaines (1994) Staringite discredited. *Mineral. Mag.*, 58, 271–277.

Staringite, reported previously from several localities and thought to be (Fe<sup>2+</sup>, Mn<sup>2+</sup>)<sub>x</sub>(Ta, Nb)<sub>2x</sub>Sn<sub>6-3x</sub>O<sub>12</sub>, is shown to consist of a submicroscopic intergrowth of casiterite and tapiolite. **J.L.J.**