

## NEW MINERAL NAMES\*

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### Bayankhanite

V.I. Vasil'ev (1984) New mercury minerals and mercury-containing deposits and their parageneses. Trudy Inst. Geol. Geofiz., Siber. Otdel. Akad. Nauk SSSR, no. 587, 5–21 (in Russian).

Microprobe analyses (3 grains) gave Cu 43.0–59.0, Hg 20.9–40.9, S 17.0–18.7. HNO<sub>3</sub> induces pale-olive tint on surfaces perpendicular to longer axis, no reaction with NHO<sub>3</sub> on surfaces parallel to it. No reaction with HCl and KOH.

X-ray powder study of impure material yields 17 lines; the strongest are 4.64(3), 2.74(4), 2.65(5), 1.983(3), 1.685(3).

In reflected light white, strongly anisotropic with effects from pale brown to bluish gray, strong bireflectance with slight creamy-pink tint ( $R_2$ ). No internal reflections. Some grains are tabularly twinned.

The mineral forms single, cataclased and corroded irregular or elongated grains or their intergrowths with cinnabar, chalcocite, and digenite. Transversal sections are hexagonal. Black. Streak black. Luster metallic. Brittle, easily polishes. Hardness (Mohs) 3–3.5.

The mineral occurs in fluorite deposits at Idermeg-Bayan-Khan-Ula (Mongolia).

The name is for the locality.

**Discussion.** This may be two or three phases of composition close to Cu<sub>8</sub>HgS<sub>5</sub>, Cu<sub>6</sub>HgS<sub>4</sub>, or Cu<sub>10</sub>Hg<sub>3</sub>S<sub>8</sub>, as indicated by the author. Complete X-ray data needed. **J.P.**

### Braunite II

C. Baudracco-Gritti (1985) Substitution du manganèse bivalent par du calcium dans les minéraux du groupe: braunite, neltnerite, braunite II. Bulletin de Minéralogie, 108, 437–445 (in French).

About 40 electron-microprobe analyses on material from a new locality (Tachgagalt, Anti-Atlas, Morocco) confirm the composition of braunite II, previously only known from the Kalahari (South Africa).

The ideal formula is Ca(Mn<sup>2+</sup>, Fe<sup>3+</sup>)<sub>14</sub>SiO<sub>24</sub>; the Fe-free phase contains 4.6 wt% CaO and 4.9 wt% SiO<sub>2</sub>. The results of the new analyses show a range of 4.6 to 6.1 wt% CaO and 4.8 to 7.6 wt% SiO<sub>2</sub>. These deviations from the ideal composition are tentatively explained by the possible existence of a solid-solution series between braunite II and neltnerite (ideally CaMn<sub>12</sub><sup>2+</sup>SiO<sub>12</sub>, with 9.5 wt% CaO and 10.2 wt% SiO<sub>2</sub>). This series, however, cannot be complete because of the stable coexistence of the two minerals at Tachgagalt. Other associated minerals include marokite, hausmannite, crednerite, henritermierite, gaudefroyite, and calcite.

Under the microscope, in reflected light, braunite II has a

somewhat higher reflectance than neltnerite, and a slightly more yellowish color compared to the bluish color of neltnerite.

**Discussion.** The name braunite II was first used (without approval of the IMA-CNMMN) by DeVilliers and Herbstein [(1967), Am. Mineral., 52, 20–40] for material previously described by De Villiers [(1946), Geol. Soc. S. Afr. Trans., 48, 17–25] as *ferrian braunite*. This phase (from several mines in the Kalahari manganese field, South Africa) differed chemically from braunite (Mn<sup>2+</sup>Mn<sup>3+</sup>SiO<sub>12</sub>) by its lower Si content (4.4 wt% SiO<sub>2</sub>) and by the presence of 4.3 wt% CaO. Crystallographically, both braunite and braunite II have the same space group  $I4_1/acd$ , but braunite II has a *c* cell parameter twice that of braunite. The refinement of the crystal structures of braunite and braunite II by De Villiers [(1975), Am. Mineral., 60, 1098–1104], Moore and Araki [(1976), Am. Mineral., 61, 1226–1240] and De Villiers [(1980), Am. Mineral., 65, 756–765] and the description of neltnerite by Baudracco-Gritti et al. [(1982), Bull. Minéral., 105, 161–165] have shown that the structures of minerals and/or phases of the braunite group consist of different stacking sequences of three different layers: A = (Mn<sup>2+</sup>, Fe<sup>3+</sup>)<sub>8</sub>O<sub>12</sub>, B = Mn<sub>2</sub><sup>2+</sup>Mn<sub>4</sub><sup>3+</sup>Si<sub>2</sub>O<sub>12</sub> and B' = Ca<sub>2</sub>Mn<sub>4</sub><sup>3+</sup>Si<sub>2</sub>O<sub>12</sub>. Neltnerite is (A + B') and has the formula Ca<sub>2</sub>Mn<sub>12</sub><sup>2+</sup>Si<sub>24</sub>O<sub>24</sub>, and braunite II is (3A + B'), which is CaMn<sub>14</sub><sup>2+</sup>SiO<sub>24</sub> (hence the doubling of the *c* parameter). Both minerals have the same space group  $I4_1/acd$ . According to the Report of the IMA-IUCr Joint Committee on Nomenclature [Bailey (1977) Am. Mineral., 62, 411–415], neltnerite and braunite II have to be regarded as polytypoids, the differences of Ca, Si, and Mn exceeding 0.25 atom per formula unit. The description of a new locality of braunite II could serve as an occasion for the IMA-CNMMN to settle the nomenclature of this phase. **E.A.J.B.**

### Canaphite\*

D.R. Peacor, P.J. Dunn, W.B. Simmons, F.J. Wicks (1985) Canaphite, a new sodium calcium phosphate hydrate from the Paterson area, New Jersey. Mineralogical Record, 16, 467–468.

Microprobe and DTA-TG analysis gave Na<sub>2</sub>O 16.5, MgO 0.2, CaO 17.5, P<sub>2</sub>O<sub>5</sub> 43.4, H<sub>2</sub>O 21.8, sum 99.4%, corresponding to Ca<sub>2.05</sub>Na<sub>3.49</sub>Mg<sub>0.03</sub>H<sub>4.39</sub>(PO<sub>4</sub>)<sub>4.01</sub>·5.73H<sub>2</sub>O, or, ideally CaNa<sub>2</sub>H<sub>2</sub>(PO<sub>4</sub>)<sub>2</sub>·3H<sub>2</sub>O with Z = 2.

X-ray studies show the mineral is monoclinic, space group *Pa*, cell dimensions *a* = 10.529 (5), *b* = 8.48 (1), *c* = 5.673 (4) Å, β = 106.13 (6)°. The strongest lines (47 given) are: 8.47(80)(010), 5.44(80)(001), 4.36(70)(210, 20 $\bar{1}$ ), 3.06(100)(31 $\bar{1}$ , 211), 2.608(90)(32 $\bar{1}$ ).

Canaphite occurs as colorless, transparent, prismatic, vitreous crystals, elongate on {001}, tabular on {010}, and composed of the forms {010}, {001}, and {100}. The streak is white, and the cleavages are {010} perfect, {100} poor, {010} poor.  $D_{\text{meas}} = 2.24$ ,  $D_{\text{calc}} = 2.27$ . H = 2. Nonfluorescent. Optically biaxial negative, α = 1.496(2), β = 1.504(2), γ = 1.506(4),  $2V_{\text{meas}} = 52(5)^\circ$ ,  $2V_{\text{calc}} =$

\* Minerals marked with asterisks were approved before publication by the Commission on New Minerals and Mineral Names of the International Mineralogical Association.

52.9°. No observable pleochroism or dispersion. Orientation  $Z = b$ ,  $X \wedge c = 25^\circ$ .

The mineral occurs as clusters of colorless crystals coating stilbite, purportedly from Haledon, New Jersey. The exact locality is unknown.

The name is in allusion to the chemical composition, calcium (Ca), sodium (Na), phosphate (P), and hydrogen (H). Type material is in the Smithsonian Institution, Washington (no. 160286). **A.C.R.**

#### Cherepanovite\*

N.S. Rudashevsky, A.G. Motshalov, N.V. Trubkin, N.M. Shumskaya, V.I. Shkursky, T.L. Evstigneeva (1985) Cherepanovite RhAs—A new mineral. *Zapiski Vses. Mineralog. Obsch.*, 114, 464–469 (in Russian).

Microprobe analyses (16) gave Rh 54.6–57.9, Ru 0.82–2.14, Pt 0.08–0.94, Ir 0.00–0.17, Ni 0.09–0.34, As 40.6–43.0, average corresponding to RhAs.

X-ray and electron-diffraction studies show the mineral to be orthorhombic,  $a = 5.70 \pm 0.02$ ,  $b = 3.59 \pm 0.01$ ,  $c = 6.00 \pm 0.01$  Å,  $D_{\text{calc}} = 9.72$ . Unit-cell parameters are almost identical to those of synthetic RhAs (space group  $Pnma$ ,  $Z = 4$ ). The strongest X-ray lines of the mineral (25 given) are 3.01(10)(002), 2.10(6)(211), 1.771(2)(212), 1.501(2)(004), 1.354(2)(222)—the last four broadened.

Brittle. Black when powdered. Coarse cleavage in one direction. In reflected light, well-pronounced orange tint. Anisotropic, green to dirty-brown anisotropic effects similar to those of marcasite. No pleochroism, bireflectance almost not visible. Distinct hardness anisotropy,  $H = 726\text{--}754$  kg/mm<sup>2</sup> (50-g load). Reflectance measurements (nm,  $R$ , %,  $R_2$ , %): 420, 40.5, 39.2; 440, 41.0, 39.6; 460, 41.9, 40.3; 480, 42.9, 41.0; 500, 43.8, 41.9; 520, 44.7, 42.7; 540, 45.5, 43.6; 560, 46.1, 44.1; 580, 46.6, 44.5; 600, 47.1, 44.9; 620, 47.3, 45.1; 640, 47.4, 45.2; 660, 47.6, 45.3; 680, 47.6, 45.5; 700, 47.6, 45.4; 720, 47.3, 45.2; 740, 46.8, 45.1.

Cherepanovite is associated with intergrown (Pt,Ru,Ir,Os) solid solutions, rutheniridoosmine, laurite, irarsite, cooperite, and unnamed RhNiAs. The mineral occurs as individual grains (up to 20 μm) or their aggregates (up to 100 μm) included in ferromagnetite or among aggregates of cooperite, in alluvial deposits derived from ultrabasic rocks of ophiolitic zone of the Koriaksho-Kamchatskaya fold zone (Pacific coast of USSR).

The name is for Russian mineralogist V. I. Cherepanov.

Type material is at the Mining Museum of the Leningrad Mining Institute (Leningrad, USSR). **J.P.**

#### Ehrleite\*

G.W. Robinson, J.D. Grice, J. van Velthuisen (1985) Ehrleite, a new calcium beryllium zinc phosphate hydrate from the Tip Top pegmatite, Custer, South Dakota. *Can. Mineral.* 23, 507–510.

Electron-microprobe analysis (e.s.d.'s in brackets) gave CaO 20.9(2), ZnO 14.8(7), P<sub>2</sub>O<sub>5</sub> 40.5(0), ion-microprobe analysis gave BeO 7.9(9) and H<sub>2</sub>O (calc. by difference) was 15.9, total 100.0%, corresponding to Ca<sub>3.92</sub>Be<sub>3.32</sub>Zn<sub>1.91</sub>P<sub>6.00</sub>O<sub>24.15</sub>·9.28H<sub>2</sub>O (based on P = 6) or, ideally Ca<sub>4</sub>Be<sub>3</sub>Zn<sub>2</sub>(PO<sub>4</sub>)<sub>6</sub>·9H<sub>2</sub>O.

X-ray study by precession methods shows that the mineral is triclinic, twinned by reflection on {001}, space group choices  $P1$  or  $P\bar{1}$ , has refined unit-cell parameters  $a = 7.32(7)$ ,  $b = 7.54(1)$ ,

$c = 12.42(4)$  Å,  $\alpha = 91.19(44)^\circ$ ,  $\beta = 99.94(82)^\circ$ ,  $\gamma = 98.64(47)^\circ$ ,  $V = 666.5$  Å<sup>3</sup> and  $Z = 1$ . The strongest lines (66 given) are: 12.41(70)(001), 7.42(20)(010), 6.95(50)(100), 6.58(30)( $\bar{1}01$ ,  $01\bar{1}$ ), 5.10(20)( $\bar{1}02$ ), 4.31(40)( $\bar{1}12$ ), 3.86(20)( $\bar{1}03$ ), 3.46(20)( $\bar{1}13$ ), 3.43(20)( $\bar{1}21$ ), 3.16(100)( $212$ ,  $21\bar{1}$ ,  $\bar{1}13$ ), 2.723(60)( $\bar{1}23$ ,  $023$ ).

Ehrleite occurs at the Tip Top mine, Custer, South Dakota as vitreous, white to colorless, thick tabular crystals up to  $2 \times 2 \times 0.1$  mm on a matrix of beryl and quartz, associated with mitridatite, roscherite, hydroxyl-herderite, and goyazite-crandallite. Crystals show three pinacoids {100}, {010} and {001} (assuming centrosymmetry), the habit form being chosen as {001}. Traces of parting are observed on (001), and the fracture is uneven to subconchoidal.  $D_{\text{meas}} = 2.64(2)$ ,  $D_{\text{calc}} = 2.62$ .  $H = 3\frac{1}{2}$ . The mineral is nonfluorescent and soluble in cold 20% HCl. Optically biaxial positive,  $\alpha = 1.556(2)$ ,  $\beta = 1.560(1)$ ,  $\gamma = 1.580(1)$ ,  $2V_{\text{meas}} = 62^\circ$ ,  $2V_{\text{calc}} = 49^\circ$ ;  $X||c$ ,  $Y \wedge b = 18^\circ$  and  $Z \wedge a = 9^\circ$ . The name is for Mr. Howard Ehrle, of Miles City, Montana, who found the holotype specimen. The holotype specimen is preserved in the collection of the National Museum of Natural Sciences, Ottawa (NMNS no.49289). The cotype specimen is in the Museum of Geology, South Dakota School of Mines and Technology, Rapid City, South Dakota (SDSM & T no. 2958). **A.C.R.**

#### Ertixiite\*

Z. Rubo, H. Fengming, D. Chongliang (1985) Ertixiite—A new mineral from the Altay Pegmatite Mine, Xinjiang, China. *Geochemistry (China)*, 4, 2, 192–195.

An average of six microprobe analyses gave SiO<sub>2</sub> 77.86, Na<sub>2</sub>O 17.98, CaO 2.82, Al<sub>2</sub>O<sub>3</sub> 1.45, FeO 0.04, sum 100.15%, corresponding to the ideal chemical formula Na<sub>2</sub>Si<sub>4</sub>O<sub>6</sub>. The infrared spectrum exhibits absorption bands at 1050 and 475 cm<sup>-1</sup> due to (SiO<sub>4</sub>)<sup>-4</sup> vibrations and a band at 775 cm<sup>-1</sup> resulting from Al–O–Al vibrations.

No X-ray single-crystal analysis was performed because of the lack of crystals of suitable size. X-ray powder data indicate the mineral to be cubic, unit cell  $a = 5.975$  Å,  $Z = 1$ . The strongest lines (8 given) are 3.443(20)(111), 2.988(20)(200), 2.674(20)(210), 1.996(80)(221), and 1.798(100)(311).

Ertixiite occurs in miarolitic cavities in a Ta-Nb-Be-bearing pegmatite at the Altay mine near Fuyun County about 600 km northeast of Urumqi City, Xinjiang Autonomous Region, China. Associated minerals include topaz, albite, muscovite, quartz, apatite, and garnet. Ertixiite occurs as colorless, transparent grains ranging from 0.1 to 0.5 mm in size. Luster vitreous, streak white, no observable cleavage but some subconchoidal fracture,  $H = 5.8\text{--}6.5$ ,  $D = 2.35$  (hydrostatic method), 2.34 (calculated). Optically isotropic,  $n = 1.502(1)$ .

The mineral is named for the Ertixi River. The original material is preserved at the Geological Museum of the Chengdu Geological College. **J.E.S.**

#### Ferridiopside

Gerhard Frenzel, Bernhard Nuber, Joachim Otteman (1985) Crystal chemistry of ferridiopside from the Katzenbuckel (Odenwald, FRG). *Chem. Erde*, 44, 299–309 (in German).

Electron-microprobe analysis and Mössbauer spectroscopy gave the analysis SiO<sub>2</sub> 51.33, Al<sub>2</sub>O<sub>3</sub> 1.27, Fe<sub>2</sub>O<sub>3</sub> 5.96, FeO 0.47, TiO<sub>2</sub> 2.14, MnO 0.17, MgO 13.75, CaO 22.57, Na<sub>2</sub>O 1.38, K<sub>2</sub>O 0.15, sum = 99.19; on the basis of 6 oxygens, the formula is

$(\text{Na}_{0.10}\text{Ca}_{0.90})(\text{Mg}_{0.76}\text{Fe}_{0.02}^{2+}\text{Fe}_{0.16}^{3+}\text{Ti}_{0.06})(\text{Si}_{1.91}\text{Fe}_{0.06}\text{Fe}_{0.01}^{3+})$ , and a structure refinement is given.

**Discussion.** The name used is not an accredited name; this is a ferrian diopside. F.C.H.

### Irtyshite\*

A.V. Voloshin, Ya.A. Pakhomovsky, L.V. Bulgak, G.A. Perlina (1985) Irtyshite, a new mineral from granitic pegmatites. Mineral. Zhurnal, 7, 83–87 (in Russian).

The average of three electron-microprobe analyses using lorenzenite (Na), diopside (Ca), PbSe (Pb), Sn, Nb, and Ta metals as standards gave  $\text{Na}_2\text{O}$  6.46,  $\text{CaO}$  0.20,  $\text{PbO}$  0.41,  $\text{MnO}$  trace,  $\text{SnO}_2$  0.58,  $\text{Nb}_2\text{O}_5$  12.07,  $\text{Ta}_2\text{O}_5$  80.00, sum 99.72, corresponding to  $(\text{Na}_{1.83}\text{Ca}_{0.03}\text{Pb}_{0.02})_{\Sigma 1.88}(\text{Ta}_{3.19}\text{Nb}_{0.80}\text{Sn}_{0.03})_{\Sigma 4.02}\text{O}_{11}$ , or ideally  $\text{Na}_2\text{Ta}_4\text{O}_{11}$ .

Powder X-ray study shows the mineral to be hexagonal;  $a = 6.231$ ,  $c = 36.77$  Å, space group  $P6_3/m$  or  $P6_3$ ,  $Z = 6$ . The strongest diffractions in the pattern (42 given) are 6.13(7)(00.6), 5.18(6)(01.2), 3.082(9)(11.1, 11.2, 00.12), 3.029(10)(01.10, 11.3), 2.780(9)(11.6), 2.480(6)(119) using unfiltered Fe radiation and a NaCl internal standard. The powder pattern is very similar to those of natrotantite and calciotantite, from which it differs by the presence of additional lines at intermediate to large  $d$  values. Inconsistent powder data for synthetic  $\text{Na}_2\text{Ta}_4\text{O}_{11}$  makes comparison with this compound difficult.

The mineral is colorless, transparent, luster adamantine. It has no cleavage, fracture is uneven and tenacity brittle.  $D_{\text{calc}}$  7.03,  $\text{VHN}(20, 40\text{g}) = 1190, 1030$  kg/mm<sup>3</sup>. Anisotropic, birefractant, nonpleochroic and nonluminescent, but cathodoluminesces bright yellow-green. Reflectance values, in air, are 18.0–19.0 (486), 18.6–19.5 (553), 18.9–19.6 (589), 18.5–18.7% (656 nm).

The mineral occurs as veins to 0.02–0.03 by 0.20 mm in altered thoreaulite and as irregular grains to 0.05 mm around ixiolite and lithiotantite. It comes from undesigned granitic pegmatites in the vicinity of the Irtys River, East Kazakhstan, USSR, after which it is named. Type material is at the Fersman Mineralogical Museum, Moscow.

**Discussion.** The mineral is strongly pseudo  $R$  centered, thus closely resembles natrotantite,  $\text{Na}_{2-x}\text{Ta}_4\text{O}_{11-x}(\text{OH}, \text{F})_x$ ; however, the few weak diffractions (all  $I \leq 1$ ) indicating  $P$  centering cannot be accounted for by contamination with associated Ta oxide minerals, and so irtyshite and natrotantite are assumed to be polytypoids. The assignment of the possible space groups  $P6_3/m$  or  $P6_3$  is confusing; the authors' own indexing of the powder data does not conform with either space group. T.S.E.

### Kolarite

A.D. Genkin, Y.G. Safonov, V.N. Vasudev, B. Krishna Rao, V.A. Boronikhin, L.N. Vyalsov, A.I. Gorshkov, A.V. Mokhov (1985) Kolarite  $\text{PbTeCl}_2$  and radhakrishnaite  $\text{PbTe}_3(\text{Cl}, \text{S})_2$ , new mineral species from the Kolar gold deposits, India. Canadian Mineralogist, 23, 501–506.

Analysis by electron microprobe gave Pb 50.05, Te 32.87, Cl 16.88, sum = 99.60.

Electron-diffraction analysis shows kolarite to be orthorhombic with unit cell  $a = 5.93(5)$ ,  $b = 3.25(5)$ ,  $c = 3.89(5)$  Å,  $Z = 1$ . The strongest diffraction lines (16 given) are 3.91(4)(001), 3.27(10)(101, 010), 2.35(5)(201), 2.00(4)(300), 1.86(3)(102), 1.79(3)(301), 1.50(3)(021, 400), 1.35(3)(410, 221).

Kolarite occurs intergrown with radhakrishnaite and cotunnite

as veinlet and rim replacements ( $< 40$  μm) of altaite inclusions in galena. The entire association occurs in gold-bearing quartz veins at 1500 m in the Champion reef lode of the Kolar gold deposits, India. Gray under reflected light with no anisotropism; reflectance in air 400(26.1), 420(26.2), 440(26.5), 460(27.0), 480(27.5), 500(27.9), 520(28.3), 540(28.6), 560(29.0), 580(29.2), 600(29.4), 620(29.6), 640(29.6), 660(29.5), 680(29.5), 700(29.5), 720(29.5), 740(29.4) (nanometers and percent, respectively).  $D = 9.14$  g/cm<sup>3</sup> calculated from diffraction data.

The name is for the Kolar gold deposit. Polished sections containing kolarite are preserved in the Mineralogical Museum of the Academy of Sciences of the USSR and in the Mineralogical Laboratory of IGEM, Academy of Sciences of the USSR, Moscow. K.W.B.

### Nickel-Boussingualtite\*

L.K. Yakhontova, G.A. Sidorenko, T.I. Stolyarova, I.I. Plyusnina, T.L. Ivanova 1976? Nickel-containing sulfates from the oxidation zone of the Norilskiy Deposits. Zapiski Vsesoyuzn. Mineral. Obshch., Part 105, 710–720 (in Russian).

A chemical analysis (on 8–10 mg) gave NiO 16.84, CuO 2.74, MgO 2.30, FeO 0.37, CaO and K<sub>2</sub>O not detected, Al<sub>2</sub>O<sub>3</sub> < 0.1, Na<sub>2</sub>O 0.52, SO<sub>3</sub> 40.20, ± H<sub>2</sub>O 27.42, sum 90.49. A calculated value of 10.40 for (NH<sub>4</sub>)<sub>2</sub>O balances the valences, leading to a sum of 100.89 and the formula  $(\text{NH}_4)_{1.6}(\text{Ni}_{0.84}\text{Mg}_{0.22}\text{Cu}_{0.12}\text{Fe}_{0.02}^{3+})_{1.2}[\text{SO}_4]_2 \cdot 6\text{H}_2\text{O}$ . The mineral is readily soluble in water. The DTA curve shows a marked endothermic effect at 180°C and three lesser ones at 270, 340, and 400°C, all due to dehydration; another at 500°C due to melting with no weight loss; and a marked effect near 850°C due to disassociation of the sulfate. Infrared spectra have features in the ranges 3300–2900, 1700–1600, and 1480–1430 cm<sup>-1</sup> characteristic of the tetrahedral NH<sub>4</sub> group.

X-ray powder-diffraction data show the mineral to be isostructural with synthetic  $(\text{NH}_4)_2\text{Ni}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$  and yield a monoclinic cell with parameters  $a = 9.21 \pm 0.02$  Å,  $b = 12.46 \pm 0.02$  Å,  $c = 12.50 \pm 0.03$  Å,  $\beta = 106^\circ 52'$ ;  $Z = 4$ . However,  $c$  is doubled with respect to  $c$  in the synthetic salt and in the isostructural minerals boussingualtite and mohrite. The strongest lines (33 given) are 11.7(7)(001), 4.153(10)(030, 210), 3.759(8)(130), 3.022(6)(230), 2.793(6)(124, 141), 2.119(7)(244), 1.806(6).

The mineral forms greenish-blue (like chrysocolla) films resembling sinter on pentlandite-chalcopyrite ore at the Norilskiy deposits, USSR. It is found in underground works, where this ore was first oxidized to limonite, upon which this sulfate was deposited. The mineral is developed mostly near old wooden timbers and locally has spread onto these. The tiny grains ( $< 0.01$  mm) are prismatic, cleavage imperfect. In immersion mount, yellow-blue, with  $\gamma =$  yellow,  $\alpha =$  bluish;  $c \wedge \alpha = 0-4^\circ$ , optically positive, and  $\gamma = 1.501$ ,  $\beta = 1.494$ ,  $\alpha = 1.490$ . Grains too small to measure  $2V$ . Hardness 2.5. Density calculated from X-ray data is 1.85 g/cm<sup>3</sup>.

The mineral is named from its being the nickel analogue of boussingualtite. Samples are at the A. E. Fersman Mineralogical Museum of the USSR Academy of Sciences, Moscow. E.S.G.

### Radhakrishnaite

A.D. Genkin, Y.G. Safonov, V.N. Vasudev, B. Krishna Rao, V.A. Boronikhin, L.N. Vyalsov, A.I. Gorshkov, A.V. Mokhov (1985) Kolarite  $\text{PbTeCl}_2$  and radhakrishnaite  $\text{PbTe}_3(\text{Cl}, \text{S})_2$ , new mineral species from the Kolar gold deposits, India. Canadian Mineralogist, 23, 501–506.

Analysis by electron microprobe gave Pb 31.39, Te 58.23, Cl 7.18, S 3.09, sum = 99.89. Systematic variation in the amount of sulfur and chlorine in four different grains suggests mutual substitution in the mineral.

Electron-diffraction analysis shows radhakrishnaite to be tetragonal with a primitive unit cell  $a = b = 5.71(5)$ ,  $c = 3.77(5)$  Å,  $Z = 1$ . The strongest diffraction lines (13 given) are 3.78(6)(001), 3.16(10)(011), 2.73(4)(111), 2.29(4)(021), 2.04(3)(220), 1.92(5)(030), 1.78(5)(012,221), 1.59(4)(230).

The mineral occurs intergrown with kolarite and cotunnite as veinlet and rim replacements (<40 μm) of altaite inclusions in galena. The entire association occurs in gold-bearing quartz veins at 1500 m in the Champion reef lode of the Kolar gold deposits, India. Rose-brown under reflected light with distinct anisotropism; reflectance in air 400(24.3), 420(25.2), 440(26.1), 460(27.1), 480(28.2), 500(29.2), 520(30.1), 540(31.0), 560(31.8), 580(32.4), 600(32.9), 620(33.3), 640(33.5), 660(33.6), 680(33.6), 700(33.6), 720(33.5), 740(33.2) (nanometers and percent, respectively).  $D = 8.89$  g/cm<sup>3</sup> calculated from diffraction data.

The name honors B. P. Radhakrishna, an Indian geologist. Polished sections containing radhakrishnaite are preserved in the Mineralogical Museum and in the Mineragraphy Laboratory of IGEM, of the Academy of Sciences of the USSR, Moscow. **K.W.B.**

#### Shigaite\*

D.R. Peacor, P.J. Dunn, A. Kato, F.J. Wicks (1985) Shigaite, a new manganese aluminum sulfate mineral from the Loi mine, Shiga, Japan. Neues Jahrb. Mineral Monatsh., 453–457.

Microprobe and TGA-EG analyses gave Al<sub>2</sub>O<sub>3</sub> 15.3, Fe<sub>2</sub>O<sub>3</sub> 0.9, MnO 41.7, SO<sub>3</sub> 13.6, H<sub>2</sub>O 28.0, sum 99.5%, corresponding (on the basis of O = 114) to (Al<sub>10.97</sub>Fe<sub>0.41</sub>)<sub>11.38</sub>Mn<sub>21.49</sub>(SO<sub>4</sub>)<sub>6.21</sub>(OH)<sub>64.70</sub>·24.46H<sub>2</sub>O. Calculation of unit-cell contents, using the refined cell parameters and measured density, yields (Al<sub>10.77</sub>Fe<sub>0.41</sub>)<sub>11.18</sub>Mn<sub>21.10</sub>(SO<sub>4</sub>)<sub>6.10</sub>(OH)<sub>63.54</sub>·24.02 H<sub>2</sub>O. The ideal formula is Al<sub>10</sub>Mn<sub>21</sub>(SO<sub>4</sub>)<sub>6</sub>(OH)<sub>63</sub>·24H<sub>2</sub>O with  $Z = 3$ .

X-ray studies show the mineral is hexagonal,  $R\bar{3}$  or  $R\bar{3}c$ , with  $a = 9.51(1)$ ,  $c = 32.83(10)$  Å and has a substructure with  $A = a\sqrt{3}$  and  $C = c/3$ . The strongest lines (38 given) are 10.98(100)(003), 5.47(90)(006), 3.664(80)(024), 2.547(90)(036), 2.198(60)(134,039), 1.947(60)(0,3,12). Shigaite is structurally related to lawsonbauerite and mooreite.

Unaltered shigaite occurs as millimeter-sized tabular hexagonal crystals that are light yellow, moderately flexible, and possess a very light yellow to white streak. Cleavage {0001} perfect.  $H = 2$ . Nonfluorescent.  $D_{\text{meas}} = 2.32$ ,  $D_{\text{calc}} = 2.35$ . Optically, uniaxial negative with  $\omega = 1.546$ . Pleochroism is distinct with  $O =$  medium yellow and  $E =$  very light yellow. Absorption is  $O > E$ .

Shigaite occurs as a secondary phase in veins cutting altered manganese-rhodochrosite-sonolite ore from the Loi mine, Shiga Prefecture, Japan. Associated minerals are pyrochroite, jacobsonite, hausmannite, and galaxite. The name is for the locality. Type material is preserved at the Smithsonian Institution, Washington (no. 122089-2). **A.C.R.**

#### Sidwillite\*

F. Cesbron, D. Ginderow (1985) Sidwillite MoO<sub>3</sub>·2H<sub>2</sub>O; a new mineral species from Lake Como, Colorado, U.S.A. Bull. Minéral., 108, 813–823 (in French).

The average of 15 electron-microprobe analyses gave MoO<sub>3</sub> 78.60, Fe<sub>2</sub>O<sub>3</sub> tr., H<sub>2</sub>O (difference) 21.40, which compares well

with the calculated values of MoO<sub>3</sub> 79.98, H<sub>2</sub>O 20.02 for the ideal formula given above.

Single-crystal and X-ray powder-diffraction studies show the mineral to be monoclinic, space group  $P2_1/n$ ,  $a = 10.618(5)$ ,  $b = 13.825(7)$ ,  $c = 10.482(5)$  Å,  $\beta = 91.61(4)^\circ$ ,  $V = 1538$  Å<sup>3</sup>,  $Z = 16$ . The refined crystal structure ( $R = 0.023$  for 4603 independent reflections) consists of layers of [MoO<sub>3</sub>H<sub>2</sub>O] octahedra parallel to (010), with H<sub>2</sub>O layers between. Layers are hydrogen bonded and evidence of molybdenyl ions is given. The strongest X-ray diffraction lines (50 given) are 6.94(84)(020), 3.79(53)(202), 3.680(58)(202), 3.322(100)(22 $\bar{2}$ ), 3.248(93)(222), 2.656(51)(400), 2.620(41)(004).

Sidwillite occurs as bright yellow, resinous, tabular crystals up to 0.2 mm in length. It has a perfect [010] cleavage, hardness 2.5,  $D_{\text{meas}} = 3.12$  and  $D_{\text{calc}} = 3.11$  g/cm<sup>3</sup>. Optically it is biaxial negative with  $\alpha = 1.70(1)$ ,  $\beta = 2.21(2)$ ,  $\gamma = 2.38(2)$  and  $2V_{\text{calc}} = 48^\circ$ ; pleochroism is strong with  $X$  colorless,  $Y$  and  $Z$  yellow;  $X = b$ ,  $Z \wedge a = 47^\circ$ .

Sidwillite occurs as an oxidation product of jordisite in a quartz vein and is associated with pyrite. The name honors Dr. Sidney A. Williams, an eminent American mineralogist. The type material, a polished section, and a massive sample, are deposited in the Collection de Minéralogie de l'Ecole nationale supérieure des Mines de Paris. **J.D.G.**

#### Ungursait

A.V. Voloshin, Ya.A. Pakhomovsky, L.V. Bulgak, G.A. Perlina (1985) Ungursait, a new calcium, sodium tantalate from granitic pegmatites. Mineral. Zhurnal, 7, 88–94 (in Russian).

Electron-microprobe analyses of four crystals from three different localities using lorezenite (Na), diopside (Ca), PbSe (Pb), Sn, Nb, Ta metals, and LiDy(WO<sub>4</sub>)<sub>2</sub> (W) gave ranges of Na<sub>2</sub>O 0.42–0.65, CaO 5.13–5.60, PbO 0.08–0.75, SnO<sub>2</sub> 0.00–1.88, Nb<sub>2</sub>O<sub>5</sub> 1.47–8.19, Ta<sub>2</sub>O<sub>5</sub> 84.46–92.58, WO<sub>3</sub> 0.00–0.28, sum 99.80–100.34%. The average formula is Na<sub>0.87</sub>(Ca<sub>5.16</sub>Pb<sub>0.07</sub>Ta<sub>21.29</sub>Nb<sub>2.34</sub>Sn<sub>0.25</sub>W<sub>0.02</sub>)<sub>223.90</sub>O<sub>64.6</sub>(OH)<sub>1.4</sub>, or ideally NaCa<sub>5</sub>Ta<sub>24</sub>O<sub>65</sub>(OH), on a basis of 30 cations and 66 anions, and the assumed presence of OH.

Powder X-ray study shows the mineral to be hexagonal;  $a = 6.218$ ,  $c = 36.80$  Å, space group  $P6_3/m$  or  $P6_3$ ,  $Z = 1$ . The strongest diffractions in the pattern (78 given) are 6.16(10)(00.6), 3.07(9)(11.2, 00.12), 3.01(10)(11.3), 2.776(10)(11.6), 2.477(9)(11.9), using unfiltered Fe radiation and a NaCl internal standard. The powder data are similar to those of calciotantite [and irtyshite, T.S.E.]; however, several diffractions in the pattern can be indexed only if  $c$  is tripled from 12.22 (calciotantite) to 36.77. The tripling of  $c$  is interpreted as resulting from the ordering of Na and Ca into different octahedral layers along  $c$ , supported by the near-constant 5:1 ratios of Ca:Na.

The mineral is colorless, transparent, luster adamantine. It has no cleavage.  $D_{\text{calc}} 7.23(1)$ , VHN(40g) = 1180 kg/mm<sup>3</sup>. Anisotropic, birefractant, nonpleochroic and nonluminescent, but cathodoluminesces bright yellow-green. Reflectance values, in air, are 16.8–17.7 (486), 17.3–18.1 (553), 17.3–18.0 (589), 17.5–18.0% (656 nm).

The mineral occurs in the margins of thoreaulite crystals from granitic pegmatites at Ungursai, East Kazakhstan, USSR, the locality after which it was to be named. It also is found at undesignated granitic pegmatites of the Kola Peninsula, USSR, as slender, platy crystals to 0.05 mm, in association with tantite and microlite, and is found at a granitic pegmatite at Katanga, Zaire, in association with thoreaulite, lithiotantite, microlite, and simpsonite. Reference samples are at the Fersman Mineralogical Museum, Moscow.

**Discussion.** The indexing of the powder data disagrees with the systematic absences of the proposed space groups; furthermore, the ordering scheme inferred by the authors is *impossible* for these space groups. Although the authors indicate otherwise, the mineral and its name were *disapproved* by the IMA prior to publication. T.S.E.

### Uranotungstite\*

K. Walenta (1985) Uranotungstite, a new secondary uranium mineral from the Black Forest, West Germany. *Tschermaks Min. Petr. Mitt.*, 25–34 (in German).

Analysis by a combination of electron-microprobe, atomic-absorption and water-loss techniques gave, on average, FeO 2.3, BaO 4.9, PbO 6.9, UO<sub>3</sub> 45.1, WO<sub>3</sub> 19.8, H<sub>2</sub>O 22.5, sum 101.5%, for the Menzenschwand material. On the basis of 24 oxygen atoms this corresponds to (Fe<sub>0.38</sub>Ba<sub>0.37</sub>Pb<sub>0.36</sub>)U<sub>1.82</sub>W<sub>0.99</sub>H<sub>28.94</sub>O<sub>24</sub> or ideally (Fe,Ba,Pb)(UO<sub>2</sub>)<sub>2</sub>(WO<sub>4</sub>)(OH)<sub>4</sub>·12H<sub>2</sub>O. Only traces of Ba and no Pb were semiquantitatively detected in material from the Clara mine. The mineral is decolorized but not dissolved by either 1:1 HNO<sub>3</sub> or 1:1 H<sub>2</sub>SO<sub>4</sub>. It is dissolved by cold 1:1 HCl, and the reaction is accelerated upon warming. A yellow residue remains upon evaporation.

X-ray powder-diffraction data tentatively indicate that the mineral possesses a unit cell with  $a = 9.22$ ,  $b = 13.81$ ,  $c = 7.17$  Å,  $Z = 2$ . The strongest powder-diffraction lines (23 given) on material from the Clara mine are 6.96(10)020; 4.60(6)200,030; 3.46(5)012,040; 3.21(7)140,022. Possible space groups:  $P222_1$ ,  $Pccm$ ,  $Pmc2_1$ ,  $Pcc_2$ ,  $Pmmm$ ,  $P222$  or  $Pmm2$ .

Uranotungstite has been found at both the uranium deposit of Menzenschwand in the Southern Black Forest, and at the Clara mine near Oberwolfach in the Central Black Forest. It forms crusts on quartz, meta-uranocircite, and meta-heinrichite. Other associated minerals are bergenite, meta-torbernite, meta-zeunerite, and schoepite. The mineral occurs as spherulitic aggregates up to 0.3 mm in diameter. The orthorhombic crystals are lathlike and are colored yellow, orange, or brownish, with a yellow streak. Hardness about 2,  $D_{\text{calc}} = 4.27$ ,  $D_{\text{meas}} > 4.03$  g/cm<sup>3</sup>. The crystals are translucent with a dull luster and possess a perfect (010) cleavage. Irregular fracture. Optically biaxial, negative, with  $\alpha = 1.682$ ,  $\beta = 1.845$ ,  $\gamma = 1.855$ ,  $2V = 42^\circ$ , pleochroic at intersections at right-angles to (010), with  $X$  more or less colorless,  $Y$  and  $Z$  yellow (values measured on Menzenschwand material). No fluorescence in UV light.

The mineral is claimed to be the first uranyl tungstate found naturally. Type material is deposited at the Institute for Mineralogy and Crystal Chemistry at the University of Stuttgart, Germany. R.A.S.

### Villyaellenite\*

H. Sarp (1984) Villyaellenite, H<sub>2</sub>(Mn,Ca)<sub>3</sub>(AsO<sub>4</sub>)<sub>4</sub>·4H<sub>2</sub>O un nouveau minéral de Sainte-Marie aux Mines (France). *Schweiz. Mineral. Petrogr. Mitt.*, 64, 323–328 (in French).

Combined EDS electron-microprobe (for Ca, Mn, and As) and thermogravimetric (for H<sub>2</sub>O) analyses gave CaO 13.58, MnO 22.40, As<sub>2</sub>O<sub>5</sub> 52.99, H<sub>2</sub>O 11.42, sum 100.39 wt%, corresponding to H<sub>2.27</sub>(Mn<sub>2.69</sub>Ca<sub>2.07</sub>)<sub>24.76</sub>(AsO<sub>4</sub>)<sub>3.93</sub>·4.28H<sub>2</sub>O, or idealized H<sub>2</sub>(Mn,Ca)<sub>3</sub>(AsO<sub>4</sub>)<sub>4</sub>·4H<sub>2</sub>O with Mn > Ca.

Single-crystal X-ray study shows the mineral to be monoclinic, space group  $C2/c$ ,  $a = 18.55$ ,  $b = 9.52$ ,  $c = 10.01$  Å and  $\beta = 97^\circ$ ,  $V = 1754.54$  Å<sup>3</sup>,  $Z = 4$ ,  $D_{\text{calc}} = 3.24$ ,  $D_{\text{meas}} = 3.20$  g/cm<sup>3</sup>. The

strongest X-ray diffraction lines (35 listed) are 8.476(90)(110), 4.761(40)(020), 4.606 (50)(20 $\bar{2}$ ,400), 4.400(30)(311,11 $\bar{2}$ ), 3.811(40)(221), 3.429(30)(022,510), 3.297(100)(22 $\bar{2}$ ,420), 3.132(60)(511,222), 3.025(40)(113).

The mineral is the Mn analogue of sainfeldite.

Villyaellenite occurs in rosettes up to 4–5 mm in diameter on a specimen from Sainte-Marie aux Mines (France). Associated minerals are fluckite, picroparmacolite, native arsenic, and pharmacolite. The crystals (up to 0.3 mm long) are tabular parallel to {100} and elongated parallel to [001]. Crystal forms present are {100}, {011}, {010} and rarely {001}. No cleavage, no twinning, no fluorescence. The mineral is colorless to light pink, transparent with vitreous luster; white streak. Hardness could not be measured. Soluble in HCl. In thin section villyaellenite is colorless. Its optical properties are biaxial negative with  $\alpha = 1.660(2)$ ,  $\beta = 1.670(2)$ ,  $\gamma = 1.676(2)$  and  $2V_{X_{\text{meas}}} = 76^\circ$ ,  $2V_{X_{\text{calc}}} = 75.6^\circ$  at  $\lambda = 589$  nm;  $X = b$ ,  $Y \wedge c \approx 30^\circ$  in the obtuse angle  $\beta$ .

The name is for Dr. Villy Aellen, director of the Natural History Museum of Geneva, Switzerland. Type material is at the Department of Mineralogy of the same museum. E.A.J.B.

### Yecoraite

S.A. Williams, F.P. Cesbron (1985) Yecoraite Fe<sub>3</sub>Bi<sub>5</sub>(TeO<sub>3</sub>)(TeO<sub>4</sub>)<sub>2</sub>O<sub>5</sub>· $n$ H<sub>2</sub>O A new mineral from Sonora, Mexico. *Sociodad Mexicana De Mineralogia, A.C.*, 1, 10–16.

Wet-chemical and electron-microprobe analyses of the mineral gave As<sub>2</sub>O<sub>5</sub> 0.96, Fe<sub>2</sub>O<sub>3</sub> 10.45, TeO<sub>2</sub> 7.65, TeO<sub>3</sub> 16.83, Bi<sub>2</sub>O<sub>3</sub> 55.37, H<sub>2</sub>O 8.06 (~9 molecules per formula unit), sum = 99.32. Yecoraite dissolves readily in cold 16% HCl or 10% HNO<sub>3</sub>. It fuses easily to a red glass and begins to evolve TeO<sub>2</sub> shortly after losing water.

As a consequence of minute grain size and a lack of single crystals, X-ray analysis yielded broad diffraction lines and incomplete cell data. The unindexed diffraction lines are 5.45(4), 3.722(4), 3.212(7), 2.962(4), 2.743(10), 1.940(3), and 1.625(3). The cell is either tetragonal or hexagonal and is believed to be "very large, with stringent extinction rules." Found in quartz veins that cut granite, Yecoraite occurs as pitchy or resinous masses intimately associated with tetradymite, often penetrating along cleavage. Other associated phases include goethite, chalcopyrite, pyrite, and two unidentified tellurites-tellurates of Bi and Fe. No crystals were found; masses display conchoidal fracture. Pure material is yellow (RHS 20B/20C); goethite admixtures dull the color to browns. Mohs' hardness is 3.  $D = 5.59(11)$  g/cm<sup>3</sup> (Berman balance). No fluorescence was observed under long or short ultraviolet wavelengths.

Microscopic examination revealed mats of fibers (<5  $\mu$ m) that are length slow with parallel extinction. Optically the mineral is uniaxial positive,  $\omega = 1.812$ ,  $\epsilon = 1.824$ .

Found at the San Martin de Porres mine near Yecora, Sonora, Mexico. Samples are preserved at the British Museum of Natural History and at the Paris School of Mines. K.W.B.

### Yuksporite

A.A. Konev, E.I. Vorobev, A.N. Saposhnikov, Yu.U. Malyshonok, L.F. Paradina, I.L. Lapidus (1985) New data on yuksporite. *Mineralog. Zhurnal*, 7(4), 74–78 (in Russian).

Microprobe and wet analyses of a material from new occurrence (Muruna syenitic massif, Siberia, USSR) gave SiO<sub>2</sub> 38.40,



TiO<sub>2</sub> 11.00, Al<sub>2</sub>O<sub>3</sub> 0.07, Fe<sub>2</sub>O<sub>3</sub> 0.75, MnO 0.29, CaO 18.90, SrO 5.87, BaO 8.60, Na<sub>2</sub>O 3.84, K<sub>2</sub>O 6.15, H<sub>2</sub>O<sup>+</sup> 2.20, F 3.05, Cl 0.80, total 100.53 (O = F<sub>2</sub>, Cl<sub>2</sub> 1.46, total 99.07). A new formula is suggested to be KNaCa<sub>2</sub>(Si<sub>3.5</sub>Ti<sub>0.5</sub>)<sub>4</sub>O<sub>11</sub>F·nH<sub>2</sub>O, better fitting analytical data than the former one (see Amer. Miner., 62, 1262). Ba is substituted for K; Sr for Na.

X-ray powder study shows the mineral to be orthorhombic,  $a = 2.4869(8)$ ,  $b = 1.6756(6)$ ,  $c = 0.7057(3)$  nm.

**Discussion.** A complete description of the mineral yuksporite is given. J.P.

#### Unnamed Hg<sub>2</sub>I<sub>2</sub> mineral

R. Krupp, G. Nottes, U. Heidtke (1985) Naturally occurring halogen compounds, especially mercury iodide, from Moschellandsberg, Pfalz, West Germany. *Aufschluss*, 36, 73–80 (in German).

Fine lemon-yellow crystalline crusts of the mineral overgrowing cinnabar were found in a centimeter-sized cavity of a sample of siliceous sandstone, the latter partly covered with weathered cinnabar. The mineral becomes olive green to black when exposed to air and light for any length of time.

No chemical analyses are given, and the material was identified solely by comparison of its powder-diffraction pattern with that of synthetic material. The strongest lines are given as 3.48(10), 2.23(9), 2.90(6), 2.09(6), 4.63(2), 1.87(2), 1.25(2), 2.45(1), 1.74(1), 1.59(1), 1.49(1).

The mineral occurs together with cinnabar, native mercury, Hg-tetrahedrite (schwartzite), calomel, eglestonite, and terlingaite. The paper gives a brief description of the mineralization of the mercury deposit at Moschellandsberg, together with general observations and speculations.

**Discussion.** The above description is very incomplete. Optical, chemical, and further X-ray data are needed, as well as an explanation of the processes resulting in the color change of the material. R.A.S.

#### Unnamed minerals of the hydrotalcite-manasseite groups

V.A. Drits, N.A. Lisitsyna, V.I. Cherkashin (1985) New mineral varieties from the hydrotalcite-manasseite group—products of low-temperature reconstitution of basalts and volcanogenic sediments of the ocean floor. *Doklady Akad. Nauk SSSR, Earth Science Section* (?), 284, 2, 443–447 (in Russian).

Several varieties of sulfate-bearing, layered minerals related to hydrotalcite occur as authigenic phases in volcano-sedimentary deposits on the ocean floor. One mineral, not previously described from nature, is SO<sub>4</sub>-hydrotalcite with a 3-layered cell having  $a = 3.05$  Å and  $c = 26.5$  Å. It is the major constituent of a separated fraction the analysis of which gives a formula (Mg<sub>3.91</sub>Al<sub>2.09</sub>)(OH)<sub>12</sub>(SO<sub>4</sub>)<sub>0.83</sub>(CO<sub>3</sub>)<sub>0.21</sub>·nH<sub>2</sub>O. This material gives major peaks on an X-ray diffractometer trace at 8.85 and 4.40 Å, as well as minor peaks at 7.56 Å from admixed CO<sub>3</sub>-hydrotalcite and at  $d < 4.40$  Å. A second preparation has practically the same chemical composition as the first, but the X-ray trace has major peaks at 10.80, 5.40, and 3.60 Å. This material is interpreted to be a mixture of the two polytypic modifications, one having a rhombohedral (three-layered cell,  $c = 32.4$  Å) and the other a hexagonal cell ( $c = 21.6$  Å). These modifications have not been previously reported. The greater interplanar spacing

(10.8 Å) relative to SO<sub>4</sub>-hydrotalcite is attributed to the insertion of water molecules between the layers of sulfate tetrahedra and the brucite layers. Other varieties are ordered mixed-layered compounds in which single SO<sub>4</sub>-bearing and single CO<sub>3</sub>-bearing units alternate. One such compound is a mixed-layered SO<sub>4</sub>-hydrotalcite (10.94-Å layer) and CO<sub>3</sub>-hydrotalcite (7.56-Å layer) resulting in a combined-unit layer thickness of 18.5 Å and peaks on the X-ray trace at 18.5, 9.24, 6.18, 4.60, and 3.70 Å. It occurs admixed with CO<sub>3</sub>-hydrotalcite and SO<sub>4</sub>-hydrotalcite. Another such compound is mixed-layered CO<sub>3</sub>-hydrotalcite (7.56 Å) and SO<sub>4</sub>-hydrotalcite (8.85 Å) with a combined layer thickness of 16.4 Å and X-ray peaks at 16.4, 8.20, 5.47, and 4.10 Å.

These minerals occur with Ba-phillipsite, calcite, dolomite, and barite in pores and fractures cutting clasts of basalt and hyaloclastite and their carbonate matrix in volcanogenic sediments of Miocene-Quaternary age. The volcanogenic deposits overlie the basaltic submarine volcanic mountains Atlantis, Ampere, and Josephine in the North Atlantic. The authigenic minerals formed by interaction of seawater with basalt and hyaloclastite at low temperatures on the ocean floor.

**Discussion.** The first variety could also be regarded as the Mg, Al analogue of honessite, and the second variety, the Mg, Al analogue of hydrohonessite. The second variety differs from motukoreaitite in that Na may not be present (none was reported) and in that the  $c$  spacing is a multiple of 10.8 Å, not 11.17 Å (see Table 3 of Nickel, E.H., and Wildman, J.E., 1981, *Mineral. Mag.*, 44, 333–337). E.S.G.

#### New Data

##### Mammothite

H. Effenberger (1985) The crystal structure of mammothite, Pb<sub>6</sub>Cu<sub>4</sub>AlSbO<sub>2</sub>(OH)<sub>16</sub>Cl<sub>4</sub>(SO<sub>4</sub>)<sub>2</sub>. *Tschermaks Min. Petr. Mitt.*, 34, 279–288.

The crystal structure of mammothite was determined from single-crystal X-ray data and refined to an  $R$  index of 4.7% for 2465 reflections. A revised chemical formula resulted from this work: Pb<sub>6</sub>Cu<sub>4</sub>AlSbO<sub>2</sub>(OH)<sub>16</sub>Cl<sub>4</sub>(SO<sub>4</sub>)<sub>2</sub>; the valence state of Sb was 5<sup>+</sup> rather than 3<sup>+</sup> as had been previously proposed. F.C.H.

##### Winchite

B.E. Leake, C.M. Farrow, F. Chao, V.K. Nayak (1986) Winchite rediscovered from the type locality in India. *Mineral. Mag.*, 50, 173–175.

Electron-microprobe analysis of the core of a nearly colorless crystal gave SiO<sub>2</sub> 56.08, Al<sub>2</sub>O<sub>3</sub> 1.91, TiO<sub>2</sub> 0.00, Fe<sub>2</sub>O<sub>3</sub> 5.27, MnO 0.67, MgO 20.66, CaO 8.56, Na<sub>2</sub>O 3.48, K<sub>2</sub>O 0.55, sum = 97.18. Recalculation on the basis of 23(O) gives (K<sub>0.10</sub>Na<sub>0.21</sub>)<sup>+</sup>(Na<sub>0.73</sub>Ca<sub>1.27</sub>)<sup>+</sup>(Mg<sub>4.27</sub>Mn<sub>0.08</sub>Fe<sub>0.55</sub><sup>+</sup>Al<sub>0.09</sub>)<sup>c</sup>(Si<sub>7.78</sub>Al<sub>0.22</sub>)<sup>c</sup>O<sub>22</sub>(OH)<sub>2</sub>, which is close to the original analysis given in 1909. The sample comes from the manganese mine at Kajlidongri, India, where there is an extremely complex assemblage of amphiboles.

**Discussion.** These amphiboles had been closely examined before, but no samples approaching the winchite composition originally reported from this region had been found. As winchite is an important component in the International Mineralogical Association amphibole nomenclature scheme, confirmation of the original analysis is obviously of considerable interest. F.C.H.