

NEW MINERAL NAMES*

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Bismutostibiconite*

K. Walenta (1983) Bismutostibiconite, a new mineral of the stibiconite group from the Black Forest. *Chem. Erde*, 42, 77–81 (in German).

Quantitative analysis (electron beam instrument with standardless EDS) of the mineral gave Fe_2O_3 6.9, Bi_2O_3 49.2, Sb_2O_3 43.9, sum 100.0%, corresponding to $\text{Fe}_{0.54}^{3+}\text{Bi}_{1.31}^{3+}\text{Sb}_{1.69}^{3+}\text{O}_7$, a Bi and Fe containing member of the stibiconite group.

X-ray camera studies show the mineral to be cubic, $Fd\bar{3}m$, $a = 10.38\text{\AA}$, $Z = 8$, D calc. 7.38. The strongest X-ray lines (12 given) are 3.01(10)(222), 2.60(7)(400), 1.833(7)(440), 1.565(7)(622).

The mineral is always anhedral and forms yellow to yellowish-brown, rarely greenish, earthy crusts on quartz, barite and variegated sandstone. Sometimes it is in association with corroded tetrahedrite-tenantite. It has no cleavage and a probable hardness of 4–5. Optically isotropic with $n = 2.09 \pm 0.01$.

It is a secondary mineral that occurs as encrustations on samples from the Clara mine and from the mine dumps at Neubulach in the Black Forest. In the district of Neubulach it is intergrown with beyerite, atelestite and preisingerite. The mineral is an alteration product of Bi-containing tetrahedrite-tenantite.

The name is derived from its being a Bi member of the stibiconite group. W. M.

Cabriite*

T. L. Evstigneeva and A. D. Genkin (1983) Cabriite Pd_2SnCu , a new species in the mineral group of palladium, tin and copper compounds. *Can. Mineral.*, 21, 481–487.

Analyses by six analysts using three different electron microprobes gave Pd 55.5, 51.0, 51.4, 49.5, 53.5, 52.1; Pt -, 1.0, 3.3, 7.1, 3.7, 2.6; Sn 27.5, 30.0, 28.0, 29.2, 29.5, 30.0; Cu 16.0, 16.0, 12.7, 15.2, 15.3, 16.2, Ag -, 2.0, 0.5, -, -, -; Sb 2.2, 1.0, 1.4, -, -, -; totals 101.2, 101.0, 97.3, 101.0, 102.0, 100.9%; corresponding to a general formula of $(\text{Pd,Pt,Ag})_2(\text{Sn,Sb})\text{Cu}$ or, ideally, Pd_2SnCu .

X-ray study (Gandolfi camera, Fe radiation) shows that the mineral may be indexed as orthorhombic, space group $Pnmm$, $a \sim b \sim 7.88$ (5), $c = 3.94(2)\text{\AA}$, $Z = 4$, D calc. 11.1 (4th analysis), for ideal composition D calc. 10.7. The strongest X-ray lines (18 given) are 2.29(10)(221), 2.17(9)(230,301), 1.840(3b)(330,112), 1.434(3b)(151), 1.230(8)(161,450,502,342,123), 1.217(4)(152), 1.182(3)(223,261).

Cabriite is characteristically found in massive Cu–Ni sulfide ores of the Oktyabr'sk deposit (Noril'sk district, USSR), especially those rich in mooihoeite, putoranite and talnakhite. The

mineral usually occurs as individual grains up to 200 μm , but it is sometimes closely intergrown with polarite, sobolevskite, sperylite and other platinum-group minerals. In galena–chalcopyrite vein ores, cassiterite and stannite are associated with cabriite.

The mineral has been synthesized and disorders at 200°C to form cubic $(\text{Pd,Cu})_3\text{Sn}$ solid solution.

In polished section the mineral is white with a slight greyish (pinkish?) tinge the brightness of the pink color changes depending on the host minerals. Bireflectance in air is detectable, and under crossed nicols, cabriite grains are strongly anisotropic (from greyish brown to golden colors). Cabriite characteristically exhibits a shreddy-aggregate texture, and individual grains are polysynthetically twinned. Reflectance values are given for three grains and for analysis No. 1 are (R_2, R_1, nm) 43.0, 42.4, 440; 43.4, 43.0, 460; 44.7, 44.0, 480; 46.5, 45.5, 500; 48.4, 46.8, 520; 50.0, 48.2, 540; 51.7, 50.0, 560; 53.2, 51.4, 580; 55.2, 53.2, 600; 57.2, 55.0, 620; 59.4, 57.2, 640; 61.9, 59.6, 660; 64.5, 62.0, 680; 67.0, 64.8, 700; 69.3, 67.3, 720; 71.9, 70.0, 740. Micro-indentation hardness with a 5 g load was 272(258–282).

The name is in honor of Canadian mineralogist, Louis J. Cabri. Polished sections with cabriite are preserved in the Mineralogical Museum of the Academy of Sciences of the USSR, in the Mineragraphy Laboratory of IGEM, Academy of Sciences of the USSR, both in Moscow and in the National Mineral Collection, Geological Survey of Canada, Ottawa. L. J. C.

Ferronickelplatinum*

N. S. Rudashevski, A. G. Mochalov, Y. P. Men'shikov, and N. I. Shumskaya (1983) Ferronickelplatinum, Pt_2FeNi , a new mineral species. *Zapiski Vses. Mineralog. Obsh.*, 112, 487–494 (in Russian).

Analyses of six grains in one polished section by electron microprobe gave Pt 75.7–77.6, Fe 10.4–11.0, Ni 10.2–11.7, Ir 0.27–0.69, Cu 0.33–0.36, totals 98.41–100.76 corresponding to $(\text{Pt}_{2.016}\text{Ir}_{0.012})\text{Fe}_{0.983}(\text{Ni}_{0.962}\text{Cu}_{0.027})$ or, ideally, Pt_2FeNi . Analyses of another 4 grains gave variable but low contents of Ru, Rh, Pd and Co and also suggest a continuous series with tulameenite because of variable Cu/Ni contents.

X-ray powder data (Fe radiation) shows that the pattern is similar to tetraferroplatinum and tulameenite so that it is indexed as tetragonal, $a = 3.871(4)$, $c = 3.635(5)\text{\AA}$, $Z = 1$. The strongest X-ray lines (14 given) are 2.192(10)(111), 1.935(5)(020), 1.699(3)(021), 1.324(4)(022), 1.157(3b)(013).

The mineral was found in the heavy fraction of Quaternary alluvial deposits associated with ultramafics from the ophiolite belt of the Koryak-Kamchatska folded region, northeastern USSR. It occurs in intergrowths of platinum-group minerals which occur as unrounded or slightly rounded (nodule-like) grains ranging in size from 0.2–4.5 mm. Ferronickelplatinum occurs as a minor constituent, together with isoferroplatinum

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

and tetraferroplatinum in intergrowths which may consist up to 90–95% of rutheniridosmine and a solid solution of (Pt,Ru,Ir,Os) of up to 30–70%. The Pt–Fe–Cu–Ni minerals also contain inclusions of laurite, irarsite, cooperite, sperrylite, hollingworthite and unnamed RhAs and RhNiAs. Chromite and olivine are also intergrown. Monomineralic areas of the new mineral do not exceed 0.15 mm. It is intensely etched only by hot aqua regia.

The mineral is ductile, polishes well and fragments are silvery-white with a metallic luster. In polished section the mineral has a rosy-cream color, imperceptible birefractance and is weakly anisotropic. Reflectance values (for the grain whose analysis is reported above) are (R , nm) 56.5,420; 56.4,440; 56.8,460; 57.0,470; 57.4,480; 58.2,500; 58.7,520; 59.0,540; 59.1,546; 59.3,460; 59.7,580; 60.0,589; 60.2,600; 60.5,620; 60.9,640; 61.2,650; 61.4,660; 62.0,680; 62.8,700; 63.4,720; 64.0,740. Microindentation hardness with a 50 g load is 481(381–592).

The name is after the composition. Polished sections containing the mineral are preserved in the Museum of the Leningrad Mining Institute. L. J. C.

Genèveite

H. Sarp and J. Deferne (1983) "Geneveite" or theisite? Arch. Sc. Genève, 36, 163–168 (in French).

Analysis of the mineral (atomic absorption and H₂O by thermal analysis) gave CuO 36.42, ZnO 29.53, CaO 1.05, As₂O₅ 18.47, H₂O 13.97, sum 99.45 corresponding to (Cu_{5.00}Zn_{3.96}Ca_{0.19})_{Σ9.15}As_{1.747}O_{13.51} · 8.48H₂O on the basis of 22 oxygens or ideally (Cu,Zn)₉As₂O₁₄ · 8H₂O or (Cu,Zn)₉(AsO₄)₂(OH)₁₂ · 2H₂O.

The X-ray powder pattern is similar to theisite and is indexed on a hexagonal cell with $a = 8.26$, $c = 14.70$ Å, space group $P6mm$, $Z = 2$, D meas. 3.45 calc. 4.19. The strongest X-ray lines (31 given) are 14.69(35)(001), 7.35(50)(002), 4.117(35)(110), 3.672(60)(004), 2.530(100)(122), 2.172(30)(214), 1.810(35)(126,027), 1.557(30)(141,136).

The mineral occurs as blue to blue-green botryoidal aggregates (to 0.3 mm diameter) of thin hexagonal plates (0.07 × 0.07 × 0.005 mm). It has a vitreous luster and a basal cleavage. It is soluble in HCl and non-fluorescent in U.V. light. Optically, biaxial negative, $\omega = 1.790$, $\epsilon = 1.770$ with a slight pleochroism.

Genèveite is associated with tyrolite and quartz on a dolomite matrix. The specimen is from Tyrol, Austria and is part of the Genève Museum collection, hence its name.

Discussion:

This mineral was not accepted by the IMA. It is chemically very similar to theisite, Cu₅Zn₃[(As, Sb)O₄]₂(OH)₁₄. Theisite contains 7.0 wt.% Sb₂O₅ but the crystal chemical significance of this awaits a structure analysis and it does not differentiate genèveite from theisite at present. There were no single crystal studies for theisite (Mineral. Mag., 46, 49–50; Am. Mineral., 68, 282) and although the author stated that the X-ray powder pattern could be indexed in the hexagonal system, the data were presented in the orthorhombic system. For genèveite single crystal studies confirmed the hexagonal cell. There are minor differences between the two minerals in the X-ray powder pattern but further comparative studies are needed to warrant genèveite as a valid species. J. D. G.

Keiviite*

A. V. Voloshin, Ya. A. Pakhomovsky, F. N. Tyusheva (1983) Keiviite Yb₂Si₂O₇, a new ytterbium silicate from amazonitic pegmatites of the Kola Peninsula. Mineralog. Zhurnal, 5–5, 94–99 (in Russian).

Microprobe analyses (first generation: individual platy crystals, centers of zoned crystals; second generation: margins of zoned crystals, small spherulites growing on zoned crystals of first generation, radial aggregations of platy crystals, respectively) gave: Yb₂O₃ 55.06, 52.18, 43.42, 40.25, 34.57; Lu₂O₃ 8.97, 9.33, 6.55, 6.00, 5.22; Er₂O₃ 6.24, 6.51, 11.44, 9.38, 9.85; Tm₂O₃ 3.10, 2.99, 2.31, 3.14, 3.19; Dy₂O₃ 1.23, 2.05, 1.47, 4.28, 3.86; Ho₂O₃ 0.65, 0.80, 0.77, 1.16, 1.26; Tb₂O₃ 0.04, 0.04, 0.04, 0.04, 0.04; Gd₂O₃ 0.06, 0.09, 0.07, 0.29, 0.15; Y₂O₃ 1.02, 1.70, 9.32, 8.87, 15.42; CaO 0.03, 0.03, 0.03, 0.10, 0.07; FeO 0.00, 0.00, 0.00, 0.09, 0.09; SiO₂ 23.47, 23.58, 24.20, 26.03, 26.71; sum 99.87, 99.30, 99.62, 99.63, 100.40, corresponding to the formula (Yb_{1.43}Lu_{0.23}Er_{0.17}Tm_{0.08}Y_{0.05}Dy_{0.03}Ho_{0.02})_{Σ2.01}Si_{1.99}O₇. Cleavage cracks and surfaces of some crystals are covered with iron oxides, causing the presence of iron in two analyses.

X-ray powder pattern and physical properties are given for the crystals of first generation. X-ray powder pattern is identical with synthetic Yb₂Si₂O₇ and was indexed by analogy with it. It yields monoclinic, space group C_2/m , $a = 6.840(2)$, $b = 8.916(4)$, $c = 4.745(1)$ Å, $\beta = 102.11(3)^\circ$, $Z = 2$. The strongest X-ray lines (78 given) are: 4.64(8)(001), 3.24 (10)(111), 3.20(10)(021), 3.03(9)($\bar{2}01$), D meas. 5.95, calc. 5.99. IR spectrum of the mineral is similar to that of synthetic Yb₂Si₂O₇.

The mineral is colorless, transparent. Luster vitreous. Cleavage {110} perfect, {001} imperfect. Optically biaxial, negative, $2V = 58^\circ$, strong dispersion $r < v$, $\alpha = 1.723$, $\beta = 1.758$, $\gamma = 1.768$; $b = X$, $a \wedge Y = 7-8^\circ$, $c \wedge X = 3-5^\circ$. Extinction angle of polysynthetic twins = 33° . No fluorescence in UV light, faint green luminescence in cathode rays. Hardness 8632.8–9025.2 MPa (100 g load). The mineral dissolves in cold HCl.

Keiviite occurs as elongated platy and prismatic crystals within violet fluorite in amazonitic pegmatites of the Kola Peninsula. Polysynthetic twins are common. Two generations of the mineral are present. It is associated with fluorite, bastnaesite and hingganite.

The name is for the place Keiva in the Kola Peninsula. Type material is at the A. E. Fersman Mineralogical Museum, Acad. Sci. USSR (Moscow). J. P.

Lithiotantite*

A. V. Voloshin, Ya. A. Pakhomovskii, V. I. Stepanov, F. N. Tyusheva (1983) Lithiotantite Li(Ta,Nb)₃O₈—a new mineral from granite pegmatites in Eastern Kazakhstan. Mineral. Zhurnal, 5, 1, 91–95.

Analysis by electron microprobe (Li₂O by atomic absorption) gave Ta₂O₅ 71.55, Nb₂O₅ 24.96, SnO₂ 0.57, Li₂O 2.33, sum 99.41%, corresponding to Li_{0.92}(Ta_{1.90}Nb_{1.10})O₈. IR spectra show a broad absorption band from 600 to 700 cm⁻¹, containing two weak maxima, and several additional bands. The spectra are complicated, however, by mineral inclusions.

X-ray study shows the mineral to be monoclinic, space group $P2_1/c$, unit cell $a = 7.444$, $b = 5.044$, $c = 15.255$ Å, $\beta = 107.18^\circ$, $Z = 4$, D calc. 7.08, meas. 7.0. The strongest lines (74 given) are 2.96(100)($\bar{2}12,014$); 1.772(60)(206); 1.722(80)($\bar{2}26$); 1.45(80)(232,226,21,10).

The mineral forms equant, poorly formed crystals up to 0.4 mm, in thoreaulitized edge zones of microcline-albite pegmatites of Eastern Kazakhstan. Associated minerals are cassiterite, renkamaite and thoreaulite, and rare fractures through lithiotantite contain lepidolite, apatite and albite. Lithiotantite is colorless, transparent, but stained creamy pink and brownish pink by cassiterite inclusions. Luster adamantine, fracture conchoidal to uneven, moderately brittle, cleavage absent, H 6–6.5. Microhardness measured with a 40 g load: 1200 kg/mm². Weak yellow-green cathodoluminescence, no ultraviolet luminescence. Strong birefringence, $n_s > 1.9$, optic sign undetermined owing to strong dispersion. In reflected light, greyish-white without pleochroism, weakly anisotropic. Reflectances vary from 18.3 to 19.1%, depending on wavelength.

The name is for the chemical composition. Samples with lithiotantite are in the A. E. Fersman Mineralogical Museum, Acad. Sci. USSR. D. A. V.

Phosphofibrite*

K. Walenta and P. J. Dunn (1984) Phosphofibrite, ein neues Eisenphosphat aus der Grube Clara im mittleren Schwarzwald (BRD). *Chemie der Erde*, 43, 11–16.

Combined electron microprobe and microchemical analyses gave K₂O 1.9, CuO 2.6, Fe₂O₃ 46.6, Al₂O₃ 1.5, P₂O₅ 34.0, H₂O 13.4 (by difference), sum 100.0%, corresponding to K_{1.00}Cu_{0.81}(Fe_{14.52}Al_{0.73})Σ_{15.23}P_{11.92}O_{47.68}(OH)_{12.36} · 12.33H₂O, or ideally KCuFe₁₅³⁺(PO₄)₁₂(OH)₁₂ · 12H₂O. The mineral is relatively soluble in cold HCl but is unaffected by warm dilute HNO₃.

X-ray study shows the mineral to be orthorhombic, space group *Pbmn* or *Pnmm*, unit cell $a = 14.40$, $b = 18.76$, $c = 10.40$ Å, $Z = 2$. The strongest lines (29 given) are 9.50(100)(020); 4.35(50)(301,122); 3.23(60)(023,421); 3.13(60)(242,060,203,430); 2.99(50)(061,431,151,133); 2.77(50)(252,233,313,501,261,441,520,511,143).

Phosphofibrite occurs as radial aggregates of fibrous crystals reaching 0.5 mm in length among the secondary minerals at the Clara mine in the central Black Forest, Germany. It is found with beraunite, strengite, and barium-pharmacosiderite on quartz. It is yellow or yellowish green, weakly translucent, luster vitreous, more or less perfect cleavage along one pinacoid. H about 4. D 2.90 (hydrostatic suspension), 2.94 (calc.) from X-ray data. Optically biaxial, negative, $\alpha = 1.755$, $\gamma = 1.790$ (both ± 0.004), moderate $2V$, $r \ll v$, Y parallel to the long direction of the crystal.

The mineral name is taken from its chemistry and crystal habit. Phosphofibrite is structurally related to kidwellite. J. E. S.

Protojoseite

E. M. Zav'lyalov and V. D. Begizov (1983) New data on the constitution and nomenclature of the sulfotellurides of bismuth of the joseite group. *Zapiski Vses. Mineral. Obsh.*, 112, 589–601 (in Russian).

Examination of 24 museum samples from 13 deposits worldwide shows that joseite (joseite A) corresponds well with the theoretical formula Bi₄TeS₂ and that mutual substitution of Te for both Bi and S extends the solid-solution field to Bi_{4+x}Te_{1-x-y}S_{2+y} (where $x = 0.08$ to 0.33, and $y = -0.11$ to 0.09). Substitutions of Pb for Bi, and Se for S are minor. Joseite B,

theoretically Bi₄Te₂S, shows a field of solid solution corresponding to Bi_{4+x}Te_{2-x}S (where $x = -0.04$ to 0.11). A third sulfotelluride, protojoseite, was found in two samples from Rezbanya, Roumania, and in two from the Malishevskii Izumrydrye pit, Urals; eight microprobe analyses gave compositions which indicate that the theoretical formula, Bi₃TeS, extends to Bi_{3+x}Te_{1-x-y}S_{1+y} (where $x = -0.02$ to 0.14, and $y = -0.05$ to 0.17). Substitutions of Pb for Bi, and Se for S are minor. The solid solution fields of joseite A, joseite B, and protojoseite do not overlap; the individuality of the three minerals also is suggested by their coexistence in one sample.

The crystal structure of joseite A was determined by M. A. Peacock in 1941: hexagonal, *R3m*, $a = 4.25$, $c = 39.77$ Å. The structural motif, strongly reflected in systematic variations in the X-ray powder pattern, leads to a dimensionally similar cell, but different space group, for joseite B. The X-ray pattern of protojoseite is reminiscent of that of joseite-B, but many lines are displaced, split, or new. The strongest lines for protojoseite (57.3 mm camera, Fe rad.) are: 3.15(10)(1.0.1.10), 2.29(7)(1.0.1.20), 1.571(4)(2.0.2.20), 1.441(4)(1.1.2.30), 1.379(4)(1.2.3.10), 1.251(4)(3.0.3.30). Utilization of the basic structural motif and indexing of powder patterns from four protojoseite samples gave a hexagonal cell with $a = 4.330$ to 4.340, $c = 57.65$ to 58.19 Å; assuming $Z = 6$ and 5 atoms in the formula, D calc. is 8.48 to 8.52 g/cm³. Calculated densities of joseite-A and joseite-B are in this range, but with $Z = 3$.

Discussion

Thorough documentation of the microprobe and X-ray powder data, and their interpretations, but no physical or optical properties are given. The material is apparently suitable for single-crystal X-ray study; confirmation of the cell dimensions, especially the large but plausible c value, is highly desirable and a fuller description is needed. The new name appears in the paper four times, twice as proto-joseite. J. L. J.

Strontio-chevkinite*

S. E. Haggerty and A. N. Mariano (1983). Strontian-loparite and strontio-chevkinite: two new minerals in rheomorphic fenites from the Parana Basin carbonatites, South America. *Contrib. Mineral. Petrol.*, 84, 365–381.

Analyses by electron microprobe gave (average of 32 analyses) TiO₂ 23.16, SiO₂ 20.45, ZrO₂ 10.3, FeO 6.0, CaO 2.0, SrO 19.6, La₂O₃ 9.18, Ce₂O₃ 9.35, and minor amounts of Nb₂O₅, Al₂O₃, Cr₂O₃, MnO, MgO, BaO, Na₂O, K₂O, PbO, and Y₂O₃ (totalling 0.84%), sum = 100.85%, corresponding to (Sr)₂[La,Ce]_{1.5}Ca_{0.5}(Fe_{0.5}²⁺Fe_{0.5}³⁺)(Ti,Zr)₂Ti₂Si₄O₂₂, the strontium analog of chevkinite.

X-ray study shows the mineral to be monoclinic, space group *P2₁/a*, with $a = 13.56$, $b = 5.70$, $c = 11.10$ Å, $\beta = 100.32^\circ$, $V = 844.86$ Å³. The strongest X-ray diffraction lines (34 given) are 3.01(100)(401), 1.97(75)(024), 2.19(70)(421), 2.51(40)(022), 2.73(30)(004), 2.85(25)(020) Å. Calculated density is 5.44 g/cm³.

The mineral is opaque in 30 μm polished thin sections, gray in reflected light, and strongly anisotropic in shades of gray, with a characteristic flesh-red color. Reflectivity is estimated, by comparison with strontian-loparite, at =10% in air and ≈2% in oil. It has a submetallic luster and is typically twinned in thick parallel lamellae or as interpenetration twins.

Strontio-chevkinite occurs as rounded grains, up to 1.5 mm in

diameter, associated with strontian-loparite (tausonite) and lamprophyllite in fenite from Sarambi, Paraguay.

The name is from the chemical and crystallographic relation to chevkinite. Type material is deposited at the Smithsonian Institution, Washington, D. C., and the British Museum (Natural History), London. J. A. F.

Tantite*

A. V. Voloshin, Ya. A. Pakhomovskii, G. A. Perlina (1983) Tantite Ta_2O_5 —a new mineral from granitic pegmatites of the Kola Peninsula. Mineral. Zhurnal, 5, no. 3, 90–93.

Analysis by electron microprobe gave Ta_2O_5 98.28, Nb_2O_5 1.36, TiO_2 0.08, sum 99.72%, corresponding to $(Ta_{1.952}Nb_{0.045}Ti_{0.004})O_5$. Backscattered electron images and maps of characteristic X-rays indicate a high degree of homogeneity for the major elements.

X-ray study shows the mineral to be triclinic, unit cell $a = 3.80(2)$, $b = 3.79(2)$, $c = 35.74(4)\text{\AA}$, $\alpha = 90.92^\circ$, $\beta = 90.18^\circ$, $\gamma = 90^\circ$, $Z = 6$, D calc. 8.45. The strongest lines (33 given) are 3.01(100b)(017), 2.429(50)($\bar{1}\bar{1}6$), 1.844(90b)(024, $\bar{1}0.17$), 1.573(80)($0\bar{2}.13$), 1.004(50)($\bar{1}\bar{3}.19, \bar{2}\bar{3}.11$).

The mineral forms veinlets 0.5 mm long and 0.02 mm wide, and 0.04 to 0.05 mm lenticular segregations, as well as interstitial material in microlite crystal aggregates, in granitic pegmatites of the Kola peninsula. Associated minerals are stibiotantalite, holtite, and a $CaTa_4O_{11}$ phase. Tantite is colorless, transparent, adamantine luster, cleavage absent. Microhardness measured with a 20 g load is 1300 MPa. Weak blue cathodoluminescence, no ultraviolet luminescence. In reflected light, greyish-white and anisotropic. Reflectances vary from 14.2 to 17.5%, depending on crystal orientation and wavelength.

The name is for the chemical composition. Samples are in the A. E. Fersman Mineralogical Museum, Acad. Sci. USSR. D. A. V.

Tusionite*

S. I. Konovalenko, A. V. Voloshin, Ya. A. Pakhomovskii, S. A. Anan'ev, G. A. Perlina, D. L. Rogachev, V. Ya. Kuznetsov (1983) Tusionite $MnSn(BO_3)_2$ —a new borate from granite pegmatites of the southwest Pamirs. Doklady Akad. Nauk SSSR, 272, 1449–1453.

Analysis by electron microprobe gave MnO 20.46, FeO 3.57, CaO 0.39, SnO_2 52.45, B_2O_3 23.51, H_2O not detected, sum 100.39, corresponding to $(Mn_{0.84}Fe_{0.15}Ca_{0.02})Sn_{1.02}B_{1.97}O_6$. The DTA curve shows endothermic peaks up to 1050°C, as well as weak exothermic peaks interpreted as evidence for oxidation of Fe and Mn. Heating above 1050°C results in fusion and effervescence. IR spectra show absorption bands at 1250, 960, 765, 742, 675 and 450 cm^{-1} , identical to synthetic $MnSn(BO_3)_2$ except for minor shifts owing to displacement of BO_3 groups as a result of the Fe content of natural tusionite.

X-ray studies by powder diffractometry and single crystal techniques show the mineral to be trigonal, space group $R\bar{3}$, $a = 4.787 \pm 0.005$, $c = 15.30 \pm 0.02\text{\AA}$, $Z = 3$, D calc. 4.85, meas. 4.73. The strongest lines (21 given) are 3.65(90)(102), 2.818(100)(014), 2.393(60)(110), 1.999(60)($\bar{2}02$), 1.744(80)(116). Isostructural with dolomite.

The mineral occurs as lamellar intergrowths up to 1.5 cm with

tetrawickmanite, and as small tabular crystals in miarolitic cavities associated with tourmaline, danburite, hambergite, quartz, orthoclase and albite, in the axis of granitic pegmatites. The pegmatites cut Precambrian garnet-biotite gneiss in the Tusion River valley of the Pamir mountains. The mineral is yellow-brown to colorless, vitreous luster, transparent and translucent. Cleavage perfect {001}. Microhardness determinations under a load of 40 g vary, according to orientation, from 400 to 750 kg/mm^2 . Reflectance varies from 9.0 to 12.0%, according to crystal orientation and wavelength. Optically uniaxial, negative, $n_s \omega = 1.854$, $\epsilon = 1.757$ (both ± 0.002). No cathodoluminescence or ultraviolet luminescence.

The name is for the Tusion River, near the occurrence. Samples containing tusionite are in the Mineralogical Museum, Acad. Sci. USSR, Moscow. D. A. V.

Vyuntspakhite*

A. V. Voloshin, Ya. A. Pakhomovsky, Yu. P. Menshikov, A. S. Povarennykh, D. L. Rogachev (1983) Vyuntspakhite $Y_4Al_2AlSi_5O_{18}(OH)_5$, a new yttrium-aluminum silicate from amazonite pegmatites of the Kola Peninsula. Mineralog. Zhurnal, 5–4, 89–94 (in Russian).

Microprobe analyses gave (crystals of first generation and crystals of second generation—in one specimen, crystals of second generation from voids, crystals of second generation from veinlets, respectively): Y_2O_3 17.76, 21.18, 23.13, 34.66; Yb_2O_3 22.80, 17.65, 15.35, 7.03; Er_2O_3 6.86, 6.31, 6.58, 3.22; Dy_2O_3 2.67, 3.93, 3.84, 1.65; Lu_2O_3 3.40, 2.10, 2.49, 0.89; Tm_2O_3 2.05, 1.92, 1.61, 0.70; Gd_2O_3 0.28, 0.61, 0.32, 0.24; Ho_2O_3 0.22, 0.23, 0.67, 0.32; Tb_2O_3 0.37, 0.31, 0.27, 0.00; Al_2O_3 13.64, 13.69, 12.85, 14.39; SiO_2 26.15, 27.84, 29.14, 31.64; H_2O (by difference) 3.90, 4.23, 3.75, 5.26, sum 100.00 in all. IR spectrum shows the presence of SiO_4 , AlO_4 and AlO_5 polyhedra in the structure. The ideal formula of the mineral is $Y_4Al_2AlSi_5O_{18}(OH)_5$.

Single crystal X-ray study shows the mineral to be monoclinic, space group $P2_1/c$, $a = 5.830(2)$, $b = 14.763(4)$, $c = 6.261(2)\text{\AA}$, $\beta = 123.05(2)^\circ$, $Z = 1$. D calc. = 4.04, meas. = 4.02. The strongest X-ray lines (85 given) are: 7.40(6)(020), 4.98(6)($1\bar{1}\bar{1}$), 4.92(6)(110), 3.47(10)($0\bar{3}\bar{1}$), 2.604(8)(200.212).

The mineral is colorless, transparent. Luster adamantine. No cleavage. Brittle. H 6–7. Optic axial, positive. $2V$ meas. 68° , calc. 66° , optical axes plane (010), $\alpha = 1.680$, $\beta = 1.692$, $\gamma = 1.720$, $Z \wedge a = 68^\circ$, $X \wedge c = 40^\circ$. No fluorescence in UV light. Varieties rich in Y have faint yellow-green luminescence in cathode rays.

Vyuntspakhite forms 0.5–0.7 mm long and 0.05–0.2 mm thick slender prismatic crystals in small cavities within violet fine-grained fluorite in amazonite pegmatites of the Kola Peninsula. It is associated with fluorite, xenotime, and bastnaesite. Two generations of the mineral were found.

The name is for the mountain Vyuntspakh in the Kola Peninsula. Type material is at the A. E. Fersman Mineralogical Museum Acad. Sci. USSR (Moscow). J. P.

Walentaite*

P. J. Dunn, D. R. Peacor, W. L. Roberts, T. J. Campbell, and R. A. Ramik (1984) Walentaite, a new calcium iron arsenate phosphate from the White Elephant Mine, Pringle, South Dakota. Neues Jahrb. Mineral. Monatsh., 169–174.

Microprobe, microchemical, and TGA-EG analyses, when normalized, gave Al_2O_3 0.5, Fe_2O_3 28.3, FeO 3.2, CaO 2.9, MnO 3.1, As_2O_5 32.9, P_2O_5 12.5, H_2O 16.6, sum 100.0%. Trace amounts of F were also detected. This corresponds to a proposed chemical formula ($Z = 1$) of $\text{H}_{0.47}(\text{Ca}_{1.70}\text{Mn}_{1.44}\text{Fe}_{1.47}^{2+})_{\Sigma 4.61}(\text{Fe}_{11}^{3+})_{\Sigma 11.67}\text{Al}_{0.32}\text{As}_{11.99}(\text{AsO}_4)_{9.42}(\text{PO}_4)_{5.80} \cdot \sim 30.09\text{H}_2\text{O}$, or ideally $\text{H}_4(\text{Ca}, \text{Mn}, \text{Fe})_4\text{Fe}_{12}^{3+}(\text{AsO}_4)_{10}(\text{PO}_4)_6 \cdot \sim 28\text{H}_2\text{O}$. This formula is considered tentative pending structural study when more suitable material is found. On heating, water loss took place at 21°C (dehydration), and then between 60–230°C and 230–480°C with corresponding H_2O pressure maxima at 175 and 337°C. This was followed by arsenate decomposition between 480–955°C.

X-ray study by Weissenberg and precession methods shows the mineral to be body-centered orthorhombic, space group $I222$, $I2_12_12_1$, $Im2$, $Ima2$, $Immm$, or $Imam$. Unit-cell parameters are $a = 26.24(6)$, $b = 10.31(1)$, and $c = 7.38(1)\text{Å}$. The strongest lines (31 given) are 12.9(100)(200), 6.56(20)(400), 4.82(20)(220), 4.43(30)(411), and 3.00(50)(022).

Walentaite is bright yellow with a vitreous luster and a yellow streak. Cleavage perfect {010}. H (est.) approximately 3. D 2.72 (heavy liquid), 2.72 (calc.). The mineral is brittle with no discernible UV fluorescence. It forms rosette-like aggregates of thin, bladed crystals approximately $20 \times 60 \times 1\text{--}2\ \mu\text{m}$ in size which are elongate on [001] and flattened perpendicular to b so that {010} is the dominant form. It can also occur as coatings on other minerals. Optically biaxial positive, $\beta = 1.738(4)$, $\gamma = 1.779(4)$; α and $2V$ could not be determined. Weakly pleochroic with $Z =$ medium yellow-green, $Y =$ pale yellow green; absorption $Z < Y$; orientation $Z = c$, $Y = a$; dispersion not discernible.

The mineral occurs in several distinct parageneses in a portion of the White Elephant Mine, near Pringle, Custer County, South Dakota, where primary phosphates and arsenides had been extensively altered. Associated minerals include frondelite, rockbridgeite, loellingite, spessartine, quartz, tridymite, and muscovite. Based on its occurrence with tridymite, it is suggested that walentaite and its associated secondary phosphates were not derived by interaction of primary phosphates with late-stage pegmatitic fluids. Rather, they apparently originated due to the interaction of supergene solutions with primary phosphates at relatively recent times when erosion caused the pegmatite to interact with near-surface waters.

The name is for Dr. Kurt Walenta of the University of Stuttgart. Type material is preserved at the Smithsonian Institution, Washington, D. C. J. E. S.

Xitianshanite*

L. Xilin, Z. Jingliang, and L. Jiaju (1983) Xitianshanite—a new ferric sulphate mineral. *Geochemistry (China)* 2, 261–267.

Analysis of the mineral gave Fe_2O_3 26.15, FeO 0.18, Al_2O_3 0.01, MgO 0.03, CaO 0.09, K_2O 0.03, Na_2O 0.07, SO_3 27.69, H_2O 45.02, sum 99.27%, corresponding to $(\text{K}_{0.01}\text{Na}_{0.03})_0.04(\text{Fe}_{0.03}^{2+}\text{Mg}_{0.01}\text{Ca}_{0.02})_{0.06}(\text{Fe}_{3.83}^{3+}\text{Al}_{0.002})_{3.83}\text{S}_{4.05}\text{H}_{58.47}\text{O}_{47.19}$, or $\text{Fe}^{3+}(\text{SO}_4)(\text{OH}) \cdot 7\text{H}_2\text{O}$. The mineral is soluble in cold water or dilute acids. The DTA curve shows strong endothermic peaks at 85° and 170°C (dehydration), a weak endothermic peak at 460°C (loss of OH), and a strong endothermic peak at 735°C (loss of SO_3). These results are supported by the three-step weight loss as determined by TGA methods. The infrared spectrum shows molecular H_2O and SO_4 .

Single-crystal X-ray study shows the mineral to be monoclinic,

space group $P2_1/a$, unit cell $a = 14.102$, $b = 6.908$, $c = 10.673\text{Å}$, $\beta = 111.266^\circ$, $V = 968.9\text{Å}^3$, $Z = 4$. The strongest lines (88 given) are 6.67(60)($\bar{2}01$), 6.09(50)(110), 5.69(50)(011), 4.96(100)(002), 4.81(100)($\bar{2}11$), and 3.90(90)(211).

The mineral occurs in small amounts as rhombic rectangular crystals or massive aggregates up to $2 \times 2\text{ cm}$. It is bright green with a light yellow tint, translucent to nearly transparent, streak yellow, cleavage imperfect, fracture uneven to conchoidal. H (VHN) = 62.6 kg/mm^2 , corresponding to 2.7 (Mohs). D 1.98 (torsion balance), 1.99 (hydrostatic suspension), 2.02 (calc.). Optically biaxial negative, $\alpha = 1.536$, $\beta = 1.570$, $\gamma = 1.628$, $2V = 77^\circ$ (calc.), strongly pleochroic, $X =$ colorless to pale yellow, $Y =$ pale yellow, $Z =$ light yellow with a greenish tint, $r > v$, extinction parallel or inclined, elongation positive or negative.

Xitianshanite occurs in the middle to lower parts of the oxidation zone of the Xitianshan Pb-Zn deposit in the Qaidam Basin of Qinghai Province, China. It is closely associated with copiapite, roemerite, coquimbite, amarillite, sideronatrite, melanterite, and others. The name is for the deposit. Samples are preserved at the Museum of Geology, Beijing and at the Exhibition Hall of the Institute of Geochemistry, Academia Sinica, Guiyang, Guizhou Province, China. J. E. S.

Unnamed aluminum sulfate

Srebrodol'skiy, B. I. (1976) Transformation of aluminum and iron sulfates. *Doklady Earth Science Sections*, 228, 106–107 [English translation of *Doklady Akademii Nauk SSSR*, 228, 185–187 (1976)]

Chemical analysis of the mineral gave Al_2O_3 13.84, Fe_2O_3 7.19, FeO 0.29, MgO 1.69, CaO 2.92, Na_2O 0.39, K_2O 2.41, H_2O 6.93, SO_3 49.51, insol. res. 15.1, total 100.22%. After deduction of contaminating gypsum, quartz and kieserite, this yields $(\text{Al}_{1.52}\text{Fe}_{0.50})_{2.02}(\text{SO}_4)_3 \cdot 1.2\text{H}_2\text{O}$, or ideally $\text{Al}_2(\text{SO}_4)_3 \cdot \text{H}_2\text{O}$.

The DTA curve exhibits a small endothermic peak at 100°C (evolution of hygroscopic H_2O), and a significant reaction at 840°C (evolution of SO_3). The infrared spectra has bands at 3450, 1650, 1125, and 600 cm^{-1} . No X-ray data given.

It occurs as a white, light, porous, pumiceous mineral covering joint walls in coal-bearing rocks at points of seepage of hot gases from spontaneously-ignited spoil heaps of coal mines in the L'vov-Volyn' basin, U.S.S.R., associated with millosevichite, $(\text{Al}, \text{Fe})_2(\text{SO}_4)_3$, quartz, gypsum, and kieserite. Luster vitreous, $n = 1.57$, H 1.5.

The mineral is insoluble in H_2O , dissolves in dilute HCl. When stored in the laboratory, the monohydrate is transformed into two higher hydrates containing 10 and 13.5 H_2O . Chemical analyses and physical properties are given for these two phases.

Discussion

A white hexagonal mineral, $\text{Al}_2(\text{SO}_4)_3$, was reported from burning anthracite mines and dumps in Pennsylvania [Amer. Mineral. 66, 1279(1981)]. J.A.F.

Unnamed freudenbergite-related mineral

S. E. Haggerty (1983) A freudenbergite-related mineral in granulites from a kimberlite in Liberia, West Africa. *Neues Jahrb. Mineral. Monatsch.*, 375–384.

Microprobe analysis of the mineral gave TiO_2 80.10, 80.75;

Cr₂O₃ 0.08, 0.22; Al₂O₃ 0.01, 0.27; FeO 9.20, 7.69; MgO 0.75, 1.41; MnO 0.02, 0.01; CaO 0.42, 0.28; BaO 0.59, 0.52; Na₂O 8.75, 9.11; K₂O 0.06, 0.03; sum 99.98%, 100.29%, corresponding to Na₂FeTi₇O₁₆.

No X-ray data were provided.

The mineral forms a very "distinctive gray" optically anisotropic mantle (50–150 μm) thick on cores of rutile. No other mineral data are provided.

It is concluded that this is the ferrous iron analog of freudenbergite [Na₂(Ti,Fe)₈O₁₆]; however, the lack of X-ray data prevents the confirmation of this identification.

The mineral is intimately associated with rutile, perovskite, titanite, and ilmenite in lower crustal garnet-clinopyroxene-plagioclase xenoliths entrained in a kimberlite from Liberia. The kimberlite field lies along the 11° W parallel, 7–8° N latitude in the southern portion of the West Africa bulge. These bodies are Cretaceous (≅129 m.y.), are diamond-bearing, and are present in both pipes and dikes. W.M.

Unnamed hydrous Fe–Mg–aluminosilicate

Haslam, H. W. (1983): An isotropic alteration of cordierite. *Mineral. Mag.*, 47, 238–240.

Electron microprobe analysis (median of 4 analyses) of an alteration product of cordierite from the Champirar Dome, Malawi, yielded SiO₂ 40.0, Al₂O₃ 36.0, FeO 5.4, MnO 0.06, MgO 5.6, CaO 0.8, Na₂O 0.3, K₂O 0.3, TiO₂ 0.01, H₂O 11.5 (by difference), total 99.96%. A similar analysis is given for a substance that is found after biotite, or more probably, after replacement of the biotite with cordierite and the subsequent alteration. The substance in both instances is pale yellow in thin section, $n = 1.565$, $G = 2.51 \pm 0.02$. X-ray diffraction pattern (no lines given) showed lines characteristic of a dioctahedral kaolinite group mineral.

The cordierite is associated with quartz, orthoclase microperthite, sodic plagioclase, almandine, biotite, sillimanite, magnetite, hercynite, corundum, ilmenite and hematite. J.A.F.

Unnamed palladium bismuthotelluride(s)

Y. Vuorelainen, T. A. Häkli, E. Hänninen, H. Papunen, J. Reino and R. Törnroos (1982). Isomertieite and other platinum-group minerals from the Konttijärvi layered mafic intrusion, northern Finland. *Econ. Geol.* 77, 1511–1518.

Numerous small (<50 μm) anhedral inclusions of an unnamed palladium bismuthotelluride occur in bornite and chalcopyrite from the Konttijärvi intrusion. The grains have high reflectance, a creamy white color, and strong anisotropy with yellow and grayish-violet colors in air. The mineral is also distinctly softer than chalcopyrite. Probe analyses of three grains gave: Pd 37.60, 33.11, 33.65; Pt 0.59, 0.77, 0.77; Au 0.20, --, --; Ag 0.48, --, --; Cu 0.39, 0.12, 0.12; Ni 0.60, 0.08, 0.03; Fe --, 0.30, --; Te 43.10, 20.41, 14.12; Bi 19.10, 43.50, 50.40; Sb 0.38, 0.77, 0.49; As 0.39, --, --; S --, 0.04, 0.02; sums 102.83, 99.45, 99.60. These have been calculated to empirical formulae of $(\Sigma\text{cations})_{6.92}(\Sigma\text{anions})_8$, $(\Sigma\text{cations})_{6.93}(\Sigma\text{anions})_8$, and $(\Sigma\text{cations})_{7.22}(\Sigma\text{anions})_8$ suggesting an "unknown solid solution Pd₇Bi₈–Pd₇Te₈ in the system Pd–Bi–Te".

Discussion

Phases with the suggested stoichiometry have not been reported in phase equilibrium studies of the Pd–Bi–Te system. L.J.C.

Unnamed Pb–Sb–As sulfosalts

Yu. S. Borodaev, N. S. Bortnikov, N. N. Mozgova, N. A. Ozerova, P. Oivanev, and V. Yletyinov (1983). Associations of ore minerals in the deposits of the Seinajoki District and the discussion on the ore formation. *Bull. Geol. Soc. Finland*, 55, 3–23.

Microprobe analyses of two sulfosalts found in the Kalliosalo antimony deposit, Seinajoki district, Finland, named Mineral Y and Mineral Z, gave the following: Mineral Y: Pb 10.0, Sb 59.7, As 15.4, S 14.9, total 99.9%, yielding Pb₂Sb₂₀As₈S₁₉, and Mineral Z: Pb 17.7, Sb 56.9, As 11.9, S 15.0, total 101.4%, yielding PbSb₆As₂S₆. Mineral Y occurs as irregular shaped grains up to 0.1 mm in contact with Pääkkönenite. Mineral Z occurs with zinkenite as grains about 0.1 mm in size. No other data given. J.A.F.

Unnamed phosphate of U(IV)

L. N. Belova, A. I. Gorshkov, O. A. Ivanova, A. V. Sivtsov, V. A. Boronikhin (1983) A new natural phosphate of U (IV). *Doklady Akad. Nauk SSSR*, 273, 1460–1462 (in Russian).

Microprobe analyses gave: dark-green variety (average of 5) UO₂ 76.91, CaO 0.62, P₂O₅ 17.13, H₂O (by difference) 5.34, sum 100.00, green variety (average of 2) UO₂ 68.69, CaO 0.53, P₂O₅ 17.0, H₂O (by difference) 13.78, sum 100.00. This yields the chemical formulas $(U_{1.18}Ca_{0.04})_{1.22}PO_4(OH)_{1.8} \cdot 0.4H_2O$ and $(U_{1.06}Ca_{0.04})_{1.1}PO_4(OH)_{1.32} \cdot 2.5H_2O$.

X-ray and electronographic study show the mineral to be orthorhombic, $a = 6.96 \pm 0.01$, $b = 9.10 \pm 0.01$, $c = 12.38 \pm 0.01 \text{ \AA}$, space group $Cmcm, Cmc_2$ or $C2cm$. The strongest X-ray lines (17 given) are: 6.19(10)(002), 4.56(6)(020), 4.13(6)(112), 2.69(7)(221). D meas. 4.6–5.2.

The mineral occurs as green or dark-green platy crystals or spherulitic aggregations on quartz crystals. It is associated with pyrite. The mineral is weakly pleochroic in green colors, $\gamma = 1.731$ – 1.729 , $\beta = 1.729$ – 1.726 , $\alpha = 1.700$, $Z \perp$ elongation, cleavage {010}. J.P.

Unnamed RhAs

N. S. Rudashevski, A. G. Mochalov, Y. P. Men'shikov, and N. I. Shumskaya (1983) Ferronickelplatinum, Pt₂FeNi, a new mineral species. *Zapiski Vses. Mineralog. Obsh.*, 112, 487–494 (in Russian).

Analysis by electron microprobe gave Rh 55.2, Ru 1.72, Pt 0.41, Ni 0.26, As 41.5, sum 99.09. The mineral is associated with ferronickelplatinum found in alluvial deposits derived from ultramafics in the northeastern USSR. L.J.C.

Unnamed RhNiAs

N. S. Rudashevski, A. G. Mochalov, Y. P. Men'shikov, and N. I. Shumskaya (1983) Ferronickelplatinum, Pt₂FeNi, a new

mineral species. *Zapiski Vses. Mineralog. Obsh.*, 112, 487–494 (in Russian).

Analyses by electron microprobe gave Rh 43.5, Ni 24.2, Pt 0.50, Ir 0.56, As 30.6, sum 99.36. The mineral is associated with ferronickelplatinum in alluvial deposits derived from ultramafics in the northeastern USSR. L.J.C.

NEW DATA

Derriksite

D. Ginderow (1983) The crystal structure of derriksite, $\text{Cu}_4(\text{UO}_2)(\text{SeO}_3)_2(\text{OH})_6$. *Acta Cryst.*, C39, 1605–1607 (in French).

Crystal structure analysis of derriksite from the Musonoi deposit, Shaba province, Zaire, indicated the true chemical formula is that given above. The originally reported water in the formula was actually absorbed and not structurally bonded. The studied crystal is orthorhombic, $Pn2_1m$, with $a = 5.570(2)$, $b = 19.088(8)$, $c = 5.965(2)\text{\AA}$, $Z = 2$. The final R value is 0.031. J.D.G.

Jarlite

F. C. Hawthorne (1983) The crystal structure of jarlite. *Canadian Mineralogist*, 21, 553–560.

Refinement of the crystal structure of jarlite from Ivigtut, Greenland, has shown it to be monoclinic, space group $C2/m$, unit cell $a = 15.942(4)$, $b = 10.821(5)$, $c = 7.421(2)\text{\AA}$, $\beta = 101.86(2)^\circ$, $V = 1222.5\text{\AA}^3$. Previous chemical formulae of jarlite are incorrect, since Mg and OH are essential constituents. The general formula is $\text{Na}_2(\text{Sr}, \text{Na}, \square)_{14}\text{Al}_{12}(\text{Mg}, \square)_2\text{F}_{64}(\text{OH}, \text{H}_2\text{O})_4$, with some additional replacement of Sr by Ca, Ba, and K. The jarlite structure consists of corrugated (100) sheets of corner-linked Al, Mg, and Na octahedra, intersecting (001) sheets of 9-

and 10-coordinated (Sr,Na) polyhedra. This densely packed structure is not closely related to that of any of the previously described aluminofluorides. J.E.S.

Schuilngite

H. Sarp, J. Bertrand and J. Deferne (1983) New data on the lead, copper, rare earth, carbonate, hydrate schuilngite from Shin-kolobwe, Shaba, Zaire. *Schweiz. Mineral. Petrogr. Mitt.*, 63, 1–6 (in French).

Analysis by microprobe and TGA (H_2O and CO_2) of a new occurrence of schuilngite gave PbO 37.22, CuO 11.45, Nd_2O_3 17.45, Gd_2O_3 3.18, Dy_2O_3 3.51, CO_2 22.60, H_2O 5.10, sum 100.51. The formula agrees well with material from Menda and Kasompi but there are fewer rare earth elements.

X-ray study on the sample gave orthorhombic space group $Pm\bar{c}n$, $a = 7.43$, $b = 18.89$ and $c = 6.40$. There were additional lines in the X-ray powder data when compared with JCPDS 25–133.

The mineral occurs as transparent prisms. Optically biaxial negative, $n_s \alpha = 1.770$, $\beta = 1.795$, $2V = 75$, $X = a$ $Y = c$. J.D.G.

Upalite*

P. Piret and J. P. Declercq (1983) Crystal structure of upalite $\text{Al}[(\text{UO}_2)_3\text{O}(\text{OH})(\text{PO}_4)_2] \cdot 7\text{H}_2\text{O}$. An example of a mimetic twin. *Bull. Minéral.*, 106, 383–389 (in French).

New single crystal X-ray data show the mineral is monoclinic, space group $P2_1/a$, unit cell $a = 13.704(4)$, $b = 16.82(1)$, $c = 9.332(2)\text{\AA}$, $\beta = 111.5(1)^\circ$, $Z = 4$. Crystals always have fine lamellar twinning by reflection on {001} giving pseudo-orthorhombic symmetry. New density measurement gives 3.9(1), calculated 3.94. The formula given above is based on a crystal structure with refinement to $R = 0.049$. J.D.G.