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NEW MINERAL NAMES

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Unnamed Copper Selenide

D. C. HARRIS, L. J. CABRI, AND S. KAIMAN (1969) A new copper selenide from Martin Lake, Saskatchewan (abstr.) *Can. Mineral.*, **10**, 135–136

Two analyses by electron probe gave: Cu 51.1, 52.0; Se 49.7, 44.0; S—, 2.7; sum 100.8, 99.7 [98.7 (JAM)]%. These correspond to $Cu_{5.11}Se_{4.0}$ and $Cu_{5.10}Se_{3.48}S_{0.52}$. The mineral is orthorhombic with *a* 8.20, *b* 12.04, and *c* 6.46 Å. Strongest spacings are: 3.235(10)(002), 3.015(6)(040), 1.997(8)(060), 1.893(5)(033), 1.817(3)(223), 1.664(4)(422). With $Z=4$, the calculated ρ is 6.59. In reflected light the mineral is strongly bireflecting with colors ranging from light gray to bluish gray. Anisotropy very distinct with polarization colors (nicols crossed, in air) white to dark blue. Reflectivity values of four wavelengths (470–650 nm) were maximum 24.0–25.8%, minimum 19.2–14.6%. Micro-hardness with a 15 g weight ranged from 68.8 to 93.5 with an average of 78.1 kg/sq. mm. The mineral occurs at the Martin Lake mine, Uranium City, Lake Athabasca, Saskatchewan. The mineral is no. 154 in the "Peacock Atlas" [*Geol. Soc. Amer. Mem.* **85**, (1962)].

J. A. Mandarino

Unnamed CoSbS and $NiSb_2$

L. J. CABRI AND D. C. HARRIS (1969) New minerals from an unusual antimonial assemblage from the Red Lake area, Ontario. (abstr.) *Can. Mineral.*, **10**, 128

CoSbS and $NiSb_2$ have been found in ore from the Red Lake area, Ontario. Electron probe analyses of both minerals indicate that the compositions are very close to stoichiometric CoSbS and $NiSb_2$.

J. A. Mandarino

Unnamed Lead-bismuth telluride

J. RUCKLIDGE (1969) Frohbergite, montbrayite, and a new Pb-Bi telluride. *Canad. Mineral.* **9**, 709–716.

This mineral was abstracted earlier (see *Am. Mineral.*, **53**, 1421 (1968)) from an abstract. Data given in the present paper are as follows. The mineral occurs as white grains 30–40 microns in size, completely surrounded by chalcopyrite. The reflectivity (estimated at 63% for white light) is slightly lower than that of altaite and higher than that of tellurbismuth. Micro-hardness is in the range 20–50 VHN. Electron microprobe analyses gave: Pb 16.6±0.2, Bi 37.4±0.4, Te 44.6±0.4, total 98.6 (analyst: J. Rucklidge); and Pb 15.2, Bi 40.2, Te 45.3, total 100.7 (analyst: A. M. Cark). These data fit the generalized formula $(Pb, Bi)_3Te_4$. Optical evidence suggests cubic symmetry. The mineral occurs in specimens from the Robb Montbray mine, Montbray Township, Quebec.

J. A. Mandarino

Neyite

A. D. DRUMMOND, J. TROTTER, R. M. THOMPSON, AND J. A. GOWER (1969) Neyite, a new sulphosalt from Alice Arm, British Columbia. *Can. Mineral.*, **10**, 90–96.

Neyite occurs in vugs in a quartz vein and intimately intergrown with quartz near Kitsault, British Columbia (near the old community of Alice Arm about 500 miles north of Vancouver). The mineral is associated with pyrite, galena, sphalerite, chalcopyrite, aikinite, cosalite, tetrahedrite, molybdenite, and nuffieldite.

The mineral has been found as intergrown crystals and grains and as prismatic to bladed crystals with stepped surfaces on the broad faces. Neyite is lead gray in color but crystals often develop a characteristic yellow and, eventually, Prussian blue tarnish. The untarnished mineral has a bright metallic luster. It is very brittle and breaks with a flat conchoidal fracture. The hardness is about 2½ and the measured ρ is 7.02 (calc. 7.16).

In polished section, neyite is galena-white but has a distinctly light tan color when seen against galena. Reflection pleochroism is not perceptible. The mineral has moderate anisotropism with polarization colors light grey, yellow-green, light reddish-brown to grey-black. No evidence of twinning was seen. The Talmage hardness is C.

Etch reagent reactions are: HNO_3—tarnishes black with slight effervescence; HCl—develops a slight brown tarnish; KCN, $FeCl_3$, and KOH—are all negative; $HgCl_2$—develops a slight tarnish; and aqua regia—effervesces and stains dark.

Chemical analysis (H. V. Sharples, analyst) of a gram of pure mateiral gave: Pb 41.76, Bi 36.62, Cu 2.84, Ag 1.52, S_2 (actually S) 15.65, total 98.39%. The empirical formula derived from these data is $PbS \cdot 3Bi_2S_3 \cdot (Cu, Ag)_2S$.

Neyite is monoclinic with space group *C*2, *Cm*, or *C*2/*m*; *a* 37.5±0.1, *b* 4.07±0.01, *c* 41.6±0.1 Å, $\beta = 96.8° \pm 0.3°$. $Z = 8$. Thirty-two spacings (13 indexed) are listed (for radiation of an unspecified wavelength). The strongest spacings (in Å.) are: 3.72(10) (10.0.0), 3.51(10)($\bar{5}$13, 512), 2.92($\bar{7}$17, 8.0.10,$\bar{1}$.1.10), 2.04(6), ($\overline{11}$.1.14, 5.1.16, 020), 2.27 (5)(7.1.12, 13.1.3, 1.1.15), and 2.08(4) (15.1.2, $\bar{9}$.1.15, 2.0.20, 18.0.0).

The mineral is named for C. S. Ney who was geologist-in-charge during the early exploration of the molybdenite deposit. The name was approved before publication by the Commission on New Minerals and Mineral Names, I. M. A.

DISCUSSION—The authors state at the end of their paper, "It is hoped that many of the problems connected with this complex group of minerals [the Pb-Bi-Cu sulphosalts (JAM)] will be resolved with publication of data on the Gladhammar minerals by Professor Wickman and his associates." This was done in 1966 by Welin [Abstr. *Amer. Mineral.*, **53,** 351 (1968)].

J. A. Mandarino

Unnamed Sulphosalts

A. D. Drummond, J. Trotter, R. M. Thompson, and J. A. Gower (1969) Neyite, a new sulphosalt from Alice Arm, British Columbia, *Can. Mineral.*, **10,** 90–96.

1. A mineral from the Cariboo Gold Quartz Mine, Wells, British Columbia, contains Pb, Bi, Cu, Ag, and S. Strongest spacings in the X-ray powder diffraction pattern (for CuKα radiation) are: 3.45 (10), 2.04(6), 3.65(5), 3.02(5), 2.75(5), and 1.752(5). Twenty-six other spacings are listed.

2. A mineral associated with magnetite, pyrite, pyrrhotite, and chalcopyrite in a quartz vein near Castlegar, British Columbia, contains Pb, Bi, Cu, (Ag?), and S. It occurs in long, thin, prismatic crystals and resembles cosalite. Strongest spacings in the X-ray powder diffraction pattern (for Fe Kα radiation) are: 3.40(10), 2.06(6), 3.01(4), 2.91(4), 2.13(4), and 1.757(4). Eleven other spacings are listed.

J. A. Mandarino

Dadsonite

J. L. Jambor (1969) Dadsonite (minerals Q and QM), a new lead sulphantimonide *Mineral Mag.* **37,** 437–441.

Microprobe analyses by G. R. Lachance and A. G. Plant of samples from Pershing County, Nevada, and Wolfsberg, Germany, gave, resp.: Pb 49.3, 50.8; Sb 31.7, 31.8; S 20.7, 20.3; sum 101.7, 102.9%, corresponding closely to $Pb_{11}Sb_{12}S_{29}$. Weissenberg and rotation photographs by Coleman (1953) on material from Yellowknife, N. W. Territory, showed the mineral to be monoclinic, $P2$, Pm, or $P2/m$, a 19.06, b 4.11, c 17.26 Å., β 95°50′. Jambor found on Wolfsberg material a 19.05, b 4.11, c 17.33 Å., β 96°20′, $Z=1$. ρ. calcd. 5.76. The strongest X-ray lines are 4.10(4)(010), 3.78(7)($\bar{5}01$,500), 3.62(6)($\bar{5}02$), 3.38(10b)(304,$\bar{4}04$), 2.840(7)(412,$\bar{2}06$), 2.218(4), 1.886(4).

The mineral is lead gray, streak black, H. 2½. Optical properties by E. A. J. Burke: under the reflecting microscope white with a greenish tint, with blood-red internal reflections at grain edges. Anisotropism distinct to string in greenish- gray tint. Reflectivity: 450 nm, 34.8–39.7; 546, 34.9–40.0; 589, 34.2–39.6; 650, 32.7–37.4.

The mineral had been noted by Coleman *Amer Mineral.* **38,** 506–527 (1953) (Mineral Q) at Yellowknife, N. W. Territory and by Jambor, *Can. Mineral.* **9,** 191–213 (1967) (Mineral QM) from Nevada and from Madoc, Ontario.

The name is for the late A. S. Dadson, who made significant contributions the mining development of the Yellowknife gold deposits. The mineral and name were approved before publication by the Commission on New Minerals and Mineral Names, IMA.

Staringite

E. A. J. Burke, C. Kieft, R. O. Felius, and Maria S. Adusumilli (1969) Staringite, a new Sn-Ta mineral from northeastern Brazil. *Mineral. Mag.* 37, 447–454

Nine microprobe analyses (C.K.) gave (range and average): $Ta_2O_5$20.1–22.4(21.5); $Nb_2O_5$1.7–1.9(1.8); $SnO_2$72.2–75.2(73.3); $TiO_2$0.03; FeO3.5–3.9(3.7); MnO0.3, sum 100.6%, giving the formula:

$(Fe_{0.47}Mn_{0.04})(Sn_{4.47})(Ta_{0.90}Nb_{0.12})O_{12}$, intermediate between cassiterite and tapiolite, or as

$(Fe,Mn)x(Sn,Ti)_{6-3x}(Ta,Nb)_{2x}O_{12}$, with $x=0.51$. The name should be used if $x<1$; members of the series with $x>1$ are tapiolite.

X-ray powder data gave strongest lines (20 lines given): 3.63(10)(110); 2.644(8)(103); 1.76(9)(213)1 Tetragonal, the unit cell has a 4.742, c 9.535 Å., (tri-rutile structure). ρ calc. 7.17.

In reflected light in oil the mineral is dark gray, similar in color to cassiterite, birefringence moderately strong, color carying from lighter to darker gray; anisotropy very distinct in various shades of gray. Internal reflections (yellowish-orange to brownish-red) are abundant in oil. Reflectivities (Ro and R′e) are given at 10 wave lengths: 470 nm, 12.8, 14.5; 546, 12.1, 13.9; 589 12.0 13.7; 650 11.8, 13.6%. Uniaxial, positive.

The mineral occurs as small exsolution bodies (20–50 microns) in tapiolite from granitic pegmatites at Seridozenho and Pedra Lavreda, Paraiba State, Brazil.

The name is for W. C. H. Staring (1808–1877), founder of geology and mineralogy in the Netherlands. Type material is preserved at the Free University, Amsterdam, and at the Escola de Geologia, Recife, Brazil. The mineral and name were approved in advance of publication by the Commission on New Mineral and Mineral Names, I. M. A.

Wakefieldite

D. D. Hogarth and N. Miles (1969) Wakefieldite, natural YVO_4. (abstr.) *Can. Mineral.*, **10,** 136–137

XRF analysis skowed essential Y and V, appreciable Fe and Si (at least partly as chlorite impurity) and minor U. The X-ray powder pattern is identical to that to synthetic YVO_4, a zircon-type structure. a 7.10, c 6.30 Å, $Z=4$, $\rho=4.26$ (calc.). Strongest spacings are 4.67(45), 3.56(100), 2.66(55), 2.512(30), 2.214(30), and 1.825 Å(50). Color is pale tan.

Wakefieldite is optically uniaxial (+), $\omega=2.00$ and $\epsilon=2.14$ (synthetic). It occurs in the Evans-Lou feldspar mine near Wakefield, Quebec, with quartz, allanite, biotite, chlorite, bismutite, and unidentified rare-earth minerals.

J. A. Mandarino

Dresserite

J. L. JAMBOR, D. G. FONG, AND ANN P. SABINA (1969) Dresserite, the new barium analogue of dundasite. *Can. Mineral.*, **10**, 84–89.

Dresserite occurs with weloganite [see *Amer. Mineral.* **54**, 576 (1969)] as spheres and hemispheres ranging from 1 to 3 mm and averaging about 2 mm in diameter. These are radiating groups of blades which taper towards the center of the spheres. The mineral has a vitreous to silky luster, and white color and streak. Harkness is estimated to be $2\frac{1}{2}$ to 3. The measured density (by suspension in heavy liquids) is 2.96±0.02 g/cc. The calculated density is 3.06, g/cc, and it is felt that the measured density of dresserite (as well as of dundasite) is too low due to the fibrous nature of the mineral. Dresserite is optically biaxial, $2V(-)=30°$ to $40°$, $\alpha(\|a)=1.518$, $\gamma\|c)=1.601$ (both±0.004), extinction parallel, length slow. It dissolves readily with effervescence in dilute HCl.

Chemical analysis (J.-L. Bouvier, analyst) gave: BaO 36.6, SrO 0.8, Al_2O_3 25.6, $CO_2$22.2, H_2O15.3, total 100.5%. This gives a formula of $Ba_{2.0}Al_{4.1}(CO_3)_{4.1}(OH)_8\cdot 2.8H_2O$ or, in general form, $Ba_2Al_4(CO_3)_4(OH)_8\cdot 3H_2O$. Dresserite is thus the barium analogue of dundasite.

The DTA curve of dresserite (not given) is similar in appearance to that of dundasite. The principal endothermic peak is at 384°c. and indicates the combined loss of all CO_2 and H_2O. The material, after heating to 800°C., was identified by X-ray diffraction as $BaAl_2O_4$.

Dresserite is orthorhombic, space group *Pbmn*, *Pb*2_1*m*, or *Pbm*2, *a* 9.27 *b* 16.8 *c* 5.63 Å. The crystals are elongated ‖ to [001] and flattened ‖ to {010} [$Z=2$(JAM)]. Forty spacings (26 indexed are listed in the X-ray powder deffraction data. The strongest spacings (in Å for CuKα radiation) are: 8.09(10)(110), 6.23(6)(120), 3.66(5)(131), 2.73(4)(241), 4.68(3)(021), 3.17(3)(150), 2.667(3)(022).

Dresserite occurs with weloganite, plagioclase, quartz dawsonite, a powdery hydrous aluminum oxide, and other minerals at St. Michel, Montreal Island, Quebec, in an alkalic still that has intruded Ordovician limestone.

The name is in honor of J. A. Dresser and was approved before publication by the Commission on New Minerals and Mineral Names, I. M. A. Type material is in the National Mineral Collection, Ottawa.

J. A. Mandarino

Agardite

J. E. DIETRICH, MARCEL ORLIAC, AND FRANCOIS PERMINGEAT, (1969) L'agardite, une nouvelle espèce minérale, et al problème du chlorotile. *Bull. Soc. Franc. Mineral. Christallogr.* **92**, 420–434.

Chemical analysis by M.O. on 350 mg of material containing very little quartz and malachite gave CuO 45.35, CaO 2.60, Y_2O_3 7.5, TR_2O_3 1.2, As_2O_5 31.50, H_2O 11.35, sum 99.50%. Spectrographic analysis by L. Ortelli gave for the rare earths Nd 0.3, Dy, Gd, Sm 0.15, Yb, La 0.1, Ho, Pr, Tb 0.04, Lu 0.025, Tm, Er 0.01. This corresponds to a unit cell content of $(Ca_{0.95}Y, etc_{1.50})Cu_{11.71}(AsO_4)_{5.66}\cdot 12.97H_2O$ or $(Y, etc_{1.50}, CaH)_{0.50}(Cu_{11.71}, Ca_{0.45})[(AsO_4)_{5.66}, (OH)_{1.36})](OH)_{12}\cdot 6H_2O$. The general formula for the mixite group, of which this is a member, is $A_2Cu_{12}(AsO_4)_6(OH)_{12}\cdot 6H_2O$, where A=Bi (mixite), Ca, Y. Differential thermal analysis shows an endothermic break beginning at 75° with peak at 120°, two exothermal breaks, one beginning at 280° with peak at 370° and a very sharp one at 660°, an endothermic break with peak at 625°, and a complex endothermic break with maxima at 945, 970 and 995°. Material heated at 105° lost 2% H_2O and gave the same powder pattern as unheated material; the water was taken up again after cooling. Dissolved by HCl.

X-ray study showed the mineral to be hexagonal, a 13.55±0.05, c 5.87±0.02 Å. The strongest lines (68 given) are 11.73(10)(10.0), 4.43(7)(11.1, 21.0), 3.54(7)(21.1), 2.938 (8)(00.2, 22.1), 2.692(6)(11.2, 32.0), 2.558(6)(41.0), 2.451(8)(21.2, 32.1), 1.769(5)(42.2), 1.629(5)(40.3, 60.2)

Color blue-green. ρ. (meas) 3.72±0.05, calc. from X-ray 3.66±0.04. Optically unaxial, positive, ω 1.701, ϵ 1.782, both±0.005. (Eight samples from other localities gave *n*s ranging from ω 1.705, ϵ 1.777, to ω 1.723, ϵ 1.815).

The mineral occurs as acicular crystals up to a few mm long in the oxidation zone of the copper deposite of Bou-Skour, Morocco, associated with azurite, malchite, cuprite, native Cu, quartz, and unidentified minerals. It has since been found at 4 other localities, including Tintic, Utah (samples labelled chlorotile, mixite, azurite, or aurichalcite).

Chlorotile, described from Schneeberg, Saxony, by Franzel in 1875 has been supposed to be the Cu member of this group without Bi, Ca, or Y. The type material at Budapest was destroyed in 1956; examination of many samples from Schneeberg labelled chlorotile showed them to be mixite. The existence of the species is therefore doubtful.

The name is for J. Agard, geologist, BRGM, Orleans, France, formerly of the Serv. Geol. Maroc. It is to be applied to members of the mixite group in which rare earths predominate in the A position. Type material is preserved at the Serv. Geol. Maroc, Rabat, and the Ecole Natl. Superieure des Mines, Paris. The mineral and name were approved before publication by the Commission on New Minerals and Mineral Names, I. M. A.

Zemannite

J. A. Mandarino, E. Matzat, and S. J. Williams (1969) Zemannite, a new tellurite mineral from Moctezuma, Sonora, Mexico (abstr.) *Can. Mineral.*, **10,** 139–140

The mineral occurs as small (<1 mm long) hexagonal prisms terminated by a dipyramid. Zemannite is light to dark brown, has an adamantine luster, and is very brittle. Optically uniaxial (+) with $\omega=1.85$ and $\epsilon=1.93$. The density is greater than 4.05 g/cm$_3$. It is hexagonal, space group $P6_3/m$–C^2_{6h}, a 9.41±0.02 Å, c 7.64±0.02 Å, $Z=2$. The crystal structure of the mineral shows that zemannite is a zeolite-like tellurite with a negatively charged framework of $Zn_2(TeO_3)_3$ having large (diam. = 8.28 Å) open channels parallel to [001]. The channels are statistically occupied by Na and H ions and possibly by H_2O. Some Fe substitutes for Zn. Partial analyses and the crystal structure analysis indicate the formula: $(Zn,Fe)_2(TeO_3)_3Na_xH_{2-x}\cdot yH_2O$. Strongest spacings (in Å for CuKα) are: 8.15 (10)(100), 2.778(9)(202), 4.07(8)(200), 2.96(6)(112), 2.845(6)(211), and 1.726(6)(204,223). Thirty-nine spacings were measured and indexed from d = 8.15 Å to d = 1.31 Å. The name is for Prof. Dr. Josef Zemann, University of Vienna, and was approved by the Commission on New Minerals and Mineral Names, I.M.A.

J. A. Mandarino

Unnamed Niobiam silicates

G. Perrault, J. Vicat, and N. Sang (1969) UK-19–1 et UK-19–2, deux nouveaux silicates hydrates de niobium de Mont St. Hilaire, P. Q. (abstr.) *Can. Mineral.*, **10,** 143–144

One of the unnamed minerals (UK-19) of Chao and Hounslow [abstr. *Amer. Mineral.*, **52,** 1587 (1967)] has been studied further. Chao and Hounslow recorded the following elements by emission spectrography: Mn, Mg, Na, Ti, and Si. The present paper indicates that UK-19 is really two minerals and that both are hydrous nibbium silicates. The new data are as follows.

UK-19-1: Analysis by electron probe gave SiO_2 46.0, Nb_2O_5 25.5, TiO_2 7.1, K_2O 4.3, Na_2O 3.7, CaO 2.8, H_2O 10.0, total 99.4%. The mineral is orthorhombic with space group *Cmm*2, *a* 7.34, *b* 14.08, *c* 7.15 Å. The color is pale pink and the crystals are very small (0.1–0.2 mm) It is associated with analcime, aegirine, and hisingerite (?).

UK-19-2: Analysis by electron probe gave SiO_2 42.4, Nb_2O_5 30.9, TiO_2 8.4, K_2O 0.4, Na_2O 5.5, CaO 0.7, H_2O 11.1, total 99.4%. The mineral is also orthorhombic but with space group *Pba*2, *a* 7.42, *b* 14.23, and *c* 7.16 Å. The crystals are transparent with the forms {010}, {010}, and {110} well developed. Size varies between 0.2 and 0.5 mm. It is associated with analcime, dolomite, polylithionite and aegirine.

J. A. Mandarino

NEW DATA

Bonchevite

V. Kupčik, L. Franc and E. Makovický. (1969) Mineralogical data on a suphosalt from the Rhodope Mountains, Bulgaria. *Tschermaks, Mineral. Petrogr. Mitt.* **13,** 149–156.

X-ray examination of specimens of bonchevite [*Mineral. Mag.*, **31,** 821–828 (1958); *Amer. Mineral.* **43,** 1221–1222, (1958)] from the type locality showed it to consist of two phases occurring in separate needle-shaped crystals. The major phase, *ca.* 60%, is galenobismutite. The other phase is also orthorhombic but has the cell dimensions *a* 13.58±0.02, *b* 20.51±0.07, *c* 4.09±0.07 Å as determined from single crystal X-ray data. The morphological axial elements, 0.9004:1:0.3249, given for "bonchevite", show no simple relations to this cell. The five strongest lines on an indexed powder pattern made from crushed crystals first checked by single crystal observations are:—3.447 (s), 2.998(s), 2.753(m), 2.049(s), 1.757(m).

Spectrographic analysis of X-ray-checked crystals showed Pb and Bi to be the main constituents, with minor Cu and Ag and only traces of Zn and Sn. Structure determination (to be published) led to the formula $Pb_3Bi_2S_6$, $Z=4$, the space group being *Bbmm*. In a structural classification the mineral belongs to the andorite-ramdohrite-fizelyite group. The relations to or possible identity with other minerals and synthetic compounds are discussed. It is not stated that the name bonchevite is to be applied to the newly described mineral.

A. Pabst

Susannite and Leadhillite

M. E. Mrose and R. P. Christian. (1969) The leadhillite-susannite relation [abstr.] *Can. Mineral.*, **10,** 141.

X-ray single-crystal, optical, electron probe, and infrared investigations show that leadhillite and susannite are the monoclinic and trigonal dimorphs, respectively, of $Pb_4(SO_4)(CO_3)_2(OH)_2$. Leadhillite (Tintic, Utah) is monoclinic, $P2_1/a$, *a* 9.08 Å, *b* 20.76 Å, *c* 11.56 Å, β 90°27.5′, $2V \approx 10°$. Susannite (Leadhills, Scotland) is trigonal, $R\bar{3}$, *a* 9.05 Å, *c* 11.54 Å, and $2V = 0°–3°$. Their powder patterns are identical. X-ray single-crystal studies and optical studies indicate that single crystals of leadhillite are converted to susannite at 200°C and revert to leadhillite on cooling to room temperature. Leadhillite, therefore, is a low-temperature polymorph of susannite. Susannite decomposes at about 300°C to $Pb_5(SO_4)O_4$.

J. A. Mandarino