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NEW MINERAL NAMES*

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Bogdanovite*

E. M. Spiridonov and T. N. Chvileva (1979) Bogdanovite, $Au_5(Cu,Fe)_3(Te,Pb)_2$, a new mineral of the group of intermetallic compounds of gold. *Vestnik Moskva Univ., Ser. Geol., 1979, no. 1,* 44–52 (in Russian).

Microprobe analyses are given of 11 samples, 4 iron-rich, 3 copper-rich, and 4 intermediate. Range of composition Au 57.6–63.6, Ag 1.67–3.39, Cu 3.32–15.1, Fe 10.28–0.09, Pb 10.7–14.4, Te 9.60–10.3, Se 0–0.28%, corresponding to the formula above. Cu and Fe vary reciprocally from $Cu_{3.36}Fe_{0.32}$ to $Cu_{0.75}Fe_{2.66}$.

X-ray data indicate a pseudocubic cell, derived from that of gold, with a = 4.087A. However, the optics show that the mineral is probably orthorhombic. The strongest lines (16 given) for iron-rich material are 2.36(10)(111), 2.045(6)(200), 1.447(6)(220), 1.230(8)(311).

Bogdanovite is rose-brown to bronze-brown with semi-metallic luster. It polishes well. Cleavage is absent. In polished section unusual color effects (like rickardite and bilibinskite) from purple-raspberry or grayish-lilac to gold and yellow are seen. Reflectances are given (Rg and Rp) at 15 wavelengths from 420 nm to 700 nm. For Cu-rich, 460 nm, 14.8, 9.2%; 540, 29.5, 5.6; 580, 37.6, 8.4; 660, 39.0, 36.2; for Fe-rich, 460, 13.8, 6.7; 540, 28.3, 2.5; 580, 36.4, 3.0; 660, 35.8, 29.9. The microhardness is much more affected by change of composition: for Cu-rich 235–270, av. 257 kg/sq. mm; for Fe-rich 290–354, av. 321 kg/sq. mm. Relief higher than for gold. The mineral quickly tarnishes in air to bluish-black.

Bogdanovite occurs with bilibinskite in the supergene zone of oxidation of deposits in Kazakhstan and Far Eastern USSR, associated with gold, various tellurides, and tellurites of Fe, Cu, and Pb.

The name is for the Soviet geologist Aleksei A. Bogdanov. 1907–1971. Type material is in the Mineralogical Museum, Acad. Sci. USSR, Moscow. **M.F.**

Chlormanasseite

G. D. Feokistov, S. I. Ivanov, A. A. Kashaev, L. N. Klyuchanskii, N. G. Taskina and Z. F. Ushchapovskaya (1978) The occurrence of chlormanasseite in the USSR. *Zap. Vses. Mineral. Obshch., 107,* 321–325 (in Russian).

The name chlormanasseite was given by Allman and Lohse (*Neues Jahrb. Mineral. Monatsch.,* p. 161–168, 1966) to a compound formed by the alteration of koenenite. It has now been found in drill cores penetrating iron-ore skarns of the Kapaev explosive pipe, middle course of the Angara River, southern Siberian Platform. Analysis by N.G.T. gave MgO 30.84, FeO 4.10, MnO 0.05, TiO_2 0.20, Fe_2O_3 1.15, Al_2O_3 21.20, Na_2O 0.36, H_2O+ 27.19, H_2O- 5.20, Cl 11.31, CO_2 1.10, sum 102.70 – ($O = Cl_2$) 2.55 = 100.15%. SiO_2, CaO, K_2O, F, SO_3 not found. This corresponds to $(Mg_{4.81}Fe^{2+}_{0.36}Mn_{0.01})(Al_{2.62}Fe^{3+}_{0.09}Ti_{0.02}Na_{0.08})(OH)_{16}[Cl_{2.01}(OH)_{0.32}(\frac{1}{2}\ CO_3)_{0.32}] \cdot 3.20H_2O$; manasseite is $Mg_6Al_2(OH)_{16}(CO_3) \cdot 4H_2O$.

The X-ray pattern is very similar to that of manasseite. The strongest lines (21 given) are 7.67(10)(002), 3.86(8)(004), 2.60(8)(201,113), 2.49(7)(202), 2.34(9)(203), 2.17(9)(204), 1.839(10)(206), 1.555(8)(208), 1.526(9)(220), 1.496(9)(222). This corresponds to a unit cell with a = 6.11±0.01, c = 15.46±0.05A.

The mineral occurs in cavities in magnetite ore, closely intergrown with (and possibly formed by the alteration of) chlorite by NaCl-rich solutions. Platy crystals up to several mm in size have the form of dipyramids. Colorless to greenish-brown, luster vitreous to pearly on the perfect basal cleavage. Soft. G = 1.98 (yellowish-brown), 2.09 (colorless). Optically uniaxial, positive, ω = 1.540, ϵ = 1.560; colorless in section. **M.F.**

Chrompyroaurite (= chromian pyroaurite)

Zhang Rubo, Liu Kiyin, Yang Benjin, Liu Yunxia, and Liri Dehna (1978) Chrompyroaurite, $Mg_6(Fe^{+3},Cr)_2(CO_3)(OH)_{16} \cdot 4H_2O$, a new variety on the pyroaurite–stichtite join. *Geochimica (China), 1978, no. 4,* 281–290 (Chinese with English abstr.).

Two analyses of the mineral, found in serpentinite, SW China, gave Fe_2O_3 13.54, 12.79; Cr_2O_3 6.94, 7.49; Al_2O_3 2.21, 1.74; MgO 36.74, 35.62; FeO 0.1, 0.15; MnO 0.06, 0.01; CO_2 6.45, 7.78; H_2O+ 32.33, 32.30; H_2O- 2.38, 1.78; sum 100.75, 100.56%. For the second analysis, this gives Fe:Cr:Al = 1.05:0.63:0.22. G = 2.12, H = 1–1.5; uniaxial neg., ω = 1.556, ϵ = 1.545. The DTA curve shows endothermic peaks at 270° and 460°C. Trigonal, a = 6.165, c = 46.760A. Color violet. Pleochroic, O colorless, E pale pink.

Discussion

An unnecessary name for chromian pyroaurite. **M.F.**

Garavellite*

F. Gregorio, P. Lattanzi, G. Tanelli, and F. Vurro (1979) Garavellite, $FeSbBiS_4$, a new mineral from the Cu–Fe deposit of Valle del Frigido in the Apuane Alps, northern Tuscany, Italy. *Mineral. Mag., 43,* 99–102.

Garavellite was recognized in polished sections as small aggregates, up to 200 μm across, of anhedral crystals, usually in contact

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

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with tetrahedrite, Sb-rich bismuthinite, chalcopyrite, and siderite. Microprobe analysis led to the empirical formula $Fe_{0.80}Cu_{0.02}Sb_{1.13}Bi_{0.78}As_{0.01}S_4$ on the basis of S = 4, or ideally $FeSbBiS_4$. Garavellite is orthorhombic, $a = 11.439$, $b = 14.093$, $c = 3.754$A, $Z = 4$, G (calc) = 5.64. Strongest lines in the X-ray powder pattern (39 tabulated and indexed) are 3.62(vs)(230,011), 3.12(vs)(121), 2.98(s)(240,330), 2.89(s)(221), 2.63(vs)(311,231), 2.51(vs)(250,141). In reflected light garavellite is gray with a brown-olive tint similar to tetrahedrite. Bireflectance is distinct and anisotropism is strong, from yellowish-green to bluish-gray. Vickers hardness (50 g load) 212–222 kg/mm^2. The name is for Professor C. L. Garavelli. **A.P.**

Georgeite*

P. J. Bridge, J. Just, and M. H. Hey (1979) Georgeite, a new amorphous copper carbonate from the Carr Boyd Mine, Western Australia. *Mineral. Mag., 43*, 97–98.

Georgeite forms thin coatings mostly associated with malachite and chalconatronite on partly weathered tremolite rock containing disseminated copper and iron sulfides. It is light blue with a pale blue streak and vitreous to earthy luster, soft, and G = 2.55; transparent to sub-opaque (aggregates), $n(Na_D) = 1.593$, isotropic. Georgeite is amorphous to X-rays and electron beam. Chemical microanalysis gave CuO 54.9, ZnO 0.4, Na_2O 2.7, CO_2 20.8, H_2O 21.7, sum 100.5%. After deduction of all Na_2O and corresponding amounts of CuO, CO_2, and H_2O as chalconatronite (12.35 wt%), the atomic ratios correspond to $(Cu_{5.0}Zn_{0.05})(CO_3)_3(OH)_{4.12} \cdot 6.3H_2O$, the ideal formula being $CU_5(CO_3)_3(OH)_4 \cdot 6H_2O$. The name is for George Herbert Payne, past Chief of the Mineral Division, Western Australian Government Chemical Laboratories. **A.P.**

Jixianite

Liu Jianchang (1979) Jixianite $Pb(W,Fe^{3+})_2(O,OH)_7$—a new tungsten mineral. *Acta Geol. Sinica, 53*, 46–49 (in Chinese with English abstract).

Chemical analysis gave WO_3 50.39, Fe_2O_3 6.53, MgO 0.20, PbO 38.72, FeO 0.71, CuO 0.27, MoO_3 0.01, H_2O+ 3.68, sum 100.51 wt%. After deduction of wulfenite, the analysis was recalculated, on the basis of 7(O,OH) per formula, to $(Pb_{1.0365}Fe^{2+}_{0.0592}Cu_{0.0203})_{\Sigma = 1.1160}(W_{1.2995}Fe^{3+}_{0.4889}Mg_{0.0299})_{\Sigma} = {}_{1.8183}(O_{4.5565}OH_{2.4335})_{\Sigma=7}$, or simply, $Pb(W,Fe^{3+})_2(O,OH)_7$. Electron microprobe analysis gave WO_3 50.13, PbO 40.15, FeO (total Fe) 8.86, CuO 0.0X, sum 99.14 wt%. $Z = 8$, G(meas) = 6.04, (calc) = 7.22 (from Gladstone–Dale Rule) = 7.42. Soluble in hot concentrated H_3PO_4, but not in HCl, HNO_3, HF, H_2SO_4, or aqua regia.

X-ray powder diffraction showed that the mineral has the pyrochlore structure, cubic, $Fd\bar{3}m$, $a = 10.3594(6)$A. The strongest lines of the pattern (21 given) are 5.97(5)(111), 2.982(10)(222), 2.585(6)(400), 1.833(8)(440), 1.562(7)(622), 1.189(5)(662), 1.159(5)(840), 0.9968(5)(666,10.22).

The mineral commonly occurs as microcrystalline, honeycomb, and crust-like aggregates. Grain size ranges from a few hundredth of a micron to over 10 microns. It rarely occurs as octahedral crystals approximately 160 microns in size. The mineral is red to brownish-red with strong resinous luster and yellow streak. It is transparent, void of cleavage, and weakly magnetic with a specific susceptibility of 7.072×10^{-6}mm^3/g. H = 3±. Under the polarizing microscope the mineral is yellowish brown or greenish yellow, isotropic with $n = 2.262$–2.315. Some grains show weak birefringence.

Jixianite was found as a secondary mineral, closely associated with bismuthite and stolzite in the oxidized zone of hypothermal to mesothermal tungsten-bearing quartz veins located near the southern boundary of the inner contact zone of the Pan-shan porphyritic quartz monzonite stock, in Jixian (Ji County), Hebei, China. The primary minerals in the oxidized zone are quartz, wolframite, cassiterite, pyrite, chalcopyrite, and minor scheelite, wulfenite, native silver, and native copper. Other secondary minerals are sericite, goethite, and malachite. The name is for the locality. The type specimen is preserved in the Geological Museum, State Bureau of Geology.

Discussion (D.D.H.)

The data suggest that jixianite belongs to the pyrochlore structural type, although it is not a member of the pyrochlore group as defined by Hogarth (*Am. Mineral., 62*, 403–410, 1977). All X-ray lines with the exception of the weak line at 1.722A are pyrochlore-type lines. This exception, said to represent the planes 600 and 442, does not belong to the pyrochlore structure and may be incorrectly indexed or belong to an impurity. All spacings appear to have been calculated using $FeK\alpha$ wavelengths, regardless of whether they belong to α or β spectra. The number of significant figures in the formula, unit cell, and specific gravity (Gladstone–Dale) calculations is, in each case, unjustified. The pyrochlore structure implies complete disorder amongst the A ions and vacant A positions; the formulae are conventionally calculated with respect to B ions. The formula of jixianite can therefore be given as: $(Pb_{1.14}Fe^{2+}_{0.07}Cu_{0.02})_{\Sigma=1.23}(W_{1.43}Fe^{3+}_{0.54}Mg_{0.03})_{\Sigma=2.00}\ O_6(OH)_{0.72} \cdot 0.98H_2O$.

The data suggest the mineral to be a new species. Further single-crystal work is necessary to confirm the structural type. The density calculated from the empirical formula in the above discussion is 7.89 g/cm^3, much greater than the measured density of 6.04 g/cm^3. Assuming the analysis and the cell dimension to be accurate, a pore space of 30% in the mineral specimen used for density measurement would be required to account for the unusually large discrepancy. **G.Y.C.**

Keckite*

Arno Mücke (1979) Keckite, $(Ca,Mg)(Mn,Zn)_2(Fe^{+3}_3)(OH)_3(PO_4)_4 \cdot 2H_2O$, a new mineral from Hagendorf, Oberpfalz, and its genetic position. *Neues Jahrb. Mineral. Abh., 134*, 183–92 (in German).

Microprobe analysis (standards Mg, Mn, Fe, and Zn metals and apatite) gave P_2O_5 35.75, Fe_2O_3 30.02, MnO 14.85, ZnO 2.24, CaO 5.88, MgO 0.66, H_2O (by diff.) 10.60%, corresponding to $(Ca_{0.83}Mg_{0.13})(Mn_{1.66}Zn_{0.22})Fe^{+3}_{2.99}(OH)_{2.65}(PO_4)_4 \cdot 2.03H_2O$. Infrared study showed the presence of hydroxyl.

X-ray study showed keckite to be monoclinic, space group $P2_1/a$, $a = 15.02$, $b = 7.19$, $c = 19.74$A, $\beta = 110°30'$, $Z = 2$, G (calc) 2.682, (meas) 2.6. The strongest lines (16 given) are 9.3(8)(002); 4.98(5)($\bar{2}12$); 3.51(5d)(400,021); 2.86(10)(402,411,$\bar{1}16$); 2.59(4)($\bar{4}22$,$\bar{1}17$). The structure is related to that of jahnsite.

Color brown, yellow-brown, dirty grayish-brown; luster dull. Cleavages {001}, {100}. H = 4½. Optically biaxial, neg., $\beta = 1.692$,

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$\gamma = 1.699$, $2V$ not determinable because the crystals were inhomogeneous and showed undulatory extinction. Pleochroic, with X reddish-brown, Y yellow, Z yellow brighter than Y; absorption $X \gg Y > Z$, $Z = b$, $X \Lambda c = 15\text{–}22°$.

The mineral occurs in aggregates of crystals up to 2 mm long, formed by the weathering of phosphophyllite or rockbridgeite in the Hagendorf pegmatite, Bavaria, W. Germany. The name is for Erich Keck, collector of Hagendorf minerals. **M.F.**

Kleemanite*

E. S. Pilkington, E. R. Segnit and J. Watts (1979) Kleemanite, a new zinc aluminum phosphate. *Mineral. Mag., 43,* 93–95.

Kleemanite occurs as an ochre-like coating and thin veins 1–2 mm thick on manganiferous iron ore in one section of the iron ore deposit at Iron Knob, South Australia. Chemical analysis gave ZnO 20.7, Al_2O_3 24.4, P_2O_5 35.7, Fe_2O_3 1.1, Mn_2O_3 1.3, H_2O 18.2, sum 101.4% (Fe and Mn calculated as Fe_2O_3 and Mn_2O_3; total water calculated from weight loss on TGA curve), leading to the ideal formula $ZnAl_2(PO_4)_2(OH)_2 \cdot 3H_2O$. Kleemanite is monoclinic, with a primitive lattice, $a = 6.290(6)$, $b = 7.194(6)$, $c = 9.762(9)$A, $\beta = 110.20(4)°$, $Z = 2$; G (calc) = 2.76. Principal lines of the X-ray powder pattern (31 given) are 9.09(6)(001), 4.76(10)(101), 3.30(6)(102), 3.09(8)(210). Due to the small size of the fibers or crystallites only partial information on optical properties is reported: colorless in transmitted light, inclined extinction up to 40°, $\alpha = 1.598(2)$, $\gamma = 1.614(2)$. The name is for Dr. Alfred William Kleeman of the University of Adelaide. **A.P.**

Montdorite

J.-L. Robert and R. C. Maury (1979) Natural occurrence of a (Fe,Mn,Mg) tetrasilicic potassium mica. *Contrib. Mineral. Petrol., 68,* 117–123.

Analysis by electron microprobe (Li by ion microprobe) (av. of 25 grains) gave SiO_2 47.31, TiO_2 2.44, Al_2O_3 4.96, MgO 4.30, FeO 17.13, MnO 9.89, K_2O 8.89, Na_2O 1.02, F 4.40, H_2O (by difference) 1.53, sum 101.87 − ($O = F_2$) 1.87 = 100%. All iron was calculated as FeO; Mössbauer study indicates that very little Fe^{3+} is present. Trace elements (ppm) Li 360, Rb 2700, Cs 140, Ca 100, Cr 100. The analysis yields the formula $(K_{1.76}Na_{0.31})(Fe^{2+}_{2.22}Mn_{1.29}Mg_{0.99}Ti_{0.28}Al_{0.24})(Si_{7.33}Al_{0.67})O_{20.26}[F_{2.16}(OH)_{1.58}]$.

X-ray study shows the mineral to be monoclinic, space group $C2/m$, polytype 1M or 3T, $a = 5.310$, $b = 9.20$, $c = 10.175$A, $\beta = 99.9°$. The strongest lines of the powder pattern (22 given) are 9.97(43)(001), 3.41(35)(022), 3.339(100)(003), 3.142(26)(112), 2.710(34)(023), 2.519(39)($113,004,131,20\bar{2}$), 2.172(25)($202,13\bar{3}$), 1.669(31)($006,13\bar{5}$).

Color green to brownish-green. G (meas) 3.15, (calc) 3.159. Optically biaxial, neg., $2V = 0.3°$, $\alpha = 1.580$, $\beta = \gamma = 1.605$.

The mineral occurs as grains, mostly 5–10 microns, max. 25 microns, in a peralkaline rhyolite (comendite) near La Bourboule, France. The rock belongs to the Mont Dore stratovolcano, for which the mineral is named [for the end member $K_2M^{2+}_5Si_8O_{20}(OH,F)_4$, where M = Fe^{2+},Mg,Mn with Fe predominant over the Mn and Mg]. **M.F.**

Queitite*

Paul Keller, Pete J. Dunn, and Heinz Hess (1979) Queitite, $Pb_4Zn_2(SO_4)(SiO_4)(Si_2O_7)$, a new mineral from Tsumeb, South West Africa. *Neues Jahrb. Mineral. Monatsh.,* 203–209 (in German).

Microprobe analyses of 2 crystals gave SiO_2 14.33, 14.52; SO_3 6.06, 6.04; ZnO 12.37, 12.97; PbO 67.10, 66.71; Ca, Mg, Fe traces, sum 99.86, 100.24%, giving $Pb_{3.87}Zn_{2.01}Si_{3.10}S_{0.98}O_{15}$, close to the formula above. The mineral dissolves with difficulty in hot HNO_3.

The mineral is monoclinic, space group $P2_1$, $a = 11.362$, $b = 5.266$, $c = 12.652$A, $\beta = 108.16°$, $Z = 2$, G (calc) = 6.07. The strongest X-ray lines (69 given) are 3.77(5)($30\bar{1},210$), 3.59(5)(300), 3.18(10)($01\bar{3},013,301$), 2.99(5)($31\bar{2}$), 2.82(5)($203,40\bar{2}$), 1.884(5)(511,420,314), 1.873(5)($01\bar{6},016$), 1.635(8)($61\bar{5}$), 1.536(5), 1.490(6), 1.486(6).

The mineral occurs in the oxidation zone at Tsumeb, associated with larsenite, alamosite, leadhillite, willemite, melanotekite, and quartz. It occurs in crystals up to 10 × 3 × 0.5 mm, tabular to c, elongated on b. Cleavages [010] and [001] observed in traces. Colorless to pale yellow, luster greasy, streak white. Optically biaxial, probably positive, $2V$ near 90°, $\alpha = 1.899$, $\beta = (1.901)$, $\gamma = 1.903$, $X = b$; Z: a varies with wavelength; at 405 nm ~ 40°, at 493 nm ~ 15°, at 592 nm = 0°, at 671 nm ~ −4°; H = 4.

The name is for Clive S. Queit of Tsumeb, who collected the mineral. **M.F.**

Rajite*

S. A. Williams (1979) Rajite, naturally occurring cupric pyrotellurite, a new mineral. *Mineral Mag., 43.* 91–92.

Rajite occurs as small (1.5 mm) crystals with mackayite in rhyolite at Lone Pine, New Mexico, and may be a pseudomorph after teineite. Analysis gave CuO 18.05, CaO 1.06, TeO_2 80.96, sum 100.07%, average on 3 samples with total weight 3051 μg, after correcting for rem. This gives $CuTe_2O_5$, identical with the artificial compound prepared by Moret *et al.* (1969). Rajite is easily soluble in dilute acids and fuses readily.

Monoclinic, $P2_1/c$, with $a = 6.866$, $b = 9.314$, $c = 7.598$A, $\beta = 109.1°$; $Z = 4$, G (calc) 5.77, (meas) 5.75. Strongest lines of the X-ray powder pattern (32 tabulated, 15 indexed) are 4.654(8)(020), 3.793(6)(120,111), 3.348(8)(012), 3.111(7)(121), 3.064(10)(210), 2.744(7)($13\bar{1}$).

Crystals Duesbury green (RHS-131D), H = 4, pleochroic in greens, $\gamma > \beta > \alpha$; $\alpha = 2.115$, $\beta = 2.135 \parallel b$, $\gamma = 2.26$, $\alpha \Lambda c = 22°$ in obtuse angle β, $2V_\gamma = 40°$.

The name is for Robert Allen Jenkins, mineralogist/geologist for Phelps Dodge Corporation, who first recognized the new species. **A.P.**

Rostite*

(Khademite = Rostite, "Lapparentite of Rost" = Rostite)

F. Cech (1979) Rostite, a new name for orthorhombic $Al(SO_4)(OH) \cdot 5H_2O$. *Neues Jahrb. Mineral. Monatsh.,* 193–196.

The mineral first described by Rost (1937) (*Dana's System of Mineralogy,* 7th ed., v. 2, p. 601) as "lapparentite" and later described as khademite is renamed rostite. X-ray data for the new mineral gave $a = 11.169$, $b = 13.039$, $c = 10.871$A. The infrared absorption spectrum is given. **M.F.**

Sabatierite*

Zdenek Johan, Milan Kvacek, and Paul Picot (1978) Sabatierite, a new selenide of copper and thallium. *Bull. Mineral. (Soc. fr. Mineral. Cristallogr.), 101,* 557–560 (in French).

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Five electron microprobe analysis by J. Breton and C. Gille gave Cu 42.33–43.35, Tl 22.25–22.78, Se 34.27–34.75%, corresponding closely to Cu_6TlSe_4. X-ray powder data are given; the strongest of 17 lines are 3.987(5)(100), 3.089(10)(102), 2.706(7)(021), 2.525(5)(103), 2.445(6)(004), 1.991(7)(200), 1.847(6)(202), 1.673(5)(124,131). The indexing is on an orthorhombic cell with $a = 3.986$, $b = 5.624$, $c = 9.778$A, $Z = 1$; G (calc) = 6.78.

In reflected light bluish-gray, strongly anisotropic with color effects from gray-blue to yellow-brown. Reflectivities (max. and min.) are given at 15 wavelengths from 420 to 700 nm, 460, 33.8, 30.6; 540, 30.6, 27.9; 580, 28.4, 26.1; 660, 23.8, 23.0.

The mineral, extremely rare, occurs in radiating aggregates replacing crookesite included in berzelianite, in calcite veins in the Bukov deposit, Moravia, Czechoslovakia. The name is for Germain Sabatier, director of research, C.N.R.S. Type material is at the Ecole Superiere des Mines, Paris. **M.F.**

Sidorenkite*

A. P. Khomyakov, E. I. Semenov, M. E. Kazakova, and N. G. Shumyatskaya (1979) Sidorenkite, $Na_3Mn(PO_4)(CO_3)$, a new mineral. *Zap. Vses. Mineralog. Obshch., 108*, 56–59 (in Russian).

The mineral had previously been referred to as "unnamed Na–Mn carbonate" (*Am. Mineral., 49*, 1154, 1964). Analysis by M.E.K. gave P_2O_5 25.77, MnO 22.40, FeO 0.49, MgO none, CaO 2.20, Na_2O 32.36, K_2O 0.44, CO_2 15.71, sum 99.37%, corresponding to $(Na_{2.93}K_{0.03})(Mn_{0.89}Ca_{0.11}Fe_{0.02})(PO_4)(CO_3)$ or $Na_3Mn(PO_4)(CO_3)$, the manganese analogue of bradleyite. The DTA curve showed a sharp endothermic break at 720°C (dissociation of carbonate); in nitrogen the break was at 790–830°C and had two stages. The infrared spectrum is given.

X-ray study showed the mineral to be monoclinic, pseudo-orthorhombic, space group $C_2^2h - P2_1/m$ or $C_2^2 - P2_1$, $a = 8.979 \pm 0.001$, $b = 6.729 \pm 0.001$, $c = 5.150 \pm 0.002$A, $\beta = 90°06 \pm .02'$, $Z = 2$, G (calc) = 2.98, (meas) = 2.90. The strongest lines (39 given) are 8.97(20)(100), 3.36(100)(201,$\bar{2}$01,020), 2.99(12)(300), 2.69(15)(121,$\bar{1}$21,220), 2.243(12)(400), 1.682(20)(040).

Color pale rose, luster vitreous to pearly on cleavages. Cleavages {100} and {010} perfect, {001} imperfect; fracture stepped; H ~ 2, brittle. Strongly electromagnetic. Optically biaxial neg., $\alpha = 1.521$, $\beta = 1.563$, $\gamma = 1.585$ (± 0.002), $2V = 68°$ (meas), 70° (calc).

The mineral occurs in irregular grains and in crystals of matchbox shape, up to 2 cm, in pegmatites cutting cancrinite syenites of the Mt. Alluaiv region, Lovozero massif, Kola Peninsula, USSR. It is associated with K-feldspar, nepheline, sodalite, cancrinite, and is cut by aegirine.

The name is for the Soviet geologist Alexander V. Sidorenko, President of the All-Union Mineralogical Society. **M.F.**

Unnamed $BaCa(CO_3)_2$

A. C. Roberts (1978) Mineralogical study of an unnamed barium calcium carbonate from the Cave-in-Rock district, Illinois. *Geol. Surv. Can. Pap., 78-1C*, 49–52.

Electron microprobe analysis by A. G. Plant gave BaO 45.6, SrO 5.2, CaO 18.8, CO_2 (calc) 30.0, sum 99.6%. Traces of Fe, Mn, and Mg (less than 0.05%) were present. Water was absent (Penfield method). The formula is $Ba_{0.872}Sr_{0.147}Ca_{0.983}(CO_3)_2$ (same as alstonite and barytocalcite). Dissolves with effervescences in dilute HCl.

Single-crystal photographs showed the mineral to be hexagonal; $a = 8.692$, $c = 6.148$A, $Z = 3$; however, supercell reflections indicate that the crystals are twinned with a approx. 17.40A. Space group $P312$, $P321$, $P3m1$, $P31m$, $\overline{P3}1m$, or $P\bar{3}m1$. The strongest X-ray lines (42 given) are 6.15(18)(001), 3.550(111)(100), 2.510(67)(300), 2.048(21)(221), 1.943(18)(302), 1.853(15)(113); (these are essentially identical with those of alstonite).

The mineral occurs as euhedral crystals, not exceeding 1 mm, of pyramidal habit. Colorless to smoky white to gray-white in masses. Luster vitreous. H 4–4½, G (calc) = 3.62, (meas) = 3.75 (probably high because of barite impurity). Fluorescent pale to bright orange under long-wave ultraviolet. Optically uniaxial, negative, $\omega = 1.672$, $\epsilon = 1.527$, very close to those of the biaxial negative alstonite, $2V = 6–10°$.

The mineral occurs at Cave-in-Rock district, Illinois, as coatings on barite, associated with yellow calcite, gray alstonite, purple fluorite, and dark brown sphalerite. **M.F.**

Unnamed $CaZrSi_2O_7$

A. G. Plant and A. C. Roberts (1979) New data on unnamed Ca $ZrSi_2O_7$ from Kipawa, Quebec. *Geol. Surv. Canada Pap. 79-1A*, 391.

An unnamed mineral of this composition was mentioned by Gittins *et al.*, *Can. Mineral., 12*, 211–214, 1973. Microprobe analysis gave CaO 18.4, ZrO_2 40.3, SiO_2 40.8, sum 99.5%. X-ray data, indexed by analogy with thortveitite, gave a monoclinic cell, space group probably $C2/m$, $a = 6.869$, $b = 8.667$, $c = 4.681$A, $\beta = 101.82°$, $Z = 2$; G (calc) = 3.645. The strongest lines (36 given) are 5.31(6)(110), 3.225(8)(111), 3.151(10)(021), 3.023(7)(201), 2.655(7)(220,130), 2.221(5)(136). **M.F.**

Unnamed tellurides

Czeslaw Haranczyk (1978) The Krakow Paleozoic telluride province. *Przeglad Geol., 26, no. 6*, 337–343 (in Polish with English and Russian summaries).

Veins contain scheelite, wolframite, tetradymite, tellurobismuthite, csiklovaite, rucklidgeite, hessite, and the following new minerals:

(1) Bi_3Te_4. Probe analysis from Ryczowa gave Bi 50.6, Cu 0.1, Fe 0.1, Te 43.0, sum 93.8%. Strongly anisotropic. Reflectance 438 nm, 51; 487, 60; 535, 62; 591, 63; 658, 63%. H = 24–28 kg/sq mm (20 g load). The X-ray lines are 3.15(10), 2.35(9), 2.16(7), 2.01(6), 1.798(6), 1.598(6), 1.484(7), 1.410(6), 1.389(6), 1.072(6).

(2) Bi_3Te_5. Probe analysis gave Bi 50.0, Te 51.0, sum 101.0%. Isotropic. Reflectance 438–686 nm, 60–63%. H 25–30 kg/sq mm (20 g load).

(3) $Bi_4Te_2S_2$. Probe analysis gave Bi 68.8, Te 22.0, S 6.0, sum 96.8%. Anisotropic. Reflectance at 591 nm 55%. H 34 kg/sq mm (20 g load).

(4) $Bi_3Te_2S_2$. Probe analysis gave Bi 63.1, Cu 0.2, Te 27.5, S 7.9, sum 98.7%. Anisotropic. Reflectance at 591 nm = 53%. H 32 kg/sq mm.

(5) Ag_7Te. Probe analyses gave Ag 75.3, Te 25.0, sum 100.3%. Ag 69, Cu 0.2, Fe 0.1, Bi 2.4, Te 25.8, S 0.1, sum 97.6%. Reflect-

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ance 438 nm, 24; 487, 26; 535, 29; 591, 32; 658, 32%. Anisotropic.

(6) $(Ag,Cu,Bi)_6Te_2S$. Probe analysis gave Ag 52.7, Cu 5.3, Bi 8.5, Te 28.5, S 3.9, sum 98.9%. Anisotropic. Reflectance at 591 nm 40%. H 18 kg/sq mm.

(7) $Ag_3CuBiTe_2S_2$. Probe analysis gave Ag 39.0, Cu 5.8, Bi 19.1, Te 28.4, S 6.6, sum 99.0%. Anisotropic. Reflectance at 591 nm = 43%. H = 20–23 kg/sq mm. **M.F.**

Unidentified palladium arsenide

Elvira Gasparrini (1975) Mertieite and an unnamed compound of palladium with arsenic and tin in a mineral intergrowth from the Atok Mine. *National Institute for Metallurgy Report No. 1726.*

Electron microprobe analysis gave Pd 71.8, Pt 2.5, As 19.9, Sn 5.0, Sb 0.4, sum 99.6 percent, corresponding to $(Pd_{2.174}Pt_{0.042})(As_{0.855}Sn_{0.135}Sb_{0.010})$, assuming As + Sn + Sb = 1 atom.

Distinctly anisotropic, slightly bireflectant, grayish-yellow under reflected light. Single occurrence from Atok mine in a 50-micron intergrowth with a mineral reported as mertieite, from which it could only be distinguished because of different orientation. Reflectances (percent) for R′ max and R′ min 436 nm 48.52 and 46.82, 480 nm 51.85 and 49.52, 527 nm 56.85 and 54.26, 546 nm 56.16 and 54.42, 589 nm 58.76 and 56.51 nm, 622 nm 57.89 and 56.41, 656 nm 58.99 and 57.11. $VHN_{10} = 532.7$ and $VHN_{25} = 585$.

A 16-reflection powder pattern representing the mineral intergrowth is reported and indexed on a pseudo-hexagonal cell (a = 15.038, c = 22.481A) attributed to "mertieite." Nine of these reflections are also re-indexed on another pseudo-hexagonal cell (a = 8.677, c = 17.106A) which is attributed to the unidentified mineral. **L.J.C.**

Palladium arsenostannide

L. V. Razin and L. S. Dubakina (1974) First discoveries of arsenoantimonides and arsenostannides of palladium in platinum deposits of the Soviet Union. *Memoirs All Union Mineral. Soc., Part 103,* 582–594.

Electron microprobe analyses of four grains from the Norilsk mining area gave Pd 61.5, 61.8, 57.1, 64.2; Ag 2.3,--, 2.2, 3.0; Fe 0.2, --, --, --; Au --, 0.3, --, 3.3; Pt --, --, 2.0, 3.1; Sn 24.6, 29.7, 32.0, 19.2; As 7.2, 5.7, 3.1, 6.1; Sb 2.3, 2.0, 2.2, --; Pb 0.3, --, 0.4, --; Bi --, 0.1, --, --; sums 98.4, 99.6, 97.0, 98.9, with suggested idealized formulas of $(Pd,Ag)_{2-x}(Sn,As,Sb)$, $Pd_{5+x}(Sn,As,Sb)_3$, $(Pd,Ag)_{5+x}(Sn,As,Sb)_3$ and $(Pd,Ag)_{3-x}(Sn,As)$. The authors described the first three compositions separately from the fourth in parts of the text, but in other parts these are not distinguished from each other. Both groups are referred to as palladium arsenostannide but the first three are also called antimonian palladium arsenostannide.

The mineral is described as distinctly anisotropic, with colors usually from gray to light yellow-grays. It is light gray with a yellowish tint, with an occasional pinkish hue, and weakly bireflectant under reflected light. The mineral occurs in several size ranges: 1–10, 2–10, 25–60, and 40–200 microns. Reflectances are given for four grains, for analysis No. 2, above for R′ max and R′ min (in percent) 460 nm 48.6 and 44.6, 520 nm 53.0 and 49.8, 580 nm 56.1 and 52.0, 640 nm 58.4 and 55.3, 700 nm 60.5 and 56.1.

A 14-reflection powder pattern of the mineral was indexed on a pseudo-hexagonal cell with a = 8.68, c = 17.07A. The $Pd_{5+x}(Sn,As,Sb)_3$ mineral is considered to represent "a solid solution of the compounds Pd_5As_2+Pd_5Sb_2 (or Pd_5Sb_3) in Pd_3Sn_2."

Discussion

The data presented are not sufficiently unambiguous to characterize any single new mineral. The unfortunate practice of using names derived from elements determined, without regard to the essential nature of all elements, is deplored. This has been a "technique" used to obtain publication in certain journals without seeking approval of the New Minerals and Mineral Names Commission, IMA. **L.J.C.**

New Data

Bohdanowiczite

M. Banas, D. Atkin, J. F. W. Bowles and P. R. Simpson (1979) Definitive data on bohdanowiczite, a new silver bismuth selenide. *Mineral. Mag., 43,* 131–133.

Bohdanowiczite, first reported in 1967 (*Am. Mineral., 53;* 2103; *55,* 2135), has been reexamined by microprobe and X-ray powder diffraction and has now been accepted by the IMA Commission on New Minerals and Mineral Names. The average of three microprobe analyses gave Pb 1.34, Bi 44.39, Ag 22.31, Cu 0.25 Co 0.01, Ni 0.02, S 2.47, Se 28.46, sum 99.75%, corresponding to $AgBiSe_2$ with minor substitution of Cu for Ag, Pb for Bi, and S for Se. Cell parameters for the hexagonal lattice are a = 4.183(8) and c = 19.561(16)A, and the most likely space group is considered to be $P\bar{3}m1$. Strongest lines of the powder pattern (24 tabulated) are 6.54(20)(0003), 3.40(20)($10\bar{1}2$), 3.26(18)(0006), 2.91(100)($10\bar{1}4$), 2.09(18)(1120), and 2.03(30)($11\bar{2}2$, $10\bar{1}8$). The calculated G is 7.72, Vickers hardness between 63 and 96 kg/mm^2. The color is creamy yellow and bireflectance can be observed only along grain margins under oil immersion. The name is for the late Professor Karol Bohdanowicz of Cracow. **A.P.**

Griphite

Romano Rinaldi (1978) The crystal structure of griphite, a complex phosphate, not a garnetoid. *Bull. Mineral. (Soc. fr. Mineral. Cristallogr. 101,* 543–547.

A new analysis of non-metamict griphite from Alberes, east Pyrenees, gives the formula as $M_{24}Ca_4(Fe^{2+}_{0.7}Al_{0.13}\square_{0.17})_4(Al_{0.96}Fe^{3+}_{0.04})_8(PO_4)_{24}(F,OH)_8$, where $M = Li_{2.08}Na_{4.13}Mg_{0.24}Ca_{1.66}Mn_{14.24}Fe^{2+}_{1.29}Fe^{3+}_{0.05}$. Cubic, space group $Pa3$, a = 12.205A, G(calc) = 3.65, (meas) = 3.64. **M.F.**

Todorokite

F. V. Chukhrov, A. I. Gorshkov, A. V. Sivtsov and V. V. Berezovskaya (1978) Structural varieties of todorokite. *Izvest. Akad. Nauk SSSR, Ser. geol.,* no. 12, 86–95 (in Russian).

Electron diffraction patterns of todorokites show that besides the Cuban todorokite from Oriente Province with cell parameters

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$a = 9.75$, $b = 2.84$, $c = 9.59$A (*Am. Mineral., 45,* 1174, 1961), there also occur varieties with $a = 14.6$A (*i.e.,* 4.88 × 3) and $a = 24.38$A (*i.e.,* 4.88 × 5), having the same b and c values. Trilling intergrowths of elongated crystallites resembling sagenitic rutile were observed by electron microscopy for todorokites from an iron–manganese concretion from the Pacific Ocean ($a = 14.6$A) and from the Bakal deposit ($a = 14.6$ and 24.4A). Todorokites with $a \approx 25$A were found in samples from Sterling Hill and the Takhte-Karacha deposit. It is suggested that varieties with $a = 4.88$ and 19.5A (*i.e.,* 4.88 × 4) might also exist. The following nomenclature is recommended for the todorokite polymorphs:

todorokite I, $a = 4.88$A; todorokite II, $a = 4.88 \times 2$;
todorokite III, $a = 4.88 \times 3$; todorokite IV, $a = 4.88 \times 4$;
todorokite V, $a = 4.88 \times 5$. **R.G.B.**

Vernadite

F. V. Chukhrov, A. I. Gorshkov, E. S. Rudnitskaya, V. V. Berezovskaya and A. V. Sivtsov (1978) On vernadite. *Izvest. Akad. Nauk SSSR, Ser. geol.,* no. 6, 5–19 (in Russian).

Vernadite was originally named for the X-ray amorphous to slightly crystalline $MnO_2 \cdot xH_2O$ phase formed by supergene alteration of rhodonite (*Am. Mineral., 31,* 85, 1946). It is now proposed that the name vernadite take precedence over delta-MnO_2 (term for a specific synthesis product) for poorly crystalline supergene hydrated manganese(IV) oxides giving reflections at 2.4 and 1.4A in X-ray powder and electron diffraction patterns. The composition of vernadite is variable: $MnO_2 \cdot m(R_2O, RO, R_2O_3) \cdot nH_2O$, where R = Na,Ca,Co,Mn,Fe. It is distinguished from less abundant birnessite by the absence of diffractions at 7.0–7.2 and 3.5–3.6A. In electron microscope preparations leaflets of vernadite have smaller dimensions (tens of angstroms) than flakes of birnessite, and vernadite leaflets are often curved and folded to resemble fibers. Electron diffraction patterns suggest vernadite is hexagonal $a = 2.86$, $c \approx 4.7$A, and structurally similar to feroxyhyte (δ'-FeOOH). In addition to its occurrence as a weathering product of Mn^{2+}-containing oxides, carbonates, and silicates, vernadite occurs in marine and freshwater iron–manganese crusts and concretions, often in relict bacterial forms. It also forms as an oxidation product of todorokite, which it replaces pseudomorphously. **R.G.B.**

Discredited Minerals

Droogmansite = Kasolite

Michel Deliens (1978) Droogmansite, a discredited species. *Bull. Mineral. (Soc. fr. Mineral. Cristallogr.), 101,* 561–562 (in French).

Droogmansite was described in 1925 (*Am. Mineral., 11,* 168, 1926) as a uranium mineral from Kasolo, Belgian Congo (now Zaire). A sample, probably the original, or at least a metatype, has been re-examined by X-ray and found to be kasolite. **M.F.**

Frigidite = Tetrahedrite and Ni-bearing minerals

F. Gregorio, P. Lattanzi, G. Tanelli and F. Vurro (1979) Garavellite, $FeSbBiS_4$, a new mineral from the Cu–Fe deposit of Valle del Frigido in the Apuane Alps, northern Tuscany, Italy. *Mineral. Mag., 43,* 99–102.

Frigidite from the type locality, formerly regarded as a nickelian tetrahedrite [Dana's System of Mineralogy, 7th ed., vol. I, p. 377 (anal. 27), 379, 1944], has been examined by microprobe and no Ni found. However, this tetrahedrite is associated with the nickel sulfides ullmannite, vaesite and pentlandite, not hitherto reported from this locality. **A.P.**

Schuchardtite = nickel-bearing interlayered vermiculite–chlorite

Andrzy Wiewiora (1978) Ni-containing mixed layer silicates from Szklary, Lower Silesia, Poland. *Bull. Bur. Rech. Geol. Min., Sec. II, Geol. Gites Min. no. 3,* 247–261.

Analyses (NiO 0.20–24.12%), DTA and X-ray data of samples from the type locality show that they are mixtures of vermiculite-like and chlorite-like materials, mostly irregularly interstratified. The name should be dropped. **M.F.**

ERRATA

How much crystallography should we teach geologists? by Gabrielle Donnay and J. D. H. Donnay (Vol. 63, 840–846).

The following corrections should be noted on page 845. In equation 7: instead of $(\sin\theta)/\lambda$, read $(\sin\theta)^2/\lambda^2$. In equation 8 the scattering factor f_j should not be factored; it should be placed under each $\sum_j$ sign.

Error problems in the two-media method of deriving the optical constants *n* and *k* from measured reflectances by Peter G. Embrey and Alan J. Criddle (Vol. 63, 853–862).

Fig. 2, page 855, should have the abscissa labeled "Refractive Index *n*". Equation 7b, page 860, should read

$$a = \frac{h}{2N^2}(N^2 + 1) + \frac{1}{2N^2}(N^2 - 1)\sqrt{(h^2 - N^2)}$$

New Mineral Names: *Arsenbrackebuschite* by Michael Fleischer (Vol. 63, 1282–1284).

The suggested formula in the Discussion should read $Pb_2(Fe^{2+},Zn)(AsO_4)_2 \cdot H_2O$.

The crystal structure of baratovite by Silvio Menchetti and Cesare Sabelli (Vol. 64, 383–389).

The formula for baratovite in Table 1 (page 384) should read $KLi_3Ca_7(Ti_{0.87}Zr_{0.13})_2[Si_6O_{18}]_2F_2$.

Chemistry and physical properties of axinites by Gregory R. Lumpkin and Paul H. Ribbe (Vol. 64, 635–645).

No less than three spelling errors have come to our attention. *Severginite* and *manganseverginite* are the proper renderings of the names given by Kurshakova to manganaxinite and tinzenite (p. 636). With apologies to the gentlemen in question, we report two misspelled names: *Chaudhry* (for Chaudry—pp. 636, 640, 645) and Plyusnina (for Plyusina— pp. 637 and 645).

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