American Mineralogist, Volume 76, pages 2020–2026, 1991

NEW MINERAL NAMES*

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Ankangite*

Ming Xiong, Zhesheng Ma, Zhizhong Peng (1989) A new mineral—Ankangite. Chinese Science Bulletin, 34(7), 592–596 (in English).

Electron-microprobe analysis gave TiO_2 54.0891 [*sic*], BaO 20.5927, V_2O_3 22.3242, Cr_2O_3 2.0792 wt% (sum 99.0852), corresponding to $Ba_{1.087}(Ti_{5.482}V_{2.412}Cr_{0.222})_{\Sigma 8.116}O_{16}$, ideally $Ba(Ti,V,Cr)_8O_{16}$. The valence state of V was confirmed by X-ray photoelectron spectroscopy; no OH or H_2O is evident in the infrared pattern. Occurs as black, euhedral to subhedral tetragonal prismatic crystals up to 0.5 × 0.5 × 1 mm, showing {100} and {110}; grayish black streak, vitreous to adamantine luster, brittle, VHN_{50} = 874, uneven fracture approximately normal to elongation, $D_{meas} = 4.44$, $D_{calc} = 4.389$ g/cm^3 with $Z = 1$. The DTA curve shows an endothermic peak at 588 °C and an exothermic peak at 643 °C; the latter corresponds to a gain of 2.8 wt% on the TG curve and is attributed to oxidation of V. In reflected light, rosy gray-white, anisotropic, weak to distinct bireflectance; reflection pleochroism O = pinkish gray, E = light pink (= c); no internal reflection; at 589 nm, $R_e = 20.1\%$, $R_o = 12.8\%$. Single-crystal X-ray study gave $a = 10.118(1)$, $c = 2.956(3)$ Å, space group $I4$, $I\bar{4}$, or $I4/m$ for a subcell in which $c = 1/2.27c^*$, indicating a one-dimensional incommensurate modulation. The nine lines given for the powder pattern (subcell indexing) are 3.580(50,220), 3.202 (100, 310), 2.476(70,211), 2.264(40,420), 2.333(50,301), 1.892(50, 411), 1.685(50,600), 1.589(70,521,620), and 1.397(50,640, 541).

The mineral occurs in a quartz vein, associated with barite, barytocalcite, roscoelite, and diopside. The new name is for the locality, Ankang County, Shaanxi Province, China. Differs from priderite, which is K dominant, and from redledgeite and mannardite in cell dimensions and the absence of H_2O.

Discussion. The repository for type material is not stated. **J.L.J.**

Bismuth ramdohrite

Yu.S. Borodayev, N.N. Mozgova, S.N. Nenasheva, O.V. Kuzmina, A.V. Yefimov, A.F. Sivtsov (1990) Bismuth ramdohrite, a new sulfosalt. Doklady Akad. Nauk SSSR (1989), 305, 1468–1473 (English translation available).

Ramdohrite was described by Ahlfeld in 1930 as $Ag_2Pb_3Sb_6S_{13}$, but recent investigations by different authors (Moëlo, Makovicky, Karup-Møller, Borodayev, Mozgova and others) have shown that ramdohrite is a member of the andorite-fizelyite homologous series in which $N = 4$ and with the general formula $Ag_xPb_{3-2x}(Sb,Bi)_{2+x}S_6$; ramdohrite is $Ag_6Pb_{12}Sb_{22}S_{48}$ with virtually the same unit-cell parameters as fizelyite. Electron-microprobe analysis of material from Alyaskitovoye tin-tungsten deposit in Yakutia shows two Bi-rich ramdohrite phases: Ag 11.8, 10.6, Pb 27.5, 30.0, Sb 21.4, 23.0, Bi 21.4, 15.4, S 18.5, 18.9, total 100.6, 97.9 wt%, giving respectively $Ag_{1.10}Pb_{1.34}(Sb_{1.76}Bi_{1.02})_{\Sigma 2.78}S_{5.78}$ and $Ag_{0.99}Pb_{1.45}(Sb_{1.90}Bi_{0.74})_{\Sigma 2.64}S_{5.92}$. X-ray diffraction data indicate normal subcell parameters for the andorite series and a $2c'$ superlattice. X-ray powder patterns of the phases are similar and resemble those of the fizelyite standard. As computed by the formula recommended by Makovicky and Karup-Møller (1977), however, N differs markedly from that of andorite: for Bi-rich ramdohrite, N is 5 rather than 4. These phases also do not fit into the general formula of the andorite series: a new $2Ag^+ \rightarrow Pb^{2+}$ type of substitution is proposed, called ramdohrite to distinguish it from the well-known gustavite substitution. The new general formula for the fizelyite-ramdohrite part of the series can then be written as $Ag_{0.66+x+2y}Pb_{1.67-2x-y}(Sb,Bi)_{2.67+x}S_6$, in which x is the gustavite substitution and y the ramdohrite one. In reflected light, bismuth ramdohrite is similar to bismuthian andorite: bluish white color, average bireflectance (in lightest position as for galena, in darkest position bluish gray with greenish tint), average anisotropy with bluish brown color effects, no internal reflection, fine, flaky, saw-toothed twins in one or two directions.

Discussion. The new name, bismuth ramdohrite, was not intended by the authors but is a figment of the translation. The original Russian title *Vismutovyy ramdorit—novaya raznovidnost sulfosoley* should have been translated as *Bismuthian ramdohrite, a new sulfosalt variety.* Moëlo et al. (*Documents du BRGM*, 167, 107 pp., 1989) also have described members of the andorite–fizelyite series with $N = 5$, and a *ramdohrite bismuthifère* with 17 wt% Bi, but also with Bi/Sb atomic ratios >1. Further studies are in progress. **E.A.J.B.**

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

0003–004X/91/1112–2020$02.00

Camgasite*

K. Walenta, P.J. Dunn (1989) Camgasite, a new calcium-magnesium arsenate mineral with composition $CaMg(AsO_4)(OH)\cdot 5H_2O$ from Wittichen in the Central Black Forest. Der Aufschluß, 40, 369–372 (in German, English abstract).

Electron-microprobe analysis gave Ca0 18.9, MgO 12.9, As_2O_5 37.9, H_2O (by difference) 30.3, total 100.0 wt%, leading to a formula (calculated on the basis of 10 O atoms) $Ca_{1.06}Mg_{1.01}As_{1.04}H_{10.63}O_{10}$, or ideally $CaMg(AsO_4)(OH)\cdot 5H_2O$. A direct analysis for H_2O was not possible because of intimate intergrowth with monohydrocalcite. Single-crystal X-ray study indicated monoclinic symmetry, space group probably $P2_1/m$, $a = 9.18(3)$, $b = 7.63(2)$, $c = 16.27(5)$ Å, $\beta = 128.0(5)°$, $V = 898.0$ Å^3, $Z = 4$, $D_{calc} = 2.335$ (with empirical formula), $D_{meas} = 2.4(1)$ g/cm^3. The strongest lines (42 listed) of the powder pattern (Fe radiation) are 7.28(100,100), 6.42(100,002), 4.00(80,$\bar{1}04$), 3.28(80,022,210), 3.21(80,$\bar{2}05$,004), 3.02(80diffuse,201, $\bar{3}04$), 2.96(80 diffuse, $\bar{2}15$,103,014), and 2.54(80,$\bar{3}06$,005, $\bar{2}16$,202,030,$\bar{3}11$). The mineral occurs with monohydrocalcite, calcite, gypsum, rapidcreekite, novacekite, erythrite, and hörnesite as secondary minerals in crusts on hydrothermally altered granite with U and Co mineralization in the lower adit (no longer accessible) of the Johann mine near Wittichen, Black Forest, Germany. The mineral was previously described by Walenta in 1966 and 1972 as mineral a. Camgasite forms idiomorphic prismatic crystals up to 0.15 mm long, slightly elongate [010], with pinacoids {100}, {010}, and {001}. Colorless, transparent to translucent, white streak, vitreous luster, good cleavages {100} and {001}, conchoidal fracture, H about 2, no fluorescence, easily soluble in dilute HCl and HNO_3. Optically biaxial positive, $\alpha = 1.540(2)$, $\beta = 1.548$ (calc.), $\gamma = 1.563(2)$ at 589 nm, $2V = 74°$, $X = b$, Z roughly parallel to one crystal edge of unknown direction. Polysynthetic twins have been observed in sections parallel to {010}. The compatibility index $[1 - K_p/K_c]$ is -0.022, "excellent."

The name is for the composition (Ca-Mg-As). Type material is at the Institute of Mineralogy and Crystallography of Stuttgart University, and at the Smithsonian Institution, Washington. **E.A.J.B.**

New nomenclature for chlorites

A. Wiewióra, Z. Weiss (1990) Crystallochemical classification of phyllosilicates based on the unified system of projection of chemical composition: II. The chlorite group. Clay Minerals, 25, 83–92.

The first author has proposed for the phyllosilicates a new unified system of vector representation of chemical composition (*Clay Minerals,* 25, 73–81, 1990). The system is based on projection of the composition, as given by the crystallochemical formula, onto a field with orthogonal axes X and Y for octahedral cations R^{2+} (range 0–6) and Si (range 2–4), respectively, and with oblique axes V and Z for the respective octahedral trivalent cations R^{3+} (range 0–4) and the number of vacant octahedral sites □ (range 0–2).

The chemical composition of chlorite at any point in the field is controlled by the formula $[(Mg,Fe^{2+},Mn,Ni)_{(6-y-z)}(Al,Fe^{3+},Cr,Ti^{4+})_y\square_z](Si_{(4-x)}Al_x)O_{10}(OH)_8$. This formula is superior for trioctahedral and dioctahedral chlorites because existing formulas cover only particular chlorite compositions. The motivation to diverge from previous classifications, which are based principally on tetrahedral substitution, is the dependency of the structure of chlorites on substitution in the octahedral sheets. In the approved nomenclature of Bailey for chlorites (*Am. Mineral.,* 65, 1–7, 1980) all end-members and the solid solutions among them project to one single point in the new unified system. The authors propose another nomenclature for the chlorites, which is based on the division along vacant isolines in their projection system, on the predominant octahedral cation and, for prefixes, on the second predominant cation. In this new nomenclature many traditional and previously discarded names are reinstated (e.g., diabantite, ripidolite, corundophyllite). Although the trioctahedral chlorites would require about 220 names in the new system, the authors propose to retain only those defined by Bayliss (*Can. Mineral.,* 13, 178–180, 1975).

Discussion. The authors mention in their paper that they have submitted the proposed species names, based on their classification scheme, to the Nomenclature Committee of the AIPEA (Association Internationale pour l'Etude des Argiles), which considered and rejected them on 30 August 1989. The paper is thus a straightforward violation of internationally adopted procedures on the publication of mineral names. Journals should require from their authors strict adherence to these procedures. **E.A.J.B.**

Clinomimetite*

Yongshan Dai, J.M. Hughes, P.B. Moore (1991) The crystal structures of mimetite and clinomimetite, $Pb_5(AsO_4)_3Cl$. Can. Mineral., 29, 369–376.

Mimetite, $Pb_5(AsO_4)_3Cl$, is hexagonal, space group $P6_3/m$. At 98–120 °C, mimetite undergoes a reversible phase transition to a monoclinic dimorph, now named clinomimetite. X-ray crystal structural study ($R = 0.040$) of a natural sample, from Johanngeorgenstadt, Erzgebirge, Sachsen, Germany (USNM B13647) gave monoclinic symmetry (pseudohexagonal), space group $P2_1/b$, constrained parameters $a = 10.1891$, $b = 20.3723$, $c = 7.4564$ Å, $\gamma = 119.8827°$, composition $Pb_{9.99}(As_{5.74}Si_{0.07}S_{0.06}P_{0.14})_{\Sigma 6.01}Cl_{2.18}O_{23.91}$.

Discussion. An incomplete description. No physical or optical properties, or X-ray powder pattern are given. **J.L.J.**

Levyclaudite*

Y. Moëlo, E. Makovicky, S. Karup-Møller, B. Cervelle, C. Maurel (1990) Levyclaudite, $Pb_8Sn_7Cu_3(Bi,Sb)_3S_{28}$, a new mineral species with non-commensurate structure, of the cylindrite series. Eur. J. Mineral., 2, 711–723 (in French, English abstract).

Electron microprobe analysis (average of 22) gave Pb 40.24, Sn 18.88, Cu 4.38, Bi 12.16, Sb 1.95, S 21.40, total 99.01 wt%, leading to an empirical formula (calculated on the basis of 28 S atoms) of $Pb_{8.14}Sn_{6.64}Cu_{2.89}(Bi_{2.44}Sb_{0.67})_{\Sigma 3.11}S_{28}$, or ideally $Pb_8Sn_7Cu_3(Bi,Sb)_3S_{28}$. X-ray studies of natural and synthetic samples show that levyclaudite is isomorphous with cylindrite and has a noncommensurate lattice, with two monoclinic sublattices (space group $A2$, Am or $A/2m$); the first subcell is pseudotetragonal [Q-type, a = 11.84(1), b = 5.825(10), c = 5.831(10) Å, β = 92.6(2)°], and the second is pseudohexagonal [H type, a = 11.84(1), b = 3.67(1), c = 6.31(1) Å, β = 92.6(2)°]. D_{calc} (for the global composition) = 6.04 g/cm³. The strongest lines (23 listed) of the powder pattern (Cu radiation) are 4.06(30)(Q 011), 3.93(100)(Q 300,111; H 300), 3.17(20)(H 002,011), 2.95(20)(Q and H 400), 2.92(10)(Q 020), 2.82(Q 120,10$\bar{2}$, 311; H 21$\bar{1}$), and 2.068(30)(Q 420). The mineral is a member of the cylindrite isomorphous series, with Bi/Sb >1, with Cu and without Fe.

Levyclaudite occurs in veinlets (<1 mm wide) of lamellae (maximum length 300 μm) in flow texture, associated with pyrite, sphalerite, kirkiite, galena, tennantite, and kesterite in quartz in a drill hole sample from the Aghios Philippos lead-zinc deposit, Kirki district, Thrace, Greece. Crystals of levyclaudite are platy, but some synthetic grains are fibrous. Twins (only visible in X-ray photographs): mirror on {100} and 60° rotation around [013] for the tetragonal component. The mineral is opaque, metallic luster, gray color, black streak, VHN_{25} = 80–87, H = 2½–3, very good cleavage {100}. In polished section, indistinguishable from franckeite and cylindrite. No distinct color (dominant wavelength = 478–479 nm, chromaticity coordinates: X = 0.302–0.301, Y = 0.308); weak pleochroism without visible colors, but distinct variation in reflectance values. Reflectance values (nm, R_{max}/R_{min}%): 470 35.8/34.2; 546 34.0/32.5; 589 33.1/31.6; 650 32.1/30.5. Strong anisotropism without very pronounced colors; no internal reflection.

The name is for Dr. Claude Lévy of Université de Paris VI in recognition of his contributions to the mineralogy of complex sulfides. Type material is at the École des Mines de Paris and at the University of Copenhagen. **E.A.J.B.**

Lishizhenite*

Wanmao Li, Guoying Chen (1990) Lishizhenite—A new zinc sulfate mineral. Acta Mineral. Sinica, 10(4), 299–305 (in Chinese, English abstract).

The average of two wet-chemical analyses gave ZnO 8.17, MnO 0.76, MgO 0.05, FeO 0.11, Na_2O 0.02, CdO 0.01, PbO 0.01, CaO 2.25, Fe_2O_3 18.28, Al_2O_3 0.37, SO_3 41.00, H_2O 29.20, sum 100.23 wt%, corresponding to $(Zn_{0.86}Mn_{0.09}Fe^{2+}_{0.01}Mg_{0.01})_{\Sigma 0.97}(Fe^{3+}_{1.96}Al_{0.06})_{\Sigma 2.02}S_{4.04}O_{16.13}\cdot 13.87H_2O$, simplified as $ZnFe_2(SO_4)_4\cdot 14H_2O$. Room-temperature Mössbauer spectroscopy confirmed that the Fe is trivalent. Occurs as crystal aggregates and clusters and as veinlet-type aggregates and masses in cavities in anhydrite. Crystals are up to 8 mm long, typically 2–3 mm; usually elongate [100], tabular prismatic and showing {010}, {100}, and {001}. Color light violet, deeper in aggregates; white streak, vitreous luster, H = 3.5, cleavage {010} nearly perfect, {001} poor, D_{meas} = 2.206, D_{calc} = 2.201 g/cm³ with Z = 1. Alters readily in air to dull and nontransparent, then to yellowish brown. Readily soluble in cold H_2O or HCl. Optically negative, colorless, and nonpleochroic, α = 1.522(2), β = 1.568(1), γ = 1.578(4), $2V$ = 47°, OAP ∧ {010} = 86°, strong dispersion, $r > v$. The TGA curve shows dehydration in steps, with 30 wt% loss to 310 °C. X-ray single-crystal and powder diffractometry (Cu radiation) indicated triclinic symmetry, space group $P\bar{1}$, a = 6.477(1), b = 15.298(3), c = 6.309(1) Å, α = 90.20(1), β = 101.11, γ = 93.97(1)°. Strongest lines of the powder pattern (110 lines listed) are 5.07(70,120), 4.79(100,021), 4.11(29,$\bar{1}$30), 4.06(68,$\bar{1}\bar{2}$1), 3.98(38,1$\bar{1}$1), 3.51(78,121), and 2.859(36,1$\bar{4}$1).

The mineral occurs in the oxidation zone of a lead-zinc deposit at Xitieshan, Qinghai Province, China, in association with anhydrite, römerite, copiapite, sulfur, gypsum, pyrite, and quartz. The new name is for Li Shizhen, a famous Chinese pharmacologist (1518–1593). Type material is at the Geology Museum, Beijing, and at the Department of Geology, Lanzhou University, Lanzhou, China.

Discussion. Results of the crystal-structure study for the then unnamed mineral were abstracted in *Am. Mineral.*, 76, p. 670, 1991. **J.L.J.**

Mangangordonite*

P.B. Leavens, J.S. White, Jr., G.W. Robinson, J.A. Nelen (1991) Mangangordonite, a new phosphate mineral from Kings Mountain, North Carolina and Newry, Maine, U.S.A. Neues Jahrb. Mineral. Mon., 169–176.

Electron-microprobe analysis of the mineral from Kings Mountain gave MgO 0.4, MnO 12.43, FeO 3.88, Al_2O_3 25.38, P_2O_5 33.96, sum 76.05 wt%. The mineral reacts with the electron beam; recalculation to 100 wt% on the basis of 18 H gives MgO 0.34, MnO 10.79, FeO 3.44, Al_2O_3 22.09, P_2O_5 29.57, H_2O 33.77, corresponding to $(Mn,Fe,Mg)Al_2(PO_4)_2(OH)_2(H_2O)_6\cdot 2H_2O$. Occurs as nearly equant to bladed crystals up to 2 mm (Kings Mountain), and as bladed crystals and divergent aggregates up to 1 mm long (Newry, Maine). Tabular on {010}, elongate [001], forms {010}, {100}, {1$\bar{1}$0}, and {0$\bar{1}$1}. Transparent, colorless to faintly yellow, vitreous luster, white streak, brittle, H = 3, perfect {010} cleavage, nonfluorescent, D_{meas} = 2.36(3), D_{calc} = 2.319 g/cm³ with Z = 1. Optically colorless, nonpleochroic, biaxial positive, α = 1.556(1), β = 1.561(2), γ = 1.571(2), $2V_{meas}$ = 70, $2V_{calc}$ = 71°, distinct dispersion $r < v$, $Z \sim c$, (010) ∧ OAP = −45°. Single-crystal X-ray structural study indicated triclinic symmetry, space group $P\bar{1}$, a = 5.257(3), b = 10.363(4), c = 7.040(3) Å, α = 105.44(3), β = 113.07(3), γ = 78.69(4)°. Strongest lines of a 114.6-mm Gandolfi pattern (Cu radiation) are 9.96(60,010), 6.39(80,001), 4.77(100,$\bar{1}\bar{1}1$), 3.18(70,002), 2.86(50,$\bar{1}12$), and 2.59(40,$0\bar{3}2$).

The mineral occurs in vugs in spodumene-microcline-quartz pegmatite at the Foote Mineral Company spodumene mine at Kings Mountain, North Carolina, and in vugs in pegmatite at the Dunton Gem mine, Newry, Maine. The new name recognizes that the mineral is the Mn analogue of (Mg-dominant) gordonite. Type material is in the U.S. National Museum, Washington, D.C., and in the National Museum of Natural Sciences, Ottawa, Ontario, Canada. **J.L.J.**

Perraultite*

G.Y. Chao (1991) Perraultite, a new hydrous Na-K-Ba-Mn-Ti-Nb silicate species from Mont Saint-Hilaire, Quebec. Can. Mineral., 29, 355–358.

A preliminary description of the mineral was abstracted in *Am. Mineral.*, 76, p. 300, 1991. Single-crystal X-ray study showed the mineral to be monoclinic, space group $C2$, Cm, or $C2/m$, a = 10.820(2), b = 13.843(4), c = 20.93(1) Å, β = 95.09(2)°, Z = 4. A pronounced subcell is present, with $a' = ½a$, $b' = ½b$, $c' = c$, $\beta' = \beta$. The strongest lines of the powder pattern (Cu radiation, diffractometer) are 10.43(42,002), 3.474(100,006), 3.186(15, 224), 2.867(13,241), 2.789(10,$\bar{2}26$), 2.606(40,008), 2.084 (15,00.10), and 1.737(10, 00.12). The tentative ideal formula is $Na_2KBaMn_8(Ti,Nb)_4Si_8O_{32}(OH,F,H_2O)_7$, closely related to that of jinshajiangite, $(Ba,Ca)_4(Na,K)_5(Fe^{2+},Mn)_{15}(Ti,Fe^{3+},Nb,Zr)_8Si_{15}O_{64}(F,OH)_6$. The latter can be recast as $Na_2KBaCa(Fe,Mn)_8Ti_4Si_8O_{32}(F,OH)_7$. The similarity in the X-ray powder patterns, cell parameters, physical properties, and identical space group of perraultite and jinshajiangite suggests that they are analogues. Type material is in the Royal Ontario Museum, Toronto, and in the Canadian Museum of Nature, Ottawa, Ontario, Canada. **J.L.J.**

Rouvilleite*

A.M. McDonald, G.Y. Chao, R.A. Ramik (1991) Rouvilleite, a new sodium calcium fluorocarbonate mineral from Mont Saint-Hilaire, Quebec. Can. Mineral., 29, 107–111.

The mineral (formerly UK62) occurs as irregular crystalline masses up to 3 mm across, rarely as crystals up to 1 mm long, in cavities in a sodalite syenite inclusion in nepheline syenite at the Poudrette quarry, Mont Saint-Hilaire, Quebec. Electron-microprobe analysis (average of three) gave Na_2O 25.95, CaO 26.47, MnO 6.83, FeO 0.52, MgO 0.01, CO_2 (calc.) 37.21, F 5.65, O ≡ F 2.38, sum 100.26 wt%, corresponding to $Na_{2.97}(Ca_{1.67}Mn_{0.34}Fe_{0.02})_{\Sigma 2.03}(CO_3)_3F_{1.06}$. Pale tan to colorless, white streak, vitreous to slightly waxy luster, transparent, brittle, good {001} and imperfect {010} cleavages, uneven fracture, H = 3, nonfluorescent, strongly effervescent in cold 1:1 HCl, insoluble in water, D_{meas} = 2.67(2), D_{calc} = 2.69 g/cm³ for the empirical formula with Z = 4. The infrared spectrum shows strong absorptions at 1600–1250 cm^{-1} attributable to carbonate; doubling of bands (1497 and 1457 cm^{-1}, and elsewhere) suggests the presence of at least two nonequivalent carbonate groups. TGA–EGA analysis over the range 150–1400 °C showed a weight loss of 63.6 wt%. Both Mn-bearing and Mn-free rouvilleite were hydrothermally synthesized at 600–700 °C and 1.5 kbar pressure. Optically biaxial negative, nonpleochroic, α = 1.472(1), β = 1.562(1), γ = 1.569(1) for Na light, $2V_{meas}$ = 25(1)°, $2V_{calc}$ = 30°, $r > v$ weak, $b = Y$, $c \wedge X$ = 6° in the acute angle β. X-ray single-crystal study indicated monoclinic symmetry, space group Cc or $C2/c$, a = 8.043(4), b = 15.812(5), c = 7.030(3) Å, β = 101.16(3)° as refined from a 114.6-mm Gandolfi pattern (Cu radiation). Rare euhedral crystals show {010}, {110}, {100}, and {001} (Type 2), and {010}, {110}, {100}, {$10\bar{1}$}, {023}, and {$03\bar{2}$} (Type 1); forms {023} and {$03\bar{2}$} (Type 1) are inconsistent with the possible space groups. Strongest lines of the Gandolfi pattern are 7.081(80,110), 2.937(70,150), 2.895(100,$20\bar{2}$), 2.711(90,$22\bar{2}$), 2.637(60,060), 2.039(70, 242), 1.869(75,$35\bar{2}$), and 1.746(60,$\bar{1}14$).

The new name is for the type locality, Rouville County. Rouvilleite occurs within villiaumite, and kupletskite occurs within rouvilleite. Type material is in the Royal Ontario Museum, Toronto, and in the Canadian Museum of Nature, Ottawa, Canada. **J.L.J.**

Silinaite*

G.Y. Chao, J.D. Grice, R.A. Gault (1991) Silinaite, a new sodium lithium silicate hydrate mineral from Mont Saint-Hilaire, Quebec. Can. Mineral., 29, 359–362.

J.D. Grice (1991) The crystal structure of silinaite, $NaLiSi_2O_5 \cdot 2H_2O$: A monophyllosilicate. Can. Mineral., 29, 363–367.

Electron-microprobe analyses using different probes and different specimens gave SiO_2 58.54, 58.72, Al_2O_3 0.01, 0.00, CaO 0.14, 0.42, Na_2O 14.96, 13.66, Li_2O (calc.) 7.28, 7.25, H_2O (calc.) 17.56, 17.47, sum 98.49, 97.52 wt%, corresponding to $(Na_{0.99}Ca_{0.01})LiSi_{2.00}O_5 \cdot 2H_2O$ and $(Na_{0.91}Ca_{0.02})LiSi_{2.02}O_5 \cdot 2H_2O$. The ideal formula is $NaLiSi_2O_5 \cdot 2H_2O$, requiring SiO_2 59.45, Na_2O 15.33, Li_2O 7.39, H_2O 17.83 wt%. Occurs as clear tabular crystals up to 2 mm across, as fibrous clusters, and as chalky to earthy or powdery patches in cavities. White to colorless, white streak, vitreous to earthy luster, opaque to translucent or transparent, H = 4.5, brittle, conchoidal fracture, cleavages {001} perfect, {010} good, {110} distinct. Tabular crystals show {001}. Nonfluorescent, slowly soluble in concentrated HCl, HNO_3, or H_2SO_4, leaving a gelatinous residue; D_{meas} = 2.24, D_{calc} = 2.23 g/cm³ with Z = 4. Optically biaxial positive, α = 1.515(1), β = 1.516(1), γ = 1.518(1), $2V_{meas}$ = 64(1), $2V_{calc}$ = 71°, $X = b$, $Y \wedge c$ = 16° in the acute β angle, strong inclined dispersion $r > v$. Single-crystal X-ray structural study (r = 0.03) gave monoclinic symmetry, space group *A*2/*n*, $a = 5.061(1)$, $b = 8.334(2)$, $c = 14.383(3)$ Å, $\beta = 96.6(2)°$. Strongest lines of a 114.6-mm Gandolfi pattern (Cu radiation) are 7.14(100,011), 4.24(80,$\bar{1}11$), 4.14(100,013), 4.02(80,111), 2.847(100,122), 2.698(50,015), 1.610(40,311,$\bar{1}37$), and 1.557(40,$\bar{3}22$).

The new name alludes to the composition (Si-Li-Na). The mineral, formerly UK81, occurs in sodalite syenite xenoliths in nepheline syenite at the Poudrette quarry, Mont Saint-Hilaire, Quebec. Type material is in the Royal Ontario Museum, Toronto, and in the Canadian Museum of Nature, Ottawa, Ontario. **J.L.J.**

Strontiowhitlockite*

S.N. Britvin, Y.A. Pakhomovskii, A.N. Bogdanova, V.I. Skiba (1991) Strontiowhitlockite, $Sr_9Mg(PO_3OH)(PO_4)_6$, a new mineral species from the Kovdor deposit, Kola Peninsula, U.S.S.R. Can. Mineral., 29, 87–93.

Electron-microprobe analysis of pipelike to tubular aggregates gave SrO 51.4, CaO 5.5, BaO 2.3, MgO 4.6, MnO 0.2, FeO 0.2, P_2O_5 35.2, H_2O (coulometric, high-temperature portion) 0.5, sum 99.9 wt%, corresponding to $(Sr_{6.96}Ca_{1.38}Ba_{0.21}Mg_{1.60}Mn_{0.04}Fe_{0.04})_{\Sigma 10.23}H_{0.78}P_{6.96}O_{28.00}$ or $(Sr_{6.96}Ca_{1.38}Mg_{0.60}Ba_{0.21}Mn_{0.04}Fe_{0.04})_{\Sigma 9.23}Mg_{1.00}H_{0.78}P_{6.96}O_{28}$, ideally $Sr_9Mg(PO_3OH)(PO_4)_6$. Pipelike or tubular, up to 2 mm long and 20 μm in diameter; also as roselike aggregates of rounded tabular crystals up to 5–8 μm across, flattened on {001}; white color, dull luster, translucent, white streak, moderate {001} cleavage or parting, *H* not determinable, $D_{meas} = 3.64$, $D_{calc} = 3.60$ g/cm³ with $Z = 6$. Optically, parallel extinction for the pipes; by analogy with whitlockite, uniaxial negative and projected $\omega = 1.601$, $\epsilon = 1.598$. By analogy with whitlockite, hexagonal, $a = 10.644(9)$, $c = 39.54(6)$ Å as calculated from a diffractometer pattern (Cu radiation) with strongest lines of 3.288(37,00.12,214), 3.071(29,300), 3.004(100,02.10), 2.661(80,220), 1.940(29,238,12.17), and 1.783(36).

The mineral occurs in a 1-cm cavity in a dolomite carbonatite vein, 60 m long, that crosscuts pyroxenite in the Kovdor magnetite-apatite-baddeleyite deposit, southwestern part of the Kovdor ultramafic alkaline complex, Kola Peninsula, USSR. Associated minerals are strontian collinsite, pyrite, dolomite, and an unnamed strontium magnesium phosphate (which see). The new name indicates that the mineral is the Sr analogue of whitlockite. Type material is in the Fersman Mineralogical Museum, Moscow, and in the Museum of Mines, Institute of Mines, Leningrad. **J.L.J.**

Trimounsite-(Y)*

P. Piret, M. Deliens, M. Pinet (1990) Trimounsite-(Y), a new rare earths silicotitanate from Trimouns, Ariège, France: $(REE)_2Ti_2SiO_9$. Eur. J. Mineral., 2, 725–729 (in French, English abstract).

Electron-microprobe analysis (average of 20) gave SiO_2 11.77, TiO_2 34.47, Y_2O_3 34.62, Sm_2O_3 0.40, Gd_2O_3 1.92, Tb_2O_3 0.71, Dy_2O_3 5.67, Ho_2O_3 0.79, Er_2O_3 5.04, Yb_2O_3 4.83, sum 100.22 wt%; the formula calculated on the basis of nine O atoms is $(Y_{1.48}Dy_{0.15}Er_{0.13}Yb_{0.12}Gd_{0.05}Ho_{0.02}Tb_{0.02}Sm_{0.01})_{\Sigma 1.98}Ti_{2.08}Si_{0.94}O_9$, ideally $(REE)_2Ti_2SiO_9$. Small quantities of Tm are also present, but could not be measured because of interference from Al peaks in the standard; all lanthanides with atomic number between 62 and 70 are present, except for Eu. Single-crystal X-ray study indicated monoclinic symmetry, space group $P2_1c$, $a = 12.299(2)$, $b = 11.120(2)$, $c = 4.858(1)$ Å, $\beta = 95.62(1)°$, $V = 661.3(4)$ Å³, $Z = 4$, $D_{calc} = 4.85$, $D_{meas} = 5.0(1)$ g/cm³. The strongest lines (28 listed) of the powder pattern (Cu radiation) are 3.44(90,211,121), 2.82(100,$32\bar{1}$), 2.777(40, 004), 2.359(40,$11\bar{2}$), 2.117(50,$34\bar{1}$), 1.959(60,312,350), 1.643(60,550,640,$60\bar{2}$,$15\bar{2}$), and 1.628(50,631). The mineral is a nesosilicate bearing no relation to known species. Occurs with allanite, bastnäsite, and other REE minerals in cavities with calcite and dolomite crystals in white dolomitic rock in the Trimouns talc deposit, 6 km north of Luzenac, Ariège, France. Trimounsite-(Y) occurs as prismatic crystals up to 5 mm long, elongate [001], with crystal forms {110}, {130}, {010}, {211}, {121}, and {011}. Forms {110} and {130} appear striated by interpenetration. No twinning. Light brown color, translucent or slightly smoky and transparent depending on thickness of crystals, white streak, adamantine luster, no cleavage, brittle, $H = 7$, nonfluorescent, strong bluish cathodoluminescence in the electron beam. Optically biaxial negative with α, β, and $\gamma > 2.10$ (589 nm), 2*V* not measurable, $r > v$ (strong), no pleochroism. The compatibility index could not be calculated because optical data could not be measured.

The name is for the locality. Type material is in the mineralogical collection of the Royal Institute of Natural Sciences of Belgium in Brussels. **E.A.J.B.**

Zenzénite*

D. Holtsam, B. Lindqvist, M. Johnsson, R. Norrestam (1991) Zenzénite: $Pb_3(Fe^{3+},Mn^{3+})_4Mn^{4+}_3O_{15}$, a new mineral species from Långban, Filipstad, Sweden, and its crystal structure. Can. Mineral., 29, 347–354.

Electron-microprobe analysis gave PbO 53.68, BaO 0.06, TiO_2 0.19 Mn_2O_3 8.88, MnO 23.63, Fe_2O_3 15.36, MgO 0.12, Al_2O_3 0.19, SiO_2 0.03, sum 102.15 wt%, corresponding to $Pb_{2.87}Ba_{0.01}(Fe^{3+}_{2.30}Mn^{3+}_{1.35}Mg_{0.04}Al_{0.04})_{\Sigma 3.71}(Mn^{4+}_{3.24}Ti^{4+}_{0.03}Si_{0.01})_{\Sigma 3.28}O_{15}$, ideally $Pb_3Fe_4Mn_3O_{15}$ for the end-member. Occurs as euhedral to subhedral grains, tabular on {001} and up to 150 μm long, black, opaque, distinct {001} cleavage, $VHN_{50} = 764(739–795)$, $H = 5.7$, $D_{calc} = 6.83$ g/cm³ for the empirical formula with $Z = 4$. Bright white in reflected light, weak bireflectance in oil, strongly anisotropic from gray to pale brown. Reflectance values R_o, $R_{e'}$ are given in 20-nm steps; representative values in air are 400 32.0, 25.9; 440 31.6, 26.5; 480 30.8, 25.9, 520 30.0, 25.4; 560 29.2, 24.8; 600 28.3, 24.2; 640 27.4, 23.6; 680 26.8, 22.9. Single-crystal X-ray structure study ($R =$

0.028) indicated hexagonal symmetry, space group $P6_3/mcm$, a = 10.008(4), c = 13.672(8) Å. Strongest lines of a 57.3-mm Gandolfi pattern (Cu radiation) are 3.42(50, 004), 3.18(80,211), 2.828(70,114), 2.663(100,213), 2.366-(60,222,311), and 1.687(80, 226).

The mineral occurs in a carbonate-phyllosilicate skarn at the Långban mines, Filipstad, south-central Sweden. Associated minerals are dolomite, calcite, barytocalcite, northesite, chlorite, kinoshitalite, pinakiolite, hausmannite, jacobsite, and macedonite. The new name is for Nils Zenzén (1883–1959), the former senior curator at the Department of Mineralogy of the Swedish Museum of Natural History, in which type material is preserved. **J.L.J.**

Fluorine-bearing gibbsite-like mineral

J.L. Jambor, A.P. Sabina, R.A. Ramik, B.D. Sturman (1990) A fluorine-bearing gibbsite-like mineral from the Francon quarry, Montreal, Quebec. Can. Mineral., 28, 147–153.

An aluminium hydroxide giving an X-ray powder-diffraction pattern resembling that of gibbsite was reported as early as 1968 by Sabina et al. (*Can. Mineral.*, 9, 468–477), and was later referred to as unidentified No. 3 from the Francon quarry at Montreal, Quebec. Older and newer chemical analyses with different methods (wet chemical, neutron activation, thermal decomposition, electron microprobe) gave variable results, but indicated an ideal formula of $Al(OH_{1-x}F_x)_3$; F contents are as high as 8.3 wt%. Excess H_2O and persistently present SiO_2 are attributed to absorption and admixture with amorphous silica. The mineral is unstable under the electron beam, and electron-diffraction investigations have revealed only that the elongation axis has a periodicity of about 2.35 Å. X-ray powder data have been indexed by analogy to gibbsite; the strongest lines (19 listed, 114-mm Debye-Scherrer camera, Cu radiation) are 4.83(100,002), 4.340(60,200, 110), 2.420(30,004,021), 2.006(20,313,402), and 1.446-(30,133,600,423). Calculated cell dimensions are a = 8.656, b = 4.981, c = 9.675 Å, β = 92.10°, V = 417.6 Å^3, D_{calc} for $8[Al(OH_{2.5}F_{0.5})_{\Sigma 3.0}]$ = 2.51 g/cm^3, D_{meas} 2.43 g/cm^3. The Francon gibbsite-like mineral differs in important respects from the seven polymorphs of $Al(OH)_3$ reported to occur as natural phases, and from the four additional polymorphs known only as synthetic phases. The mineral occurs as white powdery coatings and coalesced globules. The globules are typically 0.1–0.2 mm in diameter and consist of radial aggregates. Contamination with dawsonite, fluorite, calcite, and halloysite is common. Individual grains are colorless and have a parallel or almost parallel extinction, with Z' parallel to the elongation, nx' = 1.535(5), nz' = 1.550(5). The mineral is fluorescent and phosphorescent in ultraviolet light: bluish white in short wavelength radiation and cream-white in long wavelength UV radiation. Thermogravimetric data are similar to those of gibbsite. The infrared absorption spectrum of the Francon mineral is simpler than that of other $Al(OH)_3$ minerals: there are only two strong absorption bands in the high-frequency region of OH stretching, and in the Al-O stretching region below 900 cm^{-1} the Francon spectrum is even less complex than that of doyleite. **E.A.J.B.**

$Mg_3[SO_4]_2(OH)_2$

N.A. Yamnova, D.Yu. Pushcharovskii, V. N. Apollonov (1989) Crystalline structure of a new natural Mg sulfate $Mg_3[SO_4]_2(OH)_2$. Vestnik Mosk. Univ. Geol., 44(5), 73–75 (in Russian; English translation in Moscow Univ. Geol. Bull., 44(5), 76–79).

The mineral occurs in halite beds of the potassium-salt Nepa deposit, eastern Siberia. Chemical analysis (not given) showed Mg:S = ~1:5. X-ray single-crystal structural study (R = 0.035) gave tetragonal symmetry, diffraction class $4/mmm$, a = 5.254(2), c = 12.971(7) Å, composition $Mg_3[SO_4]_2(OH)_2$ with Z = 2. **J.L.J.**

Unnamed Sr-Mg phosphate

S.R. Britvin, Y.A. Pakhomovskii, A.N. Bogdanova, V.I. Skiba (1991) Strontiowhitlockite, $Sr_9Mg(PO_3OH)(PO_4)_6$, a new mineral species from the Kovdor deposit, Kola Peninsula, USSR. Can. Mineral., 29, 87–93.

The central part of tubes of strontiowhitlockite (which see) are occupied by spindles of a strontium magnesium phosphate that makes up about 10% of the total volume of the tubes. Electron-microprobe analysis gave CaO 4.7, SrO 47.5, BaO 2.0, MgO 3.0, MnO 0.1, FeO 0.3, P_2O_5 31.6, H_2O (by difference) 10.8, sum 100 wt%. The cation ratios correspond to $(Sr_{7.21}Ca_{1.32}Ba_{0.21})_{\Sigma 8.74}(Mg_{1.17}Fe_{0.07}Mn_{0.02})_{\Sigma 1.26}P_{7.00}$. H_2O loss apparently occurs between 70 and 120 °C. The spindles are about 10 μm in diameter and hexagonal in outline. The sharp boundary with strontiowhitlockite suggests that the strontium magnesium phosphate is a distinct compound. **J.L.J.**

New Data

Algodonite, awaruite, billingsleyite, bogdonovite, hexatestibiopanickelite, keithconnite, mgriite, polarite, roaldite, sobolevskite, stibiopalladinite, stützite, urvantsevite, wairauite, weissite

P. Bayliss (1990) Revised unit-cell dimensions, space group, and chemical formula of some metallic minerals. Can. Mineral., 28, 751–755.

Most of the following revisions are based on the principles that the possible structure types of simple metallic minerals are limited and that the majority of the atoms have all or some atomic coordinates in fixed positions. Intensities of the X-ray powder-diffraction reflections were calculated from data given in the literature, were compared with the observed intensities, and were adjusted until the calculated and observed intensities matched completely.

Algodonite

Algodonite is isostructural with allargentum, $Ag_{1-x}Sb$, space group $P6_3/mmc$. The formula of algodonite is $Cu_{1-x}As_x$.

Awaruite

Awaruite is $FeNi_3$, isostructural with isoferroplatinum, $FePt_3$, space group $Pm\bar{3}m$.

Billingsleyite

The formula is Ag_7AsS_6; cubic, space group $P2_13$, a = 10.481(4) Å, $Z = 4$. Previously reported as orthorhombic with $Z = 8$.

Bogdanovite

The new formula is $(Au,Te,Pb)_3(Cu,Fe)$, cubic, space group $Pm3m$, a = 4.0876(15) Å, $Z = 1$. Suggested to be isostructural with isoferroplatinum, $FePt_3$.

Hexatestibiopanickelite

Isostructural with nickeline, NiAs; hexagonal, space group $P6_3/mmc$, a = 3.983(3), c = 5.339(3) Å, new formula Ni(Te,Sb), $Z = 2$.

Keithconnite

Rhombohedral, space group $R\bar{3}$, a = 11.458(10), c = 11.296(12) Å, a new formula $Pd_{20}Te_7$ with $Z = 1$.

Mgriite

Isostructural with silicon and diamond, cubic, space group $Fd3m$, a = 5.5–5.8 Å, new formula (Se,Cu,As) with $Z = 8$.

Polarite

Orthorhombic, space group $Ccm2_1$, new formula $BiPbPd_2$.

Roaldite

Formula Fe_4N, cubic, new space group $P\bar{4}3m$.

Sobolevskite

PdBi is known synthetically as hexagonal and monoclinic polymorphs. Sobolevskite was described as hexagonal, isostructural with nickeline, but refinement of the X-ray powder pattern indicates that sobolevskite is a mixture of the two PdBi polymorphs.

Stibiopalladinite

Pd_5Sb_2, isostructural with orcelite, Ni_5As_2. Hexagonal, space group $P6_3cm$, a = 7.606(11), c = 14.21(4) Å, Z = 6. The unit cell and space group are new.

Stützite

New formula Ag_7Te_4, hexagonal, space group $P6/mmm$, $Z = 5$ according to Imamov and Pinsker (*Soviet Phys. Crystallogr.*, 11, 182–188, 1966).

Urvantsevite

The high-temperature polymorph of froodite. Tetragonal rather than hexagonal, space group $I4/mmm$, a = 3.3628(16), c = 12.902(11) Å.

Wairauite

CoFe, cubic, a = 2.857 Å, new space group $Pm\bar{3}m$.

Weissite

$Cu_{2-x}Te$, hexagonal, space group $P3m1$, a = 8.342(15), C = 21.69(9) Å, Z = 24.

Discussion. Some of the proposals involving formulas are substantial, almost amounting to redefinitions. The results, however, are based on an indirect method rather than on direct observation and should be treated with caution. For example, the unit cell and space group for natural stibiopalladinite (*Am. Mineral.*, 61, 1249–1254, 1976) do not conform with the above; also, the conclusions about keithconnite are based on comparison to a synthetic compound whose X-ray pattern is known to differ from that of keithconnite (*J. Less-Common Metals*, 162, 61–74, 1990). **J.L.J.**

Bismuthian berthierite

A.A. Borovikov, N.W. Pal'chik, L.N. Pospelova (1990) New bismuth-bearing variety of berthierite. Geol. Geofiz., 31(7), 130–135 (in Russian; English translation in Soviet Geol. Geophys., 31(7), 122–136).

In berthierite, $FeSb_2S_4$, the amount of solid-solution Bi was not known to exceed 0.*n*%. Electron-microprobe analyses (mean of 5) of two grains in a polished section from the Aprelkovskii deposit gave Fe 11.49, Pb 0.28, Bi 28.62, Sb 32.19, S 26.34, corresponding to $Fe_{1.01}(Sb_{1.29}Bi_{0.68})_{\Sigma 1.97}S_{1.02}$. This represents an intermediate member between berthierite and garavellite, $FeSbBiS_4$, all of which have similar X-ray powder patterns. For the intermediate member, a = 11.406, b = 14.104, c = 3.792 Å as calculated from a 57.3-mm powder pattern (Cu radiation); D_{calc} = 5.29 as compared to 4.65 and 5.64 g/cm³ for berthierite and garavellite, respectively. The results suggest that garavellite is the Bi-dominant member of the hypothetical series $FeSb_2S_4$–$FeBi_2S_4$. **J.L.J.**