American Mineralogist, Volume 78, pages 672–678, 1993

NEW MINERAL NAMES*

JOHN L. JAMBOR
CANMET, 555 Booth Street, Ottawa, Ontario K1A 0G1, Canada
ERNST A. J. BURKE
Instituut voor Aardwetenschappen, Vrije Universiteite, De Boelelaan 1085, 1081 HV, Amsterdam, The Netherlands
EDWARD S. GREW
Department of Geological Sciences, University of Maine, Orono, Maine 04469, U.S.A.
JACEK PUZIEWICZ
Institute of Geological Sciences, University of Wroclaw, Cybulskiego 30, 50–205 Wroclaw, Poland

Arsenoflorencite-(La), arsenoflorencite-(Nd)

B. Scharm, M. Scharmová, P. Sulovský, P. Kühn (1991) Philipsbornite, arsenoflorencite-(La), and arsenoflorencite-(Nd) from the uranium district in northern Bohemia, Czechoslovakia. Casopis pro Mineral. Geol., 36(2–3), 103–113.

Electron microprobe analyses gave La_2O_3 12.99, 4.63, Ce_2O_3 1.32, 3.12, Pr_2O_3 0.58, 1.65, Nd_2O_3 0.95, 8.65, Sm_2O_3 –, 1.30, SrO 7.27, –, CaO 1.01, 0.45, BaO –, 4.87, PbO –, 2.51, Al_2O_3 26.42, 23.29, Fe_2O_3 0.80, 3.76, As_2O_5 31.05, 34.19, P_2O_5 2.84, 1.94, SO_3 5.03, 0.60, H_2O (calc. for 6OH) 9.74, 9.04, sums 100 wt%, corresponding to $(La_{0.442}Ce_{0.044}Pr_{0.020}Nd_{0.031}Sr_{0.389}Ca_{0.100})_{\Sigma 1.026}(Al_{2.875}Fe_{0.056})_{\Sigma 2.931}[(AsO_4)_{1.499}(PO_4)_{0.222}(SO_4)_{0.348}]_{\Sigma 2.069}(OH)_6$ and to $(Nd_{0.307}La_{0.170}Ce_{0.114}Pr_{0.060}Sm_{0.045}Ba_{0.190}Pb_{0.067}Ca_{0.047})_{\Sigma 1.000}(Al_{2.731}Fe_{0.282})_{\Sigma 3.013}[(AsO_4)_{1.779}(PO_4)_{0.164}(SO_4)_{0.044}]_{\Sigma 1.987}(OH)_6$, ideally $LaAl_3(AsO_4)_2(OH)_6$ and $NdAl_3(AsO_4)_2(OH)_6$, which are the La-dominant and Nd-dominant members of arsenoflorencite. The first occurs as the cores of zoned crystals with florencite-(Ce); also as 30-μm irregular aggregates with arsenogoyazite, showing mutual compositional gradations; as the outer zones of microspherical grains, 5–10 μm in diameter, containing crandallite cores; and as complex, nearly isometric grains that also contain crandallite and arsenoflorencite-(Nd). The minerals occur in drill cores from the Holičky, Stráž, and Osečná uraniferous deposits of northern Bohemia, Czech Republic, mainly as a cement in the host Cretaceous sandstones. **J.L.J.**

Clinotobermorite*

V. Henmi, I. Kusachi (1992) Clinotobermorite, $Ca_5Si_6(O,OH)_{18} \cdot 5H_2O$, a new mineral from Fuka, Okayama Prefecture, Japan. Mineral. Mag., 56, 353–358.

The mineral abstracted previously as unnamed monoclinic tobermorite (*Am. Mineral.*, 77, p. 451, 1992) has been approved as the mineral clinotobermorite. The ideal formula is $Ca_5Si_6(O,OH)_{18} \cdot 5H_2O$, and $D_{meas} = 2.58$, $D_{calc} = 2.69$ g/cm³. Type material is in the National Science Museum, Tokyo, Japan. The new name is an allusion to the mineral being the monoclinic polymorph of tobermorite. **J.L.J.**

Franklinphilite*

P.J. Dunn, D.R. Peacor, Shu-Chun Su (1992) Franklinphilite, the manganese analog of stilpnomelane, from Franklin, New Jersey. Mineral. Record, 23, 465–468.

Electron microprobe analysis gave SiO_2 44.0, Al_2O_3 3.6, Fe_2O_3 7.8, MgO 6.4, K_2O 1.5, Na_2O 0.4, ZnO 5.9, MnO 22.3, H_2O (by difference) 8.1, sum 100 wt%, corresponding to $(K_{2.64}Na_{1.07})_{\Sigma 2.71}(Mn_{26.08}Mg_{13.18}Zn_{6.02}Fe^{3+}_{2.72})_{\Sigma 48}(Si_{60.77}Al_{5.86}Fe^{3+}_{5.38})_{\Sigma 72}[O_{163.25}(OH)_{52.77}]_{\Sigma 216} \cdot nH_2O$, ideally $K_4Mn_{48}(Si,Al)_{72}(O,OH)_{216} \cdot nH_2O$ where $n \simeq 6$. The mineral is the isostructural Mn analogue of stilpnomelane. Occurs as radial aggregates of dark brown platy crystals; light brown streak, vitreous to slightly resinous luster, $H = 4$, imperfect {001} cleavage, brittle, nonfluorescent, $D_{meas} = 2.6$–2.8, $D_{calc} = 2.66$ g/cm³ with $Z = 3/8$. Optically transparent to translucent, biaxial negative, $\alpha = 1.545(5)$, $\beta = 1.583(3)$, $\gamma = 1.583(3)$, $2V_{meas} = 10(3)°$, $2V_{calc} = 0°$; $X \wedge (001) = \sim 6°$, X = pale yellow, $Y = Z$ = deep brown. Electron diffraction patterns revealed an *hk*0 net similar to that of stilpnomelane, which is triclinic but has a pseudoorthohexagonal cell; by analogy with this cell, $a = 5.521(4)$, $b = 9.560(6)$, $c = 36.57$ Å. Strongest lines of the powder pattern (114.6-mm Gandolfi camera, Fe$K\alpha$ radiation) are 12.3(100,003), 2.737(30,202), 2.583(40,205), 2.362(30,208), 1.594(30,060), and 1.580(30,063).

The mineral occurs with friedelite in a centimeter-wide vein that crosscuts a breccia of aegirine, calcite, chamosite, and interlayered 7- and 14-Å phyllosilicates in a specimen from the Buckwheat mine dump at Franklin, Sussex County, New Jersey; also with nelenite, rhodonite, and

---

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

0003–004X/93/0506–0672$02.00

tirodite in another assemblage. The name is a combination for the type locality (Franklin) and the Greek word for friend (*philos*). Type material is in the Harvard Mineralogical Museum. **J.L.J.**

Krasnogorite, krasnoselskite

B.V. Chesnokov, L.F. Bazhenova, E.P. Shcherbakova, T.A. Michal, T.N. Deriabina (1988) New minerals from the burned dumps of the Chelyabinsk coal basin. In Mineralogy, technogenesis, and mineral-resource complexes of the Urals. Akad. Nauk SSSR-Uralskoe Otdel., 5–31 (in Russian).

Krasnogorite WO_3 and krasnoselskite $CoWO_4$ were identified by X-ray study. They occur as pseudomorphs after hard alloy VK8 (92% WC, 8% Co) on the plates of the cutting element of a drilling machine found in burned rocks of the Krasnoselskaya mine in Krasnogorsk, Chelyabinsk coal basin, southern Urals, Russia. The pseudomorphs are greenish or bluish gray, luster dull, bluish gray streak, conchoidal or splintery fracture, $H = \sim 4$, $D_{meas} = 6.62$ g/cm³. Brittle, but can be polished.

Krasnogorite is orthorhombic, $a = 7.39(1)$, $b = 7.53(1)$, $c = 3.84(1)$ Å. Strongest lines of the X-ray powder pattern are 3.848(100,001), 3.769(100,020), 3.656(86,200), and 2.625(32,220).

Krasnoselskite is monoclinic, $a = 4.95(1)$, $b = 5.68(1)$, $c = 4.70(1)$ Å, $\beta \approx 90.0°$. Strongest lines of the X-ray powder pattern are 3.739(41,110), 3.611(23,011), 2.916(77,111), and 1.695(20,122).

Discussion. Neither name has been submitted to the CNMMN for approval. **J.P.**

Liebauite*

M.H. Zöller, E. Tillmanns (1992) Liebauite, $Ca_3Cu_5Si_9O_{26}$: A new silicate mineral with 14er single chain. Zeits. Kristallogr., 200, 115–126.

Electron microprobe analysis gave CaO 15.0, CuO 34.9, SiO_2 48.5, sum 98.4 wt%, corresponding to $Ca_{2.99}Cu_{4.91}Si_{9.05}O_{26}$. Occurs as bluish green transparent crystals <0.03 mm, vitreous luster, $H = 5–6$, $D_{calc} = 3.62$ g/cm³ with $Z = 4$. Optically biaxial positive, $\alpha = 1.722(1)$, $\beta = 1.723(1)$, $\gamma = 1.734(1)$, $2V = 72.8°$. Single-crystal X-ray structure study ($R = 0.046$) gave monoclinic symmetry, space group $C2/c$, $a = 10.160(1)$, $b = 10.001(1)$, $c = 19.973(2)$ Å, $\beta = 91.56(2)°$. Strongest lines of the powder pattern (57.3-mm Debye-Scherrer) are 7.13(60,110), 6.70(70,11$\bar{1}$,111), 3.12(90,13$\bar{1}$,131), 3.00(100,312,13$\bar{2}$,132, 116), 2.45(60,22$\bar{6}$), and 2.41(70,226); the line at 3.00 overlaps with that of associated cuprorivaite, but I_{calc} for 116 is 91.

The mineral was initially found with tenorite, volborthite, calciovolborthite, and cuprorivaite in cavities in a 0.5-m mudstone xenolith from the Sattelberg scoria cone near Kruft, Eifel district, Germany, and has since been found in xenoliths at two additional cones. The new name is for Friedrich Liebau of Kiel, in recognition of his work on silicate crystal chemistry. Type material is in the University Mineralogical Museum at Würzburg, Germany, and Kiel, Germany. **J.L.J.**

Unnamed $(Ir,Pt,Rh)S_2$ and $(Pt,Ir)_2(As,S)_3$

I.Ya. Nekrasov, V.V. Ivanov, A.M. Lennikov, R.A. Oktiabrskij, V.I. Sapin, V.I. Taskaev, B.L. Zalishchak, V.V. Khitrov (1991) New data on platinum mineralization of alkaline-ultrabasic concentrically zoned massifs of the Far East. Doklady Akad. Nauk SSSR, 320(3), 705–709 (in Russian).

Microprobe analysis of a rim of 3–10 μm on laurite, in chromite-bearing dunite of the Chadskij massif (eastern margin of the Aldan Shield, Siberia, Russia) gave Pt 13.08, Pd 0.34, Rh 4.94, Ir 46.47, Os 2.62, Fe 2.93, Cu 1.08, S 27.00, As 0.15, sum 98.62 (98.61) wt%, corresponding to $(Ir_{0.60}Pt_{0.18}Rh_{0.12}Os_{0.04})_{\Sigma 0.94}S_{2.08}$. Microhardness 615 kg/mm².

Microprobe analysis of 25-μm subhedral platy intergrowths in isoferroplatinum occurring in dunites of the Konderskij massif (eastern margin of the Aldan Shield, Siberia, Russia) gave Pt 51.62, Rh 1.08, Ir 10.57, Os 0.28, Cu 0.16, S 2.20, As 33.14, sum 99.05 wt%, corresponding to $(Pt_{1.57}Ir_{0.33}Rh_{0.06})_{\Sigma 1.96}(As_{2.63}S_{0.40})_{\Sigma 3.03}$. Microhardness 500 kg/mm².

Discussion. IrS_2 is known as orthorhombic and as cubic synthetic phases. $Pt_2(As,S)_3$ has also been reported from placers near Vladivostok, Russia (*Am. Mineral.,* 78, p. 233, 1993). **J.P.**

Unnamed Pd PGM

T.L. Grokhovskaya, V.V. Distler, S.F. Klyunin, A.A. Zakharov, I.P. Laputina (1992) Low-sulfide platinum group mineralization of the Lukkulaisvaara pluton, northern Karelia. Geologiya Rudnykh Mestorozhdeniy, 1992, no. 2, 32–50 (English translation in Internat. Geol. Review, 34(5), 503–520).

Kotulskite, merenskyite, michenerite, moncheite, telargpalite, sopcheite, majakite, mertieite II, isomertieite, stillwaterite, sperrylite, braggite, cooperite, tulameenite, hollingworthite, irarsite, arsenopalladinite, and the following unnamed platinum-group minerals (PGM) occur in the Precambrian Lukkulaisvaara layered ultramafic pluton on the Russian side of the Russian-Finnish border.

$Pd_2(Sn,Sb)$

Two analyses gave Pt 0.16, 0.5, Pd 63.56, 63.01, As 0.08, 0.01, Ag 0.93, 0.68, Sb 16.55, 17.45, Sn 16.43, 15.07, Te 0.60, 0.19, Bi 0.25, 0.70, sum 98.56, 97.26 wt%. Occurs as cream-colored, weakly anisotropic grains of <20 μm with mertieite II, merenskyite, sopcheite, and hessite in rock-forming silicates and in chalcopyrite-bearing sulfide schlieren in microgabbro-norite.

Pd_8Sb_3

Occurs as grains up to 30 μm in size, localized in chalcopyrite in which there is intergrowth with sopcheite and michenerite or with hessite and merenskyite. Creamy rose color, weakly anisotropic. Analysis gave Pd 68.68, As 0.97, Ag 0.86, Sb 26.37, Te 0.55, Bi 0.23, sum 97.66 wt%.

The virtual absence of As distinguishes this mineral from mertieite II.

Pd_6AgTe_4

Analysis gave Pd 52.12, Ag 7.89, Te 40.39, sum 100.37 wt%. Bright gray in reflected light, distinct bireflectance from white to bright gray, anisotropic with brownish polarization colors. Occurs as grains of 30–50 μm associated with telargpalite and tulameenite in a millerite-bornite-chalcopyrite paragenesis.

$(Pd,Pt,Ag)_8(Te,Bi)_3$

Three analyses gave Pt 1.0, 0.62, 0.12, Pd 65.01, 61.60, 61.22, Ag 3.15, 4.41, 1.0, Te 28.42, 32.76, 15.84, Bi 1.63, –, 25.34, Pb –, –, 0.12, Sb –, –, 0.10, sum 99.21, 99.39, 103.74 wt%. Occurs as creamy white, weakly anisotropic grains 10–15 μm in size, in complex intergrowths with kotulskite, moncheite, telargpalite, and tulameenite.

$(Pd,Cu,Pt,Fe)_9Sn(Te,S)_4$

Three analyses gave Pt 0.89, 3.08, 3.92, Pd 43.59, 44.05, 41.83, Ir 0.09, –, –, Cu 16.91, 12.81, 16.12, Fe 2.74, 3.55, 1.91, Ag –, 0.94, 0.06, Sn 9.67, 9.54, 3.48, S 4.88, 5.04, 4.56, Te 22.70, 21.51, 21.49, sum 101.47, 100.52, 99.37 wt%. Occurs as rodlike and lathlike grains with pronounced bireflectance and anisotropy. Intergrown with kotulskite, moncheite, and telargpalite in chalcopyrite.

$(Pd,Ag,Cu)_4S_3$

Two analyses gave Pt 0.33, –, Pd 45.91, 45.58, Cu 28.83, 22.73, Fe 0.05, 0.28, Ag 10.04, 9.57, S 20.25, 19.92, sum 100.41, 97.98 wt%. Gray in reflected light, without perceptible anisotropism or bireflectance. Reflectance percentages in 20-nm steps from 420 to 740 nm are 46.3, 47.4, 40.4, 49.0, 49.4, 49.7, 50.2, 50.7, 51.2, 51.6, 52.1, 52.6, 53.2, 53.8, 54.4, 55.0, and 55.6. Occurs as grains of 15–20 μm in polymetallic intergrowths of PGM among rock-forming silicates.

Discussion. $Pd_2(Sn,Sb)$ was reported without data from the Noril'sk Intrusion (*Am. Mineral.,* 74, p. 1218, 1989); could be paolovite, Pd_2Sn. The analysis for Pd_8Sb_3 is not really distinct from previous analyses for mertieite II (e.g., 1.8 wt% As reported in *Am. Mineral.,* 61, 1249–1254, 1976), and mertieite II has been synthesized in the pure Pd-Sb binary (*Can. Mineral.,* 29, 401–409, 1991). Pd_8Te_3 has been reported from the Stillwater Complex (*Am. Mineral.,* 69, p. 410, 1984); another analysis of this mineral, also from the Lukkulaisvaara intrusion, was abstracted in *Am. Mineral.,* 76, p. 1438 (1991). Also in the 1991 abstract are data for $Pd_2(Cu,Ag)_2S_3$, which here is described as $(Pd,Ag,Cu)_4S_3$. **J.L.J.**

$Cu_6Fe_3Ag_7S_{11}$

T.A. Todorov (1990) Copper-lead-bismuth sulphosalts of the aikinite-bismuthinite series in the Rossen ore field deposits. Doklady Bolg. Akad. Nauk, 43(1), 87–90.

The chalcopyrite-molybdenite vein deposits of the Rossen ore field, Sredna Gora area, Bulgaria, contain aikinite, friedrichite, and hammarite, as determined by wavelength-dispersion electron microprobe analyses. Analyses by energy-dispersion methods without standards also indicated the presence of lindströmite, rezbanyite (see *Am. Mineral.,* 77, p. 1308, 1992), and an unidentified sulfide, for which two analyses gave Cu 22.53, 22.10, Fe 10.05, 9.74, Ag 45.74, 46.53, S 21.69, 21.61, sums 100 wt%, calculated as $Cu_6Fe_3Ag_7S_{11}$. The grains are stated to be too small to obtain further data. **J.L.J.**

$4CaO \cdot 3Al_2O_3 \cdot SO_3$

H. Heritsch (1990) A contact zone with rare minerals from the nepheline basanite quarry at Klöch (southeast Steiermark); natural occurrence of $4CaO \cdot 3Al_2O_3 \cdot SO_3$. Mitt. Abt. Mineral. Landesmuseum Joanneum, 58, 15–35 (in German, English abstract).

A contact zone formed at temperatures around 1000 °C on a calcite-dolomite xenolith in nepheline basanite at Klöch, southeastern Steiermark, Austria, contains melilite, kalsilite, wollastonite, perovskite, mayenite, brownmillerite, periclase, corundum, larnite, and a calcium aluminate that is in SiO_2-rich glass and is intergrown with brownmillerite, mayenite, periclase, and apatite. The grain size of the intergrowths is 10–30 μm. A normalized electron microprobe analysis gave Al_2O_3 50.1, CaO 36.7, SO_3 13.1, sum 99.9 wt%; a small but constant SiO_2 content is also present (no quantitative data offered). The mineral is cubic; strongest X-ray diffraction (XRD) lines (Co radiation) in a mixture with brownmillerite and mayenite are 4.92(17,321), 3.75(60,422), 3.24(13,440), 2.653(10,444), 2.464(20,642), and 2.168(10,822), from which $a = 18.39$ Å. The mineral is suggested to be the first natural occurrence of $4CaO \cdot 3Al_2O_3 \cdot SO_3$, a phase commonly found in Portland cement clinker.

Discussion. The natural occurrence of the phase $4CaO \cdot 3Al_2O_3 \cdot SO_3$ (or $Ca_4Al_6O_{12}SO_4$) in a similar paragenesis has been described as the mineral ye'elimite (abstr. in *Am. Mineral.,* 72, 226–227, 1987). **E.A.J.B.**

Zn analogue of ktenasite

A. Livingstone (1991) The zinc analogue of ktenasite from Smallcleugh and Brownley Hill mines, Nenthead, Cumbria. J. Russel Soc., 4(1), 13–15.

The average of six electron microprobe analyses of grains from the Smallcleugh mine and six from the Brownley Hill mine gave, respectively, ZnO 62.88, 33.38, CuO 3.36, 21.73, SO_3 17.68, 22.31 wt%; CHN analysis of a 1-mg sample gave 20.5 wt% H_2O. After recalculation using stoichiometric SO_3 and H_2O values the respective results are ZnO 52.96, 33.57, CuO 2.84, 22.02, SO_3 21.97, 22.08, H_2O 22.23, 22.33 wt%, corresponding to $(Zn_{9.48}Cu_{0.52})_{\Sigma 10.00}(SO_4)_4(OH)_{12} \cdot 12H_2O$ and $(Zn_{6.0}Cu_{4.0})_{\Sigma 10.0}(SO_4)_4(OH)_{12} \cdot 12H_2O$. Structurally, the first analysis corresponds to $Zn_2(Zn_4)_4(Zn_{3.48}Cu_{0.52})_{\Sigma 4}$, clearly indicating Zn dominance in the two Cu sites for ktenasite. The mineral occurs as blue-green and bright blue, irregular grains, generally platy and 0.2–0.3 mm across. Soft, nonfluorescent, no cleavage. Optically biaxial negative, $\alpha = 1.588$, $\beta = 1.604$, $\gamma = 1.619$ (blue-green variety). X-ray powder data are similar to those of ktenasite; refinement (blue-green var.) gave $a = 5.652$, $b = 6.101$, $c = 23.645$ Å, $\beta = 95.6°$. The mineral was collected underground at the Smallcleugh and Brownley Hill mines in the parish of Ashton, Cumbria, England. The Zn-dominant analogue of ktenasite has been reported previously (*Am. Mineral.*, 64, 446–448, 1979) but has not been named. **J.L.J.**

Mn analogue of arseniosiderite

J. Lorenz (1991) The minerals of the rhyolite quarry at Sailauf—An addition. Aufschluß, 42, 1–38 (in German, English abstract).

A rhyolite in a quarry north of the village of Ober-Sailauf (close to Aschaffenburg, northwestern Bavaria, Germany) contains several veins of Mn ore with a number of rare arsenate minerals, e.g., brandtite and an unnamed calcium manganese arsenate for which electron microprobe analyses (no quantitative data offered) show only Ca, Mn, and As; Fe was not detected. The strongest XRD lines (Cu radiation, 17 lines given, but no indices) are 8.75 ($I = 95$), 5.64(30), 2.93(100), 2.89(42), 2.81(26), 2.76(42), 2.63(26), 2.515(26), and 2.198 Å (62). On the basis of chemical and X-ray data the mineral is thought to be the monoclinic (?) Mn analogue of arseniosiderite, a member of the mitridatite group. The mineral forms small (0.5 mm) tabular six-sided crystals. Color black, dark brown to red-brown, streak light brown, high vitreous luster, perfect {100} cleavage, thin cleavage flakes are red translucent, $H = \sim 3.5$, $D_{meas} = 3.6$ g/cm^3, soluble in dilute HCl. The crystals resemble those of hematite in form, color, and luster. The mineral occurs on Mn-bearing calcite with arseniosiderite (transitions between the two minerals have been observed), hausmannite, kutnohorite, dolomite, quartz, and calcite.

The existence of the Mn analogue of arseniosiderite as a stable phase in nature has been postulated by Moore (*Mineral. Record*, 4, 103–130, 1973). Further studies are being done at the Institute of Mineralogy and Crystal Structure of Würzburg University. **E.A.J.B.**

Mn silicate

K.A. Lazebnik, L.V. Nikishova (1992) The first occurrence of a manganese-bearing silicate in charoite rocks. Doklady Akad. Nauk SSSR, 322(3), 589–594 (in Russian).

An average of six electron microprobe analyses of the mineral gave SiO_2 50.33, FeO 7.35, MnO 16.87, MgO 2.17, CaO 0.65, BaO 0.73, K_2O 5.15, Na_2O 2.93, sum 86.17 wt% [sic]. H_2O is inferred to be 13.83 by difference, which leads to the formula $(K,Na)(Mn,Fe,Mg,Ca,Ba)_2[Si_4O_{10}](OH)\cdot nH_2O$. The infrared spectrum has two well-resolved bands in the interval 400–1100 cm^{-1}, one band near 1600 cm^{-1}, and a broadened band in the interval 3300–3800 cm^{-1}, the last two bands corresponding to vibration modes of weakly bonded or zeolitic H_2O. The mineral is almost amorphous to X-rays, yielding only three very broad, weak lines at 4.4, 2.59, and 1.59 Å. Under the electron microscope, larger particles (1–3 μm) yielded no patterns, but isometric flakes 0.1–0.5 μm across yielded patterns with a hexagonal or nearly hexagonal motif similar to those of layered silicates; *d* values of the reflections corresponded to those for the powder diffraction lines. Insoluble in HCl, but loses its color and gelatinizes. The mineral is reddish brown; in thin slices, brownish yellow, translucent. Streak light brown, greasy luster, conchoidal fracture, $H \leq 3$, cleavage and parting absent, $D_{meas} = 2.206$ g/cm^3. Optically isotropic, $n = 1.465$. The mineral was found in three samples of charoite rock from the Sirenevyy Kamen' deposit in Russia, occurring as flattened aggregates in rock composed principally of charoite, potassium feldspar, aegirine, and tinaksite. The mineral is inferred to be a poorly crystallized, hydrated micaceous silicate rather than neotocite and related minerals, differing from the latter in its substantial content of K and Na, absence of Al, and higher Si/Mn ratio.

Discussion. Assuming an anion composition characteristic of micas and assuming that Ca and Ba substitute for K, the following formula was calculated from the average analysis and H_2O estimated by difference: $(K_{0.55}Na_{0.48}Ca_{0.06}Ba_{0.02})_{\Sigma 1.11}(Mn_{1.20}Fe_{0.51}Mg_{0.27})_{\Sigma 1.98}Si_{4.21}O_{10}(OH)_2\cdot 2.86H_2O$. There is an excess of alkalis and Si, which does not appear in the reported formula because the authors normalized to 10.5O = 10O + 1OH instead of 11O = 10O + 2OH. The authors showed that the infrared spectrum of the Mn silicate is similar to that for sturtite, another Mn silicate whose spectrum is reported to resemble the spectra of trioctahedral hydrous micas (see *Am. Mineral.*, 65, p. 210, 1980) and of stilpnomelane. Possibly the Mn silicate is a poorly crystallized, modulated layer silicate. **E.S.G.**

Na-Ba-Mn fluorosilicate

N.A. Yamnova, D.Yu. Pushcharovskii, T. Mernaf, V.V. Kalinin, L.V. Kalacheva (1992) Crystal structure of a new natural Na, Ba, Mn-fluorosilicate. Soviet Phys. Crystallogr., 37(2), 174–178.

The mineral occurs as grains and small concretions in braunite ores of the Ir-Nimi Mn deposit of the former Soviet Far East. Single-crystal X-ray structure study ($R = 0.065$) gave orthorhombic symmetry, space group *Pnma*, $a = 23.42(1)$, $b = 12.266(8)$, $c = 7.181(5)$ Å. X-ray spectral analysis gave SiO_2 32.09, MnO 13.22, Mn_2O_3 10.84, Na_2O 3.12, BaO 36.73, H_2O 2.40 wt% (sum 98.40); the structurally determined formula is $NaBa_3(Mn^{2+},Mn^{3+})_4[Si_4O_{10}(OH)_2][Si_2O_7]O_2F\cdot H_2O$, with $Z = 4$. Strongest lines of the X-ray powder pattern (diffractometer, Fe*K*α radiation, nine lines listed) are 4.556(54.6,121), 3.288(68.5, 521), 3.017(100,701), 2.984(98.5,222), 2.641(94.6,341), and 2.630(73.8,602,820). The Raman spectrum has its highest frequency maxima at 3599 and 3521 cm^{-1}, corresponding to H_2O and OH groups. **J.L.J.**

$Na_{16}K_2[Si_{18}O_{36}(OH)_{18}]\cdot 38H_2O$

N.A. Yamnova, R.K. Rastsvetaeva, D.Yu. Pushcharovskii, T. Mernaf, M.G. Mikheeva, A.P. Komyakov (1992) Crystal structure of the new annular Na, K silicate $Na_{16}K_2[Si_{18}O_{36}(OH)_{18}]\cdot 38H_2O$. Soviet Phys. Crystallogr., 37(2), 167–174.

The mineral occurs as inclusions 1–3 mm in size intergrown with revdite among the interstices of fenaksite in fenaksite-delhayelite veins at Mount Rasvumchorr, Khibiny alkaline massif, Russia. Colorless, transparent, vitreous luster, steplike fracture, perfect {100} cleavage, optically biaxial negative, $\alpha = 1.460$, $\beta = 1.478$, $\gamma = 1.481$, $2V = 40°$, strong dispersion with $r > v$. Single-crystal X-ray structure study ($R = 0.048$) gave monoclinic symmetry, space group $P2_1/c$, $a = 24.91(5)$, $b = 11.94(1)$, $c = 14.92(2)$ Å, $\beta = 94.47(9)°$, $Z = 2$. **J.L.J.**

New Data

Cuproaurite

L.V. Razin, A.L. Razin (1991) A unique native cuproaurite nugget from the southern Urals in the exposition "Diamond Treasury of the USSR." Izvestiya Vysshikh Uchebnykh Zavedeniy, Geologiya i Razvedka, 1991(5), 136–137 (in Russian).

A chemical analysis (method unspecified) gave Au 73.53, Ag 5.55, Cu 20.11, rock 0.81, sum 100 wt%, which corresponds to $Au_{50.31}Cu_{42.74}Ag_{6.95}$. The mineral forms a dendritic aggregate 10.5 cm long and weighing 199.9 g, part of which consists of intergrown cubes and cuboctahedra up to 8 mm across. The aggregate is silvery gray with a straw yellow tint that is more pronounced at one end of the aggregate. Compositionally, this mineral could be either cuproaurite or tetraauricupride; the cubic symmetry and dendritic habit suggest the former. No other data were obtained. The specimen was collected in the Kochkar mine, southern Urals, Russia, but the specific geological conditions of the occurrence are not known.

Discussion. In the absence of X-ray data, it is not possible to identify this mineral. In 1975 L.V.R. described the phase $Cu_{53}Au_{39}Pd_8$ as "aurocuproite," which was reviewed (*Am. Mineral.,* 62, p. 593, 1977) and considered to be an unnecessary name for palladian AuCu or auroan palladian copper. Neither aurocuproite nor cuproaurite has been approved by the CNMMN. **E.S.G.**

Fergusonite

Weiliang Gong (1991) A study on high-temperature phase transition of metamict fergusonite group minerals. Acta Mineralogica Sinica, 11(1), 1–8 (in Chinese, English abstract).

Weiliang Gong (1991) Chemistry and evolution of fergusonite-group minerals, Bayan Obo, Inner Mongolia. Chinese J. of Geochem., 10(3), 266–276 (in English; also Acta Mineralogica Sinica, 11(3), 200–208, in Chinese with English abstract).

Morphological study of metamict fergusonite crystals, mainly from Bayan Obo, Inner Mongolia, showed them to be monoclinic and tetragonal dimorphs. Heating of the tetragonal phase led to crystallization, gradually producing at 700–900 °C a well-defined, sharp Debye-Scherrer pattern. Below 730–880 °C the heated phase characteristically has a broad diffraction pattern and is designated fergusonite-*T,* for which the strongest lines of the X-ray pattern are 3.065(100,112), 2.757(16,004), 2.610(20,200), 1.892(29,204), 1.844(17,220), and 1.582 Å (18,312), leading to $a = 5.222$, $c = 11.072$. A second tetragonal phase, designated *T′*, is stable between 730 and 880 °C and has a sharp XRD pattern with strongest lines of 3.080(100,112), 2.621(25,200), 1.913(37,204), 1.856(19,220), and 1.590(30,312), from which $a = 5.246$, $c = 11.172$. The lines at 1.913 and 1.590 in the *T′* phase correspond to doublets in the *T* phase: 1.892(29) and 1.882(12); 1.589(10) and 1.582(18). Annealing of a monoclinic metamict parent gives a monoclinic product, designated fergusonite-*M*. The DTA pattern of the monoclinic form, however, shows an endothermic peak between 740 and 760 °C, which may represent a phase transition to the tetragonal form.

It is proposed that the fergusonite-group minerals be named according to structural type, using the prefixes *T* or *M* (tetragonal and monoclinic, respectively). Thus, for example, fergusonite-(Y) would become *T*-fergusonite-(Y) to designate the tetragonal form, and fergusonite-beta-(Y) would become *M*-fergusonite-(Y) to designate the monoclinic form.

Discussion. No new nomenclature system should be introduced, as this has, prior to approval by the CNMMN. Aside from prefixes, the new system would also require the discreditation of fergusonite-beta. **J.L.J.**

Fergusonite-(Nd)

Weiliang Gong (1991) Chemistry and evolution of fergusonite-group minerals, Bayan Obo, Inner Mongolia. Chinese J. Geochem., 10(3), 266–276 (in English).

Three complete chemical analyses are listed for a mineral stated to be (tetragonal) fergusonite-(Nd). No other data other than occurrence are given. The mineral is from riebeckite-rich, dolomite-type Nb-REE ores at Bayan Obo.

Discussion. A partial analysis (REE only) for this mineral, also from Bayan Obo, was abstracted in *Am. Mineral.,* 74, 946–947, 1989. **J.L.J.**

Koutekite

S.D. Abulgazina, P.Ye. Kotel'nikov, S.A. Sal'kov, B.M. Tasov, M.A. Yarenskaya, G.P. Yasnitskaya (1991) New data on koutekite. Zapiski Vses. Mineral. Obshch., 120(2), 49–51 (in Russian).

Electron microprobe analyses gave Cu 66.25, 67.33, As 33.52, 33.35, sums 99.77, 100.68 wt%, which correspond to $Cu_{2.33}As$ and $Cu_{2.38}As$. In reflected light the mineral is violet gray and markedly bireflectant, strongly anisotropic with a color effect in red-blue tones. X-ray powder data (Co$K\alpha$ radiation, 57.3-mm camera) gave hexagonal parameters of a = 23.068(8), c = 14.540(7) Å, that is, a doubled (relative to the type material), which is interpreted to result from a superstructure. The strongest lines (17 given) are 3.568(20,014), 3.340(20,060), 2.580(30,262), 2.089(80,282), 2.044(90,117), and 2.001(100,127). Koutekite occurs with domeykite, löllingite, native silver, and nickeline in Cu-mineralized sandstone that is part of a Carboniferous-Permian sequence in Kazakhstan. Intergrowths of koutekite with domeykite and löllingite range from several hundredths of a millimeter to 0.5 mm. As a rule, koutekite replaced domeykite.

Discussion. Koutekite from the type locality in Bohemia and from France has a formula close to $Cu_{2.5}As$ (Picot and Vernet, *Bull. Soc. fr. Minéral. Cristallogr.*, 90, 82–89, 1967), which is slightly richer in Cu than the Kazakhstan material. The powder pattern of the Kazakhstan material differs from those of the two others, mostly in the low-angle reflections (i.e., for d > 3.3 Å). **E.S.G.**

Leucophanite

E. Cannillo, G. Giuseppetti, F. Mazzi, V. Tazzoli (1992) The crystal structure of a rare earth bearing leucophanite: $(Ca,RE)CaNa_2Be_2Si_4O_{12}(F,O)_2$. Zeits. Kristallogr., 202, 71–79.

Single-crystal X-ray structural study (R = 0.013) of leucophanite from Mont St. Hilaire, Quebec, showed that the orthorhombic symmetry is lowered to triclinic, space group $P1$, a = 7.417, b = 7.398, c = 9.986 Å, α = 90, β = 90, γ = 90°, by the presence of about 3 wt% REE_2O_3. The REE substitute for Ca (about one atom of REE per 16 Ca sites), and substitution occurs only in two of the four sites equivalent in the orthorhombic cell. **J.L.J.**

Lorettoite

G. Schnorrer-Köhler (1986) New discoveries in the Laurium slags. Lapis, 11, 25–29 (in German).

R. Edwards, R.D. Gillarad, P.A. Williams, A.M. Pollard (1992) Studies of secondary mineral formation in the $PbO-H_2O-HCl$ system. Mineral. Mag., 56, 53–65.

Lorettoite was described as $Pb_7O_6Cl_2$ by Wells and Larsen in 1916 (*J. Wash. Acad. Sci.*, 6, 669–672), but was discredited by White in 1979 (*Am. Mineral.*, 64, 1303–1305) because all circumstances indicated a manmade phase that was either a pigment known under the names patent yellow, Turner's patent yellow, and Montpelier yellow or a by-product of a process for preparing soda. Schnorrer-Köhler (1986) has reported a natural phase, from the famous Laurium Pb slags of Greece, that has X-ray powder data identical to those of synthetic α-$Pb_7O_6Cl_2$ (PDF 6–0393). The mineral occurs as composite small (10 μm) crystals forming wartlike, light yellow aggregates <100 μm, under hydrocerussite. The crystals are orthorhombic-pseudotetragonal.

Synthesis of the hydrated phase $Pb_7O_6Cl_2 \cdot 2H_2O$ by titration of aqueous $PbCl_2$ solutions with base at high pH led Edwards et al. (1992) to conclude that the compound $Pb_7O_6Cl_2$ does indeed occur naturally. Dehydration of synthetic $Pb_7O_6Cl_2 \cdot 2H_2O$, however, forms the dimorph β-$Pb_7O_6Cl_2$, not lorettoite. **E.A.J.B.**

Meta-uranocircite II

R.F. Vochten, L. Van Haverbeke, K. Van Springel (1992) Transformation of chernikovite into meta-uranocircite II, $Ba(UO_2)_2(PO_4)_2 \cdot 6H_2O$ and study of its solubility. Mineral. Mag., 56, 367–372.

Synthetic meta-uranocircite II was prepared by ion exchange with chernikovite $(H_3O)_2(UO_2)_2(PO_4)_2$. Meta-uranocircite II has the composition $Ba(UO_2)_2(PO_4)_2 \cdot 6H_2O$ and reversibly dehydrates from meta-uranocircite (or meta-uranocircite I), $Ba(UO_2)_2(PO_4)_2 \cdot 8H_2O$. Strongest lines of the X-ray powder pattern for meta-uranocircite II (Guinier-Hägg, Cu$K\alpha_1$ radiation) are 3.207(85,024), 2.9272(90,132), 2.9006(90,$\bar{3}12$), 2.6065(80,$\bar{1}16$), 2.4581(75,$\bar{2}33$), 2.2015(100,143,$\bar{1}43$), and 2.1869(100,241,226,$\bar{2}41$). D_{meas} = 3.964, D_{calc} = 3.970 g/cm³ with Z = 4.

Discussion. This lower hydrate is known to occur naturally, but no complete description has been given, and the nomenclature used above does not have official status (see *Am. Mineral.*, 68, p. 472, 1983). PDF data (cards 17–759, 25–1468, 36–407) do not help to resolve the nomenclature, but it is evident that the hexahydrate exists both with monoclinic and tetragonal structures. **J.L.J.**

Moganite

G. Miehe, H. Graetsch (1992) Crystal structure of moganite: A new structure type for silica. Eur. J. Mineral., 4, 693–706.

P.J. Heaney, J.E. Post (1992) The widespread distribution of a novel silica polymorph in microcrystalline quartz varieties. Science, 255, 441–443.

The mineral occurs as microcrystalline silica fillings of cavities, fissures, and cooling cracks in some of the ignimbrite flows of the Mogan Formation, Gran Canaria. Chemical analyses typically give 2–3 wt% H_2O, 0.1–1.0 wt% CO_2, and the remainder SiO_2; heating experiments indicate that the H_2O is nonessential and can be expelled without destroying the structure. Appears macroscopically as translucent gray or brownish masses having a hardness indistinguishable from that of chalcedony. Optically length slow, $n = 1.524–1.531$; apparently fibrous, but revealed by SEM and TEM to be plates from 100 to 1000 Å thick. Electron diffraction indicates monoclinic symmetry, space group $I\,1\,2/a\,1$, $a = 8.758(2)$, $b = 4.876(1)$, $c = 10.715(2)$ Å, $\beta = 90.09(3)°$, $D_{meas} = 2.52–2.58$, $D_{calc} = 2.617$ g/cm^3 with $Z = 12$. The powder pattern consists of lines that appear as splits of quartz reflections and as additional lines at $d = 4.42$, 3.12, 2.88, 2.68, 1.96, and 1.74, which do not coincide with any other known silica phase. Structural interpretation ($R = 3.5\%$) and Rietveld refinement indicated a structure different from that of quartz. Many of the crystallites also show a triclinic superstructure with $a = 10.024$, $b = 9.752$, $c = 10.715$, $\alpha = 90.00$, $\beta = 90.07$, $\gamma = 119.11°$.

X-ray examination, by Heaney and Post, of more than 150 specimens of fine-grained quartz varieties from around the world showed that >10% and as much as 80% of the silica in many samples corresponds to moganite. The purest sample is from Gran Canaria.

Discussion. Previous descriptions were abstracted in *Am. Mineral.,* 70, p. 874 (1985) and 75, p. 1435 (1990). The name has not been approved by the CNMMN and is not under current consideration. **J.L.J.**