

NEW MINERAL NAMES*

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Averievite*

L.P. Vergasova, G.L. Starova, S.K. Filatov, V.V. Anan'ev (1998)
Averievite $\text{Cu}_5(\text{VO}_4)_2\text{O}_2 \cdot n\text{MX}$ —a new mineral of volcanic ex-
halations. Doklady Akad. Nauk, 359(6), 804–807 (in Russian).

G.L. Starova, S.V. Krivovichev, V.S. Fundamenskiy, S.K. Filatov (1997)
The crystal structure of averievite, $\text{Cu}_5\text{O}_2(\text{VO}_4)_2 \cdot n\text{MX}$: compari-
son with related compounds. Mineral. Mag., 61, 441–446.

Electron microprobe analysis (mean of 17) gave CuO 62.01, Fe_2O_3 0.62, K_2O 0.98, Cs_2O 3.35, Rb_2O 0.82, V_2O_5 23.84, MoO₃ 1.51, Cl 7.56, O ≡ Cl 1.70, sum 98.99 wt%, corresponding to $\text{Cu}_{5.00}(\text{V}_{1.87}\text{Mo}_{0.08}\text{Fe}_{0.05})_{\Sigma 2.00}\text{O}_{7.78}\text{O}_{2.19}(\text{Cs}_{0.17}\text{Rb}_{0.06}\text{K}_{0.15})_{\Sigma 0.38}\text{Cl}_{0.40}$. Occurs as black, pseudo-hexagonal crystals up to 0.3 mm in diameter and 0.05 mm thick, showing {0001}, {000 $\bar{1}$ } and trigonal prisms {10 $\bar{1}0$ } and {01 $\bar{1}0$ }. Good {10 $\bar{1}0$ } cleavage, brittle, luster pitchy or metallic, streak black, $VHN_{20} = 258$, $D_{\text{meas}} = 3.54$, $D_{\text{calc}} = 4.01 \text{ g/cm}^3$ for $Z = 1$. Stable in air, insoluble in water and alcohol, readily soluble in dilute HCl. Single-crystal X-ray structure study ($R = 0.052$) showed trigonal symmetry, space group $P3$, $a = 6.375(1)$, $c = 8.399(1) \text{ \AA}$. The crystal-chemical formula is $\text{Cu}_5(\text{VO}_4)_2\text{O}_2 \cdot \text{CuCl}_2 \cdot \text{MCl}$, where $M = \text{Cs, K, Rb}$; a more general formula is $\text{Cu}_5(\text{VO}_4)_2\text{O}_2 \cdot n\text{MX}$. The structure consists of a tetrahedral network of $\{\text{OCu}_4\}^{6+}$ and $\{\text{VO}_4\}^{3+}$ groups, and contains large ($R \geq 3.2 \text{ \AA}$) channels. Molecules of composition depending on the chemical environment of crystallization can enter the channels. Strongest lines of the Debye–Scherrer pattern (57 mm, $\text{CuK}\alpha$ radiation) are 3.34(70,102), 2.810(40,003), 2.315(100,202), 2.131(30,113), and 1.598(40,220).

The mineral, which occurs in fumarole deposits of the Great Tolbachik Fissure Eruption, Kamchatka Peninsula, Russia, is associated with piypite, alumoklyuchevskite, langbeinite, and microscopic-size vanadates, tellurates, and arsenates of Cu and CuO. The new name is for Russian volcanologist V.V. Averiev (1929–1968). Type material is in the museum of the Saint Petersburg Mining Institute, Russia. **J. P.**

Ferronordite-(Ce)*, manganonordite-(Ce)*

I.V. Pekov, N.V. Chukanov, N.N. Kononkova, D.I. Belakovskiy, D.Yu. Pushcharovskiy, S.A. Vinogradova (1998) Ferronordite-(Ce) $\text{Na}_3\text{SrFeSi}_6\text{O}_{17}$ and manganonordite-(Ce) $\text{Na}_3\text{SrMnSi}_6\text{O}_{17}$ —new minerals from the Lovozero massif, Kola Peninsula. Zapiski Vseross. Mineral. Obshch., 127(1), 32–40 (in Russian, English abs.).

About 100 electron microprobe analyses revealed the existence of Fe- and Mn-dominant analogs of nordite-(Ce) and nordite-(La), $\text{Na}_3\text{Sr}(\text{REE})(\text{Zn,Fe,Mn})\text{Si}_6\text{O}_{17}$. The new names ferronordite-(Ce) and manganonordite-(Ce) allude to the chemical composition and the nordite group.

Microprobe analyses gave for ferronordite-(Ce) and manganonordite-(Ce), respectively, Na₂O 11.34, 11.48, MgO 0.51, 0.52, MnO 2.22, 3.70, FeO 3.71, 2.09, ZnO 2.28, 2.45, CaO 0.73, 0.33, SrO 12.64, 13.24, BaO 0.31, 0.38, Y₂O₃ 0.00, 0.00, La₂O₃ 8.79, 8.64, Ce₂O₃ 10.64, 10.56, Pr₂O₃ 0.56, 0.43, Nd₂O₃ 0.90, 1.06, Sm₂O₃ 0.06, 0.00, Al₂O₃ 0.09, 0.01, SiO₂ 44.92, 44.57, sum 99.70, 99.46 wt %, corresponding to $\text{Na}_3\text{Sr}(\text{Ce,La})(\text{Fe,Mn,Zn})\text{Si}_6\text{O}_{17}$ and $\text{Na}_3\text{Sr}(\text{Ce,La})(\text{Mn,Zn,Fe})\text{Si}_6\text{O}_{17}$. Ferronordite-(Ce) forms tabular crystals up to $8 \times 5 \times 1 \text{ mm}$, grouped in rosette or sheafy aggregates up to 1 cm in diameter. Manganonordite-(Ce) forms thin-plate crystals up to $10 \times 10 \times 2 \text{ mm}$, grouped in 2–2.5 cm rosettes or spherulites. The crystals are flattened [100], with {100} pinacoid (dominating), {h0l} prisms and {001} pinacoid [ferronordite-(Ce)]. When fresh, both the minerals are transparent, colorless or pale brown, whereas altered grains are brown. White streak, luster vitreous, greasy on fractures, brittle, perfect {100} cleavage, with two additional {h0l} cleavages present. Uneven fracture, H 5–5½, $VHN_{15} = 749$ and 777 for ferro- and manganonordite-(Ce), respectively; $D_{\text{meas}} = 3.46(3)$ for ferronordite-(Ce), 3.43(3) for manganonordite-(Ce), $D_{\text{calc}} = 3.51(1) \text{ g/cm}^3$ for $Z = 4$. Optically biaxial negative, $\alpha = 1.623(3)$, $\beta = 1.636(2)$, $\gamma = 1.642(2)$, $2V_{\text{meas}} = 60(10)^\circ$, $2V_{\text{calc}} = 68(4)^\circ$, weak dispersion $r > v$, $X = a$, $Y = b$, $Z = c$. The IR spectrum of ferronordite-(Ce) has bands at 1085, 1059, 998, 965, 919, 895, 875, 762, 734, 703, 647, 566, 535, 522, 493, 482, 447, 436, and 429 cm^{-1} . The spectrum of manganonordite-(Ce) is almost identical. Single-crystal X-ray study indicated orthorhombic symmetry, space group (by analogy to nordite) $Pcca$, $a = 14.460(2)$, $14.449(4)$, $b = 5.187(1)$, $5.187(2)$, $c = 19.848(7)$, $19.849(5) \text{ \AA}$, (ferro- and manganonordite-(Ce), respectively). The structure of the minerals consists of tetrahedral networks of $\{\text{M}^{2+}[\text{Si}_6\text{O}_{17}]\}$ in which $\text{M}^{2+} = \text{Mn, Fe, Zn, Mg}$ that are connected by polyhedra of Sr, REE (Thompson cubes) and Na (octahedra). Strongest lines of the X-ray powder pattern of ferronordite-(Ce) (55 lines given) are: 4.216(100,210), 3.325(67,312), 2.964(73,410), 2.879(62,314), and 2.595(46,020); those for manganonordite-(Ce) (50 lines given) are 4.215(100,210), 3.326(67,312), 2.965 (83,410), 2.875(55,314), and 2.597(54,020).

The minerals occur in sodalite syenites and in ussingite veins at the Lovozero alkaline massif, Kola Peninsula, Russia, where they are associated with aegirine, eudialyte, sodalite, vunnemite, and other minerals typical of alkaline rocks. Type material is in the Fersman Mineralogical Museum, Moscow, Russia. **J. P.**

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

Labuntsovite analog with highly ordered K and Ba

R.K. Rastsvetaeva, N.B. Chukanov, I.V. Pekov (1997) Crystal structure of a new mineral—labuntsovite analog with highly ordered potassium and barium. *Doklady Akad. Nauk*, 357(1), 64–67 (in Russian).

Barium-rich labuntsovite $\text{Na}_{4.3}\text{K}_{3.7}\text{Ba}_{2.1}\text{Ti}_8\text{Mn}_{0.6}\text{Mg}_{0.2}\text{Fe}_{0.1}[\text{Si}_4\text{O}_{12}]\text{O}_6(\text{OH})_2 \cdot 10.4\text{H}_2\text{O}$ was found in pegmatite at the Khibina alkaline massif, Kola Peninsula, Russia. Single-crystal X-ray structure study ($R = 0.0368$) indicated monoclinic symmetry, space group $C2/m$, $a = 14.216$, $b = 13.755$, $c = 7.767$ Å, $\beta = 116.7^\circ$, $D_{\text{calc}} = 3.05$ g/cm³ for $Z = 2$. Full ordering of Na, K, and Ba occurs in three independent positions, as opposite to that in K-rich labuntsovite.

Discussion. The chemical composition and unit-cell parameters of the described mineral are similar to those of other labuntsovite-type minerals. The data presented are insufficient to characterize the new mineral. **J. P.**

Nepskoeite*

V.N. Apollonov (1998) Nepskoeite $\text{Mg}_4\text{Cl}(\text{OH})_7 \cdot 6\text{H}_2\text{O}$ —a new mineral from the Nepskoye potash salt deposit. *Zapiski Vseross. Mineral. Obshch.*, 127(1), 41–46 (in Russian, English abs.).

Electron microprobe analysis (average of 7) gave Mg 27.35, Cl 10.04, O + H (by difference) 62.61, sum 100 wt%, corresponding to $\text{MgCl}_2 \cdot 6.95\text{Mg}(\text{OH})_2 \cdot 11.45\text{H}_2\text{O}$, ideally $\text{Mg}_4\text{Cl}(\text{OH})_7 \cdot 6\text{H}_2\text{O}$. The mineral occurs as 0.5–1.5 mm spherulites consisting of 0.5–10 mm fibers, elongate [010]. The spherulites are translucent, almost colorless with a bright yellow tint, pearly luster, $H = 1\frac{1}{2} - 2$, $D_{\text{meas}} = 1.76(2)$, $D_{\text{calc}} = 1.756$ g/cm³ for $Z = 2$. Colorless in transmitted light, straight extinction, negative elongation, biaxial negative, $\alpha = 1.532(2)$, $\beta \approx \gamma$, $\gamma = 1.562(2)$, $2V = <5^\circ$. TG analysis showed a gradual weight loss (42.73 wt% at 900 °C). The infrared spectrum has absorption bands at 3623, 3373, 1609, 1297, 1160 (weak), 733, and 591 cm⁻¹. Electron diffraction study showed the mineral to be orthorhombic, space group $Pcmm$, $Pcm2_1$ or $Pc2m$, $a = 11.215(9)$, $b = 3.124(3)$, $c = 19.21(3)$ Å. The X-ray powder pattern is similar to that of korshunovskite and synthetic basic Mg chlorides. Strongest lines (33 lines given) are 11.41(29,100), 9.78(46,101), 9.60(38,002), 4.25(20,203), and 3.498(100,302).

The mineral occurs in Cambrian anhydrite-halite rock at the Nepskoye salt deposit, Eastern Siberia, Russia, where it forms sparse spherulites containing subordinate fluoborite and pyrrhotite. The new name is for the locality. Type material is in the Fersman Mineralogical Museum, Moscow, Russia. **J. P.**

Niedermayrite*

G. Giester, B. Rieck, F. Brandstätter (1998) Niedermayrite, $\text{Cu}_4\text{Cd}(\text{SO}_4)_2(\text{OH})_6 \cdot 4\text{H}_2\text{O}$, a new mineral from the Lavrion mining district, Greece. *Mineral. Petrology*, 63, 19–34.

Electron microprobe analysis gave CdO 16.5, CuO 45.7, SO₃ 21.6, H₂O by difference 16.2, sum 100 wt%, corresponding to $\text{Cu}_{4.29}\text{Cd}_{0.96}(\text{SO}_4)_{2.01}(\text{OH})_{6.50} \cdot 3.46\text{H}_2\text{O}$. The mineral occurs as bluish green crusts, to several centimeters, consisting of platy crystals rarely exceeding 50 μm; the main form is {010}, and others

are {100}, {001}, and unindexed prisms. Vitreous luster, white streak, H not determinable, brittle, perfect {010} cleavage, nonfluorescent, $D_{\text{calc}} = 3.292$ g/cm³ for $Z = 2$. TGA gave a loss of 18.9 wt% (H₂O) up to 500 °C. Optically biaxial negative, $\alpha_{\text{calc}} = 1.609$, $\beta = 1.642(2)$, $\gamma = 1.661(2)$, $2V_{\text{meas}} = 66^\circ$, strong dispersion $r > v$, nonpleochroic, $X \parallel b$. Single-crystal X-ray structure study ($R = 0.026$) gave monoclinic symmetry, space group $P2_1/m$; $a = 5.535(2)$, $b = 21.947(9)$, $c = 6.085(2)$ Å, $\beta = 91.98(3)^\circ$ as refined from a Gandolfi powder pattern (114 mm, $\text{CuK}\alpha$) with strongest lines of 11.02(90,020), 5.496(100,040), 3.437(30,150), 3.243(40,141), and 2.470(30,240,171,211,132).

The mineral is an oxidation product associated with sphalerite, chalcopyrite, galena, greenockite, hawleyite, and several sulfates and carbonates in brecciated marble from an abandoned adit in the Km3 area of the Lavrion mining district, Greece. The new mineral name is for G. Niedermayr of the Naturhistorisches Museum Wien, Austria. Type material is in the Institut für Mineralogie und Kristallographie, Universität Wien, and in the Naturhistorisches Museum Wien. **J.L.J.**

Parasibirskite*

I. Kusachi, Y. Takechi, C. Henmi, S. Kobayashi (1998) Parasibirskite, a new mineral from Fuka, Okayama Prefecture, Japan. *Mineral. Mag.*, 62, 521–525.

Chemical analysis (Ca by electron microprobe) gave CaO 56.06, B₂O₃ 34.10, H₂O 9.97, sum 100.13 wt%, corresponding to $\text{Ca}_{1.985}\text{B}_{1.945}\text{O}_{4.901} \cdot 1.099\text{H}_2\text{O}$, ideally $\text{Ca}_2\text{B}_2\text{O}_5 \cdot \text{H}_2\text{O}$. Occurs as subparallel aggregates of white, tabular crystals up to $40 \times 20 \times 3$ μm. Weak pearly luster, perfect {100} cleavage, $VHN_{25} = 121$ (109–155), $D_{\text{meas}} = 2.50(1)$, $D_{\text{calc}} = 2.54$ g/cm³ for $Z = 1$, readily soluble in dilute HCl, and alters to a borate and calcite in water. DTA showed endothermic peaks at 371 and 414 °C (loss of water). Colorless in transmitted light, biaxial positive, $\alpha = 1.556(2)$, $\beta = 1.593(2)$, $\gamma = 1.663(2)$, $2V_{\text{calc}} = 74.8^\circ$. By analogy with the synthetic analog, monoclinic symmetry, space group $P2_1/m$; $a = 6.722(4)$, $b = 5.437(2)$, $c = 3.555(2)$ Å, $\beta = 93.00(5)^\circ$ as refined from a diffractometer powder pattern ($\text{CuK}\alpha_1$ radiation) with strongest lines of 6.73(70,100), 3.354(30,200), 2.975(60,011), and 2.237(100,300).

The mineral is associated with takedaite, from which it formed by hydrothermal alteration, and with olshanskyite, frolovite, sibirskite, and calcite in a vein between limestone and skarn. The new name alludes to the polymorphic relationship with sibirskite. Type material is in the National Science Museum, Tokyo, Japan. **J.L.J.**

Philolithite*

A.R. Kampf, P.B. Moore, E.J. Jonsson, G.H. Swihart (1998) Philolithite, a new mineral from Långban, Värmland, Sweden. *Mineral. Record*, 29, 201–206.

Electron microprobe analysis (one of three listed) gave PbO 75.4, MnO 8.0, MgO 2.6, SO₃ 1.2, Cl 4.4, CO₂ and H₂O by structure determination 4.9 and 3.0, respectively, O ≡ Cl 0.8, sum 98.5 wt%, corresponding to $\text{Pb}_{12.69}\text{Mn}_{4.24}\text{Mg}_{2.42}\text{S}_{0.56}\text{Cl}_{4.66}\text{C}_{4.88}\text{H}_{12.51}\text{O}_{34.43}$, simplified as $\text{Pb}_{12}\text{O}_6\text{Mn}(\text{Mg},\text{Mn})_2(\text{Mn},\text{Mg})_4(\text{SO}_4)(\text{CO}_3)_4\text{Cl}_4(\text{OH})_{12}$. IR and Raman-laser spectroscopy con-

firmed the presence of sulfate, carbonate, and OH. The mineral occurs principally as pale to medium apple-green crusts and simple tetragonal tablets dominated by {001} and {111}. White streak, adamantine luster, brittle, conchoidal fracture, $H = 3\text{--}4$, nonfluorescent, $D_{\text{calc}} = 5.91 \text{ g/cm}^3$ for $Z = 2$, sector twinned about c . Anomalously biaxial positive, $n > 1.92$, $2V = \sim 60^\circ$, $X \wedge a = 45^\circ$, $Z = c$, weak pale green to pale yellow-green pleochroism. Single-crystal X-ray structure study ($R = 0.053$) indicated tetragonal symmetry, space group $P4_2/nmm$; $a = 12.627(9)$, $c = 12.595(9) \text{ \AA}$ as refined from a diffractometer powder pattern ($\text{CuK}\alpha$ radiation) with strongest lines of 8.95(20,110), 7.30(20,111), 3.99(30,301), 2.975(100,330,303), 2.752(30,421,412), 2.473(20,413), and 1.716(20,633,336).

The mineral occurs as a late-stage fissure mineral deposited on lead in a calcite-rich matrix containing skarn Mn oxides and phlogopite. The new name is derived from the Greek words *philos* (loving) and *lithos* (stone), in honor of the Friends of Mineralogy. Type material is in the Los Angeles County Museum of Natural History, the Canadian Museum of Nature at Ottawa, and the Swedish Museum of Natural History, Stockholm. **J.L.J.**

Reevesite, Co analog

Y. Song, H.-S. Moon (1998) Additional data on reevesite and its Co-analogue, as a new member of the hydrotalcite group. *Clay Minerals*, 33, 285–296.

The mineral occurs as golden yellow, fine-grained aggregates that formed by weathering replacement of pecoraite-magnetite-millerite-polydymite assemblages in small vein-filled fractures in serpentinitized harzburgite-lherzolite at the Buk-site, Kwanchon area, Korea. X-ray diffractometry gave lines at 7.796(100,003), 3.874(60,006), 2.603(60,012), 2.319(40,015), 1.542(30,018), and 1.512 \AA (40,113), $a = 3.085$, $c = 23.355$. The IR spectrum indicates the presence of CO_3 and H_2O . Electron microprobe analyses (7 listed) gave NiO 45.6–48.2 wt%, but Co_2O_3 varies inversely with Fe_2O_3 ; the two analyses richest in Co have SiO_2 4.87, 2.96, Fe_2O_3 0.47, 1.96, MgO 0.66, 0.55, NiO 48.18, 48.45, Co_2O_3 16.37, 14.83, CO_2 (calc.) 4.19, 4.24, SO_3 0.52, 0.44, H_2O (calc.) 15.41, 15.41, sum 90.67, 88.84 wt%, corresponding to $(\text{Ni}_{6.033}\text{Mg}_{0.152})_{\Sigma 6.186}(\text{CO}_{1.846}\text{Fe}_{0.055}^{3+})_{\Sigma 1.901}[(\text{CO}_3)_{0.890}(\text{SO}_4)_{0.061}]_{\Sigma 0.951}$ and $(\text{Ni}_{6.066}\text{Mg}_{0.128})_{\Sigma 6.194}(\text{CO}_{1.672}\text{Fe}_{0.220}^{3+})_{\Sigma 1.901}[(\text{CO}_3)_{0.900}(\text{SO}_4)_{0.051}]_{\Sigma 0.951}$ on the basis of $\text{O}_3(\text{OH})_{16}$ and assuming Si is attributable to pecoraite impurity. The Ni:Co³⁺ ratio approximates 3:1, whereas in comblainite the ratio is 2:1 (*Am. Mineral.*, 65, 1065–1066). **J.L.J.**

Telluromayingite

Zuxiang Yu (1998) Telluromayingite $[\text{Ir}(\text{Te},\text{Bi})_2]$ —a new variety of mayingite. *Acta Mineral. Sinica*, 18(2), 134–137 (in Chinese, English abs.).

Five electron microprobe analyses gave Ir 34.7 (33.5–35.6), Pt 2.7 (1.9–3.9), Cu 0.3 (0.1–0.5), Bi 28.2 (27.2–29.9), Te 32.9 (31.8–33.8), sum 98.8 wt%, corresponding to $(\text{Ir}_{0.92}\text{Pt}_{0.07}\text{Cu}_{0.01})_{\Sigma 1.00}\text{Te}_{1.32}\text{Bi}_{0.68}$, ideally $\text{Ir}(\text{Te},\text{Bi})_2$. The mineral occurs as aggregates up to 0.5 mm across, and as veinlets up to 0.2×1.2 mm. Opaque, metallic luster, steel black color, black streak, $VHN_{50} = 161$ (132–

215), brittle, $D_{\text{calc}} = 12.2 \text{ g/cm}^3$ for $Z = 4$. In reflected light, bright white with a yellowish tint, isotropic. Reflectance percentages (WTiC standard, air) are given in 20 nm steps from 400 to 700 nm; representative values are 47.9 (470), 48.4 (540), 48.5 (550), 48.8 (590), and 49.2 (650). The X-ray powder pattern is in accord with cubic symmetry, space group $Pa\bar{3}$, $a = 6.486 \text{ \AA}$. Strongest lines are 2.89(60,210), 1.95(100,311), 1.246(70,511), 1.204(60,520), 1.145(50,440), and 0.9891(60,533).

The mineral occurs with a Pt-group assemblage, including mayingite, near the village of Maying, about 230 km NNE of Beijing, China. The assemblage is present in chromite ore and in placer concentrates.

Discussion. Analyses of mayingite were reported (*Am. Mineral.*, 81, p. 251, 1996) as Bi 38.5 (35.9–41.6) and Te 24.6 (23.6–25.6) wt%, from which formula Bi:Te approximates 1:1, and the ideal formula was given as IrBiTe . Presumably mayingite now becomes $\text{Ir}(\text{Bi},\text{Te})_2$ to take account of the range in the analyses, and telluromayingite is $\text{Ir}(\text{Te},\text{Bi})_2$, but no request for a re-definition or for the new name has been submitted to the CNMMN. **J.L.J.**

$(\text{MoO}_2)_2\text{As}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$, $\text{Ca}(\text{H}_2\text{AsO}_4)_2$, Ca-Cu-U minerals, etc.

P. Ondruš, F. Veselovský, R. Skála, I. Císařová, J. Hloušek, J. Frýda, I. Vavřín, J. Čejka, A. Gabašová (1997) New naturally occurring phases of secondary origin from Jáchymov (Jochimsthal). *J. Czech Geol. Soc.*, 42(4), 77–108.

$(\text{MoO}_2)_2\text{As}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$

Electron microprobe analysis gave Mo 35.04, As 27.83, O 36.91, sum 99.78 wt%, corresponding to $(\text{MoO}_2)_{1.93}(\text{As}_2\text{O}_5)_{0.95}(\text{OH})_{0.07} \cdot 3.31\text{H}_2\text{O}$. TGA, DTG, and IR curves are illustrated. The mineral occurs as green to gray-green acicular crystals and crusts associated with scorodite and partly weathered arsenopyrite-pyrite in a veinlet 5 cm wide. Single-crystal X-ray structure study ($R = 0.058$) indicated monoclinic symmetry, space group $P2_1/c$, $a = 7.0398$, $b = 12.0682$, $c = 12.210 \text{ \AA}$, $\beta = 101.265^\circ$, $D_{\text{calc}} = 3.524 \text{ g/cm}^3$ for $Z = 4$. Strongest lines of the X-ray powder pattern (diffractometer, $\text{CuK}\alpha$ radiation, 110 lines given) are 6.915(26,100), 6.046(100,020), 3.457(16,200), 3.324(59,023), and 2.2642(19).

$\text{Ca}(\text{H}_2\text{AsO}_4)_2$

The mineral occurs as hollow botryoidal crusts and typically as a transparent coating of indistinct radiating aggregates up to 2 mm thick. Energy-dispersion analysis indicated major Ca and As, and minor Mg. TGA, DTG, and IR curves are illustrated. The X-ray powder pattern (diffractometer, $\text{CuK}\alpha$, >100 lines listed) has strongest lines of 3.974(72,2 $\bar{1}$ 0), 3.700(60,101), 3.558(100,020), 3.262(85,2 $\bar{2}$ 0), 3.101(82,1 $\bar{2}$ 1), and 3.041 \AA (62,21 $\bar{1}$). The pattern indicates the presence of a small amount of contaminant, but otherwise is in good agreement with PDF data for synthetic $\text{Ca}(\text{H}_2\text{AsO}_4)_2$. Rietveld refinement gave a triclinic cell with $a = 8.5483$, $b = 7.6975$, $c = 5.7196$, $\alpha = 92.598^\circ$, $\beta = 109.871^\circ$, $\gamma = 109.912^\circ$.

$\text{Ca}_5\text{Cu}(\text{UO}_2)_4(\text{CO}_3)_6(\text{OH})_8 \cdot 4\text{H}_2\text{O}$

Microprobe analysis gave Ca 9.26, Cu 3.52, U 48.53, O 29.97,

C 3.52, sum 94.81 wt%, corresponding to $\text{Ca}_{4.81}\text{Cu}_{1.15}(\text{UO}_2)_{4.21}(\text{CO}_3)_{6.12}(\text{OH})_{8.19} \cdot 3.97\text{H}_2\text{O}$ for $O = 39$. Occurs as bright green, pseudohexagonal, platy, skeletal crystals and granular aggregates. Strongest lines of the X-ray powder pattern are 10.810(54), 9.657(76), 8.835(56), 7.602(72), 7.178(93), 4.829(100), and 3.702 Å (53).

$\text{Ca}_2\text{Cu}(\text{UO}_2)_2(\text{CO}_3)_2\text{O}_3 \cdot 3\text{H}_2\text{O}$

The mineral occurs as yellow-green, imperfect crystals that form fan-shaped aggregates. Microprobe analyses gave Ca 7.10, Cu 6.42, U 50.50, O 26.11, C 2.18, sum 92.31 wt%, corresponding to $\text{Ca}_{1.85}\text{Cu}_{1.05}(\text{UO}_2)_{2.21}(\text{CO}_3)_{1.89}(\text{OH})_{6.43}$ for $O = 17$. Strongest lines of the X-ray powder pattern are 9.094(96), 8.763(46), 6.250(100), 5.684(46), and 3.410 Å (43).

$\text{U}^{4+}(\text{HAsO}_4)_2 \cdot 4\text{H}_2\text{O}$

Occurs as gray-green to dark green crusts, to several square centimeters, that consist of platy crystals up to 0.1 mm long. TGA, DTG, and IR curves are illustrated. Microprobe analyses indicated U and As as major elements, with no minor elements detected. The X-ray powder pattern has strongest lines of 8.711(28), 8.228(100), 3.939(27), 3.400(44), and 2.933 Å (34); the pattern matches that for $\text{U}(\text{HAsO}_4)_2 \cdot 4\text{H}_2\text{O}$ (PDF 38-0644).

Other minerals

X-ray powder data, and in many cases additional information such as IR spectra and TGA-DTA curves, are given for numerous unidentified minerals for which quantitative chemical analyses are not reported. Among these minerals are possibly the P analog of walpurgite, Ca analog of schröckingerite, Mg analog of villyaellinite, two zippeite-like minerals, a Pb-U sulfate, two $\text{UO}_3\text{-H}_2\text{O}$ minerals, a Pb-U hydrous oxide, a Ni-U arsenate, three Cu arsenates, a Cu-Ca arsenate, 'hydronium uranospinite', $\text{Na}_4(\text{UO}_2)(\text{CO}_3)_3$, a Mg arsenate, two Fe arsenates, a Cu-U sulfate, a Ca-Cu-U carbonate, a Ca-Mg hydrous arsenate, and a Ca-V arsenate. **J.L.J.**

New Data

Francoanellite

S. Dick, T. Zeiske (1998) Francoanellite $\text{K}_3\text{Al}_5(\text{HPO}_4)_6(\text{PO}_4)_2 \cdot 12\text{H}_2\text{O}$: Structure and synthesis by topochemical dehydration of taranakite. *Zeits. Naturforsch.*, 53b, 711–719 (in German, English abs.).

Single-crystal X-ray structure study ($R = 0.042$) of synthetic francoanellite gave trigonal symmetry, space group $R\bar{3}c$, $a = 8.70$, $c = 95.05$ Å, $Z = 6$, in agreement with previous data, but the formula is new. **J.L.J.**

Kratochvilite(?)

L. Nasdala, I.V. Pekov, T. Witzke (1993) Raman investigation of naturally occurring $\text{C}_{14}\text{H}_{10}$. *Chem. Erde*, 53, 59–69.

V Záček, P. Ondruš (1997) Mineralogy of recently formed sublimates from Kateřina colliery in Radoanice, Eastern Bohemia, Czech Republic. *Věstník Českého geol. ústava*, 72(3), 289–302.

Raman spectroscopy of crystalline sublimates from burning coal seams in Tadzhikistan indicated that the sublimates contain phenanthrene, $\text{C}_{14}\text{H}_{10}$. At the burning dump of the Carolaschach coal mine, Frietal, Saxony, sublimates contain irregular, thin blades of anthracene of up to 10 mm long. Anthracene also has the composition $\text{C}_{14}\text{H}_{10}$.

Discussion. Anthracene apparently corresponds to the mineral kratochvilite, thought to be of fluorene composition $\text{C}_{13}\text{H}_{10}$. Although new finds of compounds formed by the burning of coal are no longer considered as minerals, kratochvilite is an older mineral in good standing. More data are needed to determine whether a redefinition is necessary. **J.L.J.**

Szenicite

P.C. Burns (1998) The crystal structure of szenicsite, $\text{Cu}_3\text{MoO}_4(\text{OH})_4$. *Mineral. Mag.* 62, 461–469.

Single-crystal X-ray structure study ($R = 0.0334$) of szenicsite confirmed the orthorhombic symmetry and cell dimensions (*Am. Mineral.* 83, p. 403, 1998), and established the space group to be $Pnmm$. **J.L.J.**

Discredited Mineral

Ashanite

Ganfu Shen (1998) Discreditation of ashanite. *Acta Mineral. Sinica*, 18(2), 230–233 (in Chinese, English abs.).

Ashanite and ixiolite are orthorhombic, space group $Pbcn$, and have similar cell dimensions. The original wet-chemical analysis of ashanite in 1980 gave Nb_2O_5 36.8, Ta_2O_5 23.4, FeO 8.2, MnO 7.8, U_3O_8 23.8, sum 100 wt%, corresponding to an ideal formula $(\text{Nb,Ta,U,Fe,Mn})_4\text{O}_8$, which is the Nb-dominant analog of ixiolite. Electron microprobe analysis of type material subsequently (1985) gave Nb_2O_5 25.3, Ta_2O_5 54.2, FeO 5.5, MnO 11.4, U_3O_8 0.6, sum 97.0 wt%, showing that atomic Nb:Ta is 0.28:0.36 and U is negligible. The original analysis is thought to have been done on a mixture of several minerals, including ixiolite, samarskite-(Y), and uranmicrolite. The discreditation of ashanite was approved by the CNMMN. **J.L.J.**