

NEW MINERAL NAMES*

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Camerolaite*

H. Sarp, P. Perroud (1991) Camerolaite, $\text{Cu}_4\text{Al}_2\text{[HSbO}_4\text{,SO}_4\text{](OH)}_{10}\text{(CO}_3\text{)}\cdot 2\text{H}_2\text{O}$, a new mineral from Cap Garonne mine, Var, France. Neues Jahrb. Mineral. Mon., 481–486.

Electron microprobe (ave. of eight) and CHN analyses (for CO_2 and H_2O) gave CuO 40.56, Al_2O_3 14.54, Sb_2O_5 13.55, SO_3 4.75, CO_2 6.26, H_2O 20.00, sum 99.66 wt%, corresponding to $\text{Cu}_{3.56}\text{Al}_{1.99}\text{Sb}_{0.59}\text{S}_{0.41}\text{C}_{0.99}\text{H}_{15.51}\text{O}_{19.00}$, ideally $\text{Cu}_4\text{Al}_2\text{[HSbO}_4\text{,SO}_4\text{](OH)}_{10}\text{(CO}_3\text{)}\cdot 2\text{H}_2\text{O}$. Occurs as tufts and radiating aggregates (0.5–2 mm) of transparent, blue-green acicular crystals up to 0.5 mm long and showing {100} and {001}, flattened on {100}, elongate [010]. Silky luster, pale green streak, nonfluorescent, fibrous fracture, good {100} and {001} cleavages, soluble in HCl, $D_{\text{meas}} = 3.1(1)$, $D_{\text{calc}} = 3.09 \text{ g/cm}^3$ for the idealized formula and $Z = 1$. Optically biaxial positive, $\alpha = 1.626(2)$, $\beta = 1.646(2)$, $\gamma = 1.682(2)$, $2V_{\text{meas}} = 77(3)^\circ$, $2V_{\text{calc}} = 75^\circ$, $r < v$ strong, $X = \perp \{100\}$, $Z = b$, $\alpha = \text{colorless}$, $\beta = \text{pale green}$, $\gamma = \text{blue-green}$. X-ray single-crystal study gave monoclinic symmetry, space group $P2_1$ or $P2_1/m$, $a = 10.765(6)$, $b = 2.903(2)$, $c = 12.527(8) \text{ \AA}$, $\beta = 95.61(4)^\circ$ as refined from a Gandolfi pattern (114.6-mm camera, $\text{CuK}\alpha$ radiation) with strongest lines of 5.62(50,102), 5.160(90,102), 4.276(100,202), 3.565(40,300), 2.380(35,013,105,402), and 2.326(35,212).

The mineral occurs with parnauite, cyanotrichite, and malachite in a quartz gangue at the old copper-lead mine of Cap Garonne near Toulon, Var, France. The new name is for Michel Camerola, mineral collector. Type material is in the Department of Natural History Museum, Geneva, Switzerland. The mineral is crystallographically and chemically related to cyanotrichite and carbonate-cyanotrichite. J.L.J.

Kukisvumite*

V.N. Yakovenchuk, Ya.A. Pakhomovskii, A.N. Bogdanova (1991) Kukisvumite—A new mineral from the alkaline pegmatites of the Khibiny massif (Kola Peninsula). Mineral. Zhurnal, 13 (2), 63–67 (in Russian).

One of five reported microprobe analyses gave Na_2O 16.27, ZnO 5.99, MnO 0.61, FeO 0.23, TiO_2 27.03, Nb_2O_5 0.83, SiO_2 42.66, H_2O (by difference) 6.38, sum 100

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

wt%, corresponding to $\text{Na}_{5.96}\text{(Zn}_{0.84}\text{MnO}_{0.10})_{\Sigma 0.94}\text{-(Ti}_{3.85}\text{Nb}_{0.07}\text{Fe}_{0.04})_{\Sigma 3.96}\text{Si}_{8.08}\text{O}_{28}\cdot 4.03\text{H}_2\text{O}$, ideally $\text{Na}_6\text{-ZnTi}_4\text{Si}_8\text{O}_{28}\cdot 4\text{H}_2\text{O}$. The mineral contains 0.18–0.22 wt% F. Occurs as fan-shaped intergrowths of long prismatic crystals, elongate [001], flattened [100], up to 7 mm long and 0.1 mm thick. Transparent, white to colorless, some grains with a silver tint; vitreous luster, elastic, crushes into thin fibers along the elongation; uneven, splintery fracture, white streak, yellow-green luminescence in the electron microprobe beam, hardness 517–571 (ave. 544) kg/mm^2 with a 20-g load (Mohs 5.5–6), no cleavage, {010} parting. $D_{\text{meas}} = 2.90$, $D_{\text{calc}} = 2.95 \text{ g/cm}^3$ with $Z = 2$. Colorless in transmitted light, nonpleochroic, straight extinction, biaxial negative, $\alpha = 1.676(3)$, $\beta = 1.746(3)$, $\gamma = 1.795(3)$ at 589 nm, Z parallel to elongation, X perpendicular to the flattening, $2V_{\text{calc}} = 77^\circ$. The infrared pattern has absorption bands (cm^{-1}) at 3410, 3360, 1680, 1645 (molecular H_2O), 1137, 1060, 1020, 955, 930, 895, 700, 600, 575, 545, 495, 450, and 420 (Si-O groups). The DTA curve indicates loss of H_2O from 160–430 °C (endotherm at 170 °C, 5% weight loss) and 540–570 °C (endotherm at 560 °C, 2% weight loss). Endothermic effects are present also at 885, 905, 925, and 970 °C. Single-crystal and powder X-ray studies showed the mineral to be orthorhombic, space group, $Pccn$, $a = 28.889(4)$, $b = 8.604(4)$, $c = 5.215(3) \text{ \AA}$, $Z = 2$. The strongest lines (35 given) of the powder pattern are 14.49(90,200), 6.42(60,310), 4.815(80,600), 3.722(65,710), and 3.009(100,910).

The mineral occurs in an arfvedsonite-microcline pegmatite vein that cuts ijolitic/urtitic rocks at the Kukisvumtschorr deposit, Khibiny alkaline massif, Kola Peninsula, Russia. The mineral forms partial to complete pseudomorphs after lamprophyllite and is associated with arfvedsonite, microcline, nepheline, and natrolite. The name is for the place of occurrence. Type material is at the Fersman Mineralogical Museum, Moscow, and at the Museum of the Leningrad Mining Institute. J.P.

Metamunirite*

H.T. Evans, Jr. (1991) Metamunirite, a new anhydrous sodium metavanadate from San Miguel County, Colorado. Mineral. Mag., 55, 509–513.

Electron microprobe analysis gave Na_2O 24.8, V_2O_5 75.2 wt% after correction of deficiencies of 8–10 wt% attributed to the presence of epoxy between the fine-grained fibers of the mineral; theoretical requirements for

NaVO_3 are Na_2O 25.4, V_2O_5 75.2 wt%. The mineral occurs as clusters of radiating, colorless, extremely soft, friable needles to 0.2 mm long, with {101} dominant. Perfect {101} and {001} cleavages, readily soluble in H_2O , $D_{\text{calc}} = 2.926 \text{ g/cm}^3$ with $Z = 4$. Optically birefringent, positive elongation, parallel extinction, $n = 1.78$ normal to the fiber direction; synthetic material has $\alpha = 1.780$, $\beta = 1.800(2)$, $\gamma \gg 1.800$, optically positive, $2V = 30\text{--}40^\circ$, $X = a$, $Y = c$, $Z = b$. Partial X-ray single-crystal data for natural fibers and a structural study of synthetic material gave orthorhombic symmetry, space group $Pnma$, $a = 14.134(7)$, $b = 3.648(2)$, $c = 5.357(2)$ Å. The X-ray powder pattern (Cr radiation) is in good agreement with that of synthetic $\beta\text{-NaVO}_3$ (PDF 32-1198), which has strongest lines of 5.01(100,101), 3.532(25,400), 3.248(18,102), 3.019(13,011), and 2.954(35,111).

The mineral occurs in cavities in sandstone at the Burro mine and the nearby Deremo-Snyder mine, San Miguel County, Colorado. The new name alludes to the relationship to munirite, $\text{NaVO}_3 \cdot 2\text{H}_2\text{O}$, from which metamunirite probably forms by dehydration. Type material is in the Smithsonian Institution, Washington, DC. J.L.J.

Romanite

M. Dragila (1990) Mineralogical observations of a new mineral in the davidite group. *Revisita Minelor*, 41 (8), 414-418 (in Romanian).

The mineral was studied by chemical analyses and electron microprobe, which showed Ti and Fe to be predominant (values not given) and PbO 4.90-6.73, REE 0-1, V_2O_5 0.35 wt%. The X-ray powder pattern of material heated to 970 °C in air gave strongest lines of 3.35(50), 2.84(90), 2.47(60-70), 2.24(60-70), 1.79(70-80), 1.69(80-90), 1.59(80-90), 1.44(90), and 1.12(70) (no line with an intensity of 100 reported). Occurs mainly as small grains and as tabular crystals or thin tablets with {001} dominant (length to 15 mm and thickness to 3 mm). Dark gray to black color, conchoidal to irregular fracture, vitreous to pitchlike or semimetallic luster, brittle, $H = 6.5\text{--}7$, S.G. 4.07-4.46, opaque, optically isotropic, metamict. DTA showed an exothermal peak at 670 °C and no other effects to 1000 °C.

The mineral occurs with ilmenite, magnetite, pyrite, and rutile as nodules or pockets in chlorite streaks and in quartz veinlets in metabasalts and metatuffs. The new name refers to the locality (Rumania), which is not specified further. The mineral is assigned to the davidite group and given the formula $(\text{Fe}^{2+}, \text{U}, \text{Pb})_2(\text{Ti}, \text{Fe}^{3+})\text{O}_{12}$.

Discussion. Insufficient data to establish the formula, species, or new name, the last not submitted to the CNMMN prior to publication. J.L.J.

Toyohaite*

J. Yajima, E. Ohta, Y. Kanazawa (1991) Toyohaite, $\text{Ag}_2\text{FeSn}_3\text{S}_8$, a new mineral. *Mineral. Jour.* (Japan), 15, 222-232.

The most Ag rich of five electron microprobe analyses gave Ag 24.39, Cu 0.14, Fe 6.28, Zn 0.37, Cd 0.22, Sn 41.24, In 0.05, S 28.16, sum 100.86 wt%, corresponding to $(\text{Ag}_{1.95}\text{Cu}_{0.02})_{21.97}(\text{Fe}_{0.97}\text{Zn}_{0.05}\text{Cd}_{0.02})_{21.04}\text{Sn}_{2.99}\text{S}_{7.57}$, ideally $\text{Ag}_2\text{FeSn}_3\text{S}_8$. Additional analyses and those previously reported (unnamed mineral of Johan and Picot from the Pirquitas deposit, Argentina; abstr. *Am. Mineral.*, 68, p. 1249, 1983) indicate solid solution with rhodostannite, $\text{Cu}_2\text{FeSn}_3\text{S}_8$. Occurs as aggregates up to 200 μm across, in which individual grains are 1-30 μm . Polishing hardness similar to that of hocartite. Brownish gray in reflected light, slightly more brownish than rhodostannite and hocartite; weakly dichroic, distinct to strong anisotropism with greenish gray to reddish brown polarization colors, checked twinning. Reflectance percentages (SiC standard), determined in air for a polycrystalline aggregate, are 480 23.5-24.3, 546 24.1-26.1, 589 24.7-26.4, 650 26.5-28.3. The X-ray powder pattern corresponds to that of rhodostannite, suggesting tetragonal symmetry, space group $I4_1/a$. Strongest lines of a diffractometer pattern (Cr radiation) are 3.72(35,200), 3.21(100,103,211), 2.64(30,220), 2.03(35,303,321), 1.882(35,224), and 1.856 Å (30,400), from which $a = 7.464(3)$, $c = 10.80(2)$, and $D_{\text{calc}} = 4.94 \text{ g/cm}^3$ for the ideal formula with $Z = 2$.

The new name is after the Toyoha mine, Sapporo, Hokkaido, Japan, which consists of more than 50 veins and has been the most productive supplier of silver, lead, and zinc in Japan. Toyohaite occurs in massive pyrite-sphalerite ore in a vein that cuts Miocene basalt. Intimate associates include rhodostannite, hocartite, teallite, herzenbergite, and berndtite. Type material is in the Geological Museum of the Geological Survey of Japan, Hokkaido Branch, Sapporo. J.L.J.

(Cu,Fe)(Re,Mo) $_4$ S $_8$

M. Tarkian, R.M. Housley, A. Volborth, O. Greis, G.H. Moh (1991) Unnamed Re-Mo-Cu sulfide from the Stillwater complex, and crystal chemistry of its synthetic equivalent spinel type $(\text{Cu,Fe})(\text{Re,Mo})_4\text{S}_8$. *Eur. Jour. Mineral.*, 3, 977-982.

The mineral occurs as inclusions up to $10 \times 10 \mu\text{m}$ in pyrrhotite and pentlandite in pyroxenite about 200 m below the J-M Reef of the Stillwater Complex, Montana. Electron microprobe analysis gave Cu 5.81, Fe 1.20, Ni 0.23, Re 54.47, Mo 11.97, S 27.53, sum 101.21 wt%, corresponding to $(\text{Cu}_{0.84}\text{Fe}_{0.20}\text{Ni}_{0.04})_{21.08}(\text{Re}_{2.72}\text{Mo}_{1.16})_{23.88}\text{S}_{8.00}$, simplified as $(\text{Cu,Fe})(\text{Re,Mo})_4\text{S}_8$. In reflected light, isotropic, light gray and slightly darker than pyrrhotite; polishing hardness distinctly higher than those of pyrrhotite and pentlandite; $VHN_{25} = 724\text{--}812 \text{ kg/mm}^2$ (synthetic material). Reflectance values (SiC standard) given in 20-nm steps for natural and synthetic material are, respectively, 470 nm 36.2, 36.1, 546 nm 36.2, 37.3, 589 nm 36.6, 37.2, 650 nm 37.5, 37.6. X-ray data could not be obtained for the mineral; synthetic material of analogous composition is cubic, space group $F\bar{4}3m$, $a = 9.5408(1)$ Å, $D_{\text{calc}} = 7.34 \text{ g/cm}^3$ with $Z = 4$. Strongest

lines of the powder pattern (Guinier camera, $\text{CuK}\alpha_1$ radiation) are 5.508(100,111), 2.8765(70,311), 2.3849(52,400), 2.1885(34,331), 1.9474(35,422), and 1.8356(60,511,333). The authors report that their submission to the CNMMN was not approved because of the absence of X-ray data for natural material. J.L.J.

Tl-Cu-Fe sulfide

A. Genkin, S.Th. Schmidt (1991) Preliminary data for a new thallium mineral from the lead-zinc ore deposit, Agucha, India. In G.H. Moh et al., Thallium and gold: Observations and experimental contributions to mineralogy, geochemistry and crystal chemistry. Neues Jahrb. Mineral. Abh., 163, 197–270.

An electron microprobe analysis of a 30- μm grain gave Tl 32.260, Ag 4.765, Cu 15.619, Fe 22.658, S 24.212, Cl 1.277, sum 100.79 wt%. The analyses (five, for two grains) indicate a composition $(\text{Cu}_{0.60}\text{Ag}_{0.06}\text{Tl}_{0.39})_{21.05}\text{Fe}_{1.01}(\text{S}_{1.91}\text{Cl}_{0.09})_{22.00}$, ideally $(\text{Cu,Tl,Ag})\text{FeS}_2$. In reflected light, brown with a reddish tint, isotropic; reflectance percentages (given in 20-nm steps) are 400 23.3; 440 24.9; 480 26.8; 520 28.8; 560 30.8; 600 31.9; 640 31.8; 680 30.8; 720 29.2; 760 27.6. The mineral occurs as inclusions up to 30 μm in galena and along the boundary of pyrrhotite in the disseminated ores of the Agucha Pb-Zn deposit, Rajasthan, India. J.L.J.

Ca-Ba-Ce fluorcarbonate

Jinchuan Shen, Jinxiao Mi (1991) Crystal structure of $(\text{Ca}_{0.5}\square_{0.5})\text{BaCe}_2(\text{CO}_3)_4\text{F}$. Acta Petrolog. Mineral., 10 (3), 246–251 (in Chinese, English abstract).

X-ray crystal-structure determination ($R = 0.05$) of a REE fluorcarbonate mineral from the Bayan Obo deposits, Inner Mongolia, gave hexagonal symmetry, space group $P6_2c$, $a = 5.10$, $c = 23.02 \text{ \AA}$, $Z = 2$. The structural formula is $(\text{Ca}_{0.5}\square_{0.5})\text{BaCe}_2(\text{CO}_3)_4\text{F}$, similar to that of baiyuneboite-(Ce) except that Na is replaced by Ca and charge balance is maintained by only half of the sites being occupied. There are also similarities to the structure of huanghoite, $\text{BaCe}(\text{CO}_3)_2\text{F}$, which is trigonal.

Discussion. Seems to be distinct in composition from baiyuneboite-(Ce), which is $\text{NaBaCe}_2(\text{CO}_3)_4\text{F}$, but the structural relationship with baiyuneboite and cordylite needs clarification (see the Discussion in *Am. Mineral.*, 75, p. 240, 1990). J.L.J.

Unnamed $(\text{Mn,Fe})_7\text{Si}_2$ and $(\text{Mn,Fe})_5\text{Si}_3$

V.I. Tatarintsev, S.N. Tsymbal, S.M. Sandomirskaya, L.N. Egorova, A.N. Vashtchenko, A.P. Khnyazkov (1990) Iron-bearing manganese silicides from the Priazovye (USSR). Mineral. Zhurnal, 12 (6), 35–43 (in Russian).

Inclusions of unaltered glass in a volcanic breccia occurring in the basin of the Volnovakha River, eastern

Azov area, Ukraine, contain two minerals associated with graphite, khamrabaevite, moissanite, and alabandite. The two minerals are rounded, ellipsoidal or polygonal grains up to 0.4 mm. Steel gray color, metallic luster, black tarnish, locally mutually intergrown. In reflected light, anisotropic, nonpleochroic, no birefractance, no color effects.

Mineral 1. Microprobe analysis (three given) gave Fe 8.65, Mn 78.50, Si 12.66, sum 99.81 wt%, corresponding to $(\text{Mn}_{6.34}\text{Fe}_{0.68})_{27.02}\text{Si}_{2.00}$. Pale yellow in reflected light. Reflectance percentages for R_1 and R_2 : 440 47.9, 46.6; 460 48.9, 47.1; 480 49.8, 48.0; 500 51.0, 48.4; 520 52.1, 49.0; 540 52.9, 49.9; 560 53.9, 50.7; 580 54.6, 51.4; 600 55.5, 52.2; 620 55.9, 52.7; 640 56.5, 53.3; 660 57.1, 54.0; 680 57.9, 54.8; 700 58.9, 55.6. Microhardness 1030–1100 kg/mm² (50-g load). X-ray powder study showed the mineral to be trigonal, space group $R\bar{3}$, $a = 10.815(5)$, $c = 19.820(2) \text{ \AA}$, $Z = 17$, $D_{\text{calc}} = 6.4 \text{ g/cm}^3$. The strongest lines (24 given) are 2.213(70), 2.110(100), 2.052(80), 2.011(80), and 1.960(60).

Mineral 2. Microprobe analysis (two given) gave Fe 6.49, Mn 70.60, Si 23.31, Ti 0.18, sum 100.58 wt%, corresponding to $(\text{Mn}_{4.62}\text{Fe}_{0.42})_{25.04}(\text{Si}_{2.99}\text{Ti}_{0.01})_{23.00}$. In reflected light, yellowish pale gray. Reflectance percentages for R_1 and R_2 : 440 41.0, 39.4; 460 41.7, 39.7; 480 42.1, 40.4; 500 42.8, 40.9; 520 43.3, 41.7; 540 44.0, 42.4; 560 44.9, 43.3; 580 45.6, 44.0; 600 46.6, 44.9; 620 46.5, 45.4; 640 47.1, 46.3; 660 48.1, 46.8; 680 48.5, 47.5; 700 49.3, 48.6. Microhardness 820–900 kg/mm² (20-g load). X-ray powder study showed the mineral to be hexagonal, space group $P6_3/mcm$, $a = 6.888(4)$, $c = 4.802(3) \text{ \AA}$, $Z = 2$, $D_{\text{calc}} = 5.3 \text{ g/cm}^3$. The strongest lines (25 given) are 2.240(80,210), 2.114(70, not indexed), 2.038(100,211), 1.971(90,112), and 1.302(60,410). J.P.

Unnamed $[\text{N}(\text{CH}_3)_4][\text{Si}_2(\text{Si}_{0.5}\text{Al}_{0.5})\text{O}_6]_2$

E.V. Sokolova, V.B. Rybakov, L.A. Pautov (1991) Crystal structure of a new natural tetramethylammonium aluminosilicate $[\text{N}(\text{CH}_3)_4][\text{Si}_2(\text{Si}_{0.5}\text{Al}_{0.5})\text{O}_6]_2$. Doklady Akad. Nauk SSSR, 317 (4), 884–887 (in Russian).

Microprobe analysis of a transparent, pale yellowish mineral from metamorphic rocks of the northern Urals, Russia, gave SiO_2 66.7, Al_2O_3 12.2 wt%. On heating, the mineral becomes pitch-black and gives ammonia and urotropine odors. Insoluble in acids. No absorption bands characteristic of NH_3 are present in the infrared pattern. The presence of $[\text{N}(\text{CH}_3)_4]^+$ groups is inferred on the basis of an X-ray crystal-structure refinement that gave orthorhombic symmetry, space group $I222$, $a = 8.984(3)$, $b = 8.937(2)$, $c = 8.927(2) \text{ \AA}$, $D_{\text{meas}} = 2.02(1)$, $D_{\text{calc}} = 2.01 \text{ g/cm}^3$ with $Z = 2$. J.P.

Unnamed hydrous zirconium silicate

I.Ya. Nekrasov, V.S. Korzhinskaya (1991) A new genetic type of tungsten-zirconium mineralization. Mineral. Zhurnal, 13 (1), 7–17 (in Russian).

One of eight microprobe analyses of a mica-like zirconium silicate occurring at the Ingili ore deposit in the northern part of the Khabarovsk District, Siberia, Russia, gave Zr 55.48, Si 21.48, Hf 1.03, Ca 2.66, Ti 0.10, Fe 2.76 H₂O (calc.) 16.36, sum 99.88 wt%, corresponding to Ca_{0.52}Fe_{0.38}Ti_{0.01}Zr_{4.95}Hf_{0.05}Si_{3.88}O₁₉·10H₂O. The general formula is (Ca,Fe)_{0.8-1.0}(Zr,Hf)₅Si₄O₁₉·8-10H₂O. **J.P.**

New Data

Alushtite

P.M. Kartashov (1989) On the Li-bearing alushtite from Crimea and its position in the tosudite group. *Novye Dannye Mineral.*, 36, 67-83 (in Russian).

Alushtite occurring in fissures in Crimean sandstones has the composition SiO₂ 40.48, TiO₂ 0.22, Al₂O₃ 33.04, Fe₂O₃ 1.06, FeO 2.74, MnO 0.015, MgO 2.84, CaO 1.09, SrO 0.007, BaO 0.01, Li₂O 0.64, Na₂O 0.07, K₂O 0.18, H₂O⁻ 6.92, H₂O⁺ 10.28, sum 99.592 wt%, corresponding to (Ca_{0.20}Mg_{0.04}K_{0.04}Na_{0.02})_{20.30}(Al_{5.26}Mg_{0.67}Li_{0.43}Fe_{0.38}²⁺Fe_{0.13}³⁺)_{26.87}[Si_{6.76}Al_{1.24}O₂₀](OH)₁₀·3H₂O. X-ray patterns of dry, oriented samples show strongest peaks (11 given) at 28.6 ± 0.04 (100), 14.5 ± 0.02 (58), and 4.82 (21) Å. The DTA curve has endotherms at 160, 240, and 570 °C and an exotherm at 890 °C. Weight losses are 5.1% from 60-180 °C, 1.4% from 180-240 °C, and 8.4% from 400-700 °C. The infrared spectrum has absorption bands at 3640, 3500, 3445, 3330, 1640, 1038, 1005, 940, 718, 528, and 468 cm⁻¹. The mineral is a mixed-layer di-trioctahedral chlorite-beidellite.

Discussion. The author suggests the name alushtite for the di-trioctahedral Mg-Li members of the mixed-layer dioctahedral chlorite-smectite group (alushtite group). The dioctahedral chlorite-smectite minerals have the generally accepted name tosudite, and the new proposal based on a name known generally only in the Russian literature leads to unnecessary confusion. **J.P.**

Ankangite

Nicheng Shi, Zhesheng Ma, Wei Liu (1991) Crystal structure determination of ankangite with one-dimensional incommensurate modulation. *Acta Petrolog. Mineral.*, 10 (8), 233-245 (in Chinese, English abstract).

X-ray crystal-structure determination ($R = 0.039$) of ankangite, ideally Ba(Ti,V)₈O₁₆, gave tetragonal symmetry, space group $I4/m$, $a = 10.139(4)$, $c = 2.961(2)$ Å, $Z = 1$. The mineral has a supercell 14 times as large as the subcell, space group $P4/m$, $a = 10.126(4)$, $c = 41.41(2)$ Å. **J.L.J.**

Armenite

T. Armbruster (1991) Superstructures, (Si,Al) and H₂O ordering in armenite: BaCa₂Al₆Si₉O₃₀·2H₂O. *Schweiz. Mineral. Petrogr. Mitt.*, 71, 301-304.

Single-crystal X-ray study of armenite from Rémigny, Quebec, Canada, indicated orthorhombic symmetry, space group $Pnna$, $a = 13.874(2)$, $b = 18.66(2)$, $c = 10.697(1)$ Å. A Guinier pattern with $FeK\alpha$, radiation showed previously undetected splitting of several reflections; strongest lines of the pattern are 6.927(100,200), 4.255(50,231), 3.8633(66,222), 2.9148(61,431), and 2.7782(49,422). The mineral is optically biaxial, $2V_x = 59.9(6)^\circ$. **J.L.J.**

Clay minerals

R.T. Martin, S.W. Bailey, D.D. Eberl, D.S. Fanning, S. Guggenheim, H. Kodama, D.R. Pevear, J. Srodón, F.J. Wicks (1991) Report of the Clay Minerals Society nomenclature committee: Revised classification of clay minerals. *Clays Clay Minerals*, 39 (3), 333-335.

Discussion. The classification is given in Tables 1 and 2. The latter, for non-planar hydrous phyllosilicates, is an addition to the previous classification system. **J.L.J.**

Fluorapophyllite

T. Kato, Y. Miura (1991) The crystal structure of orthorhombic apophyllite. *Yamaguchi Univ., College of Arts Bull., Natural Sci. Report*, 25, 15-22.

X-ray crystal-structure study ($R = 0.035$) of apophyllite that occurred in a druse in basalt at Christmas, Arizona, gave orthorhombic symmetry, space group $Pnmm$, $a = 8.964(7)$, $b = 8.987(5)$, $c = 15.911(20)$ Å, $Z = 2$. Chemical analysis (not reported) gave (K_{1.05}Na_{0.01})Ca_{4.24}Si_{8.15}O₂₀(F,OH)·8H₂O. The Si-O tetrahedra are slightly deformed by a shift in the positions of O atoms, thus lowering the symmetry from tetragonal to orthorhombic.

Discussion. The formula indicates that the mineral is the orthorhombic polymorph of fluorapophyllite and the potassium analogue of natroapophyllite. **J.L.J.**

Phosphuranylite

F. Demartin, V. Diella, S. Donzelli, C.M. Gramaccioli, T. Pilati (1991) The importance of accurate crystal structure determination of uranium minerals. I. Phosphuranylite KCa(H₃O)₃(UO₂)₇(PO₄)₄O₄·8H₂O. *Acta Crystallogr.*, B47, 439-446.

X-ray structural study of samples from four localities gave orthorhombic symmetry, space group $Cmcm$, $a = 15.778(3)$ -15.899(2), $b = 13.702(2)$ -13.790(5), $c = 17.253(3)$ -17.330(3) Å, $D_{\text{calc}} = 4.575$ -4.631 g/cm³ with $Z = 4$, $R = 0.036$ (Capoterra, Sardinia), $R = 0.048$ (Bois Noirs, France). Electron microprobe analyses of specimens from S. Leone di Capoterra (Sardinia), Bois Noirs (France), Peveragno, Piedmont (Italy), and Zambia gave, respectively, UO₃ 79.3, 78.1, 77.8, 79.1; PbO 0.5, 0.2, 0.6, 1.4; BaO -, -, 0.1, 0.5; CaO 2.0, 2.1, 1.9, 2.5; K₂O 2.2, 2.5, 2.8, 1.9; P₂O₅ 10.9, 10.3, 10.4, 9.8; H₂O (by difference from 100 wt%) 5.1, 6.8, 6.4, 4.8. The structural formula as given in the title requires UO₃ 76.58, CaO

TABLE 1. Classification of planar hydrous phyllosilicates

| Layer type | Interlayer material* | Group | Octahedral character | Species |
|------------|--|----------------------|---|--|
| 1:1 | None or H ₂ O only ($x \sim 0$) | serpentine-kaolin | trioctahedral dioctahedral di-trioctahedral | lizardite, berthierine, amesite, cronstedtite, nepouite, kellyite, fraipontite, brindleyite kaolinite, dickite, nacrite, halloysite (planar) odinite |
| 2:1 | None ($x \sim 0$) | talc-pyrophyllite | trioctahedral dioctahedral | talca, willemseite, kerolite, pimelite pyrophyllite, ferripyrophyllite |
| | Hydrated exchangeable cations ($x \sim 0.2-0.6$) | smectite | trioctahedral dioctahedral | saponite, hectorite, sauconite, stevensite, swinefordite montmorillonite, beidellite, nontronite, volkonskoite |
| | Hydrated exchangeable cations ($x \sim 0.6-0.9$) | vermiculite | trioctahedral dioctahedral | trioctahedral vermiculite dioctahedral vermiculite |
| | Nonhydrated monovalent cations ($x \sim 0.6-1.0$) | true (flexible) mica | trioctahedral dioctahedral | biotite, phlogopite, lepidolite, etc. muscovite, illite, glauconite, celadonite, paragonite, etc. |
| | Nonhydrated divalent cations ($x \sim 1.8-2.0$) | brittle mica | trioctahedral dioctahedral | clintonite, kinoshitalite, bityite, anandite margarite |
| | Hydroxide sheet ($x = \text{variable}$) | chlorite | trioctahedral dioctahedral di-trioctahedral | clinochlore, chamosite, pennantite, nimate, baileychlore donbassite cookeite, sudoite |
| 2:1 | Regularly interstratified ($x = \text{variable}$) | variable | trioctahedral dioctahedral | corrensitite, allettite, hydrobiotite, kulkeite rectorite, tosudite |

* The x is net layer charge per formula unit.

2.14, K₂O 1.80, P₂O₅ 10.86, H₂O 8.61 wt%. The uranyl-phosphate framework and statistical distribution of Ca are similar to those described recently (*Am. Mineral.*, 76, p. 1734, 1991), but the detection of K in the structure has permitted a better structural refinement and the derivation of the new formula. J.L.J.

Discredited Mineral

Donathite

E. Libowitzky (1991) Donathite: An intergrowth of magnetite and chromite, causing form birefringence. *Neues Jahrb. Mineral. Mon.*, 449-456.

Optical examination of type donathite, considered to be an anisotropic, tetragonal analogue of chromite, re-

vealed the presence of a lamellar, two-phase structure. Electron microprobe analyses of type donathite and similar material from Ramberget (Hestmona), Norway, gave respective compositions of $(\text{Fe}_{0.51}^{3+}\text{Mg}_{0.54}\text{Mn}_{0.01})_{\Sigma 1.06}(\text{Fe}_{1.02}^{3+}\text{Cr}_{0.62}\text{Al}_{0.31})_{\Sigma 1.96}\text{O}_4$ and $(\text{Fe}_{0.67}^{2+}\text{Mg}_{0.26}\text{Mn}_{0.01})_{\Sigma 0.94}(\text{Fe}_{1.35}^{3+}\text{Cr}_{0.48}\text{Al}_{0.19}\text{Ti}_{0.02})_{\Sigma 2.04}\text{O}_4$. A Guinier powder pattern ($\text{FeK}\alpha_1$ radiation) of the Ramberget sample is in good agreement with the type pattern but shows eight additional weak lines, all of which are doublets. Donathite is thus interpreted to be a fine-grained lamellar intergrowth of two cubic spinels, one with $a = 8.380 \text{ \AA}$ and a composition close to that of magnetite; the other is probably chromite with $a = 8.34 \text{ \AA}$. The apparent anisotropy described for donathite is an optical phenomenon known as form-birefringence, wherein parallel orientation of particles equal to or smaller than the wavelength of the light having a different n causes birefringence; the smaller

TABLE 2. Classification of nonplanar hydrous phyllosilicates

| Layer type | Modulated component | Linkage configuration | Unit layer, $c \sin \beta$ value | Traditional affiliation | Species |
|-----------------------------|---------------------|-------------------------------|----------------------------------|--------------------------------------|---|
| Modulated structures | | | | | |
| 1:1 layer | Tet. sheet | strips islands | 7 Å 7 Å | serpentine serpentine | antigorite, bementite greenalite, caryophilite, pyrosmalite, manganpyrosmalite, ferropyrosmalite, friedelite, mcgillite, schallerite, nelenite |
| 2:1 layer | Tet. sheet | other strips islands | 9.5 Å 12.5 Å 9.6-12.5 Å | none talc mica mica/complex | none minnesotaite ganophyllite, eggletonite zussmanite, parsettensite, stilpnomelane, ferrostilpnomelane, ferristilpnomelane, lennilenapeite |
| | | other strips | 12.3 Å 14 Å 12.7-13.4 Å | none chlorite pyribole | bannisterite gonyerite sepiolite, loughlinite, falcondoite, palygorskite, yofortierite |
| 1:1 layer | None | trioctahedral dioctahedral | — — | serpentine kaolin | chrysotile, pectoraite halloysite (nonplanar) |

the particles and the higher the difference of the optical constants, the stronger is the effect.

Discussion. Discreditation of an established mineral species requires approval by the CNMMN. This procedure has not been followed. **J.L.J.**

Acknowledgments

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