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# NEW MINERAL NAMES*

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## Berezanskite*

L.A. Pautov, A.A. Agakhonov (1997) Berezanskite, $KLi_3Ti_2Si_{12}O_{30}$, a new mineral. Zapiski Vseross. Mineral. Obshch., 126(4), 75–80 (in Russian, English abs.).

Seven electron microprobe analyses gave a mean and range of $SiO_2$ 73.64 (72.93–74.02), $Al_2O_3$ 0.09 (0.06–0.15), $TiO_2$ 15.86 (15.59–16.44), $Nb_2O_5$ 0.56 (0.53–0.74), FeO 0.16 (0.07–0.25), BaO 0.11 (0.00–0.27), $K_2O$ 4.70 (4.64–4.78), $Na_2O$ 0.18 (0.13–0.26), $Li_2O$ (AAS) 4.50 (4.50–4.50), sum 99.79 (99.34–100.32) wt%, corresponding to $(K_{0.98}Na_{0.06}Ba_{0.01})_{\Sigma1.05}(Li_{2.95}Al_{0.02})_{\Sigma2.97}(Ti_{1.94}Nb_{0.04}Fe_{0.02})_{\Sigma2.00}Si_{11.99}O_{30}$. Occurs as aggregates, up to 2 × 3 mm, and as vein-like aggregates to 3 × 20 mm, consisting of platy grains up to 0.6 mm across. White color, vitreous to pearly luster, perfect basal cleavage {0001}, brittle, $H = 2½–3$, $VHN_{20} = 68.5$, $D_{meas} = 2.66(2)$, $D_{calc} = 2.674$ g/cm$^3$ for $Z = 2$. Insoluble in water or 1:1 HCl; bright bluish white fluorescence in short-wave ultraviolet light, bright bluish luminescence under an electron beam. The IR spectrum has absorption bands at 465, 540, 620, 790, 980, and 1130 cm$^{-1}$, and is similar to that of silicates whose structure contains doubled six-member rings. Optically uniaxial negative, rarely with anomalous, weak biaxial character, $\epsilon = 1.630(2)$, $\omega = 1.635(1)$. Hexagonal symmetry, possible space group $P6/mcc$, $a = 9.903(1)$, $c = 14.274(2)$ Å as determined from X-ray powder patterns (diffractometer and 57 mm camera, Fe$K\alpha$ radiation) with strongest diffractometry lines (36 lines given) of 7.15(40,002), 4.29(50,020), 4.07(85,112), 3.57(80,004), 3.16(100,121), and 2.895(95,114); intensities of some lines are enhanced because of selective orientation.

The mineral has some of the properties of the milarite group, and may by the Ti analog of brannockite, but there are also similarities to the tuhualite group. The mineral is associated with pyrophanite, aegirine, microcline, tienshanite, and a Ba-Ti silicate that occur in a fragment of alkali pegmatite in moraine at the Dara-i-Pioz glacier in the Pamir Mountains, Garm region, Tadzhikistan. The new name is for geologist A.V. Berezanskii (b. 1948). Type material is in the Mineralogical Museum of the Ilmen Reserve, Miass, Russia. **N.N.P.**

## Changchengite*

Zuxiang Yu (1997) Changchengite—a new iridium bismuthide-sulphide from the Yanshan Mountains. Acta Geol. Sinica, 71(4), 486–490.

Seven electron microprobe analyses gave an average and range of S 7.2 (6.9–8.1), Ni 0.0 (0.0–0.1), Cu 0.3 (0.2–0.4), Te 0.4 (0.3–0.7), Ir 41.2 (40.4–42.2), Pt 2.8 (1.8–3.5), Bi 47.3 (46.4–48.2), sum 99.1 (97.2–99.8) wt%, corresponding to $(Ir_{0.936}Pt_{0.063}Cu_{0.021})_{\Sigma1.020}(Bi_{0.987}Te_{0.014})_{\Sigma1.001}S_{0.981}$, ideally IrBiS. The mineral occurs as aggregates to 0.2 mm, and as veinlets to 0.2 mm width and 1.0 mm length. Opaque, metallic luster, steel gray color, black streak, $VHN_{20} = 165$ (140–185), no cleavage, brittle, nonmagnetic, insoluble in $HNO_3$, HCl, and $H_3PO_4$, $D_{calc} = 11.96$ g/cm$^3$ for $Z = 4$. Bright white with a yellowish tint in reflected light, isotropic. Reflectance percentages (WTiC standard, air) are given in 10 nm steps from 400 to 700 nm; representative values are 46.2 (470), 47.2 (550), 47.6 (590), and 47.4 (650). By analogy to X-ray data for the synthetic analog and mayingite, cubic symmetry, space group $P2_13$, $a = 6.164(4)$ Å. Strongest lines of the Debye-Scherrer X-ray pattern (57 mm, Fe$K\alpha$ radiation) are 2.75 (70, 210), 2.51 (60, 211), 1.860 (100, 311), 1.090(50,440), and 1.027(50,600).

The mineral occurs as replacements or along the edges of iridisite and laurite, and as anhedral to subhedral grains within iridisite. These occur in Pt placer deposits, and in their parental chromite orebodies in dunite, along a branch of the Luanhe River in Hebei Province, about 200 km ENE of Beijing, China. The new name alludes to a feature at the locality, Changcheng, which is Chinese for the Great Wall. Type material is in the National Geological Museum of China, in Beijing. **J.L.J.**

## Fluorcaphite*

A.P. Khomyakov, I.M. Kulikova, R.K. Rastsvetaeva (1997) Fluorcaphite $Ca(Sr,Na,Ca)(Ca,Sr,Ce)_3(PO_4)_3F$, a new mineral with the apatite structural motif. Zapiski Vseross. Mineral. Obshch., 126(3), 87–97 (in Russian, English abs.).

Electron microprobe analyses of seven grains gave a mean and range of $Na_2O$ 1.74 (1.46–1.85), CaO 30.46 (28.34–33.29), SrO 20.78 (19.92–23.08), BaO 0.03 (0.00–0.06), $La_2O_3$ 2.61(2.03–3.62), $Ce_2O_3$ 4.78 (3.36–5.93), $Pr_2O_3$ 0.34 (0.15–0.60), $Nd_2O_3$ 1.48 (1.37–1.73), $Sm_2O_3$ 0.14 (0.02–0.35), $SiO_2$ 0.57 (0.33–0.88), $P_2O_5$ 36.23 (35.48–36.93), F 2.17 (1.91–2.54), $H_2O$ (calc.) 0.52, $O \equiv F$ 0.91, sum 100.94 wt%, corresponding to $(Ca_{6.31}Sr_{2.23}Na_{0.65})_{\Sigma9.29}(Ce_{0.34}La_{0.19}Nd_{0.10}Pr_{0.02}Sm_{0.01})_{\Sigma0.66}(P_{5.93}Si_{0.11})_{\Sigma6.04}O_{24}F_{1.33}(OH)_{0.67}$, simplified as $Ca_{3.2}Sr_{1.2}Ce_{0.3}Na_{0.3}(PO_4)_3F$ or $(Ca,Sr,Ce,Na)_5(PO_4)_3F$. Occurs as subhedral

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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.

prisms up to 5 mm long, and in aggregates up to 15 mm across. Light to bright yellow color, vitreous luster, brittle, $H = 5$, readily soluble in 10% HCl or $HNO_3$, $D_{meas} = 3.60$, $D_{calc} = 3.57$ g/cm³ for $Z = 2$. The infrared spectrum has a series of distinct absorption bands at 400, 573, 601, 953, 1000 (shoulder), 1039, 1090 (shoulder), and two weak bands at 3360 and 3490 cm$^{-1}$, generally corresponding to spectra for the apatite family. Optically uniaxial negative, $\epsilon = 1.637$, $\omega = 1.649$. Single-crystal X-ray structure study indicated hexagonal symmetry, space group $P6_3$, $a = 9.485(3)$, $c = 7.000(3)$ Å. Strongest lines of the X-ray powder pattern (diffractometer, Cu$K\alpha$ radiation, 57 lines given) are 3.498(45,002), 2.838(100,211), 2.814(48,112), 2.740(53,130), and 1.865(31,213). See also *Am. Mineral.*, 82, p. 821, 1997.

The mineral occurs in miarolitic cavities in the central part of a hyperagpaitic pegmatite in ijolite-urtite at the Khibina alkaline massif, Kola Peninsula, Russia. Associated minerals are alkali amphibole, lamprophyllite, labuntsovite(?), wadeite, sazykinaite-(Y), sphalerite, galena, fluorite, graphite, and deloneite-(Ce) and belovite-(Ce), the last two of which are members of the apatite family, and which form intergrowths with fluorcaphite, thus indicating solid-solution limits among Na-Ca-Sr-REE in the apatite family. The new name alludes to the chemical composition of the mineral (F, Ca, and P). The mineral is a Ca- and F-dominant structural analog of strontium-apatite. Type material is in the Fersman Mineralogical Museum, Moscow, Russia. **N.N.P.**

## Fluorthalénite-(Y)*

A.V. Voloshin, Ya.A. Pakhomovskii (1997) Fluorthalénite-(Y), a new mineral from amazonite randpegmatites of the Kola Peninsula. Doklady Akad. Nauk, 354(1), 77–78 (in Russian, English abs.).

Two electron microprobe analyses gave $Y_2O_3$ 54.59, 54.06, $Yb_2O_3$ 3.26, 2.40, $Er_2O_3$ 2.83, 2.91, $Dy_2O_3$ 1.02, 1.77, $Lu_2O_3$ 0.43, 0.19, $Gd_2O_3$ 0.16, 0.24, $Tm_2O_3$ 0.41, 0.26, $Ho_2O_3$ 0.61, 0.22, CaO 0.27, 0.33, $SiO_2$ 34.21, 34.55, F 3.39, 3.76, $O \equiv F$ 1.43, 1.58, sum 99.75, 100.11 wt%, corresponding to $(Y_{2.62}Er_{0.81}Yb_{0.07}Dy_{0.05}Ca_{0.03}Gd_{0.01}Ho_{0.01}Tm_{0.01}Lu_{0.01})_{\Sigma 2.89}Si_{3.09}O_{9.94}F_{1.06}$, ideally $Y_3Si_3O_{10}F$. Occurs as inclusions and veinlets of equant crystals, typically 0.2–1.0 mm, in yttrian fluorite. Colorless, adamantine luster, moderately brittle, uneven fracture, no luminescence, $H = 4–5$, $D_{meas} = 4.24$, $D_{calc} = 4.29$, and 4.16 g/cm³ for $Z = 4$. The infrared spectrum has strongest absorption bands at 1170, 1095, 1040, 970, 910, and 890 cm$^{-1}$. Optically biaxial negative, $\alpha = 1.719(1)$, $\beta = 1.739(1)$, $\gamma = 1.748(1)$, $2V_{meas} = 73(2)$, $2V_{calc} = 68°$, moderate dispersion $r < v$. Single-crystal X-ray structure study indicated monoclinic symmetry, space group $P2_1/n$, $a = 7.321(2)$, $b = 11.133(4)$, $c = 10.375(6)$ Å, $\beta = 97.17(3)°$. The X-ray powder pattern (114 mm camera, Fe$K\alpha$ radiation, 28 lines given) has strongest lines at 5.60(50,020), 3.81(50,022), 3.12(100,$\bar{1}$13,131), 2.828(80,221,$\bar{1}$23), and 2.253(80,$\bar{3}$12,311). Also see *Am. Mineral.*, 75, p. 436, 1990.

The mineral, which is the F analog of thalénite-(Y), is associated with fluorite, microcline, albite, quartz, keiviite-(Y), kuliokite-(Y), xenotime-(Y), hingganite-(Y), and bastnäsite-(Ce) in ‘‘amazonite’’ (microcline) pegmatites at Ploskaya Mountain, western Keiv, Kola Peninsula, Russia. Type material is in the Fersman Mineralogical Museum, Moscow, Russia. **N.N.P.**

## Juonniite*

R.P. Liferovich, V.N. Yakovenchuk, Ya.A. Pakhomovskii, A.N. Bogdanova, S.N. Britvin (1997) Juonniite, a new scandium mineral from calcite-dolomite carbonatites of the Kovdor massif. Zapiski Vseross. Mineral. Obshch., 126(4), 80–88 (in Russian, English abs.).

Nine electron microprobe analyses of grains from four paragenetic types gave MgO 11.56–12.98, CaO 10.33–13.54, $Sc_2O_3$ 11.85–14.43, $TiO_2$ 0.00–1.55, MnO 0.47–2.54, FeO 0.29–2.11, SrO 0.00–1.59, BaO 0.33–2.33, $P_2O_5$ 35.49–36.95, $H_2O$ (Penfield method) 20, $H_2O$ by difference 19.78–22.70, sum 100 wt%, with the average of the nine formulas corresponding to $(Ca_{0.86}Ba_{0.04}Mn_{0.07}Sr_{0.02})_{\Sigma 0.99}Mg_{1.00}(Sc_{0.75}Mg_{0.18}Fe_{0.05}Ti_{0.02})_{\Sigma 1.00}(PO_4)_2(OH)_{0.83}\cdot 4.25H_2O$, ideally $CaMgSc(PO_4)_2(OH)\cdot 4H_2O$. Occurs as spherulites, to 0.8 mm across, consisting of subparallel, commonly curved, plates up to 12 μm across and 2 μm thick. Gray to bright orange color, vitreous luster, translucent, white streak, no cleavage, $H = 4–4½$, $VHN_{20} = 330$, nonfluorescent, slowly soluble in 10% HCl, $D_{meas} = 2.43(3)$, $D_{calc} = 2.39–2.47$ g/cm³ for $Z = 8$. The infrared spectrum has absorption bands at 435, 447, 546, 582, 641, 878, 1022, 1050, 1120, 1435, 1663, 3025, 3130, 3410, and 3500 cm$^{-1}$, corresponding to $(H_2O)_4$, $(OH)^-$, and $(PO_4)^{3-}$ groups. Optically biaxial negative, $\alpha = 1.574(1)$, $\beta = 1.579(1)$, $\gamma = 1.582(2)$, $2V_{calc} = 70°$. Indexing of the X-ray powder pattern (diffractometer, Cu$K\alpha$ radiation) indicated orthorhombic symmetry, probable space group *Pbca* by analogy with minerals of the overite group, $a = 15.03(5)$, $b = 18.95(4)$, $c = 7.59(1)$ Å. Strongest lines of the pattern are 9.49(100,020), 4.75(17,040), 3.440(31,122), 2.942(27,440), 2.912(44,260), and 2.890(35,322).

The mineral occurs as incrustations in cavities and along contacts with ore minerals in metasomatically reworked calcite-phlogopite-clinohumite-magnetite ores in a calcite-dolomite carbonatitic stockwork zone at the Kovdor ultramafic alkaline complex, Kola Peninsula, Russia. Other associated minerals are talc, bobierrite, a messelite-series mineral, apatite, pyrite, manasseite, hydrotalcite, baddeleyite, zircon, gypsum, magnesite, barite, collinsite, rinkorolgite, strontiowhitlockite, kovdorskite, and chlorite. The new name alludes to the locality, which is the Yona or Juonni River (from the Russian or Finnish, respectively). Type material is in the Mineralogical Museum of the Saint Petersburg Mining Institute, Russia.

**Discussion.** The pronunciation is YO’NAITE. **N.N.P.**

## Kuzelite*

H. Pöllmann, T. Witzke, H. Kohler (1997) Kuzelite, $[Ca_4Al_2(OH)_{12}][(SO_4)\cdot 6H_2O]$, a new mineral from Maroldsweisach/Bavaria, Germany. Neues Jahrb. Mineral. Mon., 423–432.

Electron microprobe and wet-chemical analyses gave CaO 34.5 (33.1–36.0), $Al_2O_3$ 19.6 (18.2–20.9), $SO_3$ 12.9 (12.3–13.5), $H_2O$ 33.45, sum 100.45 wt%, which for $SO_4$ = 1 corresponds to $Ca_{3.83}Al_{2.40}(OH)_{12.86}(SO_4)\cdot 6H_2O$. No $CO_3$ groups are detectable in the infrared spectrum. The mineral occurs as platy crystals with a hexagonal outline, apparently about 10 μm across; transparent, vitreous luster, white steak, $H$ = 1–2, excellent cleavage, uneven fracture, nonfluorescent, readily soluble in $HNO_3$, $D_{meas}$ = 1.99(5), $D_{calc}$ = 2.014 g/cm³ for $Z$ = 3. Uniaxial negative, $\epsilon$ = 1.483(5), $\omega$ = 1.504(5). By analogy with the synthetic analog, the mineral is trigonal, space group $R3$ or $R\overline{3}$; $a$ = 5.76(1), $c$ = 53.66(2) Å as determined from an X-ray powder pattern (Cu$K\alpha$ radiation) with strongest lines of 8.972(100,006), 4.476(70,0.0.12), 2.362(40,1.0.20), 2.190(40,1.0.22), and 2.071(35,1.1.18).

The mineral, which is a member of the hydrocalumite group, is associated with ettringite, afwillite, natrolite, calcite, tobermorite, gyrolite, portlandite, and apophyllite in carbonaceous xenoliths in a Tertiary basalt in a quarry at Maroldsweisach, northern Bavaria, Germany. The new name is for H.J. Kuzel, who first synthesized the compound and established its stability relations. Type material is in the mineralogical collection at Martin Luther University, Halle/Saale, Germany. **J.L.J.**

## Mutinaite*

E. Galli, G. Vezzalini, S. Quartieri, A. Alberti, M. Franzini (1997) Mutinaite, a new zeolite from Antarctica: The natural counterpart of ZSM-5. Zeolites, 19, 318–322.

The mineral occurs as subspherical aggregates, up to 1.8 mm in diameter, consisting of milk-white, radiating fibers that are flattened and grouped (100); also as aggregates, to 0.6 mm across, of transparent, colorless to pale milky, tabular (100) crystals, equant or slightly elongate [010] or [001]. Crystals are up to 200 × 80 × 60 μm, with {100} dominant, {010} and {101} intermediate, and {032} minor. White streak, vitreous to silky luster, brittle, $H$ not determinable, good {100} cleavage, irregular fracture, not twinned, nonfluorescent, $D_{meas}$ = 2.14(3), $D_{calc}$ = 2.14 g/cm³ for $Z$ = 1. Optically biaxial negative, $\alpha$ = 1.485(2), $\beta$ = 1.487(2), $\gamma$ = 1.488(2), $2V_{calc}$ = 110°, $X = b$, $Y = a$, $Z = c$. Electron microprobe analysis (mean of 22) gave $SiO_2$ 72.22, $Al_2O_3$ 8.08, MgO 0.12, CaO 3.00, $Na_2O$ 1.21, $K_2O$ 0.07, $H_2O$ (TGA) 15.30, sum 100 wt%, with the microprobe data normalized to correct for loss of undetermined zeolitic water; the results for 192 O correspond to $(Ca_{3.78}Na_{2.76}K_{0.11}Mg_{0.21})_{\Sigma 6.86}(Si_{84.91}Al_{11.20})_{\Sigma 96.11}O_{192}\cdot 60H_2O$, ideally $Na_3Ca_4Al_{11}Si_{85}O_{192}\cdot 60H_2O$ (IMA no. 96-025). The infrared spectrum has absorption peaks at 3600–3300 and 1600 cm⁻¹ attributable to structural water. The mineral quickly regains up to 95% of its weight loss after heating to temperatures as high as 900 °C. X-ray study of grouped crystals gave results consistent with orthorhombic symmetry, space group $Pnma$, and refinement of the 114 mm Gandolfi powder pattern (Cu$K\alpha$ radiation) gave $a$ = 20.223(7), $b$ = 20.052(8), $c$ = 13.491(5) Å, in good agreement with data for synthetic zeolite ZSM-5. Strongest lines of the pattern are 11.20(84,101,011), 9.98(35,200,020,111), 3.85(100,501,051), 3.75(98,303), 3.67(27,133), and 3.00(32,503).

The mineral occurs with heulandite, terranovaite, and tschernichite atop smectite linings in cavities in the Jurassic Ferrar dolerite at Mt. Adamson, Northern Victoria Land, Antarctica. The new name is from Mutina, the ancient Latin name of Modena, Italy, a center of zeolite research. Type material is in the Museo di Storia Naturale e del Territorio, University of Pisa, Italy. **J.L.J.**

## Rhodarsenide*

M. Tarkian, S. Krstić, K.-H. Klaska, W. Liebmann (1997) Rhodarsenide, $(Rh,Pd)_2As$, a new mineral. Eur. J. Mineral., 9, 1321–1325.

The most Rh-rich and Pd-rich of six electron microprobe analyses listed are, respectively, Rh 60.81, 38.53, Pd 12.65, 34.67, Pt 0.49, 1.90, Ir –, 0.48, Fe, –, 0.10, Cu 0.08 –, As 26.04, 23.42, Sb 0.09, 1.55, Te –, 0.50, sum 100.16, 101.15 wt%, corresponding to $(Rh_{1.67}Pd_{0.34})_{\Sigma 2.01}As_{0.99}$ and $(Rh_{1.07}Pd_{0.94}Pt_{0.03})_{\Sigma 2.04}(As_{0.91}Sb_{0.04}Te_{0.01})_{\Sigma 0.96}$. Occurs as inclusions, up to 80 × 100 μm, in Pt-Fe and Ru-Os-Ir alloys. Brownish with a pale green tinge in reflected light, $VHN_{25}$ = 515 (493–585); weakly pleochroic in air, and distinct pleochroism, from brownish to greenish, in oil immersion; moderate to distinct anisotropism, with polarization colors of dark brown to greenish gray. Reflectance percentages in air and in oil (WTiC standard) are given in 20 nm steps from 400 to 700 nm; representative maximum and minimum values in air are 38.2, 32.9 (470 nm), 39.8, 35.7 (546), 40.4, 36.4 (589), and 40.5, 36.6 (650). By analogy with data for synthetic β-$Rh_2As$, a microdiffractometer X-ray powder pattern (Cr$K\alpha$ radiation) was indexed on an orthorhombic cell, space group $Pnma$ or $Pn2_1a$, $a$ = 5.866(5), $b$ = 3.893(2), $c$ = 7.302(4) Å, $D_{calc}$ = 11.32 g/cm³ for $Z$ = 4. Strongest lines of the powder pattern are 2.426(70,112), 2.237(100,211), 2.067(80,013), 1.935(60,020,113), and 1.860(50,203).

The mineral occurs with other PGM in placers of the Srebrnica River, near Veluce, central Serbia (*Am. Mineral.,* 82, p. 1263, 1997). The new name alludes to the composition. Type material is in the Mineralogical Museum of the University of Hamburg, Germany. **J.L.J.**

## Wadalite*

Y. Kanazawa, M. Aoki, H. Takeda (1997) Wadalite, rustumite, and spurrite from La Negra mine, Queretaro, Mexico. Bull. Geol. Surv. Japan, 48(7), 413–420.

The mineral occurs as granular crystals, $<200$ μm in size, associated with hydrogrossular in skarn. The mean for seven electron microprobe analyses (13 analyses listed) is $SiO_2$ 19.87, $TiO_2$ 0.16, $Al_2O_3$ 21.08, $Fe_2O_3$ 3.36, MnO 0.03, MgO 3.06, CaO 42.04, $Na_2O$ 0.04, Cl 12.81, $O \equiv Cl$ 2.89, sum 99.56 wt%, corresponding to $(Ca_{6.01}Na_{0.01})_{\Sigma 6.02}(Al_{3.32}Si_{2.65}Mg_{0.61}Fe^{3+}_{0.34})_{\Sigma 6.92}O_{16}Cl_{2.90}$, ideally $Ca_6(Al,Si,Mg,Fe)_7O_{16}Cl_3$. Colorless and isotropic in transmitted light, $n = 1.708$. Single-crystal X-ray study indicated cubic symmetry, space group $I43d$, $a = 12.014(1)$ Å. The calculated X-ray powder pattern has strongest lines of 4.903(16,211), 3.003(42,400), 2.686(100,420), 2.452(39,422), 2.355(18,510), 2.193(17,521), and 1.665(25,640).

**Discussion.** The name was introduced in 1993 in conjunction with a crystal structure report (*Am. Mineral.*, 77, p. 1317, 1993). Although the current paper adds to the data, a complete description of wadalite has not been published. **J.L.J.**

## $FeS_3$

Zhenya Sun (1997) Study on nanometer-sized iron sulphides in carbonaceous material by analytical transmission electron microscopy. J. Trace and Microprobe Techniques, 15(4), 515–519.

Carbonaceous silt and mudstone at the Huangchang gold deposit in Guizhou Province, China, contain illite, pyrite, and Au nanominerals. Analytical TEM compositions of iron sulfide grains 400, 200, and 400 nm gave, respectively, Fe 38.06, 37.03, 36.56, S 61.94, 62.97, and 63.44, for which S/Fe is 2.86, 2.96, and 3.02. With increased analytical time (20 s) and a stronger beam, S/Fe values changed to 2.11, 2.00, and 2.01, respectively, and slight contraction of the particles was observed. The chemical form of the excess S relative to that of pyrite is not known. **J.L.J.**

## $(K,Na)MgF_3$

R.H. Mitchell (1997) Carbonate–carbonate immiscibility, neighborite, and potassium iron sulphide in Oldoinyo Lengai natrocarbonatite. Mineral. Mag., 61, 779–789.

Among the seven electron microprobe analyses listed for a fluoride mineral, the most Na-poor and Na-rich analyses are, respectively, Na 8.65, 9.63, K 16.83, 15.86, Mg 17.45, 15.25, Ba 8.00, 13.49, Ca 0.56, 0.42, Sr 0.77, 0.71, Fe 0.62, –, $F_{calc}$ 46.21, 43.93, sum 99.26, 99.29 wt%, corresponding to $(Na_{0.464}\,K_{0.531})_{\Sigma 0.995}\,(Mg_{0.885}\,Ba_{0.072}\,Ca_{0.017}\,Sr_{0.011}\,Fe_{0.014})_{\Sigma 0.999}\,F_3$ and $(Na_{0.544}\,K_{0.526})_{\Sigma 1.070}\,(Mg_{0.814}\,Ba_{0.127}\,Ca_{0.014}Sr_{0.011})_{\Sigma 0.965}F_3$. The mineral, which is suggested to be in the series neighborite ($NaMgF_3$)–$KMgF_3$, occurs as anhedral grains, $<10$ μm across, intimately intergrown with sodian sylvite, Ba-Ca-Sr carbonates, gregoryite, and nyerereite in natrocarbonate lava at Oldoinyo Lengai volcano, Tanzania. **J.L.J.**

## $(Ti,Zr)_2O_4$, $(Ce,Nd)_2Ti_3O_9$

Qi Lu, Huyun Zhou, Huifang Liu, Sinrong Lei (1997) New kind of Zr-Ti, REE-Ti oxide mineral from kimberlite—study of oxide minerals bearing large cations Cr, Ti, Fe from the upper mantle, Part IV. Acta Mineralogica Sinica, 17(3), 270–275 (in Chinese, English abs.).

The minerals occur as blebs, worm-like intergrowths, and micro-veinlets at the boundary of mathiasite in kimberlite from an unstated locality. Grain size is up to 30 μm in the long dimension.

### $(Ti,Zr)_2O_4$

Minimum and maximum values for six listed electron microprobe analyses are $SiO_2$ 0.894–13.749, $Al_2O_3$ 0–0.043, $TiO_2$ 27.765–42.169, FeO 2.670–6.195, $Cr_2O_3$ 1.624–4.111, MgO 0.144–0.221, $K_2O$ 0.050–0.274, $Na_2O$ 0.101–0.318, CaO 0.228–0.475, BaO 0–0.017, $ZrO_2$ 33.414–58.092, SrO 0–0.670, MnO 0.102–0.569, $V_2O_5$ 0.090–0.593, $Nb_2O_5$ 1.353–4.357, $La_2O_3$ 0–0.773, $Ce_2O_3$ 0–1.343, $Ta_2O_5$ 0.155–2.814, sum 97.207–100.320 wt%. When calculated with $O = 4$, the average composition is $(Ti_{0.86}Zr_{0.73}Si_{0.19}Fe_{0.11}\ldots)_{\Sigma 2.04}O_4$, with formula $Ti > Zr$ in four of the analyses and $Zr > Ti$ in the other two.

### $(Ce,Nd)_2Ti_3O_9$

One of five similar electron microprobe analyses gave $TiO_2$ 43.065, FeO 1.437, MgO 0.192, CaO 1.169, $ZrO_2$ 1.402, $V_2O_5$ 0.522, $Nb_2O_5$ 6.087, $Ta_2O_5$ 0.226, $La_2O_3$ 5.414, $Ce_2O_3$ 21.045, $Pr_2O_3$ 2.0, $Nd_2O_3$ 13.4, $Sm_2O_3$ 4.4, sum 100.293 wt%, corresponding to $(Ce_{0.677}Nd_{0.423}La_{0.180}\,Sm_{0.138}\,Pr_{0.063}\,Ca_{0.111}\,Nb_{0.243}\,Zr_{0.058}\,V_{0.015})_{\Sigma 1.908}\,(Ti_{2.851}\,Fe_{0.106}\,Mg_{0.027})_{\Sigma 2.984}O_9$, simplified as $(Ce,Nd)_2Ti_3O_9$. The mineral is thought to be similar to synthetic $Ce_2Ti_3O_{8.7}$, which is cubic. **J.L.J.**

## Rhombohedral synchysite-(Ce)

Wenxia Zhao, Guangming Yang, Xiangwen Liu (1997) Discovery and study of synchysite with rhombohedral system in China using transmission electron microscope. J. China University of Geosciences, 22(6), 579–583 (in Chinese, English abs.).

Wenxia Zhao, Guangming Yang, Xiangwen Liu (1997) TEM study of 6*R*, 3*R* polytypes and microtwin structures in synchysite. Acta Mineralogica Sinica, 17(3), 239–244 (in Chinese, English abs.).

Synchysite-(Ce) has been variously described as monoclinic (*Am. Mineral.*, 80, p. 1077, 1995) or orthorhombic. TEM study of synchysite-(Ce) from the Chisan REE deposit, Shandong Province, China, showed the mineral to be rhombohedral, space group $R3c$ or $R\overline{3}c$, $a = 7.12$, $c = 56.16$ Å for the 6*R* polytype, and $a = 7.10$, $c = 28.16$, space group $R\overline{3}$ or $R3$ for the 3*R* polytype. **J.L.J.**

### Orthorhombic calzirtite

A. Callegari, F. Mazzi, L. Ungaretti (1997) The crystal structure of the orthorhombic calzirtite from Val Malenco (Italy). Neues Jahrb. Mineral. Mon., 467–480.

Calzirtite is tetragonal, *a* = 15.094, *c* = 10.043 Å, space group $I4_1/acd$. Calzirtite from Val Malenco, Sondrio, Italy, contains tetragonal domains, but also has orthorhombic domains with *a* = *b,* space group *Pbca,* that form as a consequence of local ordering of the Zr atoms. Calculated X-ray powder patterns indicate that no differences between the disordered (tetragonal) and ordered calzirtite can be detected.

**Discussion.** The authors suggest that the orthorhombic form not be considered a new mineral because (1) the orthorhombic and tetragonal forms can change in a continuous way in the small domains, and (2) the orthorhombic and tetragonal forms are distinguishable only by single-crystal X-ray diffraction, and not by any simpler method. **J.L.J.**

## New Data

### Coccinite

T. Witzke (1997) New data on the mercury iodide mineral coccinite, $HgI_2$. Neues Jahrb. Mineral. Mon., 505–510.

X-ray fluorescence analysis gave Hg 45.2, I 54.7, sum 99.9 wt%, corresponding to $Hg_{1.00}I_{1.92}$, ideally $HgI_2$. The X-ray powder pattern is in good agreement with that for the synthetic analog, which is tetragonal, space group $P4_2/nmc$; by analogy, *a* = 4.376(4), *c* = 12.41(1) Å. Crystals are up to 1 mm across, showing {100} and {102}, good {001} cleavage, *H* = 2, deep red color, red streak, translucent. Occurs as a sublimation product from burning pyritic, graptolitic slate at the former Lichtenberg open-pit U mine at Ronneburg, Thuringia, Germany. Other occurrences, some not involving burning, are known. **J.L.J.**

### Eudialyte

O. Johnsen, O.V. Petersen, R.A. Gault (1997) Optical data on minerals of the eudialyte group: Discussion of the eucolite-mesodialyte-eudialyte terminology. Neues Jahrb. Mineral. Mon., 371–383.

Correlation of optical properties among 21 samples of eudialyte, whose compositions were determined by electron microprobe analysis, has shown that the term eucolite, which commonly has been used for an optically negative and Ca-rich eudialyte, is meaningless. The use of ‘‘mesodialyte’’ for an optically isotropic intermediate is also inappropriate. The optical properties are primarily dependent upon substitutions involving heavy elements such as REE and Nb. **J.L.J.**

### Geminite

M. Prencipe, D.Y. Pushcharovskii, H. Sarp, G. Ferraris (1996) Comparative crystal chemistry of geminite $Cu[AsO_3OH]H_2O$ and minerals related to it. Vestn. Mosk. Univ. Series 4, Geol. (4), 66–74 (in Russian; English translation in Moscow Univ. Geol. Bull., 51(4), 51–58).

Single-crystal X-ray structure study (*R* = 0.0132) confirmed the recently determined new formula and cell (*Am. Mineral.*, 81, p. 770, 1996), for which $D_{calc}$ = 3.574 g/cm³. **J.L.J.**

### Ianthinite

P.C. Burns, R.J. Finch, F.C. Hawthorne, M.L. Miller, R.C. Ewing (1997) The crystal structure of ianthinite, $[U^{4+}_2(UO_2)_4O_6(OH)_4(H_2O)_4](H_2O)_5$: a possible phase for $Pu^{4+}$ incorporation during the oxidation of spent nuclear fuel. J. Nuclear Materials, 249(2,3), 199–206.

Single-crystal X-ray structure study (*R* = 0.097) of ianthinite from the Shinkolobwe (Kasolo) deposit in Shaba, southern Congo, gave orthorhombic symmetry, space group, $P2_1cn$, *a* = 7.178(2), *b* = 11.473(3), *c* = 30.39(1) Å, $D_{calc}$ = 5.00 g/cm³ for *Z* = 4. The proposed formula is new. **J.L.J.**

### Leonhardite

W.H. Baur, W. Joswig, B.A. Fursenko, I.A. Belitsky (1997) Symmetry reduction of the aluminosilicate framework of LAU topology by ordering of exchangeable cations: the crystal structure of primary leonhardite with a primitive Bravais lattice. Eur. J. Mineral., 9, 1173–1182.

Single-crystal X-ray structure study ($R_1$ = 0.047) of ‘‘primary’’ leonhardite of composition $Ca_{2.55}K_{1.59}Na_{1.24}Fe_{0.03}Al_{8.19}Si_{15.87}O_{48}\cdot 13.93H_2O$ gave monoclinic symmetry, space group P12/*a*1. The mineral, unlike other leonhardite, cannot be hydrated and is not formed by the dehydration of laumontite. The symmetry of laumontite, space group C2/*m,* is reduced because Na and K substitution for Ca in ‘‘primary’’ leonhardite is ordered. **J.L.J.**