NEW MINERAL NAMES*

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Alumoklyuchevskite*

M.G. Gorskaya, L.P. Vergasova, S.K. Filatov, D.V. Rolich, V.V. Ananiev (1995) Alumoklyuchevskite, $K_3Cu_3AlO_2(SO_4)_4$, a new oxysulfate of K, Cu, and Al from volcanic exhalations, Kamchatka, Russia. Zapiski Vseross. Mineral. Obshch., 124(1), 95–100.

Electron microprobe analysis (average of 26) gave K_2O 18.68, CuO 31.19, Al_2O_3 4.65, Fe_2O_3 3.70, SO_3 40.70, sum 98.92 wt%, corresponding to $K_{3.07}Cu_{3.04}(Al_{0.71}Fe_{0.36})_{\Sigma1.07}S_{3.94}O_{18}$; Al/Fe ranges from 0.26 to 0.88. The mineral occurs as aggregates of dark green acicular crystals, elongate [010], to 1 mm length and <0.1 mm width. Almost equant in cross-section, transparent, $H = 2.3$ (42 kg/mm²), perfect cleavage along $(h0l)$, $D_{meas} = 3.1(1)$, $D_{calc} = 2.95$ g/cm³ for $Z = 4$. Turns white upon exposure to air, probably by hydration. Optically biaxial positive, $\alpha = 1.641(1)$, $\beta = 1.548(1)$, $\gamma = 1.542(1)$, $2V_{calc} = 30°$; strongly pleochroic, with X = light green, Y = grayish green, Z = dark green, Z parallel to b, and X and Y in the plane normal to it. Single-crystal X-ray study gave monoclinic symmetry, space group $I2$; $a = 18.423(5)$, $b = 5.139(1)$, $c = 18.690(7)$ Å, $\beta = 101.72(2)°$ as refined from a powder pattern with strongest lines of 9.15(84,002), 9.04(100, 200), 3.781(37,204), 3.757(33,402), and 2.786(21,$\overline{6}$04).

The mineral is associated with fedotovite, tenorite, langbeinite, and lammerite as a fumarolic product at the Main Tolbachik fracture eruption, Kamchatka, Russia. The new name alludes to the relation to klyuchevskite, the Fe analog. Type material is in the Mineralogical Museum of the Saint Petersburg Mining Institute, Russia. **J.L.J.**

Arsenogorceixite*

K. Walenta, P.J. Dunn (1993) Arsenogorceixite from the Clara mine, central Schwarzwald. Aufschluss, 44(5), 250–254 (in German, English abs.).

The mineral is an oxidation product occurring as tabular crystals flattened (0001), as pseudooctahedral crystals showing {10$\overline{1}$1} and {0001}, and as spherulitic aggregates of radiating crystals. Maximum crystal size is 0.1–0.2 mm. Color variable from white to yellow, also

bluish or colorless. Vitreous luster, no cleavage, conchoidal fracture, $H = 4$, $D_{meas} = 3.65(5)$, $D_{calc} = 3.71$ g/cm³ for $Z = 3$. Optically isotropic or weakly birefringent, $n = 1.645(2)$, negative elongation for radial crystals. Electron microprobe analysis gave BaO 24.9, SrO 0.9, CaO 0.2, FeO 0.7, Al_2O_3 27.8, As_2O_5 27.2, P_2O_5 5.9, F 2.5, H_2O by difference 10.9, O $\equiv$ F 1.0, sum 100 wt%, corresponding to $(Ba_{0.92}Sr_{0.05}Ca_{0.02}Fe_{0.05})_{\Sigma1.04}Al_{3.09}[(AsO_4)_{1.34}(PO_4)_{0.47}]_{\Sigma1.81}[(OH)_{5.19}F_{0.73}]_{\Sigma5.92}\cdot0.83H_2O$, ideally $BaAl_3H(AsO_4)_2(OH)_6$. Indexing of the powder pattern (Fe$K\alpha$ radiation) gave hexagonal symmetry, $a = 7.10(2)$, $c = 17.39(4)$ Å, probable space group $R\overline{3}m$ by analogy with other crandallite-type minerals. Strongest lines are 5.84(80,101,003), 3.55(80,110,104), 3.02(100,021,113,015), 2.30(60,205, 107), and 1.930(60,303,125,009).

The mineral was described previously as sulfate-free weilerite. The new name is intended to apply to the arsenate analog of gorceixite.

Discussion. The ratio of As:P is 74:26, which is less As than is required if Scott's (*Am. Mineral.*, 72, 178–187, 1987) IMA-approved nomenclature for the alunite-jarosite family is followed. Although the authors recognize the difficulty and have had the new name approved by the CNMMN, either the new name or the nomenclature system is invalid. See also the **Discussion** in *Am. Mineral.*, 80, p. 634, 1995. Arsenogorceixite is not the sole example of contradictory approved names for the alunite-jarosite members. **J.L.J.**

Gaotaiite*

Zuxiang Yu (1995) Gaotaiite—A new iridium telluride. Acta Mineralogica Sinica, 15(1), 1–4 (in Chinese, English abs.).

The mean and range of nine electron microprobe analyses gave Cu 0.2 (0.1–0.3), Ir 35.6 (35.1–36.5), Pt 0.1 (0.0–0.3), Te 62.8 (61.6–63.9), S 0.2 (0.0–0.4), sum 98.9 (97.7–99.9) wt%, corresponding to $(Ir_{2.96}Cu_{0.05}Pt_{0.01})_{\Sigma3.02}(Te_{7.88}S_{0.10})_{\Sigma7.98}$, ideally Ir_3Te_8. Steel black color, black streak, opaque, metallic luster, brittle, $H = 3$, $VHN_{20} = 117$ (94–117), $D_{calc} = 10.0$ g/cm³ for $Z = 1$. In reflected light, bright white with a bluish tint, isotropic to weakly anisotropic with bluish or yellowish polarization colors, no bireflectance or pleochroism. Reflectance percentages (given in 10 nm steps from 400 to 700 nm; WTiC standard, air) are 46.6 (470 nm), 46.3 (540), 46.3 (550), 46.3 (590), 45.6 (650), and 45.2 (700). The X-ray powder pat-

tern, indexed by analogy with data for synthetic $IrTe_{2+x}$ (PDF 9–295), gave isometric symmetry, space group $Pa3$, $a = 6.413(4)$ Å; strongest lines are 2.86(70,210), 2.60 (60,211), 1.93(100,311), 1.713(60,321), 1.399(50,421), 1.235(80,333), 1.190(60,520), 1.132(90,440), 1.068 (50,600), 1.040(80,611), and 0.9780(80,533).

The mineral occurs as veinlets, to 0.5 mm width and 1 mm length, and as subhedral granular aggregates in which individual grains measure to 0.2 mm, in placer concentrates and in crushed chromite ores near the village of Gaotai, about 200 km NNE of Beijing, China. Associated minerals are iridium, osmium, platinum, iridisite, erlichmanite, laurite, chromite, magnetite, gold, and shuangfengite. Type material is in the Geological Museum of China, Beijing. **J.L.J.**

Jankovićite*

L. Cvetković, V.A. Boronikhin, M.K. Pavićević, D. Krajnović, I. Grżetić, E. Libowitzky, G. Giester, E. Tillmanns (1995) Jankovićite, $Tl_5Sb_9(As,Sb)_4S_{22}$, a new Tl-sulfosalt from Allchar, Macedonia. Mineral. Petrology, 53, 125–131.

Electron microprobe analysis gave Tl 31.51, Sb 37.69, As 7.95, S 22.30, sum 99.45 wt%, corresponding to $Tl_{4.87}Sb_{9.79}As_{3.35}S_{21.99}$, ideally $Tl_5Sb_9(As,Sb)_4S_{22}$. The mineral occurs as hypidiomorphic or tabular grains >1 mm in size, associated with realgar, stibnite, and pyrite. Black color, metallic luster, opaque, brown-violet streak, brittle, $H = 2$, perfect {100} cleavage, subconchoidal fracture, $D_{calc} = 5.08$ g/cm³ for $Z = 1$. White in reflected light; low to medium bireflectance to grayish-bluish white; red internal reflection; distinct to strong anisotropy, with colors gray-blue to green-blue; some grains show a lamellar texture (twinning). Minimum and maximum reflectance percentages (SiC standard, air) are given in 20 nm steps from 400 to 700 nm; standard values are 34.0, 36.7 (470), 32.0, 34.9 (546), 30.5, 33.0 (589), and 28.1, 29.7 (650). Single-crystal X-ray structure study ($R_w = 0.037$) indicated triclinic symmetry, space group $P\bar{1}$, $a = 7.393(4)$, $b = 8.707(2)$, $c = 17.584(3)$ Å, $\alpha = 103.81(1)$, $\beta = 91.79(1)$, $\gamma = 109.50(1)°$.
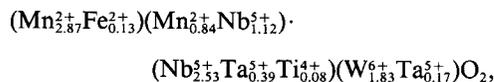
The mineral is associated with realgar, orpiment, pyrite, marcasite, and other Tl minerals at the Crven Dol mine of the Allchar ore deposit, Macedonia. The new name is for S. Janković in recognition of his work in the Allchar region. Type material is in the Natural History Museum of Vienna, Austria, and in the Natural History Museum of Belgrade, Serbia. **J.L.J.**
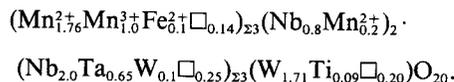
Koragoite*

N.A. Yamnova, D.Yu. Pushcharovsky, A.V. Voloshin (1995) Crystal structure of a new natural Mn, W-tantaloniobate. Kristallografiya, 40(3), 469–475 (in Russian).

The mineral occurs as platy crystals in granitic peg-

matites in Pamir, Tadzhikistan. Electron microprobe analysis (not given) corresponds to

$$(Mn^{2+}_{2.87}Fe^{2+}_{0.13})(Mn^{2+}_{0.84}Nb^{5+}_{1.12})\cdot$$

$$(Nb^{5+}_{2.53}Ta^{5+}_{0.39}Ti^{4+}_{0.08})(W^{6+}_{1.83}Ta^{5+}_{0.17})O_2,$$

or $A_3(B,A)_2B_3C_2O_{20}$. Single-crystal X-ray structure study ($R = 0.054$) indicated monoclinic symmetry, space group $P2_1$, $a = 24.73(2)$, $b = 5.056(3)$, $c = 5.760(3)$ Å, $\beta = 103.50(7)°$, $D_{calc} = 6.11$ g/cm³ for $Z = 2$. The structural formula is

$$(Mn^{2+}_{1.76}Mn^{3+}_{1.0}Fe^{2+}_{0.1}\square_{0.14})_{\Sigma3}(Nb_{0.8}Mn^{2+}_{0.2})_2\cdot$$

$$(Nb_{2.0}Ta_{0.65}W_{0.1}\square_{0.25})_{\Sigma3}(W_{1.71}Ti_{0.09}\square_{0.20})O_{20}.$$

The authors indicate in a footnote that the new name, karagoite, was approved by the CNMMN in 1995.

Discussion. An incomplete description for introducing a new name. J.D. Grice, chairman of the CNMMN, confirmed the approval (written communication, August 1995), but as koragoite rather than karagoite. **J.L.J.**

Magnesiodumortierite*

G. Ferraris, G. Ivaldi, C. Chopin (1995) Magnesiodumortierite, a new mineral from very-high-pressure rocks (western Alps). Part I: Crystal structure. Eur. J. Mineral., 7, 167–174.
C. Chopin, G. Ferraris, G. Ivaldi, H.-P. Schertl, W. Schreyer, R. Compagnoni, C. Davidson, A.M. Davis (1995) Magnesiodumortierite, a new mineral from very-high-pressure rocks (western Alps). Part II: Crystal chemistry and petrological significance. Eur. J. Mineral., 7, 525–535.

The mineral occurs rarely as anhedral to subhedral inclusions to 300 μm in pyrope megablasts (to 25 cm diameter) in coesite-bearing quartz-phengite-kyanite schists of the Dora-Maira massif, western Alps, Italy. Pink to red color, transparent, vitreous luster, $H = 7$–8 probably, poor cleavage parallel to [001], $D_{calc} = 3.22$ g/cm³ for $Z = 4$. Optically biaxial negative, $\alpha = 1.678(1)$, $\beta = 1.700(1)$, $\gamma = 1.701(1)$, $2V_{meas} = 38.5(1.0)$, $2V_{calc} = 24°$, $X \parallel c$; pleochroism X = pale pink to red, Y and Z colorless, $X \gg Y = Z$. Electron and ion microprobe analyses gave SiO_2 31.7, P_2O_5 0.07, Al_2O_3 47.3, TiO_2 4.28, ZrO_2 0.06, FeO 0.09, MgO 7.8, B_2O_3 5.1, H_2O 3.5, sum 99.90 wt%, corresponding to $(Al_{5.28}Mg_{1.10}Ti_{0.30}Fe_{0.01})_{\Sigma6.69}Si_{3.00}O_{18}H_{2.21}B_{0.83}$; additional analyses and X-ray structure studies indicate the mineral to be isostructural with dumortierite and to have the simplified formula $(Mg,Ti,\square)(Al,Mg)_2Al_4Si_3$-$O_{18-y}(OH)_yB$, with $2 \le y < 3$. Orthorhombic symmetry, space group $Pmcn$, $a = 11.91(2)$, $b = 20.42(3)$, $c = 4.714(7)$ Å as refined from a Gandolfi pattern (Cu$K\alpha$ radiation) with strongest lines of 5.91(90,130), 3.472(70,221), 3.246 (100,231), 2.915(60,321), 2.105(90,371), 1.687(60,452), and 1.3451(60,443).

The new name alludes to the compositional relation to dumortierite. Type material is in the National Museum

of Natural History, Paris, France, and in the Regional Museum of Natural Science, Torino, Italy. **J.L.J.**

Mayingite*

Zuxiang Yu (1995) Mayingite—A new iridium bismu-thide-telluride. Acta Mineralogica Sinica, 15(1), 5–8 (in Chinese, English abs.).

The mineral occurs as massive aggregates to 0.2 mm across and as veinlets to 0.2 mm width and 1 mm length in placer concentrates and in chromite ore near Maying, about 230 km NNE of Beijing, China. Electron microprobe analyses (mean and range of 11) gave Cu 0.1 (0.0–0.2), Te 24.6 (23.6–25.6), Ir 34.6 (32.2–35.8), Pt 1.9 (0.3–3.2), Bi 38.5 (35.9–41.6), sum 99.7 wt%, corresponding to $(Ir_{0.99}Pt_{0.01})Bi_{0.99}Te_{1.00}$, ideally IrBiTe. Steel black color, black streak, opaque, metallic luster, brittle, $H = 4$, $VHN_{50} = 178$ (158–241), $D_{calc} = 12.77$ g/cm³ for $Z = 4$. In reflected light, bright white with a yellowish tint, moderately anisotropic with bluish to yellowish tints. Reflectance percentages (WTiC standard, air), given in 10 nm steps from 400 to 700 nm, are 49.8 (470), 50.7 (540), 50.9 (550), 51.6 (590), and 52.2 (650). The X-ray powder pattern was indexed with a cubic cell, space group $Pa3$, $a = 6.502(4)$ Å; strongest lines are 2.89(70,210), 1.955(100,311), 1.735(80,311), 1.250(80,511), 1.207 (70,520), 1.148(70,440), 1.054(70,532), and 0.9911 (70,533). Cubic IrBiTe is known as a synthetic phase.

The new name is for the locality. Associated minerals are platinum, iridisite, laurite, chromite, magnetite, gold, irarsite, and shuanfengite. Type material is in the Geological Museum of China, Beijing. **J.L.J.**

Mereiterite*

G. Giester, B. Rieck (1995) Mereiterite, $K_2Fe(SO_4)_2$ · $4H_2O$, a new leonite-type mineral from the Lavrion Mining District, Greece. Eur. J. Mineral., 7, 559–566.

The mineral occurs as inclusions of subhedral crystals up to $10 \times 8 \times 6$ mm in gypsum associated with smithsonite and limonite. Pale yellow color, transparent, vitreous to greasy luster, faces strongly etched and rounded, brittle, conchoidal fracture, no cleavage, $H = 2\frac{1}{2}$–3, nonfluorescent, readily soluble in water, $D_{meas} = 2.36(1)$, $D_{calc} = 2.358$ g/cm³ for $Z = 4$. Optically biaxial positive, $\alpha = 1.497(1)$, $\beta = 1.501(1)$, $\gamma = 1.509(1)$, $2V_{meas} = 71$, $2V_{calc} = 73(5)°$, $X = [010]$, $Z:c \approx 20°$, weak dispersion $r > v$, nonpleochroic. ICP analysis gave K_2O 22.9, FeO 19.2, SO_3 40.0, H_2O (TGA to 180 °C) 18.0 (sum 100.1 wt%), corresponding to $K_{1.94}Fe_{1.07}S_{1.99}O_{8.01}$ · $3.99H_2O$, ideally $K_2Fe(SO_4)_2$ · $4H_2O$. Single-crystal X-ray structure study ($R = 0.025$) indicated monoclinic symmetry, space group $C2/m$, $a = 11.844(1)$, $b = 9.556(1)$, $c = 9.947(1)$ Å as refined from a diffractometer pattern (CuKα radiation) with strongest lines of 4.778(30,223), 3.505(52,311),

3.444(100,022), 3.331(48,311), 3.051(29,222), 2.405 (30,223), and 2.390(49,114,040).

The mineral formed by oxidation of primary sulfides at the Hilarion adit, Agios Konstandinos, Lavrion mining district, Greece. The new name is for Kurt Mereiter of the Technical University of Vienna. Type material is in the Institut für Mineralogie und Kristallographie, University of Vienna, and in the Smithsonian Institution, Washington, DC. The mineral is the Fe analog of leonite. **J.L.J.**

Nierite*

M.R. Lee, S.S. Russell, J.W. Arden, C.T. Pillinger (1995) Nierite (Si_3N_4), a new mineral from ordinary and enstatite chondrites. Meteoritics, 30, 387–398.

The mineral occurs as $\sim 2 \times 0.4$ μm laths associated with spinel, chromite, hibonite, rutile, and diamond in perchloric acid-resistant residues of the Adrar, Inman, and Tieschitz chondrites and the Indarch enstatite chondrite. Eight energy-dispersion STEM analyses of three grains gave a mean of N 43 (range 38–47), Si 57 (53–62), sum 100 wt%; requirements for Si_3N_4 are N 40, Si 60 wt%. SAED patterns gave X-ray diffraction lines (18 listed) in good agreement with data for synthetic α-Si_3N_4; by analogy, $a = 7.74(2)$, $c = 5.61(2)$ Å, trigonal symmetry, space group $P31c$, $D_{calc} = 3.11$ g/cm³ for $Z = 4$. Grains in the residues are euhedral to subhedral prisms, elongate [001]. Synthetic α-Si_3N_4 is transparent and colorless, becoming brown to brownish red with uptake of O; $H = 9$, $D_{meas} = 3.17$ g/cm³. Optically uniaxial negative, $\omega = 2.03$, $\epsilon = 2.02$.

The new name is for A.O.C. Nier (1912–1994), one of the founding fathers of mass spectrometry. Type material is in the British Museum (Natural History), London, U.K. Nierite is interpreted to have formed by exsolution of Si and N from kamacite, perryite, and schreibersite during parent-body metamorphism.

Discussion. See also the abstract for β-Si_3N_4. **J.L.J.**

Olkhonskite*

A.A. Koneva, L.F. Piskunova, Z.F. Ushchapovskaya, A.A. Konev (1994) Olkhonskite $(Cr,V)_2Ti_3O_9$—A new mineral from the Priolkhon'ye. Zapiski Vseross. Mineral. Obshch., 123(4), 98–103 (in Russian).

The new mineral forms platy inclusions 1–20 mm wide and 50–150 mm long in rutile. Electron microprobe analyses of 23 plates gave TiO_2 59.93–63.13, Al_2O_3 0.48–0.92, Cr_2O_3 19.64–28.18, V_2O_3 9.15–18.36, FeO_{tot} 0.12–0.35 wt%, corresponding to $(Cr,V)_2Ti_3O_9$ with X_{Cr} or Cr/$(Cr + V) = 56.4$–75.2 mol%. Compositions vary between the chromian (olkhonskite) and vanadian (schreyerite) end-members. Black color, metallic luster, $H = 1412$ kg/mm² (for $X_{Cr} = 0.52$). Light gray in reflected light (lighter than the host rutile), noticeable bireflectance, weak pleochroism in a brownish tint, weak anisotropism. Reflec-

tion percentages are given in 20 nm steps from 440 to 700 nm; at the four standard wavelengths, for $X_{Cr} = 0.52$, R_{max} and R_{min} are 21.1, 18.1 (470), 19.9, 18.5 (546), 19.8, 18.4 (589), and 20.0, 18.6 (650). Monoclinic symmetry by analogy with schreyerite; for $X_{Cr} = 0.52$, $a = 7.03(1)$, $b = 5.02(1)$, $c = 18.83(1)$ Å, $\beta = 119.60°$ from the powder pattern; $D_{calc} = 4.48$ g/cm^3 for $Z = 4$. Strongest lines of the powder pattern (nine lines given) are 2.88(70,21$\bar{3}$), 2.75(100,015), 2.43(70,105), 1.426(70,036), and 1.386(100,2.1.$\bar{1}\bar{3}$).

The olkhonskite-bearing rutile occurs in thin layers of quartzite-schists of the Olkhon series on the western shore of Lake Baikal near Olkhon Island. The quartzite-schists are enriched in Cr, V, and Ti. They are interbedded with carbonate-silicate rocks and also contain sillimanite, chromian kyanite, cordierite, graphite, and chromian vanadian tourmaline. The new mineral is associated with platy schreyerite, inclusions of eskolaite, karelianite, and other Cr-V-Ti oxides. No compositional zoning is evident in individual plates of olkhonskite, but its Cr content changes from one host layer to the other. The new name is for locality. Type material is at the Fersman Mineralogical Museum, Moscow, Russia.

Discussion. The coexistence of homogeneous grains of olkhonskite and schreyerite may be an indication of a miscibility gap. In the 12 analyses listed for olkhonskite, formula Cr ranges from 1.014 to 1.425. **N.N.P.**

Shannonite*

A.C. Roberts, J.A.R. Stirling, G.J.C. Carpenter, A.J. Criddle, G.C. Jones, T.C. Birkett, W.D. Birch (1995) Shannonite, Pb_2OCO_3, a new mineral from the Grand Reef mine, Graham County, Arizona, USA. Mineral. Mag., 59, 305–310.

Electron microprobe and CHN analyses gave PbO 89.9, CO_2 9.70, sum 99.60 wt%, corresponding to $Pb_{1.91}C_{1.05}O_{4.00}$, ideally Pb_2OCO_3. Occurs as millimeter-size white, porcelaneous crusts with a waxy luster; white streak, brittle, uneven fracture, nonfluorescent, $VHN_{100} = 97$ (93–100), $D_{calc} = 7.59$ g/cm^3 for the ideal formula and $Z = 4$. Crystallites are up to 400 nm in size and are platy. Gray to white in reflected light, white internal reflection, weak anisotropy, barely detectable bireflectance, $n_{calc} = 2.09$. TEM study indicated orthorhombic symmetry, space group $P2_122_1$ or $P2_12_12_1$, $a = 9.294(3)$, $b = 9.000(3)$, $c = 5.133(2)$ Å as refined from a 114 mm Debye-Scherrer pattern (Cu$K\alpha$ radiation) with strongest lines of 4.02 (40,111), 3.215(100,211), 3.181(90,121), 2.858(40,130), and 2.564(35,002).

The mineral occurs with plumbojarosite, hematite, Mn oxides, litharge, massicot, minium, hydrocerussite, and unnamed $PbCO_3 \cdot 2PbO$ at the Grand Reef mine, Graham County, Arizona. Also known as a fire-induced decomposition product from cerussite at the Kintore Opencut, Broken Hill, New South Wales, Australia. The new name is for mineral dealer David M. Shannon (b. 1942), who helped to collect the discovery specimens. Type ma-

terial is in the Systematic Reference Series, Geological Survey of Canada, Ottawa, and in the Natural History Museum, London, U.K. **J.L.J.**

Strakhovite*

V.V. Kalinin, D.Yu. Pushcharovsky, N.A. Yamnova, Yu.P. Dikov, S.E. Borisovsky (1994) Strakhovite $NaBa_3(Mn^{2+},Mn^{3+})_4Si_6O_{19}(OH)_3$—A new sodium-bearing silicate of barium and manganese. Zapiski Vseross. Mineral. Obshch., 123(4), 94–97 (in Russian).

Electron microprobe analyses of four grains gave (wt%) SiO_2 29.15–31.12, Al_2O_3 0.21–0.26, Mn_2O_3 11.30–11.84, MnO 13.72–14.38, Na_2O 2.75–2.91, BaO 38.46–39.55, H_2O 2.40 (by heating between 105 and 1000 °C); the average corresponds to

$$Na_{1.09}Ba_{3.04}Mn^{2+}_{2.37}Mn^{3+}_{1.7}Si_{5.95}Al_{0.05}O_{19}(OH)_{3.11},$$
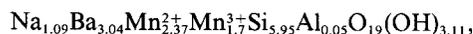
for which the structure-determined formula is

$$NaBa_3Mn^{2+}_{2.3}Mn^{3+}_{1.73}[Si_4O_{10}(OH)_2](Si_2O_7)O_2(F,OH) \cdot H_2O.$$

Occurs in grains to 0.7 mm across; black with a greenish tint, dark olive green in thin translucent fragments, olive green streak, vitreous to greasy luster, $H = 5$–6, $VHN_{100} = 633$–764, $D_{meas} = 3.86$, $D_{calc} = 3.84$ g/cm^3 for $Z = 4$. Optically biaxial positive, $2V = 60$–65°, $\alpha = 1.767(6)$, $\beta_{calc} = 1.793$, $\gamma = 1.871(6)$ at 578 nm; dispersion strong, $r > v$; orientation $X = c$, $Y = b$, $Z = a$; strong pleochroism, with X = light green, Y = green, Z = dark olive green to brown. Single-crystal X-ray structure study ($R = 0.063$) indicated orthorhombic symmetry, space group $Pnma$, $a = 23.42(1)$, $b = 12.266(8)$, $c = 7.181(5)$ Å; the structure study and X-ray photoelectron spectroscopy showed Mn to be present as $Mn^{2+}/Mn^{3+} = 11/8$. Strongest lines of the X-ray powder pattern (40 lines given; 57 mm camera, Fe$K\alpha$ radiation) are 4.580(50,121), 3.303 (90,521), 2.999(100,222), 2.715(50,440), 2.655(100,341), and 1.648(50,10.4.2).

The mineral occurs in the Ir-Nimi manganese deposit (Taikan Ridge, Russian Far East) at the contact between braunite ore and alkali basalt. Equant to slightly elongate grains (rarely with crystal faces) are in veinlets in association with braunite, taikanite, namansilite, pectolite, and a manganiferous amphibole. The name is for N.M. Strakhov (1900–1978), lithologist. Type material is at the Fersman Mineralogical Museum, Moscow, Russia.

Discussion. A report on the crystal structure of the then-unnamed mineral was abstracted in *Am. Mineral.*, 78, 675–676 (1993). **N.N.P.**

Yuanfuliite*

Zouliang Huang, Pu Wang (1994) Yuanfuliite—A new borate mineral. Acta Petrologica Mineralogica, 13(4), 328–334 (in Chinese, English abs.).

Electron microprobe analysis (mean of four) gave Na_2O 0.70, K_2O 0.03, MgO 27.71, CaO 0.035, MnO_2 0.025,

Fe_{tot} 36.87, Al_2O_3 6.02, Cr_2O_3 0.04, SiO_2 0.07, P_2O_5 0.15, TiO_2 5.76, CoO 0.04, B_2O_3 (wet chemistry) 20.44, sum 97.89 wt%, corresponding to $(Mg_{0.91}Fe^{2+}_{0.09})(Fe^{3+}_{0.56}Al_{0.19}\text{-}Mg_{0.17}Ti_{0.11}Fe^{2+}_{0.10})_{\Sigma1.13}(B_{0.92}O_{3.00})O$, for which $Fe^{2+}:Fe^{3+}$ was determined by Mössbauer spectroscopy; the simplified formula is $Mg(Fe^{3+},Al)(BO_3)O$, which is the Fe^{3+} analog of warwickite. The mineral occurs as black prismatic crystals $0.1 \times 0.2 \times 1$ mm, elongate [001]; brownish black streak, nearly opaque, submetallic to adamantine luster, brittle, $VHN_{50} = 843$, $H = 5\text{-}6$, perfect {100} cleavage, $D_{calc} = 3.80$ g/cm^3 for $Z = 4$. Light gray in reflected light, with dark reddish brown internal reflection, weak anisotropism, and dark red to dark brown pleochroism. Maximum reflection percentages (SiC standard, air) are 9.99 (470 nm), 9.66 (540), 9.40 (560), 9.29(589), 8.79 (650), and 1.33 (700). Single-crystal X-ray structure study showed the mineral to be orthorhombic, space group *Pnam*, $a = 9.258(6)$, $b = 9.351(4)$, $c = 3.081(2)$ Å as refined from the powder pattern (diffractometer, Cu$K\alpha$ radiation) with strongest lines of 6.563(23,110), 4.176 (38,120), 2.957(30,130), 2.570(100,320), 2.088(20,240), 1.591(18,431), and 1.550(19,511).

The mineral occurs with suanite, anhydrite, and apatite in metamorphosed magnesian marble at the Zhuanmiao boron deposit, Kuandian County, Liaoning Province, China. The new name is for geologist Fuli Yuan (1893–1987). Type material is in the Geological Museum of China, Beijing. **J.L.J.**

Zdenekite*

P.-J. Chiappero, H. Sarp (1995) Zdenekite, NaPb-$Cu_5(AsO_4)_4Cl \cdot 5H_2O$, a new mineral from the Cap Garonne mine, Var, France. Eur. J. Mineral., 7, 553–557.

Electron microprobe analysis gave Na_2O 2.92, CaO 0.62, PbO 16.79, CuO 32.97, As_2O_5 36.66, Cl 3.54, H_2O (TGA) 7.2, Cl $\equiv$ O 0.80, sum 99.90 wt%, corresponding to $Na_{1.15}Ca_{0.13}Pb_{0.92}Cu_{5.09}As_{3.90}H_{9.82}Cl_{1.23}O_{20.77}$, ideally $NaPbCu_5(AsO_4)_4Cl \cdot 5H_2O$. Occurs as blue crusts to several square centimeters, consisting of tabular crystals to 0.1 mm, and spherulites and aggregates to 0.3 mm across. Turquoise blue color, translucent, vitreous luster, pale blue streak, soft and fragile, irregular fracture, perfect cleavage along (001), nonfluorescent; tabular crystals are flattened on {001}, showing also {100} and {110}; $D_{meas} = 4.1(1)$, $D_{calc} = 4.08$ g/cm^3 for $Z = 8$. Optically uniaxial negative, $\omega = 1.770(5)$, $\epsilon = 1.710(5)$; strongly pleochroic, with $O =$ turquoise blue, $E =$ pale blue to light green. Single-crystal X-ray study indicated tetragonal symmetry, space group $P4_122$ or $P4_322$; $a = 10.066(1)$, $c = 39.39(4)$ Å as refined from a 114 mm Gandolfi pattern (Cu$K\alpha$ radiation) with strongest lines of 9.83(100,004), 4.925(60,008), 4.482(50b,204,211), 3.132(90,226,1.0.12), 2.772(40,308,317), 2.515(50,400,401), and 1.778(40,440, 441).

The mineral formed with anglesite, olivenite, and a tsumcorite-group mineral on the walls of the Cap Garonne Cu-Pb mine in an area thought to have been mined about a century ago. Primary minerals are galena and tennantite in Triassic sandstone and conglomerate of the red-bed type. The new name is for Zdenek Johan (b. 1935) of the Bureau de Recherches Géologiques et Miniéres, France. Type material is in the Natural Museum of Geneva, Switzerland, and in the National Museum of Natural History, Paris, France. **J.L.J.**

β-Si_3N_4

M.R. Lee, S.S. Russell, J.W. Arden, C.T. Pillinger (1995) Nierite (Si_3N_4), a new mineral from ordinary and enstatite chondrites. Meteoritics, 30, 387–398.

Associated with neirite-bearing acid-resistant residues from the Indarch, Inman, and Tieschitz meteorites, β-Si_3N_4 is a phase that is less abundant than nierite and occurs with it in sharply defined epitaxial growths. SAED patterns gave d values (six listed) in good agreement with data for synthetic β-Si_3N_4, which is hexagonal, space group $P6_3/m$, $a = 7.603$, $c = 2.909$ Å, $Z = 2$; optically uniaxial positive, $\omega = 2.02$, $\epsilon = 2.04$. **J.L.J.**

New Data

Cebaite-(Ce)

Zhuming Yang (1995) Structure redetermination of natural cebaite-(Ce), $Ba_3Ce_2(CO_3)_5F_2$. Neues Jahrb. Mineral. Mon., 56–64.

Single-crystal X-ray structure study ($R = 0.034$) of cebaite-(Ce) from the Bayan Obo deposit, Inner Mongolia, gave $a = 21.42(5)$, $b = 5.078(5)$, $c = 13.30(5)$ Å, $\beta = 94.8(2)°$, space group $C2/m$, thus differing from previously reported space groups for this mineral, but confirming that established for the synthetic La end-member (*Am. Mineral.*, 78, p. 1112, 1993). **J.L.J.**

Parisite-(Ce)

Dawei Meng, Xiuling Wu, Guangming Yang, Zhaolu Pan (1994) A study of new polytype $6R_2$ in parisite by high resolution transmission electron microscopy. Jour. China University of Geosciences, 19(5), 655–661 (in Chinese, English abs.).

Guangming Yang, Zhaolu Pan, Xiuling Wu (1994) Transmission electron microscope study of the new regular stacking structure in the calcium rare-earth fluorocarbonate mineral series from southwest China. Scientia Geologica Sinica, 29(4), 393–398 (in Chinese, English abs.).

Xiuling Wu, Guangming Yang, Dawei Meng, Zhaolu Pan, Douxing Li, Jiyan Dai (1994) A study of new polytypes in the calcium rare-earth fluorocarbonate minerals under high resolution transmission electron microscope. Acta Petrologica et Mineralogica, 13(4), 335–341 (in Chinese, English abs.).

Parisite-(Ce), with $a = 7.14$, $c = 84.78$ Å, space group $R3c$ or $R\bar{3}c$, corresponds to the $6R_2$ polytype; also reported are the $8H$ polytype with $c = 113.04$ and the $10H$ polytype with $c = 141.30$. Regular mixed-layer compounds of the types B_3S_2 and B_mS_n, as well as various polytypes, also occur within a single grain; these phases can be thought of as unit layers of bastnaesite (B) and synchysite (S) with ordered stacking in various proportions along the c axis. **J.L.J.**

Zemannite, kinichilite, keystoneite

R. Miletich (1995) Crystal chemistry of the microporous tellurite minerals zemannite and kinichilite, $Mg_{0.5}[Me^{2+}Fe^{3+}(TeO_3)_3] \cdot 4.5H_2O$, ($Me^{2+} = Zn;Mn$). Eur. J. Mineral., 7, 509–523.

New microbeam analyses (electron microprobe, EDX) of crystals of zemannite from the Moctezuma mine, Mexico (type locality), and of kinichilite from the Kawazu mine, Japan (type locality), showed that Na contents are insignificant and that the values of Fe^{3+} are similar in both; contents of MnO are up to 2.80 wt% in zemannite but are in the range of 4.0–6.1 for kinichilite. Single-crystal X-ray structure study of both minerals indicated hexagonal symmetry, space group $P6_3/m$; for two crystals of zemannite ($R = 0.032$, 0.031), $a = 9.404(2)$ and $9.420(3)$, $c = 7.636(4)$ and $7.657(6)$ Å, $D_{calc} = 4.19$ and 4.128 g/cm^3 for $Z = 2$; for kinichilite ($R = 0.030$), $a = 9.451(7)$, $c = 7.687(9)$, $D_{calc} = 4.11$ g/cm^3. Channels within the structure are occupied by Mg atoms rather than Na atoms, thus leading to the formula $Mg_{0.5}[ZnFe^{3+}(TeO_3)_3] \cdot 4.5H_2O$ for zemannite and $Mg_{0.5}[(Mn,Zn)Fe^{3+}(TeO_3)_3] \cdot 4.5H_2O$ for kinichilite. Therefore, kinichilite is not in accord with its original definition as the Fe^{2+}-dominant analog of zemannite. Mössbauer spectroscopy showed that all Fe in zemannite and kinichilite is octahedrally coordinated Fe^{3+}. If all iron in keystoneite is assumed to be ferric, the formula corresponds to $Na_{0.07}K_{0.02}Mg_{0.78}[(Ni_{1.26} Fe^{3+}_{0.47}Mn_{0.10})_{\Sigma1.83}Te_{3.04}O_{9.00}] \cdot 4.52H_2O$.

Discussion. The results redefine kinichilite as the Mn analog of zemannite, but the redefinition has not been submitted to the CNMMN for approval. The data also suggest that keystoneite is a Ni-dominant member of the zemannite group. **J.L.J.**