

# Thirty-seventh list of new mineral names. Part 2: M–Z

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THE complete list (Part 1: *Mineralogical Magazine*, 60, 523–536) contains 237 names, of which 222 are new species, approved by the IMA Commission on New Minerals and Mineral Names.

**Magnesio-ferrifluor-katophorite.** F.C. Hawthorne, L. Ungaretti, R. Oberti, P. Bottazzi and G.K. Czamanske. 1993. *Amer. Min.*, 78, 733. A name given to one of several compositionally-unusual alkalic amphiboles from the Amalia Tuff and Virgin Canyon complexes, Questa, Taos County, New Mexico, U.S.A. Amphibole Group. Monoclinic, space group,  $C2/m$ ,  $a$  9.80,  $b$  17.993,  $c$  5.284 Å,  $\beta$  10.54° (Amalia sample). The mineral name is listed as an 'IMA name' though it is not clear whether such approval has been given. Only limited data are provided in the description. Systematically-named for its compositional relationship to katophorite.

**Magnesio-ferrifluor-oxy-katophorite.** F.C. Hawthorne, L. Ungaretti, R. Oberti, P. Bottazzi and G.K. Czamanske. 1993. *Amer. Min.*, 78, 733. A name given to one of several compositionally-unusual alkalic amphiboles from the Amalia Tuff complex, Questa, Taos County, New Mexico, U.S.A. Amphibole Group. Monoclinic, space group,  $C2/m$ ,  $a$  9.795,  $b$  17.993,  $c$  5.280 Å,  $\beta$  104.53° (sample A1). The mineral name is listed as an 'IMA name' though it is not clear whether such approval has been given. Only limited data are provided in the description. Systematically-named for its compositional relationship to katophorite.

**Mahlmoodite.** C. Milton, J.J. McGee and H.T. Evans Jr., 1993. *Amer. Min.*, 78, 437. Cream-white spheres, to less than 0.5 mm, consisting of radiating fibres, associated with sodic pyroxene in gulls within contact rocks of the Union Carbide

vanadium deposit, Wilson Springs, Garland County, Arkansas, U.S.A.  $\text{FeZr}(\text{PO}_4)_2 \cdot 4\text{H}_2\text{O}$ . Monoclinic, space group  $C21/c$ ,  $a$  9.12,  $b$  5.42,  $c$  19.17 Å,  $\beta$  94.8°,  $Z = 4$ .  $d_{\text{calc}}$ . 2.877 g/cm<sup>3</sup>. Optically uniaxial negative; pseudo-ordinary index  $\beta = \gamma$  1.650 and  $\alpha$  1.646. Named for B.K. Mahlmoood, Administrative Assistant of the Analytical Laboratories, U.S. Geological Survey.

**Manaksite.** A.P. Khomyakov, T.A. Kurova and G.N. Nechelyustov. 1992. *Zap. Vses. Min. Obshch.*, 121, 112. [Russian]. Occurs as colourless to rosy grains and aggregates, up to 5 mm across and disseminated within alkalic pegmatites Mount Alluaiv, Lovozero Complex, Kola Peninsula, Russia; associated minerals include potassium feldspar, nepheline, sodalite, cancrisilite (this list) and arfvedsonite.  $\text{NaKMnSi}_4\text{O}_{10}$ . Possibly the manganese analogue of fenaksite. Triclinic, space group  $P1$ ,  $a$  6.993,  $b$  8.219,  $c$  10.007 Å,  $\alpha$  105.11°,  $\beta$  100.76°,  $\gamma$  114.79°,  $Z = 2$ .  $D_{\text{meas}}$ . 2.73,  $D_{\text{calc}}$ . 2.71 g/cm<sup>3</sup>. Optically biaxial negative,  $2V$  73°,  $\alpha$  1.540,  $\beta$  1.551,  $\gamma$  1.557. Named for its chemical composition.

**Mangangordonite.** P.B. Leavens, J.S. White Jr., W. Robinson and J.A. Nelen, 1991. *Neues Jahrb. Min., Mh.*, 169. As bladed, colourless to faintly yellow, crystals to 2 mm in pegmatites at King's Mountain, North Carolina and Newry, Maine, U.S.A.  $(\text{Mn,Fe,Mg})\text{Al}_2(\text{PO}_4)_2(\text{OH})_2(\text{H}_2\text{O})_6$ . Manganese analogue of gordonite. Triclinic, space group  $P\bar{1}$ ,  $a$  5.257,  $b$  10.363,  $c$  7.040 Å,  $\alpha$  105.44°,  $\beta$  113.07°,  $\gamma$  78.69°,  $Z = 1$ .  $D_{\text{meas}}$ . 2.36,  $D_{\text{calc}}$ . 2.319 g/cm<sup>3</sup>. Optically biaxial positive,  $2V_{\text{meas}}$ . 70°,  $2V_{\text{calc}}$ . 71°,  $\alpha$  1.556,  $\beta$  1.561,  $\gamma$  1.571. Named for its compositional relationship to gordonite.

**Manganosegelerite.** A.V. Voloshin, Ya.A. Pakhomovskii and F.N. Tyusheva. 1992. *Zap.*

- Vses. Min. Obshch.*, **121**, 95. [Russian]. Found as yellow or yellow-green, fine-grained aggregates, up to 2 mm across, on mitridatite in fractures within certain granitic pegmatites of the Kola Peninsula, Russia; associated with eosphorite, kingsmountite and manganooan gordonite. Ideally,  $(\text{Mn,Ca})(\text{Mn,Fe}^{2+},\text{Mg})\text{Fe}^{3+}(\text{PO}_4)_2 \cdot (\text{OH}) \cdot 4\text{H}_2\text{O}$ . Manganese analogue of segelerite, overite group. Orthorhombic, space group *Pbca*,  $a$  14.89,  $b$  18.79,  $c$  7.408 Å,  $Z = 8$ .  $D_{\text{meas}}$ . 2.76,  $D_{\text{calc}}$ . 2.74 g/cm<sup>3</sup>. Optically biaxial positive,  $2V_{\text{meas}}$ . 75°,  $2V_{\text{calc}}$ . 70°,  $\alpha$  1.657,  $\beta$  1.668,  $\gamma$  1.691, exhibits pleochroism and marked dispersion. Named for its compositional relationship to segelerite.
- Manganotychite.** A.P. Khomyakov, A. Yu. Bakhchisaraitsev, A.V. Martynova and T.M. Parashenko, 1990. *Vses. Min. Obshch.*, **119**, 46. [Russian]. As pale pink irregular grains to 1 cm and in massive aggregates to 5 cm across in cores of hyper-alkalic pegmatitic veins at Mount Alluaiv, Lovozero Complex, Kola Peninsula, Russia. Ideal formula  $\text{Na}_6\text{Mn}_2(\text{SO}_4)(\text{CO}_3)_4$ . Manganese analogue of tychite and ferrotychite. Cubic, space group *Fd3*,  $a$  13.9951 Å,  $Z = 8$ .  $D_{\text{meas}}$ . 2.70,  $D_{\text{calc}}$ . 2.79 g/cm<sup>3</sup>. Optically isotropic,  $n$  1.544. Named for its compositional relationship to tychite and ferrotychite.
- Maxwellite.** E.E. Foord, P.F. Hlava, J.J. Fitzpatrick, R.C. Erd and R.W. Hinton, 1991. *Neues Jahrb. Min., Mh.*, 363. As red aggregates to 3 mm and prismatic euhedral to subhedral crystals to 1 mm in cavities in rhyolites at Squaw Creek, Black Range district, Catron County and in Willow Spring Draw, Sierra County, New Mexico, U.S.A. Ideal composition  $\text{NaFe}^{3+}(\text{AsO}_4)\text{F}$ . Ferric analogue of durangite; shows solid solutions towards durangite and tilasite. Monoclinic, space group *Aa* or *A2/a*,  $a$  7.161,  $b$  8.780,  $c$  6.687 Å,  $\beta$  114.58°,  $Z = 4$ .  $D_{\text{meas}}$ . 3.90,  $D_{\text{calc}}$ . 3.95 g/cm<sup>3</sup>. Optically biaxial positive,  $2V_{\text{meas}}$ . 86°,  $2V_{\text{calc}}$ . 89°,  $\alpha$  1.748,  $\beta$  1.772,  $\gamma$  1.798, distinctly pleochroic. Named for C.H. Maxwell, previously of the U.S. Geological Survey.
- Mcalpineite.** A.C. Roberts, T. Scott Ercit, A.J. Criddle, G.C. Jones, R. Scott Williams, F.F. Cureton Jr. and M.C. Jensen, 1994. *Min. Mag.*, **58**, 417. Occurs as isolated, emerald green cryptocrystalline crusts (up to 0.5 mm) on quartz at the McAlpine mine, Tuolumne County, California, U.S.A.; mcAlpineite occurs with mariposite, choloalite, keystoneite (this list) and other minerals. Also recorded from the Centennial Eureka mine, Juab County, Utah, U.S.A.  $\text{Cu}_3\text{TeO}_6 \cdot \text{H}_2\text{O}$ . Cubic, space group unknown,  $a$  9.555 Å,  $Z = 8$ .  $D_{\text{calc}}$ . 6.65 g/cm<sup>3</sup>. Optically isotropic; reflectance data are given,  $n$  2.00 (air and 2.02 (oil); brilliant lime-green internal reflections under crossed polars. Named for the deposit.
- McCrillisite.** E.E. Foord, M.E. Brownfield, F.E. Lichte, A.M. Davis and S.J. Sutley, 1994. *Can. Min.*, **32**, 839. Mount Mica pegmatite, South Paris, Oxford County, Maine, U.S.A.  $\text{NaCs}(\text{Be,Li})\text{Zr}_2(\text{PO}_4)_4 \cdot 1-2\text{H}_2\text{O}$ . Tetragonal,  $a$  6.573,  $c$  17.28 Å. Named for D. and P. McCrillis.
- Megacyclite.** A.P. Khomyakov, G.N. Nechelyustov, N.A. Yamnova and D.Yu. Pushcharovsky, 1993. *Proc. Russian Mineral. Soc.*, **122**, 125. [Russian]. As colourless, irregular grains, up to 3 mm, associated with fenaksite, revdite and a host of other minerals in unweathered portions of veined pegmatites from Mount Rasvumchorr, Khibina Complex, Kola Peninsula, Russia.  $\text{Na}_3\text{KSi}_9\text{O}_{18}(\text{OH})_9 \cdot 19\text{H}_2\text{O}$ . Monoclinic, space group *C2<sub>1</sub>/c*,  $a$  24.91,  $b$  11.94,  $c$  14.92 Å,  $\beta$  94.47°,  $Z = 4$ .  $D_{\text{meas}}$ . 1.82,  $D_{\text{calc}}$ . 1.87 g/cm<sup>3</sup>. Optically biaxial negative,  $2V_{\text{meas}}$ . 43°,  $2V_{\text{calc}}$ . 44°,  $\alpha$  1.460,  $\beta$  1.478,  $\gamma$  1.481, strong dispersion. Name alludes to crystal structure, being composed of unusually large ring-like groups of 18 [SiO<sub>4</sub>] tetrahedra.
- Metamunirite.** H.T. Evans Jr., 1991. *Min. Mag.*, **55**, 509. As colourless, radiating, friable needles, to 0.2 mm in sandstones at the Burro and Deremo-Snyder mines, San Miguel County, Colorado, U.S.A.  $\beta\text{-NaVO}_3$ . Orthorhombic, space group *Pnma*,  $a$  14.134,  $b$  3.648,  $c$  5.357 Å,  $Z = 4$ .  $D_{\text{calc}}$ . 2.926 g/cm<sup>3</sup>. Optically biaxial positive; synthetic material has  $2V$  30–40°,  $\alpha$  1.780  $\beta$  1.800,  $\gamma$  >1.800. Named for its compositional relationship to munirite.
- Mikasaite.** H. Miura, K. Niida and T. Hirama, 1994. *Min. Mag.*, **58**, 649. Mikasaite occurs as a white to light brown sublimate in the Palaeogene Ikushunbetsu coal area, Mikasa city, Hokkaido, Japan.  $(\text{Fe}^{3+},\text{Al})_2(\text{SO}_4)_3$ ; the sublimate consists of aggregates of hollow spherical crystals, up to 100  $\mu\text{m}$ . Hexagonal (rhombohedral), space group  $R\bar{3}$ ,  $a$  8.14,  $c$  21.99 Å. Optically uniaxial positive,  $\omega$  1.504,  $\epsilon$  1.518. Named for Mikasa city.
- Mineevite-(Y).** A.P. Khomyakov, L.I. Polezhaeva, N.A. Yamnova and D.Yu. Pushcharovskii, 1992. *Zap. Vses. Min. Obshch.*, **121**, 138. [Russian]. Found as pale green to yellowish-green, irregular grains, up to 1 cm in diameter, together with nahcolite, trona, sidorenkite and other minerals within interstices of K-feldspar crystals in pegmatites from Mount Alluaiv, Lovozero Complex, Kola Peninsula, Russia.  $\text{Na}_{25}(\text{Y,Cd,Dy})_2(\text{CO}_3)_{11}(\text{HCO}_3)_4(\text{SO}_4)_2\text{F}_2\text{Cl}$ . Hexagonal, space group *P6<sub>3</sub>/m*,  $a$  8.811,  $c$  37.03 Å,  $Z = 2$ .  $D_{\text{meas}}$ . 2.85,  $D_{\text{calc}}$ . 2.84 g/cm<sup>3</sup>. Optically uniaxial negative,  $\omega$  1.510,  $\epsilon$  1.536. Weak

yellowish-green fluorescence. Named for D.A. Mineev, renowned Russian mineralogist and geochemist.

- Montesommaite.** R.C. Rouse, P.J. Dunn, J.D. Grice, J.L. Schlenker and J.B. Higgins, 1990. *Amer. Min.*, **75**, 1415. As transparent, colourless, dipyrarnidal crystals with dolomite, calcite, chabazite and natrolite in vesicles in volcanic scoria from Vesuvius-Somma, Campania, Italy.  $(K,Na)_9Al_9Si_{23}O_{64} \cdot 10H_2O$ , A zeolite belonging to the gismondine group. Orthorhombic, space group *Fdd2*,  $a = b$  10.099,  $c$  17.307 Å, although very nearly tetragonal,  $Z = 1$ .  $D_{meas.}$  2.34,  $D_{calc.}$  2.30 g/cm<sup>3</sup>. Optically biaxial negative,  $2V_{meas.}$  35°,  $2V_{calc.}$  39°,  $\alpha$  1.498,  $\beta$  1.506,  $\gamma$  1.507. Named for the locality.
- Morimotoite.** C. Henmi, I. Kusachi and K. Henmi, 1995. *Min. Mag.*, **59**, 143. As black euhedral to subhedral grains, up to 15 mm, in endoskarns at Fuka, Okayama Prefecture, Japan.  $Ca_3TiFe^{2+}Si_3O_{12}$ . Garnet group. Cubic, space group, *Ia3d*,  $a$  12.162 Å.  $D_{meas.}$  3.75,  $D_{calc.}$  3.80 g/cm<sup>3</sup>. Optically isotropic,  $n$  1.995. Named for N. Morimoto, in recognition of his outstanding contributions to the fields of mineralogy and crystallography.
- Mozartite.** R. Basso, G. Lucchetti, L. Zefiro. and A. Palenzona. 1993. *Can. Min.*, **31**, 331. Initially described by A. Palenzona and A. Pozzi. (*Riv. Mineral. Ital.*, 1993, no. 2, 79). As minute, deep red, transparent, anhedral crystals, associated with pectolite, calcite, quartz and hausmannite in veins within ophiolitic metacherts from the Cerchiara mine, Faggiona, La Spezia, Liguria, Italy.  $CaMn^{3+}(OH)SiO_4$ . Manganese analogue of vuagnatite, with which it is isostructural. Orthorhombic, space group  $2_12_12_1$ ,  $a$  5.838,  $b$  7.224,  $c$  8.690 Å,  $Z = 4$ .  $D_{meas.}$  3.63,  $D_{calc.}$  3.68 g/cm<sup>3</sup>. Optically biaxial positive,  $2V_{obs}$  50°,  $\alpha$  1.840,  $\beta$  1.855,  $\gamma$  1.920, strongly pleochroic. Named for the classical music composer W.A. Mozart. Recently reported from the Kalahari manganese field, South Africa.
- Mrázekite.** T. Ridkosi, V. Srein, J. Fábry, J. Hybler and B.A. Maximov, 1992. *Can. Min.*, **30**, 215. As bright blue needles to 2 mm, in a quartz matrix, from the Reiner mine, Lubietova (Libethen), near Banská Bystrica, Slovakia.  $Bi_2Cu_3(OH)_2O_2(PO_4)_2 \cdot 2H_2O$ . Monoclinic, space group *C2/m*,  $a$  12.359,  $b$  6.331,  $c$  9.060 Å,  $\beta$  122.71°,  $Z = 2$ .  $D_{meas.}$  4.90,  $D_{calc.}$  5.013 g/cm<sup>3</sup>. Optically biaxial negative,  $2V_{meas.}$  68°, refractive indices between 1.8 and 1.9. Named for Z. Mrázek, co-discoverer of the phase. Not the mrazekite (27th List) of Gh. Neacsu (1970).
- Mummeite.** S. Karup-Møller and E. Makovicky. 1992. *Neues Jahrb. Min., Mh.*, 555. As grey aggregates of randomly intergrown short, columnar crystals, up to 1 mm in quartz from the Alaska mine, San Juan County, Colorado, U.S.A.  $(Ag,Cu,Pb,Bi)_{11}S_{13}$ . Member of the pavonite homologues series ( $N = 8$ ). Monoclinic, space group *C2/m* or *Cm*,  $a$  13.47,  $b$  4.06,  $c$  21.63 Å,  $\beta$  92.9°,  $Z = 2$ .  $D_{calc.}$  6.79 g/cm<sup>3</sup>. Reflectance data are given; exhibits pronounced anisotropism. Named for W.G. Mumme of CSIRO, Melbourne, Australia.
- Nalipoite.** G.Y. Chao and T.S. Ercit, 1991. *Can. Min.*, **29**, 565. As white, pale blue or pale yellow anhedral to subhedral blocky grains to 0.2 mm in sodalite-analcime-microcline xenoliths at the Poudrette quarry, Mont Saint-Hilaire, Quebec, Canada. Ideal formula  $NaLi_2(PO_4)$ . Orthorhombic, space group *Pmnb*,  $a$  6.884,  $b$  9.976,  $c$  4.927 Å,  $Z = 4$ .  $D_{meas.}$  2.58,  $D_{calc.}$  2.612 g/cm<sup>3</sup>. Optically biaxial negative,  $2V_{meas.}$  49°,  $2V_{calc.}$  41°,  $\alpha$  1.533,  $\beta$  1.540,  $\gamma$  1.541, distinctly pleochroic. Previously described as UK 63; named for its chemical composition.
- Namansilite.** V.V. Kalinin, I.M. Marsii, Yu.P. Dikov, N. V. Troneva and N.V. Trubkin. 1992. *Zap. Vses. Min. Obshch.*, **121**, 89. [Russian]. Occurs as dark red to orange red, equant to elongate grains, up to 0.6 mm, in veins with taikanite and pectolite within braunite ore from the Irnimiisk deposit, Russia. The species was perhaps first described from New South Wales, Australia by P.M. Ashley (*Austral. J. Earth Sci.*, 1986, **33**, 443).  $NaMn^{3+}S_2O_6$ . Monoclinic, space group *C2/c* or *Cc*,  $a$  9.513,  $b$  8.615,  $c$  5.356,  $\beta$  105.12°,  $Z = 4$ .  $D_{meas.}$  3.60 g/cm<sup>3</sup>. Optically biaxial negative,  $2V$  15–20°,  $\alpha$  1.746,  $\beta$  1.769,  $\gamma$  1.837, distinctly pleochroic. Named for its chemical composition.
- Nchwangingite.** D. Nyfeler, T. Armbruster, R. Dixon and V. Bermanec, 1995. *Amer. Min.*, **80**, 377. Nchwangingite occurs as brown radiating balls of acicular colourless crystals up to 5 mm in diameter associated with bultfonteinite, calcite and green chlorite within a mineralised pocket in Section 27 South, N'Chwaning II Mine, Farm N'Chwaning 267, Hotazel district, Northern Cape Province, South Africa; also recorded from the nearby Wessels mine.  $Mn_2^{2+}SiO_3(OH)_2 \cdot H_2O$ . A pyroxene-related inosilicate. Orthorhombic, space group *Pca2\_1*,  $a$  12.672,  $b$  7.217,  $c$  5.341 Å,  $Z = 4$ .  $D_{calc.}$  3.202 g/cm<sup>3</sup>. Optically biaxial negative,  $2V\alpha$  54.4°,  $\alpha$  1.681,  $\beta$  1.688,  $\gamma$  1.690. Named for the mine.
- Nickenichite.** M. Auerhammer, H. Effenberger, G. Hentschel, Th. Reinecke, and E. Tillmanns, 1993. *Mineral. Petrol.*, **48**, 153. Bright blue fibrous and prismatic grains up to 0.20 mm long, with vanadinite in a cavity within scoria from a

Quaternary volcano near Nickenich, Nickenicher Sattel, Eifel, Germany  $\text{Na}_{0.8}\text{Ca}_{0.4}\text{Cu}_{0.4}(\text{Mg,Fe})_3(\text{AsO}_4)_3$ . Monoclinic, space group  $C2/c$ ,  $a$  11.882,  $b$  12.769,  $c$  6.647 Å,  $\beta$  112.81°,  $Z = 4$ . Structurally-related to johillerite and o'danielite.  $D_{\text{calc}}$ . 4.06 g/cm<sup>3</sup>. Optically biaxial positive,  $2V_{\text{meas}}$ . 60°,  $2V_{\text{calc}}$ . 84°,  $\alpha$  1.714,  $\beta$  1.744,  $\gamma$  1.783. Named for the locality.

**Olekminskite.** A.A. Konev, E.I. Borobev, L.F. Piskunova, Z.F. Ushchapovskaya and G.A. Tichonova. 1991. *Zap. Vses. Min. Obshch.*, **120**, 89. [Russian]. As needle-like crystals forming spherulitic aggregates up to 0.15 mm in barytocalcite-quartz veins from the Kedrovyy massif, Aldan Shield, Yakutia, Russia.  $\text{Sr}(\text{Sr,Ca,Ba})(\text{CO}_3)_2$ . Olekminskite-paralstonite series, with compositions extending through to paralstonite. Hexagonal (rhombohedral), space group  $P321$ ,  $a$  8.66,  $c$  6.08 Å.  $D_{\text{meas}}$ . 3.70,  $D_{\text{calc}}$ . 3.650–3.682 g/cm<sup>3</sup>. Optically uniaxial negative,  $\omega$  1.670,  $\epsilon$  1.527. Named for the nearby city of Olekminsk.

**Orlymanite.** D.R. Peacor, P.J. Dunn and J.A. Nelen, 1990. *Amer. Min.*, **75**, 923. Occurs as dark brown radial spheres, embedded in massive orlymanite in a sample of hydrothermal ore, presumably from the Wessels mine, Hotazel district, Northern Cape Province, South Africa. Tentative formula given as  $\text{Ca}_4\text{Mn}_3\text{Si}_8\text{O}_{20}(\text{OH})_6 \cdot 2\text{H}_2\text{O}$ . Related to the gyrolite family. Hexagonal (rhombohedral), space group  $P\bar{3}$  or  $P3$ ,  $a$  9.60,  $b = c$  35.92 Å,  $Z = 5$ .  $D_{\text{meas}}$ . 2.7–2.8,  $D_{\text{calc}}$ . 2.93 g/cm<sup>3</sup>. Optically uniaxial negative,  $\omega$  1.598. Named for Orlando Lyman, founder of the Lyman House Memorial Museum, Hilo, Hawaii.

**Orschallite.** C. Wiedenthaler, E. Tillinanns and G. Hentschel, 1993. *Mineral. Petrol.*, **48**, 167. Colourless, transparent cubes, up to 0.3 mm, in cavities within compact areas of Quaternary melilite nepheline leucitites at Hannebacher Ley, Eifel, Germany; occurs with clinopyroxene, apatite and phillipsite.  $\text{Ca}_3(\text{SO}_3)_2\text{SO}_4 \cdot 12\text{H}_2\text{O}$ . Hexagonal (rhombohedral), space group,  $R\bar{3}c$ ,  $a$  11.350,  $c$  28.321 Å,  $Z = 6$ . Optically uniaxial positive,  $\omega$  1.4941,  $\epsilon$  1.4960. Named for P. Orschall, who first discovered the mineral at this locality.

**Padmaite.** Yu.S. Polekhovskij, A.V. Voloshin, I.P. Tarasova, S.A. Nikitin, Ya.A. Pakhomovskii, Yu.P. Men'shikov, Yu.L. Ktretzer and T.I. Kolytsheva. 1991. *Zap. Vses. Min. Obshch.*, **120**, 85. [Russian]. Occurs as isometric, irregular grains, up to 0.2 mm and as intergrowths with palladium minerals in metasomatites from the Padma River region, southern Karelia, Russia.  $\text{PdBiSe}$ . Cubic, space group  $P4_132$  or  $P4_332$ ,  $a = 6.448$  Å,  $Z = 4$ .  $D_{\text{calc}}$ . 9.86 g/cm<sup>3</sup>. Optically

isotropic; reflectance data are given. Named for the region.

**Parafransoletite.** A.R. Kampf, P.J. Dunn and E.E. Foord, 1992. *Amer. Min.*, **77**, 848. Occurs as colourless to white, submillimetric to millimetric spear-shaped blades, bow tie-like aggregates and radial sprays on fracture surfaces in beryl from the Tip Top Pegmatite, Custer County, South Dakota, U.S.A.  $\text{Ca}_3\text{Be}_2(\text{PO}_4)_2(\text{PO}_3\text{OH})_2 \cdot 4\text{H}_2\text{O}$ . Triclinic, space group  $P1$ ,  $a$  7.327,  $b$  7.696,  $c$  7.061 Å,  $\alpha$  94.903°,  $\beta$  96.820°,  $\gamma$  101.865°,  $Z = 1$ .  $D_{\text{meas}}$ . 2.54,  $D_{\text{calc}}$ . 2.56 g/cm<sup>3</sup>. Optically biaxial positive,  $2V$  33°,  $\alpha$  1.562,  $\beta$  1.564,  $\gamma$  1.588. Dimorphous with fransoletite and named accordingly.

**Paranatisite.** A.P. Khomyakov, L.I. Polezhaeva and E.V. Sokolova. 1992. *Zap. Vses. Min. Obshch.*, **121**, 133. [Russian]. Paranatisite occurs as yellow to orange yellow to brownish-yellow grains and aggregates, up to 5 mm diameter in ijolite-urtite pegmatites at Mount Yukspor, Khibina Complex, Kola Peninsula, Russia; occurs with lepidomelane, aegirine and other minerals.  $\text{Na}_2\text{TiSiO}_5$ . Dimorphous with natisite. Orthorhombic, space group  $Pcnn$  or  $Pmma$ ,  $a$  9.827,  $b$  9.167,  $c$  4.799 Å,  $Z = 4$ .  $D_{\text{meas}}$ . 3.12,  $D_{\text{calc}}$ . 3.07 g/cm<sup>3</sup>. Optically biaxial positive,  $2V_{\text{meas}}$ . 20°,  $2V_{\text{calc}}$ . 23°,  $\alpha$  1.740,  $\beta$  1.741,  $\gamma$  1.765, weakly pleochroic. Named for its relationship to natisite.

**Parkinsonite.** R.F. Symes, G. Cressey, A.J. Criddle, C.J. Stanley, J.G. Francis and G.C. Jones, 1994. *Min. Mag.*, **58**, 59. Found as compact clusters or patches (up to 3 mm) consisting of red to purplish-red, bladed crystals up to 300  $\mu\text{m}$ , in lead oxychloride assemblages in limestones from the Merehead quarry, Cranmore (Somerset) and at the Wesley mine, Didsbury, (near Bristol), England, U.K.  $(\text{Pb,Mo},\square)_8\text{O}_8\text{Cl}_2$ . Tetragonal, possible space groups  $I4/mmm$ ,  $I42m$ ,  $I4m2$ ,  $I4/m$  or  $I422$ ,  $a$  3.988,  $c$  22.34 Å,  $Z = 1$ .  $D_{\text{meas}}$ . 7.32 (for synthetic material),  $D_{\text{calc}}$ . 7.39 g/cm<sup>3</sup>. Optically uniaxial negative,  $\omega$  2.58,  $e'$  2.42. Named for R.F.D. Parkinson, who first found the mineral. The name originally appeared in the 36th List (Alabaster, 1989) but now has accredited species status.

**Pengzhizhongite-6H.** J. Chen, G. Yang, Z. Pan, N. Shi and P. Zhizhong, 1989. *Acta Min. Sinica*, **9**, 20. [Chinese, English abstract]. As light yellowish brown to light yellow tabular crystals, to 1 mm long, from tungsten deposits of the Anhua area, Hunan Province, China. Simplified formula  $(\text{Mg,Zn,Fe,Al})_4(\text{Sn,Fe})_2(\text{Al},\square)_{10}\text{O}_{22}(\text{OH})_2$ . Magnesium analogue of nigerite-6H. Hexagonal (rhombohedral), space group  $P\bar{3}m$ ,  $a$  5.692,  $c$  13.78 Å,  $Z = 1$ .  $D_{\text{meas}}$ . 4.22,  $D_{\text{calc}}$ . 4.16 g/cm<sup>3</sup>. Optically uniaxial positive,  $\omega$  1.802,  $\epsilon$  1.814. Named for the late Peng Zhizhong one of the

authors, who had initially determined its crystal structure in 1981. Pengzhizhongite-24R is also reported by the same authors.

- Pepprosiite-(Ce).** G. Della Ventura, G.C. Parodi, A. Mottana and M. Chaussidon, 1993. *Eur. J. Mineral.*, **5**, (see also F.S. Stoppani and G. Penco, 1994. *Riv. Mineral. Ital.*, **17**, 48.) Occurs as light yellow, platy, well-cleaved grains between sanidine crystals in a sanidinite ejectum within pyroclastic rocks in the Monte Cavalluccio area, Sacrofano Complex, Campagnano, Latium, Italy; associated minerals include aegirine-augite, a hellandite-group mineral and zircon.  $(\text{Ce}, \text{La})\text{Al}_2\text{B}_3\text{O}_9$ . Hexagonal, space group  $P\bar{6}2m$ ,  $a$  4.610,  $c$  9.358 Å,  $Z$  1.  $D$  3.45 g/cm<sup>3</sup>. Optically uniaxial,  $\omega$  1.703,  $\epsilon$  1.711. Named for Guiseppe ('Pep') Rossi of Pavia.
- Perraultite.** G. Chao, 1991. *Can. Min.*, **29**, 355 (see also L. Horvath and R.A. Gault, 1990. *Min. Rec.*, **21**, 284). Found as orange brown, prismatic to tabular crystals from Mont St. Hilaire, Quebec, Canada. Ideal formula  $\text{Na}_2\text{KBaMn}_3\text{Ti}_4\text{Si}_8\text{O}_{32}(\text{OH})_5 \cdot 2\text{H}_2\text{O}$ . Analogous to jinshajiangite. Monoclinic, space group  $C2$ ,  $Cm$  or  $C2/m$ ,  $a$  10.820,  $b$  13.843,  $c$  20.93 Å,  $\beta$  95.09°,  $Z$  = 4.  $D_{\text{meas}}$  3.71,  $D_{\text{calc}}$  3.81 g/cm<sup>3</sup>. Optically biaxial negative,  $2V_{\text{meas}}$  66°,  $2V_{\text{calc}}$  64°,  $\alpha$  1.785,  $\beta$  1.81,  $\gamma$  1.82, pronounced pleochroism. Named for G. Perrault of Ecole Polytechnique, Montreal, Quebec. Perraultite is the unnamed mineral UK 17 of G.Y. Chao *et al.* (*Can. Min.*, 1967, **9**, 109.).
- Peterbaylissite.** A.C. Roberts, T.S. Ercit, L.A. Groat, A.J. Criddle, R.C. Erd and R.S. Williams, 1995. *Can. Min.*, **33**, 47.  $\text{Hg}_3\text{CO}_3\text{OH} \cdot 2\text{H}_2\text{O}$ . Orthorhombic,  $a$  11.130,  $b$  11.139,  $c$  10.725 Å,  $Z$  = 8. From Clear Creek claim, San Benito Co., California, U.S.A. Named for Prof. Peter Bayliss.
- Petersenite-(Ce).** J.D. Grice, J. Van Velthuisen and R.A. Gault, 1994. *Can. Min.*, **32**, 405. Occurs as yellow, mauve and grey, acicular crystals and prisms, up to 7 mm, from Mont Saint-Hilaire, Quebec, Canada.  $\text{Na}_4(\text{Ce}, \text{La})_2(\text{CO}_3)_5$ . Monoclinic, space group  $P2_1$ ,  $a$  20.84,  $b$  6.374,  $c$  10.578,  $\beta$  120.43°,  $Z$  = 4.  $D_{\text{meas}}$  3.69,  $D_{\text{calc}}$  3.67 g/cm<sup>3</sup>. Optically biaxial,  $2V_{\text{calc}}$  89.8°,  $\alpha$  1.623,  $\beta$  1.636,  $\gamma$  1.649. Named for O.V. Petersen, of the Geology Museum, Copenhagen, Denmark, and for the dominant rare earth component.
- Petitjeanite.** W. Krause, K. Belendorff and H.-J. Bernhardt, 1993. *Neues Jahrb. Min., Mh.*, 487. Occurs with bismutite, mixite and reichenbachite as white to pale pink, spherical aggregates or crusts of intergrown crystals (up to 0.2 mm) in silicified baryte veins at Gaderheim and Reichenbach, Bensheim district, Odenwald, Hesse, Germany.  $\text{Bi}_3\text{O}(\text{OH})(\text{PO}_4)_2$ . Phosphate analogue of preisingerite and schumacherite, forming a series with both minerals. Triclinic, space group  $P1$ ,  $a$  9.798,  $b$  7.250,  $c$  6.886 Å,  $\alpha$  88.28°,  $\beta$  115.27°,  $\gamma$  110.70°,  $Z$  = 2.  $D_{\text{calc}}$  6.99 g/cm<sup>3</sup>. Optically biaxial positive,  $2V$  75°,  $\alpha$  2.06,  $\gamma$  2.13, distinct dispersion. Named for K. Petitjean, a mineral collector who first discovered the species.
- Pitiglianoite.** S. Merlini, M. Mellini, E. Bonaccorsi, M. Pasero, L. Leoni, and P. Orlandi, 1991. *Amer. Min.*, **76**, 2003. As colourless, well-developed, hexagonal prisms to 4 mm in ejected metasomatic blocks at Casa Collina, near Pitigliano, Tuscany, Italy. Ideal formula  $\text{Na}_6\text{K}_2\text{Si}_6\text{Al}_6\text{O}_{24}(\text{SO}_4) \cdot 2\text{H}_2\text{O}$ . Feldspathoid, cancrinite-vishnevitte group. Hexagonal, space group  $P6_3$ ,  $a$  22.121,  $c$  5.221 Å,  $Z$  = 3.  $D_{\text{meas}}$  2.37,  $D_{\text{calc}}$  2.394 g/cm<sup>3</sup>. Optically uniaxial negative,  $\omega$  1.508,  $\epsilon$  1.506. Named for the locality.
- Poldervaartite.** Y. Dai, G.E. Harlow and A.R. McGhie, 1993. *Amer. Min.*, **78**, 1082. Initially described but not named by Von Bezing *et al.* (*Min. Rec.*, **22**, 279). Found as colourless to milky white wheat-sheaf polycrystals, associated with bultfonteinite, braunite, hausmannite, henritermierite and other minerals in Wessels-type ore of the Wessels mine, near Hotazel, Northern Cape Province, South Africa.  $\text{Ca}(\text{Ca}_{0.5}\text{Mn}_{0.5})(\text{SiO}_3)(\text{OH})(\text{OH})$ . Orthorhombic, space group  $Pbca$ ,  $a$  9.398,  $b$  9.139,  $c$  10.535 Å,  $Z$  = 8.  $D_{\text{meas}}$  2.91,  $D_{\text{calc}}$  2.90 g/cm<sup>3</sup>. Optically biaxial positive,  $2V_{\text{meas}}$  65°,  $2V_{\text{calc}}$  63°,  $\alpha$  1.634,  $\beta$  1.640,  $\gamma$  1.656, pleochroic. Named for A. Poldervaart, in recognition of his contributions to South African geology.
- Polyphite.** A.P. Khomyakov, G.N. Nechelyustov, E.A. Sokolova and G.I. Dorokhova, 1992. *Zap. Vses. Min. Obshch.*, **121**, 105. [Russian]. As light brown flakes up to 3 mm across, and associated with a host of other minerals from the alkaline pegmatites of Mount Alluaiv, Lovozero Complex, Kola Peninsula, Russia.  $\text{Na}_{17}\text{Ca}_3\text{Mg}(\text{Ti}, \text{Mn})_4[\text{Si}_2\text{O}_7]_2[\text{PO}_4]_6\text{O}_2\text{F}_6$ . Lomonosovite group. Triclinic, space group  $P1$ ,  $a$  5.412,  $b$  7.079,  $c$  26.56 Å,  $\alpha$  92.21°,  $\beta$  93.51°,  $\gamma$  90.10°,  $Z$  = 1.  $D_{\text{meas}}$  3.07,  $D_{\text{calc}}$  3.00 g/cm<sup>3</sup>. Optically biaxial negative,  $2V\alpha$  56°,  $\alpha$  1.600,  $\beta$  1.658,  $\gamma$  1.676, pleochroic. Named for its chemical composition and in particular to the phosphate content.
- Potassium-fluor richterite.** G. Della Ventura, G.C. Parodi and A. Maras, 1992. *Rend. Lincei, Sci. Fis. Nat. ser.* **9**, **3**, 239. Light grey, euhedral, prismatic crystals, up to 0.5 cm with calcite and diopside in skarn ejectum within pyroclastic rocks from near San Vito, Monte Somma, Campania, Italy. Ideally  $(\text{K}, \text{Na})(\text{Ca}, \text{Na})_2\text{Mg}_5\text{Si}_8\text{O}_{22}(\text{F}, \text{OH})$ . Amphibole group. Monoclinic, space group  $C2/m$ ,  $a$  9.978,  $b$  17.991,  $c$  5.269 Å,  $\beta$  104.90°.  $D_{\text{meas}}$  3.06,  $D_{\text{calc}}$

- 3.03 g/cm<sup>3</sup>. Optically biaxial negative,  $2V_{\text{calc}}$ . 79.4°,  $\alpha$  1.613,  $\beta$  1.623,  $\gamma$  1.630, non-pleochroic. Named for its compositional relationship to richterite.
- Povondraite.** J.D. Grice, T. S. Ercit and F.C. Hawthorne. 1993. *Amer. Mineral.*, **78**, 433. Redefinition of ferridravite.  $\text{NaFe}_3^{2+}\text{Fe}_6^{3+}(\text{BO}_3)_3\text{-(Si}_6\text{O}_{18})(\text{O},\text{OH})_4$ . Hexagonal (rhombohedral), space group  $R3m$ ,  $a$  16.186,  $c$  7.444 Å. Named for P. Povondra of Karlovy University (Czech Republic), in recognition of his extensive work, on the tourmaline group.
- Pringleite.** A.C. Roberts, J.A.R. Stirling, J.D. Grice, P.C. Burns, B.V. Roulston, J.D. Curtis and J.L. Jambor, 1993. *Can. Min.*, **31**, 795. As rare colourless to orange, platy subhedral to anhedral cleaved masses, up to 4 mm, in the Potash Company of America mine at Penobsquis, Sussex, New Brunswick, Canada. Associated minerals include hilgardite-1A, halite and sylvite.  $\text{Ca}_9\text{B}_{26}\text{O}_{34}(\text{OH})_{24}\text{Cl}_4\cdot 13\text{H}_2\text{O}$ , dimorphous with ruitenbergite (this list). Triclinic, space group  $P1$ ,  $a$  12.759,  $b$  13.060,  $c$  9.733 Å,  $\alpha$  102.14°,  $\beta$  102.03°,  $\gamma$  85.68°,  $Z = 1$ .  $D_{\text{meas}}$ . 2.22,  $D_{\text{calc}}$ . 2.11 g/cm<sup>3</sup>. Optically biaxial positive,  $2V_{\text{meas}}$ . 77°,  $2V_{\text{obs}}$  71.4°,  $\alpha$  1.537,  $\beta$  1.548,  $\gamma$  1.570, non-pleochroic. Named for G.J. Pringle in recognition of his contributions to Canadian mineralogy.
- Qilianshanite.** S. Luo, J. Lu, J.L. Wang and J. Zhu, 1993. *Acta Min. Sinica*, **13**, 97. [Chinese, English abstract]. Predominantly as colourless aggregates, up to 4 mm, with quartz, calcite, tinalconite and nahcolite in the Juhongtu borate deposit, Qilian Mountains, Qinhai Province, China.  $\text{NaHCO}_3\cdot\text{H}_3\text{BO}_3\cdot 2\text{H}_2\text{O}$ . Monoclinic, space group  $C2$ ,  $a$  16.119,  $b$  6.928,  $c$  6.730 Å,  $\beta$  100.46°,  $Z = 4$ . Polysynthetically-twinning.  $D_{\text{meas}}$ . 1.706,  $D_{\text{calc}}$ . 1.639 g/cm<sup>3</sup>. Optically biaxial negative,  $2V$  50°,  $\alpha_{\text{calc}}$ . 1.351,  $\beta$  1.459,  $\gamma$  1.486. Named for the Qilian Mountains.
- Quadruphite.** A.P. Khomyakov, G.N. Nechelyustov, E.A. Sokolova and G.I. Dorokhova. 1992. *Zap. Vses. Min. Obshch.*, **121**, 105. [Russian]. As light brown flakes up to 3 mm across and, associated with a host of other minerals from the alkaline pegmatites of Mount Alluaiv, Lovozero Complex, Kola Peninsula, Russia.  $\text{Na}_{11}\text{CaMgTi}_4\text{-}[\text{Si}_2\text{O}_7]_2[\text{PO}_4]_4\text{O}_4\text{F}_2$ . Lomonosovite group. Triclinic, space group  $P1$ ,  $a$  5.415,  $b$  7.081,  $c$  20.34 Å,  $\alpha$  86.85°,  $\beta$  94.40°,  $\gamma$  89.94°,  $Z = 1$ .  $D_{\text{meas}}$ . 3.12,  $D_{\text{calc}}$ . 3.11 g/cm<sup>3</sup>. Optically biaxial negative,  $2V$  62°,  $\alpha$  1.620,  $\beta$  1.678,  $\gamma$  1.697, pleochroic. Named for the number of phosphate groups in the formula unit.
- Rabejacite.** M. Deliens and P. Piret, 1993. *Eur. J. Mineral.*, **5**, 873. [French]. Bright to amber yellow, acicular crystals, up to 0.1 mm, with gypsum and secondary uranium minerals in altered pitchblende from Rabejac and Mas d'Alary, Lodève district, Hérault Department, France.  $\text{Ca}(\text{UO}_2)_4(\text{SO}_4)_2(\text{OH})_6\cdot 6\text{H}_2\text{O}$ . Orthorhombic, space group not determinable,  $a$  8.73,  $b$  17.09,  $c$  15.72 Å,  $Z = 4$ .  $D_{\text{meas}}$ . 4.1,  $D_{\text{calc}}$ . 4.31 g/cm<sup>3</sup>. Optically biaxial negative,  $2V_{\text{meas}}$ . 68°,  $\alpha_{\text{calc}}$ . 1.617,  $\beta$  1.710,  $\gamma$  1.758, strongly pleochroic. Fluorescent under both short- and long-wave ultraviolet light. Named for the deposit.
- Radtkeite.** J.K. McCormack, F.W. Dickson and M.P. Leshendok, 1991. *Amer. Min.*, **76**, 1715. As yellow-orange, micron-sized grains and prismatic crystals up to 30  $\mu\text{m}$ , in altered tuffaceous sediments at the McDermitt mercury deposit, Humboldt County, Nevada, U.S.A.  $\text{Hg}_3\text{S}_2\text{ClH}$ . Orthorhombic, possible space groups  $Fmmm$ ,  $F222$  or  $Fmm2$ ,  $a$  16.859,  $b$  20.27,  $c$  9.133 Å,  $Z = 16$ .  $D_{\text{meas}}$ . 7.0,  $D_{\text{calc}}$ . 7.05 g/cm<sup>3</sup>. Optically biaxial positive,  $2V$  approximately 35°; refractive indices  $>2$ . Named for A.S. Radtke in recognition of his work on Carlin-type gold deposits.
- Ravatite.** L. Nasdala and I.V. Pekov. 1993. *Eur. J. Mineral.*, **5**, 699. Occurs as colourless to white to pale grey, platy crystals, to a few hundred  $\mu\text{m}$ , with native selenium and a liquid bitumen. Found as a sublimation product from the natural combustion of Middle Jurassic brown coal seams from near Ravat, Tadzhikistan.  $\text{C}_{14}\text{H}_{10}$ . Natural analogue of phenanthrene. Monoclinic, space group  $P2_1$ ,  $a$  8.392,  $b$  6.181,  $c$  9.558 Å,  $\beta$  98.48°,  $Z = 2$ .  $D_{\text{meas}}$ . 1.11,  $D_{\text{calc}}$ . 1.207 g/cm<sup>3</sup>. Optically biaxial positive,  $2V \sim 90^\circ$ ,  $n$  1.75–1.95. Named for the locality.
- Reppiaite.** R. Basso, G. Lucchetti, L. Zefiro and A. Palenzona. 1992. *Z. Kristallogr.*, **201**, 223. Found as orange-red aggregates of minute tabular crystals in fractures with manganiferous cherts at the Gambatesa mine, Reppia, Val Graveglia, Liguria, Italy.  $\text{Mn}_5(\text{OH})_4(\text{VO}_4)_2$ . Monoclinic, space group  $C2/m$ ,  $a$  9.604,  $b$  9.558,  $c$  5.3930 Å,  $\beta$  98.45°,  $Z = 2$ .  $D_{\text{meas}}$ . 3.92,  $D_{\text{calc}}$ . 3.91 g/cm<sup>3</sup>. Optically biaxial negative, large  $2V$ ,  $\alpha'$  1.803,  $\gamma'$  1.810, weakly pleochroic. Named for the locality.
- Rorisite.** B.V. Chesnokov, T.P. Nishanbaev and L.F. Bazhenova. (1990). *Zap. Vses. Min. Obshch.*, **119**, 73. [Russian]. As transparent, colourless, tabular crystals to 1 mm within carbonised wood fragments in burnt dumps at Kopeysk, Chelyabinsk coal basin, southern Urals, Russia.  $\text{CaFCl}$ . Isostructural with matlockite and a member of the matlockite group. Tetragonal, space group  $P4/nmm$ ,  $a$  3.8903,  $c$  6.810 Å,  $Z = 2$ .  $D_{\text{meas}}$ . 2.78,  $D_{\text{calc}}$ . 2.94 g/cm<sup>3</sup>. Optically uniaxial negative,  $\omega$  1.668,  $\epsilon$  1.635. Named from the Latin for dew, alluding to the dew-like

- droplets that cover the mineral in moist air. Perhaps first described as an unnamed phase from Tyrny Auz, Caucasus (see I.V. Kulikov, V.E. Devyatov and A.V. Gromov, 1982. *Izvest. Vyssh. Uchebn. Zaved. geol. Razved.*, **25**, 120).
- Rosenbergite.** F. Olmi, C. Sabelli and R. Trostiferroni. 1994. *Eur. J. Miner.*, **5**, 1167. Rosenbergite occurs as radiating tufts of colourless prisms, up to 0.25 mm, in highly-silicified limestones in the Cetine mine, Tuscany, Italy. Initially described as a volcanic sublimate from Mount Erebus, Ross Island, Antarctica.  $\text{AlF}_3 \cdot 3\text{H}_2\text{O}$ . Tetragonal, space group  $P4/n$ ,  $a$  7.715,  $c$  3.648 Å,  $Z = 2$ .  $D_{\text{meas.}}$  2.10,  $D_{\text{calc.}}$  2.111 g/cm<sup>3</sup>. Optically uniaxial negative,  $\gamma$  1.403,  $\epsilon$  1.427. Named for P.E. Rosenberg, of Washington State University, who first described the Antarctic phase (*Amer. Min.*, 1988, **73**, 855).
- Roshchinite.** E.M. Spiridonov, I.V. Petrova, D.M. Dashevskaya, E. P. Balashov and L.M. Klimova, 1990. *Dokl. Akad. Nauk, SSSR*, **31**, 197. [Russian]. As short, prismatic, partly-rounded crystals, to 4 mm, intergrown with calcite and gold from the Kvartsitov Gorki Au deposit, northern Kazakhstan. Ideal formula  $\text{Ag}_{19}\text{Pb}_{10}\text{Sb}_{51}\text{S}_{96}$ . Orthorhombic, space group  $Pmna$ ,  $a$  12.946,  $b$  19.048,  $c$  16.932,  $Z = 1$ .  $D_{\text{meas.}}$  5.265,  $D_{\text{calc.}}$  5.263 g/cm<sup>3</sup>. Silver white with bluish tint in reflected light; reflectance values given. Named for the Kazakh geologist, Yu.V. Roschin.
- Rouvilleite.** A.M. McDonald, G.Y. Chao, and R.A. Ramik, 1991. *Can. Min.*, **29**, 107. As pale tan to colourless, irregular crystalline masses to 3 mm across in sodalite syenite inclusions at the Poudrette quarry, Mont Saint-Hilaire, Rouville County, Quebec, Canada. Ideal formula  $\text{Na}_3(\text{Ca},\text{Mn})_2(\text{CO}_3)_3\text{F}$ . Monoclinic, space group  $Cc$  or  $C2/c$ ,  $a$  8.043,  $b$  15.812,  $c$  7.030 Å,  $\beta$  101.16°,  $Z = 4$ .  $D_{\text{meas.}}$  2.67,  $D_{\text{calc.}}$  2.69 g/cm<sup>3</sup>. Optically biaxial negative,  $2V_{\text{meas.}}$  25°,  $2V_{\text{calc.}}$  30°,  $\alpha$  1.472,  $\beta$  1.562,  $\gamma$  1.569, non-pleochroic. Named for the locality. Formerly sample UK 26.
- Ruitenbergitte.** A.C. Roberts, J.A.R. Stirling, J.D. Grice, P.C. Burns, B.V. Roulston, J.D. Curtis and J.L. Jambor, 1993. *Can. Min.*, **31**, 795. As a single grain measuring 7 mm, in the Potash Company of America mine at Penobsquis, Sussex, New Brunswick, Canada.  $\text{Ca}_9\text{B}_{26}\text{O}_{34}(\text{OH})_{24}\text{Cl}_4 \cdot 13\text{H}_2\text{O}$ . Dimorphous with pringleite (this list). Monoclinic, space group  $P2_1$ ,  $a$  19.88,  $b$  9.715,  $c$  17.551 Å,  $\beta$  114.85°,  $Z = 2$ .  $D_{\text{calc.}}$  2.13 g/cm<sup>3</sup>. Optically biaxial positive,  $2V_{\text{meas.}}$  47°,  $2V_{\text{calc.}}$  42.5°,  $\alpha$  1.542,  $\beta$  1.545,  $\gamma$  1.565, non-pleochroic. Named for A.A. Ruitenbergt in recognition of his contributions to the mineral industry in New Brunswick.
- Samfowlerite.** R.C. Rouse, D.R. Peacor, P.J. Dunn, S.-C. Su, P.H. Ci and H. Yeats, 1994. *Can. Min.*, **32**, 43. Found as colourless crystals, up to 0.05 mm across, in andradite-lined vugs in franklinite-willemite ore from Franklin, Sussex County, New Jersey, U.S.A.  $\text{Ca}_{30}\text{Mn}_6\text{Zn}_5\text{Be}_{10}\text{Si}_{28}\text{O}_{113}\text{F}_{2.4}\text{H}_{19}$ . Monoclinic, space group  $P2_1/c$ ,  $a$  9.068,  $b$  17.992,  $c$  14.586,  $\beta$  104.86°,  $Z = 2$ .  $D_{\text{meas.}}$  3.28,  $D_{\text{calc.}}$  3.29–3.31 g/cm<sup>3</sup>. Optically biaxial negative,  $2V$  29.0°,  $\alpha$  1.674,  $\beta$  1.680,  $\gamma$  1.681, weakly fluorescent. Named for Samuel Fowler for his pioneering studies on the Franklin deposit.
- Schwertmannite.** J.M. Bingham, L. Carlson and E. Murad, 1994. *Min. Mag.*, **58**, 641. Occurs with other sulphates as an ochreous precipitate released from acidic, sulphate-rich waters from the Pyhäsalmi sulphide deposit, Oulu Province, Finland. Schwertmannite, a yellowish-brown, fibrous, poorly crystalline mineral, is recorded from an additional 40 localities world wide.  $\text{Fe}_{16}^{\text{IV}}\text{O}_{16}(\text{OH})_y(\text{SO}_4)_z \cdot n\text{H}_2\text{O}$ . Tetragonal, probable space group is  $P4/m$ ,  $a$  10.66,  $c$  6.04 Å,  $Z = 1$ .  $D_{\text{calc.}}$  3.77–3.99 g/cm<sup>3</sup>. Optical properties could not be measured owing to the extremely fine grain size. Named for U. Schwertmann, a soil scientist at the Technical University of Munich, Germany.
- Seelite.** P. Bariand, B. Bachet, B. Brassy, O. Medenbach, M. Deliens and P. Piret, 1993. *Min. Rec.*, **24**, 463. Occurs as bright yellow, tufted spherules and rosettes of tabular crystals in the oxidation zones of the Talmessi mine, Iran and the Rabejac uranium deposit, Lodève district, Hérault Department, France.  $\text{Mg}[\text{UO}_2(\text{AsO}_3)_x - (\text{AsO}_4)_{1-x}]_2 \cdot 7\text{H}_2\text{O}$ , where  $x = 0.7$ . Monoclinic, space group  $C2/m$ ,  $a$  18.207,  $b$  7.062,  $c$  6.661 Å,  $\beta$  99.65°,  $Z = 2$ . Optically biaxial negative,  $2V_{\text{meas.}}$  41.0° and 30°,  $2V_{\text{calc.}}$  37.5° and 34°,  $\alpha$  1.602 and 1.610,  $\beta$  1.737 and 1.30,  $\gamma$  1.753 and 1.740 for the Talmessi and Rabejac material, respectively; strongly pleochroic. Named for the mineral collectors P. and H. Seel.
- Segnitite.** W.D. Birch, A. Pring and B.M. Gatehouse, 1992. *Amer. Min.*, **77**, 656. Initially described by K.M. Scott (*Amer. Min.*, 1987, **72**, 178). As millimetric greenish brown to yellowish brown, pseudo-octahedral crystals and yellow brown rhombohedra in the oxidised zone at Broken Hill, New South Wales, Australia. Simplified formula  $\text{PbFe}_3\text{H}(\text{AsO}_4)_2(\text{OH})_6$ . Lusungite group. Ferric analogue of philipsbornite and arsenate-ferric analogue of kintoreite (this list). Hexagonal (rhombohedral), space group  $R\bar{3}m$ ,  $a$  7.359,  $c$  17.113 Å,  $Z = 3$ . Named for E.R. Segnit, in recognition of his contribution to Australian mineralogy.
- Selwynite.** W.D. Birch, A. Pring and E.E. Foord, 1995. *Can. Min.*, **33**, 55.  $\text{Na}(\text{Be},\text{Al})\text{Zr}_2(\text{PO}_4)_4$ -

- 2H<sub>2</sub>O. Tetragonal,  $a$  6.570,  $c$  17.142 Å,  $Z = 2$ . From Wycheproof, Victoria, Australia. Named after A.R.C. Selwyn. The K analogue of gainesite.
- Shomiokite-(Y)**. A.P. Khomyakov, N.G. Shumyatskaya and L.I. Polezhaeva. 1992. *Zap. Vses. Min. Obshch.*, **121**, 129. [Russian]. Name erroneously given as schomiokite [in 94M/2330]. Forms colourless, irregular grains and short prismatic crystals, up to 2 mm in diameter, among the interstices of K-feldspar crystals in pegmatites at Mount Alluaiv, Shomiok River area, Lovozero Complex, Kola Peninsula, Russia. Na<sub>3</sub>Y(CO<sub>3</sub>)<sub>3</sub>·3H<sub>2</sub>O. Orthorhombic, space group  $P$ ,  $a$  10.136,  $b$  17.348,  $c$  5.970 Å,  $Z = 4$ .  $D_{\text{meas.}}$  2.52,  $D_{\text{calc.}}$  2.59 g/cm<sup>3</sup>. Optically biaxial positive,  $2V_{\text{meas.}}$  39–49°,  $\alpha$  1.528,  $\beta$  1.529,  $\gamma$  1.531. Named for the locality area.
- Silicon**. M.I. Novgorodova, V.A. Boronikhin, M.E. Generalov and H. Kramer, 1989. *Dokl. Akad. Nauk, SSSR*, **309**, 1182. [Russian]. Recorded from the ophiolitic Nuevo Potosi deposit, Cuba and in Archaean plagiogneisses at the 10182-metre level, super-deep drill hole, Kola Peninsula, Russia. Si. Cubic. Native silicon has been recorded previously; see E.J. Essene and D.C. Fisher (*Science*, 1986, **234**, 189) and V.Yu. Pankov and Z.V. Spetsius (*Dokl. Akad. Nauk, SSSR*, 1989, **305**, 704) and the new mineral and name was apparently approved in 1983.
- Silinaite**. G.Y. Chao, J.D. Grice and R.A. Gault, 1991. *Can. Min.*, **29**, 359. As white to colourless, clear tabular crystals to 2 mm and as chalky to warty patches in sodalite syenite xenoliths in nepheline syenite at the Poudrette quarry, Mont Saint-Hilaire, Quebec, Canada. Ideal formula LiSi<sub>2</sub>O<sub>5</sub>·2H<sub>2</sub>O. Monoclinic, space group  $A2/n$ ,  $a$  5.061,  $b$  8.334,  $c$  14.383 Å,  $\beta$  96.6°,  $Z = 4$ .  $D_{\text{meas.}}$  2.24,  $D_{\text{calc.}}$  2.23 g/cm<sup>3</sup>. Optically biaxial positive,  $2V_{\text{meas.}}$  64°,  $2V_{\text{calc.}}$  71°,  $\alpha$  1.515,  $\beta$  1.516,  $\gamma$  1.518. Named for the chemical composition. Formerly sample UK 81.
- Simferite**. O.V. Yakubovich, V.V. Bairakov and M.A. Simonov, 1989. *Dokl. Akad. Nauk SSSR*, **307**, 1119. [Russian]. Found as dark red aggregates, up to 3 mm, in the contact zone of a REE-rich pegmatite, presumably in Russia. Li<sub>0.5</sub>(Mg,F<sup>3+</sup>,Mn<sup>3+</sup>)(PO<sub>4</sub>)<sub>3</sub>. Orthorhombic, space group  $Pbnm$  or  $Pbn2_1$ ,  $Z = 4$ .  $D_{\text{meas.}}$  3.22–3.25,  $D_{\text{calc.}}$  3.25 g/cm<sup>3</sup>. Optical data are given. An approved named, although descriptions are incomplete. Etymology is not given.
- Sitinakite**. Yu.P. Men'shikov, E.V. Sokolova, Yu.K. Egorov-Tismenko, A.P. Khomyakov and L.I. Polezhaeva, 1992. *Zap. Vses. Min. Obshch.*, **121**, 94. [Russian]. Found as light brown, equant and short prismatic crystals, up to 2 mm in hydrothermal natrolite nodules within pegmatites from Mount Kukisvumchorr, Khibina Complex, Kola Peninsula, Russia. Na<sub>2</sub>KTi<sub>4</sub>Si<sub>2</sub>O<sub>13</sub>(OH)·4H<sub>2</sub>O. Tetragonal, space group  $P4_2/mcm$ ,  $a$  7.819,  $c$  12.099 Å,  $Z = 2$ .  $D_{\text{meas.}}$  2.86,  $D_{\text{calc.}}$  2.87–2.89 g/cm<sup>3</sup>. Optically uniaxial positive,  $\omega$  1.780,  $\epsilon$  1.988, though some crystals exhibit anomalous biaxial character. Named for its chemical composition.
- Squawcreekite**. E.E. Foord, P.F. Hlava, J.J. Fitzpatrick, R.C. Erd and R.W. Hinton, 1991. *Neues Jahrb. Min., Mh.*, 363. As single, euhedral, yellow-brown crystals to 200 µm and as radiating clusters to 2 mm across, with maxwellite and cassiterite in rhyolites at Squaw Creek, Black Range district, Catron County, New Mexico, U.S.A. Ideal composition Fe<sup>3+</sup>Sb<sup>5+</sup>O<sub>4</sub>. Tetragonal, space group  $P4_2/mnm$ ,  $a$  4.6673,  $c$  3.1006 Å,  $Z = 2$ .  $D_{\text{calc.}}$  6.02–6.06 g/cm<sup>3</sup>. Optically uniaxial positive,  $v$  2.21; weakly pleochroic. Named for the occurrence at Squaw Creek.
- Stibicolusite**. E.M. Spiridonov, A.S. Badalov and V.V. Kovachev, 1992. *Dokl. Akad. Nauk SSSR*, **324**, 411. [Russian]. A dark grey mineral occurring as ovoid segregations (up to 80 µm) and rounded grains (up to 40 µm) in tetrahedrite, luzonite and enargite in auriferous quartz veins of the volcanogenic massive sulphide deposits at Kayragach, Uzbekistan and Chelopech, Bulgaria. Cu<sub>26</sub>V<sub>2</sub>(Sb,Sn,As)<sub>6</sub>S<sub>32</sub>. Antimony analogue of colusite. Cubic, space group  $P\bar{4}3m$ ,  $a$  10.705 Å,  $Z = 1$ .  $D_{\text{calc.}}$  4.66 g/cm<sup>3</sup>. Optically isotropic; reflectance values are given. Named for its compositional relationship to colusite.
- Strontio whitlockite**. S.N. Britvin, Y.A. Pakhomovskii, A.N. Bogdanova and V.I. Skiba, 1991. *Can. Min.*, **29**, 87. As white tubular crystals to 2 mm long and as rosette-like aggregates of rounded, tabular crystals to 8 µm, within a dolomite-carbonate vein cutting pyroxenite in the Kovdor deposit, Kovdor Complex, Kola Peninsula, Russia. Sr<sub>2</sub>Mg(PO<sub>3</sub>OH)(PO<sub>4</sub>)<sub>6</sub>. Strontium analogue of whitlockite. Hexagonal,  $a$  10.644,  $c$  39.54 Å,  $Z = 6$ .  $D_{\text{meas.}}$  3.64,  $D_{\text{calc.}}$  3.60 g/cm<sup>3</sup>. Optically uniaxial negative,  $\omega$  1.601,  $\epsilon$  1.598. Named for its compositional relationship to whitlockite.
- Swaknoite**. J.E.J. Martini. 1992. *Bull. South Afr. Speleol. Assoc.*, **32**, 72. Arnheim cave, Gobabis district, Namibia. Ca(NH<sub>4</sub>)<sub>2</sub>·(HPO<sub>4</sub>)<sub>2</sub>·H<sub>2</sub>O. Orthorhombic. Dimorphous with mundrabillaite.
- Szenicsite**. C.A. Francis, L.C. Pitman and D.E. Lange, 1994. *Min. Rec.*, **25**, 76. Occurring as dark green, bladed crystals (up to 3 cm) and as fracture fillings, with powellite, chrysocolla and other secondary minerals in the Tierra Amarilla district, Atacama Province, Chile.



- $\text{Cu}_3(\text{MoO}_4)(\text{OH})_4$ . Orthorhombic, space group *Pnmm*,  $a$  8.449,  $b$  12.527,  $c$  6.067 Å,  $Z = 4$ .  $D_{\text{meas.}}$  4.26,  $D_{\text{calc.}}$  4.30 g/cm<sup>3</sup>. Optically biaxial positive,  $2V_{\text{meas.}}$  74°,  $2V_{\text{calc.}}$  73,  $\alpha$  1.886,  $\beta$  1.892,  $\gamma$  1.903, non-pleochroic. Named for T. and M. Szenics, the discoverers of the mineral.
- Szymańskiite**. A.C. Roberts, T.S. Ercit, R.C. Erd and R.L. Oscarson, 1990. *Can. Min.*, **28**, 703. As blue-grey to blue green, euhedral crystals to 0.4 mm long and as millimetric-sized sprays in massive quartz near the Clear Creek mercury mine, San Benito County, California, U.S.A. Ideal formula is given as  $\text{Hg}_6^+(\text{Ni}, \text{Mg})_6(\text{CO}_3)_{12}(\text{OH})_{12}(\text{H}_3\text{O})_8^{+} \cdot 3\text{H}_2\text{O}$ . Hexagonal, space group *P6<sub>3</sub>*,  $a$  17.415,  $c$  6.011 Å,  $Z = 1$ .  $D_{\text{calc.}}$  4.86 g/cm<sup>3</sup>. Optically uniaxial negative,  $\omega$  1.795,  $\epsilon$  1.786. Named for J.T. Szymański, of CANMET, Ottawa, Canada.
- Tetraroosevelite**. J. Sejkora and T. Rídkosil, 1994. *Neues Jahrb. Min., Mh.*, 179. As white to yellowish grains, up to 50 µm in diameter and forming powdery aggregates along with bayldonite, malachite and mimetite in a fluorite-baryte-quartz vein in the Moldava polymetallic deposit, Krusny-Hory Mountains, Bohemia, Czech Republic.  $\beta$ -Bi(AsO<sub>4</sub>). Tetragonal dimorph of roosevelite. Space group *I4<sub>1</sub>/a*,  $a$  5.085,  $c$  11.69 Å,  $Z = 4$ .  $D_{\text{calc.}}$  7.64 g/cm<sup>3</sup>. Optically uniaxial positive,  $n$  2.20. Named for its relationship to roosevelite.
- Thersemagnanite**. H. Sarp. 1993. *Archives des Sciences*, **46**, 37. [French]. Occurs as pink to light pink, platy crystals, comprising radiating spherules, up to 2 mm, with other secondary minerals including guarinoite (this list) in the Cap Garonne mine, Var Department, France.  $(\text{Co}, \text{Zn}, \text{Ni})_6(\text{SO}_4)(\text{OH}, \text{Cl})_{10} \cdot 8\text{H}_2\text{O}$ . Hexagonal,  $a$  8.363,  $c$  26.18 Å,  $Z = 3$ .  $D_{\text{meas.}}$  2.52,  $D_{\text{calc.}}$  2.48 g/cm<sup>3</sup>. Optically uniaxial negative,  $\omega$  1.568,  $\epsilon$  1.542, strongly pleochroic. Named for Theresa Magnan, in recognition of her contributions to the knowledge on the Cap Garonne deposit.
- Tiettaite**. A.P. Khomyakov, V.P. Pautov, D.L. Rogachov, O.A. Zalkind and A. Martynova, 1993. *Proc. Russian Mineral. Soc.*, **122**, 121. [Russian]. As greyish-white, rounded aggregates, up to 1 cm, in unweathered (subsurface) ultragapaitic pegmatites at Mount Rasvumchorr and Mount Koashva, Khibina Complex, Kola Peninsula, Russia; associated minerals include ershovite (this list).  $(\text{Na}, \text{K})_{17}\text{FeTiSi}_{16}\text{O}_{29}(\text{OH})_{30} \cdot 2\text{H}_2\text{O}$ . Orthorhombic, space group *Cmcm*, *Cmc2<sub>1</sub>* or *C2mc*,  $a$  29.77,  $b$  11.03,  $c$  17.111 Å,  $D_{\text{meas.}}$  2.42,  $D_{\text{calc.}}$  2.39 g/cm<sup>3</sup>. Optically biaxial negative,  $2V_{\text{meas.}}$  79°,  $2V_{\text{calc.}}$  79°,  $\alpha$  1.548,  $\beta$  1.548,  $\gamma$  1.559. Named for the Saamsk word *tietta*, meaning science or knowledge.
- Titanowodginite**. T.S. Ercit, P. Černý and F.C. Hawthorne, 1992. *Can. Min.*, **30**, 633. As dark brown to black euhedral, bipyramidal, single crystals, up to 1 cm, with microlite and manganocolumbite in the Tanco pegmatite, Manitoba, Canada.  $\text{MnTiTa}_2\text{O}_8$ . Wodginite group. Monoclinic, space group *C2/c*,  $a$  9.446,  $b$  11.431,  $c$  5.126 Å,  $\beta$  90.31°,  $Z = 4$ .  $D_{\text{meas.}}$  6.86,  $D_{\text{calc.}}$  6.89 g/cm<sup>3</sup>. Optically biaxial positive,  $n > 2.0$ . Named for its compositional relationship to wodginite.
- Tooeleite**. F.P. Cesbron and S.A. Williams, 1992. *Min. Mag.*, **56**, 71. As cadmium-orange, blades crystals to 10 mm, forming crusts on scorodite and jarosite at the U.S. Mine, Gold Hill, Tooele county, Utah, U.S.A. Ideal formula  $\text{Fe}_8[(\text{As}, \text{S})\text{O}_4]_6 \cdot 5\text{H}_2\text{O}$ . Orthorhombic, space group *Pbcm* or *Pbc2<sub>1</sub>*,  $a$  6.416,  $b$  19.45,  $c$  8.941 Å,  $Z = 2$ .  $D_{\text{meas.}}$  4.23,  $D_{\text{calc.}}$  4.15 g/cm<sup>3</sup>. Optically biaxial negative,  $2V_{\text{meas.}}$  2–5°,  $\alpha$  1.94,  $\beta$  2.04,  $\gamma$  2.05, pleochroic. Named for Tooele County.
- Touunkite**. V.G. Ivanov, A.N. Sapozhnikov, L.F. Piskunova and A.A. Kashaev, 1992. *Zap. Vses. Min. Obshch.*, **121**, 92. [Russian]. Bottle green, columnar crystals to 1 cm within lazurite calciphyres from the Malaya Bystraya and Tultuy (Toultui) lazurite deposits, Tounka Valley, Transbaikalia, Russia.  $(\text{Na}, \text{Ca}, \text{K})_8(\text{Al}_6\text{Si}_6\text{O}_{24})(\text{SO}_4)_2\text{Cl} \cdot \text{H}_2\text{O}$ . Hexagonal, space group *P6<sub>2</sub>22*,  $a$  12.843,  $c$  32.239 Å,  $Z = 6$ .  $D_{\text{meas.}}$  2.557,  $D_{\text{calc.}}$  2.60 g/cm<sup>3</sup>. Optically uniaxial positive,  $\omega$  1.528,  $\epsilon$  1.543, pleochroic. Named for the locality.
- Toyohaite**. J. Yajima, E. Ohta and Y. Kanazawa, 1991. *Mineral. J. (Japan)*, **15**, 222. Initially documented as an unnamed mineral by Z. Johan and P. Picot (in *Amer. Min.*, 1983, **68**, 1249). Occurs as aggregates to 200 µm in massive pyrite-sphalerite ore from the Sorachi vein, Toyoha mine, Sapporo, Hokkaido, Japan.  $\text{Ag}_2\text{FeSn}_3\text{S}_8$ . Silver analogue of rhodostannite. Tetragonal, space group *I4<sub>1</sub>/a*,  $a$  7.464,  $c$  10.80 Å,  $Z = 2$ .  $D_{\text{calc.}}$  4.94 g/cm<sup>3</sup>. Brownish grey in reflected light with a distinct to strong anisotropism; reflectance data are given. Named for the deposit.
- Trembathite**. P.C. Burns, F.C. Hawthorne and J.A.R. Stirling, 1992. *Can. Min.*, **30**, 445. Colourless to light blue rhombohedral crystals, up to 2 mm across, in massive halite within drill core from a Carboniferous (Mississippian) evaporite succession at the Salt Springs potash deposit, near Sussex, New Brunswick, Canada.  $(\text{Mg}, \text{Fe})_3\text{B}_7\text{O}_{13}\text{Cl}$ . Magnesium analogue of congolite and dimorphous with boracite. Hexagonal (rhombohedral), space group *R3c*,  $a$  8.574,  $c$  20.99 Å.  $D_{\text{meas.}}$  2.84–3.34,  $D_{\text{calc.}}$  3.14 g/cm<sup>3</sup>. Optically uniaxial negative,  $\omega$  1.648,  $\epsilon$  1.668, polysynthetic twinning. Named for L.T. Trembath

of the University of New Brunswick, Canada.

- Trimounsité-(Y).** P. Piret, M. Deliens and M. Pinet, 1990. *Eur. J. Mineral.*, **2**, 725. As light brown prismatic crystals, up to 5 mm, in cavities within dolomitic rocks of the Trimouns talc deposit, Luzenac district, Ariège, France; associated minerals include allanite and bastnäsite. Ideal formula  $Y_2Ti_2SiO_9$ . A nesosilicate. Monoclinic, space group  $C2_1c$ ,  $a$  12.299,  $b$  11.120,  $c$  4.858 Å,  $\beta$  95.62°,  $Z = 4$ .  $D_{meas.}$  4.85,  $D_{calc.}$  5.0 g/cm<sup>3</sup>. Optically biaxial negative,  $2V$  not measurable,  $\alpha$ ,  $\beta$  and  $\gamma > 2.10$ . Named for the deposit.
- Tsaregorodtsevite.** V.P. Pautov, V.Yu. Karpenko, E.V. Sokolova and K.I. Ignatenko, 1993. *Proc. Russian Mineral. Soc.*, **122**, 128. [Russian]. As well-developed pseudocubic crystals, up to 1 cm diameter, in friable fracture-filling material within schists at Man'-Khambo, northern Urals, Russia.  $N(CH_3)_4[Si_2(Si_{0.5}Al_{0.5})O_6]_2$ . Orthorhombic, space group  $I222$ ,  $a$  8.984,  $b$  8.937,  $c$  8.927 Å,  $Z = 2$ .  $D_{meas.}$  2.04,  $D_{calc.}$  2.01 g/cm<sup>3</sup>. Optically biaxial negative,  $2V_{meas.}$  76°,  $\alpha$  1.529,  $\gamma$  1.531, sections commonly show sector-twinning. Named for S.V. Tsaregorodtsev, an expert on the Ural Mountains and mineral collector.
- Tschernichite.** R.C. Boggs, D.G. Howard, I.V. Smith and G.L. Klein, 1993. *Oregon. Amer. Min.*, **78**, 822. Initially described by D.G. Howard *et al.* (*Amer. Min.*, 1990, **77**, 1200) and prematurely named in *Lapidary Journal* (see 36th List). A zeolite occurring as colourless to white, tetragonal dipyramidal crystals, up to 10 mm. within vesicles in Eocene basalt from near Goble Creek, Goble, Columbia County, Oregon, U.S.A.  $(Ca,Na,K,Mg)_{1.1}Si_6Al_2O_{16} \cdot 8H_2O$ . Zeolite group. Tetragonal, possible space group  $P4/mmm$ ,  $a$  12.880,  $c$  25.020 Å,  $D_{meas.}$  2.02,  $D_{calc.}$  2.12 g/cm<sup>3</sup>. Optically uniaxial negative,  $\omega$  1.484,  $\varepsilon$  1.483, fluorescent. Named for R.W. Tschernich, who first discovered the species. Not to be confused with tschernigite (= error for tschernigite), tschernychit (28th List) or tschernikit (= an alternative spelling of chernikite).
- Tuzlaite.** V. Bermanec, T. Armbruster, D. Tibljas, B.D. Sturman, and G. Kniewald, 1994. *Amer. Min.*, **79**, 562. Colourless to white, almost monomineralic veinlets within dolomitic marls of the Tuzla evaporite deposit, Bosnia Hercegovina.  $NaCa[B_5O_8(OH)_2] \cdot 3H_2O$ . Monoclinic, space group  $P2_1/c$ ,  $a$  6.506,  $b$  13.280,  $c$  11.462 Å,  $\beta$  92.97°,  $Z = 4$ .  $D_{meas.}$  2.21,  $D_{calc.}$  2.23 g/cm<sup>3</sup>. Optically biaxial positive,  $2V_{meas.}$  82°,  $2V_{calc.}$  80.9°,  $\alpha$  1.532,  $\beta$  1.544,  $\gamma$  1.561. Named for the deposit.
- Tvedalite.** A.O. Larsen, A. Asheim, G. Raade and J. Taftø, 1992. *Amer. Min.*, **77**, 438. Cream white to pale beige spherulites, to 3 mm, in vugs in

nepheline syenite pegmatite of the Vevja quarry, Tvedalen, Vestfold County, Norway.  $(Ca,Mn)_4Be_3Si_6O_{17}(OH)_4 \cdot 3H_2O$ . Orthorhombic,  $a$  8.724,  $b$  23.14,  $c$  4.923 Å.  $Z = 2$ .  $D_{meas.}$  2.541,  $D_{calc.}$  2.554 g/cm<sup>3</sup>. Optically biaxial,  $n$  1.604 (average value). Named for the locality.

- Tsnigriite.** S.M. Sandomirskaya, Ch.Kh. Arifulov, M.M. Botova, N. N. Mozgova, S.N. Nenasheva, A.I. Tsepin and A.V. Sivtsov, 1992. *Zap. Vses. Min. Obshch.*, **121**, 95. [Russian]. Occurs as anhedral grains, up to 0.1 mm across, with other tellurides and sulphides in the Vysokovolt'noye precious metal deposit, Uzbekistan (a Se-rich variety) and Bethumy polymetallic deposit, Rajasthan, India (a Se-free variety).  $Ag_9SbTe_3(S,Se)_3$ . Monoclinic, space group  $P2$  or  $P2/m$  or  $Pm$ ,  $a$  8.89,  $b$  8.292,  $c$  19.50 Å,  $\beta$  97.02°,  $Z = 4$ .  $D_{calc.}$  7.38 g/cm<sup>3</sup>. Reflectance data are given; anisotropic. Named from the initials for the Russian name for the Central Scientific-Research Institute of Geological Prospecting in Moscow (TSNIGRI).

- Ungarettiite.** F.C. Hawthorne, R. Oberti, E. Cannillo, N. Sardone, A. Zanetti, J.D. Grice and P.M. Ashley, 1995. *Amer. Min.*, **80**, 165. As cherry red to dark red prismatic grains in manganese silicate and oxide rocks from the Hoskins mine, Grenfell, New South Wales, Australia.  $NaNa_2(Mn_2^{2+}, Mn_3^{3+})Si_8O_{22}O_2$ . Amphibole group. Monoclinic, space group  $C2/m$ ,  $a$  9.89,  $b$  18.04,  $c$  5.29 Å,  $\beta$  104.6°,  $Z = 2$ .  $D_{meas.}$  3.52,  $D_{calc.}$  3.45 g/cm<sup>3</sup>. Strongly pleochroic, optically biaxial positive,  $2V$  51°,  $\alpha$  1.717,  $\beta$  1.780,  $\gamma$  1.800. Named for L. Ungaretti, in recognition of his contribution to the crystal chemistry of rock-forming silicates.

- Uranopolycrase.** C. Aurisicchio, P. Orlandi, M. Pasero and N. Perchiazzi, 1993. *Eur. J. Mineral.*, **5**, 1161. Uranopolycrase is found as brownish-red, euhedral crystals, up to 0.15 mm, in a pegmatitic vein with various rare-earth species in the Fonte del Prete pegmatite, San Piero in Campo, Elba Island, Italy.  $(U,Y)(Ti,Nb)_2O_6$ . The U-dominant analogue of polycrase-(Y). Almost totally metamict; heated material exhibited orthorhombic symmetry, space group  $Pbcn$ ,  $a$  14.51,  $b$  5.558,  $c$  5.173 Å. Reflectance data are given, red to brown internal reflections. Named for its compositional relationship to the polycrase group minerals.

- Vasilite.** A.V. Atanasov, 1990. *Can. Min.*, **28**, 887. As irregular to platy grains to 100  $\mu$ m long as a component of polymineralic inclusions in isoferroplatinum from Novoseltsi, Bourgas region, Bulgaria.  $(Pd,Cu)_{16}(S,Te)_7$ . Cubic, space group  $I\bar{4}3$ ,  $a$  8.922.  $Z = 2$ .  $D_{calc.}$  8.796 g/cm<sup>3</sup>. Cream coloured with yellow tint in reflected light;

reflectance data are provided. Named for Vasil Atanasov, of the Higher Institute of Mining and Geology (Sofia), Bulgaria.

- Vicanite-(Ce).** A. Maras, G. C. Parodi, G. Della Ventura and D. Ohnenstetter, 1994. *Eur. J. Mineral.*, **7**, 439. Initially described by A. Callegari *et al.* (*Plinius*, 1991, **6**, 123). From Tre Croci, near Vetralla, Vico Complex, Latium, Italy.  $(\text{Ca}, \text{REE}, \text{Th})_{15}\text{As}^{5+}(\text{As}_{1.5}^{3+}\text{Na}_{0.5})\text{Fe}^{3+}\text{Si}_6\text{B}_4\text{O}_{40}\text{F}_7$ . Trigonal,  $a$  10.795,  $c$  27.336 Å,  $Z = 3$ . Named for the locality.
- Vistepite.** L.A. Pautov, D.I. Belakovsky, R. Scala, R.E.V. Sokolova, K.I. Ignatenko and A.V. Mokhov, 1992. *Zap. Vses. Min. Obshch.*, **121**, 107. [Russian]. Forms orange yellow, radial aggregates, with rhodonite, quartz, tephroite galena, hübnerite and other minerals, within biotite quartz hornfels at the margin of a tin-bearing granite massif along the northern slopes of the Inylchek Range, Tien-Shan, Kirghizia.  $\text{Mn}_5\text{SnB}_2\text{Si}_5\text{O}_{20}$ . Monoclinic, space group  $P2_1/m$ ,  $a$  28.77,  $b$  7.01,  $c$  13.72 Å,  $\beta$  96.6,  $Z = 7$ .  $D_{\text{meas}}$ . 3.67,  $D_{\text{calc}}$ . 3.70 g/cm<sup>3</sup>. Optically biaxial negative,  $2V_{\text{meas}}$ . 57°,  $2V_{\text{calc}}$ . 54.3°,  $\alpha$  1.696,  $\beta$  1.711,  $\gamma$  1.715, non-pleochroic, strong dispersion. Named for V.I. Stepanov, mineralogist and collector.
- Vlodavetsite.** L.P. Vergasova, S.K. Filatov, G.L. Starova and G.L. Matushevich, 1995. *Dokl. Akad. Nauk Russia*, (in press) [Russian]; see also G.L. Starova, S.K. Filatov, G.L. Matushevich, and V.S. Fundamensky (*Min. Mag.*, 1995, **59**, 159.) As fine-grained sublimate consisting of transparent, colourless microcrystals from the Tolbachik Main Fracture Eruption, Kamchatka Peninsula, Russia.  $\text{AlCa}_2(\text{SO}_4)_2\text{F}_2\text{Cl}\cdot 4\text{H}_2\text{O}$ . Tetragonal, space groups  $I4/m$ ,  $I4$ , and  $I\bar{4}$ ,  $a$  6.870,  $c$  13.342 Å,  $Z = 2$ .  $D$  2.35 g/cm<sup>3</sup>. Optically uniaxial. Further optical data and etymology are not given.
- Vonbezingite.** Y. Dai and G.E. Harlow, 1992. *Amer. Min.*, **77**, 1292. As deep azure blue, euhedral crystals, to 1 cm, in a single solution cavity at the Wessels mine, near Hotazel, Kalahari Mn field, Northern Cape Province, South Africa. Ideal formula  $\text{Ca}_6\text{Cu}_3(\text{SO}_4)_3(\text{OH})_{12}\cdot 2\text{H}_2\text{O}$ . Monoclinic, space group  $P2_1/c$  (pseudo-cell  $C2/c$ ),  $a$  15.122,  $b$  14.358,  $c$  22.063 Å,  $\beta$  108.68°,  $Z = 8$ .  $D_{\text{meas}}$ . 2.82,  $D_{\text{calc}}$ . 2.81 g/cm<sup>3</sup>. Optically biaxial negative,  $2V_{\text{meas}}$ . 65°,  $2V_{\text{calc}}$ . 67°,  $\alpha$  1.590,  $\beta$  1.610,  $\gamma$  1.619, strongly pleochroic. Named for K. Ludi Von Bezing who, along with co-workers, had earlier described the phase (*Min. Rec.*, 1991, **22**, 279).
- Vyalsovite.** T.L. Evstigneeva, A.D. Genkin, S.M. Sandomirskaya and N.V. Trubkin, 1992. *Amer. Min.*, **77**, 201. Grains to 150 µm and veinlets, associated with valleriite, diaspore and djerfisherite in forsterite skarns at the Komsomol mine, Talnakh, Noril'sk district, Russia.  $\text{FeS}\cdot\text{Ca}(\text{OH})_2\cdot\text{Al}(\text{OH})_3$ . Orthorhombic, possible space groups  $Cmmm$ ,  $C222$ ,  $Cmm2$ ,  $Cm2m$ ,  $Cmma$ ,  $C2ma$ ,  $a$  14.20,  $b$  20.98,  $c$  5.496 Å,  $Z = 8$ .  $D_{\text{calc}}$ . 1.96 g/cm<sup>3</sup>. Optic sign changes four times within the 250–800 nm range; displays extreme reflection pleochroism from dark grey to crimson red. Named for L.N. Vyalsov, a specialist in ore microscopy and who first studied this mineral's unique optical properties.
- Waltherite.** G. Li, D.R. Peacor, E.J. Essene, D.R. Brosnahan and R.E. Beane, 1992. *Amer. Min.*, **77**, 1275. As white to yellowish, subhedral to anhedral crystals, to 100 µm, with baryte in the Reina vein, Tambo mining district, Coquimbo Province, Chile.  $\text{Ba}_{0.5}\square_{0.5}\text{Al}_3(\text{SO}_4)_2(\text{OH})_6$ . Alunite group. Barium analogue of huangite (this list). Hexagonal (rhombohedral), space group  $R\bar{3}m$ ,  $a$  6.992,  $c$  34.443 Å,  $Z = 6$ .  $D_{\text{calc}}$ . 3.02 g/cm<sup>3</sup>. Optically uniaxial positive,  $\omega$  1.588,  $\epsilon$  1.604. Named for T.N. Walther; the name should not be confused with the waltherite of Adam (1869).
- Watanabeite.** M. Shimizu, A. Kato, S. Matsubara, A.J. Criddle and C.J. Stanley, 1993. *Min. Mag.*, **57**, 643. Occurs as rectangular and elongate grains, up to 50 µm, in quartz from the Teine mine, Sapporo, Hokkaido, Japan.  $\text{Cu}_4(\text{As}, \text{Sb})_2\text{S}_5$ . Orthorhombic,  $a$  14.51,  $b$  13.30,  $c$  17.96 Å,  $Z = 16$ .  $D_{\text{meas}}$ . 4.666,  $D_{\text{calc}}$ . 4.66 g/cm<sup>3</sup>. Reflectance data are given; weakly anisotropic and birefractant. Named for T. Watanabe, who first reported the occurrence of tellurium minerals from the mine.
- Wattersite.** A.C. Roberts, M. Bonardi, R.C. Erd, A.J. Criddle and Y. Le Page, 1991. *Min. Rec.*, **22**, 269. As thin, dark reddish brown, shell-like aggregates at the Clear Creek Hg deposit, San Benito County, California, U.S.A.  $\text{Hg}_4\text{Hg}^{2+}\text{Cr}^{6+}\text{O}_6$ . Monoclinic, space group  $C2/c$ ,  $a$  11.250,  $b$  11.630,  $c$  6.595 Å,  $\beta$  98.16°,  $Z = 4$ .  $D_{\text{calc}}$ . 8.91 g/cm<sup>3</sup>. Greenish white to lilac grey in reflected light, strongly anisotropic, bright red internal reflections; reflectance values given. Named for mineral collector L. Watters.
- Weinebeneite.** F. Walter, 1992. *Eur. J. Min.*, **4**, 1275. Occurs as colourless, platy crystals, up to 0.5 mm, in small fractures in a spodumene pegmatite at Weinebene, Koralpe district, Carinthia, Austria; associated minerals include fairfieldite, roscherite and uralolite.  $\text{CaBe}_3(\text{PO}_4)_2(\text{OH})_2\cdot 4\text{H}_2\text{O}$ . A framework beryllophosphate. Monoclinic, space group  $Cc$ ,  $a$  11.897,  $b$  9.707,  $c$  9.633 Å,  $\beta$  95.76°,  $Z = 4$ .  $D_{\text{calc}}$ . 2.17 g/cm<sup>3</sup>. Optically biaxial,  $2V\gamma$  10°,  $\alpha$  1.520,  $\beta$  1.520,  $\gamma$  1.530. Named for the locality.
- Widgiemoolthalite.** E.H. Nickel, B. W. Robinson and W.G. Mumme, 1993. *Amer. Min.*, **78**, 819. As

bluish-green spheroids of radiating fibres in the weathered zone of the 132 North nickel mine, Widgiemooltha, Western Australia, Australia.  $\text{Ni}_5(\text{CO}_3)_4(\text{OH})_2 \cdot 4-5\text{H}_2\text{O}$ . Nickel analogue of hydromagnesite. Monoclinic, space group not given,  $a$  10.06,  $b$  8.75,  $c$  8.32 Å,  $\beta$  114.31°,  $Z = 7$ .  $D_{\text{meas.}}$  3.13,  $D_{\text{calc.}}$  3.24 g/cm<sup>3</sup>. Optically biaxial positive,  $n_{\text{min}}$  1.630,  $n_{\text{max}}$  1.640, non-pleochroic. Named for the locality.

**Wycheproofite.** W.D. Birch, A. Pring, D.J.M. Bevin and Kharisun, 1994. *Min. Mag.*, **58**, 635. The mineral occurs as compact, finely fibrous masses composed of pinkish- to brownish-orange aggregates with other phosphates in small cavities in a pegmatite vein cutting granite at Wycheproof, Victoria, Australia.  $\text{NaAlZr}(\text{PO}_4)_2(\text{OH})_2 \cdot \text{H}_2\text{O}$ . Triclinic, space group not specified,  $a$  10.926,  $b$  10.986,  $c$  12.479 Å,  $\alpha$  71.34°,  $\beta$  77.39°,  $\gamma$  87.54°,  $Z = 6$ .  $D_{\text{meas.}}$  2.83,  $D_{\text{calc.}}$  2.81 g/cm<sup>3</sup>. Optical data are incomplete due to the fibrous nature of the mineral; refractive indices are in the range 1.62–1.64. Named for the locality.

**Ximengite.** J. Shi, 1989. *Acta Min. Sinica*, **9**, 15. [Chinese, with English abstract]. Found as colourless, earthy granular aggregates to 0.1 mm, occurring as an alteration product of bismuthinite, in the Ximen tin mining district, Yunnan Province, China. Ideal formula  $\text{BiPO}_4$ . Hexagonal (rhombohedral), space group  $P3_121$ ,  $a$  6.9860,  $c$  6.4753 Å,  $Z = 3$ .  $D_{\text{calc.}}$  5.53 g/cm<sup>3</sup>. Optically uniaxial positive, with refractive indices  $>1.78$ . Named for the deposit. The name should not be confused with yimengite (34th List).

**Yanomamite.** N.F. Botelho, G. Roger, F. d'Yvoire, Y. Moëlo and M. Volfinger, 1994. *Eur. J. Min.*, **6**, 245. Occurs as pale green to yellow green, euhedral dipyrnidal crystals, up to 0.2 mm, in quartz- and topaz-greisen veins in granites of the Mangabeiro tin deposit, Goiás, Brazil. Associate minerals include indium-rich sphalerite and scorodite.  $\text{InAsO}_4 \cdot 2\text{H}_2\text{O}$ . Orthorhombic, space group  $Pbca$ ,  $a$  10.446,  $b$  9.085,  $c$  10.345 Å,  $Z = 8$ .  $D_{\text{calc.}}$  3.876. Optically biaxial positive,  $2V$  55–76°,  $n$  1.65 (average value). Named for the Yanomami Indians of the Amazon Basin.

**Yingjiangite.** Z. Chen, Z. Huang and X. Gu, 1990. *Acta Min. Sinica*, **10**, 102. [Chinese, English abstracts]. As golden yellow to yellow compact, microcrystalline aggregates in the oxidised zone containing uraninite at Tongbiguan, Yingjiang County, Yunnan Province, China. Simplified formula  $(\text{K}_{1-x}\text{Ca}_x)(\text{UO}_2)_3(\text{PO}_4)_2(\text{OH})_{1+x} \cdot 4\text{H}_2\text{O}$ , where  $x = 0.35$ . Orthorhombic, space group  $C22_1$ ,  $a$  13.73,  $b$  15.99,  $c$  17.33 Å,  $Z = 8$ . Structurally-similar to phosphuranylite.  $D_{\text{meas.}}$  4.15,  $D_{\text{calc.}}$  4.17 g/cm<sup>3</sup>. Optically biaxial negative,  $2V_{\text{calc.}}$  83°,  $\alpha$  1.669,  $\beta$  1.692,  $\gamma$  1.710. Named for

the County.

**Zanazziite.** P.B. Leavens, J.S. White and J.A. Nelen, 1990. *Min. Rec.*, **21**, 413. As pale to dark olive-green, compositionally-zoned, barrel-shaped crystals and crystal rosettes, up to 4 mm, with quartz and eosphorite in pockets of the Lavra de Ilha pegmatite, Taquaral district, Minas Gerais, Brazil. Ideal formula  $\text{Ca}_2\text{Me}^{2+}\text{Me}_4^{2+}\text{Be}_4(\text{PO}_4)_6(\text{OH})_4 \cdot 6\text{H}_2\text{O}$ , where  $\text{Me}^{2+}$  indicates  $\text{Mg} > \text{Fe}^{2+}$  or  $\text{Mn}^{2+}$ . Monoclinic, space group  $C2/c$ ,  $a$  15.874,  $b$  11.854,  $c$  6.605 Å,  $\beta$  95.35°,  $Z = 2$ .  $D_{\text{meas.}}$  2.76,  $D_{\text{calc.}}$  2.77 g/cm<sup>3</sup>. Optically biaxial positive,  $2V_{\text{meas.}}$  72°,  $2V_{\text{calc.}}$  65°,  $\alpha$  1.606,  $\beta$  1.610,  $\gamma$  1.620. Named for P.F. Zanazzi, of the Università degli Studi di Perugia, in recognition of his studies on crystal structure and crystal chemistry of minerals.

**Zemkorite.** K.N. Yegorov, Z.F. Ushchapovskaya, A.A. Kashayev, G.V. Bogdanov and Yu.I. Sizykh, 1988. *Dokl. Akad. Nauk SSSR*, **301**, 188. [Russian]. As colourless, transparent grains to 0.5 mm filling thin fractures in unaltered kimberlite in cores at depths of 400–450 m along the eastern body of the Udachnaya pipe, Daldyn kimberlite field, Yakutia, Russia.  $(\text{Na},\text{K})_2\text{Ca}(\text{CO}_3)_2$ . Similar to nyerereite. Hexagonal, space group  $P6_3/mmc$ ,  $P6_3mc$  or  $P6_2c$ ,  $a$  10.06,  $c$  12.72 Å,  $Z = 8$ .  $D_{\text{meas.}}$  2.46,  $D_{\text{calc.}}$  2.47 g/cm<sup>3</sup>. Optically uniaxial negative,  $\omega$  1.522,  $\varepsilon$  1.507. Named for the Zemoy Kory Institut.

**Zenzénite.** D. Holtstam, B. Lindqvist, M. Johnsson and R. Norrestam, 1991. *Can. Min.*, **29**, 347. As euhedral to subhedral grains in a carbonate-phyllosilicate skarn, with dolomite, calcite, barytocalcite, norsethite and other phases at Långban, Värmland, Sweden. Ideal formula  $\text{Pb}_3\text{Fe}_4\text{MnO}_{15}$ . Hexagonal, space group  $P6_3/mcm$ ,  $a$  10.008,  $c$  13.672 Å,  $Z = 4$ .  $D_{\text{calc.}}$  6.83 g/cm<sup>3</sup>. Bright white in reflected light and strongly anisotropic; reflectance values given. Named for N. Zenzén, former senior curator at the Department of Mineralogy, Swedish Museum of Natural History (Stockholm), Sweden.

**Znucalite.** O. Ondrus, F. Beslovsky and R. Rybka, 1990. *Neues Jahrb. Min., Mh.*, **393**. As porous coatings of white to light yellow to greyish yellow, saucer-shaped aggregates of thin plates to 15 µm, on oxidised uraninite from the Lill mine, Příbram, Bohemia, Czech Republic. Ideal formula  $\text{Zn}_{12}(\text{UO}_2)\text{Ca}(\text{CO}_3)_3(\text{OH})_{22} \cdot 4\text{H}_2\text{O}$ . Triclinic, space group  $P1$  or  $P\bar{1}$ ,  $a$  12.692,  $b$  25.096,  $c$  11.685 Å,  $\alpha$  89.08°,  $\beta$  91.79°,  $\gamma$  90.37°,  $Z = 4$ .  $D_{\text{meas.}}$  3.01,  $D_{\text{calc.}}$  3.09 g/cm<sup>3</sup>. Optically biaxial negative,  $2V_{\text{calc.}}$  approximately 0°,  $\alpha$  1.563,  $\beta$  1.621,  $\gamma$  1.621. Named for its chemical composition.