

Thirty-seventh list of new mineral names.

Part 1: A–L

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AND

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THE present list is divided into two sections; the section M–Z will follow in the next issue. Those names representing valid species, accredited by the IMA Commission on New Minerals and Mineral Names, are shown in bold type.

Abenakiite-(Ce). A.M. McDonald, G.Y. Chao and J.D. Grice. 1994. *Can. Min.* **32**, 843. Poudrette Quarry, Mont Saint-Hilaire, Quebec, Canada. $\text{Na}_{26}\text{REE}(\text{SiO}_3)_6(\text{PO}_4)_6(\text{CO}_3)_6(\text{SO}_2)\text{O}$. Trigonal, a 16.018, c 19.761 Å, $Z = 3$. Named after the Abenaki Indian tribe.

Abswurbachite. T. Reinecke, E. Tillmanns and H.-J. Bernhardt, 1991. *Neues Jahrb. Min. Abh.*, **163**, 117. White, fibrous to elongate prismatic grains, to 50 µm, in manganiferous quartzites at Mount Ochi, Mili, Evvia Island and from the Vasilikon Mountains, Apika, Andros Island, Greece. $\text{CuMn}_6\text{SiO}_{12}$. Copper analogue of braunite; complete solid-solution with braunite. Tetragonal, space group $I4_1/acd$, a 9.406, c 18.546 Å, $Z = 8$. D_{calc} . 4.96 g/cm³. Grey, weakly anisotropic and non-pleochroic in reflected light; reflectance values given. Named in honour of I. Abs-Wurbach, for her work on braunite, mineralogy.

Aheylite. E.E. Foord and J.E. Taggart, 1986. *Pap. & Proc. Gen. Meet., IMA*, 1986. 102. Mira Flores mine, Huanuni district, Oruro, Bolivia. $\text{FeAl}_6(\text{PO}_4)_4(\text{OH})_8 \cdot 4\text{H}_2\text{O}$. Evidently the ferroan analogue of turquoise.

Alluavite. A.P. Khomyakov, G.N. Nechelyustov and R.K. Rastsvetaeva, 1990. *Zap. Vses. Min. Obshch.*, **119**, 117. [Russian]. Occurs intergrown with eudialyte, forming colourless, irregular masses, up to 1 mm, in the ultra-apatitic

pegmatites at Mount Alluav, Lovozero Complex, Kola Peninsula, Russia. $\text{Na}_{19}(\text{Ca},\text{Mn})_6(\text{Ti},\text{Nb})_3\text{Si}_{26}\text{O}_{74}\text{Cl} \cdot \text{H}_2\text{O}$. Trigonal, space group $R\bar{3}m$, a 14.046, c 60.60 Å, $Z = 6$. D_{meas} . 2.76, D_{calc} . 2.78 g/cm³, ω 1.618, ϵ 1.626. Named for the locality.

Altsite. A.P. Khomyakov, G.N. Nechelyustov, G. Ferraris and G. Ivalgi, 1994. *Zap. Vses. Min. Obshch.*, **123**, 82 [Russian]. From peralkaline pegmatites at Oleny Stream, SE Khibina alkaline massif, Kola Peninsula, Russia. Monoclinic, a 10.37, b 16.32, c 9.16 Å, β 105.6°, $Z = 2$. Named for the chemical elements Al, Ti and Si.

Ankangite. M. Xiong, Z.-S. Ma and Z.-Z. Peng, 1989. *Chinese Science Bulletin*, **34**, 592. As black euhedral to subhedral crystals to 1 mm in a quartz vein from Ankang County, Shaanxi Province, China. Ideal formula $\text{Ba}(\text{Ti},\text{V},\text{Cr})_8\text{O}_{16}$. Closely related to mannardite. Tetragonal, space group $I4$, $I\bar{4}$ or $I4/m$, a 10.118, c 2.956 Å, $Z = 1$. D_{meas} . 4.44, D_{calc} . 4.389 g/cm³. Pinkish grey-white in reflected light, exhibiting reflection pleochroism; reflectance data are given. Named for the County in which the type locality is situated.

Antimonseelite. Luming Chen, Qifa Zhang, Deren Li and Guanxin Wang, 1993. *Acta Min. Sinica*, **13**, 7. Occurs as black anhedral grains and as radiating acicular crystals, up to 23 µm, with other minerals in uraniferous calcite veins in the Kaiyang U-Hg-Mo polymetallic deposit, Guizhou Province, China. Sb_2Se_3 . Selenium analogue of stibnite. Orthorhombic, space group $Pbnm$, a 11.593, b 11.747, c 3.3984 Å, $Z = 4$. D_{calc} . 5.88 g/cm³. Reflectance data are provided; distinctly pleochroic, birefractant and anisotropic. Named for its chemical composition.

† Died 10 February 1996

- Anyuuite.** L.V. Razin and G.A. Sidorenko, 1989. *Min. Zhurn.* **11**, 88. [Russian]. As platy aggregates to 900 μm long in polymineralic grains within Au-Pt concentrates of the Bolshoi Anyui River basin, northeastern Russia. AuPb_2 ; an antimonian variety is also recorded. Tetragonal, space group $I4/mcm$, a 7.39, c 5.61 \AA , $Z = 4$. $D_{\text{calc.}}$ 13.49 g/cm^3 . Weakly anisotropic; reflectance data are given. Named for the locality.
- Arsenoflorencite-(La).** B. Scharm, N. Scharmová, P. Sulovský and P. Kühn, 1991. *Časop. Mineral. Geol.*, **36**, 103. As micron-sized zonal intergrowths with philipsbornite and as concentrically-zoned spherical or irregular aggregates (<0.02 mm) with arsenoflorencite-(Nd) and arsenogoyazite (both this list) and other minerals in cements of Cenomanian sandstones, northern Bohemia, Czech Republic. $\text{LaAl}_3(\text{AsO}_4)_2(\text{OH})_6$. Lanthanum analogue of arsenoflorencite-(Ce) and named accordingly.
- Arsenoflorencite-(Nd).** B. Scharm, M. Scharmová, P. Sulovský and P. Kühn, 1991. *Časop. Mineral. Geol.*, **36**, 103. Associated with arsenoflorencite-(La) and arsenogoyazite (both this list) and other minerals in cements of Cenomanian sandstones, northern Bohemia, Czech Republic. $\text{NdAl}_3(\text{AsO}_4)_2(\text{OH})_6$. Neodymium analogue of arsenoflorencite-(Ce) and named accordingly.
- Arsenogorceixite.** K. Walenta and P.J. Dunn, 1993. *Aufschluss*, **44**, 250. Clara mine, Schwarzwald, Germany. Arsenate analogue of gorceixite (4th List). Arsenogorceixite is the redefined sulphate-free weilerite of K. Walenta (*Schweiz. Mineral. Petrog. Mitt.*, 1981, **61**, 23). See also arsenoflorencite-(La) and arsenoflorencite-(Nd) entries.
- Arsenowaylandite.** B. Scharm, M. Scharmová and M. Kundrát, 1994. *Vesník. Cesk. geol. ústava*, **69**, 79. From northeastern Bohemia, Czech Republic. $\text{BiAl}_3(\text{AsO}_4)_2(\text{OH})_6$. The arsenic analogue of waylandite; not submitted to the IMA.
- Artroite.** A.R. Kampf and E.E. Foord, 1995. *Amer. Min.*, **80**, 179. As colourless, bladed crystals in a mineralised vug from the Grand Reef mine, Graham County, Arizona, USA. $\text{PbAlF}_3(\text{OH})_2$. Triclinic, space group $P1$, a 6.270, b 6.821, c 5.057 \AA , α 90.680, β 107.690, γ 104.46°, $Z = 2$. $D_{\text{meas.}}$ 5.36, $D_{\text{calc.}}$ 5.47 g/cm^3 . Optically biaxial negative, $2V_{\text{meas.}}$ 41°, α 1.629, β 1.682, γ 1.691. Named for Arthur Roe, mineral collector from Tucson, Arizona.
- Ashburtonite.** J.D. Grice, E.H. Nickel, E.H. and R.A. Gault, 1991. *Amer. Min.*, **76**, 1701. As clusters of clear blue, prismatic crystals, to 0.4 mm long, from the Anticline prospect, Ashburton Downs, Western Australia, Australia; associated minerals include diaboelite, duftite, caledonite, plattnerite and other secondary Cu-Pb minerals. Ideal formula $\text{HPb}_4\text{Cu}_4\text{Si}_4\text{O}_{12}(\text{HCO}_3)(\text{OH})_4\text{Cl}$. Tetragonal, space group $I4/m$, a 14.234, c 6.103 \AA , $Z = 2$. $D_{\text{meas.}}$ >4.07, $D_{\text{calc.}}$ 4.69 g/cm^3 . Optically uniaxial positive, ω 1.786, ϵ 1.800. Named for the deposit.
- Barberite.** A. Garavelli and F. Vurro, 1994. *Amer. Min.*, **79**, 381. As a minutely-crystalline, colourless sublimation product from the Fossa Crater, on Vulcano Island, Aeolian Islands, Italy; associated minerals include sulphur, malladrite, realgar and Bi sulphosalts. NH_4BF_4 . Orthorhombic, space group $Pnma$, a 9.061, b 5.6727, c 7.2672, $Z = 4$. $D_{\text{meas.}}$ 1.89, $D_{\text{calc.}}$ 1.90 g/cm^3 . Optically biaxial, $2V_{\text{meas.}}$ 90°, mean $n = 1.308$ (calculated from Gladstone-Dale relationship). Named for F. Barberi, Professor of Vulcanology at Pisa University (Italy).
- Barium-zinc alumopharmacosiderite.** H. Sarp, P.J. Chiappero and G. Favreau, 1994. *Arch. Sci. Genève*, **47**, 45. From the Cap Garonne mine, Var, France. $(\text{Ba},\text{K})_{0.5}(\text{Zn},\text{Cu})_{0.5}(\text{Al},\text{Fe})_4(\text{AsO}_4)_3 \cdot 5\text{H}_2\text{O}$. Tetragonal, a 15.476, c 15.675 \AA , $Z = 8$. The Ba-Zn analogue of alumopharmacosiderite, not submitted to the IMA.
- Barstowite.** C.J. Stanley, G.C. Jones, A.D. Hart, P. Keller and D. Lloyd, 1991. *Min. Mag.*, **55**, 119. As aggregates to 3 mm, composed of white, subparallel, elongate intergrown crystals in cavities with phosgenite in a vein at Bounds Cliff, St. Endellion, Cornwall, England, UK. $3\text{PbCl}_2 \cdot \text{PbCO}_3 \cdot \text{H}_2\text{O}$. Monoclinic, space group $P2_1$ or $P2_1/m$, a 4.218, b 9.180, c 16.673 \AA , β 91.49°, $Z = 2$. $D_{\text{meas.}}$ 5.50–5.69, $D_{\text{calc.}}$ 5.77 g/cm^3 . Reflectance values given; moderately birefractant and colourless internal reflections. Named for R.W. Barstow, the Cornish mineral collector. Perhaps earlier described as an unnamed phase by V.L. Melnikova (*Izvest. Akad. Nauk Kazakh SSSR, Ser. Geol.*, 1972, **6**, 82).
- Basinite.** N.P. Tschirvinskiy, L. Savina and E.S. Golovanova, 1990. *Mineral. Sbornik Lvov*, **44**, 84 [Russian]. A calcium bilirubinate compound found in human secretions.
- Baumhauerite-2a.** A. Pring, W.D. Birch, D. Swell, S. Graeser, A. Edenharter and A. Criddle, 1990. *Amer. Min.*, **75**, 915. As steel-grey, massive intergrowths with silver-free baumhauerite in dolomite at Lengenbach, Binnental, Valais Canton, Switzerland. Average composition $\text{Pb}_{11}\text{Ag}_{0.7}\text{As}_{17.2}\text{Sb}_{0.4}\text{S}_{36}$. Monoclinic, space group not given, a 44.74, b 8.477, c 7.910 \AA , β 93.370, $Z = 2$. $D_{\text{calc.}}$ 5.31 g/cm^3 . Reflectance data are given; birefractant, non-pleochroic. Named for its relationship to baumhauerite.
- Bearthite.** C. Chopin, F. Brunet, W. Gebert, O. Medenbach and E. Tillmanns. 1993. *Schweiz.*

- Mineral. Petrol. Mitt.*, **73**, 1. Occurs as yellowish aggregates of partly-euhedral crystals in quartz segregations within high-pressure metamorphic rocks from the Monte Rosa Massif (Switzerland) and Dora Maira Massif (Italy). $\text{Ca}_2\text{Al}[\text{PO}_4]_2(\text{OH})$. Calcium analogue of goedenite. Monoclinic, space group $P2_1/m$, a 7.231, b 5.734, c 8.263, β 112.57°, $Z = 2$. D_{calc} . 6.79 g/cm³. Optically biaxial positive, $2V_{\text{meas}}$. 65.0°, α 1.662, β 1.671, γ 1.696. Named for P. Bearth, in recognition of his studies on the high-pressure terrains of the western Alps.
- Belendorffite**. H.-J. Bernhardt and K. Schmetzer, 1992. *Neues Jahrb. Min., Mh.*, p. 21. As globular nodules at Moschellandsberg, Rhineland-Pfalz, Germany. Ideal formula Cu_7Hg_6 . Dimorphous with Kolymite (31st List). Hexagonal (rhombohedral), space group $R3m$, a 9.4082 Å, α 90.472°, $Z = 4$. D_{meas} . 13.2, D_{calc} . 13.15 g/cm³. Reflectance values given. Named for K. Belendorff, mineral collector, who obtained the specimen from the Krantz collection (labelled landsbergite).
- Belkovite**. A.V. Voloshin, V. V. Subbotin, Ya.A. Pakhomovskii, A.Yu. Bakhchisaraitsev, A. Yu., N.A. Yamnova and D.Yu. Pushcharovskii, 1991. *Neues Jahrb. Min., Mh.*, p. 23. As brown rims on barian pyrochlore and as crystals to 1 mm in dolomite-calcite carbonatites of the Vuoriyarvi alkalic massif, Kola Peninsula, Russia. Ideal formula $\text{Ba}_3(\text{Nb,Ti})_6(\text{Si}_2\text{O}_7)_2\text{O}_{12}$. Hexagonal, space group $P6_2m$, a 8.996, c 7.799 Å, $Z = 1$. D_{meas} . 4.16, D_{calc} . 4.25 g/cm³. Optically uniaxial positive, ω 1.928, ϵ 2.002; some grains display biaxial figures, with $2V$ up to 10°. Named for the Soviet mineralogist I.V. Belkov. Not to be confused with either belovite (20th List) or melkovite (26th List).
- Bellbergite**. B. Rudinger, E. Tillmanns and G. Hentschel, 1993. *Mineral. Petrol.*, **48**, 147. Occurs as colourless to white, subparallel intergrowths, up to 0.3 mm long, in the reaction contact zones of calcium-rich xenoliths within leucite tephrite, from the Bellberg Volcano, Mayen, Eifel region, Germany. $(\text{K,Ba,Sr})_2\text{Sr}_2\text{Ca}_2(\text{Ca,Na})_4\text{Al}_{18}\text{Si}_{18}\text{O}_{72}\cdot 30\text{H}_2\text{O}$. Hexagonal, space group $P6_3/mmc$, $P6_2c$ and $P6_3mc$, a 13.244, c 15.988 Å, $Z = 1$. Zeolite structure type EAB. D_{meas} . 2.20, D_{calc} . 2.19 g/cm³. Optically uniaxial negative, ω 1.522, ϵ 1.507. Named for the locality.
- Benyacarite**. F. Demartin, T. Pilati, H.D. Gay and C.M. Gramaccioli, 1993. *Zeits. Krist.*, **208**, 57. From Cerro Blanco, near Tanti, Cordoba, Argentina. $[(\text{H}_2\text{O}),\text{K}]_2(\text{Mn,Fe})(\text{Fe,Ti})(\text{PO}_4)_4(\text{O,F})_2\cdot 14\text{H}_2\text{O}$; the Mn (and H_2O) analogue of paulkerrite. Not yet approved by IMA.
- Bernalite**. W.D. Birch, A. Pring, A. Reller and H.W. Schmalle, 1992. *Naturwiss.*, **79**, 509, and *Amer. Min.*, 1993, **78**, 827. Found as dark bottle green flattened pyramidal to pseudo-octahedral crystals, up to 3 mm on edge, associated with concretionary goethite and coronadite. From the Proprietary mine, Broken Hill, New South Wales, Australia. $\text{Fe}(\text{OH})_3$. Perovskite structure. Pseudocubic, although orthorhombic cell given, space group $Immm$, a 7.544, b 7.560, c 7.558 Å, $Z = 8$. D_{meas} . 3.32, D_{calc} . 3.35 g/cm³. Refractive indices in the range 1.92–1.94. Named for the eminent British crystallographer, J.D. Bernal. Not the bernalite of Mueller (26th List).
- Bismutocolumbite**. I.S. Peretazhko, V.E. Zagorskij, A.N. Sapozhnikov, Yu.D. Bobrov and A.D. Rakcheev, 1992. *Zap. Vses. Min. Obshch.*, **121**, 130. Black, elongate crystals, up to 2 mm long, in miarolitic pegmatites of the Malkhanskij (Malkanskoe) Khrebet, Chitinskaya Oblast, Russia; intergrown with elbaite and danburite. $\text{Bi}(\text{Nb,Ta})\text{O}_4$. Orthorhombic, space group $Pcnn$, a 4.992, b 11.731, c 5.677 Å, $Z = 4$. D_{meas} . 7.56, D_{calc} . 7.66 g/cm³. Optically biaxial positive, $2V_{\text{calc}}$ 85°, α 2.38, β 2.42, γ 2.47; reflectance data are given. Named for its chemical composition.
- Boggsite**. D.G. Howard, R.W. Tschernich, J.V. Smith, and G.L. Klein, 1990. *Amer. Min.*, **75**, 1200. As colourless to white, zoned hemispheres in small vesicles in Eocene basalts from the Goble district, Columbia County, Oregon, USA. $(\text{Ca,Na})_{11}(\text{Fe,Al,Si})_{98}\text{O}_{192}\cdot 70\text{H}_2\text{O}$. Zeolite group. Orthorhombic, space group $Imma$, a 20.21, b 23.77, c 12.80 Å, $Z = 1$. D_{meas} . 1.98, D_{calc} . 1.99 g/cm³. Optically biaxial negative, $2V$ 25°, α 1.480, β 1.481, γ 1.487. Named for R.M. and R.C. Boggs, both of Washington State. Previously listed prematurely (36th List).
- Bøgvadite**. H. Pauly and O.V. Petersen, 1988. *Bull. Soc. Geol. Denmark*, **37**, 21. Found as colourless, transparent crystals to 0.15 mm in the cryolite deposit at Ivigtut, Greenland. Ideal formula $\text{Na}_2\text{SrB}_2\text{Al}_4\text{F}_2\text{O}$. Orthorhombic, space group $Pnmm$ or $Pn2n$, a 7.110, b 19.907, c 5.347 Å, $Z = 2$. D_{meas} . 3.85, D_{calc} . 3.898 g/cm³. Optically biaxial negative, $2V_{\text{meas}}$. 870, α 1.4326, β 1.4360, γ 1.4389. Named for R. Bøgvad, former chief geologist at Ivigtut.
- Borodaevite**. S.N. Nenasheva, A.V. Efimov, A.V. Sivtsov and N. Mozgova. 1992. *Zap. Vses. Min. Obshch.*, **121**, 115. [Russian]. As elongate, platy crystals, up to 1.2 mm, in the Alaskitivoje deposit, Ust-Nera district, Yakutia, Russia; associated minerals include quartz, molybdenite, triplite and various Pb-Bi sulphosalts. $[\text{Ag}_5(\text{Fe,Pb})\text{Bi}_7]_{13}(\text{Sb,Bi})_2\text{S}_{27}$, a member of the pavonite homologous series. Monoclinic, space group $C2/m$ or Cm , a 13.515, b 4.098, c 26.000, β

93.00°, $Z = 2$. $D_{\text{calc.}}$ 7.90 g/cm³. Reflectance data are given; distinct brown anisotropism and non-pleochroic. Named for Yu.S. Borodaev, Russian mineralogist.

Boromuscovite. E.E. Foord, R.F. Martin, J.J. Fitzpatrick, J.E. Taggart Jr., and J.G. Crock, 1991. *Amer. Min.*, **76**, 1998. White to cream coloured porcelaneous coatings, to 1 cm thick, within the New Spaulding pocket of the Little Three mine pegmatite, Ramona district, San Diego County, California, USA. Ideal formula $\text{KAl}_2(\text{Si}_3\text{B})\text{O}_{10}(\text{OH},\text{F})_2$. Boron analogue of muscovite. Monoclinic. $2M_1$ polytype: a 5.075, b 8.794, c 19.815 Å, β 95.59°, $1M$ polytype: a 5.077, b 8.775, c 10.061 Å, β 101.31°. $D_{\text{calc.}}$ 2.89 and 2.90 g/cm³ for the $2M_1$ and $1M$ polytypes, respectively. Optically biaxial negative, $2V_{\text{meas.}}$ 44°, $2V_{\text{calc.}}$ 47.5°, α 1.557, β 1.587, γ 1.593, non-pleochroic. Named for its compositional relationship to muscovite.

Bottinoite. P. Bonazzi, S. Menchetti, A. Caneschi, and S. Magnanelli, 1992. *Amer. Min.*, **77**, 1301. Light blue-green, tabular or very short prismatic crystals, to 0.4 mm, forming rosette-like aggregates, to 2.5 mm from the Paoli Level, Bottino de Seravezza mine, Alpi Apuane, Italy. Ideal formula $\text{Ni}(\text{H}_2\text{O})_6[\text{Sb}(\text{OH})_6]_2$. Trigonal, space group $P\bar{3}1m$ or $P31m$ or $P312$. a 16.026, c 9.795 Å, $Z = 6$. $D_{\text{meas.}}$ 2.83, $D_{\text{calc.}}$ 2.81 g/cm³. Optically uniaxial positive, ω 1.600, ϵ 1.605, non-pleochroic, very low birefringence. Named for the locality.

Brianyoungite. A. Livingstone and P.E. Champness, 1993. *Min. Mag.*, **57**, 665. Found as white rosettes of thin blades, up to 2 µm, with gypsum in oxidised ore of the Brownley Hill mine, Nenthead, Cumbria, England, UK; also recorded from the Smallcleugh mine, Nenthead (England), from Vieille Montagne (Belgium) and in the Bastenberg mine (Germany). $\text{Zn}_{12}(\text{CO}_3)_3(\text{SO}_4)(\text{OH})_{16}$. Orthorhombic, a 15.724, b 6.256, c 5.427 Å, $Z = 4$. $D_{\text{meas.}}$ 3.93–4.09, $D_{\text{calc.}}$ 4.11 g/cm³. Optically biaxial, α 1.635, β 1.650. Named for Brain Young, who collected the type specimen.

Brizziite. C. Sabelli and F. Olmi, 1994. *Riv. Mineral. Ital.*, **17**, 271. F. Olmi and C. Sabelli, 1994. *Eur. J. Min.*, **6**, 667. From the Cetine di Cototniano mine, Tušcani, Italy. NaSbO_3 . Trigonal, a 5.301, c 15.93 Å, $Z = 6$. Named after G. Brizzi.

Buckhornite. C.A. Francis, A.J. Criddle, C.J. Stanley, D.E. Lange, S. Snow and J.G. Francis, 1992. *Can. Min.*, **30**, 1039. From the Buckhorn mine, Jamestown, Boulder County, Colorado, USA. $\text{AuPb}_2\text{BiTe}_2\text{S}_3$. Occurs as splendid black blades, up to 1.5 mm, associated with aikinite, tetradymite and other minerals. Orthorhombic, space group $Pmmm$ or $P222$, a 4.092, b 12.245, c

9.322 Å. $D_{\text{calc.}}$ 8.43 and 8.34 g/cm³ for the empirical and ideal formulae, respectively. Bireflectant and pleochroic in reflected light; reflectance data are given. Named for the mine. Perhaps previously recorded as unnamed phases by V.A.J. Pašava et al., 1986, *Vestnik Ustred. Ustavu. Geol.*, **61**, 217; and Kovalenker et al., 1990, *Int. Geol. Rev.*, **32**, 705.

Byelorussite-(Ce). E.P. Shpanov, G.N. Nechelyustov, S.V. Baturin and L.S. Solntseva, 1989. *Zap. Vses. Min. Obshch.*, **118**, 100. [Russian]. As pale yellow to pale brown, thin tabular to tabular crystals to 25 mm in a quartz vein cutting metasomatised granosyenites from the Zhitkovitschskij horst, Homel district, Byelorussia. $\text{NaNbBa}_2\text{Ti}_2\text{Si}_8\text{O}_{26}(\text{F},\text{OH})\cdot\text{H}_2\text{O}$. Joaquinite group. Orthorhombic, space group $P2_12_12_1$, a 10.57, b 9.69, c 22.38 Å. $D_{\text{meas.}}$ 3.92, $D_{\text{calc.}}$ 4.09 g/cm³. Optically biaxial positive. $2V$ 58.62°, α 1.743, β 1.760, γ 1.820. Named for the country.

Bystrite. A.N. Sapozhnikov, V.G. Ivanov, L.F. Piskunova, A.A. Kashaev, L.E. Terentjeva and E.A. Pobedimskaya, 1991. *Zap. Vses. Min. Obshch.*, **120**, 97. [Russian]. Initially described by V.G. Ivanov and A.N. Sapozhnikov (*Lazurites of the USSR.*), 1985, (Nauka Novosibirsk) 1. [Russian.] Yellow, tabular crystals, up to 5 mm long and intergrown with lazurite, calcite and diopside occur in the Malo-Bystrinskoe lazurite deposit, Pribaikal area, Russia. $\text{Ca}(\text{Na},\text{K})_7(\text{Si}_6\text{Al}_6\text{O}_{24})(\text{S}_3)\cdot 1.5\text{H}_2\text{O}$. Feldspathoid group. Hexagonal (rhombohedral), space group $P\bar{3}1c$, a 12.855, c 10.700 Å. $D_{\text{meas.}}$ 2.43, $D_{\text{calc.}}$ 2.45 g/cm³. Optically uniaxial positive, ω 1.584, ϵ 1.660, pleochroic. Named for the locality.

Camerolaite. H. Sarp and P. Perroud, 1991. *Neues Jahrb. Min., Mh.*, 1991, 481. As transparent blue-green acicular crystals to 0.5 mm comprising radiating aggregates at the Cap Garonne mine, Var, Department, France. Ideal formula $\text{Cu}_4\text{Al}_2[\text{HSbO}_4, \text{SO}_4](\text{OH})_{10}(\text{CO}_3)\cdot 2\text{H}_2\text{O}$. Monoclinic, space group $P2_1$ or $P2_1/m$, a 10.765, b 2.903, c 12.527 Å, β 95.61°, $Z = 1$. $D_{\text{meas.}}$ 3.1, $D_{\text{calc.}}$ 3.09 g/cm³. Optically biaxial positive, $2V_{\text{meas.}}$ 77°, $2V_{\text{calc.}}$ 75°, α 1.626, β 1.646, γ 1.682. Named for M. Camerola, mineral collector.

Cancrisilite. A.P. Khomyakov, E.I. Semenov, E.A. Pobedimskaya, T.N. Nadezhina and R.K. Rastsvetaeva, 1991. *Zap. Vses. Min. Obshch.*, **120**, 80. [Russian]. Found as anhedral, lilac-coloured grains, up to 3 mm, within hyperalkalic pegmatites of Mount Alluaiv, Lovozero Complex, Kola Peninsula, Russia; associated minerals include potassium feldspar, nepheline, sodalite, manaksite (this list) and arfvedsonite. $\text{Na}_7[\text{Al}_5\text{Si}_7\text{O}_{24}]\text{CO}_3\cdot 3\text{H}_2\text{O}$. Feldspathoid,

- Cancrinite group. Hexagonal, space group $P6_3$, a 12.575, c 5.105 Å, $Z = 1$. $D_{\text{meas.}}$ 2.40, $D_{\text{calc.}}$ 2.39 g/cm³. Optically uniaxial negative, ω 1.509, ϵ 1.490, luminescent under UV light. Named for the anomalously high Si:Al ratio and for its relationship to the cancrinite group.
- Cannonite.** C.J. Stanley, A.C. Roberts, D.C. Harris, A.J. Criddle and J.T. Szymański, 1992. *Min. Mag.*, **56**, 606. As colourless crystal aggregates, up to 1 mm, in quartz gangue from the Tunnel Extension mine, Ohio mining district, Marysville, Piute County, Utah, USA; associated minerals include cuprobismutite and bismuthinite. $\text{Bi}_2\text{O}(\text{OH})_2\text{SO}_4$. Monoclinic, space group $P2_1/c$, a 7.700, b 13.839, c 5.686 Å, β 109.11°, $Z = 4$. $D_{\text{calc.}}$ 6.515 g/cm³. Reflectance data are given; moderately birefractant, weakly anisotropic, colourless to white internal reflections. Named for B.B. Cannon, who first recognised the species. This is the unnamed phase of Radtke *et al.* (*U.S. Geol. Surv. Prof. Paper*, 1967, **575-D**, D127). Also compare the unnamed $\text{Bi}_2(\text{SO}_4)(\text{OH})_4$ of Shi (1989) re: ximengite (this list).
- Capgaronnite.** B. Mason, W.G. Mumme, W.G. and H. Sarp, 1992. *Amer. Min.*, **77**, 197. As translucent to opaque black crystals, to 0.1 mm, forming tufted aggregates from the Cap Garonne mine, Var Department, France; associated minerals include olivenite, cyanotrichite and brochantite. Ideal formula $\text{HgS} \cdot \text{Ag}(\text{Cl}, \text{Br}, \text{I})$. Orthorhombic, space group $P2_12_12_1$. a 6.803, b 12.87, c 4.528 Å, $Z = 4$. $D_{\text{calc.}}$ 6.43 g/cm³. Optically biaxial negative, $\alpha \sim 2.2$, $\gamma \sim 2.3$; β could not be measured; pleochroic α dark brown and γ grey to clear purple. Named for the locality.
- Carlosruizite.** J.A. Konnert, H.E. Evans Jr., J. J. McGee and G.E. Erickson, 1994. *Amer. Min.*, **79**, 1003. As platy crystals, up to 200 μm , in iquiqueite found within yellow nitrate ore samples of mainly nitratine, halite and darapskite from the Zapiga district, Tarapacá Province, Chile. $\text{K}_6(\text{Na}, \text{K})_4\text{Na}_6\text{Mg}_{10}(\text{SeO}_4)_{12}(\text{IO}_3)_{12} \cdot 12\text{H}_2\text{O}$. Isostructural with fuenzalidaitite (this list). Hexagonal (rhombohedral), space group $P\bar{3}c1$, a 9.590, c 27.56 Å, $Z = 1$. $D_{\text{calc.}}$ 3.400 g/cm³. Optically uniaxial negative, ω 1.655, ϵ 1.642. Named for Carlos Ruiz, in recognition of his efforts in the development of Chilean geology.
- Chelyabinskite.** B.V. Chesnokov, L.F. Bazhenova, E.P. Shcherbakova, T.A. Michal and T.N. Deriabina, 1988. *Mineralogy, Technogenesis, and Mineral-Resource Complexes of the Urals*, p. 5 [Russian]. From burned dumps of the Chelyabinsk coal basin, Russia. A mineral with similar chemical, X-ray and DTA properties to thaumasite. Named from the locality; not approved by IMA.
- Cheremnykhite.** A.A. Kim, N.V. Zayakina and V.F. Makhotko, 1990. *Zap. Vses. Min. Obshch.*, **119**, 50. [Russian]. As elongate tabular crystals to 0.5 mm in calcite and associated with kuksite (this list), dugganite, yafsoanite and other minerals at Kuranakh, Yakutia, Russia. Ideal formula $\text{Pb}_3\text{Zn}_3\text{TeO}_6(\text{VO}_4)_2$. Orthorhombic, space group $Cmmm$, $C222$, $Cm2m$ or $Cmm2$, a 8.58, b 14.86, c 5.18 Å, $D_{\text{calc.}}$ 6.44 g/cm³. Optically biaxial negative, $2V$ 20°, α 1.986, γ 1.997, non-pleochroic. Named for I.M. Cheremnykh, co-discoverer of the Kuranakh deposit.
- Chiluite.** X. Yong, D. Li, H. Wang, Deng, N. Chen and S. Wang, 1989. *Acta Min. Sinica*, **9**, 9. [Chinese, English abstract]. As a yellow, plumose replacement in joesite inclusions within bismuthinite from the Chilu molybdenite deposit, Fujian Province, China. Ideal formula $\text{Bi}_6\text{Te}_2\text{Mo}_2\text{O}_{21}$. Hexagonal, space groups $P6_322$, $P6_3/m$ and $P6_3$, a 8.970, c 12.207 Å, $Z = 1$. $D_{\text{meas.}}$ 3.65, $D_{\text{calc.}}$ 3.67 g/cm³. Weakly anisotropic, non-birefractant; reflectance values given. Optically uniaxial negative, ω 2.4, ϵ 2.3. Named for the deposit.
- Chladniite.** T.J. McCoy, I.N. Steele, K. Keil, B.F. Leonard and N. Endreß, 1994. *Amer. Min.*, **79**, 375. Found as a single grain within a silicate inclusion in the Carlton (HICD) iron meteorite, Carlton, Hamilton County, Texas, USA. $\text{Na}_2\text{CaMg}(\text{PO}_4)_6$. Magnesium analogue of fillowite and johnsomervilleite. Hexagonal (rhombohedral), space group $R\bar{3}$, a 14.967, c 42.595 Å. Reflectance values are given. Named for E.F.F. Chladni, who is regarded as the founder of the science of meteoritics. Not to be confused with chladnite (meteorite group name) of Rose (1863) nor chladnite (= enstatite) of C.U. Shepard (1846).
- Ciacciullite.** P.J. Dunn, J.D. Grice, A. Criddle, and C. Stanley, 1991. *Amer. Min.*, **76**, 1708. Dark reddish-brown flattened crystals, to 0.6~mm, associated with cahnite, in a single museum specimen from the Franklin mine, Franklin, Sussex County, New Jersey, USA. $\text{Mn}(\text{Mg}, \text{Nn})_2\text{Zn}_2(\text{OH})_{10} \cdot 2-4\text{H}_2\text{O}$. Monoclinic, space group $C2/m$, a 15.47, b 6.369, c 5.576 Å, β 101.290, $Z = 2$. $D_{\text{calc.}}$ 2.87 g/cm³. Refractive indices between 1.76 and 1.92, weakly anisotropic; reflectance values given; orange red internal reflections. Named for J. Ciacciulli of Sussex County, New Jersey.
- Clinobirnessite.** A.I. Gorskov, V.A. Drits, V.s. Putilina, E.V. Pokrovskaya and A.V. Sivtsov, 1992. *Litol. Polezn. Iskop.*, no. 6, p. 67 [Russian]; *Lithology and Mineral Resources*, **27**, 503; *Amer. Min.*, **79**, 1210 (1994). Variety of birnessite; a natural single-layered triclinic or double-layered monoclinic form.

- Clinomimetite.** Y. Dai, J.M. Hughes and P.B. Moore, 1991. *Can. Min.*, **29**, 369. A name given to the monoclinic dimorph of mimetite from Johangeorgenstadt, Saxony, Germany. Ideal formula $Pb_5(AsO_4)_3Cl$. Monoclinic (pseudo-hexagonal), space group $P2_1/b$, a 10.1891, b 20.3723, c 7.4564 Å, β 119.8827°. An approved new mineral, although initial description remains incomplete. Dimorphous with mimetite and named accordingly.
- Clinotobermorite.** C. Henmi and I. Kusachi, 1992. *Min. Mag.*, **56**, 353. Occurs as colourless to white, tabular or acicular crystals with apophyllite, calcite and tobermorite in veins cutting skarns at Fuka, Bitchu-cho, Okayama Prefecture, Japan. $Ca_5Si_6(O,OH)_{18} \cdot 5H_2O$. Monoclinic, space group Cc or $C2/c$, a 11.331, b 7.353, c 22.67 Å, β 96.590, exhibits polysynthetic twinning. $D_{meas.}$ 2.58, $D_{calc.}$ 2.69 g/cm³. Optically biaxial, $2V_{calc.}$ 89.8°, α 1.575, β 1.580, γ 1.585. Dimorphous with tobermorite and named accordingly. Originally described as monoclinic tobermorite by C. Henmi and I. Kusachi (*J. Jap. Assoc. Mineral. Petrol. Econ. Geol.*, 1989, **84**, 374.)
- Coniféite.** G.C. Popescu, 1990. *Rev. Roum. Geol. Geophys. Geogr.; Geology*, **34**, 11. From Baia de Arama, southern Carpathians, Romania. A mineral claimed to be isomorphous with cobalt pentlandite but with lower Co and higher Ni contents. Named from its principal cations Co-Ni-Fe.
- Coombsite.** T. Sameshima and Y. Kawachi, 1991. *New Zealand J. Geol. Geophys.*, **34**, 329. As brown, patchy aggregates in a lenticular body of manganiferous-siliceous rocks at Watsons Beach, Otago Province, New Zealand. $K(Mn,Fe,Mg)_{13} \cdot (Si,Al)_{18}O_{42}(OH)_{14}$. Manganese analogue of zussmanite. Tetragonal (by analogy to zussmanite), a 11.828, c 29.146 Å, $Z = 3$. $D_{meas.}$ 3.0, $D_{calc.}$ 3.063 g/cm³. Optically uniaxial negative, ω 1.600, ϵ 1.619. Named for D.S. Coombs, University of Otago, New Zealand.
- Coquandite.** C. Sabelli, P. Orlandi and G. Vezzalini, 1992. *Min. Mag.*, **56**, 599. Described as colourless to white spheroidal knobs of silky fibres or as lamellar crystals on stibnite from Pereta, Tuscany, Italy; also described from the Cetine mine, Tuscany, Italy and at the Lucky Knock mine, Tonasket, Okanogan County, Washington, USA. $Sb_6O_8(SO_4) \cdot H_2O$. Triclinic, space group $P\bar{1}$, a 11.434, b 29.77, c 11.314 Å, α 91.073°, β 119.245°, γ 92.82°, $Z = 12$. $D_{calc.}$ 5.78 g/cm³. Optically biaxial positive, $2V_{meas.}$ $\gg 60^\circ$, mean $n = 2.08$. Named for H. Coquand, French scientist who made extensive studies of the Tuscany antimony deposits.
- Crawfordite.** A.P. Khomyakov, L.I. Polezhaeva and E.V. Sokolova, 1994. *Zap. Min. Vses. Min. Obshch.*, **123**, pt 3, 107. From the Khibiny alkaline massif, Kola Peninsula, Russia. $Na_3Sr(PO_4)CO_3$. Monoclinic, a 9.187, b 6.707, c 5.279 Å, β 89.88°, $Z = 2$. Related to badleyite, bonshtedtite and sidorenkite. Named after A. Crawford (1748–1795) who first discovered strontium salts.
- Crerarite.** N.J. Crook, S.A. Wood, W. Gebert, H.-J. Bernhardt and O. Medenbach, 1994. *Neues Jahrb. Min. Mh.*, 567. From Lac Sheen, Abitibi-Témiscamisque, Quebec, Canada. $(Pt,Pb)Bi_3(S,Se)_{4-x}$. Cubic, a 5.86 Å, $Z = 1$. Named after D. Crerar.
- Deansmithite.** A.C. Roberts, J.T. Szymański, R.C. Erd, A.J. Criddle and N. Bonardi, 1993. *Can. Min.*, **31**, 787. As orange-red fan-shaped aggregates of elongate crystals, up to 0.5 mm, closely associated with cinnabar and edoylerite (this list) in a quartz-magnesite rich host rock from the Clear Creek Claim, New Idria district, San Benito County, California, USA. $Hg_2^+Hg_3^{2+}Cr^{6+}O_5S_2$. Triclinic, space group $P\bar{1}$, a 8.116, b 9.501, c 6.891 Å, α 100.43°, β 110.24°, γ 82.80°, $Z = 2$. $D_{calc.}$ 8.06 and 8.14 g/cm³ for the empirical and idealised formulae, respectively. Weakly birefractant and pleochroic in reflected light; measured reflectance values are tabulated; bright yellow-orange to orange-red internal reflections. Named for Deane K. Smith in recognition of his contributions to structural and experimental mineralogy.
- Debaoite.** Y. Li and L. Lai, 1990. *Acta Geol. Sinica*, **64**, 337. [Chinese, English abstract]. From the Debao skarn deposit, Guangxi Province, China. $Cu_{10}(AsO_4)_2(SO_4)(CO_3)(OH)_{10} \cdot 5H_2O$. Status however, remains uncertain.
- Deloryite.** H. Sarp and P.J. Chiappero, 1992. *Neues Jahrb. Min., Mh.*, p. 58. As dark green to black rosettes to 6 mm from Cap Garonne mine, near Le Pradet, Var Department, France. $Cu_4(UO_2)(MoO_4)_2(OH)_6$. Monoclinic, space group $C2$, Cm or $C2/m$, a 19.83, b 6.112, c 5.529 Å, β 103.9°, $Z = 2$. Crystallographically related to derriksite. $D_{meas.}$ 4.9, $D_{calc.}$ 4.84 g/cm³. Optically biaxial positive, $2V_{meas.}$ 90°, $2V_{calc.}$ 91.3°, α 1.90, β 1.93, γ 1.96, non-pleochroic. Named for J.C. Delory, mineral collector.
- Dissakisite-(Ce).** E.S. Grew, E.J. Essene, D.R. Peacor, S-C. Su and N. Asami, 1991. *Amer. Min.*, **76**, 1990. As pale yellow-brown, anhedral grains, up to 0.6 mm and associated with calcite dolomite, forsterite and other minerals in marble on Balchen Mountain, Sør Rondane Mountains region, Dronning Naud Land, Antarctica. Ideal formula $Ca(Ce,Lu)MgAl_2Si_3O_{12}(OH)$. Magnesium analogue of allanite-(Ce). Monoclinic, space group $P2_1/m$, a 8.916, b

- 5.700, c 10.140 Å, β 114.72°, $Z = 2$. $D_{\text{meas.}}$ 3.75, $D_{\text{calc.}}$ 3.97–4.02 g/cm³. Optically biaxial positive, $2V_{\text{meas.}}$ 64.2°, $2V_{\text{calc.}}$ 62°, α 1.735, β 1.741, γ 1.758, weakly pleochroic. Name derived from the Greek *dissákis*, meaning 'twice over' for a magnesium analogue of allanite having been described twice.
- Dmisteinbergite.** B.V. Chesnokov, E.V. Lotov, E.N. Nigmatulina, V.S. Pavlutchenko and A.F. Bushmakin, 1990. *Zap. Vses. Min. Obshch.*, **119**, 43. [Russian]. As hexagonal tablets to 0.7 mm on fracture surfaces in blocks from burned coal dumps of the Chelyabinsk coal basin, southern Urals, Russia. Ideal formula $\text{CaAl}_2\text{Si}_2\text{O}_8$. Hexagonal, space group $P6/mmm$, a 5.122, c 14.781 Å, $Z = 2$. $D_{\text{calc.}}$ 2.747 g/cm³. Optically uniaxial positive, ω 3 1.575, ϵ 1.580. Named for the Soviet petrologist, Dmitrii Steinberg.
- Dorallcharite.** T. Balić Žunić, Y. Moëlo, A. Lončar and H. Micheelsen, 1994. *Eur. J. Min.*, **6**, 255. Occurs as golden yellow, fine-grained, earthy masses in the Allchar deposit, Macedonia. $(\text{Ti}_{0.81}\text{K}_{0.19})\text{Fe}_3(\text{SO}_4)_2(\text{OH})_6$. Hexagonal (rhombohedral), space group $R\bar{3}m$, a 7.3301, c 17.663 Å, $Z = 3$. $D_{\text{calc.}}$ 3.85 g/cm³. Optically uniaxial negative, ω 3 1.822, ϵ 1.768, non-pleochroic. Named for the both the deposit and colour (*doré* = golden yellow in French).
- Dozyite.** S.W. Bailey, J.F. Banfield, W.W. Barker and G. Katchan, 1995. *Amer. Min.*, **80**, 65. A 1:1 regular interstratification of serpentine and chlorite occurring as colourless crystals in altered skarns associated with the Ertzberg East deposit, Carstensz Mountains, Irian Jaya, Indonesia. $(\text{Mg}_7\text{Al}_2)(\text{Si}_4\text{Al}_2)\text{O}_{15}(\text{OH})_{12}$. Monoclinic, space group Cm , a 5.323, b 9.214, c 21.45 Å, β 94.43°, $Z = 2$. $D_{\text{meas.}}$ 2.66, $D_{\text{calc.}}$ 2.66 g/cm³. Optically uniaxial positive, with slight separation of isogyres to a biaxial nature ($2V < 5^\circ$), $\alpha = \beta$ 1.575, γ 1.581. Named for J.J. Dozy, a Dutch geologist who discovered the deposit.
- Dzharkenite.** Yu.V. Yashunkii, E.G. Ryabeva, M.V. Abramov and S.D. Rasulova, 1995. *Zap. Vses. Min. Obshch.*, **124**, pt. 1, 85. From Dzharkenstskaya depression, SE Kazakhstan. FeSe_2 . Cubic a 5.783 Å, $Z = 4$. Named from the locality.
- Edenharterite.** S. Graeser and H. Schwander, 1992. *Eur. J. Mineral.*, **4**, 1265. Initially described by S. Graeser (*Uni Nova*, 1988, **49**, 17). As parallel intergrowths, up to 2 mm in diameter, from the Lengenbach quarry, Binntal, Valais Canton, Switzerland. $\text{TlPbAs}_3\text{S}_6$. Orthorhombic, space group $Fdd2$, a 15.465, b 47.507, c 5.843 Å, $Z = 16$. Reflectance data are given; weakly anisotropic, bright red internal reflections. Named for A. Edenharter who first synthesised the compound in 1982.
- Edoylerite.** R.C. Erd, A.C. Roberts, M. Bonardi, A.J. Criddle, Y. LePage and E.J. Gabe, 1993. *Min. Rec.*, **24**, 471. Occurs as canary yellow to orange yellow, stellate to acicular crystal (to 0.5 mm) groups with quartz, chalcedony, magnesite, deansmithite (this list) and other mercury minerals in a small prospect near the Clear Creek Hg mine, New Idria district, San Benito County, California, USA. $\text{Hg}_3^{2+}\text{Cr}^{6+}\text{O}_4\text{S}_2$. Monoclinic, space group $P2_1/a$, a 7.524, b 14.819, c 7.443 Å, β 118.72°, $Z = 4$. $D_{\text{calc.}}$ 7.13 g/cm³. Optically biaxial positive, $n > 1.78$, slightly pleochroic. Named for Ed Oyler, mineral collector who made the initial discovery.
- Effenbergerite.** G. Giester and B. Rieck. *Min. Mag.*, **58**, 663. Occurs as transparent, blue platelets, up to 8 mm, with copper, calcite, quartz and clinzoisite in pectolite veinlets within braunite ore from the Wessels manganese deposit, near Hotazel, Northern Cape Province, South Africa. $\text{BaCu}[\text{Si}_4\text{O}_{10}]$. Tetragonal, space group $P4/ncc$, a 7.442, c 16.133 Å, $Z = 4$. $D_{\text{calc.}}$ 3.52 g/cm³. Optically uniaxial negative, ω 1.633, ϵ 1.593; strongly pleochroic. Named for H.S. Effenberger in recognition of her work on the crystal chemistry of copper(II) compounds.
- Efremovite.** Ye. P. Shcherbakova and L.F. Bazhenova, 1989. *Zap. Vses. Min. Obshch.*, **118**, 84. [Russian]. As white, equant grains to 0.015 mm in the burning dumps of two shafts in the Chelyabinsk coal basin, southern Urals, Russia. $(\text{NH}_4)_2\text{Mg}_2(\text{SO}_4)_3$. Ammonium analogue of langbeinite. Cubic, space group $P2_13$, a 9.99 Å, $Z = 4$. $D_{\text{calc.}}$ 2.52 g/cm³. Optically isotropic, $n = 1.550$. Named for the Russian geologist I.A. Yefremov; the name should not be confused with efremovite of Gagarin and Cuomo (19th List).
- Erniennickelite.** J.D. Grice, B. Gattrell, R.A. Gault and J. Van Velthuizen, 1994. *Can. Min.*, **32**, 333. Found as almost black, circular plates, up to 0.5 mm, in cavities in quartz within nickeliferous-cobaltiferous laterites from the Siberia Complex, Western Australia. $\text{NiMn}_2\text{O}_7 \cdot 3\text{H}_2\text{O}$. Hexagonal (rhombohedral), space group $R\bar{3}$ or $R\bar{3}$, a 7.514, c 20.517 Å, $Z = 6$. $D_{\text{meas.}}$ 3.84, $D_{\text{calc.}}$ 3.83 g/cm³. Optically uniaxial negative, $\omega > 2.00$, ϵ 1.97, non-pleochroic. Named for Ernest H. Nickel, mineralogist.
- Ernigglite.** S. Graeser, H. Schwander, R. Wuld and A. Edenharter. 1992. *Schweiz. Mineral. Petrol. Mitt.*, **72**, 293. Initially described by S. Graeser (*Uni Nova*, 1988, **49**, 17). Found as steel-grey to black-grey euhedral, prismatic crystals, up to 1 mm, from the Lengenbach quarry, Binntal, Valais Canton, Switzerland. $\text{Tl}_2\text{SnAs}_2\text{S}_6$. Hexagonal (rhombohedral), space group $P\bar{3}$, a 6.680, c

- 7.164 Å, $Z = 1$. $D_{\text{calc.}}$ 5.24 g/cm³. Optically isotropic; reflectance data are given; non-bireflectant, non-pleochroic. Named for Ernst Niggli, mineralogist and petrographer at the University of Bern.
- Ershovite.** A.P. Khomyakov, Yu.P. Men'shikov, R.K. Rastsvetaeva and G.N. Nechelyustov, 1993. *Proc. Russian Mineral. Soc.*, **122**, 116. [Russian]. As olive green elongate grains, up to 1 cm and as parallel fibrous aggregates, up to 3 cm, in pegmatites of Mount Rasvumchorr and Mount Koashva, Khibina Complex, Kola Peninsula, Russia; associated minerals include tiettaite (this list). $\text{Na}_4\text{K}_3(\text{Fe}, \text{Mn}, \text{Ti})_{21}\text{Si}_8\text{O}_{20}(\text{OH})_4 \cdot 4\text{H}_2\text{O}$. Triclinic, space group $P\bar{1}$, a 10.244, b 11.924, c 5.276 Å, α 103.491°, β 96.960°, γ 91.945°, $Z = 1$. $D_{\text{meas.}}$ 2.75, $D_{\text{calc.}}$ 2.73 g/cm³. Optically biaxial positive, $2V_{\text{meas.}}$ 58°, $2V_{\text{calc.}}$ 59°, α 1.569, β 1.574, γ 1.590, strongly pleochroic. Named for V.V. Ershov.
- Eugenite.** H. Kucha, 1986. *Mineral. Polon.*, **17**, 3. Grains to 4 mm in the Lubin mine, Zechstein copper deposits, Silesia, Poland. $\text{Au}_{11}\text{Hg}_2$. Cubic, space group $\bar{I}43$, a 10.02 Å. $Z = 4$ $D_{\text{meas.}}$ 10.75, $D_{\text{calc.}}$ 10.45 g/cm³. Optically isotropic; reflectance values given. The second mineral named for Eugen F. Stumpfl, again in recognition for his substantial contributions to platinum group mineralogy. Not the eugenit (= polybasite/pearceite) of Hintze (1904).
- Fangite.** J.R. Wilson, P.K. Sen Gupta, P.D. Robinson and A.J. Criddle. 1993. *Amer. Min.*, **78**, 1096. Found as deep red to maroon material in an isolated vug in one boulder from the Marion Hill pit, Mercur deposit, Tooele County, Utah, USA. Initially described from Allchar, Macedonia by A. El Goresy and M.K. Pavicevic (*Naturwiss.*, 1988, **75**, 405). Ti_3AsS_4 . Orthorhombic, space group $Pnma$, a 8.894, b 10.855, c 9.079 Å, $Z = 4$. $D_{\text{meas.}}$ 6.20, $D_{\text{calc.}}$ 6.185 g/cm³. Reflectance data are given; exhibits low bireflectance. Named for J-H. Fang, in recognition of his contributions to crystallography, crystal chemistry and geostatistics.
- Ferrilotharmeyerite.** H.G. Ansell, A.C. Roberts, P.J. Dunn, W.D. Birch, V.E. Ansell and J.D. Grice, 1992. *Can. Min.*, **30**, 225. As brownish yellow aggregates to 3 mm, from the Tsumeb polymetallic deposit, Namibia. Associated minerals include tennantite, scorodite and schneiderhöhnite. $\text{Ca}(\text{Zn}, \text{Cu})(\text{Fe}^{3+}, \text{Zn})(\text{AsO}_3\text{OH})_2(\text{OH})_3$. Ferric analogue of lotharmeyerite. Monoclinic, space group $C2$, Cm or $C2/m$, a 8.997, b 6.236, c 7.390 Å, β 115.74°, $Z = 2$. $D_{\text{meas.}}$ 4.25, $D_{\text{calc.}}$ 4.25 g/cm³. Optically biaxial positive, $2V_{\text{meas.}}$ 85°, $2V_{\text{calc.}}$ 89°, α 1.811, β 1.844, γ 1.88, strongly pleochroic. Named for its relationship to lotharmeyerite.
- Ferrisurite.** A.R. Kampf, L.J. Jackson, G.B. Sidder, E.E. Foord and P.M. Adams, 1992. *Amer. Min.*, **77**, 1107. As compact radial aggregates of forest green fibres and yellow-green crystals up to 2 mm, embedded in quartz and cerussite from the Shirley Anne mining claim, Big Dodd Spring, Inyo County, California, USA. Ideal formula $(\text{Pb}, \text{Ca})_{2-3}(\text{CO}_3)_{0.5-1}[\text{Fe}, \text{Al}]_2(\text{S}, \text{Al})_4\text{O}_{10}(\text{OH})_2 \cdot n\text{H}_2\text{O}$. Ferric analogue of surite. Monoclinic, space group $P2_1$ or $P2_1/m$, a 5.241, b 9.076, c 16.23 Å, β 90.03°, $Z = 2$. $D_{\text{meas.}}$ 4.0, $D_{\text{calc.}}$ 3.89 g/cm³. Optically biaxial positive, $2V_{\text{calc.}}$ 76°, α 1.757, β 1.763, γ 1.773, pleochroic. Named for its compositional relationship to surite.
- Ferrowodginite.** T.S. Ercit, P. Černý and F.C. Hawthorne, 1992. *Can. Min.*, **30**, 633. As dark brown to black, anhedral grains, up to 0.3 mm, with tapiolite and bismuth in granitic pegmatites from near Sukula, Finland. $\text{Fe}^{2+}\text{SnTa}_2\text{O}_8$. Wodginite group. Monoclinic, space group $C2/c$, a 9.415, b 11.442, c 5.0103 Å, β 90.8°, $Z = 4$. $D_{\text{calc.}}$ 7.02 g/cm³. Optically anisotropic, $n > 2.0$, polysynthetically-twinned. Named for its compositional relationship to wodginite.
- Fetiasite.** S. Graeser, H. Schwander, F. Demartin, C.M. Gramaccioli, T. Pilati and E. Reusser, 1994. *Amer. Min.*, **79**, 996. As brown to black, crystalline aggregates, up to 2 mm across, in Alpine mineral fissures at Pizzo Cervandone (Italy) and at Gorb, Binntal (Switzerland) and associated with other arsenite/arsenate mineral species. $(\text{Fe}^{2+}, \text{Fe}^{3+}, \text{Ti})_3\text{O}_2[\text{As}_2\text{O}_5]$. Monoclinic, a 10.614, b 3.252, c 8.945 Å, β 108.95°, $Z = 2$. $D_{\text{meas.}}$ 4.6, $D_{\text{calc.}}$ 4.74–4.80 g/cm³. Reflectance values are given; anisotropism visible along grain boundaries. Named for its chemical composition.
- Fluor-richterite.** A.G. Bazhenov, I.L. Nedosekova and E.U. Petersen, 1993. *Zap. Vses. Min. Obshch.*, **122**, 98. [Russian]. As light green to blue-green rock-forming component in fenites from the Il'menski Complex, southern Urals, Russia. $\text{Na}_2\text{Ca}(\text{Mg}, \text{Fe})_5[\text{Si}_8\text{O}_{22}](\text{F}, \text{OH})_2$. Amphibole group. Monoclinic, space group $C2/m$, a 9.800–9.828, b 17.93–18.04, c 5.195–5.265 Å, β 103.17–104.35°. $D_{\text{calc.}}$ 3.213, $D_{\text{meas.}}$ 3.174 g/cm³. Optically biaxial negative, $2V$ 71–72°, α 1.612–1.618, β 1.621, γ 1.627–1.629; exhibits anomalous interference colours; strongly pleochroic. Systematically named for its compositional relationship to richterite.
- Foitite.** D.J. MacDonald, F.C. Hawthorne and J.D. Grice, 1993. *Amer. Min.*, **78**, 1299. As bluish black single crystal in a museum sample from an unspecified pegmatite locality in southern California, USA. $\square[\text{Fe}^{2+}(\text{Al}, \text{Fe}^{3+})]\text{Al}_6\text{Si}_6\text{O}_{18}(\text{BO}_3)_3(\text{OH})_4$. Tourmaline group. Hexagonal (rhombohedral), space group $R3m$, a 15.967, c

- 7.126 Å, $Z = 3$. $D_{\text{meas.}}$ 3.17, $D_{\text{calc.}}$ 3.14 g/cm³. Optically uniaxial negative, ω 1.664, ϵ 1.642, strongly pleochroic. Named for F.F. Foit Jr., in recognition of his work on the structure and chemistry of tourmaline minerals.
- Fontanite.** M. Deliens and P. Piret, 1992. *Eur. J. Mineral.*, **4**, 1271. [French]. Found as bright yellow, radiating aggregates, up to 4 mm, consisting of rectangular, lath-shaped crystals, with billietite and uranophane in the oxidised zone of the Rabejac uranium deposit, Lodève district, Hérault Department, France. $\text{Ca}(\text{UO}_2)_3(\text{CO}_3)_4 \cdot 3\text{H}_2\text{O}$. Orthorhombic, space group Pmn , $Pmn2_1$ or $P2_1nm$, a 15.337, b 17.051, c 6.931 Å, $Z = 4$. $D_{\text{meas.}}$ 4.10, $D_{\text{calc.}}$ 4.19 g/cm³. Optically biaxial negative, $2V_{\text{obs}}$ 50°, $\alpha_{\text{calc.}}$ 1.603, β 1.690, γ 1.710, non-pleochroic, fluorescent. Named for F. Fontan of the University of Paul Sabatier (Toulouse) France.
- Francisite.** A. Pring, B.M. Gatehouse and W.D. Birch, 1990. *Amer. Min.*, **75**, 1421. As radiating clusters of bright green bladed crystals, up to 0.25 mm, with baryte, chlorargyrite, muscovite, bismuth and other minerals in cavities within a baryte lens in massive hematite ore from Iron Monarch, South Australia, Australia. $\text{Cu}_3\text{Bi}(\text{SeO}_3)_2\text{O}_2\text{Cl}$. Orthorhombic, space group $Pmmn$, a 6.354, b 9.630, c 7.220 Å, $Z = 2$. $D_{\text{calc.}}$ 5.42 g/cm³. Optical properties not determined in detail; all refractive indices are >1.79. Named for G. Francis of Iron Knob.
- Franklinphilite.** P.J. Dunn, D.R. Peacor and S-C. Su, 1992. *Min. Rec.*, **23**, 465. As radial aggregates of dark brown platy crystals, with friedelite in vein material from the Buckwheat dump, Franklin, Sussex County, New Jersey, USA. $\text{K}_4\text{Mn}_{48}(\text{Si},\text{Al})_{72}(\text{O},\text{OH})_{216}$. Manganese analogue of stilpnomelane. Triclinic, but has pseudo-orthorhombic-hexagonal cell, a 5.521, b 9.560, c 36.57 Å, $Z = 0.475$. $D_{\text{meas.}}$ 2.6–2.8, $D_{\text{calc.}}$ 2.66 g/cm³. Optically biaxial negative, $2V_{\text{meas.}}$ 10°, $2V_{\text{calc.}}$ 0°, γ 1.545, β 1.583, γ 1.583, strongly pleochroic. Named for both the locality and the Greek word *philos* (friend).
- Fuenzalidaite.** J.A. Konnert, H.E. Evans Jr., J.J. McGee, and G.E. Erickson, 1994. *Amer. Miner.*, **79**, 1003. As bright yellow, micaceous blebs and flattened aggregates in veins and veinlets of white nitrate ore (mainly nitratine and halite) from the Oficina Santa Luisa area, Tarapaca Province, Chile. $\text{K}_6(\text{Na},\text{K})_4\text{Na}_6\text{Mg}_{10}(\text{SO}_4)_{12}(\text{IO}_3)_{12} \cdot 12\text{H}_2\text{O}$. Isostructural with carlosruizite (this list). Hexagonal (rhombohedral), space group $P\bar{3}c1$, a 9.4643, c 27.336 Å, $Z = 1$. $D_{\text{calc.}}$ 3.284 g/cm³. Optically uniaxial negative, ω 1.622, ϵ 1.615. Named for H. Fuenzalida, in recognition of his efforts in the development of Chilean geology.
- Gatehouseite.** A. Pring and W.D. Birch, 1993. *Min. Mag.*, **57**, 309. First noted by A. Pring *et al.* (*Austral. Mineral.*, 1989, **4**, 49). Pale yellow, yellow and pale orange radiating to divergent bladed crystals, up to 100 µm, occurring as overgrowths on arsenoklasite, within cavities at the Iron Monarch sedimentary iron deposit, South Australia. Ideal composition is $\text{Mn}_5(\text{PO}_4)_2(\text{OH})_4$. Phosphate analogue of arsenoklasite (12th List). Orthorhombic, probable space group $P2_12_12_1$, a 9.097, b 5.693, c 18.002 Å, $Z = 4$. $D_{\text{calc.}}$ 3.85 g/cm³ for ideal composition. Optically biaxial, optic sign uncertain; refractive index values for two directions given (1.74 and 1.76); distinctly pleochroic. Named for B.M.K.C. Gatehouse, chemical crystallographer at Monash University, Melbourne, Australia.
- Gaultite.** T.S. Ercit and J. Van Velthuizen, 1994. *Can. Min.*, **32**, 855. From the Poudrette Quarry, Mont Saint-Hilaire, Quebec, Canada. $\text{Na}_4\text{Zn}_2\text{Si}_7\text{O}_{18} \cdot 5\text{H}_2\text{O}$. Orthorhombic, a 10.211, b 39.88, c 10.304 Å; structurally similar to lovdarite. Named after R.A. Gault. It is a zeolite-like mineral.
- Geminite.** H. Sarp and P. Perroud, 1990. *Schweiz. Mineral. Petrog. Mitt.*, **70**, 309. As green, euhedral crystals to 0.3 mm from Cap Garonne, Var Department, France. Ideal composition $\text{Cu}_2\text{As}_2\text{O}_7 \cdot 3\text{H}_2\text{O}$. Triclinic, a 6.639, b 8.110, c 15.739 Å, α 92.01°, β 93.87°, γ 95.02°, $Z = 4$. $D_{\text{meas.}}$ 3.70, $D_{\text{calc.}}$ 3.71 g/cm³. Optically biaxial positive, $2V_{\text{meas.}}$ 75°, $2V_{\text{calc.}}$ 71°, α 1.656, β 1.692, γ 1.770. Named for the latin for twins – *gemin*, alluding to the twinned character of its crystals.
- Germanocolusite.** E.M. Spiridonov, V.M. Kachalovskaya, V.V. Kovachev and L.Ya. Krapiva, 1992. *Vest. Moskov. Universit., Ser. 4, Geol.*, **6**, 50. [Russian]. As single grains or elongate segregations, up to 100 µm across, in late bornite-tennantite mineralisation at Urup, northern Caucasus, Russia; also from Maykain (Kazakhstan), Tsumeb (Namibia) and Chelopech (Bulgaria). $\text{Cu}_{26}\text{V}_2(\text{Ge},\text{As})_6\text{S}_{32}$. Germanium analogue of colusite. Cubic, space group $P\bar{4}3m$, a 10.568 Å, $Z = 1$ (Urup mineral). $D_{\text{calc.}}$ 4.55 g/cm³. Optically isotropic; reflectance values given. Named for its compositional relationship with colusite.
- Gillulyite.** J.R. Wilson, P.D. Robinson, P.N. Wilson, L.W. Stanger and G.L. Salmon, 1991. *Amer. Min.*, **76**, 653. Deep red cleavable masses to 2 cm, within vuggy baryte of the Lulu cut, South Mercur open pit, Mercur Au deposit, Tooele County, Utah, USA. Ideal composition $\text{Ti}_2(\text{As},\text{Sb})_8\text{S}_{13}$. Monoclinic, space group $P2/n$ or Pn , a 9.584, b 5.679, c 21.501 Å, β 100.07°. $D_{\text{meas.}}$ 4.02, $D_{\text{calc.}}$

- 4.14 g/cm³. Deep red internal reflections, distinctly anisotropic. Reflectance values are given. Named for the late J.C. Gilluly, of the U.S. Geological Survey.
- Gravegliaite.** R. Basso, G. Lucchetti and A. Palenzona, 1991. *Z. Kristallogr.*, **197**, 97. As colourless, euhedral crystals, to 0.5 mm and as sheaf-like or radial aggregates along fractures cutting manganese ore at the Gambatesa mine, Val Graveglia, Liguria, Italy. MnSO₃·3H₂O. Orthorhombic, space group *Pnma*, *a* 9.763, *b* 5.635, *c* 9.558 Å, *Z* = 4. *D*_{calc.} 2.39 g/cm³. Optically biaxial positive, 2*V*_{meas.} 41°, 2*V*_{calc.} 43°, α 1.590, β 1.596, γ 1.636. Named for the locality.
- Grechishchevite.** V.I. Vasil'ev, L.V. Usova and N.A. Pal'chik, (1989). *Geol. Geofis.*, **7**, 61. As bright to dark orange films consisting of minute prisms and grains, up to 0.2 mm, lining fractures in the Arzak mercury deposit, Tuva ASSR, Russia; also recorded from the Kadyrel deposit, in the same autonomous republic. HgS(Br,Cl,I). Tetragonal, space groups *P4₂m*, *P4m2*, *P4mm* or *P4/mmm*, *a* 13.208, *c* 6.698 Å (calculated), *Z* = 8. *D*_{meas.} 7.16 g/cm³, *D*_{calc.} 7.23 g/cm³. Optically uniaxial positive, ω and ϵ > 2, pleochroic; anisotropic and distinctly bireflectant in reflected light. Named for O.K. Grechishchev in recognition of his work on the Tuva mercury deposits. Perhaps the tetragonal polymorph of arzakit.
- Grossite.** D. Weber and A. Bischoff, 1994. *Eur. J. Min.*, **6**, 591. In Ca,Al-rich inclusions from several meteorites; also in terrestrial rocks of the Hatrurim formation, Israel. CaAl₄O₇. Monoclinic, *a* 12.94, *b* 8.910, *c* 5.446 Å, β 107.01°, *Z* = 4. Named after S. Gross.
- Guarinoite.** H. Sarp, 1993. *Archives des Sciences*, **46**, 37. [French]. Found as bright pink to deep pink aggregates of rounded crystals, up to 0.4 mm, associated with anglesite, antlerite and other minerals in the Cap Garonne mine, Var Department, France. (Zn,Co,Ni)₆(SO₄)(OH,Cl)₁₀·5H₂O. Hexagonal, space group *P6₃*, *P6₃/m* or *P6₃22*, *a* 8.344, *c* 21.599 Å, *Z* = 3. *D*_{meas.} 2.80, *D*_{calc.} 2.77 g/cm³. Optically uniaxial negative, ω 1.548, ϵ 1.544, strongly pleochroic. Named for A. Guarino, mineral collector. Not to be confused with guarinite (= hiortdahlite) of Guiscardi (1857).
- Harrisonite.** A.C. Roberts, J.A.R. Stirling, J.D. Grice, T. Frisch, R.K. Herd and J.L. Jambor, 1993. *Can. Min.*, **31**, 775. As yellow-brown to orange-brown, equidimensional grains with other minerals in an iron silicate-quartz-apatite layered sequence in granulite facies gneisses on Arcedeckne Island, District of Franklin, Baffin Island, Canada. Ca(Fe²⁺,Mg)₆(SiO₄)₂(PO₄)₂. Hexagonal (rhombohedral), space group *R3m*, *a* 6.240, *c* 26.784 Å. *D*_{meas.} 4.02, *D*_{calc.} 4.01 g/cm³. Optically uniaxial negative, ω 1.770, ϵ 1.759, weakly pleochroic. Named for J.M. Harrison, former Director of the Geological Survey of Canada.
- Haynesite.** M. Deliens and P. Piret, 1991. *Can. Min.*, **29**, 561. As amber yellow tablets in the Morrison Formation of the Repete mine, Blanding area, San Juan County, Utah, USA. Ideal formula (UO₂)₃(OH)₂(SeO₃)₂·5H₂O. Orthorhombic, space group *Pnc2* or *Pn₂m*, *a* 8.025, *b* 17.43, *c* 6.953 Å, *Z* = 2. *D*_{meas.} 4.1, *D*_{calc.} 4.07 g/cm³. Optically biaxial negative, 2*V*_{meas.} 45°, 2*V*_{calc.} 48°, α 1.618, β 1.783, γ 1.765, pleochroic. Named for the U.S. geologist P. Haynes who first collected the mineral.
- Hejtmanite.** S. Vrána, M. Rieder and M.E. Gunter, 1992. *Eur. J. Mineral.*, **4**, 35. Name erroneously given as hetjmanite [in 92M/2071]. As brownish to yellow, lath-shaped crystals, to 1 mm, in arfvedsonite-bearing pegmatoids at Mbolwe Hill, Mkushi River area, Central province, Zambia. Ba(Mn,Fe)₂TiO(Si₂O₇)(OH,F)₂. Manganese-dominant analogue of bafertisite. Monoclinic, space group *P2₁/m*, *a* 11.748, *b* 13.768, *c* 10.698 Å, β 112.270, *Z* = 8. *D*_{meas.} 4.016, *D*_{calc.} 4.291 g/cm³. Optically biaxial negative, 2*V*_{meas.} 76°, 2*V*_{calc.} 76.80, α 1.814, β 1.846, γ 1.867, pleochroic. Named for B. Hejtman of Charles University (Prague), Czech Republic. Perhaps earlier identified by R.K. Rastsvetaeva *et al.* (*Sov. Phys. Crystallogr.*, 1991. **36**, 186.)
- Hennomartinite.** T. Armbruster, R. Oberhänsli, V. Bermanec and R. Dixon, 1993. *Schweiz. Mineral. Petrog. Mitt.*, **73**, 349. As yellow-brown poikiloblasts, up to 1 mm diameter, in sugilite and serandite-pectolite bearing veinlets within hydrothermal ores of the Wessels Mn mine, Hotazel district, Northern Cape Province, South Africa. SrMn₂[Si₂O₇](OH)₂·H₂O. Lawsonite-type structure. Orthorhombic, space group *Cmcm*, *a* 6.255, *b* 9.034, *c* 13.397 Å, *Z* = 4. *D*_{calc.} 3.68 g/cm³. Optically biaxial (sign uncertain), 2*V* 63°, *n* > 1.82, strongly pleochroic. Named for Henno Martin, German geologist and formerly of the University of Stellenbosch (South Africa), in recognition of his work on southern African geology.
- Hibbingite.** B. Saini-Eidukat, H. Kucha and H. Keppler, 1994. *Amer. Mineral.*, **79**, 555. As grains (up to 700 μ m) in vein fillings in drill core of partially serpentinised troctolites from the Duluth Complex, Hibbing district, Minnesota, USA. Polymorphs of hibbingite are described from the Strathcona mine, Sudbury, Canada and Noril'sk, Russia. γ -Fe₂(OH)₃Cl. Hibbingite-kempite series. Orthorhombic, space group *Pnam* (by analogy

with atacamite-type compounds), a 6.31, b 9.20, c 7.10 Å, $Z = 4$. $D_{\text{calc.}}$ 3.04 g/cm³. Slightly pleochroic, n 1.6–1.7, bireflectant in reflected light. Named for the locality.

Høgtuvaite. R.I. Grauch, I. Lindahl, H.T. Evans Jr., D.M. Burt, J.J. Fitzpatrick, E.E. Foord, P.-R. Graff and J. Hysingjord, 1994. *Can. Min.*, **32**, 439. Recorded as black, prismatic crystals, up to 4 cm, in peraluminous granitic gneiss from near Høgtuva Mountain, Nordland County, Norway. $(\text{Ca}, \text{Na})_2(\text{Fe}^{2+}, \text{Fe}^{3+}, \text{Ti})_6(\text{Si}, \text{Be}, \text{Al})_6\text{O}_{20}$. Aenigmatite group. Triclinic, space group $P\bar{1}$, a 10.317, b 10.724, c 8.855 Å, α 105.77°, β 96.21°, γ 124.77°, $Z = 2$. $D_{\text{meas.}}$ 3.85, $D_{\text{calc.}}$ 3.98 g/cm³. Optically biaxial negative (?), large $2V$, α' 1.78, γ' 1.82, strongly pleochroic. Named for the locality. The mineral is identical with makarochkinite, a name given to an unapproved phase from Mine 400, Il'menski Mountains, Urals, Russia (see O.V. Yakubovich *et al.*, 1990, *Sov. Phys. Crystallogr.*, **35**, 818).

Huangite. G. Li, D.R. Peacor, E.J. Essene, D.R. Brosnahan and R.E. Beane, 1992. *Amer. Min.*, **77**, 1275. As anhedral to subhedral crystals, to 10 µm, associated with kaolinite, pyrite and woodhouseite in wallrock of the Campana B vein, El Indio deposit, Coquimbo Province, Chile. $\text{Ca}_{0.5}\square_{0.5}\text{Al}_3(\text{SO}_4)_2(\text{OH})_6$. Alunite group. Calcium analogue of walthierite (this list). Hexagonal (rhombohedral), space group $R\bar{3}m$, a 6.983, c 33.517 Å, $Z = 6$. $D_{\text{calc.}}$ 2.80 g/cm. Optically uniaxial positive. Named for Y. Huang, in part for recognition of her contributions to the studies of Chinese contact metasomatic Be deposits. Should not be confused with huanghoite (23rd List).

Hunchunite. S. Wu, Y. Yang and Q. Song, 1992. *Acta Min. Sinica*, **12**, 319. [Chinese, English abstract]. Found as anhedral, granular aggregates, up to 500 µm across and intergrown with gold, anyuinite (this list) and lead in the Quaternary placer deposits along the Hunchun River, eastern Jilin Province, China. Au_2Pb . Cubic, space group $Fd\bar{3}m$, a 7.933 Å, $Z = 8$. $D_{\text{calc.}}$ 15.99 g/cm³. Reflectance data are given; optically isotropic. Named for the type area.

Hydroxycancrinite. A.P. Khomyakov, T.N. Nadezhina, R.K. Rastsvetaeva and E.A. Pobedimskaya, 1992. *Zap. Vses. Min. Obshch.*, **121**, 100. [Russian]. Recorded as blue, massive aggregates, up to 15 mm across, in veins within ultra-alkalic pegmatites from Mount Karnasurt, Lovozero Complex, Kola Peninsula, Russia; associated minerals include natrolite and steensstrupine. $\text{Na}_8[\text{Al}_6\text{Si}_6\text{O}_{24}](\text{OH})_2 \cdot 2\text{H}_2\text{O}$. Feldspathoid, cancrinite group. Hexagonal (rhombohedral), space group $P\bar{3}$, a 12.740, c

5.182 Å, $Z = 1$. $D_{\text{meas.}}$ 2.32, $D_{\text{calc.}}$ 2.26 g/cm³. Optically uniaxial negative, ω 1.494, ϵ 1.501. Named for its compositional relationship to cancrinite.

Jianshuiite. G. Yan, S. Zhang, M. Zhao, J. Ding and D. Li, 1992. *Acta Min. Sinica*, **12**, 69. [Chinese, English abstract]. Found as hypogene porous aggregates and massive ore, consisting of brown to brownish black grains, up to 5 µm across, from the Lu manganese deposit, Jianshui County, Yunnan Province, China. Ideally $(\text{Mg}, \text{Mn})\text{Mn}_3^{4+}\text{O}_7 \cdot 3\text{H}_2\text{O}$, chalcophanite group. Triclinic, space group $P\bar{1}$, a 7.534, b 7.525, c 8.204 Å, α 89.753°, β 117.375°, γ 120.000°, $Z = 2$. $D_{\text{meas.}}$ 3.60, $D_{\text{calc.}}$ 3.598 g/cm³. Greyish white in reflected light with distinct anisotropism and brown internal reflections. Reflectance values given. Named for the County.

Jolliffeite. L.J. Cabri and J.H.G. Laflamme, 1991. *Can. Min.*, **29**, 411. As anhedral grains to 240 µm in drill core of a fracture zone near a dolomite-peridotite contact at Fish Hook Bay, Shirley Peninsula, Lake Athabasca, Saskatchewan, Canada. Ideal formula NiAsSe . Selenium analogue of gersdorffite-Pa3. Cubic, a space group $Pa\bar{3}$, a 5.831 Å, $Z = 4$. $D_{\text{calc.}}$ 7.12 g/cm³. White in reflected light, neither bireflectant nor pleochroic; reflectance values given. Named for A.W. Jolliffe, Queens University (Kingston), Ontario, Canada.

Kaluginite. V.I. Kydryashova and I.V. Rozhdestvenskaya, 1991. *Zap. Vses. Min. Obshch.* **120**, pt 4, p. 100. From the Ilmenskij National Park, Urals, Russia. $(\text{Mn}, \text{Ca})\text{Mg}_2\text{Fe}^{3+}(\text{PO}_4)_2\text{OH} \cdot 4\text{H}_2\text{O}$. Orthorhombic, a 15.05, b 37.37, c 7.18 Å, $Z = 16$. Named for A.V. Kalugin, but not approved by the IMA.

Kamphaugite-(Y). G. Raade and K. Brastad, 1993. *Eur. J. Mineral.*, **5**, 679. As white to colourless, platy crystals, up to 1 mm across, in cavities in magnetite-helvite skarns at Hørtekollen and Høydalen, Oslo region, Norway. Earlier reported from Kazakhstan, Canada and South Africa. $\text{Ca}_2(\text{Y}, \text{REE})_2(\text{CO}_3)_4(\text{OH})_2 \cdot 3\text{H}_2\text{O}$. Tetragonal, space group $P4_12_12$, a 7.434, c 21.793 Å, $Z = 4$. D 3.10 g/cm³. Kamphaugite from Hørtekollen is anomalously biaxial, $2V\alpha \sim 15^\circ$, α 1.627, $\beta = \gamma$ 1.663. Named for E. Kamphaug.

Karasugite. O.V. Petersen, A.P. Khomyakov, E.S. Leonardsen, H.I. Micheelsen and O. Johnsen, 1994. *Neues Jahrb. Min., Mh.*, p. 209. Occurs as colourless rosettes, up to 1.5 mm across, with fluorite, quartz and barium celestine in the oxidation zone of the Karasug rare earth deposit, southern Siberia, Russia. $\text{SrCaAl}[\text{F}(\text{OH})]_7$. Monoclinic, space group $P2_1/c$, a 8.215, b 11.989, c 6.076 Å, β 96.22°, $Z = 4$. $D_{\text{meas.}}$

- 3.06–3.11, $D_{\text{calc.}}$ 3.206 g/cm³. Optically biaxial positive, $2V_{\text{meas.}}$ 94.5°, $2V_{\text{calc.}}$ 94°, α 1.4240, β 1.4320, γ 1.4415. Named for the locality.
- Kazakhstanite.** E.A. Ankinovich, G.K. Bekenova and N.I. Podlipaeva, 1989. *Zap. Vses. Min. Obshch.*, **118**, 95. [Russian]. As black, small round to oval grains and aggregates with bokite from the vanadium-bearing shales of northwestern Kara Tau district, Kazakhstan. $\text{Fe}_3^{3+}\text{V}_3^{4+}\text{V}_{12}^{5+}\text{O}_{39}\cdot 8.5\text{H}_2\text{O}$. Monoclinic, space group $C2c$ or Cc , a 11.84, b 3.650, c 21.27 Å, β 100.0°, $Z = 1$. $D_{\text{meas.}}$ 3.4–3.6, $D_{\text{calc.}}$ 3.52 g/cm³. Reflectance values given. Named for the country.
- Keystoneite.** M.E. Back, A.C. Roberts, Y. Lepage and J.A. Mandarino, 1988. (*Abstr.*) *Geol. Soc. Assoc. Can. - Mineral. Assoc. Can., Progr.*, **13**, A3. From the Keystone mine, Magnolia district, Boulder County, Colorado, USA. $(\text{Ni}, \text{Mg}, \text{Fe}, \text{Mn})_3\text{Te}_3^{4+}\text{O}_9\cdot 5\text{H}_2\text{O}$. Hexagonal, a 9.344, c 7.607 Å, $Z = 2$. It is the nickel analogue of zemannite and kinichilitite. Named from the locality. Not the keystoneite of Anon. (28th List).
- Khristovite-(Ce).** L.A. Pautov, P.V. Khorov, K.I. Ignatenko, E.V. Sokolova and T.N. Nadezhina, 1993. *Zap. Vses. Mineral. Obshch.*, **122**, 103. [Russian]. As elongate, brown to dark brown grains in rhodonite and associated with hejtmanite (this list) and other minerals from the Iniltschek Range, Khirghizya. $(\text{Ca}, \text{La})\text{Ce}(\text{Mg}, \text{Fe})\text{-AlMnSi}_3\text{O}_{11}(\text{OH})(\text{F}, \text{O})$. Epidote group. Monoclinic, space group $P2_1/m$, a 8.903, b 5.748, c 10.107, β 113.41°. $D_{\text{meas.}}$ 4.05, $D_{\text{calc.}}$ 4.11 g/cm³. Optically biaxial negative, $2V_{\text{meas.}}$ 83°, α 1.773, β 1.790, γ 1.803; strong pleochroism. Named for E.V. Khristov, an expert of Tien Shan geology, and for its REE content.
- Kieftite.** R.T.M. Dobbe, W.J. Lustenhouwer, M.A. Zakrzewski, D. Goubitz, J. Fraanje and H. Schenk, 1994. *Can. Min.*, **32**, 179. Found as euhedral to subhedral equant crystals, up to 400 μm , in chalcopyrite within ores of the Tunaberg Co-Cu skarn deposit, Sweden. CoSb_3 . Cubic, space group $Im\bar{3}$, a 9.0411 Å, $Z = 8$. $D_{\text{meas.}}$ 7.2, $D_{\text{calc.}}$ 7.63 g/cm³. Optically isotropic; reflectance values given; tin white in reflected light. Named for C. Kieft, mineralogist.
- Kintoreite.** A. Pring, W.D. Birch, J. Dawe, M. Taylor, M. Deliens and K. Walenta, 1995. *Min. Mag.*, **59**, 143. As cream to yellowish green rhombohedral crystals, up to 2 mm, forming clusters and coatings on other phosphate minerals from the Kintore open cut, Broken Hill, New South Wales, Australia. $\text{Pb}_3(\text{PO}_4)_2(\text{OH}, \text{H}_2\text{O})_6$. Phosphate analogue of segnitite (this list). Hexagonal, space group $R\bar{3}m$, a 7.325, c 16.900 Å, $Z = 3$. $D_{\text{calc.}}$ 4.34 g/cm³. Optically uniaxial negative; refractive indices between 1.935–1.955; pleochroic. Named for the deposit.
- Kochkarite.** E.M. Spiridonov, N.A. Ershova and O.I. Tananaeva, 1989. *Geol. Rudn. Mestoroz.*, **31**, 98. [Russian]. Occurs as platy tabular crystals, up to 10 mm, in quartz and quartz carbonate veins of the Kochkar deposit, southern Urals, Russia. PbBi_4T_6 . Hexagonal (rhombohedral), space group $P\bar{3}m1$, a 4.416, c 72.09 Å, $Z = 3$. $D_{\text{meas.}}$ 7.89, $D_{\text{calc.}}$ 7.84 g/cm³. Pinkish white in reflected light, showing strong anisotropism and distinct birefractance; reflectance values given. Named for the deposit.
- Kopeiskite.** B.V. Chesnokov, L.F. Bazhenova, E.P. Shcherbakova, T.A. Michal and T.N. Deriabina, 1988. *Minealogy, Technogenesis and Mineral-Resource Complexes of the Urals*, p. 5. [Russian]. Occurs in waste dumps of the Chelyabinsk coal basin, Russia. A component of chloride accumulations, named for the town of Kopeisk. Rejected by the IMA as corresponding to kremersite.
- Korkinoite.** B.V. Chesnokov, L.F. Bazhenova, E.P. Shcherbakova, T.A. Michal and T.N. Deriabina, 1988. *Minealogy, Technogenesis and Mineral-Resource Complexes of the Urals*, p. 5. [Russian]. From burned dumps in the Chelyabinsk coal basin, Russia. An orthorhombic mineral with X-ray powder pattern similar to thaumasite; cf. chelyabinskite. An unapproved name.
- Kornite.** T. Armbruster, R. Oberhänsli, V. Bermanec and R. Dixon, 1993. *Schweiz. Mineral. Petrog. Mitt.*, **73**, 349. Occurs associated with hennomartinite (this list) as dark red to brownish lilac bundles of fibres, up to 20 μm in diameter, in sugilite and serandite-pectolite bearing veinlets within hydrothermal ores of the Wessels Mn mine, Hotazel district, Northern Cape Province, South Africa. $(\text{K}, \text{Na})(\text{Na}, \text{Li})_2(\text{Mg}, \text{M}^{3+}, \text{Fe}^{3+}, \text{Li})_5\text{-Si}_8\text{O}_{22}(\text{OH})_2$. Amphibole group. Monoclinic, space group $C2/m$, a 9.94, b 17.80, c 5.30 Å, β 105.5°. $Z = 2$. $D_{\text{calc.}}$ 3.15 g/cm³. Optically biaxial negative, $2V$ 88–92°, α 1.654, $\beta_{\text{calc.}}$ 1.675, γ 1.696, strongly pleochroic. Named for H. Korn, an associate of Henno Martin (re: hennomartinite, this list). Initially described as 'group A amphibole' and potassium-manganese-magnesium-arfvedsonite by R. Dixon (*Bull. Geol. Surv. S. Afr.*, 1989, **93**, 1). Not to be confused with kornit of Breithaupt (1830) a rock name.
- Kosnarite.** M.E. Broenfield, E.E. Foord, S.J. Sutley and T. Botinelly, 1993. *Amer. Min.*, **78**, 653. As pale blue to blue-green to almost colourless, pseudocubic rhombohedral crystals, up to 0.9 mm, in granitic pegmatites of Mount Mica and Black Mountain, Oxford County, Maine, USA. $\text{KZr}_2(\text{PO}_4)_3$. Hexagonal (rhombohedral), space group $R\bar{3}c$, a 8.687, c 23.877 Å, $Z = 6$. $D_{\text{meas.}}$ 3.194, $D_{\text{calc.}}$ 3.206 g/cm³. Optically uniaxial

- positive, ω 1.656, ε 1.682, non-pleochroic. Named for R.A. Kosnar of Blackhawk, Colorado.
- Krasnogorite.** B.V. Chesnokov, L.F. Bazhenova, E.P. Shcherbakova, T.A. Michal and T.N. Deriabina, 1988. *Minealogy, Technogenesis and Mineral-Resource Complexes of the Urals*, p. 5. [Russian]. WO_3 . Occurred as a pseudomorph after hard alloy (92% WC, 8% Co) on plates of the cutting element of a drilling machine found in burned rocks of the Krasnoselskaya mine, Krasnogorsk, Chelyabinsk coal basin, Southern Urals, Russia. Orthorhombic, a 7.39, b 7.53, c 3.84 Å. Named from the locality. Not submitted to the IMA.
- Krasnoselskite.** B.V. Chesnokov, L.F. Bazhenova, E.P. Shcherbakova, T.A. Michal and T.N. Deriabina, 1988. *Minealogy, Technogenesis and Mineral-Resource Complexes of the Urals*, p. 5. [Russian]. CoWO_4 . Occurred as a pseudomorph after hard alloy (92% WC, 8% Co) on plates of the cutting element of a drilling machine found in burned rocks of the Krasnoselskaya mine, Krasnogorsk, Chelyabinsk coal basin, Southern Urals, Russia. Monoclinic, a 4.95, b 5.68, c 4.701 Å, β c . 90°. Named from the locality. Not submitted to the IMA.
- Kukisvumite.** V.N. Yakovenchuk, Ya.V. Pakhomovskii and A.N. Bogdanova, 1991. *Min. Zhurn.*, **13**, 63. [Russian]. As white to colourless, fan-shaped intergrowths of long prismatic crystals to 7 mm in an arfvedsonite-microcline pegmatite vein at Kukisvumchorr, Khibina Complex, Kola Peninsula, Russia. $\text{Na}_6\text{ZnTi}_4\text{Si}_8\text{O}_{28}\cdot 4\text{H}_2\text{O}$. Orthorhombic, space group *Pccn*, a 28.889, b 8.604, c 5.215 Å, $Z = 2$. $D_{\text{meas.}}$ 2.90, $D_{\text{calc.}}$ 2.95 g/cm³. Optically biaxial negative, $2V_{\text{calc.}}$ 77°, α 1.676, β 1.746, γ 1.795, non-pleochroic. Named for the locality.
- Kuksite.** A.A. Kim, N.V. Zayakina and V.F. Makhotko, 1990. *Zap. Vses. Min. Obshch.*, **119**, 50. [Russian]. As thin tabular crystals to 0.3 mm in calcite and associated with chermnykhite (this list), dugganite, yafsoanite and other minerals at Kuranakh, Yakutia, Russia. Ideal formula $\text{Pb}_3\text{Zn}_3\text{TeO}_6(\text{PO}_4)_2$. Orthorhombic, space group *Cmmn*, *C222*, *Cm2m* or *Cmm2*, a 8.50, b 14.72, c 5.19 Å, $Z = 2$. $D_{\text{calc.}}$ 6.21 g/cm³. Optically biaxial negative, $2V$ 12–20°, α 1.971, γ 1.981, non-pleochroic. Named for A.I. Kuks, co-discoverer of the Kuranakh deposit.
- Kusachiite.** C. Henmi, 1995. *Min. Mag.*, **59**, 545. From Fuka, Okayama Prefecture, Japan. CuBi_2O_4 . Tetragonal, a 8.511, c 5.823 Å, $Z = 4$. Named for I. Kusachi.
- Laurelite.** A.R. Kampf, P.J. Dunn, and E.E. Foord, 1989. *Amer. Min.*, **74**, 927. As colourless needles, with aravaipaite, grandreefite and pseudograndreefite in a vug within ore from the Grand Reef mine, Laurel Canyon, Aravaipa mining district, Graham County, Arizona, USA. $\text{Pb}(\text{F},\text{Cl},\text{OH})_2$. Hexagonal, space group *P6*, $\text{P}\bar{6}$ or *P6/m*, a 10.252, c 3.973 Å, $Z = 6$. $D_{\text{meas.}}$ 6.2, $D_{\text{calc.}}$ 6.52 g/cm³. Optically uniaxial positive, ω 1.903, ε 1.946. Named for the locality. Not the laurelite (= vesuvianite) of J. Sinkankas (*Gemstones of North America*, 1966, Van Nostrand, 266).
- Lautenthalite.** O. Medenbach and W. Gebert, 1993. *Neues Jahrb. Min., Mh.*, p. 401. Bright blue crystals up to 0.5 mm and as sheaf-like aggregates with anglesite, devilline and serpierite in vugs with an argentiferous galena from Lautenthal, Harz Mountains, Germany. $\text{PbCu}_4[(\text{OH})_6(\text{SO}_4)_2] \cdot 3\text{H}_2\text{O}$. Lead analogue of devilline. Monoclinic, space group *P2₁/c*, a 21.642, b 6.040, c 2.544 Å, β 108.2°, $Z = 8$. $D_{\text{calc.}}$ 3.84 g/cm³. Optically biaxial negative, $2V_{\text{meas.}}$ 79°, $2V_{\text{calc.}}$ 78°, α 1.659, β 1.703, γ 1.732, distinct dispersion, faintly pleochroic. Named for the locality.
- Leakeite.** F.C. Hawthorne, R. Oberti, L. Ungaretti and J.D. Grice, 1992. *Amer. Min.*, **77**, 1112. As deep red prisms up to 1 mm in an amphibole-albite-braunite-bixbyite rock from the Kajlidongri manganese mine, Jhabua district, Madhya Pradesh, India. Ideal end-member formula is given as $\text{NaNa}_2(\text{Mg}_2\text{Fe}_3^{3+}\text{Li})\text{Si}_8\text{O}_{22}(\text{OH})_{22}(\text{OH})_2$. Amphibole group. Monoclinic, space group *C2/m*, a 9.822, b 17.836, c 5.286 Å, β 104.37°, $Z = 2$. $D_{\text{meas.}}$ 3.11, $D_{\text{calc.}}$ 3.107 g/cm³. Optically biaxial negative, $2V$ 59–71°, a 1.667, β 1.675, γ 1.691; strongly pleochroic. Named for B.E. Leake, Professor of Geology at Glasgow University, in recognition of his work on amphibole chemistry.
- Leningradite.** L.P. Vergasova, S.K. Filatov, T.F. Semenova and V.V. Anan'ev, 1990. *Dokl. Akad. Nauk SSSR*, **310**, 1435. [Russian]. As red rhombic flakes or tablets to 0.3 mm and globules to 0.6 mm at the Great Tolbachik fracture zone, Kamchatka Peninsula, Russia. Ideal formula $\text{PbCu}_3(\text{VO}_4)_2\text{Cl}_2$. Orthorhombic space group *Ibam*, *Iba2*, a 8.988, b 11.083, c 9.360 Å, $Z = 4$. $D_{\text{meas.}}$ 4.8, $D_{\text{calc.}}$ 4.97 g/cm³. Optically biaxial negative, large $2V$, α not measured, β 2.29, γ 2.35, non-pleochroic. Named for Leningrad, the location for the depository of the type material.
- Lévyclauidite.** Y. Moëlo, E. Mackovicky, S. Karup-Møller, B. Cervelle and C. Maurel, 1990. *Eur. J. Mineral.*, **2**, 711. Occurs in veinlets of lamellae in a drill core sample of quartz from the Aghios philippos Pb-Zn deposit, Kirki district, Greece. $\text{Pb}_8\text{Sn}_7\text{Cu}_3(\text{Bi},\text{Sb})_3\text{S}_{28}$. Member of the cylindrite isomorphous series. Two monoclinic sub-lattices, with space group *A2*, *Am* or *A/2m*; pseudo-tetragonal, a 11.84, b 5.825, c 5.831 Å, β 92.6° and pseudo-hexagonal, a 11.84, b 3.67, c 6.31 Å, β 92.6°. Strongly anisotropic; reflectance data are

- given. Named for Claude Lévy of Université de Paris VI (France) in recognition of his contributions to sulphide mineralogy.
- Lidinite.** N.P. Tschirvinskij, L.V. Savina and E.S. Golovanova, 1990. *Mineral. sbornik Lvov*, **44**, 84. An organic cholesterol compound found in human secretions.
- Liebauite.** M.H. Zöller, E. Tillmanns and G. Hentschel, 1992. *Z. Kristallogr.*, **200**, 115. As bluish-green, transparent crystals in cavities of a mudstone xenolith from the Sattelberg scoria, Kruft, Eifel, Germany; associated minerals include volborthite and cuprorivaite. Ideal formula $\text{Ca}_3\text{Cu}_5\text{Si}_9\text{O}_{26}$. Monoclinic, space group $C2/c$, a 10.160, b 10.001, c 19.973 Å, β 91.56°, $Z = 4$. $D_{\text{calc.}}$ 3.62 g/cm³. Optically biaxial positive, $2V$ 72.8°, α 1.722, β 1.723, γ 1.734. First known natural 14er loop-branched single-chain silicate. Named for F. Liebau in recognition of his work on silicate crystal chemistry.
- Lindqvistite.** D. Holstam and R. Norrestam, 1993. *Amer. Min.*, **78**, 1304. Found as black crystals, up to 5 mm, associated with hematite, jacobite, plumbiferite and other minerals in skarn assemblages at Jakobsberg, Filipstad district, Varmland, Sweden. $\text{Pb}_2(\text{Mn}^{2+}, \text{Mg})\text{Fe}_{16}\text{O}_{27}$. Hexagonal, space group $P6_3/mmc$, a 5.951, c 33.358 Å, $Z = 2$. $D_{\text{calc.}}$ 5.76 g/cm³. Reflectance values are given; weakly birefractant and moderately anisotropic. Named for B. Lindqvist of the Swedish Museum of Natural History (Stockholm).
- Lintisite.** A.P. Khomyakov, L.I. Polezhaeva, S. Merlino and M. Pазero, 1990. *Zap. Vses. Min. Obshch.*, **119**, 76. As colourless or pale yellow, fibrous aggregates to 5 mm long and replacing lorenzenite in nepheline-sodalite syenite pegmatites at Mount Alluaiv, Lovozero Complex, Kola Peninsula, Russia. $\text{Na}_3\text{LiTi}_2\text{Si}_4\text{O}_{14}\cdot 2\text{H}_2\text{O}$. Monoclinic, space group $C2/c$, a 28.583, b 8.600, c 5.219 Å, β 91.03°, $Z = 4$. $D_{\text{meas.}}$ 2.77, $D_{\text{calc.}}$ 2.825 g/cm³. Optically biaxial negative, $2V_{\text{meas.}}$ 85°, α 1.672, β 1.739, γ 1.802. Named for the chemical composition.
- Lishizhenite.** W. Li and G. Chen, 1990. *Acta Min. Sinica*, **10**, 299. [Chinese, English abstract]. As pale violet aggregates of crystals to 8 mm long in cavities in anhydrite in the oxidation zone of the Xitianshan Pb-Zn deposit, Qinhai Province, China. Ideal formula $\text{ZnFe}_2(\text{SO}_4)_4\cdot 14\text{H}_2\text{O}$. Triclinic, space group $P\bar{1}$. a 6.477, b 15.298, c 6.309 Å, α 90.20°, β 101.11°, γ 93.97°, $Z = 1$. $D_{\text{meas.}}$ 2.206, $D_{\text{calc.}}$ 2.201 g/cm³. Optically biaxial negative, $2V$ 47°, α 1.522, β 1.568, γ 1.578, non-pleochroic. Named for Li Shizhen, a nationally-famous sixteenth century Chinese pharmacologist.
- Lithiomarsturite.** D.R. Peacor, P.J. Dunn, J.S. White, J. D. Grice and P.H. Chi, 1990. *Amer. Min.*, **75**, 409. Occurs as pinkish-brown to light yellow, euhedral crystals up to 3 mm in vugs within pegmatites from the Foote mine, Kings Mountain, Cleveland County, North Carolina, USA. Associated minerals include albite, bavenite, brannockite, parsettsite and tetrawickmanite. $\text{LiCa}_2\text{Mn}_2\text{HSi}_5\text{O}_{15}$. Pectolite-pyroxene series. Triclinic, space group $P\bar{1}$, a 7.652, b 12.119, c 6.805 Å, α 85.41°, β 94.42°, γ 111.51°, $Z = 2$. $D_{\text{meas.}}$ 3.32, $D_{\text{calc.}}$ 3.27 g/cm³. Optically biaxial negative, $2V_{\text{meas.}}$ 59.9°, $2V_{\text{calc.}}$ 64°, α 1.645, β 1.660, γ 1.666. Named for its compositional relationship to marsturite.
- Lithiowodginite.** A.V. Voloshin, Ya.A. Pakhomovskii and A.Yu. Bakhchisaraitsev, 1990. *Min. Zhurn.*, **112**, 94. [Russian]. Forms the central part to wodginite crystals in albitic zones of granite pegmatites in eastern Kazakhstan. Idealised formula $(\text{Li}, \text{Mn}, \text{Fe})(\text{Ta}, \text{Nb}, \text{Sn})_3\text{O}_8$. Wodginite group. Monoclinic, space group $C2/c$, a 9.441, b 11.516, c 5.062 Å, β 91.06°. $D_{\text{meas.}}$ 7.5, $D_{\text{calc.}}$ 7.44 g/cm³. Optically similar to wodginite in reflected light; reflectance data are given. Named for its lithium content and compositional similarity to wodginite.
- Luberoite.** J. Jedwab, B. Cervelle, G. Gouet, X. Hubaut and P. Piret, 1992. *Eur. J. Mineral.*, **4**, 683. As dark bronze idiomorphic crystals and fragments up to 0.5 mm and as inclusions in platinum grains, from Au-Pt placer deposits of the Lubero region, Kivu Province, Zaire. Ideal formula Pt_5Se_4 . Monoclinic, space group $P2_1/c$, a 6.584, b 4.062, c 11.10 Å, β 101.6°, $Z = 2$. $D_{\text{meas.}}$ 13.02, $D_{\text{calc.}}$ 13.02 g/cm³. Reflectance data are given; shows strong birefractance and anisotropism. Named for the locality. This is the second palladium selenide mineral and once again from Zaire.
- Lunijianlaite.** Y. Kong, X. Peng and D. Tian, 1990. *Acta Min. Sinica*, **10**, 289. [Chinese, English abstract]. As colourless to white, acicular crystals and as radiating aggregates to 2 mm in rhyolites at Qingtian, Zhejiang province, China. The phase consists of regular 1:1 interstratified cookeite and pyrophyllite. Simplified formula $\text{Li}_{0.732}\text{Al}_{6.189}(\text{Si}_7\text{AlO}_{20})(\text{OH}, \text{O})_{10}$. Monoclinic, a 5.09, b 8.97, c $\sin\beta$ 23.397 Å. $D_{\text{meas.}}$ 2.75. Optically biaxial negative, $2V$ 60°, α 1.576, β 1.582, γ 1.587. Named for luni (= chlorite group, representing cookeite) and jian for pyrophyllite.