# NEW MINERAL NAMES*

## Michael Fleischer, G. Y. Chao and J. A. Mandarino

### Aleksite*

A. G. Lipovetskii, Yu. S. Borodaev, and E. N. Zav'yalov (1978) Aleksite, $PbBi_2Te_2S_2$, a new mineral. *Zap. Vses. Mineral. Obshch., 107*, 315–321 (in Russian).

Electron microprobe analyses of 2 samples gave Pb 20.3, 20.5; Bi 46.0, 45.5; Te 27.3, 27.3; S 6.3, 6.3; Ag, Sb, Se not found, sum 99.9, 99.6, corresponding to $Pb_{0.94}Bi_{2.11}Te_{2.06}S_{1.89}$ and $Pb_{0.95}Bi_{2.10}Te_{2.06}S_{1.89}$.

The X-ray pattern (55 lines given) (Fe radiation, Mn filter) has strongest lines 3.09(10)(0.1.$\bar{1}$.14), 2.25(4)(1.0.$\bar{1}$.28), 2.12(6) (11$\bar{2}$0), 1.348(4)(1.2.$\bar{3}$.14), 1.307(4)(1.1.$\bar{2}$.48). This indicates a cell with $a = 4.238$, $c = 79.76$A, $Z = 6$, G calc 7.80.

The mineral occurs as platy grains up to 1 mm in sulfide–quartz veins at Alekseev mine, Sutamskii region, Stanovoi Range, USSR, with galena, gold, altaite, tetradymite, rucklidgeite, and other tellurides. Cleavage perfect, {0001}. Hardness (20 g load), av. of 6, = 51±8 kg/sq mm. Relief low, polishes well. In reflected light pale gray with slight greenish tint, weakly anisotropic. Reflectivity is given at 15 wave lengths. Rg = 460, 51.4; 540, 53.2; 580, 53.4; 640, 54.2%.

The name is for the mine. Type material is preserved at the Moscow Gosudarst University. **M.F.**

### Altmarkite, unnamed Hg–Pb analgam

T. Kaemmel, E. P. Muller, L. Krossner, J. Nebel, H. Unger, and H. Ungethum (1977) Altmarkite, a new mineral (preliminary report). *Z. angew. Geol., 23*, 535–536 (in German).

Metallic deposits on installations of the natural gas plant at Altmark, East Germany, contained Hg and Pb. $HgPb_2$, containing Hg 27–36, Pb 73–64 atomic percent, has strongest X-ray lines 2.78, 2.49, 1.67A, corresponding to synthetic tetragonal $HgPb_2$ with $a = 2.52$, $c = 4.53$A, $G = 12.1$, $H = 2$, silver-white to gray. It is named altmarkite for the locality. Also present is an unnamed Hg–Pb amalgam, Hg 20, Pb 80 atomic percent, cubic, $Fm3m$, $a = 4.87$A, strongest lines 2.80, 2.43, 1.73A, $G = 11.8$.

*Discussion*

Data inadequate. It is not clear whether the material is of natural origin or an artefact. **M.F.**

### Bilibinskite*

E. M. Spiridonov, M. S. Bezsmertnaya, T. N. Chileva, and V. V. Bezsmertny (1978) Bilibinskite, $Au_3Cu_2PbTe_2$, a new mineral of gold–telluride deposits. *Zap. Vses. Mineral. Obshch., 107*, 310–315 (in Russian).

Electron microprobe analyses, with pure Au, Ag, Cu, Fe, Te, and Se, and chemically analyzed altaite, clausthalite, and chalcopyrite as standards, of 8 spots from 2 samples from Far Eastern USSR gave Au 40.7–50.5, av 48.4; Ag 0.63–3.05, av. 1.54; Cu 7.43–11.8, av. 9.35; Fe 0.13, 0.36, av. 0.19; Pb 16.7–22.5, av. 19.2, Te 18.5–22.9, av. 21.6; Se 0–1.35, av. 0.34; sum 99.4, 101.7, av. 100.6%, giving the formula $(Au_{2.90}Ag_{0.17})(Cu_{1.74}Fe_{0.04})Pb_{1.10}(Te_{2.00}Se_{0.05})$.

X-ray study gave 12 lines, the strongest being 2.37(10)(111), 2.05(7)(200), 1.448(6)(220), and 1.232(8)(311). The pattern is similar to that of gold with primitive pseudocubic cell $a = 4.10$A.

The mineral occurs in the zone of weathering of telluride deposits of the Far Eastern USSR and Kazakhstan, associated with tellurides of Au, Cu, Pb, and Fe, as rims on Au, and replacing sylvanite and krennerite. It had previously been called rickardite, which it resembles in optical properties.

The color is light brown, rose-brown, luster semi-metallic, streak gold-brown to brown. No cleavages. It polishes well and easily. In reflected light, blue-violet to beige-cream. Reflectances are given at 15 wavelengths with Rg and Rp, respectively, for 2 samples: 460 nm, 13.4–14.5, 10.2–10.7; 540 nm, 21.5–23.2, 4.5–6.8; 580 nm, 25.0,28.1, 6.1–12.0; 640 nm, 23.9–30.7, 8.5–36.5%; the optical sign changes at 620 nm. Hardness (load 20 g) 329–419, av. 381 kg/sq nm.

The name is for the Soviet geologist Yuri A. Bilibin (1901–1952). Type material is preserved in the Mineralogical Museum, Acad. Sci. USSR, Moscow, and at IMGRE, Moscow. **M.F.**

### Canavesite*

G. Ferraris, M. Franchini-Angela, and P. Orlandi (1978) Canavesite, a new carboborate mineral from Brosso, Italy. *Can. Mineral., 16*, 69–73.

The mineral occurs as milky-white rosette-like aggregates of fibers (~1mm long) on ludwigite and magnetite skarns in the iron mine of Brosso, Province of Torino, Piedmont, Italy. The slightly flexible fibers are very thin and elongated parallel to [010], have vitreous luster, and do not fluoresce under ultraviolet light. G meas about 1.8, calc 1.79. Very rare crystals show pseudohexagonal prismatic habit. One or more {h0l} cleavages or partings were observed. It is biaxial(+), $2V$ is very large, $Z = b$, $\alpha = 1.485(4)$, $\beta = 1.494(4)$, $\gamma = 1.505(2)$, dispersion very weak.

Canavesite is monoclinic with a space group having a diffraction symbol $2/mP$-/-. The X-ray powder diffraction pattern was indexed using $a = 23.49(2)$, $b = 6.164(6)$, $c = 21.91(2)$A, $\beta = 114.91(9)°$. The strongest lines (average for $FeK\alpha$ and $CuK\alpha$) are: 9.54(100)($\bar{2}$02), 8.12(40)(201), 7.80(18)(102,$\bar{3}$01), 4.56(21)($\bar{5}$01,$\bar{5}$03), and 3.110(19)($\bar{4}$07).

Chemical analyses (two complete and one partial) gave the following average values: MgO 31.60, $B_2O_3$ 12.70, $CO_2$ 18.57, $H_2O$ 37.44, total 100.31 wt.%. On the basis of eleven oxygen ions, the empirical formula calculated from these data is $Mg_{2.03}(CO_3)_{1.09}(HBO_3)_{0.94}\cdot4.91H_2O$ or, ideally, $Mg(CO_3)(HBO_3)\cdot5H_2O$.

The name is for the district, Canavese, in which the village and mine of Brosso occur. Type material is deposited in the Museo Civico di Storia Naturale di Milano. Some "nesquehonite" collected from this locality since 1973 is in reality canavesite. **J.A.M.**

## Černýite*

S. A. Kissin, D. R. Owens, and W. L. Roberts (1978) Cernyite, a copper–cadmium–tin sulfide with the stannite structure. *Can. Mineral.*, *16*, 139–146.

Cernyite (CHÄRNÏ·AIT) is a rare constituent of two complex, zoned pegmatites in the Tanco mine, Bernic Lake, Manitoba, and the Hugo mine, Keystone, South Dakota. It occurs as small grains (up to 200$\mu$m) intergrown with kesterite. Associated minerals are stannite and various other sulfides. It is steel gray, luster metallic, streak black. H is about 4; no cleavages or crystal forms were observed. Density could not be measured; calculated density for Tanco and Hugo mine specimens is 4.776 and 4.618 g/cm³, respectively. The microindentation hardness (VHN$_{50}$) is 189 for Tanco material and 210 for Hugo material. In reflected light (in air), černýite is medium gray and is not readily distinguished from kesterite. Bireflectance is imperceptible, and anisotropy is very weak, in shades of gray. Under oil, černýite is distinctly bireflectant from creamy gray with a yellowish tint to very light gray and is anisotropic in shades of gray. Reflectance values (Tanco and Hugo) are: 470nm (24.6 and 25.5), 546nm (23.4 and 25.6), 589nm (22.3 and 25.0), and 650nm (22.7 and 24.3).

The mineral is tetragonal, space group $I\bar{4}2m$, Z = 2, $a$ = 5.5330 and $c$ = 10.8266A (Tanco), $a$ = 5.4871 and $c$ = 10.845A (Hugo). Strongest X-ray lines (for Co$K\alpha$) are: 3.167(10)(112), 1.954(4)(220), 1.939(7)(024), 1.662(5)(132), and 1.639(4)(116) for Tanco černýite.

Electron microprobe analyses of Hugo and (Tanco) material gave: Cu 28.1(26.5), Ag −(0.20), Fe 3.6(1.1), Zn 4.9(2.0), Cd 9.3(18.2), Mn 0.06(n.d.), Sn 26.3(24.9), Sb −(n.d.), S 28.5(26.9), total 100.8(99.8). These data yield the following empirical formulas (based on a total of 8 atoms): Cu$_{1.99}$(Cd$_{0.37}$Zn$_{0.33}$Fe$_{0.29}$Mn$_{0.01}$)Sn$_{1.00}$S$_{4.00}$ (Hugo) and (Cu$_{1.99}$Ag$_{0.01}$)(Cd$_{0.77}$Zn$_{0.14}$Fe$_{0.10}$)Sn$_{1.01}$S$_{3.99}$ (Tanco). The ideal formula is Cu$_2$CdSnS$_4$.

The name is in honor of Dr. Peter Černý of the University of Manitoba. Type specimens are preserved in the collections of the Royal Ontario Museum; National Reference Collection, Geological Survey of Canada; Museum of Geology, South Dakota School of Mines and Technology; National Museum of Natural History, Smithsonian Institution; Crystallography Laboratory, Mineral Sciences Laboratories, CANMET; and Department of Earth Sciences, University of Manitoba. **J.A.M.**

## Cesbronite*

S. A. Williams (1974) Cesbronite, a new copper tellurite from Moctezuma, Sonora. *Mineral. Mag.*, *39*, 744–746.

Electron microprobe analysis by R. F. Symes gave Cu 49.4, 49.8, 50.3, av. 49.95; TeO$_2$ 39.3, 39.2, 38.6, 38.6, av. 38.92%, Penfield determination gave 11.0% H$_2$O, corresponding to Cu$_6$(TeO$_3$)$_2$(OH)$_6$2H$_2$O. The mineral is readily dissolved by cold or warm 1:1 HCl and HNO$_3$, insol. in H$_2$O or 40% KOH.

Weissenberg and rotation photographs show it to be orthorhombic, space group *Pbcn*, $a$ = 8.624, $b$ = 11.878, $c$ = 5.872 (all ±0.016A), Z = 2, G calc 4.455, G meas 4.45±0.2. The strongest X-ray lines (18 given) are 5.934(100)(020), 4.889(71)(120), 3.490(92)(220), 2.379(38)(212), 2.358(70)(032).

Color green, H = 3, brittle. In thin section rich green. Under the microscope a good cleavage on {021} and a poor one {101}. Optically biaxial, positive, $ns$ (Na, 22°C) $\alpha$ = 1.880, $\beta$ = 1.928, $\gamma$ = 2.029 (all ±0.008), 2V = 72° (calc), X = $a$. Pleochroic with X pale bluish-green, Y rich yellow-green, Z deep emerald green, abs. Z ~ Y >> X. Dispersion moderate, $r > v$.

The mineral occurs in crystals up to 0.5 mm elongated on $a$, with terminations showing d{103} and n{180}. It occurs in veins of the Bambollita mine near Moctezuma, Sonora, Mexico, associated with electrum, teineite, and carlfriesite.

The name is for Fabian Cesbron, French mineralogist. Type material is at the British Museum of Natural History, London, and at the University of Paris. **M.F.**

## Donnayite*

G. Y. Chao, P. R. Mainwaring, and J. Baker (1978) Donnayite, NaCaSr$_3$Y(CO$_3$)$_6$·3H$_2$O, a new mineral from Mont St. Hilaire, Quebec. *Can. Mineral.*, *16*, 335–340.

This mineral formerly designated "UK33" occurs in small quantities in the pegmatite dikes, miarolitic cavities, and interstices in the nepheline syenite at Mont St. Hilaire, Quebec. Associated minerals are microcline, analcite, natrolite, calcite, chlorite, aegirine, arfvedsonite, siderite, rhodochrosite, ancylite, pyrite, sphalerite, hematite, goethite, pyrophanite, catapleiite, gaidonnayite, and astrophyllite. Donnayite is commonly in syntactic intergrowths with ewaldite, a Sr-analog of ewaldite, mckelveyite, and rarely synchysite. The crystals are usually small, from 0.05 to 1.0mm, rarely 2.0mm. The color is usually pale yellow to yellow, but some crystals are colorless, white, gray, and rarely reddish-brown due to hematite inclusions. The mineral has a white streak and is transparent with a vitreous luster, although the white and gray varieties are opaque and earthy. The hardness is about 3 and an indistinct to fair basal cleavage is present. G meas = 3.30(1), G calc = 3.266. The mineral dissolves rapidly in 1:1 HCl with strong effervescence. Optically, donnayite is biaxial (−), $\alpha$ = 1.551–1.561(2), $\beta$ = 1.646(2), $\gamma$ = 1.652(2), 2V varies 0° to 20° with 5° to 10° the most common values. The X principal vibration direction is approximately parallel to $c^*$.

Donnayite crystals display apparent trigonal or hexagonal symmetry with habits varying from platy, tabular, saucer-shaped, columnar, barrel-shaped, to irregularly granular; some crystals are hemimorphic. Single-crystal X-ray study shows that the mineral is triclinic, pseudo-rhombohedral, and isomorphous with weloganite. The space group is $P1$, $a$ = 9.000(1), $b$ = 8.999(1), $c$ = 6.793(1)A, $\alpha$ = 102.77(1)°, $\beta$ = 116.28(1)°, $\gamma$ = 59.99(1)°, Z = 1. Strongest X-ray lines (for Cu$K\alpha$) are: 6.103(4)(001), 4.368(7)(120 *etc.*), 3.209(3)(121 *etc.*), 2.839(10)(211 *etc.*), 2.598(4)(030 *etc.*), 2.038(3)(3$\bar{1}$0 *etc.*), 2.018(3)(420 *etc.*), 1.978(3)(032 *etc.*), 1.916(3)(241 *etc.*), and 1.694(3)(150 *etc.*) (*etc.* refers to other *hkl* designations for these *d*-spacings. JAM). Most donnayite crystals are twinned according to the following twin laws: rotation about [103]$_{120}$°; reflection across (010), (30$\bar{1}$), or ($\bar{3}$31).

Electron microprobe analysis of a crystal free of syntactic intergrowths gave: Na$_2$O 3.37, CaO 5.75, BaO 0.85, SrO 35.8, Y$_2$O$_3$ 13.1, Nd$_2$O$_3$ 1.83, La$_2$O$_3$ 0.45, CO$_2$ (30.98), H$_2$O (6.34), total (98.47). Values of CO$_2$ and H$_2$O were calculated on the basis of 6(CO$_3$)²⁻ and 3H$_2$O per formula by analogy with weloganite. The data give an empirical formula (based on 21 oxygen ions) of Na$_{0.93}$(Ca$_{0.87}$Nd$_{0.09}$La$_{0.03}$)(Sr$_{2.95}$Ba$_{0.05}$)Y$_{0.99}$(CO$_3$)$_6$·3H$_2$O, which corresponds closely to the ideal formula NaCaSr$_3$Y(CO$_3$)$_6$·3H$_2$O.

Donnayite is isomorphous with weloganite, Na$_2$Sr$_3$Zr(CO$_3$)$_6$·

$3H_2O$, and mckelveyite, $NaCaBa_3Y(CO_3)_6 \cdot 3H_2O$. The name is for Professors J. D. H. Donnay and G. Donnay. Type material is preserved in the National Museum of Natural Sciences, Ottawa, and the Royal Museum, Toronto. **J.A.M.**

## Friedrichite*

T. T. Chen, E. Kirchner and W. Paar (1978) Friedrichite, $Cu_5Pb_5Bi_7S_{18}$, a new member of the aikinite–bismuthinite series. *Can. Mineral.*, *16*, 127–130.

The mineral occurs as isolated crystals or as granular aggregates (0.2mm to 1.5mm) in "head-sized" vein-quartz boulders. Friedrichite grains are commonly altered to cerussite, a hydrous (?) Cu–Bi sulfate, and a hydrous carbonate–sulfate of Bi. Trace amounts of chalcopyrite, covellite, chlorite, and mica are also present. The boulders were found in the screes of a landslip, below the well-known emerald deposit of the "Sedl" region at the east side of the Habach Valley, Salzburg, Austria.

Although a megascopic description is not given, friedrichite presumably is similar in appearance to other members of the aikinite–bismuthinite series. In polished section it is creamy yellowish-white in air, more pinkish in oil. Bireflectance is moderate in air and distinct in oil: from creamy yellowish-white with a pink tint to pinkish gray-white or light bluish yellow-white. Anisotropism is distinct in air and strong in oil. Reflectance values, maximum–minimum, and (average) are: at 470nm, 46.7–41.0(44.2); at 546nm, 46.2–40.1(43.5); at 589nm, 45.8–39.9(43.0); and at 650nm, 45.6–39.9(42.9). Microindentation tests on seven grains gave $VHN_{50} = 201$ to 244 (av. 224). Etch tests: $HNO_3$ (1:1) burns with effervescence and darkens surface within seconds; $FeCl_3(20\%)$ gave a light brown stain; HCl (1:1) gave no reaction.

Precession study showed friedrichite to be a new superstructure of the aikinite–bismuthinite series with: $a = 3 \times 11.28 = 33.84$, $b = 11.65$, $c = 4.01A$, $Pb^{**}$ ($Pb2_1m$). The strongest lines in the X-ray powder diffraction pattern (in A for $CuK\alpha$ with 114.6mm diam. Debye-Scherrer camera) are: 4.05(4)(620), 3.644(10)(330), 3.584(10)(311,910), 3.161(10)(321,611), 2.850(8)(621), 2.577(4)(640), and 1.979(4)(351,12.3.1,950).

Electron microprobe analyses of six grains gave the following averages: Cu 9.1, Pb 29.7, Bi 44.2, S 17.2, total 100.2. The empirical formula derived from these data for 36S atoms is $Cu_{9.61}Pb_{9.62}Bi_{14.19}S_{36}$. The structural cell formula for the aikinite–bismuthinite series can be represented by $Cu_xPb_xBi_{82-x}S_{122}$ where $z$ is the multiplier of the $a$ parameter of aikinite. The value of $z$ for friedrichite is 3 and thus the ideal formula is $Cu_{10}Pb_{10}Bi_{14}S_{36}$ (this formula requires Cu 9.36, Pb 30.53, Bi 43.11, S 17.00, total 100.00 wt. %, JAM). G meas = 6.98, calc = 7.06.

The name is in honor of Professor Emeritus Dr.-Ing. O. M. Friedrich, Mining University, Leoben, Styria, Austria. Type material (quantity not stated) is preserved at the Institute of Mineralogy, University of Salzburg, Salzburg, Austria; Museum of Landeskunde Joanneum, Graz, Styria, Austria; Royal Ontario Museum, Toronto, Ontario, Canada; and Smithsonian Institution, Washington, D. C., U.S.A. **J.A.M.**

## Genkinite*

L. J. Cabri, J. M. Stewart, J. H. G. Laflamme and J. T. Szymanski (1977) Platinum-group minerals from Onverwacht. III. Genkinite, $(Pt,Pd)_4Sb_3$, a new mineral. *Can. Mineral.*, *15*, 389–392.

Genkinite occurs as irregular grains from less than 5 microns to about 165×165 microns. It is associated with sperrylite, Pt-Fe-Cu-Ni alloys, platarsite, ruthenarsenite, stibiopalladinite, mertieite II, and an unidentified Pt-Pd-Rh oxide from the Onverwacht mine, Transvaal. In polished section in air the mineral is pale brown or tan with a yellowish tinge and moderately to strongly anisotropic from gray to brown. In oil the yellowish tinge is absent, some grains are weakly bireflectant, and anisotropism is moderate to strong. Reflectances in air in percent are: 470nm, 52.55 and 51.7; 546nm, 54.05 and 53.5; 589 nm, 55.25 and 54.6; 650 nm, 56.5 and 56.2. Micro-indentation hardness is $VHN_{25} = 603(578–612)$ for one grain and $VHN_{25} = 677(627–697)$ for another grain.

Genkinite is tetragonal; space group not determined but is in Laue class *P*422; $a = 7.736$ $c = 24.161A$, $Z = 8$. Strongest X-ray lines (Fe-filtered, Co-radiation) are: 3.020(9)(025,008), 2.265(10)(134), 1.934(6)(040), 1.910(5)(02.11), 0.9043(5B)(26.18), and 0.9025A(5B)(382).

Results of electron microprobe analyses of eight grains are given. The data for the grain used for X-ray diffraction studies are: Pt 47.3, Pd 14.1, Rh 1.5, Ni 0.06, Cu n.d., Sb 36.1, Bi 0.49, As 0.27, total 99.82 wt.%. This gives the following empirical formula (based on 7 atoms): $(Pt_{2.45}Pd_{1.34}Rh_{0.15}Ni_{0.01})_{\Sigma 3.95}(Sb_{2.99}As_{0.04}Bi_{0.02})_{\Sigma 3.05}$. Ideally, this is $(Pt,Pd)_4Sb_3$ with Pt > Pd, and it is thought that the Pd is essential. The density calculated for the empirical formula is 9.256 $g/cm^3$.

The name is in honor of Dr. A. D. Genkin, Soviet mineralogist. Type material is in the Royal Ontario Museum (Toronto), Smithsonian Institution (Washington), Mineralogical Museum of the Academy of Sciences (Moscow), and Pinch Mineralogical Museum (Rochester). **J.A.M.**

## Hydrodresserite*

J. L. Jambor, A. P. Sabina, and B. D. Sturman (1977) Hydrodresserite, a new Ba–Al carbonate from a silicocarbonatite sill, Montreal Island, Quebec. *Can. Mineral.*, *15*, 399–404.

The mineral occurs as white spheres and hemispheres about 2mm in diameter which consist of radiating fibrous crystals. Crystals are colorless, streak white, luster vitreous, H 3 to 4, and two perfect cleavages, {010} and {2T0}. The measured density is 2.80 $g/cm^3$. The mineral is biaxial (−), $\alpha = 1.501(3)$, $\beta = 1.594(1)$ $\gamma = 1.595(1)$, $2V$ 17(1)°; orientation: $X(\phi 65°, \rho 88°)$, $Y(\phi -27°, \rho 46°)$, $Z(\phi 158-1/4°, \rho 44-1/4°)$. Hydrodresserite is triclinic (space group not given) with $a = 9.77$, $b = 10.45$, $c = 5.66A$, $\alpha = 95°42'$, $\beta = 92°22'$, $\gamma = 115°47'$. Least-squares refinement of the powder-diffraction data gave $a = 9.79$, $b = 10.42$, $c = 5.66$ A, $\alpha = 96.05°$, $\beta = 92.20°$, $\gamma = 115.71°$. Strongest X-ray lines ($CuK\alpha$ radiation) are: 8.75(4)(100), 8.52(10)(T10), 4.26(5)(220), 3.42(7)(210,T30), and 3.10(6)(030,211). Crystals are elongated parallel to [001] with forms {010}, {2T0}, and {102}. With $Z = 2$, the calculated density is 2.79 $g/cm^3$ (empirical formula) and 2.81 $g/cm^3$ (theoretical formula).

Chemical analysis gave BaO 35.0, $Al_2O_3$ 23.7, $CO_2$ 21.8, $H_2O$ 20.3, total 100.8 wt.%. This yields an empirical formula (based on 13 oxygen ions) of $Ba_{0.97}Al_{1.99}(CO_3)_{2.12}(OH)_{3.88} \cdot 2.97H_2O$. This is essentially $BaAl_2(CO_3)_2(OH)_4 \cdot 3H_2O$ which requires BaO 35.38, $Al_2O_3$ 23.52, $CO_2$ 20.31, $H_2O$ 20.79, total 100.00 wt.%.

Hydrodresserite loses water readily even at room temperature and breaks down at least in part to dresserite, $BaAl_2(CO_3)_2(OH)_4 \cdot H_2O$. In a few cases the dehydration product is not dresserite but is believed to be $BaAl_2(CO_3)_2(OH)_4 \cdot 2H_2O$. Details of the DTA-TGA runs are given.

The mineral occurs in an alkalic sill in the Francon Quarry at St. Michel, Montreal Island, Quebec. The name is in allusion to its

relationship to dresserite. Chemically it is the barium analog of alumohydrocalcite, but otherwise the two minerals are not related. Type material is deposited in the Royal Ontario Museum, Toronto, and in the National Mineral Collection, Geological Survey of Canada, Ottawa. **J.A.M.**

## Jokokuite*

Matsuo Nambu, Katsutoshi Tanida and Tsuyoshi Kitamura (1978) Jokokuite, $MnSO_4 \cdot 5H_2O$, a new mineral from the Jokoku mine, Hokkaido, Japan. *Mineral. J. (Tokyo), 9,* 28–38.

Analysis gave MnO 27.34, FeO 1.13, ZnO 0.94, MgO, CaO none, $SO_3$ 33.06, $H_2O$ 37.68, sum 100.15%, corresponding to $(Mn_{0.943}Fe_{0.038}Zn_{0.028})(SO_4) \cdot 5.07H_2O$, or $MnSO_4 \cdot 5H_2O$. DTA and TG curves are given. The DTA curve shows weak endothermic peaks at 60°, 83°, and 890°, strong endothermic peaks at 140°, 328°, and 1032°C. The break at 140° corresponds to dehydration to $MnSO_4 \cdot H_2O$, that at 328° to $MnSO_4$, that at 1032° to loss of $SO_3$. The final product at 1080° consisted mainly of hausmannite. The mineral is readily soluble in $H_2O$. It dehydrates to ilesite at 20°C and 50% humidity.

X-ray powder data are given (50 lines) (Fe/Mn radiation). The strongest lines are 5.84(100)(100), 5.66(56)(110), 4.98(61)(11$\bar{1}$), 3.28(25)(1$\bar{1}$1), 2.727(72)($\bar{1}$12,1$\bar{3}$0), 2.290(27)(03$\bar{2}$), 1.622(31)(3$\bar{1}$1). The data are indexed on a triclinic cell with $a = 6.37$, $b = 10.77$, $c = 6.13A$, $\alpha = 98°46'$, $\beta = 109°58'$, $\gamma = 77°50'$, $Z = 2$; G 2.094 calc,2.03 meas. By analogy with the very similar chalcanthite and siderotil, the space group is probably $P\bar{1}$.

Color pale pink, streak white, luster vitreous; H about 2.5. Optically biaxial, neg., $2V = 70$–80°, dispersion very weak, $\alpha = 1.498$, $\beta = 1.510$, $\gamma = 1.517$ (all ±0.003). No cleavage.

The mineral occurs as stalactites in the Jokoku mine, SW Hokkaido, along with gypsum, szmikite, ilesite, rozenite, siderotil, ferrohexahydrite, mallardite, melanterite, and goslarite. It apparently was deposited directly from mine waters at about 25°C. The ores at the mine consist mainly of rhodochrosite with less sphalerite, galena, pyrite, marcasite and others.

The name is for the mine. Type material is at Tohoku University, Sendai. **M.F.**

## Kanonaite*

S. Vrana, M. Rieder and J. Podlaha (1978) Kanonaite, $(Mn_{0.75}^{3+}Al_{0.23}Fe_{0.02}^{3+})^{[6]}Al^{[5]}[O](SiO_4)$, a new mineral isotypic with andalusite. *Contrib. Mineral. Petrol., 66,* 325–332.

Microprobe analysis at 24 points, using analyzed pyroxmangite, andalusite, kaersutite, barite, galena, $Mn_3O_4$, Cu, and Zn as standards, gave $SiO_2$ 32.2, $TiO_2$ 0.01, $Al_2O_3$ 33.9, $Fe_2O_3$ 0.66, $Mn_2O_3$ 32.2, MgO 0.04, ZnO 0.13, CuO 0.01, CaO 0.01, BaO 0.04, PbO 0.01, sum 99.21%. There was slight zoning; the $Mn_2O_3$ content ranged from 27.6 to 32.6%.

X-ray study showed the mineral to be orthorhombic, space group *Pnnm*, $a = 7.953$, $b = 8.038$, $c = 5.619A$, $Z = 4$; G calc = 3.395. The strongest lines (39 given) are 5.669(100)(110), 4.590(75)(011,101), 3.587, 3.567(90)(120,210), 2.827(94)(220), 2.299(69)(022,311), 2.212(83)(320,122,212).

The mineral is greenish-black, streak gray-green, luster vitreous. H = 906–1017 kg/sq mm, Mohs = 6.5. Optically biaxial, positive, $\alpha = 1.702$, $\beta = 1.730$, $\gamma = 1.823$, $X = a$ = yellow-green, $Y = b$ = bluish-green, $Z = c$ = deep golden yellow. Cleavage {110} poor or imperfect. Infrared data are given.

The mineral occurs in a gahnite–chlorite–coronadite–quartz schist near Kanona, Zambia. The name is for the locality. Type material is at Charles University, Prague. **M.F.**

## Kleberite

Hans-Joachim Bautsch, Georg Rohde, Paul Sedlacek and Achim Zedler (1978) Kleberite, a new iron–titanium oxide from Tertiary sands. *Z. geol. Wiss., 6,* 661–671 (in German).

Achim Zedler, Paul Sedlacek, Georg Rohde, and Hans-Joachim Bautsch. First results of structure determination of a new mineral of the $TiO_x$ type. *Ibid.,* 673–679 (in German).

Electron microprobe analyses gave for grain 1, Roda, Ti 44.5, Fe 7.9, Si 1.2, Cr 0.2, Ba 1.7, Ca 0.4, Mg 0.1; for seven grains, Ti 40.5–46.6, Fe 7.0–10.6, Si 0.9–1.3, Al 0.3–1.1, Ba 1.2–1.8, Ca 0.4–0.8, P 0.2–0.3. The first analysis and the average of these seven respectively gave $TiO_2$ 74.4, 71.7; FeO 10.2, 11.3; $SiO_2$ 2.6, 2.6; $Al_2O_3$ –, 1.3; $Cr_2O_3$ 0.3, –; BaO 1.9, 1.7; CaO 0.6, 0.8; MgO 0.2, –; $P_2O_5$ –, 0.5; $H_2O$ (by ignition at 1050°) 9.3, 9.3%. These give the formulas: $(Fe_{0.181}Ba_{0.016}Ca_{0.014}Mg_{0.006})(Ti_{1.19}Si_{0.055}Cr_{0.005})(OH)_{1.32}O_{2.05}$, and $(Fe_{0.203}Ba_{0.013}Ca_{0.018})(Ti_{1.16}Si_{0.056}Al_{0.028}P_{0.009})(OH)_{1.335}O_{2.065}$. This is given in the second paper as approximating $FeTi_6O_{13} \cdot 4H_2O$. The state of oxidation of Fe is not known. DTA and TGA study of an impure sample containing much ilmenite showed continuous loss of $H_2O$ above 250°, but no thermal effects up to 900°C.

Weissenberg and precession measurements gave $a = 2.8542$, $b = 4.9448$, $c = 4.5857A$, $\alpha = \beta = \gamma = 90°$. Since $a \sqrt{3} = 4.9436$, nearly = $b$, the mineral is considered to be hexagonal with space group $P6_3mcm$. "The experimentally determined density 3.26 g/cm³, can only be made to agree with the X-ray volume of the unit cell (64.72A³) if the ratio metal (Ti+Fe): oxygen is about 1 : 3." The strongest lines (10 given) are 2.456(3), 2.156(6), 1.672(10), 1.420(6). They are not indexed.

Color dark brown to black. H = 4 to 4½. Density variable (range not stated), av. 3.28 (given as 3.26 in the second paper). Optically uniaxial, neg.; a few grains are biaxial, neg., refractive indices much higher than 1.80. Reflectivity variable 12–14.3, av. 13.5%, corresponding to mean $n$ 2.162, range 2.060–2.238. Birefringence 0.04–0.05.

The mineral was separated by heavy liquids, magnetic separation, and hand-picking from Tertiary sediments of the western Weissel basin, East Germany, amounting to 7% of the transparent heavy minerals near Borna, 30–35% near Konigshain.

The name is for Professor Will Kleber (1906–1970) of Humboldt University, Berlin.

*Discussion*

A thoroughly unsatisfactory description. **M.F.**

## Maricite*

B. D. Sturman, J. A. Mandarino, and M. I. Corlett (1977) Maricite, a sodium iron phosphate, from the Big Fish River area, Yukon Territory, Canada. *Can. Mineral., 15,* 396–398.

Y. LePage and G. Donnay (1977) The crystal structure of the new mineral maricite, $NaFePO_4$. *Can. Mineral., 15,* 518–521.

The mineral occurs as sub-parallel to radiating elongate grains in nodules from shales along the Big Fish River, Yukon Territory at about lat. 68°30'N and long. 136°30'W. Associated minerals are: quartz, ludlamite, vivianite, pyrite, wolfeite, a member of the apa-

tite group, a member of the varulite group, and satterlyite. Maričite (pronounced MĀ·RĬCHAIT) is colorless to gray and pale brown, vitreous, transparent to translucent, non-fluorescent under UV light, streak white. There is no cleavage; H 4 to 4½, G meas 3.66(2) 3.64 g/cm$^3$. Maričite is biaxial (−), $2V$ meas 43½°, calc 43°, $\alpha$ = 1.676(2), $\beta$ = 1.695(2), $\gamma$ = 1.698(2), dispersion weak $r > v$, non-pleochroic, $X = a$, $Y = b$.

The elongation of grains is [100], and LePage and Donnay recognized the following forms: {010}, {011}, {012}, and {032}. The mineral is orthorhombic, space group $Pmnb$, $a$ = 6.867, $b$ = 8.989, $c$ = 5.049A, $Z$ = 4. Strongest X-ray lines (Cu$K\alpha$) are: 3.705(40)(111), 2.729(90)(220), 2.707(80)(211). 2.574(100)(031), 2.525(30)(002), 1.881(30)(240), and 1.853(60)(222).

The average values of six electron microprobe analyses are: Na$_2$O 16.5, MgO 0.8, CaO 0.0, MnO 3.1, FeO 37.4, P$_2$O$_5$ 42.5, total 100.3 wt.%. The formula (based on four oxygen ions) derived from these data is Na$_{0.91}$(Fe$_{0.89}$Mn$_{0.07}$Mg$_{0.03}$)P$_{1.02}$O$_{4.00}$ or ideally NaFePO$_4$. Although the formula is similar to those of triphylite (LiFePO$_4$), natrophilite (NaMnPO$_4$), and lithiophilite(LiMnPO$_4$), its structure is different.

The name is for Professor Dr. Luba Marić, long-time head of the Department of Mineralogy and Petrology, University of Zagreb. Type material is preserved in the Royal Ontario Museum and the Mineralosko–Petrografski Musej in Zagreb, Yugoslavia. **J.A.M.**

## Orthobrannerite

X-ray Laboratory, Peking Institute of Uranium Geology and X-ray Laboratory, Wuhan Geological College (1978) Orthobrannerite—a new mineral of the brannerite group. *Acta Geol. Sinica*, 241–251 (in Chinese with English abstract).

Chemical analysis gave UO$_2$ 28.75, UO$_3$ 31.08, ThO$_2$ 1.03, TR$_2$O$_3$ 0.28, CaO 0.44, PbO 0.17, TiO$_2$ 35.35, Fe$_2$O$_3$ 0.40, Nb$_2$O$_5$ 0.19, Ta$_2$O$_5$ 0.01, SiO$_2$ 0.65, H$_2$O+ 1.11, H$_2$O− 0.76, sum 100.22 wt%, corresponding to (U$_{0.48}^{6+}$U$_{0.47}^{4+}$Ca$_{0.04}$Th$_{0.02}$TR$_{0.01}$)(Ti$_{1.97}$Fe$_{0.02}$Nb$_{0.01}$)O$_{6.01}$(OH)$_{0.93}$, or simply (U$_{0.5}^{6+}$U$_{0.5}^{4+}$)Ti$_2$O$_6$(OH). Electron microprobe analysis gave U 58.40, Ti 20.16, O 20.85, sum 99.41 wt%. Semi-quantitative spectrographic analysis showed Mg 0.5, Al 0.05, Y 0.03, Ce 0.01 wt% and traces of Ba, Be, Mn, Sn, Cr, Ni, Bi, Yb, Cu, Ag and Co.

Crystals (6–8 × 10–12mm) are prismatic, bounded by {001}, {120}, {021}, {110}, {140}; some crystals show additional {210}, {180}, and a form with uncertain indices. The prismatic faces are striated along $c$. Optical goniometry showed the mineral to be orthorhombic with $a:b:c$ = 0.636:1:0.550. The mineral was studied by X-ray after heat treatment to 700–1100°C. After heating to 700°C the mineral gave an X-ray powder pattern similar to that of heat-treated samiresite. After heat treatment to 1000°C the X-ray powder pattern is similar to that of synthetic UTiO$_5$ and is totally comparable to that of "phase X," a heat-treatment product of brannerite at 900°C [Krivokoneva, *Zap. Vses. Mineral. Obshch., 101*, 254–267 (1972), *Mineral. Abstr., 26*, 190 (1975).] The powder pattern (1000°C) is indexable on the basis of the orthorhombic cell of "phase X" with $a$ = 7.37, $b$ = 11.67, $c$ = 6.33A. The space group $P2_122$ predicted for "phase X" could not be ascertained. The strongest X-ray lines (29 given) are 4.87(7)(101), 3.89(8)(030), 3.17(10)(002), 2.45(9)(032,300,231), 2.29(5)(301,240), 1.823(5B)(410), 1.659(9)(233,062), 1.203(6)(611,404). Extra weak lines due to U$_3$O$_8$(H) and rutile have been observed. The mineral is thought to have regained its original crystal structure after heat treatment because the calculated axial ratios 0.632:1:0.543 and interfacial angles (110)Λ(1̄10) 64°32′, (021)Λ(02̄1) 85°20′ for the

heat-treated product are similar to those observed on the natural mineral (0.636:1:0.550, 64°46′, 84°36′).

The natural mineral is fully metamict and is black with dark brown to black streak, adamantine luster, and conchoidal fractures. VHN (100–250g) 515–532. $n$(Na) 2.328, reflectance (589M$\mu$) 15–17%. $Z$ = 2; G calc = 5.46, meas = 5.46. The mineral is grayish white under reflected light with a reddish brown internal reflection. It is non-fluorescent in UV and is strongly radioactive. After heating to 1000°C the mineral becomes brownish-green on thin edges, giving brownish-yellow streak with a green tint. VHN(50–100g) 542–546. Reflectance 16.6–17.8%. The mineral is not attacked by HCl and H$_2$SO$_4$ but dissolves in warm H$_2$SO$_4$ and H$_3$PO$_4$.

Infrared spectrum shows a strong broad band at 546 cm$^{-1}$ and several weak H$_2$O and OH bands. TGA shows a two-stage weight loss at 104° and 200–400° with a total weight loss of 1.5% at 460°, followed by a weight gain of 1.1% (oxidation) at 500–800°C. DTA shows two weak endothermic breaks at 100 and 340° and a strong exothermic break at 620°C (recrystallization).

The mineral was first found in the weathering residue of a biotite pyroxene syenite in Yunan, China. It was later also identified, from its heat-treatment product, in an alkalic lamprophyre in Szechuan, China.

### Discussion

The name orthobrannerite is a poor choice for the mineral, as the name implies an orthorhombic polymorph of brannerite. The ideal formula of the mineral is better written as U$^{6+}$U$^{4+}$Ti$_4$O$_{12}$(OH)$_2$, with $Z$ = 1. **G.Y.C.**
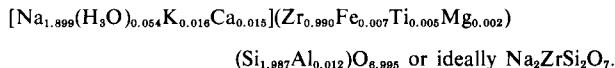
## Parakeldyshite*

G. Raade and M. H. Mladeck (1977) Parakeldyshite from Norway. *Can. Mineral., 15*, 102–107.

The mineral occurs as irregular cleavage masses up to several cm in size in nepheline syenite pegmatites which transect a foyaite at Bratthagen, Lågendalen, near Larvik, Norway. Associated minerals are alkali feldspar, nepheline, aegirine, pyrophanite, loparite, and biotite. In other parts of the pegmatite dikes are astrophyllite, catapleiite, ramsayite, analcime, and zeolites. Minor minerals present are boehmite, genthelvite, eudialyte, barylite, hilairite, ancylite, and some unidentified phases.

Parakeldyshite is white with a slight bluish tinge, translucent, and vitreous. It fluoresces a strong cream color in short-wave UV light and a very weak cream color in long-wave UV. H = 5½ to 6, G meas 3.39, calc 3.40 g/cm$^3$. Three cleavages result in a pseudo-rhombohedral aspect; the cleavages are {001} perfect, {110} and {1̄10} somewhat less perfect. The acute angles between these planes are all between 76° and 82°. There is also a good cleavage parallel to {011}. The mineral is polysynthetically twinned on (100). The color and polysynthetic twinning give the mineral the appearance of a plagioclase feldspar, but it is quickly distinguished from these by its fluorescence and by its very pronounced weathering on exposed surfaces. Parakeldyshite is biaxial(−), $2V$ meas 84°, calc 88°; $Y$ near $c$, $X$ near $b$,. $Z$ near $a$; $\alpha'$ = 1.670, $\beta'$ = 1.692, $\gamma'$ = 1.713, all measured on cleavage fragments, but because of the orientation these are probably close to the principal refractive indices.

Parakeldyshite is triclinic, space group probably $P\bar{1}$, $a$ = 5.419, $b$ = 6.607, $c$ = 8.806A, $\alpha$ = 71.50°, $\beta$ = 87.15°, $\gamma$ = 85.63°, $Z$ = 2. The strongest X-ray lines (Fe$K\alpha$) are: 6.00(6)(011), 4.234(7)(110), 4.179(8)(002), 3.963(10)(1̄10), 2.913(9)(121), 2.718(6)(1̄21), and 2.703(7)(200).

Wet chemical analyses are given; one of these gave: $SiO_2$ 39.22, $Al_2O_3$ 0.21, $ZrO_2$ 40.07, $TiO_2$ 0.13, $Fe_2O_3$ 0.18, MgO 0.03, CaO 0.27, $Na_2O$ 19.33, $K_2O$ 0.25, $H_2O^+$ 0.48, $H_2O^-$ 0.00, total 100.17 wt.%. Based on 2(Si + Al) this gives the empirical formula:

$$[Na_{1.899}(H_3O)_{0.054}K_{0.016}Ca_{0.015}](Zr_{0.990}Fe_{0.007}Ti_{0.005}Mg_{0.002})$$

$$(Si_{1.987}Al_{0.012})O_{6.995} \text{ or ideally } Na_2ZrSi_2O_7$$

The name is in allusion to its polymorphic relationship to keldyshite. Type material is preserved in the Mineralogical–Geological Museum, University of Oslo.

*Discussion*

This is not the original description of parakeldyshite nor the first mention of the name in print. Soviet mineralogists have used the name as early as 1975 and have given descriptions in 1972, 1973, 1974, and 1975. This is, however, the best description available in that it compares the Soviet and Norwegian materials. **J.A.M.**

### Penikisite*

J. A. Mandarino, B. D. Sturman, and M. I. Corlett (1977) Penikisite, the magnesium analogue of kulanite, from Yukon Territory. *Can. Mineral., 15,* 393–395

The mineral is very similar in appearance to kulanite, $BaFe_2Al_2(PO_4)_3(OH)_3$, and crystals grade from one to the other. Penikisite zones are generally near the edges of kulanite–penikisite crystals. The mineral is blue to green, transparent to translucent, non-fluorescent under UV light, vitreous, streak very pale green to white. H about 4, fair to good cleavages parallel to {010} and {100}. G meas 3.79(2), calc 3.82. Penikisite is biaxial (+), $\alpha = 1.684(2)$, $\beta = 1.688(2)$, $\gamma = 1.705(2)$, $2V$ 56° (meas.) and 52° (calc.); pleochroic with $X$ grass-green, $Y$ blue-green, $Z$ pale pink, absorption $X \sim Y > Z$; very strong asymmetrical dispersion, $r \gg v$; orientation $Y \sim b$, $Z \wedge c = -6°$, but $Y \wedge b$ ranges from 0° to 19°. The locality is the same as for kulanite.

Penikisite is morphologically and dimensionally monoclinic, but the asymmetrical dispersion indicates triclinic symmetry. The space group is $P1$ or $P\bar{1}$, $a = 8.999$, $b = 12.069$, $c = 4.921A$, $\alpha \sim 90°$, $\beta \sim 100°31'$; $\gamma \sim 90°$, $V = 525.49A^3$, $Z = 2$. Crystal forms are the same as those observed for kulanite. The X-ray powder diffraction pattern is almost identical to that of kulanite. The strongest lines (Cu$K\alpha$) are: 8.81(60)(100), 3.094(100)($\bar{2}21,031$), 3.028(60)($\bar{1}31$), 2.915(80)(211), 2.684(60)($\bar{3}11$), 2.649(70)(320).

Of the ten electron microprobe analyses quoted, eight are Fe-dominant (kulanite) and two are Mg-dominant (penikisite). The two penikisite analyses are: MgO 6.5, 6.1; CaO 1.4, 1.3; MnO 0.0, 0.4; FeO 9.5, 10.1; BaO 24.9, 24.6; $Al_2O_3$ 18.0, 17.5; $P_2O_5$ 37.1, 36.4; $H_2O$ 3.9 (one analysis by TGA); total 101.3, 100.3 wt.%. The first analysis gives an empirical formula of $Ba_{0.96}(Mg_{0.95}Fe_{0.78}Ca_{0.15})$ $Al_{2.09}P_{3.09}O_{12.44}(OH)_{2.56}$ or, ideally, $Ba(Mg_{1.01}Fe_{0.83}Ca_{0.16})Al_2(PO_4)_3$ $(OH)_3$. The mineral is ferroan penikisite.

The name is for Mr. Gunar Penikis who, with Mr. Alan Kulan, discovered the phosphate occurrence in the northeastern part of the Yukon. **J.A.M.**

### Platarsite*

L. J. Cabri, J. H. G. Laflamme, and J. M. Stewart (1977) Platinum-group minerals from Onverwacht. II. Platarsite, a new sulfarsenide of platinum. *Can. Mineral., 15,* 385–388.

The mineral occurs with Pt–Fe–Cu–Ni alloys, genkinite, sperry-

lite, bornite, stibiopalladinite, ruthenarsenite, mertieite II, some unidentified minerals, and chromite in coarse-grained, dark greenish-brown silicates from the Onverwacht No. 330 deposit, Lydenburg district, Transvaal. Platarsite is gray in polished section, isotropic. It occurs as subhedral grains up to 1.1 mm on an edge. Reflectance measurements (average for two grains; another grain gave higher values) are (in percent): 51.3 (470 nm), 49.7 (546 nm), 49.4 (589 nm), and 49.2 (650nm). It is relatively hard: $VHN_{50} = 1486$, $VHN_{100} = 1402$ (another grain gave $VHN_{100} = 1246$). G. meas 8.0, calc for the empirical formula given for grain 1 8.375 (the abstractor gets 8.414 for grain 1, 8.875 for grain 3, JAM).

Platarsite is cubic, space group $Pa3$ with $a = 5.790$ (grain 1) and 5.824A (grain 3), $Z = 4$. The strongest X-ray lines (Cu$K\alpha$ for grain 1) are: 3.345(8)(111), 2.896(9)(200), 2.047(6)(220), 1.746(10)(311), 1.114(7)(333).

Four electron microprobe analyses are given; those for grains 1 and 3 are respectively: Pt 26.9, 31.4; Rh 12.8, 10.3; Ru 11.4, 8.5, Ir 3.6, 6.1; Os 0.58, 0.10; As 31.7, 33.6; S 13.0, 10.0; total 99.98, 100.00 percent. These give the following empirical formulas (based on 3 atoms): grain 1, $(Pt_{0.34}Rh_{0.30}Ru_{0.28}Ir_{0.05}Os_{0.01})As_{1.03}S_{0.99}$, and grain 3,$(Pt_{0.43}Rh_{0.27}Ru_{0.22}Ir_{0.08}Os_{0.01})As_{1.18}S_{0.82}$. The ideal formula is PtAsS, and type material is the rhodian and ruthenian variety.

The name is for the composition. Type material is in the Royal Ontario Museum (Toronto), Smithsonian Institution (Washington), Mineralogical Museum of the Academy of Sciences (Moscow), and Pinch Mineralogical Museum (Rochester). **J.A.M.**

### Satterlyite*

J. A. Mandarino, B. D. Sturman and M. I. Corlett (1978) Satterlyite, a new hydroxyl-bearing ferrous phosphate from the Big Fish River area, Yukon Territory. *Can. Mineral., 16,* 411–413.

Satterlyite is transparent, pale yellow to pale brown, streak pale yellow, luster vitreous, H 4½ to 5, no cleavage, and does not fluoresce under ultraviolet light; G meas = 3.68(5), calc = 3.60. It occurs as grains up to $1 \times 1 \times 40$mm elongate parallel to [0001] in radiating aggregates in nodules. The nodules (up to 10cm in diameter) are found in shales along the Big Fish River in northeastern Yukon Territory (68°30'N, 136°30'W). Associated minerals are quartz, pyrite, wolfeite, and maricite. Satterlyite is uniaxial (−), $\omega = 1.721$, $\epsilon = 1.719$; dichroic in thick grains with $O$ pale yellow, $E$ brownish-yellow, absorption $E > O$.

Single-crystal X-ray study shows that the mineral is hexagonal with possible space groups $P\bar{3}1m$, $P31m$, and $P312$. Cell parameters are: $a = 11.36$, $c = 5.033A$ ($a$ and $c$ refined from the X-ray powder data are 11.361 and 5.041 A, respectively); $Z = 6$. The strongest X-ray lines (Cu$K\alpha$) are: 4.49(50)($10\bar{1}1$), 3.520(70)($20\bar{2}1$), 2.990(40)($21\bar{3}1$), 2.840(80)($22\bar{4}0$), 2.473(100)($22\bar{4}1$), 1.886(40)($22\bar{4}2$), 1.640(40)($60\bar{6}0$) and 1.447(60)($51\bar{6}2$, $22\bar{4}3$).

Analytical data were obtained by electron microprobe analysis (with $H_2O$ by the Penfield method). Total Fe from the microprobe analyses was recalculated as FeO and $Fe_2O_3$ on the basis of a ferrous to ferric ratio of 6.42 to 1.00 determined by wet-chemical means. The average of five analyses (range in brackets) gave: $Na_2O$ 1.5 (1.2–1.6), MgO 7.1 (7.0–7.5), MnO 1.3(1.2–1.7), FeO 43.1 (42.7–43.8), $Fe_2O_3$ 7.5 (7.4–7.6), $SiO_2$ 0.2 (0.0–0.2), $P_2O_5$ 34.8 (34.1–35.3), total 100.7 (100.0–101.3)%. These data give an empirical formula (based on five oxygen ions) of $(Fe^{2+}_{1.21}Mg_{0.36}Fe^{3+}_{0.19}H_{0.16}$ $Na_{0.10}Mn_{0.04})P_{0.99}Si_{0.01}O_{4.00}$ or, ideally, $(Fe^{2+}_{1.17}Mg_{0.35}Fe^{3+}_{0.18}H_{0.16}Na_{0.10}$ $Mn_{0.04})PO_4(OH)$.

Satterlyite is a hexagonal polymorph of wolfeite. DTA curves of the two minerals show no evidence of inversion. Weight loss in

satterlyite began at about 531° and continued to about 603°, after which a weight gain began and continued to about 943°C. The DTA curve shows broad exothermic peaks at 527° and 782° and an endothermic peak at 957°C.

The name is in honor of Dr. Jack Satterly, long-time geologist with the Ontario Department of Mines and, since 1971, a Research Associate in the Department of Mineralogy and Geology, Royal Ontario Museum. Type material (grams) is preserved in the Royal Ontario Museum, Toronto. **J.A.M.**

### Synchysite-(Nd)

Zoran Maksimovic and Gyorgy Panto (1978) Minerals of the rare-earth elements in karstic bauxites: synchysite-(Nd), a new mineral from the Grebnik deposit. *Proc. 4th Int. Congr. for the Study of Bauxites, Alumina, and Aluminum,* Athens, 13 pp.

In the Grebnik bauxite deposit, Yugoslavia, diaspore and hematite are the principal minerals. Rare earths were found to be concentrated at the bottom of the deposits and in contact with the footwall limestone. Synchysite occurs as micro-cavity fillings, up to 30 microns in diameter. The average of 3 electron microprobe analyses gave $La_2O_3$ 17.9, $Ce_2O_3$ 3.0, $Pr_2O_3$ 6.8, $Nd_2O_3$ 23.2, $Sm_2O_3$ 4.3, $Gd_2O_3$ 3.8, $Dy_2O_3$ 1.4, $Y_2O_3$ 5.8, CaO 12.6, F 7.0, $CO_2$ (calc) 17.1. total 102.9 − (O = $F_2$)2.9 = 100%. The formula is $Ca_{1.10}$ $(Nd_{0.34}La_{0.27}Y_{0.12}Pr_{0.10}Sm_{0.06}Gd_{0.05}Ce_{0.04}Dy_{0.02})(CO_3)_{1.90}F_{0.90}$. X-ray data could not be obtained.

In the Marmara bauxite deposit, Greece, a similar concentration of the lanthanides occurs but they are in monazite and in bastnaesite-(La) (La 30.1, Ce 27.3, Nd 27.7). **M.F.**

### Tetrakalsilite

Ettore Benedetti, Maurizio de Gennaro and Enrico Franco (1977) First occurrence in nature of tetrakalsilite. *Atti Accad. Naz. Lincei, Cl. Sci. Fi. Mat. Nat., 62,* 835–838 (in Italian).

Tetrakalsilite was described as a new phase [*Am. Mineral., 42,* 286 (1957)]. It has now been found in ejected blocks of the Somma–Vesuvius volcano, associated with augite, nepheline, kalsilite, melilite, and biotite. Analysis gave $SiO_2$ 39.60, $Al_2O_3$ 31.90, $Fe_2O_3$ 0.35, FeO 0.15, MgO 0.11, CaO 0.43, SrO 0.01, BaO 0.12, $Na_2O$ 5.74, $K_2O$ 21.52, $Rb_2O$ 0.07, $H_2O$ 0.12, sum 100.12%, corresponding to $(K_{0.75}Na_{0.25})AlSiO_4$.

The mineral is hexagonal, $P6_3$, $a = 20.513\pm0.008$, $c = 8.553\pm0.003$, $Z = 32$, G calc 2.62, meas 2.59. The strongest X-ray lines (29 given) are 4.277(m)(002), 3.929(s)(401), 3.071(vs)(402), 2.914(m)(430). The mineral is optically uniaxial, neg., $\omega = 1.540$, $\epsilon = 1.535$ (both $\pm0.001$). **M.F.**

### Unnamed calcium carbonate–silicate

M. F. Taner, Jean Bertrand and Halil Sarp (1977) On the presence of a carbonate associated with spurrite, rustumite, and hillebrandite in a limestone–granite contact zone near Ikizdere, eastern Pontides, Turkey. *C. R. Soc. Phys. Hist. Nat. Geneve, 12,* 30–37 (in French).

The mineral, associated with spurrite and rustumite, occurs in a thermally-altered limestone at the contact with granite. Wollastonite, vesuvianite, hillebrandite, calcite, and andradite garnet are also present. The mineral occurs in grains 0.1–0.4 mm. Microprobe analyses (wollastonite and vuagnatite as standards for Ca and Si) gave CaO 61.84, 60.07; $SiO_2$ 5.17, 5.02; $CO_2$ 25.61, 25.52; Cl 3.63–6.72, 3.63–3.72; sums 96.25–99.34, 94.24–97.33, less (O = $Cl_2$)

0.82–1.52, 0.82–1.52 = 95.43–97.82, 93.42–95.81%. These correspond approximately to $Ca_{10}(CO_3)_7(SiO_4)Cl(OH)$ or $Ca_{11}(CO_3)_7(SiO_4)Cl_2(OH)_2$.

Colorless, monoclinic(?), optically biaxial, neg., $\alpha = 1.554$, $\beta = 1.573$, $\gamma = 1.577$ (all $\pm0.001$), $2V = 48°$, dispersion $r < v$, medium, elongation negative. Twinning on {001}, simple and multiple. Cleavage {010} perfect, {001} doubtful. Extinction angles $Z\Lambda a = 13-16°$, $b\Lambda Y = 10-18°$. G 2.65–2.70 (calc from refractive indices).

X-ray powder data are given. The strongest of 27 lines are 11.43(35), 8.36(30), 5.701(30), 3.062(100), 2.909(40), 2.771(35), 2.417(50), 2.230(30), 1.962(40), 1.899(50), 1.837(70). **M.F.**

### Wollastonite—7T

Chiyoko Henmi, Isao Kusachi, Akira Kawahera, and Kittinosuke Henmi (1978) 7T wollastonite from Fuka, Okayama Prefecture. *Mineral. J. (Tokyo), 9,* 169–181.

The mineral was found in a single sample from skarn at Fuka, as an intergrowth with wollastonite-2M (parawollastonite). The lattice constants are $a = 54.3\pm0.3$, $b = 7.30\pm0.03$, $c = 7.08\pm03A$, $\alpha = 90.0$, $\beta = 95.5$, $\gamma = 92.1$ (all $\pm0.2°$). It may be regarded as a mixed layer structure composed of 3 2M and 1 1T. **M.F.**

# NEW DATA
## Arsenopalladinite

L. J. Cabri, A. M. Clark, and T. T. Chen (1977) Arsenopalladinite from Itabira, Brazil, and from the Stillwater Complex, Montana. *Can. Mineral., 15,* 70–73.

Type arsenopalladinite is $Pd_8(As,Sb)_3$ with As:Sb $\simeq 5:1$. It is triclinic with $a = 7.43$, $b = 13.95$, $c = 7.35A$, $\alpha = 92°53'$, $\beta = 119°30'$, $\gamma = 87°51'$, $Z = 6$. Stillwaterite from the Stillwater Complex is hexagonal $Pd_8As_3$, but grains with the composition $Pd_8(As,Sb,Sn)_3$ where As:(Sb + Sn) $\simeq 5:1$ are probably triclinic and must be considered arsenopalladinite. Strongest X-ray lines of type arsenopalladinite (Co radiation, $\lambda = 1.7902A$) are: 2.34(6)($\bar{2}13$), 2.13(10)(003,241), 1.41(4)($\bar{2}64$), 1.24(3)($\bar{5}25$), 1.21(3)($\bar{4}74$)). **J.A.M.**

## Chalcothallite

V. A. Kovalenker, I. P. Laputina, E. I. Semenov, and T. L. Evstigneeva (1978) Potassium-bearing thalcusite from the Ilimaussaq massif and new data on chalcothallite. *Dokl. Akad. Nauk SSSR, 239,* 1203–1206 (in Russian).

Electron microprobe analysis of chalcothallite from Ilimaussaq, Greenland, gave Tl 36.2, Cu 32.7, Fe 3.9, Sb 11.2, S 13.05, total 97.05%, giving the formula $(Cu_{5.15}Fe_{0.70})Tl_{1.80}Sb_{0.92}S_{4.09}$, or $(Cu,Fe)_6Tl_2SbS_4$. The X-ray pattern is indexed on a tetragonal cell with $a = 3.87$, $c = 13.16A$. **M.F.**

## Fersmanite

M. P. Machin (1977) Fersmanite, $(Ca,Na)_4(Ti,Nb)_2Si_2O_{11}(F,OH)_2$: a restudy. *Can. Mineral., 15,* 87–91.

Fersmanite from the Kola Peninsula, USSR has been restudied, and the following new data are presented. On the basis of fourteen electron microprobe analyses carried out on four grains, the following formula is proposed: $(Ca,Na)_4(Ti,Nb)_2Si_2O_{11}(F,OH)_2$; the main substitution is of the type CaTi $\leftrightarrows$ NaNb, but some OH may replace O. Fersmanite is triclinic, space group $P1$ or $P\bar{1}$, $a =$

7.210(1), $b$ = 7.213(2), $c$ = 20.451(3)A, $\alpha$ = 95.15(3)°, $\beta$ = 95.60(2)°, $\gamma$ = 89.04(5)°, $Z$ = 4. Strongest X-ray lines (radiation?) are: 3.058(100($\bar{1}$23,023,0$\bar{2}$4,$\bar{2}$13), 2.815(62)(024,0$\bar{2}$5,$\bar{1}$16), 1.801(51)(numerous), 1.687(45)(numerous), 1.552(40)(numerous), 1.518(55)(numerous). **J.A.M.**

## Mckelveyite

G. Y. Chao, P. R. Mainwaring and J. Baker (1978) Donnayite, $NaCaSr_3Y(CO_3)_6 \cdot 3H_2O$, a new mineral from Mont St. Hilaire, Quebec. *Can. Mineral., 16,* 335–340.

During their study of the new species donnayite, the authors found that it and mckelveyite are isomorphous and probably form a solid solution. The original analysis of mckelveyite has been recalculated, on the basis of $6CO_2$ per formula, to $(Na_{1.29}K_{0.02})(Ca_{0.73}U_{0.17})(BA_{2.72}Sr_{0.17})(Y_{0.70}RE_{0.32})(CO_3)_6 \cdot 3.48H_2O$ which is close to the expected ideal formula, $NaCaBa_3Y(CO_3)_6 \cdot 3H_2O$. **J.A.M.**

## Rustumite

R. A. Howie and V. V. Ilyukhin (1977) Crystal structure of rustumite. *Nature, 269,* 231.

Single-crystal study showed rustumite to be monoclinic, space group $C2/c$, with unit cell as given by Agrell in 1965, $a$ = 7.62, $b$ = 18.55, $c$ = 15.51A, $\beta$ = 104°20'. The structure shows, however, both $Si_2O_7$ and $SiO_4$ groups and one peak requiring Cl for fit, so that the formula becomes $Ca_{10}(Si_2O_7)_2(SiO_4)Cl_2(OH)_2$, $Z$ = 4. **M.F.**