

## NEW MINERAL NAMES\*

MICHAEL FLEISCHER, G. Y. CHAO AND J. A. MANDARINO

### Arsenocrandallite\*

Kurt Walenta (1981) Minerals of the beudantite-crandallite group from the Black Forest: Arsenocrandallite and sulfate-free weilerite. *Schweiz. Mineralog. Petrog. Mitt.*, 61, 23–35 (in German).

Microprobe analysis gave  $\text{As}_2\text{O}_5$  22.9,  $\text{P}_2\text{O}_5$  10.7,  $\text{Al}_2\text{O}_3$  28.7,  $\text{Fe}_2\text{O}_3$  1.2,  $\text{CaO}$  6.9,  $\text{SrO}$  6.0,  $\text{BaO}$  4.3,  $\text{CuO}$  1.8,  $\text{ZnO}$  0.3,  $\text{Bi}_2\text{O}_3$  2.4,  $\text{SiO}_2$  3.2,  $\text{H}_2\text{O}$  (loss on ignition) 11.7, sum 100.1% corresponding to  $(\text{Ca}_{0.61}\text{Sr}_{0.29}\text{Ba}_{0.14}\text{Bi}_{0.05})_{1.09}(\text{Al}_{2.79}\text{Cu}_{0.11}\text{Fe}_{0.07}\text{Zn}_{0.02})_{2.99}(\text{As}_{0.99}\text{P}_{0.75}\text{Si}_{0.26})_{2.00}\text{H}_{6.44}\text{O}_{13.63}$ , or  $(\text{Ca,Sr})\text{Al}_3\text{H}[(\text{As,P})\text{O}_4]_2(\text{OH})_6$ . Spectrographic analysis showed small amounts of Na, K, and Cl. A second sample is nearly free of Ba and P. The mineral is partly dissolved by cold 1:1 HCl or  $\text{HNO}_3$ , dissolved slowly by hot 1:1 HCl.

The strongest X-ray lines (21 given) are 5.84(10 $\bar{1}$ 1,111), 3.55(9)(11 $\bar{2}$ 0,1 $\bar{0}$ 14), 2.99(10d)(02 $\bar{2}$ 1,11 $\bar{2}$ 3,01 $\bar{1}$ 5), 1.919(5)(1 $\bar{2}$ 35,02 $\bar{2}$ 7,0009), 1.769(6)(22 $\bar{4}$ 0,20 $\bar{2}$ 8). Calculated cell constants are: hexagonal setting  $a = 7.08$ ,  $c = 17.27\text{\AA}$ ,  $Z = 3$ ; rhombohedral setting  $a = 7.06\text{\AA}$ ,  $\alpha 60.18^\circ$ ,  $Z = 1$ , the second sample had  $a = 7.06$ ,  $c = 17.22\text{\AA}$ , or  $a = 7.04\text{\AA}$ ,  $\alpha 60.19^\circ$ .

The mineral forms reniform crusts and spherulitic aggregates up to 0.1 mm. Color blue to bluish-green, luster vitreous. No cleavage, fracture conchoidal,  $H \sim 5\frac{1}{2}$ ,  $D$  meas.  $3.25 \pm 0.1$ , calc. 3.30. Isotropic to weakly birefringent,  $n$  (average) =  $1.625 \pm 0.01$ , but rarely down to 1.600 and up to 1.650. Under the microscope may show triangular sectors.

The mineral was found on old dumps in the Neubulach mining district, Black Forest, Germany, associated with brochantite, chalcophyllite, parnauite, arseniosiderite, mansfieldite, and corroded tennantite.

The name is for the composition and relation to crandallite. M.F.

### Burtite\*

P. M. Sonnet (1981) Burtite, calcium hexahydroxostannate, a new mineral from El Hamman, central Morocco. *Can. Mineral.*, 19, 397–401.

The mineral occurs as octahedra (up to 2 mm across) with an earthy, yellow surface caused by alteration to varlamoffite. Burtite is colorless, has a vitreous luster, is very brittle with  $H$  about 3. It is non-fluorescent in ultraviolet light and has a good cubic cleavage.  $D$  meas. 3.28(1), calc. 3.22. Optically, burtite appears to be isotropic with  $n = 1.633$  but thick grains are very weakly birefringent and show uniaxial positive interference figures.

\*Minerals marked with asterisks were approved before publication by the Commission on New Minerals and Mineral Names of the International Mineralogical Association.

Although single-crystal X-ray diffraction study showed no departure from cubic symmetry, the burtite unit cell is considered to be rhombohedral with space group  $R\bar{3}$ ,  $a_{rh} = 8.128\text{\AA}$ ,  $\alpha = 90^\circ$ ,  $Z = 4$  ( $a = 11.49$ ,  $c = 14.08\text{\AA}$  in hexagonal setting). The strongest lines in the X-ray powder diffraction pattern are (in  $\text{\AA}$ , for  $\text{CoK}\alpha$ , indexing is based on the pseudo-cubic cell): 4.06(vs)(200), 1.814(s)(420), 1.657(s)(422), 0.9850(s)(820,644) and 0.9576(s)(822,660).

Electron microprobe analysis (with  $\text{H}_2\text{O}$  calculated to provide the stoichiometric quantity of OH) gave  $\text{SnO}_2$  56.3,  $\text{CaO}$  20.6,  $\text{MgO}$  0.3,  $\text{H}_2\text{O}$  20.2, total 97.4 wt.%. These data give an empirical formula of  $(\text{Ca}_{0.982}\text{Mg}_{0.020})_{\Sigma 1.002}\text{Sn}_{1.000}(\text{OH})_6$  or, ideally,  $\text{CaSn}(\text{OH})_6$ .

Burtite occurs in a garnetite in a tin skarn at 33°31'26" Long., 5°49'50" Lat. on the west bank of the Beht River in central Morocco. Associated minerals are: wickmanite, stokesite, datolite, pectolite, a member of the apophyllite group, varlamoffite, andradite, wollastonite, malayaite, clinopyroxene and loellingite.

The name is for Prof. Donald M. Burt, Arizona State University. Type material is preserved at the Université catholique de Louvain, Louvain-la-Neuve, Belgium. J.A.M.

### Caswellsilverite\*

A. Okada and Klaus Keil, Caswellsilverite (1981)  $\text{NaCrS}_2$ , a new mineral in the Norton County enstatite achondrite. *Meteoritics*, 16, 370–371 (abs.).

Electron microprobe analysis gave S 46.3, Cr 37.4, Ti 0.18, Mn 0.08, Na 15.7, total 99.7%, corresponding to  $\text{NaCrS}_2$ . X-ray study shows it to be trigonal, space group  $R\bar{3}m$ ,  $a = 3.55$ ,  $c = 19.5\text{\AA}$ . (hexagonal setting). The strongest X-ray lines are 6.49(7)(003), 2.60(10)(014), 2.07(8)(017), 1.910(8)(108), 1.779(8)(110), 1.465(6)(204), 1.134(6)(0.1.16).

The mineral occurs in anhedral grains up to 1 mm in size, associated with daubreelite, titanian troilite, alabandite, perryite, and another Na-Cr sulfide. Yellowish-gray to light gray, luster metallic. Pleochroic,  $O$  pale yellow,  $E$  gray in air;  $O$  pale greenish yellow,  $E$  dark gray in oil.

The name is for Caswell Silver, U. S. Geologist. M.F.

### Chromium\*

Yue Suchin, Wang Wenying and Sun Sujing (1981) A new mineral—native chromium. *Kexue Tongbao*, 26, 959–960 (in Chinese).

Analysis gave Cr 98.01, Fe 0.001, Cu 0.366, Zn 1.40, sum 99.78%, corresponding to Cr 98.59, Zn 1.12, Cu 0.28 atomic %. Cu and Zn are probably in substitution for Cr. The material is homogeneous, showing no evidence of exsolution, under reflecting and electron microscopes.

The mineral is white with a yellow tint under reflected light. It is isotropic without internal reflection. Reflectance data are 480 nm, 65.3; 546 nm, 67.9, 589 nm, 68.8, 656 nm, 70.0%.

The mineral occurs in artificial heavy sands of massive ores in the contact zone between ultrabasic rocks and siliceous marble in Sichuan, China. The mineral is finely granular (grain size about 20  $\mu\text{m}$ ), closely associated with another new mineral  $\text{CuZn}_2$  (Cu 32.52, Zn 67.47, sum 99.99%, or  $\text{Cu}_{1.00}\text{Zn}_{2.016}$ ). The mineral  $\text{CuZn}_2$  forms rims around chromium. Other associated minerals are pyrrhotite, pentlandite, chalcopyrite, pyrite, sulfarsenides and platinum group minerals. The name is for the composition. G.Y.C.

#### Gruzdevite\*

E. P. Spiridonov, L. Ya. Krapiva, A. K., Gapeev, V. I. Stepanov, E. Ya. Prushinskaya, and V. Yu. Volgin (1981) Gruzdevite,  $\text{Cu}_6\text{Hg}_3\text{Sb}_4\text{S}_{12}$ , a new mineral from the Chauvai antimony-mercury deposit, Central Asia. Doklady Akad. Nauk SSSR, 261, 971–976 (in Russian).

Electron microprobe analyses by E.P.S. on 6 samples gave (range and average) S 20.29–20.91, 20.44; Sb 25.29–27.22, 26.21; As 0.06–0.57, 0.37; Hg 32.23–33.23, 32.73; Fe trace–0.40, 0.29; Cu 19.26–20.77, 19.99, sum 98.93–101.00, 100.03%. The average corresponds to  $(\text{Cu}_{5.87}\text{Fe}_{0.10})\text{Hg}_{3.04}(\text{Sb}_{4.01}\text{As}_{0.09})\text{S}_{11.89}$ . A complete series exists from gruzdevite to aktashite,  $\text{Cu}_6\text{Hg}_3\text{As}_4\text{S}_{12}$  (58, 562 (1973)). Gruzdevite is isotypic with nowackiite.

X-ray study shows gruzdevite to be rhombohedral,  $a = 13.90_2$ ,  $c = 9.432_2\text{\AA}$ ,  $Z = 3$ ,  $a_{\text{rh}} = 8.609_2\text{\AA}$ ,  $\alpha = 107^\circ 41'$ ,  $Z = 1$ , D calc. 5.88. The strongest X-ray lines (50 given) are 3.16(10)(311,003), 1.929(9)(520,314), 1.645(8)(621,523,315), 1.251(5)(651,911,625,317), 1.113(6)(654,914,318,10.1.2).

In reflected light the mineral resembles aktashite, tetrahedrite, and metacinnabar. Anisotropy weak,  $\Delta R \sim 0.06$ . Reflectances are given at 8 wavelengths,  $R_{\text{max}} = 460$  nm, 33.1; 540 nm, 32.8; 580 nm, 32.7; 660 nm, 31.9%. Microhardness  $295 \pm 5$  kg/sq. mm at 30 g load. Cleavage absent.

The mineral occurs in the Chauvai Sb–Hg deposit, southern Kirgizia, intergrown with well-formed tetrahedral crystals of aktashite, 0.2–4 mm in size, growing on stibnite and cinnabar in quality veinlets. It is associated with fluorite, calcite, barite, metacinnabar, and wurtzite. The aktashite crystals are zoned, with high Sb at the core, no Sb at the periphery.

The name is for V. S. Gruzdev, 1938–1977, Russian mineralogist. Type material is at the Fersman Mineralogical Museum, Acad. Sci. USSR, Moscow. M.F.

#### Ingodite\*, (Grünlingite discredited)

E. N. Zav'yalov and V. D. Begizov (1981) The new bismuth mineral ingodite,  $\text{Bi}_2\text{TeS}$ . Zapiski Vses. Mineralog. Obsh., 110, 594–600 (in Russian). E. N. Zav'yalov and V. D. Begizov (1981) Once again on the problem of grünlingite Zapiski Vses. Mineralog. Obsh., 110, 633–635.

During the study of numerous museum samples labelled "grünlingite", all were found to consist of joseite-A or bismuthinite. A sample from the type locality, Brandy Gill, Cumberland, England, and one the Ingoda deposit, central Transbaikal, also contained a new mineral.

Electron microprobe analyses of 5 samples from the 2 local-0003–004X/82/0708–0855\$00.50

ities gave Bi 68.8–73.3, Pb 0–1.2, Sb 0–0.15, Te 19.3–25.3, S 5.1–6.3, Se 0–0.4, sum 99.1–100.3%, giving the formula above.

X-ray study showed the mineral to be hexagonal, space group  $P\bar{3}m$ ,  $P3m1$ , or  $P321$ ,  $a = 4.248$ ,  $c = 23.22_2\text{\AA}$ ,  $Z = 9$ , D calc. 7.88. Weak lines indicate that the value of  $c$  should be tripled. The strongest X-ray lines (35 given) are 3.11(10)(1.0.T.12), 2.28(6)(1.0.T.24), 2.13(5)(1.120), and 1.942(4)(0.0.0.36).

Ingodite is silver-white, luster metallic, cleavage perfect, non-magnetic, brittle, soft. H on 2 samples 64.6 and 60.9 kg/sq. mm. In reflected light white, birefringence noticeable in air (creamy to grayish-white), moderately anisotropic. Reflectances are given at 15 wave lengths ( $R_g$  and  $R_p$ ): (av. of 2) 460 nm, 55.5, 51.4; 540 nm, 57.7, 52.5; 580 nm, 57.8, 52.4; 660 nm, 56.9, 51.6%.

The name is for the locality. M.F.

#### Kamaishilite\*

Etsuo Uchida and J. T. Iiyama (1981) On kamaishilite,  $\text{Ca}_2\text{Al}_2\text{SiO}_6(\text{OH})_2$ , a new mineral (tetragonal), dimorphous with bicchulite, from the Kamaishi Mine, Japan. Proc. Japan Acad., 57B, 239–243.

Microprobe analysis ( $\text{H}_2\text{O}$  by wet chemical analysis) gave  $\text{SiO}_2$  20.03,  $\text{Al}_2\text{O}_3$  34.15,  $\text{FeO}$  0.21,  $\text{MgO}$  0.02,  $\text{CaO}$  37.42,  $\text{H}_2\text{O}^+$  6.1,  $\text{H}_2\text{O}^-$  0.2, sum 98.13%, corresponding to  $\text{Ca}_{1.99}\text{Fe}_{0.01}\text{Al}_{2.00}\text{Si}_{0.99}\text{O}_{5.98}(\text{OH})_{2.02}$  or  $\text{Ca}_2\text{Al}_2\text{SiO}_6(\text{OH})_2$ , a dimorph of bicchulite.

X-ray powder data are indexed on a tetragonal cell with  $a = 8.850$ ,  $c = 8.770_2\text{\AA}$ ,  $Z = 4$ . The strongest X-ray lines (28 given) are 3.607(100)(211,112), 2.799(85)(310,301), 2.777(40)(103), 2.547(40)(222), 2.085(30)(330,411), 1.557(35)(404).

The mineral occurs as grains about 0.1 mm in diameter. Colorless and transparent. No cleavage was observed. Optically nearly isotropic,  $n = 1.629$ , close to that of bicchulite. No conoscopic interference figure was observed.

The mineral occurs in vesuvianite skarn, associated with vesuvianite, "hydrograndite", and small amounts of perovskite, calcite, magnetite, and chalcopyrite. It is apparently an alteration product of vesuvianite.

The name is for the Kamaishi mine. M.F.

#### Kyzylkumite\*

I. G. Smyslova, A. I. Komkov, V. V. Pavshukov, and N. V. Kuznetsova (1981) Kyzylkumite,  $\text{V}_2\text{Ti}_3\text{O}_9$ , a new mineral of vanadium and titanium of a group of complex oxides. Zapiski Vses. Mineralog. Obsh., 110, 607–612 (in Russian).

Electron microprobe analysis (by V.V.P.) gave  $\text{TiO}_2$  61.7,  $\text{V}_2\text{O}_5$  36.2,  $\text{Cr}_2\text{O}_3$  1.2,  $\text{Fe}_2\text{O}_3$  0.7, sum 99.8%, corresponding to  $(\text{V}_{1.90}\text{Cr}_{0.01}\text{Fe}_{0.04})\text{Ti}_{3.05}\text{O}_{9.09}$ , or  $\text{V}_2\text{Ti}_3\text{O}_9$ . Titration with  $\text{KMnO}_4$  and with Mohr's salt showed that  $\text{V}^{+4}$  and  $\text{V}^{+5}$  were absent. The mineral is insoluble in acids. The IR absorption spectrum is given. When heated to 320–390°C, the mineral is transformed into rutile.

Laue and oscillation studies showed the mineral to be monoclinic,  $a = 33.80 \pm 0.05$ ,  $b = 4.578 \pm 0.005$ ,  $c = 19.99 \pm 0.03\text{\AA}$ ,  $\beta = 93.40 \pm 0.05^\circ$ ,  $Z = 18$ , D calc. 3.77, meas.  $3.75 \pm 0.1$ . The strongest X-ray lines (23 given) are 3.70(80)(511), 2.92(100)(713), 2.60(50)(715), 2.192(48)(018), 1.692(50)(12.2.4), 1.682(65)(028). The mineral is therefore a dimorph of schreyerite (63, 1182 (1978)).

The mineral is black, luster vitreous to resinous, opaque. Reflectances,  $R_g$  and  $R_p$  are given at 12 wave lengths: 480 nm, 15.7, 14.5; 540 nm, 16.05, 14.7; 580 nm, 16.2, 14.85; 640 nm, 16.5, 15.2%. Birefringence not noticeable visibly, anisotropy distinct, without color tints.

The mineral was found in fine veins cutting siliceous schists in "a deposit of Central Asia", associated with chlorite, pyrite, and rutile. Grains are 0.01–0.2 mm long and have prismatic habit, sometimes with pyramidal terminations and striations along the elongation. The name is for the locality (Kyzyl-Kum) (Uzbekistan). M.F.

#### Mcnearite\*

Halil Sarp, Jacques Deferne, and B. W. Liebich (1981) Mcnearite,  $\text{NaCa}_5\text{H}_4(\text{AsO}_4)_5 \cdot 4\text{H}_2\text{O}$ , a new hydrous arsenate of calcium and sodium. *Schweiz. Mineral. Petrog. Mitt.*, 61, 1–6 (in French).

Analysis by atomic absorption ( $\text{H}_2\text{O}$  by thermogravimetry) gave  $\text{As}_2\text{O}_5$  60.59, 57.80;  $\text{CaO}$  25.27, 26.16;  $\text{Na}_2\text{O}$  3.40, 3.40,  $\text{H}_2\text{O}$  11.32, 11.32, sum 100.58, 100.68, giving  $\text{Na}_{1.09}\text{Ca}_{4.99}\text{H}_{3.91}(\text{AsO}_4)_5 \cdot 4.32\text{H}_2\text{O}$ . Dissolved by acids.

Precession and Weissenberg photographs showed the mineral to be triclinic,  $P1$  or  $P\bar{1}$ ,  $a = 13.50$ ,  $b = 14.10$ ,  $c = 6.95 \text{ \AA}$ ,  $\alpha = 90^\circ$ ,  $\beta = 92^\circ$ ,  $\gamma = 119^\circ$ ,  $Z = 2$  D calc. 2.85, meas. 2.60 (difference probably due to fibrous nature). The strongest X-ray lines (37 given) are 12.33(100)(010), 6.94(50)(001), 3.92(60)(300,12 $\bar{1}$ ); 3.122(60)(1 $\bar{2}\bar{2}$ ,12 $\bar{2}$ ).

The mineral occurs as radiating fibers, length up to 1–2 mm. Color white, luster pearly.  $H_c$  could not be measured. Optically biaxial, positive,  $2V + 60^\circ$ ,  $ns \alpha = 1.559$ ,  $\beta = 1.562$ ,  $\gamma = \bar{1}.572$  (calc.),  $Y \wedge c = 6\text{--}22^\circ$ , dispersion rather strong, elongation positive. Cleavage perfect, parallel to the elongation.

Mcnearite was found in specimens from Sainte-Marie-aux-Mines, Vosges, France, associated with picroparmacolite, pharmacolite, guerinite, and haidingerite. The name is for Miss Elizabeth McNear, mineralogist and crystallographer, University of Geneva. Type material is at the Museum of Natural History, Geneva. M.F.

#### Muchuanite

Zhang Rubo, Gong Xiasheng, Zhou Zhendong, Fan Liangming and Shuai Dequan (1981) Muchuanite, a new water-bearing molybdenum sulphide mineral. *Geochimica*, 120–127 (in Chinese with English abstract).

Electron microprobe and chemical analyses gave Mo 54.20, 52.88; S 36.00, 37.34, Fe 2.20, —; Si 0.50, —;  $\text{H}_2\text{O}^+$  5.95, 6.03;  $\text{H}_2\text{O}^-$  1.00, 2.07; sums 99.85, 98.32%, corresponding to  $(\text{Mo}_{1.01}\text{Fe}_{0.07})\text{S}_2 \cdot 0.59\text{H}_2\text{O}$  and  $\text{Mo}_{0.95}\text{S}_2 \cdot 0.58\text{H}_2\text{O}$ , or ideally  $\text{MoS}_2 \cdot 0.5\text{H}_2\text{O}$ . Electron microprobe analysis shows the presence of 0.26% Re and a homogeneous distribution of Mo. Infra-red analysis shows a distinct absorption band at  $3380 \text{ cm}^{-1}$  (OH stretching) and an indistinct band at  $1620 \text{ cm}^{-1}$  (OH bending).

The strongest X-ray lines (25 including  $\beta$ -lines given) are 6.098(10)(007), 2.704(9)(0.0.16), 2.280(8)(1.0.10), 1.579(7)(112), 1.536(6)(0.0.28), 1.362(5)(200), 1.0961(1.1.28), 1.0325(7)(0.0.42), 1.0048(7)(0.1.40,2.1.10). Most lines are broad and diffuse. The indexing was based on a trigonal cell,  $P3m1$ ,  $a = 3.16$ ,  $c = 43.60 \text{ \AA}$ ,  $Z = 7$ , derived from two molybdenite- $2\text{H}_1$  layers and

one 3R layer stacked according to the sequence  $\text{A}_1\text{B}_2\text{A}_1\text{B}_1\text{C}_1\text{A}_1\text{B}_2$ . The mineral is intermediate between molybdenite and jordisite with  $\text{H}_2\text{O}$  molecules between  $\text{MoS}_2$  layers.

DTA curve shows a weak endothermic reaction at  $315^\circ \text{C}$  (dehydration) an exothermic reaction above  $580^\circ \text{C}$  (oxidation of S). Infra-red spectrum shows an absorption band at  $3380 \text{ cm}^{-1}$  (OH stretching) and an indistinct band near  $1620 \text{ cm}^{-1}$ .

The mineral occurs as black flakes (0.05–0.5 mm) with organic matter, minor chlorite and kaolinite in the matrix of a lenticular Middle Jurassic sandstone bed near Muchuan County, Sichuan, China. The flakes are apparently aggregates of fine-grained particles (1 to several  $\mu\text{m}$ ). The mineral is grayish white under reflected light, strongly anisotropic. It is uniaxial negative. Reflectance  $R_g = 26.6\text{--}29.5$ ,  $R_p = 12.3\text{--}14.2\%$ . Color index  $X = 0.3125$ ,  $Y = 0.3754$ ,  $\lambda_d = 568.5 \text{ nm}$ ,  $P_c = 17.6\%$  Dispersion  $v > r$ .  $\text{VHN} = 16\text{--}35 \text{ kg/mm}^2$ , D meas. 5.01, calc. 5.10.

The name is for the locality.

#### Discussion

The mineral is most likely an altered molybdenite- $2\text{H}_1$ , perhaps mixed with jordisite (amorphous  $\text{MoS}_2$ ). All X-ray lines can be indexed on the molybdenite- $2\text{H}_1$  cell except two weak lines at 3.287(1) and 1.442(1) which may be due to impurities in view of its occurrence. The poor crystallinity of the material and the use of a 57.3 mm camera with unfiltered radiation may have contributed to the difficulties in the interpretation of data. The indexing based on the large cell is not as satisfactory as is claimed. A seven-layered structure cannot be reconciled with the space group  $P3m1$ . The  $c$ -dimension derived from  $2c(2\text{H}_1) + c(3\text{R})$  does not allow space for interlayer water molecules. G.Y.C.

#### Nahpoite\*

L. C. Coleman and B. T. Robertson (1981) Nahpoite  $\text{Na}_2\text{HPO}_4$ , a new mineral from the Big Fish River area, Yukon Territory. *Can. Mineral.*, 19, 373–376.

The mineral occurs as a fine-grained white material filling fractures in maricite. The fine-grained nature of nahpoite prevented single-crystal studies as well as precise determination of optical properties. Hardness could not be measured, but the mineral appears to be very soft. It is extremely soluble in water and, to a much lesser extent, in concentrated HCl. Nahpoite grains are elongate with a maximum dimension of 4  $\mu\text{m}$ . Optical-ly, they are length fast with nearly parallel extinction and have minimum and maximum refractive indices of about 1.490 and 1.505.

The X-ray powder diffraction data are essentially the same as those obtained from synthetic  $\text{Na}_2\text{HPO}_4$  (JCPDS PDF No. 10-184). The strongest lines in the pattern for  $\text{CuK}\alpha$  radiation are: 3.97(45)(011,110), 3.84(55)(110), 3.41(25)(020), 2.868(30)(10 $\bar{1}$ ), 2.803(100)(021,120), and 2.720(70)(201,102) all in  $\text{Å}$  (a total of 17 indexed lines are listed down to 1.913 $\text{Å}$ ). The data on PDF Card 10-184 are indexed on a B-centered cell and refinement of the unit cell parameters from the powder data of nahpoite based on this indexing gives:  $a = 9.26(1)$ ,  $b = 6.82(1)$ ,  $c = 5.75(1) \text{ \AA}$ ,  $\beta = 90.3^\circ$ ,  $V = 363.13 \text{ \AA}^3$ ,  $Z = 4$ . The authors give the following refined cell parameters based on a primitive cell:  $a = 5.47(1)$ ,  $b = 6.84(1)$ ,  $c = 5.45(1) \text{ \AA}$ ,  $\beta = 116^\circ 20(5)'$ ,  $V = 182.75 \text{ \AA}^3$ ,  $Z = 2$ . (However, an error must have occurred in these calculations because the  $b$  and  $c$  parameters of the two cells must remain the same and the volume of the primitive cell should be  $\frac{1}{2}$  that of the

centered cell; the abstractor calculated  $a = 5.463$ ,  $b = 6.82$ ,  $c = 5.75$ ,  $\beta = 122.05^\circ$ ,  $V = 181.58\text{\AA}^3$ ,  $Z = 2$ ). The possible space groups for the primitive cell are  $P2_1/m$  or  $P2_1$ .

Chemical analysis (Na by AA spectrometry, P by colorimetry, H<sub>2</sub>O calculated to produce neutrality) gave: Na<sub>2</sub>O 43.67, P<sub>2</sub>O<sub>5</sub> 49.54, H<sub>2</sub>O 6.32, total 99.53 wt.%. These data compare to Na<sub>2</sub>O 43.66, P<sub>2</sub>O<sub>5</sub> 49.99, H<sub>2</sub>O 6.35 wt.% for stoichiometric Na<sub>2</sub>HPO<sub>4</sub>. (The analysis yields an empirical formula, based on four oxygen ions, of Na<sub>2.013</sub>H<sub>1.002</sub>P<sub>0.997</sub>O<sub>4.000</sub>; J.A.M.). (The D calc. from the cell parameters and the empirical formula is 2.600. J.A.M.).

In addition to maričite from which it appears to have formed, nahpoite occurs with another sodium phosphate which gave an X-ray powder diffraction pattern corresponding to that of Na<sub>2</sub>HPO<sub>4</sub>·7H<sub>2</sub>O (PDF 12-445). However, subsequent attempts to isolate this material yielded only data for nahpoite. Synthetic nahpoite when exposed to air for several weeks takes on water and changes to dorfmanite (Na<sub>2</sub>HPO<sub>4</sub>·2H<sub>2</sub>O). The natural compound, under the same conditions, remained unchanged. Nahpoite was found in four maričite nodules in the Big Fish River area, Yukon.

The name is for the composition. Type material is preserved in the Department of Geological Sciences, University of Saskatchewan, Saskatoon, Saskatchewan. J.A.M.

#### Namibite\*

Oleg v. Knorring and Th. G. Sahema (1981) Namibite, a new copper-bismuth-vanadium mineral from Namibia. Schweiz. Mineralog. Petrog. Mitt., 61, 7-12, (in English).

Microprobe analyses gave (8 determinations range and av.): Cu 10.0-10.4, 10.2; Bi 65.8-67.0, 66.5; V 8.0-8.2, 8.1, corresponding to Cu<sub>2</sub>O 11.5, Bi<sub>2</sub>O<sub>3</sub> 74.1, V<sub>2</sub>O<sub>5</sub> 14.5, sum 100.1%, CuBi<sub>2</sub>O<sub>6</sub>. The mineral is easily soluble in cold dilute acids. The infra-red spectrum showed no H<sub>2</sub>O or OH.

Precession photographs showed namibite to be monoclinic, space group  $C2/m$ ,  $Cm$ , or  $C2$ ,  $a = 11.864 \pm 0.008$ ,  $b = 3.696 \pm 0.004$ ,  $c = 7.491 \pm 0.005\text{\AA}$ ,  $\beta = 109^\circ 42' \pm 0.06$ ,  $Z = 2$ , D calc. 6.76, meas. (Berman balance on 11.9 mg) 6.86  $\pm$  0.03. The strongest X-ray lines (23 given) are 5.58(70)(200), 3.574(75)( $\bar{2}$ 02), 3.284(50)( $\bar{1}$ 11), 3.018(100)(111), 2.672(60)( $\bar{4}$ 02).

Color dark green, streak pistachio-green. Microindentation gave hardness 473 (= 4½-5 Mohs). Not fluorescent. Biaxial, negative, 2V moderate for red, very small for blue light. Pleochroic, X yellowish-green, Y pistachio green, Z dark green,  $Z > Y > X$ .  $Z = b$ ,  $X \wedge a \sim 12^\circ$ ,  $ns$  well above 2.10. Cleavage {100} good. Commonly twinned by interpenetration on (011), often polysynthetic.

The mineral occurs as platy crystals up to 2 mm in cavities in drusy quartz veins of a copper occurrence near Khorixas (formerly Welwitschia), NW Namibia. Associated minerals are beyerite, Bi, bismite, bismutite, and oxidized Cu minerals.

The name is for the Namib Desert. Type material is at Leeds University, England, and the University of Helsinki, Finland. M.F.

#### Nastrophite\*

A. P. Khomyakov, M. E. Kazakova, G. N. Popova, and Yu. A. Malinovskii (1981) Nastrophite, Na(Sr,Ba)PO<sub>4</sub>·9H<sub>2</sub>O, a new mineral. Zapiski Vses. Mineralog. Obsh., 110, 604-607, (in Russian).

Analysis by M.E.K. (K, Na, and Ca by flame photometry by G.N.P.) gave P<sub>2</sub>O<sub>5</sub> 19.04, SrO 22.19, BaO 8.17, CaO 0.41, Na<sub>2</sub>O 8.21, K<sub>2</sub>O 40.52, insol. (= inclusions of acicular aegirine) 1.64, H<sub>2</sub>O 40.52, sum 100.23%. Thermal analysis on unground material gave 43.5% for the loss in weight; this is taken as the better determination because the mineral partly dehydrates under natural conditions. This gives (Na<sub>0.982</sub>K<sub>0.004</sub>)(Sr<sub>0.794</sub>Ba<sub>0.198</sub>Ca<sub>0.027</sub>)P<sub>0.995</sub>O<sub>4.000</sub>·8.96H<sub>2</sub>O, or Na(Sr<sub>0.77</sub>Ba<sub>0.20</sub>Ca<sub>0.03</sub>)PO<sub>4</sub>·9H<sub>2</sub>O. The DTA curve shows a sharp endothermic break at about 150°. The mineral dissolves completely in cold 1% HCl. It is partly decomposed by hot water, giving a solution alkaline to phenolphthalein. The infra-red spectrum shows bands characteristic of the phosphate group and H<sub>2</sub>O.

Laue and oscillation photographs show the mineral to be cubic, space group  $P2_13$ ,  $a = 10.559\text{\AA}$ ,  $Z = 4$ , D calc. 2.12, meas. by suspension 2.05. The strongest X-ray lines (96 given) are 5.21(8)(200), 4.67(9)(210), 3.49(5)(221), 2.54(10)(410,322), 1.953(5)(432,520).

Colorless, luster vitreous, fracture conchoidal, H about 2, brittle. The mineral occurs as crystals, mostly 0.2-0.5 but up to 2-3 mm and as deposits of irregular form up to 1 cm in diameter. It occurs on Alluaiv Mt., Lovozero massif, Kola Peninsula in pegmatitic veins and veinlets in cancrinite syenites and on Karnasurt Mt., Lovozero massif, in veinlets cutting nepheline syenites. Associated minerals include cancrinite, aegirine, vuonemite, epistolite, mountainite, villiamite, kogarkoite, and thermanatrite.

The name is for the composition. Type material is at the Fersman Mineralogical Museum, Acad. Sci. USSR, Moscow, and at the Geological Museum, Kola Branch, Acad. Sci. USSR, Apatite. M.F.

#### Nullaginite\*

E. H. Nickel and L. G. Berry (1981) The new mineral nullaginite and additional data on the related minerals rosasite and glaukosphaerite. Can. Mineral., 19, 315-324.

Nullaginite occurs as ovoid to irregular nodules up to 2 mm in diameter and as cross-fiber veinlets. It is bright green with a luster varying from dull (nodules) to silky (veinlets). VHN<sub>20</sub> = 34.4, D meas. 3.528 to 3.606, av. 3.56. Optically, the mineral is biaxial, pale green and weakly pleochroic with slightly greater absorption normal to  $c$  than parallel to it,  $\alpha = 1.67$ ,  $\beta \sim \gamma = 1.78$ , extinction  $X \wedge c = 6^\circ$ ,  $b \sim Y$  or  $Z$ .

The mineral is monoclinic, space group  $P2_1/m$  or  $P2_1$ , cell parameters refined from the powder data are  $a$  9.236(3),  $b$  12.001(6),  $c$  3.091(2) $\text{\AA}$ ,  $\beta$  90.48(7)°,  $Z = 4$ . The strongest lines in the Guinier powder pattern (in  $\text{\AA}$  for CuK $\alpha$ ) are: 7.302(30b)(110), 5.038(30)(120), 4.619(40)(200), 3.660(40)(130,220), 2.579(100)( $\bar{2}$ 01), 2.557(90)(201), 1.545(30)(002) and 1.541(30)(600). These data are similar to those given by rosasite and glaukosphaerite.

Electron microprobe analysis gave: Ni 49.4, Mg 0.56, Cr 0.23, Fe 0.15, Cu 0.07, Si 1.88, OH(calc.)14.44, CO<sub>3</sub>(calc.) 22.70, total 89.43 wt.%. The Si and some of the Ni was attributed to admixed pecoraite. Infrared absorption analyses indicated the presence of OH, CO<sub>3</sub> and H<sub>2</sub>O. On the basis of the chemical data and the crystallographic similarity to rosasite and glaukosphaerite, nullaginite is considered to be, ideally, Ni<sub>2</sub>(OH)<sub>2</sub>CO<sub>3</sub> with some admixed water (13.34 wt.%). D (including admixed H<sub>2</sub>O) 3.660.

Nullaginite occurs with millerite, polydymite, pecoraite, ga-

spéite, otwayite, parkerite, shandite and breithauptite in serpen-  
tized peridotite in the Nullagine district of Western Australia.

The name is for the district.

#### Discussion

Even if the analysis is expressed in oxide form, the actual total  
determined is only 68.43 wt.%. J.A.M.

#### Nyböite

Luciano Ungaretti, D. C. Smith, and Giuseppe Rossi (1981)  
Crystal-chemistry by X-ray structure refinement and electron  
microprobe analysis of a series of sodic-calcic to alkali-  
amphiboles from the Nybö eclogite pod, Norway. *Bull. Mineral.*  
104, 400–412 (in English).

The name nyböite is proposed for the amphibole of ideal  
composition  $\text{NaNa}_2\text{Mg}_3\text{Al}_2(\text{Si}_7\text{Al})\text{O}_{22}(\text{OH})_2$ . Analyses of the  
crystal nearest to this composition by electron microprobe gave  
 $\text{SiO}_2$  53.84, 52.63;  $\text{TiO}_2$  0.16, 0.15;  $\text{Al}_2\text{O}_3$  12.92, 13.87;  $\text{MgO}$  14.21,  
13.12;  $\text{FeO}$  5.03, 5.75;  $\text{MnO}$  0.02, 0.08;  $\text{NiO}$  0.11, 0.11;  $\text{CaO}$  2.33,  
2.75;  $\text{Na}_2\text{O}$  9.26, 8.55;  $\text{K}_2\text{O}$  0.14, 0.11;  $\text{Cl}$  0.01, 0.02, sum 98.03,  
97.14%. This corresponds to  $(\text{Na}_{0.72}\text{K}_{0.02})(\text{Na}_{1.67}\text{Ca}_{0.33})$   
 $(\text{Mg}_{1.82}\text{Fe}_{0.18}^{+2})(\text{Mg}_{0.32}\text{Fe}_{0.24}^{+3}\text{Ti}_{0.02}\text{Al}_{1.43})(\text{Mg}_{0.8}\text{Fe}_{0.2}^{+2})(\text{Si}_{7.24}$   
 $\text{Al}_{0.76})\text{O}_{22}(\text{OH})_2$ .

The unit cell has  $a = 9.665(1)$ ,  $b = 17.752(2)$ ,  $c = 5.303(1)\text{Å}$ ,  
 $\beta = 104.11(1)^\circ$ .

#### Discussion

It is to be regretted that publication of the new name was not  
delayed until the IMA Commission could consider the name.  
M.F.

#### Ogdensburgite\*

P. J. Dunn (1981) Ogdensburgite, a new calcium-zinc-ferric iron  
arsenate from Sterling Hill, New Jersey. *Mineralog. Record*,  
12, 369–370.

Microprobe analyses gave  $\text{As}_2\text{O}_3$  39.2, 37.3;  $\text{Fe}_2\text{O}_3$  1.0, 1.0;  
 $\text{Al}_2\text{O}_3$  1.0, 1.0;  $\text{CaO}$  10.5, 11.1;  $\text{ZnO}$  3.1, 3.1;  $\text{MnO}$  2.1, 2.2;  $\text{MgO}$   
0.5, 0.5,  $\text{SiO}_2$  0.5, 0.5,  $\text{H}_2\text{O}$  (12.4) (by difference), sum 100%. The  
average of these gives  $(\text{Ca}_{2.81}\text{Mn}_{0.45}\text{Zn}_{0.56}\text{Mg}_{0.18})(\text{Fe}_{5.73}^{+3}\text{Al}_{0.29})$   
 $(\text{As}_{4.86}\text{Si}_{0.12}\text{O}_{19.92}(\text{OH})_{11.00} \cdot 4.64\text{H}_2\text{O}$ , or  $\text{Ca}_4\text{Fe}_6^{+3}(\text{AsO}_4)_5$   
 $(\text{OH})_{11} \cdot 5\text{H}_2\text{O}$ . The mineral gave a strong microchemical test for  
 $\text{Fe}^{+3}$  and a very weak one for  $\text{Fe}^{+2}$ .

X-ray powder data are given. The strongest lines (41 given) are  
14.8(100), 7.47(20), 5.70(20), 5.32(20), 4.52(30), 3.284(20),  
2.793(25), 2.734(25), 2.656(30).

The mineral occurs as thin (0.1) mm incrustations of dark  
brownish-red platelets. The true color is bright reddish-orange,  
streak light orange, luster resinous on cleavage surfaces.  $H \sim 2$ ,  
 $D$  2.92. One perfect cleavage. Optically biaxial, positive,  $ns$  (all  
 $\pm 0.005$ ),  $\alpha = 1.765$ ,  $\beta = 1.775$ ,  $\gamma = 1.800$ . Pleochroism moderate  
 $X < Y = Z$ . Not fluorescent in UV radiation.

The mineral occurs with parasymplectite, köttigite, and other  
iron arsenates in the Sterling Hill mine, Ogdensburg, N.J. Type  
material is at the Smithsonian Institution, cotype material in the  
Spex-Gerstmann collection, Franklin, N.J. The name is for the  
locality. M.F.

#### Pääkkonenite

Yu. S. Borodaev, N. N. Mozgova, N. A. Ozerova, N. S.  
Bortnikov, P. Oivanen, and V. Iletuinen (1981), Pääkkonenite,  
 $\text{Sb}_2\text{AsS}_2$ , a new mineral from the Seinäjoki ore region in  
Finland. *Zapiski Vses. Mineral. Obsh.*, 110, 480–487 (in  
Russian).

Five microprobe analyses gave (range and average)  $\text{Sb}$  65.3–  
69.5, 66.9;  $\text{As}$  17.0–18.9, 18.6;  $\text{S}$  15.1–16.2, 15.5, sum 99.1–102.7,  
101.0, the average corresponding to  $\text{Sb}_{2.14}\text{As}_{0.97}\text{S}_{1.89}$ . The phase  
had previously been reported in the system  $\text{Cu-Sb-As-S}$  (*Econ.*  
*Geol.* 72, 1977).

X-ray data are indexed on a monoclinic cell with  $a =$   
 $5.372 \pm 0.007$ ,  $b = 3.975 \pm 0.007$ ,  $c = 11.41 \pm 0.01\text{Å}$ ,  $\beta =$   
 $89.71 \pm 0.15^\circ$ ,  $Z = 2$ ,  $D$  calc. 5.21. The strongest X-ray lines (17  
given) are 3.90(4)(102), 3.13(4)(103), 2.87(10)(004), 2.68(3)(200).

Color dark gray, streak gray with a slight brownish tint, luster  
metallic. Readily scratched by a Cu needle, brittle, one cleavage.  
Fine polysynthetic twinning present.  $H$  66–87, av. 77 kg/sq.mm.  
In reflected light pale gray, strongly anisotropic, birefringence  
weak. Reflectances: 460 nm, 39.8–51.7; 540, 37.2–47.8; 580,  
36.7–46.3; 640, 36.4–45.3. Internal reflections bright red.

The mineral occurs in irregular grains up to 0.4 mm in size in  
the Kalliosalo deposit, associated with arsenopyrite and loellin-  
gite. The name is for the late Vieikko Pääkkönen, who studied ore  
deposits of the region. Type material is at the Fersman Mineral-  
ogical Museum, Acad. Sci. USSR, Moscow. M.F.

#### Palarstanide\*

V. D. Begizov, E. M. Zav'yalov, and E. G. Pavlov (1981)  
Palarstanide,  $\text{Pd}_8(\text{Sn,As})_3$ , a new mineral. *Zapiski Vses. Min-  
eral. Obsh.*, 110, 487–492 (in Russian).

Analyses by electron probe gave  $\text{Pd}$  64.5, 66.5, 65.0, 64.4;  $\text{Pt}$   
5.3, 4.7, 4.9, 4.0;  $\text{Au}$  1.9, 1.9, –, –,  $\text{Cu}$ -, 0.5, –, –,  $\text{Sn}$  14.9, 14.0,  
12.6, 11.3;  $\text{As}$  7.2, 6.9, 7.5, 7.3;  $\text{Pb}$  2.9, 2.2, 5.5, 7.9;  $\text{Sb}$  1.9, 4.2,  
1.0, 0.8;  $\text{Bi}$  0.7, –, 1.6, 1.5; sums 99.3, 100.9, 98.1, 97.2. A general  
formula approximates  $(\text{Pd,Pt,Au,Cu})_8(\text{Sn,As,Pb,Sb,Bi})_3$  or more  
simply  $\text{Pd}_8(\text{Sn,As})_3$ .

X-ray powder study gives a pattern indexed as hexagonal  $a =$   
 $6.784(5)$ ,  $c = 14.80(1)\text{Å}$ . The strongest X-ray lines (31 and 29  
given) are 2.50(4)(114), 2.22(10)(115,210), and 1.986(4)(107).

Palarstanide only occurs as intergrowths in massive cubanite-  
talnakhite and cubanite-chalcopyrite ores of the Talnakh deposit,  
U.S.S.R. It is most often intergrown with minerals such as  
rustenburgite-atokite, Pt-Fe alloy, polarite, sperrylite, majakite,  
"mertieite", and Au–Ag–Cu alloys with an intergrowth size  
range from 0.05 to 1.5 mm. The palarstanide grains usually  
exhibit elongated forms with rectangular, rarely sinuous out-  
lines. Under the binocular, the mineral is steel-gray with a  
metallic luster and it is nonmagnetic. Palarstanide has medium  
hardness, with  $\text{VHN}_{50} = 470(30)$ , and it is brittle. Under  
reflected light palarstanide is grayish-white with a slight rose tint.  
Bireflection in air is barely perceptible but is distinct in oil  
immersion. The mineral is slightly anisotropic, dark gray to  
brownish-gray, and it is optically uniaxial positive. Reflectance  
measurements ( $R_1\%$ ,  $R_2\%$ , nm) gave 45.6, 48.8(430); 48.1, 51.1  
(460); 50.0, 52.4(490); 52.1, 53.5(520); 53.3, 54.7(550); 55.1, 56.4  
(580); 56.7, 57.2(610); 58.5, 59.3(640); 58.7, 60.0(670); and 60.0,  
61.0(700). Palarstanide is negative to conc. and dil. HCl and

H<sub>2</sub>SO<sub>4</sub> but conc. HNO<sub>3</sub> etches in 90 sec. and aqua regia in 30 sec.

The name is for the principal elements. Samples are preserved at the Fersman Mineralogical Museum, Academy of Sciences USSR, and in the Mineralogical Museum of the Moscow Geological-Exploration Institute.

#### Discussion

The characterization of this mineral is ambiguous. One analysis has As > Sn but no data are provided whether that grain has the same structure as those for which Sn > As. In solid solutions of this kind it is essential to clearly demarcate the compositional range and ideal end-member, and, if not possible from natural samples, a certain amount of synthesis is required. The X-ray powder pattern has very few strong lines. L.J.C.

#### Panasqueiraite\*

A. M. Isaacs and D. R. Peacor (1981) Panasqueiraite, a new mineral: the OH-equivalent of isokite. *Can. Mineral.*, 19, 389–392.

Panasqueiraite is a fine grained pink mineral which occurs in aggregates several centimeters in diameter. Individual anhedral grains are about 1 mm in size. It has a poor {010} cleavage, vitreous luster, white streak, H 5. It is non-fluorescent under ultraviolet light, but emits a blue cathodoluminescence in an electron beam at 12 kV. The mineral is biaxial (+), 2V = 51(2)° meas.  $\alpha = 1.590(2)$ ,  $\beta = 1.596(2)$ ,  $\gamma = 1.616(2)$ , nonpleochroic; orientation Z = b, X  $\wedge$  c = +22°. D meas. 3.27(1); calc. 3.22. (Using the cell parameters and empirical formula, D calc. is 3.213, J.A.M.).

Single-crystal X-ray study showed that panasqueiraite is monoclinic, Cc or C2/c,  $a = 6.535(3)$ ,  $b = 8.753(4)$ ,  $c = 6.919(4)$  Å,  $\beta = 112.33(4)^\circ$ , Z = 4 (V = 366.09 Å<sup>3</sup>, J.A.M.). The strongest lines in the diffractometer pattern (in Å for CuK $\alpha$  radiation) are: 3.20(67)(002), 3.02(86)(200), 2.783(31)(20 $\bar{2}$ ), 2.626(100)(130), 2.584(45)(13 $\bar{1}$ ,022), 1.722(33)(24 $\bar{2}$ ,222) and 1.658(3)(330) (a total of 35 indexed spacings down to 1.346 are given). The powder data are essentially identical to those given by isokite and on this basis and the similar chemical compositions, the minerals are considered isostructural.

An electron microprobe analysis gave: CaO 31.0, MnO 0.0, FeO 0.4, MgO 22.9, P<sub>2</sub>O<sub>5</sub> 39.6, F 3.1, OH (calculated assuming P:(OH + F) = 1:1) 6.7, total 103.7, less O = F + OH 4.4, sum 99.3 wt.%. No Cl or As were detected. The empirical formula derived from these data by the abstractor is (Ca<sub>0.99</sub>Fe<sub>0.01</sub>) $\Sigma$ 1.00Mg<sub>1.01</sub>P<sub>1.01</sub>O<sub>4.01</sub>(OH)<sub>0.70</sub>F<sub>0.29</sub>). Ideally, the formula is CaMgPO<sub>4</sub>(OH,F) with OH > F. It is the hydroxyl analogue of isokite, CaMgPO<sub>4</sub>F.

Panasqueiraite occurs with thadeuite fluorapatite, wolfeite, topaz, muscovite, sphalerite, quartz, chalcopyrite, pyrrhotite, siderite, arsenopyrite, chlorite, vivianite and althausite in vein selvages at Panasqueira, Portugal.

The name is for the locality; type material is preserved at the Department of Geological Sciences, University of Michigan and at the Smithsonian Institution.

#### Discussion

While there is no doubt in the abstractor's mind that OH is present, it is unfortunate that H<sub>2</sub>O was not determined. J.A.M.

#### Pehrmanite\*

E. A. J. Burke and W. J. Lustenhouwer (1981) Pehrmanite, a new beryllium mineral from Rosendal pegmatite, Kemiö Island, southwestern Finland. *Can. Mineral.*, 19, 311–314.

Pehrmanite occurs as subhedral hexagonal tabular crystals (up to 250  $\mu$ m across and 40  $\mu$ m thick) and as oriented overgrowths on nigerite. It is light green, has a vitreous luster, is very brittle with VHN<sub>100</sub> = 1700 (Mohs H = 8–8½). D calc. 4.07. Reflectance values are: 8.34% at 470 nm, 8.11(546 nm), 8.01(589 nm), 7.86(650 nm); the mean refractive index calculated from these data is 1.79. The mineral is uniaxial (–) and weakly to distinctly dichroic with O pale greenish and E pale greyish-brown. The birefringence is distinctly higher than that of nigerite.

The X-ray powder diffraction pattern is very similar to that of taaffeite-9R and by analogy to that mineral, pehrmanite is rhombohedral, R $\bar{3}m$ ,  $a = 5.70$ ,  $c = 41.16$  Å Z = 9 ( $a_{rh} = 14.11$ ,  $\alpha = 23.32^\circ$ ). The strongest lines in the X-ray powder diffraction pattern are (in Å for FeK $\alpha$  radiation): 2.856(8)(11 $\bar{2}$ 0), 2.666(4)(1.0. $\bar{1}$ .13), 2.422(10)(11 $\bar{2}$ 9), 2.063(4)(2.0. $\bar{2}$ .11) and 1.426(5)(2240).

Electron microprobe analysis with confirmation of Be by ion probe (BeO given by difference) gave: Al<sub>2</sub>O<sub>3</sub> 64.40, FeO 23.30, MnO 0.30, MgO 1.875, ZnO 5.225, BeO 4.9, total 100.00. Based on 8 oxygen ions, these data give an empirical formula of (Be<sub>0.62</sub>Zn<sub>0.20</sub>Mg<sub>0.15</sub>) $\Sigma$ 0.97(Fe<sub>1.03</sub><sup>2+</sup>Mn<sub>0.01</sub>) $\Sigma$ 1.04Al<sub>3.99</sub>O<sub>8.00</sub> or, ideally, BeFe<sup>2+</sup>Al<sub>4</sub>O<sub>8</sub>. Thus, pehrmanite is the ferrous iron analog of taaffeite and a new member of the högbomite group.

The mineral occurs with quartz, plagioclase (An<sub>5</sub>–An<sub>27</sub>), sillimanite, muscovite, spessartine-almandine, chlorite, biotite, epidote, allanite and calcite in the wall zone of the Rosendal pegmatite, Kemiö Island, southwestern Finland.

The name is for Gunnar Pehrman, Professor Emeritus at the University "Åbo Akademi", Turku, Finland. Type material is at the Free University, Amsterdam, The Netherlands. J.A.M.

#### Philipsbornite\*

Kurt Walenta, Martina Zwiener, and P. J. Dunn (1982) Philipsbornite, a new mineral of the crandallite series from Dundas, Tasmania. *Neues. Jahrb. Mineral., Monatsh.*, 1–5 (in German).

Electron microprobe analysis gave As<sub>2</sub>O<sub>5</sub> 28.6, CrO<sub>3</sub> 6.3, SO<sub>3</sub> 1.3, Al<sub>2</sub>O<sub>3</sub> 22.3, Fe<sub>2</sub>O<sub>3</sub> 0.6, PbO 32.0, ZnO 1.1, CuO 0.9, MnO 0.3, H<sub>2</sub>O 9.4, sum 102.8%, corresponding to (Pb<sub>0.90</sub>Mn<sub>0.03</sub>)(Al<sub>2.76</sub>Zn<sub>0.09</sub>Cu<sub>0.07</sub>Fe<sub>0.05</sub><sup>3+</sup>)(As<sub>1.57</sub>Cr<sub>0.40</sub>S<sub>0.10</sub>)H<sub>6.58</sub>O<sub>14</sub>, or PbAl<sub>3</sub>H(AsO<sub>4</sub>)<sub>2</sub>(OH)<sub>6</sub> or PbAl<sub>3</sub>(AsO<sub>4</sub>)<sub>2</sub>(OH)<sub>5</sub>·H<sub>2</sub>O. The method of determination of H<sub>2</sub>O is not stated.

The strongest X-ray lines (30 given) are 5.82(9)(10 $\bar{1}$ 1), 3.56(8)(11 $\bar{2}$ 0), 3.02(10)(02 $\bar{2}$ 1,11 $\bar{2}$ 3), 2.26(5)(10 $\bar{1}$ 7), 1.931(5)(30 $\bar{3}$ 3). These are indexed on a trigonal cell,  $a_{rh} = 7.01$  Å.,  $\alpha = 60.94^\circ$ , Z = 1; in hexagonal setting  $a = 7.11$ ,  $c = 17.05$  Å., Z = 3. Space group R $\bar{3}m$  or R3m. D calc. 4.33, meas. > 4.1.

The mineral occurs as massive to earthy crusts, composed of fine-grained aggregates, associated with crocoite at the Dundas district, Tasmania. No cleavage, fracture conchoidal. H probably about 4½. Color grayish-green. Optically isotropic,  $n = 1.790 \pm 0.003$ .

The name is for Hellmut von Philipsborn, emeritus professor of mineralogy, University of Bonn. M.F.



**Poyarkovite\***

V. I. Vasil'ev, Yu. G. Lavrent'ev, and N. A. Pal'chik, (1981) Poyarkovite  $\text{Hg}_3\text{ClO}$ , a new natural mercury oxyhalide. *Zapiski Vses. Mineralog. Obsh.*, 110, 501–506 (in Russian).

Microprobe analysis by Y.G.L. gave (av. of 10) Hg 91.30, Cl 5.30, O 2.36, sum 98.36%, corresponding closely to  $\text{Hg}_3\text{ClO}$  or  $\text{HgO} \cdot 2\text{HgCl}$ . The mineral is instantly blackened by KOH, decomposed by  $\text{HNO}_3$ , does not react with HCl. When heated in a closed tube, turns brown, red, then yellow (formation of montroydite) and finally sublimes completely as Hg + calomel.

X-ray study showed it to be monoclinic, space group  $C2/m$ ,  $C2$ ,  $Cm$ ,  $C2/c$ , or  $Cc$ ,  $a = 18.82$ ,  $b = 9.02$ ,  $c = 16.79\text{\AA}$ ,  $\beta = 112^\circ 24'$ ,  $Z = 24$ ,  $D$  calc. 9.88,  $D$  meas. 9.50 (for porous grains) to 9.80 (dense grains). The strongest X-ray lines (48 given) are 3.09(5)(313,514,115), 2.38(10)(132), 2.74(8)(115), 2.60(6)(116), 1.799(6-7)(911). Under the microscope, shows twinning. Polishes well.

Color deep raspberry- to cherry-red, turns darker and finally black on exposure. Streak red, luster vitreous to adamantine. Very brittle, fracture irregular to conchoidal, hardness 173–201, av. 188 kg/sq.mm (=2–2.5 Mohs). In transmitted light poorly translucent, deep red or brownish red,  $n$  above 2.0. Strongly anisotropic, colors varying with orientation, but always including azure to blue. Reflectances (max. and min.). 460 nm, 31.0, 24.5; 546, 28.2, 22.2; 590, 24.3, 20.5; 620, 22.1, 18.5%.

The mineral occurs in the Khaidarkan deposit, in irregular grains and aggregates, usually in close contact with eglestonite and calomel. Also present in the deposit are terlinguaite, montroydite, kuznetsovite, shakhovite, cordierite, native Hg, and hypogene cinnabar and livingstonite.

The name, is for V. E. Poyarkov, "well-known investigator of mercury and antimony deposits". Type material is in the Central Siberian Geological Museum, Siberian Branch, Acad. Sci. USSR. M.F.

**Shuiskite\***

O. K. Ivanov, V. A. Arkhangel'skaya, L. O. Miroshnikova, and T. A. Shilova (1981) Shuiskite, the chromium analogue of pumpellyite, from the Bisersk deposit, Urals. *Zapiski Vses. Mineral. Obsh.*, 110, 508–512 (in Russian).

Analysis by V.A.A. on material separated in heavy liquids and under the binoculars gave  $\text{SiO}_2$  31.42,  $\text{TiO}_2$  0.65,  $\text{Cr}_2\text{O}_3$  19.34,  $\text{Al}_2\text{O}_3$  12.75,  $\text{Fe}_2\text{O}_3$  1.65, FeO none, MnO trace, MgO 5.07, CaO 21.00,  $\text{Na}_2\text{O}$  0.19,  $\text{K}_2\text{O}$  0.22,  $\text{H}_2\text{O}^+$  7.03,  $\text{H}_2\text{O}^-$  0.50, sum 99.82%, corresponding to  $(\text{Ca}_{3.82}\text{K}_{0.05}\text{Na}_{0.06})(\text{Mg}_{1.28}\text{Fe}_{0.21}\text{Al}_{0.51})(\text{Cr}_{2.60}\text{Ti}_{0.08}\text{Al}_{1.39})(\text{Si}_{5.34}\text{Al}_{0.61})\text{O}_{22}(\text{OH})_{4.00} \cdot 1.97\text{H}_2\text{O}$ , or  $\text{Ca}_2(\text{Mg},\text{Al},\text{Fe})(\text{Cr},\text{Al})_2[(\text{Si},\text{Al})\text{O}_4](\text{Si}_2\text{O}_7)(\text{OH})_2 \cdot \text{H}_2\text{O}$ , the Cr analogue of pumpellyite. The DTA curve shows exothermic breaks at 390° and 1000°, and an endothermic break at 830°.

The mineral is monoclinic,  $A2/m$ ,  $a = 8.897$ ,  $b = 5.843$ ,  $c = 19.41\text{\AA}$ ,  $\beta = 98^\circ$ ,  $Z = 4$ ,  $D$  3.24 meas. The strongest X-ray lines (44 given) are 2.90(9)(115,300), 2.73(7)(206), 2.64(5)(311), 2.52(5b)(024), 2.46(5)(117,2.0.10), 1.593(10)(0.0.12), 1.487(8).

Shuiskite is dark brown with a violet tint, luster vitreous, streak light greenish-brown. Optically biaxial, neg.,  $n_s \alpha = 1.725$ – $1.733$ ,  $\beta = 1.762$ – $1.772$ ,  $\gamma = 1.769$ – $1.775$ , birefringence 0.040–0.044,  $2V = -40$ – $50^\circ$ , dispersion strong  $r < v$ , elongation positive, pleochroism strong, violet-blue on  $X$ , yellowish-green on  $Y$ , dark violet on  $Z$ . Elongation positive. Cleavage {001} perfect,  $H = 6$ .

Shuiskite occurs in prismatic and radiating-fibrous aggregates

on the walls of fractures in chromitite, Gorozaov region, Perm province, Urals, commonly associated with uvarovite and rose-colored chlorite, rarely with green chromian titanite.

The name is for V. P. Shuisk, lithologist of the Ural Scientific Center, Sverdlosk. Type material is at the Mineralogical Museum, Acad. Sci. USSR, Moscow, and at the Ural Geol. Museum. M.F.

**Spertiniite\***

J. D. Grice and E. Gaspanini (1981) Spertiniite,  $\text{Cu}(\text{OH})_2$ , a new mineral from the Jeffrey mine, Quebec. *Can. Mineral.*, 19, 337–340.

Spertiniite occurs as discrete botryoidal aggregates (~100  $\mu\text{m}$  in diameter) of minute lath-like crystals. Some aggregates consist of blade-like crystals in radial arrangement. The mineral is blue to blue-green and transparent, has a vitreous lustre. It is soft, shows no cleavage and is non-fluorescent in ultraviolet light.  $D$  meas. 3.93(2), calc. from ideal formula and cell parameters 3.94 (3.946 if the empirical formula is used. J.A.M.). Spertiniite is optically anisotropic with parallel extinction and positive elongation. Pleochroism is strong with  $X$  colorless and  $Z$  dark blue  $\alpha = 1.720(2)$  and  $\gamma > 1.800$ .

The X-ray powder pattern is practically identical to that of synthetic  $\text{Cu}(\text{OH})_2$ . On that basis, spertiniite is orthorhombic, space group  $Cmcm$ ,  $a = 2.951(1)$ ,  $b = 10.592(3)$ ,  $c = 5.257(3)\text{\AA}$ ,  $V = 164.3(2)\text{\AA}^3$ ,  $Z = 4$ . The strongest lines in the Gandolfi powder pattern are (in  $\text{\AA}$  for  $\text{CuK}\alpha$ ): 5.29(80)(020), 3.73(90)(021), 2.63(100)(002), 2.50(60)(111), 2.361(50)(041,022), 2.266(70)(130), 1.718(70)(150,132).

Electron microprobe analyses gave: Cu 66.9, Cl 0.1, OH not determined. The theoretical Cu content of  $\text{Cu}(\text{OH})_2$  is 65.1 wt.%. The ideal formula of spertiniite is  $\text{Cu}(\text{OH})_2$ . (Assuming enough OH to balance charges, the empirical formula is  $\text{Cu}_{1.000}(\text{OH})_{1.997}\text{Cl}_{0.003}$ , J.A.M.).

Spertiniite occurs with atacamite, chalcocite and copper in a rodingite dike composed of diopside, grossular and vesuvianite. The dike cuts the serpentized dunite in the Jeffrey mine open pit, Asbestos, Shipton Township, Richmond Co., Quebec.

The name is for Mr. F. Spertini, Chief Geologist at the Jeffrey mine. Type material is preserved at the National Museum of Natural Sciences, Ottawa. J.A.M.