

NEW MINERAL NAMES*

PETE J. DUNN, GEORGE Y. CHAO, JOEL D. GRICE, JAMES A. FERRAILO, MICHAEL FLEISCHER, ADOLF PABST, AND JANET A. ZILCZER

Aeschynite-(Nd)

Zhang Peishan and Tao Kejie (1982) Aeschynite-(Nd). *Scientia Geologica Sinica*, No. 4, 424-428 (in Chinese with English abstract).

Wet chemical and X-ray fluorescence analyses of six samples were provided. Analyses 3 and 6 correspond to: (3) $[\text{La}_{0.05}\text{Ce}_{0.29}\text{Pr}_{0.06}\text{Nd}_{0.30}\text{Sm}_{0.05}(\text{Eu}, \text{Gd})_{0.04}\text{Dy}_{0.02}\text{Y}_{0.03}\text{Ca}_{0.19}\text{Na}_{0.05}\text{Mg}_{0.04}\text{Th}_{0.02}]_{\Sigma=1.14}(\text{Ti}_{1.00}\text{Nb}_{0.82}\text{Fe}^{3+}_{0.09}\text{Al}_{0.04}\text{Si}_{0.04})_{\Sigma=1.99}(\text{O}_{5.62}\text{OH}_{0.38})$. (6) $(\text{Ce}_{0.16}\text{Pr}_{0.06}\text{Nd}_{0.40}\text{Sm}_{0.10}\text{Eu}_{0.01}\text{Gd}_{0.03}\text{Y}_{0.04}\text{Th}_{0.11}\text{Ca}_{0.05}\text{Mg}_{0.03}\text{Na}_{0.01})_{\Sigma=1.00}(\text{Ti}_{1.29}\text{Nb}_{0.58}\text{Fe}^{3+}_{0.06}\text{Al}_{0.05}\text{Ta}_{0.02})_{\Sigma=2.00}(\text{O}_{5.45}\text{OH}_{0.55})$.

The general formula for the mineral is $(\text{Nd}, \text{Ce}, \text{Ca}, \text{Th})(\text{Ti}, \text{Nb})_2(\text{O}, \text{OH})_6$. The mineral is readily soluble in warm HCl, H_2SO_4 , H_3PO_4 and weakly in HNO_3 .

The mineral is essentially metamict. The X-ray powder pattern of the unheated material gave only one line at 2.03\AA and that of the heated material (800°C) was almost identical to the pattern of aeschynite. The strongest X-ray lines are: 5.45(5), 3.00(9), 2.93(10), 2.64(5), 2.26(5), 1.95(6), 1.69(5), 1.565-1.585(7), 1.52-1.54(6).

The mineral is dark brown, brown, light brown to brownish black with light brown streak, adamantine luster and conchoidal fracture. It is yellowish to reddish orange in thin sections. Properties vary, density (pycnometer) from 4.60 to 5.04g/cm^3 , hardness 5-6, optically from isotropic to biaxial, $2V = 78-82^\circ$, sign uncertain, refractive indices 2.2-2.4, pleochroism weak to distinct, dispersion weak to strong. It is brittle, non-magnetic and radioactive.

The mineral occurs as tabular and prismatic crystals (up to several mm) and as equigranular and radiating clusters in veins in slate and metamorphosed dolomite in the Beiyun-Obo (Bayan Obo) district, Inner Mongolia, China. The associated minerals are aegirine, riebeckite, barite, fluorite, albite and phlogopite. G.Y.C.

Asselbornite*

H. Sarp, J. Bertrand, and J. Deferne (1983) Asselbornite, $(\text{Pb}, \text{Ba})(\text{UO}_2)_6(\text{BiO})_4(\text{As}, \text{P})\text{O}_4 \cdot 12(\text{OH})_{12} \cdot 3\text{H}_2\text{O}$, a new uranium, bismuth, lead and barium hydrous arsenate. *Neues Jahrb. Mineral., Monatsh.*, 417-423.

Microprobe analyses indicated some chemical irregularities and zonation, with UO_3 56.00, Bi_2O_3 33.27, PbO 5.88, BaO 1.84, As_2O_5 6.42, P_2O_5 1.11, sum 104.52%, typical for central portions of the mineral grains, and slight decreases of Pb and increases of Ba toward the exterior of the grains. Thermogravimetric analysis yielded 5.6% H_2O . The proposed empirical formula for the cores of the grains, $\text{Pb}_{0.77}\text{Ba}_{0.35}\text{U}_{5.78}\text{Bi}_{4.18}$

$\text{As}_{1.63}\text{P}_{0.46}\text{O}_{30} \cdot 9.16 \text{H}_2\text{O}$, suggests an ideal formula of $(\text{Pb}, \text{Ba})(\text{UO}_2)_6(\text{BiO})_4(\text{As}, \text{P})\text{O}_4 \cdot 12(\text{OH})_{12} \cdot 3\text{H}_2\text{O}$, with $\text{Pb} > \text{Ba}$ and $\text{As} > \text{P}$. Asselbornite is slowly soluble in dilute HCl.

X-ray examination shows the mineral to be isometric, space group $Im\bar{3}m$, $I432$, $Im\bar{3}$ or $I23$, $a = 15.66\text{\AA}$, $Z = 4$. The strongest X-ray diffractions (26 given) are: 6.39(30)(211), 5.536(40)(220), 4.520(70)(222), 4.185(100)(321), 3.691(60)(330), 3.501(35)(420), 3.196(80)(422), 2.609(40)(600)(442), 1.988(25)(651)(732).

The mineral is found in association with metauranospinite, uranophane and uranosphaerite in quartz gangue from Schneeberg, Saxony, East Germany. It occurs as translucent brown to lemon yellow idiomorphic cubic crystals up to 0.3 mm in size. Luster is greasy to adamantine. $D(\text{calc.})$ is 5.6 to 5.8. Optically isotropic with $n \cong 1.9$; asselbornite is light yellow in thin section.

The name is for Dr. Eric Asselborn, a mineral collector and surgeon from Dijon, France. Type material is preserved in the Department of Mineralogy of the Natural History Museum of Geneva. J.A.Z.

Barentsite*

A. P. Khomyakov, T. A. Kurova, G. N. Nechelyustov, and G. O. Piloyan (1983) Barentsite, $\text{Na}_7\text{AlH}_2(\text{CO}_3)_4\text{F}_4$, a new mineral. *Zapiski Vses. Mineralog. Obshch.*, 112, 474-479 (in Russian).

Microprobe analyses gave Na_2O 43.8-44.3, av. 44.1, Al_2O_3 10.3-10.6, av. 10.5, F 14.0%; microchemical analyses gave H_2O 3.59, CO_2 31.45, total 103.64 ($\text{O} = \text{F}_2$) 5.9-97.74%, corresponding to $\text{Na}_{6.99}\text{Al}_{1.01}\text{F}_{3.62}\text{H}_{1.96}(\text{CO}_3)_{3.51}$. The mineral is slowly decomposed by water, dissolves with effervescence in dilute HCl. When heated it loses 22.1% to 350° , 7.0% 350-450°, 2.1% 450-600°, 11.2% 600-900°C. The infrared spectrum indicates the presence of OH- and CO_3 -groups.

X-ray study shows barentsite to be triclinic, pseudohexagonal, $a = 6.472(2)$, $b = 6.735(2)$, $c = 8.806(2)\text{\AA}$, $\alpha = 92.50^\circ$, $\beta = 97.33^\circ$, $\gamma = 119.32^\circ$, $Z = 1$, $D(\text{calc.})$ is 2.55, $D(\text{meas.})$ is 2.56. The strongest X-ray lines (39 given) are 2.887(84)(003, $2\bar{1}1$); 2.778(100)(200, 103); 2.658(100)($2\bar{2}1$); 2.316(50)(222); 2.169(70)(120, 004); 1.870(42)($3\bar{3}1, 204$).

The mineral occurs as colorless grains up to 3-5 mm, luster vitreous to pearly on the perfect cleavages (001) and (110). Brittle. H 86-172, av. 165 on 1 grain, 100 on another (3, Mohs). Optically biaxial, negative, $2V = 62^\circ$, $n_s \alpha = 1.358$, $\beta = 1.479$, $\gamma = 1.530$ (all ± 0.002), $r < v$ weak. X is near (001), $X \wedge a$ about 45° .

Barentsite was found in a drill core on Mt. Restinyon, NE part of the Khibina alkalic massif, Kola Peninsula, in hydrothermal veinlets in alkalic pegmatites, associated with shortite, albite, natrolite, villiaumite, and natrite.

The name is for Willem Barents (1550-1597), Dutch seafarer, for whom the Barents sea was named.

Type material is at the Fersman Mineralogical Museum, Moscow, and the museum of the Geol. Inst., Kola Branch, Acad. Sci. USSR, Apatite. M.F.

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

Danbaite*

Yue Shuqin, Wang Wenying, Liu Jinding, Sun Shuqiong and Chen Dianfen (1983) A study on danbaite. *Kexue Tongbao*, 22, 1383–1386 (in Chinese).

Electron microprobe analyses using pure Cu and Zn metals as standards gave Cu 33.12, 32.52; Zn 66.70, 67.47; sums 99.82, 99.99%, corresponding to $\text{CuZn}_{1.957}$ and $\text{CuZn}_{2.016}$ respectively, or ideally CuZn_2 . The mineral is compositionally equivalent to γ -brass.

The Gandolfi X-ray diffraction pattern is indexable on the basis of a cubic cell with $a = 7.7615\text{\AA}$. The strongest lines are (14 given) 2.3552(5)(311), 2.1574(4)(320), 2.0803(10)(321), 1.5901(3)(422), 1.3732(4)(440), 1.2256(3)(620), 1.2154(3)(621,540,443), 1.1603(3)(630,642). The cell contains 32 (Cu,Zn) atoms. $D_{\text{calc.}} = 7.36\text{ g/cm}^3$.

The mineral is silver white to grayish white with a strong metallic luster. Cleavage is absent. $\text{VHN}(10\text{g}) = 238\text{ kg/mm}^2$, $\text{VHN}(20\text{g}) = 234\text{--}288\text{ kg/mm}^2$, corresponding to 4.2 on Mohs' scale. Under reflected light the mineral is white with a milky blue tint. It is slightly yellowish when compared with adjacent chromium. The mineral is isotropic. Internal reflection is absent. Reflectances are (nm, R%): 405, 71.3; 436, 71; 482, 71; 526, 68.3; 546, 68.5; 589, 67.9; 644, 66.8; 656, 66.6; 664, 66.6; 700, 65.8. Color values are $R_{\text{vis}} 68.3\%$, $x 0.3364$, $y 0.3261$, $\lambda_d 519\text{ nm}$, $P_c 0.0304$.

The mineral occurs as botryoidal and spherulitic aggregates (0.05–0.2 mm) and as rims around chromium in a platinum-bearing Cu–Ni deposit in a highly altered ultramafic intrusion at Danba, Sichuan, China. The associated minerals are pyrrhotite, pentlandite, chalcopyrite, violarite, cubanite, bornite, sphalerite, galena, linnaeite, magnetite with minor testibiopalladite, sudburyite, sperrylite, omeiite, gold and electrum. The name is for the locality.

Discussion

The mineral is not the natural analogue of γ -brass (Cu_5Zn_8 , $a = 8.860\text{\AA}$, $Z = 4$, Bradley and Gregory, 1931, *Phil. Mag.*, 12, 143) although its composition and electron concentration are well within the range of those for γ -brass. G.Y.C.

Eifelite*

K. Abraham, W. Gebert, O. Mendenbach, W. Schreyer, and G. Hentschel (1983) Eifelite, $\text{KNa}_3\text{Mg}_4\text{Si}_{12}\text{O}_{30}$, a new mineral of the osumilite group with octahedral sodium. *Contrib. Mineral. Petrol.*, 82, 252–258.

Analysis by electron microprobe on two crystals gave SiO_2 71.06, 69.06, TiO_2 0.06, 0.03, Al_2O_3 0.79, 0.57, Cr_2O_3 0.06, 0.00, FeO 0.48, 0.19, MnO 0.46, 0.53, CuO 0.08, 0.16, ZnO 0.34, 0.43, MgO 16.25, 15.47, K_2O 4.18, 4.16, Na_2O 6.48, 8.07, sum 100.24, 98.67%, corresponding respectively to $\text{KNa}_2\text{Mg}_{4.5}\text{Si}_{12}\text{O}_{30}$ and $\text{KNa}_3\text{Mg}_4\text{Si}_{12}\text{O}_{30}$ (ideal). A complete solid solution series exists between eifelite and roedderite, $\text{KNaMg}_5\text{Si}_{12}\text{O}_{30}$, with two Na substituting for one Mg. Eifelite is insoluble in HCl and H_2SO_4 . The mineral belongs to the osumilite group with a milarite-type structure.

X-ray study shows the mineral to be hexagonal, $P6/m2/c2/c$, with $a = 10.137(5)\text{--}10.150(5)$, $c = 14.223(6)\text{\AA}$, $V = 1265.73\text{--}1268.98\text{\AA}^3$, $Z = 2$. The strongest X-ray lines (16 given) are 3.26(10)(211), 3.75(9)(202), 4.43(6)(200), 7.07(5)(002),

5.11(5)(110), 4.14(5)(112). This pattern is essentially identical with roedderite. No cleavage observed.

Eifelite is hexagonal, varying from platy to prismatic, exhibiting dominant forms $\{10\bar{1}0\}$ and $\{0001\}$ with subordinate $\{11\bar{2}0\}$ and occasional $\{10\bar{1}2\}$; this morphology is very similar to roedderite.

The mineral occurs as euhedral crystals up to nearly 1 mm in diameter in vesicles of a contact metamorphosed basement gneiss xenolith (quartz and sanidine) ejected with the leucite tephrite lava of the Bellerberg volcano, about 2 km north of Mayen, eastern Eifel, West Germany. It is associated with pyroxene, amphibole, tridymite, hematite and pseudobrookite. It is colorless, or faintly yellow or green, transparent, luster vitreous, streak white, H not given, $D_{\text{calc.}} 2.67\text{ g/cm}^3$. Optically uniaxial, positive, $n_s \omega = 1.5445, 1.5430$ and $\epsilon = 1.5458, 1.5443$ (all ± 0.0005) for the two crystals studied. Birefringence is slightly lower than that of roedderite, 0.001 compared to 0.003–0.007. However, there is no physical property to distinguish eifelite from roedderite, and only chemical analysis can positively identify the two minerals.

The name is for the Eifel region in which the mineral occurs. Type material is deposited at Institut für Mineralogie, Ruhr University, Bochum, West Germany. J.A.F.

Fluocerite-(La)

M. B. Chistyakova and M. E. Kazakova (1969) Fluocerite from Kazakhstan. *Trudy Mineralog. Muzeya Akad. Nauk SSSR*, 19, 236–238 (in Russian).

Analysis by MEK gave La_2O_3 42.34, Ce_2O_3 33.13, Pr_2O_3 3.68, Nd_2O_3 3.12, Gd_2O_3 0.08, $(\text{Y,Tb,Dy})_2\text{O}_3$ 0.08, ThO_2 1.56, Fe_2O_3 0.14, SmO_3 0.17, CaO 0.54, MgO tr., F 25.27, sum 111.50–(O = F₂) 10.64 = 100.86%. The formula is $(\text{La}_{0.50}\text{Ce}_{0.39}\text{Pr}_{0.04}\text{Nd}_{0.04}\text{Ca}_{0.02}\text{Th}_{0.01})\text{F}_{2.55}\text{O}_{0.22}$. Spectrographic analysis showed Si 0.2, Al 0.05, P 0.05, Mn 0.005%.

X-ray study shows the mineral to be hexagonal, $a = 4.135$, $c = 7.295\text{\AA}$, $a:c = 1:1.764$. The strongest X-ray lines (13 given) are 3.19(10), 2.07(6), 2.01(6), 1.796(5–6), 1.048(7).

The mineral occurs in platy to tabular crystals 0.1–7 cm in diameter. Color pale greenish-yellow, luster vitreous. Cleavage dipyramidal, imperfect, fracture conchoidal. H 390 Kg/sq.mm, D 5.93. Optically uniaxial, neg., $\omega = 1.609$, $\epsilon = 1.603$.

The mineral occurs in hydrothermal quartz veins of granite in central Kazakhstan. M.F.

Jasmundite*

G. Hentschel, L. S. Dent Glasser, and C. K. Lee (1983) Jasmundite, $\text{Ca}_{22}(\text{SiO}_4)_8\text{O}_4\text{S}_2$, a new mineral. *Neues Jahrb. Mineral., Monatsh.*, 337–342.

Microprobe analyses by K. Abraham yielded SiO_2 27.3, Al_2O_3 0.4, total iron as FeO 0.8, MgO 0.9, CaO 67.6, S^{2-} 2.7, sum 99.7%, corresponding to a measured formula, $(\text{Ca}_{21.2}\text{Mg}_{0.4}\text{Fe}_{0.2}\text{Al}_{0.1})_{\Sigma 21.9}\text{Si}_{8.0}\text{O}_{36.5}\text{S}_{1.5}$, quite close to the calculated formula $\text{Ca}_{22}(\text{SiO}_4)_8\text{O}_4\text{S}_2$. This mineral is soluble in dilute HCl with a slight evolution of gas.

X-ray study showed the mineral to be tetragonal, space group $I\bar{4}m2$, $a = 10.461$, $c = 8.813\text{\AA}$, $Z = 1$. The four strongest lines from the powder diffraction pattern are given: 3.242(42)(031), 2.832(100)(222), 2.615(35)(040), 1.849(34)(440).

This mineral is found in metamorphosed limestone inclusions in the basalt of Bellerberg, near Mayen, Eifel, Western Germa-

ny. It occurs both as irregular grains, up to several millimeters in size, poikilolithically intergrown with mayenite, brownmillerite and larnite, or associated with portlandite and ettringite, and, occasionally, as euhedral crystals of isometric habit with dominant {110} and {101} forms. It is dark brown, greenish brown or brownish green with conchoidal fracture and resinous luster. H is about 5, streak white, D (by suspension) 3.03 and D (calc.) 3.23. Optically uniaxial positive, with $\omega = 1.715$, $\epsilon = 1.728$, jasmundite is light brown in thin section.

The mineral is named for Prof. Dr. Karl Jasmund, retired director of the Mineralogical-Petrographic Institute of the University of Cologne. Type material is preserved at the latter institution and in the Department of Chemistry, University of Aberdeen.

Discussion

The structure determination and indexed powder pattern of jasmundite were presented by Dent Glasser and Lee (1981) in *Acta Crystallogr.*, B 37, 803–806. J.A.Z.

Jinshajiangite*

Hong Wenxing and Fu Pingqiu (1982) Jinshajiangite, a new Ba–Mn–Fe–Ti-bearing silicate mineral. *Geochemistry (China)* 1, 458–464 (in English).

Analysis gave SiO₂ 27.10, TiO₂ 15.90, (Zr,Hf)O₂ 0.70, Nb₂O₅ 1.03, Ta₂O₅ 0.07, Fe₂O₃ 1.64, Al₂O₃ 0.36, FeO 19.07, MgO 0.28, MnO 12.93, SrO 0.08, BaO 9.80, RE₂O₃ 0.30, CaO 2.94, Na₂O 3.15, K₂O 2.31, H₂O⁺ 0.33, H₂O⁻ 0.36, F 2.66 = 101.01-(O = F₂)1.12 = 99.89%. This corresponds to (Na_{3.36}K_{1.62})(Ba_{2.11}Ca_{1.73}RE_{0.09}Sr_{0.02})(Fe_{8.77}Mn_{6.02}Mg_{0.23})(Ti_{6.57}Nb_{0.26}Zr_{0.18}Al_{0.12}Ta_{0.01})(Si_{14.90}Al_{0.11})O_{64.17}(F_{4.62}OH_{1.21}) or (Na,K)₅(Ba,Ca)₄(Fe²⁺,Mn)₁₅(Ti,Fe³⁺,Nb,Zr)₈Si₁₅O₆₄(F,OH)₆ (Note—It might also be written (Na,Ca)₅(Ba,K)₄ M.F.) The DTA curve shows a strong endothermic peak at 795° and a wide endothermic peak at 995°. About 3% is lost 825–1000°C. Infrared and Mössbauer spectra are given.

Weissenberg study showed the mineral to be monoclinic, space group *C2/m*, *Cm*, or *C2*, $a = 10.732$, $b = 13.847$, $c = 20.817$ Å, $\beta = 95^\circ 3'$, $Z = 2$, D (calc.) 3.56, (meas.) 3.61. The strongest lines (Fe radiation) (26 given) are 10.2(7)(002), 3.44(10)($\bar{3}$ 11,310, $\bar{2}$ 05,006), 3.15(8)(205), 2.85(7)(241), 2.63(7)(136,243), 2.570(8)(403).

The mineral occurs in an arfvedsonite dike in alkali syenites near the Jinshajiang River, western Sichuan Prov., S.W. China, associated with albite, arfvedsonite, aegirine, pyrochlore, monazite, and chevkinite. It occurs as tabular crystals 20 × 2 to 10 × 1 mm. Color blackish-red, brownish-red, golden-red, luster vitreous. Streak light yellow. Cleavages {010} and {100} perfect, fracture uneven. Vickers hardness 430 kg/sq.mm = ? Mohs. Optically biaxial positive, $n_s \alpha = 1.729$, $\beta = 1.802$, $\gamma = 1.852$, $2V = +72^\circ$, dispersion $r < v$. Pleochroism strong, *X* light golden yellow, *Y* brownish-yellow, *Z* brownish-red, abs. $X = Y > Z$ (MF). Extinction $X \wedge c = 13^\circ$.

The name is for the Jinshajiang River. Type material is at the Institute of Geochemistry, Acad. Sinica, Guiyang, Guizhou Prov., China. M.F.

Molybdofofornacite*

O. Medenbach, K. Abraham and W. Gebert (1983) Molybdofofornacite, a new lead–copper–arsenate–molybdate hydroxide

from Tsumeb, Namibia. *Neues Jahrb. Mineral. Monat.*, 289–295. (in German).

Molybdofofornacite was found in minute lath-like crystals on a diopside specimen from the deep oxidation zone of the Tsumeb mine, Namibia. It is the latest oxidation product in the association which also includes calcite, quartz, “limonite” and duftite. Six microprobe analyses are reported leading to the idealized formula Pb₂CuOH(As,P)O₄(Mo,Cr)O₄ where As > P and Mo > Cr. Molybdofofornacite is the Mo dominant analogue of fornacite. It is monoclinic, space group *P2₁|c*, $a = 8.100(5)$, $b = 5.946(3)$, $c = 17.65(1)$ Å, $\beta = 109.17(5)^\circ$, $Z = 4$, density (calc.) 6.6 g/cm³. The strongest lines in the X-ray powder pattern are: 4.84(5)(012), 3.41(4)(014), 3.32(10)($\bar{2}$ 15), 2.979(6)($\bar{2}$ 14,020), 2.937(4)($\bar{1}$ 06), 2.845(6)(114), 2.753(6)(212,203), and 2.353(5)(220). The mineral is light green, transparent with adamantine luster; the streak is yellow. Fracture is conchoidal, no cleavage and hardness is 2–3 (Mohs). Though optically biaxial, only refractive indices $\alpha = 2.05(2)$ and $\gamma = 2.15(2)$ are given and the optical orientation is given only partially, $Z \parallel b$. Distinct pleochroism is *X* and *Y* pale yellow, *Z* green yellow. A.P.

Oursinite*

M. Deliens and P. Piret (1983) Oursinite (Co_{0.86}Mg_{0.10}Ni_{0.04})O · 2UO₃ · 2SiO₂ · 6H₂O, a new mineral from Shinkolobwe, Zaire. *Bull. Minéral.*, 106, 305–308 (in French).

Seven microprobe analyses gave SiO₂ 13.21, UO₃ 66.71, CoO 6.56, MgO 0.42, NiO 0.30 and H₂O (by difference) 12.80% which corresponds to (Co_{0.78}Mg_{0.09}Ni_{0.04})_{Σ0.91}O · 2.07UO₃ · 1.95H₂O on the basis of 11 oxygens, the ideal formula is given above. DTA on 0.6 mg indicated two H₂O losses between 20–100°C and 260–300°C totalling ~11%.

Single crystal X-ray study showed it to be orthorhombic, space group *Aba2* or *Abam* with $a = 12.74(1)$, $b = 17.55(2)$, $c = 7.050(6)$ Å, $V = 1.576.3$ Å³, $Z = 4$, D calc. = 3.674. The strongest X-ray lines (20 given) are 8.73(100)(020), 7.20(70)(120), 5.16(50)(220), 4.55(35)(211), 4.141(70)(140), 3.528(40)(002), 3.267(30)(022), 2.853(90)(160). The cell resembles that of sklowdovskite.

It occurs as radial aggregates of pale yellow acicular crystals, elongated along *c*, maximum dimensions 1 × 0.02 × 0.02 mm. Optically biaxial negative, $\alpha = 1.624(2)$, $\beta = 1.640(2)$, $\gamma = 1.650(2)$, $2V$ calc. = 76°, $Y = c$. It has parallel extinction and there is a cleavage parallel to the elongate axis.

The mineral occurs in the uranium deposit at Shinkolobwe. It is found on uraninite-bearing samples of brecciated dolomite and it is commonly associated with soddyite, kasolite, schoepite and curite. The name is the French translation of urchin, which the mineral resembles. Type material is at the Royal Museum of Central Africa, Tervuren, Belgium. J.D.G.

Qingheite*

M. Zhesheng, S. Nicheng, and P. Zhizhong (1983) Crystal structure of a new phosphatic mineral—qingheite. *Scientia Sinica (Series B)*, 25, 876–884 (English).

Analysis (method not given) of the new mineral (after deduction of SiO₂, CO₂, H₂O, and normalization from 101.16% to 100%) gave Na₂O 8.75, K₂O 0.04, Li₂O 0.02, CaO 0.94, ZnO 0.23, MnO 23.66, MgO 9.78, FeO 3.95, Fe₂O₃ 2.25, Al₂O₃ 4.54,

Cr₂O₃ 0.04, TiO₂ 0.05, P₂O₅ 45.75%, sum 100.00%, yielding an idealized formula Na₂NaMn₂Mg₂(Al,Fe)₂(PO₄)₆, the Mg analog of wylleite and ferrowylleite.

Crystal structure determination places qingheite in the monoclinic system, space group *P2₁/n*, with *a* = 11.856(3), *b* = 12.411(3), *c* = 6.421(1) Å, *Z* = 2, β = 114.45(2)°. *D* = 3.718 (meas.), 3.61 (Calc.) g/cm³. *H* = 5.3–5.6. No X-ray powder data are given.

Qingheite is jade green. Grains are irregular, occasionally short prismatic or tabular, up to 4 mm. It has a glassy luster, conchoidal fracture and cleavage {010} imperfect. It is brittle and nonmagnetic. Optically biaxial positive, α = 1.6776, β = 1.6836, γ = 1.6913, *2V* = 79°36', showing strong pleochroism, *X* = light yellowish green, *Y* = jade green, *Z* = dark bluish green. Dispersion *r* >> *v*, strong.

Qingheite is found in a muscovite pegmatite at Qinghe County, Altay Prefecture, Uygur Autonomous Region of Xinjiang, The People's Republic of China, situated in the north foldbelt of the East Zunggar eugeosyncline, associated with muscovite, quartz, perthite, microcline, braunite and pyrolusite.

The name is for Qinghe, the locality. J.A.F.

Sayrite*

P. Piret, M. Deliens, J. Piret-Meunier and G. Germain (1983) Sayrite, Pb₂[(UO₂)₅O₆(OH)₂] · 4H₂O, a new mineral; its properties and crystal structure. Bull. Minéral., 106, 299–304 (in French).

Ten microprobe analyses gave PbO 21.82, UO₃ 73.58, H₂O (by difference) 4.60% which corresponds to 1.91 PbO, 5.03 UO₃ · 4.99 H₂O and the structure refinement gives the ideal formula above.

Single-crystal X-ray study showed it to be monoclinic, space group *P2₁/c* with *a* = 10.704(3), *b* = 6.960(2), *c* = 14.533(3) Å, β = 116.81(2)°, *V* = 9.66.3 Å³, *Z* = 2, *D* calc. 6.76. The strongest X-ray lines (27 given) are 7.01(80)(10 $\bar{2}$), 5.67(50)(110), 3.512(90)(20 $\bar{4}$), 3.426(40)(211), 3.113(100)(12 $\bar{2}$.31 $\bar{1}$), 3.052(70)(113), 1.955(50)(402.32 $\bar{6}$). The crystal structure consists of layers of [(UO₂)₅O₆(OH)₂]_n⁴ⁿ⁻ linked by Pb and H₂O.

It occurs as small, yellow-orange to red-orange, prismatic crystals elongated along *b* and flattened on {10 $\bar{2}$ }, maximum size 0.6 × 0.3 × 0.1 mm, a distinct {10 $\bar{2}$ } cleavage. Optically biaxial negative, α not measurable, β ~ 1.94, γ ~ 1.95, *2V* large, *X* ~ *a*, *Y* = *b*, *Z* ~ *c*, dichroic with *Y* pale yellow and *Z* amber.

The mineral occurs in the uranium deposit at Shinkolobwe, Shaba, Zaïre. It is associated with uranophane, becquerelite, masuyite and richetite. The name is in honor of the American crystallographer David Sayre. Type material is at the Royal Museum of Central Africa, Tervaren, Belgium. J.D.G.

Wilhelmvierlingite*

A. Mücke (1983) Wilhelmvierlingite, (Ca,Zn)MnFe³⁺[OH](PO₄)₂2H₂O, a new mineral from Hagendorf/Oberpfalz. Der Aufschluss, 34, 267–274 (in German).

Wilhelmvierlingite is found with rockbridgeite, zwieselite and other secondary phosphates in the pegmatite of Hagendorf, Bavaria. It occurs as very fine-grained radial fibrous aggregates, pale yellow to brownish. Microprobe analysis yielded: Ca 8.5, Zn 2.1, Mn 13.6, Fe 13.3, PO₄ 47.5, H₂O 15.0 (by difference),

sum 100.0 leading to the formula (Ca_{0.85}Zn_{0.13})Mn_{0.99}Fe_{0.98}[OH](PO₄)₂ · 2.33H₂O, hydroxyl having been recognized by its characteristic absorption peaks in the IR spectrum. The formula is idealized in the title. Linescan by microprobe shows that there is reciprocal variation in the Ca and Zn content, whereas the ration of Mn and Fe is nearly constant. Wilhelmvierlingite is the manganese counterpart of segelerite and the X-ray powder diffraction patterns of the two minerals are very similar. The dimensions of the orthorhombic cell, as determined from the powder pattern, are: *a* = 14.80(5), *b* = 18.50(5), *c* = 7.31(2) Å; *Z* = 8, *D* (meas.) 2.58, (calc.) 2.60; the space group is *Pbca*. Strongest lines in the X-ray powder pattern are: 9.34(7)(020), 5.00(6d)(211), 4.67(4)(040), 2.86(10)(440), 2.58(4)(412). The Mohs hardness of wilhelmvierlingite is 4, it is biaxial negative with α = 1.637, β = 1.664, γ = 1.692, *2V* (calc.) 45°. There is perfect (010) cleavage and the pleochroism and optical orientation are given as *X*||*b* light yellow, *Y*||*a* light yellow, *Z*||*c* dark yellow. It is not explained how the cleavage direction or orientation were defined in the absence of goniometric or single-crystal X-ray examination. The name is for Wilhelm Vierling of Weiden, Bavaria, a longtime student of the Hagendorf minerals. A.P.

Unnamed K(Fe,Al)₃Al(Ge,Si,Al)₃O₁₀(Cl,OH)₂

Unnamed BaFe₂Ga(SiO₄)(Si₂O₇)Cl

Z. Johan, E. Oudin and P. Picot (1983) Germanium and gallium analogues of silicates and oxides found in the zinc deposits of central Pyrenees, France; argutite and carboirite, two new mineral species. Tschermarks Min. Petr. Mitt., 31, 97–119 (in French).

K(Fe,Al)₃Al(Ge,Si,Al)₃O₁₀(Cl,OH)₂: Microprobe analyses yielded: GeO₂ 39.80, SiO₂ 3.33, Al₂O₃ 12.30, Ga₂O₃ 0.78, V₂O₃ 0.26, Fe₂O₃ 2.66, FeO 26.36, MnO 0.17, MgO 0.18, ZnO 4.08, Na₂O 0.12, K₂O 2.52, Cl 6.02, H₂O (calc.) 3.40; sum 100.63. This is the Ge-analogue of biotite. It is associated with carboirite crystals.

BaFe₂Ga(SiO₄)(Si₂O₇)Cl: Microprobe analysis yielded: GeO₂ 8.99, SiO₂ 15.84, SnO₂ 0.20, Al₂O₃ 1.21, Ga₂O₃ 20.11, FeO 28.38, MnO 0.30, MgO 0.00, ZnO 2.11, BaO 20.34, Na₂O 0.06, K₂O 0.06, Cl 4.47; sum 101.06, corresponding closely to the ideal formula above. It is found as subhedral, lozenge-shaped grains in sphalerite. J.D.G.

New Data

Derbylite

M. Mellini, P. Orlandi and N. Perchiazzi (1983) Derbylite from Buca della Vena mine, Apuan Alps, Italy. Can. Mineral., 21, 513–516.

The second occurrence of derbylite is reported. Combined microprobe and atomic absorption data, with iron shared between FeO and Fe₂O₃, yielded TiO₂ 40.20, FeO 4.44, Fe₂O₃ 31.83, Sb₂O₃ 19.80, H₂O 1.24, sum 97.51%, corresponding to Fe_{0.45}Fe_{3.50}Ti_{4.44}Sb_{3.66}O_{13.11}(OH), or an idealized crystal-chemical formula Fe_x²⁺Fe_{3-x}³⁺Ti_{4.44}Sb_{3.66}³⁺O₁₃(OH), compared with Fe₃²⁺Ti₄³⁺Sb₃³⁺O₁₃(OH) (Am. Mineral., 62, 396(1977)). The higher charge due to Ti is balanced by substitution of Fe²⁺ for Fe³⁺. This assemblage of oxidation states also occurs in the

associated minerals versiliaite, $\text{Fe}_4^{2+}\text{Fe}_8^{3+}\text{Sb}_{12}^{3+}\text{O}_{32}\text{S}_2$, and apuanite, $\text{Fe}_4^{2+}\text{Fe}_8^{3+}\text{Sb}_{12}^{3+}\text{O}_{48}\text{S}_4$ (Am. Mineral., 64, 1230–1234(1979)).

X-ray study confirms derbylite is monoclinic, space group $P2_1$ or $P2_1/m$, $a = 7.156(2)$, $b = 14.354(4)$, $c = 4.980(1)\text{\AA}$, $\beta = 104.69(2)^\circ$, in good agreement with the previous data. The strongest lines (46 given) are 2.853(100)(131), 2.674(73)($\bar{2}31$), 3.186(43)(140,121), 3.118(33)(220), 2.479(23)($\bar{1}02$), 2.393(23)(060). Observed crystal forms are {100}, {110}, {120}, { $\bar{1}01$ }, {010}, { $\bar{1}02$ }, { $\bar{2}01$ }, { $\bar{1}11$ }, { $\bar{2}11$ } and { $\bar{2}31$ }. Twins on composition plane {153} were observed. In reflected light, derbylite is gray with bluish green reflections. Reflectivities measured at λ values of 470, 546, 586 and 650 nm give R_1 21.7, 19.9, 19.2 and 18.4, and R_2 19.7, 17.9, 17.0 and 16.6% respectively.

Derbylite is associated with versiliaite, apuanite, schafarzikite, bournonite, pyrite and sphalerite within dolomite in the Buca della Vena mine, Apuan Alps, Italy. J.A.F.

Vuonnemite, Epistolite

J. G. Rønnsbo, E. S. Leonardsen, O. V. Petersen and O. Johnsen (1983) Second occurrence of vuonnemite: the Ilimaussaq alkaline intrusion, South West Greenland. Neues Jahrb. Mineral. Monat., 451–460.

Vuonnemite

Vuonnemite (Am. Mineral., 59, 875(1974)) forms bladed aggregates up to several centimeters long associated either with

microcline and natrolite or with sodalite and villiaumite. Microprobe analyses (4 given) yield a formula based on 11 Na atoms: $\text{Na}_5\text{TiNb}_2(\text{Si}_2\text{O}_7)_2 \cdot 2\text{Na}_3\text{PO}_4 \cdot \text{F} \cdot 1.5 \text{O}_2$.

X-ray study, oriented in a manner normal for members of lomonosovite–murmmanite group, yielded a triclinic cell, $a = 5.501(1)$, $b = 7.162(1)$, $c = 14.440(1)\text{\AA}$, $\alpha = 92.63(1)$, $\beta = 95.33(1)$, $\gamma = 90.57(1)^\circ$ $V = 565.81\text{\AA}^3$. $H = 2-3$, D (meas.) = 3.15, D (calc.) = 3.17 g/cm^3 . Strongest lines (82 given) are 4.251(10) ($11\bar{1}$, $\bar{1}11$), 2.8728(10)(005), 2.7681(10)($1\bar{2}2$), 2.7380(10)(200, $\bar{2}01$), 1.7874(126,230,040), 7.152(7)(002,010).

Vuonnemite is light yellow, sometimes with a brownish hue, vitreous luster. Whitish with a light green tint under SW UV light. Vuonnemite is biaxial positive, $\alpha = 1.6360(5)$, $\beta = 1.6544(5)$, $\gamma = 1.6795(5)$, $2V = 86(2)^\circ$ (meas.), 82.3° (calc.). It has perfect {001} cleavage, with two other good cleavages. Orientation is $P \wedge \alpha = 57^\circ$, $P \wedge \beta = 33^\circ$, $P \wedge \gamma = 89^\circ$, where P is normal to {001} cleavage plane, indicating the optic axial plane is far from parallel to {100}, as reported for the Kola material.

Epistolite

A recalculation of the Bøggild and Winther (1899) analysis of epistolite, containing 1.98% F, yields a structural formula of $\text{Na}_5\text{TiNb}_2(\text{Si}_2\text{O}_7)_2 \cdot \text{F} \cdot 1.5 \text{O}_2 \cdot 5\text{H}_2\text{O}$, indicating that vuonnemite and epistolite, the Nb-rich minerals of the lomonosovite–murmmanite group, have 1 Na atom more, 1 Ti+Nb atom less, and 1 F atom per formula unit as compared to the Ti-rich members. J.A.F.

BOOK REVIEWS

ATLAS OF ORE MINERALS. By P. Picot and Z. Johan. Co-published by Bureau de Recherches Géologiques et Minières, Orléans, and Elsevier Scientific Publishing Co., Amsterdam, 1982, 458 p. Translation by J. Guilloux, reviewed by D. H. Watkinson. \$170.25.

This copiously illustrated monograph is a translation of the authors' *Atlas des Minéraux Métalliques* (1977), BRGM Mémoire 90, to which X-ray powder data, a strong-line index, cell dimensions, and descriptions of 17 minerals have been added. For three times the price of the original French edition, still in print in 1982, one gets these slender additions and, of course, the privilege of reading the work in English. The translation is mostly excellent. If you enjoyed the authors' elegant French, you can take pleasure in Mrs. Guilloux's graceful English. Only an occasional technical term (absorbent for absorbing, reflective for reflecting), an unintended "et" or "Mont," and the un-English hyphenation of ordinary words remind us that editors are not omniscient. The format is attractive, the print is easy to read, and the 21 × 21-cm pages yield a book that rests comfortably in the lap.

The book has a 59-page introductory section with chapters on "principles and interest of a metallographic study" (3 pages; Fr. "principe et intérêt," better understood as the concern of a mineragraphic study), the preparation of polished sections (3 pages), equipment for photography, photometry, and hardness testing (3 pages), "practical application of the method" (6 pages on qualitative and quantitative properties determinable in reflected light); "summary and advice for observation" (2 pages of

hints on how to identify an ore mineral); a one-page note on the contents of the mineral descriptions that follow and on the photographic methods used; a list of minerals arranged by color, anisotropic effects, fabric, and some other properties (5 pages); a table of common mineral associations arranged by groups of chemical elements (5 pages; examples of simpler groups are Cu–As–Sn–Mo, Pb–Zn, W–Mn), a short table of white-light reflectance values, a table of maximum reflectance values arranged in the order 540, 420, 600, and 700 nm (5 pages), a table for the qualitative determination of some troublesome sulfides and sulfosalts (2 pages); and a collection of black-and-white photomicrographs illustrating fabric (54 excellent photos, the best in the book). A 40-page index of strong-line powder data, a short bibliography, an index of minerals (page numbers not given; used for cross reference), and a Contents follow the main part of the book.

The main part (352 pages) is a detailed description of 369 ore minerals. The arrangement of minerals preserves the French alphabetical order found in the 1977 edition but accommodates English alphabetical order by cut-in headings. Thus the description of gold (Fr. *or*), sandwiched between the descriptions of oosterboschite and oregonite, can be found from the cut-in entry "GOLD (p. 281)" in the alphabetical order goethite-gold-graphite. Each description includes ideal chemical formula, crystal system, cell dimensions, abbreviated X-ray powder data (from the original literature or from the authors' own work), color (supplemented by polishing characteristics and Mohs hardness), reflectance (qualitative note), anisotropism, texture, associated minerals, occurrences (brief listing, now including occurrences