

NEW MINERAL NAMES*

JOHN L. JAMBOR

CANMET, 555 Booth Street, Ottawa, Ontario K1A 0G1, Canada

ERNST A. J. BURKE

Instituut voor Aardwetenschappen, Vrije Universiteit, De Boelelaan 1085, 1081 HV, Amsterdam, Netherlands

T. SCOTT ERCIT, JOEL D. GRICE

National Museum of Natural Sciences, Ottawa, Ontario K1A 0M8, Canada

Acuminite*

H. Pauly, O.V. Petersen (1987) Acuminite, a new Sr-fluoride from Ivigtut, South Greenland. *Neues Jahrb. Mineral. Mon.*, 502-514.

Wet-chemical analysis gave Li 0.0026, Ca 0.0185, Sr 37.04, Al 11.86, F 33.52, OH (calc. from anion deficit) 6.82, H₂O (calc. assuming 1 H₂O in the formula) 7.80, sum 97.06 wt%, corresponding to Sr_{0.98}Al_{1.02}F_{4.07}(OH)_{0.93}H₂O. The mineral occurs as aggregates of crystals shaped like spear points and about 1 mm long. Dominant forms are {110} and {111}, with {112} rare. Colorless, transparent, H = 3½, perfect {001} cleavage, twinned on (100), $D_{\text{meas}} = 3.295(10)$ g/cm³ (by suspension), nonfluorescent in ultraviolet light. Optically biaxial positive, $\alpha = 1.4507(3)$, $\beta = 1.4528(3)$, $\gamma = 1.4624-1.4627(3)$ for $\lambda = 589$ nm, $2V_{\text{meas}} = 46(2)^\circ$ to $57(2)^\circ$, strong dispersion $r > v$; $X = \mathbf{b}$, $Y \wedge c = 15(1)^\circ$ in the obtuse angle β . The infrared spectrum shows absorption bands characteristic of H₂O and OH, and the thermal analysis gave a weight loss of 11.3 wt% to 500 °C. Single-crystal study indicated monoclinic symmetry, space group $C2/c$ or Cc ; cell dimensions refined from a Guinier pattern (CuK α_1 radiation) are $a = 13.223(1)$, $b = 5.175(1)$, $c = 14.251(1)$ Å, $\beta = 111.61(1)^\circ$, yielding $D_{\text{calc}} = 3.305$ g/cm³ for $Z = 8$. Strongest lines of the powder pattern are 4.7674(100)(110), 4.7058(100)(111), 3.5049(100)(204)(113), 3.3530(100)(311), 3.3104(80)(004), 3.2857(80)(402,312), 2.0748(90)(513), and 2.0319(80)(314).

The new name is derived from the Latin word for spear head (acumen) in allusion to the crystal shape. The new mineral was found in a cavity, 2 × 3 cm, in a sample from the cryolite deposit at Ivigtut, South Greenland. Associated minerals are celestite, fluorite, jarlite, thomsenolite, pachnolite, ralstonite, and gearksutite. Acuminite is polymorphous with tikhonenkovite, which also is monoclinic.

Discussion. The repository for type material is not stated. J.L.J.

Amstallite*

R. Quint (1987) Description and crystal structure of amstallite, CaAl(OH)₂[Al_{0.8}Si_{3.2}O₈(OH)₂]₂·[(H₂O)_{0.8}Cl_{0.2}], a new mineral from Amstall, Austria. *Neues Jahrb. Mineral. Mon.*, 253-262.

Electron-microprobe analysis gave CaO 13.80, Al₂O₃ 22.84, SiO₂ 49.41, Cl 1.75, and an H₂O determination gave 12.40, sum 100.20 wt%, less O = Cl 0.39 wt%, corresponding to Ca_{0.98}Al_{1.78}Si_{3.26}O_{12.80}Cl_{0.20}H_{5.46}, ideally CaAl₂Si₃O₈(OH)₄·H₂O. The mineral occurs typically as colorless, transparent to translucent,

prismatic to acicular crystals that are up to 10 mm long and 0.5 mm in diameter, elongate and striated [001], rhombic to hexagonal in cross section, showing {100} and {110}. Perfect {100} cleavage, conchoidal fracture, vitreous luster, H = 4, $D_{\text{meas}} = 2.40(5)$ g/cm³ (pycnometer), $D_{\text{calc}} = 2.380$ g/cm³ for the ideal formula, and $Z = 4$. Optically biaxial positive, $\alpha = 1.5328(4)$, $\beta = 1.5340(4)$, $\gamma = 1.5378(4)$, $2V_{\text{meas}} = 57(2)^\circ$, $2V_{\text{calc}} = 59^\circ$; weak dispersion, $r < v$; $Z = \mathbf{b}$, $Y \wedge c = \sim 10^\circ$. X-ray structural study indicated monoclinic symmetry, space group $C2/c$, $a = 18.830(2)$, $b = 11.517(2)$, $c = 5.190(1)$ Å, $\beta = 100.86(1)^\circ$. A Guinier powder photograph (CuK α_1 radiation) gave strongest lines of 9.75(100)(110), 5.43(70)(310), 4.714(60)(111), 4.069(40)(311), 3.816(90)(021), 3.603(100)(420), 3.175(60)(511,421), 2.628(40)(331), and 2.122(40)(441).

Amstallite occurs in an open-pit graphite mine at Amstall, Lower Austria. The graphite contains pegmatoidal schlieren of plagioclase, K-feldspar, and quartz in which apatite, rutile, siderite, albite, laumontite, calcite, vivianite, and amstallite were deposited in open fractures. Type specimens are at the Naturhistorisches Museum, Wien, and at the Institut für Mineralogie, Kristallographie und Strukturchemie der Technischen Universität Wien, Austria. J.L.J.

Arsenoflorencite-(Ce)*

E.H. Nickel, J.E. Temperly (1987) Arsenoflorencite-(Ce): a new arsenate mineral from Australia. *Mineral. Mag.*, 51, 605-609.

Electron-microprobe analysis of a crystal from a heavy-mineral concentrate of a stream-sediment sample from the Eyre Peninsula, South Australia, gave Ce₂O₃ 12.97, La₂O₃ 8.62, Pr₂O₃ 3.35, Nd₂O₃ 2.40, Gd₂O₃ 1.38, Sm₂O₃ 0.38, SrO 1.99, Al₂O₃ 28.75, As₂O₃ 27.02, P₂O₅ 4.68, SO₃ 1.21, H₂O (calc. on the basis of OH necessary to maintain charge neutrality) 9.36, sum 102.11 wt%, corresponding to (Ce,La,Pr,Sr,Nd,Gd,Sm)_{1.115}Al_{3.000}(As,P,Al,S)_{2.000}O_{8.000}(OH)_{5.908} assuming 0.2 atoms of Al are present as AlO₄ that substitutes for AsO₄. The simplified formula is (Ce,La)Al₃(AsO₄)₂(OH)₆, the first arsenate-dominant member of the florencite group. The new mineral occurs as euhedral to subhedral scalenohedral crystals and crystal fragments, 0.1 to 0.5 mm in diameter, exhibiting {102} and {101} forms. Grains are creamy white, tan, or colorless, cloudy to clear, brittle, conchoidal fracture, no cleavage, $VHN_{10} = 170$, $D_{\text{meas}} = 4.096$ g/cm³ (suspension in Clerici solution), nonfluorescent in ultraviolet light, not cathodoluminescent under an electron beam. Optically uniaxial positive, $\omega = 1.739$, $\epsilon = 1.745$. Single-crystal X-ray patterns could not be obtained; least-squares refinement of the X-ray powder pattern gave $a = 7.029$, $c = 16.517$ Å; strongest lines of the pattern are 3.513(60)(110), 2.963(100)(113), 2.201(40)(107), 1.905(50)(303), and 1.753(40)(220).

* Before publication, minerals marked with an asterisk were approved by the Commission on New Minerals and Mineral Names of the International Mineralogical Association.

The new mineral has been found in heavy-mineral concentrates from the Eyre Peninsula and Port August (both South Australia), and from a sample taken in an area near the Gulf of Carpentaria, Northern Territory–Queensland border. Mineralogically related associations in the concentrates are florencite-(Ce), alunite, and what may be the La analogue of arsenoflorencite-(Ce). J.L.J.

Cassedanneite*

F. Cesbron, R. Giraud, F. Pillard, J.-F. Poullen (1988) Cassedanneite, a new lead chromate-vanadate from Beresov, Ural. C.R. Acad. Sci. Paris, 306, series II, 125–127 (in French).

Microprobe analysis gave PbO 73.24, CuO 0.61, ZnO 0.65, V₂O₅ 9.90, P₂O₅ 1.56, CrO₃ 12.39, H₂O (by difference) 1.65 wt%, which yields (Pb_{4.92}Zn_{0.12}Cu_{0.11})_{Σ5.15}(VO₄)_{1.63}(PO₄)_{0.33}(CrO₄)_{1.86}·1.37H₂O, ideally Pb₅(VO₄)₂(CrO₄)₂·H₂O. X-ray study shows the mineral to be monoclinic, space group *A2/m*, *A2* or *Am*, unit cell *a* = 7.693(8), *b* = 5.763(6), *c* = 9.795(8) Å, β = 115.93(5)°, *Z* = 1. The strongest lines (14 given) are 4.83(60)(102), 3.22(60)(211), 3.15(100)(102), 2.873(50)(020), 2.123(30)(122.304), 1.908(30)(322)(311).

Cassedanneite occurs as round aggregates of small crystals, platy on {010}, in fractured crocoite associated with embreyite. Cassedanneite and embreyite may form a series. The red-orange plates are hexagonal in outline owing to twinning. *H* about 3.5. *D*_{calc} = 6.52 g/cm³. Reflectance measurements (nm, *R*_{min} %) gave 440,2.88; 460,2.75; 480,2.66; 500,2.58; 520,2.51; 540,2.46; 560,2.41; 580,2.40; 600,2.39; 620,2.37; 640,2.36; 660,2.35; 680,2.33; 700,2.33; 720,2.33; 740,2.36; 760,2.35; 780,2.37.

The name honors Professor J. P. Cassedane, Institute of Geosciences, University of Rio de Janeiro, Brazil. Type material is preserved at École nationale supérieure des Mines de Paris. J.D.G.

Cebaite-(Nd)

Peishan Zhang, Kejie Tao (1986) Bayan Obo Mineralogy. Science Publisher, Beijing, China. 208 p. (in Chinese with English summary).

Chemical analysis gave CaO 0.24, MgO 0.31, SrO 1.88, BaO 40.57, Fe₂O₃ 0.09, Al₂O₃ 1.00, REE₂O₃ 30.81, ThO₂ 0.25, SiO₂ 1.94, CO₂ 19.62, H₂O* 0.54, F 3.60, less O = F 1.51, sum 99.70 wt%. The REE distribution, calculated to 100%, is La 8.7, Ce 38.8, Pr 8.3, Nd 39.2, Sm 3.6, Eu 0.3, Gd 0.8, Dy 0.1, Y 0.2. The results are reported as (Ba_{2.64}Sr_{0.18})_{Σ2.82}[(Ce,Nd,La,Pr,Sm,Gd,Eu,Y,Dy)_{Σ1.87}Ca_{0.04}Mg_{0.08}Th_{0.01}]_{Σ2.00}(CO₃)_{4.46}(F_{1.90}OH_{0.62})_{Σ2.52}, ideally Ba₃(Nd,Ce)₂(CO₃)₅F₂. The mineral is beige, with a vitreous luster. Unstated optical properties and X-ray powder data are reported to be similar to those of cebaite. The mineral occurs in association with fluorite, quartz, sodic pyroxene, sodic amphibole, and barite at the Bayan Obo iron–niobium–rare earth deposit in Inner Mongolia, northern China.

Discussion. As is noted by the authors, the formula ratio of Ce:Nd is 1.02:0.98, and the mineral is not Nd dominant. The mineral was not submitted for IMA approval and should not have been named. J.L.J.

Chaidamuite*

Wanmao Li, Guoying Chen, Zhizhong Peng (1986) Chaidamuite—A new zinc and ferric sulfate mineral. Acta Mineral. Sinica, 6, 109–113 (in Chinese, English summary).

Wet-chemical analysis gave Fe₂O₃ 20.00, FeO 2.09, ZnO 17.00, MnO 0.06, Al₂O₃ 0.12, K₂O 0.01, Na₂O 0.02, SiO₂ 0.15, SO₃ 46.63, H₂O 19.21, sum 99.29 wt%, corresponding to (Zn_{0.85}Fe_{0.12})_{Σ0.97}(Fe_{1.01}Al_{0.01})_{Σ1.02}(SO₄)_{2.05}(OH)_{0.90}·3.87H₂O, ideally ZnFe³⁺(SO₄)₂(OH)·4H₂O. Spectrographic analysis confirmed the absence of significant amounts of Pb, Sn, Cu, and Ag and the presence of 0.05 wt% As. The mineral occurs as disseminated fine grains and as granular aggregates in which crystals are <1 mm in maximum dimension. Crystals are thick tabular [001], short prismatic [001], or pseudocubic; principal forms are {001}, {010}, and {101}. The mineral is brown to yellowish-brown, pale yellow streak, vitreous luster, translucent, *H* = 2.5 to 3, perfect {001} and {100} cleavages, conchoidal fracture, nonfluorescent in ultraviolet light, stable in air and insoluble in water, slightly soluble in dilute HCl. *D*_{meas} = 2.722(2), *D*_{calc} = 2.72 g/cm³ with *Z* = 2. Optically biaxial positive, α = 1.688(1), β = 1.640(1), γ = 1.632(1) for white light, 2*V* = 44(2)°, strong dispersion *r* < *v*, *X* = *b*, *c* ∧ *Y* = 12°, *a* ∧ *Z* = 28°; strong pleochroism with *X* = light yellow to colorless, *Y* = light yellow, *Z* = brownish-yellow. Single-crystal study gave monoclinic symmetry, space group *P2₁/m* or *P2₁*, *a* = 9.759(9), *b* = 7.134(9), *c* = 7.335(11) Å, β = 106.2(1)° calculated from the powder pattern (Fe radiation). Strongest X-ray lines are 9.40(80)(100), 5.03(65)(011), 5.00(80)(101), 3.64(70)(102), 3.57(35)(020), 3.118(100)(211), 3.090(95)(300), and 2.048(40)(222). The infrared curve has principal absorption bands at 3381 and 1237 to 977 cm⁻¹, and subordinate bands at 1645, 653, 625, 604, and 491 cm⁻¹. The DTA curve has strong endothermic peaks at 184, 704, and 798 °C, and weak peaks at 374 and 852 °C.

Chaidamuite occurs in fractures and as networks in the oxidized part of a galena-sphalerite-pyrite deposit at Xitieshan, Chaidamu, Qinhai Province, China. Associated sulfate minerals are coquimbite, copiapite, butlerite, and zincobotryogen. The new mineral, which is named for the locality, is the zinc analogue of guildite CuFe³⁺(SO₄)₂(OH)·4H₂O. The deposit at the type locality contains very little copper, and no copper sulfate minerals are present. Type specimens of chaidamuite are at the Geology and Mineral Resources Museum of the Ministry of Geology, Beijing, and at the Department of Geology, Lanzhou University, Qinhai Province, China. J.L.J.

Delindeite*, lourenswalsite*

D.E. Appleman, H.T. Evans, Jr., G.L. Nord, E.J. Dwornik, C. Milton (1987) Delindeite and lourenswalsite, two new titanosilicates from the Magnet Cove region, Arkansas. Mineral. Mag., 51, 417–425.

The minerals occur in vugs in nepheline syenite in the Diamond Jo quarry in the Magnet Cove area in Hot Springs County, Arkansas. They are weathering products of the titaniferous syenite. Other minerals in the vugs include pyroxenes (diopsidohedenbergite, aegirine-augite, acmite), titanite, pectolite, barite, sphalerite, K-feldspar, and labuntsovite. Delindeite and lourenswalsite occur closely associated with fine platy crystals of barite and pectolite and with small prismatic crystals of labuntsovite. The location of type materials is not given, but it is assumed to be the Smithsonian Institution in Washington.

Delindeite

Electron-microprobe analysis gave SiO₂ 27.10, Al₂O₃ 1.10, Fe₂O₃ 2.54, CaO 0.61, K₂O 1.47, Na₂O 3.79, TiO₂ 23.02, BaO 33.05, H₂O (by difference) 7.32, total 100 wt%; ion-microprobe analysis confirmed the presence of (OH)⁻ and the absence of other ele-

ments with $Z < 9$. The analyses yield the following empirical formula, based on 40(O + OH): $(\text{Na}_{2.16}\text{K}_{0.55})_{22.71}(\text{Ba}_{3.80}\text{Ca}_{0.19})_{23.99}(\text{Ti}_{5.08}\text{Fe}_{0.56}\text{Al}_{0.34})_{25.98}(\text{Si}_{7.96}\text{Al}_{0.04})_{28.00}[\text{O}_{32.83}(\text{H}_2\text{O})_{7.17}]_{240.00}$, or approximately $(\text{Na},\text{K})_{2.7}(\text{Ba},\text{Ca})_4(\text{Ti},\text{Fe},\text{Al})_6\text{Si}_8\text{O}_{26}(\text{OH})_{14}$, with $\text{Na} > \text{K}$, $\text{Ba} \gg \text{Ca}$, and $\text{Ti} \gg \text{Fe} > \text{Al}$. All Fe is assumed to be in the ferric state because of the oxidizing weathering conditions during formation of the mineral. Combined electron-diffraction and X-ray powder (Debye-Scherrer) diffraction studies revealed a monoclinic unit cell, space group $C2/m$ or a corresponding subgroup, $a = 21.617(13)$, $b = 6.816(5)$, $c = 5.383(3)$ Å, $\beta = 94.03(5)^\circ$, $Z = 1$, $D_{\text{calc}} = 3.70(1)$, $D_{\text{meas}} = 3.3(1)$ g/cm³; the calculated value of D is preferred because of the aggregate nature of delindeite flakes. The strongest X-ray diffraction lines (38 listed) are 10.78(100)(200), 3.55(24)(311), 3.083(28)($\bar{6}01$), 2.888(31)(601), 2.806(20)(221), 2.753(16)(221), 2.262(18)(910), 2.206(15)(621). The mineral is a layered titanosaluminosilicate without obvious similarity to any known titanosilicate layer type.

Delindeite occurs as tiny, compact, spherulitic aggregates up to about 1 mm in diameter, which consist of micrometer-sized, lathlike or flakelike crystals. Good {001} cleavage, irregular fracture, brittle. Submicroscopic twinning on (100). The mineral is pinkish gray, translucent with a resinous, pearly luster; H not indicated. Optically biaxial positive, average $n \sim 1.813$, parallel extinction and negative elongation when lying on the cleavage. In the plane of cleavage {001}, $\alpha = 1.790(5)$, $\beta = 1.825(5)$; reliable measurements of γ were impossible, $\gamma_{\text{calc}} = 1.982$; $2V_{\text{obs}} = \text{moderate}$, $2V_{\text{calc}} = 54^\circ$. Pleochroism not observed; dispersion not measured. Calculation of the Gladstone-Dale relationships leads to a compatibility index $[1 - K_p/K_c]$ of 0.0598, "good" to "fair."

The name is for Henry deLinde of Mabelvale, Arkansas, owner of the Diamond Jo quarry and a leading amateur mineralogist who has preserved this unique mineral locality.

Lourenswalsite

Electron-microprobe analysis gave SiO_2 28.20, Al_2O_3 5.37, Fe_2O_3 6.18, MgO 1.57, CaO 0.81, K_2O 5.82, TiO_2 28.73, BaO 11.69, H_2O (by difference) 11.63, total 100 wt%; ion-microprobe analysis confirmed the presence of (OH)⁻ and the absence of other elements with $Z < 9$. The analyses yield the following empirical formula, based on 26(O + OH): $(\text{K}_{1.16}\text{Ba}_{0.72})_{21.88}(\text{Ti}_{3.38}\text{Mg}_{0.37}\text{Ca}_{0.14}\text{Fe}_{0.13})_{24.02}(\text{Si}_{4.41}\text{Al}_{0.99}\text{Fe}_{0.60})_{26.00}[\text{O}_{19.94}(\text{H}_2\text{O})_{6.06}]_{226.00}$, or approximately $(\text{K},\text{Ba})_2(\text{Ti},\text{Mg},\text{Ca},\text{Fe})_4(\text{Si},\text{Al},\text{Fe})_6\text{O}_{14}(\text{OH})_{12}$, with $\text{K} > \text{Ba}$, $\text{Ti} \gg (\text{Mg} + \text{Ca} + \text{Fe})$, $\text{Si} > \text{Al} > \text{Fe}$. All Fe is assumed to be in the ferric state as the mineral was formed under oxidizing weathering conditions.

Combined electron-diffraction and X-ray diffraction (powder and single-crystal methods) studies yielded a hexagonal unit cell, space group unknown, $a = 5.244(3)$, $c = 20.49(3)$ Å, $V = 488.0(8)$ Å³, $Z = 1$, $D_{\text{calc}} = 3.199(5)$, $D_{\text{meas}} = 3.17(2)$ g/cm³. The strongest X-ray diffraction lines (41 listed) are 10.2(20)(002), 4.08(15)(005), 3.93(20)(?), 3.43(15)(006), 2.608(100)(111), 2.564(15)(008), 2.249(16)(201), 1.515(80)(300), and 1.3111(25)(220); certain lines cannot be indexed with the hexagonal unit cell because of the extreme layer disorder and probable mixed layering. The mineral is a layered titanosaluminosilicate without any obvious similarity to any known titanosilicate layer type.

Lourenswalsite occurs as tiny, rosettelike clusters up to about 1 mm in diameter, which consist of fragile, very thin hexagonal flakes a few micrometers on edge. Good {001} cleavage, irregular fracture, brittle. The mineral is silvery gray to light brownish-gray, translucent with pearly luster to dull, H not indicated. Lourenswalsite is biaxial negative, parallel extinction and positive

elongation when viewed lying on the platy cleavage; $\alpha = 1.815(2)$, $\beta \approx \gamma = 1.840(2)$; $2V$ is extremely low, $\sim 0^\circ$. Pleochroism is absent; dispersion not measured. Calculation of the Gladstone-Dale relationships leads to a compatibility index of 0.026, "excellent."

The name is for Dutch-born pharmacologist Dr. Lourens Wals of Turnhout, Belgium, one of the foremost mineral collectors in that country. E.A.J.B.

Gananite*

Longzai Cheng, Zongshao Hu, Shiwei Pan, Rongsheng Huang, Shuliang Guo (1984) Gananite (α -BiF₃), a new bismofluoride mineral from Jiangxi, China. *Yanshi Kuangwu Ji Ceshi*, 3, 119–123 (in Chinese, English abstract).

Electron-microprobe analysis gave Bi 78.98, F 20.40, sum 99.38 wt%, corresponding to BiF_{2.84}, ideally BiF₃. The mineral occurs as brown to black and greenish-black irregular aggregates, 0.076 to 0.15 mm in diameter; resinous to semimetallic luster, dark gray streak, fragments slightly translucent, no cleavage, uneven fracture, brittle, $H = 135$ to 153 kg/mm², nonfluorescent in ultraviolet light, readily soluble in HCl and HNO₃. Strongest lines of the X-ray powder pattern (114.6-mm camera, Fe radiation) are 3.37(100)(111), 2.91(70)(200), 2.272(50)(220 β), 2.057(90)(220), 1.756(80)(311), 1.334(50)(331), and 1.188(50)(422) Å. The powder data are almost identical to those for synthetic α -BiF₃ (cubic, space group $P43m$; PDF card 11–10) and give $a = 5.825(1)$ Å, $D_{\text{calc}} = 8.928$ g/cm³ with $Z = 4$. Gray in reflected light in air, isotropic; reflectance values in nm % in air and (oil) are 407, 11.08(4.21); 435, 12.31(10.07); 546, 12.73(11.08); 591, 12.92(12.63); 621, 12.96(11.37); and 647, 13.27(11.69).

Gananite occurs with bismuth, bismuthinite, pyrite, and chalcopyrite in wolframite-bearing quartz veins in the Laikeng mining district, southern Jiangxi Province (called the Ganan area), central China. Type material is at the National Museum of Geology of Beijing, China. J.L.J.

Gasparite-(Ce)*

S. Graeser, H. Schwander (1987) Gasparite-(Ce) and monazite-(Nd): two new minerals to the monazite group from the Alps. *Schweiz. Mineral. Petrogr. Mitt.*, 67, 103–113.

The mean of nine electron-microprobe analyses gave Ce₂O₃ 28.33, La₂O₃ 12.07, Nd₂O₃ 11.02, Pr₂O₃ 3.89, ThO₂ 1.95, CaO 1.36, SiO₂ 0.64, Al₂O₃ 0.06, SO₃ 0.99, As₂O₃ 39.21, sum 99.52 wt%, corresponding to $(\text{Ce}_{0.47}\text{La}_{0.20}\text{Nd}_{0.18}\text{Pr}_{0.06}\text{Ca}_{0.07}\text{Th}_{0.02})_{21.0}$ $(\text{As}_{0.94}\text{S}_{0.03}\text{Si}_{0.03})_{21.0}\text{O}_4$, ideally CeAsO₄. The mineral occurs as rims to complete pseudomorphs of synchysite crystal aggregates; light brown-red in color, white streak, conchoidal to uneven fracture, $VHN_{50} = 327(5)$, $D_{\text{calc}} = 5.63$ g/cm³ for $Z = 4$. Optically biaxial positive, $\alpha = 1.810(8)$, $\beta = 1.825(8)$, $\gamma = 1.92(1)$, $2V = 40$ – 45° , $X = \mathbf{b}$, $Z \wedge c = 4^\circ$. Single-crystal X-ray study indicated monoclinic symmetry, space group $P2_1/n$; cell dimensions refined from the powder-diffraction pattern are $a = 6.937(3)$, $b = 7.137(4)$, $c = 6.738(6)$ Å, $\beta = 104.69(5)^\circ$; strongest diffraction lines are 3.355(77)(200), 3.156(100)(120), 3.035(34)(210), 2.966(70)(012), 2.709(44)($\bar{2}02$), 2.519(31)($\bar{2}12$, 112), 2.003(45)(212), 1.8113(32)($\bar{3}22$, 222), and 1.7787(34)(132).

Gasparite-(Ce) is associated with rutile, anatase, magnetite, hematite, synchysite-(Ce), chernovite, and cafarsite in fissures

mineralized during Alpine amphibolite-grade metamorphism of metasedimentary rocks at Pizzo Cervandone, a mountain near the border between Italy and Switzerland. Type material is at the Natural History Museum and at the Mineralogical Institute, Basel, Switzerland. J.L.J.

Ludjibaite*

P. Piret, M. Deliens (1988) Description of ludjibaite, a polymorph of pseudomalachite, $\text{Cu}_3(\text{PO}_4)_2(\text{OH})_4$. Bull. Minéral., 111, 167–171 (in French).

Electron-microprobe analysis gave CuO 68.4, P_2O_5 24.3, H_2O (by difference) 7.3, which yields the above ideal formula. X-ray single-crystal and powder-diffraction studies show the mineral to be triclinic, space group $P\bar{1}$, unit cell $a = 4.446(3)$, $b = 5.871(4)$, $c = 8.680(7)$ Å, $\alpha = 103.9(2)$, $\beta = 90.3(2)$, $\gamma = 93.2(2)^\circ$, $Z = 1$. $D_{\text{calc}} = 4.36$ g/cm³. The strongest X-ray lines (46 given) are 4.46(100)(100), 2.462(50)(1 $\bar{2}$ 0), 2.353(50)(103, 11 $\bar{3}$), 3.02(20)(102), and 2.408(20)(103). The mineral occurs as aggregates of blue-green blades (up to 0.3 mm) on pseudomalachite in association with libethenite. Crystals have a vitreous luster and a white to pale-blue streak. Optically biaxial positive or negative, $2V$ large, $\alpha' = 1.786(2)$ and $\gamma' = 1.840(5)$. Weak pleochroism, blue to pale blue.

The name refers to the Ludjiba deposit, Zaire, beside the river bearing the same name. Type material is preserved at the Musée Royal de l'Afrique Centrale à Tervuren, Belgium, and at the Institut Royal des Sciences Naturelles de Belgique, Brussels. J.D.G.

McBirneyite*

J.M. Hughes, B.S. Christian, L.W. Finger, L.L. Malinconico (1987) McBirneyite, $\text{Cu}_3(\text{VO}_4)_2$, a new sublimate mineral from the fumaroles of Izalco volcano, El Salvador. J. Volcanology and Geothermal Research, 33, 83–190.

Black, anhedral crystals, all <200 μm in greatest dimension, of a sublimate from a fumarole in the summit crater of Izalco volcano gave electron-microprobe compositions of CuO 56.82(29), V_2O_5 41.44(21) (mean of six analyses of three crystals), and CuO 55.91(73), V_2O_5 42.70(56) (mean of two analyses of the type crystal), sums 98.26, 98.61 wt%, corresponding to $\text{Cu}_{3.08}\text{V}_{1.97}\text{O}_8$ and $\text{Cu}_{3.00}\text{V}_{2.00}\text{O}_8$. The mineral is opaque, metallic luster, hardness not determined, medium dark-gray in reflected light in air, nonpleochroic; reflectances (nm %) measured at four wavelengths (scheelite and magnetite as standards) are 470, 18.5; 546, 17.5; 589, 18.7; 650, 20.6. Crystal-structural X-ray study showed mcBirneyite to be triclinic, space group $P\bar{1}$, $a = 5.3418(9)$, $b = 6.5100(8)$, $c = 5.1798(7)$ Å, $\alpha = 88.61(1)$, $\beta = 68.11(1)$, $\gamma = 69.22(1)^\circ$, $D_{\text{calc}} = 4.50$ g/cm³ with $Z = 1$. Strongest lines of the X-ray powder pattern are 4.25(60)(101), 4.01(80)(01 $\bar{1}$), 3.12(100)(120), 2.82(100)(10 $\bar{1}$), 2.641(80)(211), 2.572(60)(102), 2.428(80)(021), and 2.308(60)(112), in good agreement with data for synthetic $\text{Cu}_3\text{V}_2\text{O}_8$.

Izalco volcano is a basaltic and andesitic composite volcano that has been intermittently active since its birth in 1770. Several vanadium minerals have been identified in its high-temperature fumarolic sublimate; mcBirneyite, however, occurs in the outer sulfate zone of a fumarole ($T = 100$ to 200°C) and is associated with fingerite, thenardite, euchlorine, and unnamed α - $\text{Cu}_2\text{V}_2\text{O}_7$. Type specimens are in the Smithsonian Institution, Washington,

D.C. The new name honors volcanologist A. R. McBirney of the University of Oregon. J.L.J.

Monazite-(Nd)*

S. Graeser, H. Schwander (1987) Gasparite-(Ce) and monazite-(Nd): two new minerals to the monazite group from the Alps. Schweiz. Mineral. Petrogr. Mitt., 67, 103–113.

Electron-microprobe analysis (reported to be the mean of three analyses) gave Ce_2O_3 19.85, La_2O_3 2.48, Pr_2O_3 6.47, Nd_2O_3 30.32, Sm_2O_3 8.81, Gd_2O_3 2.26, ZrO_2 0.77, P_2O_5 28.65, SiO_2 0.22, sum 99.83 wt%, corresponding to $(\text{Nd}_{0.44}\text{Ce}_{0.29}\text{Sm}_{0.12}\text{Pr}_{0.09}\text{La}_{0.04}\text{Gd}_{0.03}\text{Zr}_{0.02})_{21.03}(\text{P}_{0.97}\text{Si}_{0.01})_{20.98}\text{O}_4$. The mineral forms long prismatic crystals, translucent to milky, but always bright rose. Optically biaxial positive, $\alpha = 1.793(2)$, $\beta = 1.795(2)$, $\gamma = 1.860(5)$. $D_{\text{calc}} = 5.43$ g/cm³. Single-crystal X-ray study indicated monoclinic symmetry; cell dimensions refined from the powder pattern are $a = 6.745(4)$, $b = 6.694(4)$, $c = 6.435(4)$ Å, $\beta = 103.65(4)^\circ$. Strongest lines of the X-ray pattern are 4.15(30)($\bar{1}$ 11), 3.280(60)(200), 3.080(100)(120), 2.846(50)($\bar{1}$ 12), 2.425(40)($\bar{2}$ 12), 2.177(30)(031), 1.9541(30)(212), 1.8634(30)(103), and 1.7301(30)(132). The pattern is similar to that of monazite-(Ce), and the cell volume (293.7 Å³) is only slightly smaller.

Monazite-(Nd) is associated with xenotime, gadolinite, bastnäsite, allanite, and monazite-(Ce) in fissures and druses in aplitic to pegmatitic veins that cut blocks of schistose gneiss on the moraine of the north slope of Pta. Glogstafel, Val Formazza, Italy. Type material is at the Natural History Museum and at the Mineralogical Institute, Basel, Switzerland. As is noted by the authors, the mineral has also been reported to occur in a bauxite deposit in Greece (*Am. Mineral.*, 68, 849; 1983).

Discussion. A bit short on the description of properties. J.L.J.

Okhotskite*

K. Togari, M. Akasaka (1987) Okhotskite, a new mineral, an Mn^{3+} -dominant member of the pumpellyite group, from the Kokuriki mine, Hokkaido, Japan. Mineral. Mag., 51, 611–614.

Electron-microprobe analysis gave SiO_2 34.25, TiO_2 0.09, Al_2O_3 4.49, Fe_2O_3 6.03, Mn_2O_3 16.69, MnO 9.18, MgO 2.08, CaO 20.11, Na_2O 0.25, K_2O 0.03, H_2O (by TGA) 6.89, sum 100.09 wt%. Fe was confirmed as trivalent by Mössbauer spectroscopy. The empirical formula based on 56 oxygen ions is $(\text{Ca}_{7.63}\text{Na}_{0.17}\text{K}_{0.01})_{27.81}(\text{Mn}_{2.75}^{2+}\text{Mg}_{1.10})_{23.85}(\text{Mn}_{4.50}^{3+}\text{Al}_{1.87}\text{Fe}_{1.61}^{3+}\text{Ti}_{0.02})_{28.00}\text{Si}_{12.13}\text{O}_{39.71}(\text{OH})_{16.29}$. The mineral forms aggregates of prisms, up to 0.2 mm long, that are orange with a pale-orange streak, vitreous luster, transparent, nonfluorescent, $H = 6$, $D_{\text{calc}} = 3.40$ g/cm³ for the empirical formula and $Z = 1$. One set of cleavages is observed in thin section. Optically biaxial negative, $\alpha = 1.782(5)$, $\beta = 1.820(5)$, $\gamma = 1.827(5)$, $2V_{\text{meas}} = 46(5)^\circ$, $2V_{\text{calc}} = 46^\circ$, $Y = \mathbf{b}$, $Z \wedge c = 9\text{--}14^\circ$ in the acute angle of β . Pleochroism is strong: $X = \text{yellow}$, Y and $Z = \text{deep orange}$, $X < Y < Z$. Dispersion is indiscernible.

Cell dimensions, calculated from the X-ray powder pattern and indexed by analogy with pumpellyite, are $a = 8.887(5)$, $b = 6.000(4)$, $c = 19.53(2)$ Å, $\beta = 97.08(6)^\circ$; strongest powder-diffraction lines (Cu radiation) are 4.76(60)(004, 111), 3.87(70)(202), 2.961(100)(115, 300), 2.720(70)(302), 2.665(45)(304, $\bar{3}$ 11), 2.553(45)(024)($\bar{3}$ 13), 2.384(45)(304), 2.197(40)(026), and 1.815(45)(317, 128).

Okhotskite occurs in veinlets that cut hematite ore fragments

collected from the dump of the dormant Kokuriki mine, located on Jurassic stratabound manganese hematite ore that averaged 10% Mn and 33% Fe. Associated veinlet minerals are quartz, pumpellyite containing variable amounts of Mn, piemontite, neotocite, bementite, and fluorapatite. The mine is near the Sea of Okhotsk, from which the new name is derived. In accordance with the pumpellyite-group formula $W_8X_4Y_8Z_{12}O_{36-n}(OH)_n$, names are based on the predominant Y-site trivalent cation, and secondarily on the X-site divalent cation; accordingly, the new mineral is okhotskite-(Mn). The existence of pumpellyite-(Mn) is known.

Discussion. No repository for type material is given. J.L.J.

Pahasapaite*

R.C. Rouse, D.R. Peacor, P.J. Dunn, T.J. Campbell, W.L. Roberts, F.J. Wicks, D. Newbury (1987) Pahasapaite, a beryllophosphate zeolite related to synthetic zeolite rho, from the Tip Top pegmatite of South Dakota. *Neues Jahrb. Mineral. Mon.*, 433–440.

Electron-microprobe analysis gave K_2O 1.6, CaO 8.5, Na_2O 0.2, P_2O_5 46.0; $P/Li = 1.96$ by ion microprobe (calc. Li_2O 4.8), H_2O 18 (by TGA-EGA) sum 79.1 wt% (BeO not determined). Crystal-structure determination led to the formula $(Ca_{5.5}Li_{3.6}K_{1.2}Na_{0.2}\square_{13.5})_{224}Li_8Be_{24}O_{96} \cdot 38H_2O$, requiring K_2O 1.60, CaO 8.73, Na_2O 0.18, Li_2O 4.91, BeO 16.99, P_2O_5 48.22, H_2O 19.38 wt%. The mineral is a zeolite; water loss on heating is continuous between 70 and 500 °C, consistent with the zeolitic character. The (Ca,Li,K,Na) are disordered over a single 24-fold equipoint. Cubic, $a = 13.781(4)$ Å, space group $I23$ from the structural determination. Pahasapaite occurs as euhedral malformed crystals, about 1.0 mm in size, showing $\{110\}$ and $\{111\}$; transparent and colorless to light pink, vitreous luster, colorless streak, $H = 4\frac{1}{2}$, no cleavage, optically isotropic with $n = 1.523(2)$ in Na light, $D_{meas} = 2.28(4)$ by suspension in heavy liquids, $D_{calc} = 2.241$ g/cm³ using the structurally determined formula. Strongest lines of the X-ray powder pattern (114.6-mm Gandolfi camera, Cu radiation) are 9.60(100)(110), 4.35(40)(310), 3.684(90)(321), 3.248(90)(411,330), 2.935(90)(332), 2.702(60)(510,431), and 2.237(40)(611,532).

Pahasapaite occurs with other beryllophosphates in seams in fractured beryl crystals in the Tip Top pegmatite, near Custer, in the Black Hills of South Dakota. Associated minerals are montgomeryite, tiptopite, eosphorite-childrenite, roscherite, and childrenite. The new name is derived from the Lakota Sioux word for the Black Hills, Pahasapa. Type material is catalogued as NMNH 159879 at the Smithsonian Institution, Washington, D.C. J.L.J.

Parabrandtite*

P.J. Dunn, D.R. Peacor, S.-C. Su, F.J. Wicks, F.J. Parker (1987) Parabrandtite, the manganese analogue of talnessite, from Stirling Hill, Ogdensburg, New Jersey. *Neues Jahrb. Mineral. Abh.*, 157, 113–119.

Electron-microprobe analysis gave FeO 0.2, MgO 0.8, CaO 25.1, MnO 14.7, ZnO 0.7, As_2O_5 51.3, H_2O (by TGA-EGA) 8.3, sum 101.1 wt%, corresponding to $(Ca_{1.94}Mn_{0.06})(Mn_{0.84}Mg_{0.09}Zn_{0.04}Fe_{0.01})As_{1.93}O_{7.80} \cdot 2H_2O$, ideally $Ca_2Mn(AsO_4)_2 \cdot 2H_2O$. The mineral forms aggregates, 0.5 to 1.5 mm in diameter, of crystals in parallel growth; colorless, transparent, vitreous luster, white

streak, $H = 3$ to 4, perfect $\{010\}$ and $\{110\}$ cleavages, nonfluorescent in ultraviolet light. Optically biaxial positive, $\alpha = 1.701(2)$, $\beta = 1.721(2)$, $\gamma = 1.751(2)$, $2V = 79.9(4)^\circ$, $r > v$ (weak); $c = [001]$ and b^* is normal to (010). Single-crystal study indicated triclinic symmetry, space group $P1$ or $P\bar{1}$, $a = 5.89(1)$, $b = 7.031(7)$, $c = 5.64(1)$ Å, $\alpha = 96.77(10)$, $\beta = 109.32(10)$, $\gamma = 108.47(8)^\circ$. $D_{meas} = 3.55(8)$ (by suspension), $D_{calc} = 3.60$ g/cm³ for $Z = 1$ and the empirical formula. Strongest lines of the X-ray powder pattern (114.6-mm Gandolfi camera, Cu radiation) are 3.61(70)(011), 3.231(50)(020), 3.090(80)(02 $\bar{1}$), 2.811(100)(1 $\bar{2}$ $\bar{1}$), and 2.778(50)(102).

Parabrandtite is associated with sarkinite in a cavity in a vein in primary ore consisting of franklinite, pink calcite, and red willemite from the Sterling Hill mine, Sussex County, New Jersey. Three specimens are known; type material (NMNH 163210) is at the Smithsonian Institution, Washington, D.C. The new name relates to brandtite, the monoclinic polymorph. Parabrandtite is the Mn analogue of talnessite, $Ca_2Mg(AsO_4)_2 \cdot 2H_2O$. J.L.J.

Paraotwayite*

E.H. Nickel, J. Graham (1987) Paraotwayite, a new nickel hydroxide mineral from Western Australia. *Can. Mineral.*, 25, 409–411.

Paraotwayite occurs as emerald-green fibrous masses and cross-fiber veinlets in an assemblage consisting largely of millerite and nickeloan chrysotile. Electron-microprobe analysis gave NiO 66.25, MgO 0.24, SO_3 11.80; H_2O and CO_2 by CHN analyzer gave 17.42 and 4.67, respectively, for a sum of 100.38 wt%. The empirical formula, based on $Ni + Mg = 1$, is $Ni_{0.99}Mg_{0.01}(OH)_{1.43}(SO_4)_{0.17}(CO_3)_{0.12} \cdot 0.37H_2O$, generalized on an anhydrous basis as $Ni(OH)_{2-x}(SO_4, CO_3)_{0.5x}$, where x is approximately 0.6. The fibers are up to 0.5 mm long and 5 μ m wide, brittle, silky luster, white streak, $VHN_{20} = 223$, no cleavage, nonfluorescent in ultraviolet light, inert to cold HCl or HNO_3 . In transmitted light, weakly pleochroic from bluish-green parallel to fiber length, yellowish-green normal to it. Extinction parallel, length slow; $n = 1.705$ parallel to fiber length, 1.655 normal to it. Electron-diffraction studies gave a two-dimensional orthogonal net of 3.0 and 13.6 Å, and in combination with a partly indexed fiber-rotation pattern, the cell dimensions calculated from the X-ray powder pattern gave $a = 7.89(1)$, $b = 2.96(1)$, $c = 13.63$ Å, $\beta = 91.1(2)^\circ$. $D_{meas} = 3.30$ (suspension), $D_{calc} = 3.520$ g/cm³ with $Z = 6$. Strongest lines of the X-ray powder pattern are 6.81(100)(002), 5.083(80)(102), 3.859(50)(103,20 $\bar{1}$), 2.946(40)(010,203), 2.239(80)(21 $\bar{2}$,01 $\bar{4}$), and 1.973(30)(400).

Paraotwayite veinlets, together with those of dolomite and gaspeite, have been found in two specimens of nodular millerite, partly altered to polydymite, in a matrix of nickeloan chrysotile from the Otway nickel deposit, Pilbara region, Western Australia. The new name reflects the chemical and physical similarity to otwayite, which occurs in the same deposit but has not been found together with paraotwayite. Specimens have been deposited with the Western Australian State Mineral Collection (Government Chemical Laboratories, Perth) and the Museum of Victoria, Melbourne, Australia. J.L.J.

Parisite-(Nd)

Peishan Zhang, Kejie Tao (1986) Bayan Obo mineralogy. Science Publisher, Beijing, China. 208 p. (in Chinese with English summary).

Chemical analyses of two samples that have the same X-ray powder-diffraction patterns as normal parisite gave the following results for rare-earth elements summed to 100 wt%: La 9.6, 9.0, Ce 36.3, 35.5, Pr 7.9, 7.5, Nd 40.1, 41.2, Sm 4.3, 4.7, Eu 0.4, 0.4, Gd 0.9, 1.0, Dy 0.3, 0.2, Yb 0.0, 0.2, Y 0.2, 0.3. The mineral occurs as large, yellowish-brown grains in a quartz matrix; luster vitreous, fracture conchoidal, $H = 4$ to 5 , $D_{\text{meas}} = 4.2$ to 4.5 g/cm³. In thin section, light yellowish-brown, uniaxial positive with $\omega = 1.679$, $\epsilon = 1.754$. The DTA curve shows a large endothermal peak before 610 °C. One of the analyzed samples is associated with hematite, barite, sodic pyroxene, and sodic amphibole, and the other is associated with calcite, sodic pyroxene, and sodic amphibole. The general formula of parisite-(Nd) is (Nd,Ce)₂Ca(CO₃)₃F₂. The mineral occurs in the Bayan Obo iron-niobium-rare earth deposit in Inner Mongolia, northern China.

Discussion. A full description of the mineral and approval of the new name are needed. J.L.J.

Poudretteite*

J.D. Grice, T.S. Ercit, J. Van Velthuisen (1987) Poudretteite, KNa₂B₃Si₁₂O₃₀, a new member of the osumilite group from Mont Saint-Hilaire, Quebec, and its crystal structure. *Can. Mineral.*, 25, 763–766.

Electron-microprobe analysis gave SiO₂ 77.7, B₂O₃ 11.4, K₂O 5.2, Na₂O 6.2, Li and Be not detected, sum 100.5 wt%, corresponding to K_{1.00}(Na_{1.87}K_{0.04})_{21.91}B_{3.05}Si_{12.14}O₃₀. Seven crystals are known; they are roughly equant, barrel-shaped prisms up to 5 mm, colorless to pale pink, transparent, vitreous luster, white streak, $H = \sim 5$, brittle, conchoidal to splintery fracture, no cleavage, $D_{\text{meas}} = 2.51(1)$ by Berman balance, $D_{\text{calc}} = 2.53$ g/cm³ with $Z = 2$. Crystal-structure study showed the mineral to be hexagonal, space group *P6/mcc*; cell dimensions refined from the X-ray powder pattern (114.6-mm Debye-Scherrer camera, Cu radiation) gave $a = 10.239(1)$, $c = 13.485(3)$ Å; strongest diffraction lines are 5.13(100)(110), 3.253(100)(211), 2.956(40)(300), 2.815(60)(114), 2.686(50)(213,204), and 1.818(40)(315).

Poudretteite occurs with pectolite, apophyllite, and minor aegirine in marble xenoliths in nepheline syenite breccia. The name is for the Poudrette family, operators of the namesake quarry at Mont Saint-Hilaire, Rouville County, Quebec. Cotype specimens are at the National Museum of Natural Sciences, Ottawa, Canada, and at the Smithsonian Institution, Washington, D.C. J.L.J.

Qitianlingite*

Guangming Yang, Su Wang, Zhizhong Peng, Jingzhen Bu (1985) Qitianlingite—A newly discovered superstructure complex oxide. *Acta Mineral. Sinica*, 5, 193–198 (in Chinese, English abstract).

Electron-microprobe analysis gave MnO 6.01, FeO 14.64, Nb₂O₅ 34.06, Ta₂O₅ 11.73, TiO₂ 1.23, SnO₂ 0.36, WO₃ 32.30, sum 100.33 wt%, corresponding to (Fe_{1.345}Mn_{0.559})_{21.904}(Nb_{1.691}Ta_{0.350}Ti_{0.102}Sn_{0.016})_{22.159}W_{0.919}O₁₀, ideally (Fe,Mn)₂(Nb,Ta)₂WO₁₀. The mineral is black, semimetallic to metallic luster, dark brown streak, moderately magnetic, perfect {100} cleavage, VHN₅₀ = 520–580, insoluble in dilute HCl. Crystals are tabular, platy on {001}, generally 0.1 × 0.2 × 0.01 mm. Yellowish-white in reflected light, with weak anisotropism and bireflection; reflectance 12 to 14% in white light. Crystal-structure study showed the mineral to be orthorhombic, space group *Pbcn*, $a = 23.706(7)$, $b = 5.723(2)$, $c = 5.045(3)$ Å; $D_{\text{calc}} = 6.42$ g/cm³ for the empirical

formula with $Z = 4$. Strongest lines of the powder pattern (57.3-mm camera, Fe radiation) are 3.65(70)(510), 2.96(100)(511), 2.87(60)(020), 2.52(70)(002), 1.773(80)(530), 1.385(60)(523), and 1.194(60)(10.41).

Qitianlingite occurs in a pegmatite dike at Qitianling, Hunan Province, China. Associated minerals include quartz, K-feldspar, albite, muscovite, zinnwaldite, cassiterite, wolframite, and wolframioxiolite. Type material is at the National Museum of Geology, Beijing, China.

Discussion. The “superstructure” in the title refers to relationships with similar complex oxides rather than to crystallographic properties of the new mineral. The reported association with “wolframioxiolite” is of interest in that this is a doubtful species whose status needs to be clarified. J.L.J.

Trabzonite*

H. Sarp, G. Burri (1987) Trabzonite Ca₄Si₃O₁₀·2H₂O, a new mineral. *Bull. Geol. Soc. Turkey*, 30, 57–60 (in Turkish, English abstract).

Electron-microprobe analysis gave CaO 50.20, MgO 0.13, MnO 0.04, Na₂O 0.30, Al₂O₃ 0.5, SiO₂ 40.38, H₂O (wt loss from 6 mg) 7.0, sum 98.10 wt%, corresponding to (Ca_{3.99}Na_{0.05}Mg_{0.01})_{24.05}Si_{3.07}O₁₂H_{3.66}, ideally Ca₄Si₃O₁₀·2H₂O. The mineral occurs as colorless irregular grains, 0.1 to 0.2 mm, with a vitreous luster, white streak, conchoidal fracture, no cleavage, undetermined hardness, $D_{\text{meas}} = 2.9$ g/cm³ (by suspension). Optically biaxial positive, $\alpha = 1.632(2)$, $\beta = 1.634(2)$, $\gamma = 1.640(2)$ at 589 nm, $2V_{\text{meas}} = 55(5)^\circ$, $2V_{\text{calc}} = 60^\circ$, $r > v$ weak to moderate; orientation $Z = a$, $Y = b$, $X \wedge c = 8^\circ$. Single-crystal study indicated monoclinic symmetry, space group *P2*, or *P2₁/m*, $a = 6.895(2)$, $b = 20.640(3)$, $c = 6.920(2)$ Å, $\beta = 98^\circ$; $D_{\text{calc}} = 3.08$ g/cm³ for the empirical formula and $Z = 4$. Strongest lines of the X-ray powder pattern (114.6-mm Gandolfi camera, Cu radiation) are 5.71(35)(021,120), 3.442(60)(060)(002), 3.062(100)(032,230), 2.851(50)(042,240), 2.635(50)(052,250), and 2.585(90)(212,080).

Trabzonite occurs near İzkidere, in the Trabzon region of Turkey, as a retrograde mineral in a skarn containing spurrite, rustumite, calcite, vesuvianite, hillebrandite, defernite, tobermorite, killalaite, garnet, perovskite, and molybdenite. Type material is in the Natural History Museum, Geneva, Switzerland. J.L.J.

Unnamed Ag-Fe sulfides

R.A. Ixer, C.J. Stanley (1987) A silver-nickel-cobalt mineral association at Tynebottom Mine, Garrigill, near Alston, Cumbria. *Proc. Yorkshire Geol. Soc.*, 46, 133–139.

Associated with Ni-Co-Fe arsenides in a sample from the Tynebottom mine are minute amounts of a Ag-Fe-S mineral that occur as lamellae, up to 15 μm wide, in chalcopyrite. In reflected light the lamellae are pale gray-buff (air) to blue-gray (oil) against chalcopyrite; slightly anisotropic, but not obviously bireflectant nor pleochroic. Electron-microprobe analyses gave Fe 24.0, 25.1, Cu 4.1, 2.1, Ag 42.6, 45.3, As—, 0.1, S 28.1, 27.4, sums 98.8, 100.0 wt%, interpreted as AgFeS₂.

In the same sample, argentopyrite contains crystallographically oriented lamellae 1 × 10 μm to 5 × 60 μm. Reflectance is higher than that of argentopyrite, lower than that of pyrite. Cream to pinkish-brown against pyrite; slightly anisotropic. Electron-microprobe analysis gave Ni 0.7, Fe 48.6, Ag 12.3, As 0.5, S 37.7, sum 99.8 wt%, interpreted as AgFe₃S₁₁. J.L.J.

Unnamed basic Mg carbonate

A. Livingstone (1987) A basic magnesium carbonate, a possible dimorph of artinite, from Unst, Shetland. *Mineral. Mag.*, 51, 459–462.

X-ray fluorescence analysis of a 5-mg sample gave MgO 31.9, SiO₂ 2.6, CaO 2.0, Fe as FeO 0.9, SO₃ 0.7, TGA loss 64.6, sum 102.7 wt%; electron-microprobe analysis gave MgO 33.8–37.1, FeO 0.1–12.8, CaO 0.1–4.7, S 0.1 wt%. TGA and EGA curves show that water of crystallization is lost in two stages up to about 260 °C and that CO₂ and OH are evolved simultaneously between 260 and 360 °C. If substitution of OH for the small amount of SO₄ is assumed, the results can be interpreted to match the formula of artinite, Mg₄(CO₃)₂(OH)₄·6H₂O, or to be isostructural with the synthetic compound Mg₄(CO₃)₂(OH)₂(SO₄)·6H₂O.

Museum specimens of brucite from Swinna Ness, Unst, Shetland, have white coatings, mealy regions, and free-standing outgrowths that developed during museum storage, but in one specimen the same material is present as coherent veinlike areas, several millimeters thick, that may represent an original phase. The efflorescences and veinlike material both lack crystal faces or edges. The material is soft, porous, $D_{\text{meas}} = 1.67 \text{ g/cm}^3$ (by suspension in heavy liquids), mean refractive index 1.495, readily soluble and strongly effervescent in dilute HCl. Slight grinding almost destroys the structure. The X-ray powder pattern is unlike that of artinite, but resembles that of synthetic Mg₄(CO₃)₂(OH)₂(SO₄)·6H₂O (PDF 7–410). By analogy with the synthetic compound, the Shetland material is monoclinic, $a = 11.45$, $b = 24.17$, $c = 7.54 \text{ \AA}$, $\beta = 105.21^\circ$; strongest lines of the powder pattern (Cu radiation, 114.6-mm camera) are 11.60(100)(020), 6.40(90)(130), 4.92(30)(121), 3.97 (80)(15 $\bar{1}$), 2.95(60)(311,35 $\bar{1}$), 2.718(30)(360,212), 2.598(30)(28 $\bar{1}$,271), 2.528(40)(41 $\bar{2}$,37 $\bar{1}$). The infrared spectrum has a resemblance to that of artinite. Specimens of the unidentified basic magnesium carbonate are at the Royal Museum of Scotland, Edinburgh, Scotland; the veinlike material is catalogued as specimen RMS G 1871.3.1. J.L.J.

Unnamed K-dominant laumontite

G. Cressey (1987) Skarn formation between metachalk and agglomerate in the Central Ring Complex, Isle of Arran, Scotland. *Mineral. Mag.*, 51, 231–246.

The mean of six electron-microprobe analyses gave SiO₂ 51.97, Al₂O₃ 18.01, Na₂O 1.33, CaO 4.82, K₂O 10.72, H₂O (by difference) 13.15 wt%, corresponding to (K_{4.40}Ca_{1.66}Na_{0.83})_{26.89}-(Si_{16.74}Al_{6.83})_{223.57}O₄₈·14.12H₂O. The mineral is considered to be the partly dehydrated K-dominant analogue of laumontite, from which the K-rich mineral could not be distinguished satisfactorily by X-ray diffractometry of mutual mixtures containing up to 1/3 of the K-rich phase. Laumontite and the K-dominant mineral occur in complex intergrowths that are associated with other zeolites and calcite in late-stage lenses and veins, up to 1 cm wide, in a xenolithic chalk block and in agglomerate in a volcanic complex on the Isle of Arran, Scotland, J.L.J.

Unnamed Mn-dominant deerite

T. Reinecke (1987) Manganoan deerite and calderitic garnet from high-pressure metamorphic Fe-Mn-rich quartzites on Andros Island, Greece. *Mineral. Mag.*, 51, 274–251.

Electron-microprobe analysis gave SiO₂ 33.4, TiO₂ 5.5, Al₂O₃ 0.13, FeO (total Fe) 17.5, MnO 33.9, MgO 2.03, H₂O (calc.) 4.20, sum 99.66 wt%. Based on 30 cations and 90 charges, the formula is (Mn_{10.25}Fe_{2.07}Mg_{1.08}Fe_{3.15}Al_{0.06}Ti_{1.48})_{218.09}Si_{11.92}O₄₀(OH)₁₀. The unnamed mineral is associated with Mn-rich deerite; both Mn-rich deerite and Mn-dominant deerite form black needles up to 0.5 mm long and 0.02 mm across in Fe-Mn-rich quartzites. Individual grains are generally homogeneous, but compositions vary from deerite to the Mn-dominant phase within a single thin section. J.L.J.

Unnamed Nd-Nb-Ti silicate

Peishan Zhang, Kejie Tao (1986) Bayan Obo mineralogy. Science Publisher, Beijing, China. 208 p. (in Chinese with English summary).

Electron-microprobe analyses of two samples gave SiO₂ 10.12, 9.94, TiO₂ 25.44, 26.35, Nb₂O₅ 30.42, 31.33, FeO 1.06, 1.57, MnO 1.28, 1.04, La₂O₃ 1.38, 1.21, Ce₂O₃ 10.91, 10.21, Pr₂O₃ 2.15, 1.97, Nd₂O₃ 14.79, 13.91, Sm₂O₃ 1.67, 1.59, sum 99.22, 99.15 wt%. The grains are brown to brownish-yellow, tabular, radiating aggregates with a vitreous luster, dark brown streak, $H = 5$ to 6, $D_{\text{meas}} = 4.71$ to 4.76 g/cm³. In transmitted light, light reddish-brown and pleochroic from reddish-brown to yellowish-brown; high relief, with refractive indices >2.00, and optic sign not determinable. No X-ray data are given. The mineral is associated with barite and sodic pyroxene in the Bayan Obo iron-niobium-rare earth deposit, Inner Mongolia, northern China.

Discussion. The element ratios approximate (Nd, Ce,REE)₃-Ti₁₂Nb₂Si₆. J.L.J.

Unnamed uranyl sulfate

Z. Urbanec, Z. Mrázek, J. Čejka (1985) Thermal, X-ray and infrared absorption spectrum analyses of a new uranyl sulphate mineral. *Thermochimica Acta.*, 86, 383–386.

A mineral from Jáchymov, Czechoslovakia, is stated to have the composition 6UO₃·0.6SO₃·15H₂O. Cell parameters calculated from the X-ray powder pattern (not given) indicate orthorhombic symmetry, $a = 15.065(7)$, $b = 15.704(8)$, $c = 14.189(8) \text{ \AA}$. The pattern is stated to be similar to those of minerals in the becquerelite group. Thermogravimetric and differential-thermal curves show dehydration in several steps. The infrared spectrum is illustrated and described. The mineral is at the National Museum in Prague, Czechoslovakia, catalogued as M172-NMP inv. no. 68905. J.L.J.

New Data**Aerinite***

B. Azambre, P. Monchoux (1988) New mineralogical data on aerinite from a new occurrence at Saint-Pandelon, Landes, France. *Bull. Minéral.*, 111, 39–47 (in French).

Wet-chemical analysis, TGA (H₂O) and gas chromatography (CO₂) gave P₂O₅ 0.71, SiO₂ 36.91, Al₂O₃ 17.20, Fe₂O₃ 7.31, FeO 3.47, MnO 0.10, MgO 3.15, CaO 12.03, Na₂O 0.27, K₂O 0.04, H₂O 17.79, CO₂ 2.3, sum 101.28 wt%, which yields the formula (Ca_{4.04}Na_{0.16}K_{0.02})_{24.22}(Fe_{0.91}Mn_{0.03}Mg_{1.47})_{22.41}(Al_{6.36}Fe_{1.72})_{28.08}-(Si_{11.59}P_{0.19})_{211.78}O_{36.21}(OH)_{12.11}(CO₂)_{0.99}·12.11H₂O (based on density). Infrared data are given. The X-ray powder pattern was used

to determine and refine the monoclinic cell: $a = 14.690(15)$, $b = 16.872(15)$, $c = 5.170(15)$ Å, $\beta = 94^\circ 45'$. No single crystals were available. The strongest X-ray lines (53 given) are 14.65(100)(100), 4.050(80)(140), 3.798(35)(031), 3.664(30)(400), 3.651(35)(240), 3.283(30)(150), 2.812(50)(060), 2.721(75)(421,431), and 2.623(30)(260).

The mineral occurs as blue to blue-green fibers associated with scolecite and prehnite in a tholeiitic dolerite. $D_{\text{meas}} = 2.48(2)$ g/cm³. $H = \text{about } 3$. Optically biaxial negative, $\alpha = 1.510(5)$, $\beta = 1.560(5)$, $\gamma = 1.580(5)$, $2V_{\text{calc}} = 63^\circ$. Pleochroic, $X = \text{bright blue}$, $Y = Z \text{ pale beige}$.

Discussion. These data have been accepted by the CNMMN to reinstate aerinite as a valid species. Neotype material is at the École Nationale Supérieure des Mines de Paris. **J.L.J.**

Khademite*

F. Cesbron, P. Bayliss (1988) Mineral nomenclature: khademite. *Mineral. Mag.*, 52, 133–134.

A mineral thought to have the composition $\text{Al}(\text{SO}_4)(\text{OH}) \cdot 5\text{H}_2\text{O}$ was previously given the names rostitite and khademite. Crystal-structure determination of type khademite from Iran and wet-chemical analysis of a specimen from another locality indicate that the formula is $\text{Al}(\text{SO}_4)\text{F} \cdot \text{H}_2\text{O}$. The approved name for this mineral is khademite, and rostitite is discredited. **J.L.J.**

Polarite

M. Tarkian (1987) Compositional variations and reflectance of the common platinum-group minerals. *Mineralogy and Petrology*, 36, 169–190.

Electron-microprobe analysis of a mineral having weak anisotropy gave Pd 35.0, Pt 2.0, Te 5.2, Bi 59.4, sum 101.6 wt%, corresponding to $(\text{Pd}_{1.00}\text{Pt}_{0.03})_{\Sigma 1.03}(\text{Bi}_{0.85}\text{Te}_{0.12})_{\Sigma 0.97}$. Although too fine-grained to obtain X-ray data, the mineral is considered to be the first known example of Pb-free polarite. The occurrence is in the Merensky Reef at the Union mine, South Africa. **J.L.J.**

Shakhovite

W. Baur, E. Tillmanns (1986) How to avoid unnecessarily low symmetry in crystal structure determinations. *Acta Cryst.*, B42, 95–111.

The intensity data of Tillmanns et al. (1982, *Tschermaks Mineral. Petrogr. Mitt.*, 30, 227–235) were used to compare the structural models of Tillmanns et al. (1982) to Pal'chik et al. (1984, see *Am. Mineral.*, 73, 199). The model of Tillmanns et al. (1982) gave $R = 4.9\%$, which is significantly better than the model of

Pal'chik et al. (1984), which gave $R = 6.5\%$. The intensity data and refinement indicate monoclinic symmetry for the mineral. Shakhovite is $\text{Hg}_2^+\text{SbO}_3(\text{OH})_3$, space group Im , with $a = 4.871(1)$, $b = 15.098(3)$, $c = 5.433(1)$ Å, $\beta = 98.86(2)^\circ$, $Z = 2$. The formula, unit cell, and symmetry are new. **T.S.E.**

Stibiomicrolite*

L.A. Groat, P. Černý, T.S. Ercit (1987) Reinstatement of stibiomicrolite as a valid species. *Geol. Fören. Stockholm Förhand.*, 109, 105–109.

In the lepidolite-rich albitic unit of the Varuträsk pegmatite, Sweden, is an antimony-rich oxide mineral for which the following compositional range was obtained from 14 electron-microprobe analyses: Ta_2O_5 52.65–53.78, Nb_2O_5 13.23–17.54, Sb_2O_3 12.03–22.71, CaO 6.15–13.00, Na_2O 0.70–3.59 wt%. The A-site occupancy by Sb ranges from 24.5 to 44.6%, thus surpassing the 20% maximum required for naming new minerals in the pyrochlore group. Stibiomicrolite represents a re-instatement of a name originally applied in 1938 to a hypothetical mineral alleged to have decomposed into an intergrowth of stibiotantalite, microlite, native antimony, and minor stibnite. The general formula is $(\text{Ca-Sb,Na})_2(\text{Ta,Nb})_2(\text{O,OH,F})_7$, where Sb is assumed to be trivalent. The mineral is greenish-white to white; streak white; hardness less than that of stibiotantalite; $D_{\text{calc}} = 5.84$ to 6.22 g/cm³; isotropic, with $n > 1.9$. Gray in reflected light, darker than tantalite. A 114.6-mm Gandolfi X-ray pattern (Cu radiation) gave $a = 10.455(2)$ Å and the following strongest lines: 6.03(80)(111), 3.14(90)(311), 3.01(100)(222), 2.61(70)(400), 2.010(50)(511,333), 1.846(70)(440), and 1.575(80)(622). The indexing is consistent with the space group $Fd3m$. Type material is at the Swedish Museum of Natural History, Stockholm (number 600200), and in the Mineralogical Museum, Department of Geological Sciences, University of Manitoba, Winnipeg, Manitoba, Canada (no. M6134). **J.L.J.**

Discredited Mineral

Bárcenite

P.J. Dunn (1986) Bárcenite discredited. *Can. Mineral.*, 24, 591.

Bárcenite, a purported antimonate of mercury from Huitzuco, Guerrero, Mexico, was first described by J. W. Mallet in 1878. The Commission on New Minerals and Mineral Names, IMA, has accepted the proposal that one of Mallet's type-locality specimens, acquired from him by Washington Roebling, be designated the type material (R5768, U.S. National Museum). The type material is a mixture of romeite and metacinnabar. **J.L.J.**