

NEW MINERAL NAMES*

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Brocenite and β -Brocenite

KUO Chi-Ti, WANG I-Hsien, WANG Hsien-Chueh, WANG Chung-Kang, AND HOU Hung-Chuan (1973) Studies on minerals of the fergusonite group. *Geochimica*, **2**, 86-92 (in Chinese).

Analysis of brocenite gave CaO 1.26, MnO 0.03, FeO 0.95, TR₂O₃ 46.88, UO₂ 0.03, UO₃ 0.07, ThO₂ 8.01, SiO₂ 0.03, TiO₂ 0.12, Nb₂O₅ 42.98, Ta₂O₅ 0.086, H₂O⁻ tr., H₂O⁺ not determined, sum 100.45 percent. Distribution of rare earths is La 24.0, Ce 42.7, Pr 7.24, Nd 21.5, Sm 2.69, Eu 0.49, Gd 1.04, Dy 0.36 percent.

The mineral is monoclinic, isomorphous with fergusonite. Most grains are metamict. Strongest X-ray lines (22 given) of material heated at 1000°C for one hour are 3.24 **10**, 3.058 **10**, 1.965 **10**, 1.910 **8**, 1.706 **8**, 1.677 **8**, 1.608 **8**. Cell parameters calculated from powder data are $a = 5.19$, $b = 11.34$, $c = 5.48$ Å, and $\beta = 84^\circ 57'$.

The mineral occurs as well formed crystals, frequently terminated with bipyramid. Color red to reddish brown, luster vitreous to greasy. Sp. gr. = 5.34.

No analysis was given for β -brocenite, the non-metamict equivalent of brocenite. The powder pattern of β -brocenite is similar to that of brocenite with strongest lines 3.21 **10**, 3.07 **10**, 1.963 **8**, 1.911 **7**, 1.708 **6**, 1.674 **6**, 1.611 **6**. β -brocenite has very low content of radioactive elements.

Both brocenite and β -brocenite occur in a skarn deposit in Northern China, associated with diopside, phlogopite, Ce-apatite, calcite, and topaz (?).

Discussion

Brocenite is the cerium analog of fergusonite. The name is apparently derived from the Chinese name which literally means a brown-cerium-niobium mineral. The name β -brocenite is unnecessary. It is most unfortunate that the type locality is not given. G.Y.C.

If the Levinson rule is followed (*Am. Mineral.* **51**, 152-158, 1966), brocenite should be called Beta-fergusonite-(Ce). M.F.

Chengbolite

SUN Wei-Chun, LI Chao-Lung, JEN Yao-Wu, CHANG Ying-Chen, CHENG Wan-Lu, YUAN Wen-Hsi, AND LI Wan Tang (1973) Chengbolite—a platinum group mineral in Precambrian eclogite. *Acta Geol. Sinica*, **1**, 89-93 (in Chinese).

Probe analyses gave Pt 39.4, 37.0; Pd 2.2, 3.96; Te 66.3, 68.0; sum 107.9, 108.96 percent; and wet microchemical analysis gave Pt 35.86, Pd 3.26, Te 58.16, Bi not found, sum 97.28 percent, corre-

sponding to Pt_{0.20}Pd_{0.02}Te_{0.62}, Pt_{0.19}Pd_{0.04}Te_{0.63}, and Pt_{0.18}Pd_{0.06}Te_{0.46} respectively, or ideally PtTe₂. The mineral dissolves in warm *aqua regia*.

The mineral is hexagonal (by analogy to synthetic PtTe₂) with $a = 4.041$ and $c = 5.220$ Å (calc). X-ray powder pattern is nearly identical to that of synthetic PtTe₂ and d values are significantly smaller than those for moncheite (*Am. Mineral.* **48**, 1181). Strongest of the 17 lines are 2.896 **10 101**, 2.086 **9 102**, 1.560 **8 103**, and 1.096 **7 114**.

Color silver gray, luster metallic. VHN (load not given) = 142 kg/mm², Sp. gr. > 10. Cleavage not observed. Bireflectance weak, bright to grayish white. Reflectance (in oil) = 51.6 (green), 42.9 (orange), 42.1 (red). Distinctly anisotropic from pale grayish blue to pale pink.

Chengbolite occurs as irregular grains (0.2-0.3 mm) in chalcopyrite in a mineralized amphibolite (?) assemblage within a Precambrian complex, in China. Associated ore minerals are bornite, magnetite, hematite, pyrite, chalcocite, covellite, tetrahedrite, malachite, and three unnamed minerals—PtCoCuS₄, a telluride of Hg and Pd, and a telluride of Hg, Ag, and Pd.

The name is for the locality, on which no information is given. G.Y.C.

Discussion

The mineral is evidently a bismuth-free variety of moncheite (*Am. Mineral.* **48**, 1181) and the name chengbolite is unnecessary. M.F.

Ferrihydrite*

CHUKHROV, F. V., B. B. ZVYAGIN, A. I. GORSHKOV, L. P. ERMILOVA, AND V. V. BALASHOVA (1973) Ferrihydrite. *Izvest. Akad. Nauk S.S.S.R.* **1973**, 23-33 (in Russian).

The phase previously reported by Towe and Bradley (1967), Jackson and Keller (1970), and Chukhrov *et al* (1971) has now been named ferrihydrite. Ten analyses are given, showing considerable variation in composition (impurities in part). The formula is 5Fe₂O₃·9H₂O. DTA curves show an endothermic break near 180° and an exothermic break at 350-400°. The infra-red spectrum shows bands due to molecular water at about 3450 and 1620 cm⁻¹; no bands of hydroxyl were noted. The water is lost continuously up to 450°. The mineral was synthesized by slow hydrolysis of ferric salts at pH above 3 and below 9.5. The presence of iron bacteria greatly increases the yield.

X-ray study shows strongest lines 2.50-2.54 (vs) *110*, 2.21-2.28 (s) *112*, 1.96-1.98 (s) *113*, 1.70-1.725 (w - s) *114*, 1.47-1.48 (m to vs) *300*. Electron diffraction study gives a hexagonal cell with a 5.08, c 9.4 Å. The structure has been worked out; it contains FeO₆-octahedra.

The mineral occurs as yellow-brown ochers to dark brown masses. G 3.96 (synthetic, Towe and Bradley).

The mineral occurs in both cold and hot springs, especially those

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

in which iron bacteria (*Gallionella*, *Leptothrix*, or *Toxothrix*) are present.

The name is for the composition. M.F.

References

- CHUKHROV, F. V., *et al* (1971) *Izvest. Akad. Nauk SSSR, Ser. Geol.* No. 1.
 JACKSON, T. A., AND W. D. KELLER (1970) *Am. J. Sci.* **269**, No. 5.
 TOWE, K. M., AND W. F. BRADLEY (1967) *J. Colloid Interface Sci.* **24**, No. 3.

Graemite*

S. A. WILLIAMS, AND PHILLIP MATTER, III (1975) Graemite, a new Bisbee mineral. *Mineral. Rec.* **6**, 32-34.

Microchemical analyses by M. Duggan gave TeO₂ 60.8, 61.4, 61.4 av. 61.2; CuO 31.0, 31.9, 30.0, av. 31.0; H₂O (Penfield method) 7.0, 9.5, av. 8.2, sum 100.4 percent, corresponding to CuTeO₃·H₂O. Spectrographic analysis showed a trace of Ag. Microchemical tests for tellurite were positive, for tellurate, halides, and sulfate negative. The mineral is insoluble in water, easily soluble in cold dilute acids or 40% KOH. When heated, it decrepitates and fuses easily to a gray blebby slag.

The mineral occurs as crystals up to 8 mm long showing forms *a* {100}, *b* {010}, *c* {001}, and *d* {021}. Rotation and Weissenberg photographs show the mineral to be orthorhombic, space group probably *Pcmm*, *a* 6.805 ± 0.006, *b* 25.613 ± 0.015, *c* 5.780 ± 0.006 Å, *Z* = 10, *G* calc 4.24, meas 4.13 ± 0.09. The strongest X-ray lines (28 given) are 12.803 **5 020**, 6.395 **10 040**, 3.434 **8 061**, 2.873 **4 012**, 2.558 **5 010.0, 091**, 2.343 **4 010.1**.

The mineral is blue-green, near jade green. *H* 3-3.5, brittle. Cleavage {010} good, parting {100}. Not fluorescent. Optically biaxial, pos., *ns* (Na) α 1.920 ± 0.003, β 1.960 ± 0.003, γ 2.20 ± 0.005, 2*V* + 48.5°, dispersion not observed, pleochroic with *X* yellowish-green, *Y* and *Z* blue-green, absorption *Y* > *Z* = *X*.

The mineral, collected in 1959 from the 1200 ft. level of the Cole shaft, Bisbee, Arizona, occurs replacing teinite crystals embedded in malachite. Cuprite is associated. A second occurrence is from a prospect in the Dome Rock Mts., Yuma Co., Arizona, where the mineral occurs replacing teinite, in cavities in samples containing chalcocite, corroded bornite, weissite, brochantite, malachite, and goethite.

The name is for Richard Graeme, geologist, Phelps Dodge Corp., who found the mineral. Type material is at the University of Arizona, Tucson. M.F.

Incaite*

EMIL MAKOVICKY (1974) Mineralogical data on cylindrite and incaite. *Neues Jahrb. Mineral. Monatsh.* **6**, 235-256.

Incaite and stannite occur as very fine lamellae, replacing cylindrite, in samples from Poopo, Bolivia. Five electron microprobe analyses gave S 22.99-23.49, av. 23.20; Pb 36.05-37.08, av. 36.53; Ag 1.83-2.24, av. 2.15; Sn 22.14-23.71, av. 23.09; Sb 12.01-13.29, av. 12.70; Fe 2.28-2.41, av. 2.35 percent; corresponding to a cell content of Pb₃₅₁Ag₃₃Sn₁₃₆₉Sb₂₀₂Fe₇₉S₁₃₄₄, or nearly (Pb,Ag)_{3.7}Fe_{0.9}Sn_{4.2}Sb_{2.9}S_{15.2}, or FePb₄Sn₄Sb₂S₁₅.

X-ray data show that the structure is composed of two types of alternating layers, one pseudotetragonal with *a* 86.23, *b* 5.79, *c* 34.98 Å, α 90°, β 90.28°, γ 90°; and one pseudo-hexagonal, *a* 258.7, *b* 3.66, *c* 69.85 Å., α 90°, β 90.28°, γ 90°. The strongest X-ray lines (16 given) (indexing of tetrag. and hex. components, resp.) are 4.31 (m) **400,400**; 3.43 (m-s) **311**, □; 2.862 (vs) **600, 020, 120; 600; 2.029 (S) 122**, □.

Color grayish-white. Distinctly anisotropic with color greenish- and brownish-gray under crossed nicols. Cleavage {100} excellent. Reflectances (max., min): 480 nm, 33.7, 29.8; 540 nm, 33.2, 29.0; 600 nm, 32.9, 28.6; 640 nm, 32.5, 28.1 percent.

The name is for the Incas, first recorded miners of Ag-Sn ores of the area. Type material is in the Redpath Museum, McGill University, Montreal. M.F.

Khademite

PIERRE BARIAND, JEAN-PAUL BERTHELON, FABIEN CESBRON, AND MANOUCHER SADRZADEH (1973) Un nouveau sulfate hydrate d'aluminium: la khademite de Saghand (Iran). *C. R. Acad. Sci. Paris*, **277D**, 1585-1588.

Analysis gave Al₂O₃ 21.6 (wet chem.), SO₃ 35.2, H₂O 41.7 (TGA on 3.5 mg), sum 98.5 percent, corresponding to Al₂O₃·2.08 SO₃·10.9 H₂O, or Al(SO₄)(OH)·5H₂O. Spectrographic analysis showed Fe 0.1, Si 0.05, Na 0.02, Mg 0.01, Ti 0.005, Cu 0.002 percent. The DTA curve on 3.8 mg showed a large endothermic effect at 178° (loss of H₂O), another smaller one at 678° (loss of SO₃), and a large one at 803° (loss of remaining SO₃). A TGA curve is given.

Precession data show the mineral to be orthorhombic, space group *Pcab*, *a* 11.178, *b* 13.055, *c* 10.887 (all ± 0.004) Å, *Z* = 8. The strongest X-ray lines (63 given) are 4.247 **100 220**, 4.179 **71 022**, 3.901 **52 202**, 2.730 **59 241**. Crystals show the forms (010) and (001) (dominant), also (110), (111), and (313).

The mineral is colorless, no cleavage observed. *G* 1.925. Optically biaxial, negative, *ns* α 1.44 (calc), β 1.460, γ 1.487, 2*V* 68 ± 1°, *Z*=*a*, *Y*=*b*, dispersion not given. It was found at Saghand, Iran, associated with copiapite, butlerite, parabutlerite, jarosite, amarantite, and alunogen. The name is for N. Khadem, Director, Geological Survey of Iran. M.F.

Kinoshitalite*

M. YOSHII, K. MAEDA, T. KATO, T. WATANABE, S. YUI, A. KATO, AND K. NAGASHIMA (1973) Kinoshitalite, a new mineral from the Noda-Tamagawa mine, Iwate Prefecture. *Chigaku Kenkyu (Geosci. Mag.)*, **24**, 181-190 (in Japanese).

Chemical analysis by K. Maeda and K. Nagashima gave SiO₂ 24.58, TiO₂ 0.16, Al₂O₃ 22.06, Fe₂O₃ 0.71, Mn₂O₃ 3.24, FeO 0.04, MnO 7.38, MgO 16.60, CaO 0.05, BaO 17.85, Na₂O 0.68, K₂O 3.30, F 0.21, H₂O⁺ 2.90, H₂O⁻ 0.20, (O=F₂)-0.09, total 99.87 percent, corresponding to (Ba_{0.584}K_{0.352}Na_{0.110}Ca_{0.005})_{1.051}(Mg_{2.065}Mn²⁺_{0.522}Al_{0.223}Mn³⁺_{0.208}Fe³⁺_{0.045}Ti_{0.010}Fe²⁺_{0.008})_{3.074}(Si_{2.052}Al_{1.948})_{4.000}O_{10.000}[(OH)_{1.615}F_{0.055}O_{0.330}]_{2.000} on the basis of (O + OH + F) = 12. This is the Mg analog of anandite.

X-ray single crystal studies show it to be monoclinic, space group *C2/m*, *a* 5.345(3), *b* 9.250(4), *c* 10.256(8) Å, β 99.99(6)°, *Z*=2, 2*M*₁ polytype is also found. The strongest lines (17 given) are 10.1 **45 001**, 5.05 **50 002**, 3.37 **100 003**, 3.16 **5 013, 112**, 2.93 **5 113**, 2.72 **4 122,023**, 2.52 **55 004**, 2.020 **55 005**, 1.684 **15 006**, 1.546 **4 060**. The structure analysis is under way.

It is yellow brown in color, semi-transparent. Luster vitreous. Cleavage {001} perfect. Hardness (Mohs) 2½-3. Specific gravity 3.30 (meas), 3.33 (calc). Optically biaxial negative 2*V*=23°, α 1.619, β 1.633, γ 1.635, γ-α=0.016; axial colors *X* very light yellow, *Y* and *Z* light yellow; absorption *X* < *Y* ≈ *Z*.

It is found as small scales less than 1 mm across in hausmannite-tephroite ore from South No. 1 stope, 12th level of Misago ore body of Noda-Tamagawa mine, Iwate Prefecture. Also found in association with celsian, quartz, spessartine, rhodonite,

chalcopyrite, and pyrrhotite at 6th level of the same ore body. The material from the latter locality contains more iron.

The name is for Dr. Kameki Kinoshita (1896–1974), an eminent investigator of ore deposits in Japan. Type material is deposited at the Department of Geology, National Science Museum, Shinjuku, Tokyo. **A.K.**

Note

A subsequent occurrence is also reported from Hokkejino, Kyoto Prefecture (S. Matsubara, A. Kato, K. Nagashima and G. Matsuo, *Abstr. Autumn Meet. Jap. Assoc. Petrol. Mineral. Econ. Geol., Mineral. Soc. Japan, and Soc. Mining Geol. Japan*, at Yamaguchi, p. 26, 1974). Chemical analysis by K. Nagashima gave SiO_2 26.91, Al_2O_3 17.74, TiO_2 0.53, Fe_2O_3 0.49, MnO 4.73, MgO 20.90, CaO 0.83, BaO 22.53, SrO 0.02, Na_2O 0.05, K_2O 2.35, F 2.84, H_2O^+ 1.33, $-\text{O} = \text{F}_2$ 1.20, total 100.05 percent; space group *Cm* or *C2/m*, a 5.344(2), b 9.200(2), c 10.15(2) Å, β 100.2°, $Z = 2$; colorless in thin section, $(-)$ 2*V* very small, α 1.615(2), $\beta \approx \gamma$ 1.630(2). Associated minerals are tephroite, rhodonite, celsian, rhodochrosite, and rarely huebnerite, and sonolite. **A.K.**

Koashvite*

YU. L. KAPUSTIN, Z. V. PUDOVKINA, A. V. BYKOVA, AND G. V. LYUBOMILOVA (1974) Koashvite, a new mineral. *Zapiski Vses. Mineral. Obshch.* **103**, 559–566 (in Russian).

Analyses by A.V.B. and G. V. L. gave, resp., SiO_2 50.00, 51.00; TiO_2 4.45, 5.07; Nb_2O_5 0.40; Al_2O_3 tr., none; Fe_2O_3 4.45, 5.42; FeO 0.78, —; MgO 0.34, tr.; MnO 4.35, 4.20; CaO 7.33, 6.00; Na_2O 27.00, 25.60; K_2O 0.08, 0.38; H_2O 1.10, 2.27, sum 100.28, 99.94 percent. Spectrographic analysis showed traces (~ 1 ppm) of V, Be, Ba; absent rare earths, P, Zr. These analyses yield formulas:

- (1) $(\text{Na}_{24.83}\text{K}_{0.05})(\text{Ca}_{3.72}\text{Mn}_{1.76}\text{Fe}^{2+}_{0.31}\text{Mg}_{0.24})$
 $(\text{Ti}_{1.59}\text{Fe}^{3+}_{1.59}\text{Nb}_{0.09}\text{Si}_{23.71}\text{O}_{71.67} \cdot 1.74 \text{H}_2\text{O}$, and
- (2) $(\text{Na}_{23.54}\text{K}_{0.23})(\text{Ca}_{3.05}\text{Mn}_{1.68})$
 $(\text{Ti}_{1.81}\text{Fe}^{3+}_{1.83}\text{Si}_{24.19}\text{O}_{71.54} \cdot 3.59 \text{H}_2\text{O}$

These may be simplified to $\text{Na}_6(\text{Ca},\text{Mn})(\text{Ti},\text{Fe})\text{Si}_6\text{O}_{18}$ or $\text{Na}_6(\text{Ca},\text{Mn})(\text{Ti},\text{Fe})\text{Si}_6\text{O}_{18} \cdot \text{H}_2\text{O}$ ($Z = 4$), or possibly $\text{Na}_8\text{Ca}_2\text{TiSi}_8\text{O}_{24}$ ($Z = 3$). A structure determination is being made. The DTA curve shows a small endothermic effect at 200–300° (loss of water). The mineral fuses at a white enamel at 900–920°.

Laue and oscillation diagrams showed koashvite to be orthorhombic, space group *Pbam* or *Pba2*, a 7.356 \pm 0.03, b 20.950 \pm 0.006, c 10.194 \pm 0.002 Å, G calc 3.069, meas 2.98–3.02. The strongest X-ray lines (96 given) are 3.66 **50 200**, **042**, **150**, 3.28 **50 221**, **142**, **230**, 2.620 **40 080**, 2.581 **100 242**, 1.820 **70 084**, 1.504 **50 480**, 3.11.0, 1.13.2, 1.476 **40 2.13.0**, **424**, **285**, 1.294 **40**.

The mineral occurs as veinlets replacing lomonosovite in alkalic pegmatite on the eastern slope of Mt. Koashva, Khibina massif, Kola Peninsula. It is associated with pectolite, villiaumite, and natrophosphate. It is pale yellow, transparent, luster vitreous. H 680–740 kg/sq mm (20 g load) = 6 Mohs. Fracture conchoidal, no cleavage. Optically biaxial, neg., $n_s \alpha$ 1.637, β 1.643, γ 1.648 2*V* 83°, $r > v$, weak.

The name is for the locality. Type material is in the Mineralogical Museum, Acad. Sci. U.S.S.R., Moscow. **M.F.**

Laplandite*

E. M. ESKOVA, E. I. SEMENOV, A. P. KHOMYAKOV, M. E. KAZAKOVA, AND O. V. SIDORENKO (1974) Laplandite, a new

mineral. *Zapiski Vses. Mineral. Obshch.* **103**, 571–575 (in Russian).

Analysis of a yellowish sample by M.E.K. gave SiO_2 40.94, P_2O_5 9.62, TiO_2 4.08, Nb_2O_5 1.88, Al_2O_3 0.94, Fe_2O_3 0.64, MgO 1.02, MnO 0.20, CaO 0.56, ThO_2 1.32, RE_2O_3 , 16.79, Na_2O 9.81, K_2O 1.88, H_2O^+ 8.96, H_2O^- 0.37, sum 99.01 percent. Flame photometric analysis of a bluish sample by E. A. Fabrikova gave Sr 4.15 percent. Spectrographic study showed Sr and Ba 0.n percent, also traces of Be, Pb, Ga, Cu, Zr. X-ray spectrographic analysis of the rare earths showed La 46.7, Ce 51.2, Pr 5.2, Nd 6.6 percent. The DTA curve showed 2 endothermic effects at 180° and 360° (loss of H_2O). The mineral sinters at 870°. The infrared absorption curve indicates the presence of Si- and P-complexes, water, and probably hydroxyl.

The analysis leads to the formula $(\text{Na},\text{K},\text{Ca})_{16}(\text{Ce},\text{Th})_4(\text{Ti},\text{Mg},\text{Al},\text{Nb})_4(\text{P},\text{Si})_{32}\text{O}_{88} \cdot 20\text{H}_2\text{O}$ ($Z = 1$), or $\text{Na}_4\text{CeTiPSi}_7\text{O}_{22} \cdot 5\text{H}_2\text{O}$ ($Z = 4$).

Single crystals suitable for study could not be found. Electron diffraction data showed the mineral to be orthorhombic, diffraction group *Pmmm*, a 7.27, b 14.38, c 22.25 Å, $a:b:c = 0.5056:1:1.5473$. The strongest lines of the X-ray pattern (Fe radiation) are 3.78 **90 132**, 3.34 **90 212**, 3.25 **70 132**, **203**, **140**, 3.01 **70 204**, 2.82 **90 232**, 2.60 **50 206**, 1.894 **50 344**, 1.780 **70 2.3.10**.

The mineral forms radiating-fibrous deposits up to 0.5–1 cm and fan-shaped platy aggregates; the plates about 0.01 mm thick are flattened on the c axis. Under the electron microscopy they are seen to consist of prismatic individuals. Color light gray to yellowish, rarely bluish, colorless in section. Luster vitreous to greasy. H 2–3. Fracture splintery. Optically biaxial, negative, $n_s \alpha$ 1.568, β 1.584, γ 1.585, 2*V* calc = -28° . Direct determination of 2*V* could not be made. G 2.83.

The mineral occurs in the natrolite zone of the Jubilee pegmatite, Mt. Karnasurt, Lovozero massif, Kola Peninsula, associated with belovite, nordite, serandite, thermonatrite, steenstrupine, leucosphenite, sphalerite, ilmajokite, raite, and zorite.

The name is for the locality. Type material is at the Mineralogical Museum, Acad. Sci. USSR, and at I.M.G.R.E., both in Moscow. **M.F.**

Nyerereite* and Natrofairchildite

Nyerereite*

CHARLES MILTON (1968) The "natro-carbonatite" lava of Oldionyo Lengai, Tanzania (abst.). *Geol. Soc. Am. Program, Annu. Meet.* 1968, p. 202.

This abstract gives only the name and the composition $\text{Na}_2\text{Ca}(\text{CO}_3)_2$, with no further data. It had not been listed previously here in the hope that a full description would be published. In view of the publication of the name natrofairchildite for a mineral of the same composition and of the appearance of the name nyerereite in the literature (Strunz, *Mineral. Tabellen*, 5th Ed., p. 240, 1970; Cooper and Gittins, *Can. Mineral.* **12**, 426, 1974), despite the fact that it was approved by the IMA Commission in October 1963, I am here giving the data as submitted in 1963.

Analysis by Blanche Ingram on 120 mg of clear, homogeneous grains gave CaO 22.2, SrO 2.0, BaO 0.6, Na_2O 26.2, K_2O 7.9, CO_2 39.0, SO_3 2.1, Cl 0.42, F 0.23, H_2O 0.8, sum 101.4 — ($\text{O} = \text{F}_2, \text{Cl}_2$) 0.2 = 101.2 percent. This corresponds to the formula $(\text{Na}_{2.03}\text{K}_{0.48})[(\text{Ca}_{1.12}\text{Sr}_{0.06})(\text{Cl}_{0.01}\text{F}_{0.01}\text{O}_{0.38}(\text{OH})_{0.02})] \cdot (\text{Ca}_{0.94}\text{Sr}_{0.06}\text{Ba}_{0.01})\text{CO}_3$, or nearly $\text{CaCO}_3 \cdot 1.2 \text{Na}_2\text{CO}_3$.

X-ray study showed strongest lines 6.38 (vs) **002**, 4.383 (vs) **400**, 3.185 (ms) **004**, 3.046 (vvs) **601**, 2.582 (s) **404**, 2.533 (vs) **005**, 2.070

(vs) 116. Synthetic material is hexagonal, a 20.3, c 12.04 Å (Strunz).

The mineral forms platy colorless crystals up to 0.5 mm across. Optically uniaxial, negative, n_O 1.504, n_E 1.49, G 2.41. The mineral is stable in air. It occurs as a major constituent of the so-called "carbonate lava" at Mt. Oldoinyo Lengai, northern Tanzania.

The name is for Julius Nyerere, President of Tanzania.

Natrofairchildite

YU. L. KAPUSTIN (1971) Mineralogy of carbonatites. *Izdat. "Nauka", Moscow*, p. 181-183 (in Russian).

Analysis of natrofairchildite by A. V. Bykova and L. I. Baum gave CaO 25.61, SrO 0.85, BaO 0.44, Na₂O 29.46, K₂O 1.35, CO₂ 41.93, sum 99.64 percent, corresponding to (Na,K)_{2.60}Ca_{0.93}(CO₃)₂, the Na analog of fairchildite, K₂Ca(CO₃)₂. Spectrographic analysis showed small amounts of Mg, Fe, Mn, La, and Y.

The X-ray pattern is very close to that of fairchildite (which is hexagonal). The strongest of 25 lines are 6.71 6, 3.18 10, 2.67 4, 2.64 9, 2.20 6, 2.10 5, 1.891 6.

The mineral is white, luster vitreous, H 2.5, one percent cleavage (basal?). Optically uniaxial, neg., n_O 1.525, n_E 1.459; sometimes slightly biaxial. Under the microscope shows polysynthetic twinning parallel to the cleavage. Luminesces slightly in orange in U.V. light.

The mineral occurs as single platy crystals (1-2 mm), not showing faces, or as fan-shaped aggregates in burbankite-calcite veins of the Vuoriyarvi massif, Kola Peninsula. The mineral decomposes readily at the surface and is replaced by powdery calcite. It was found only at depths of 70 meters or greater.

Discussion

It is regrettable that the name natrofairchildite was published without having been submitted to the IMA Commission. It is also regrettable that the description of nyerereite has not been published in full after so many years. The name nyerereite has priority, but the data given are not sufficient to permit a decision as to whether they are the same mineral. M.F.

Phosinaite*

YU. L. KAPUSTIN, A. P. KHOMYAKOV, E. I. SEMENOV, E. M. ES'KOVA, A. V. BYKOVA, AND Z. V. PUDOVKINA (1974) Phosinaite, a new rare-earth mineral. *Zapiski Vses. Mineral. Obshch.* **103**, 567-570 (in Russian).

Analyses by A.M.B. from Khibina (first and second) and Lovozero (third) gave P₂O₅ 21.30, 21.60, 20.50; SiO₂ 18.30, 18.81, 23.78; Fe₂O₃ —, —, 0.49; MnO tr., —, 1.90; TR₂O₃ 13.44, 13.00, 13.80; CaO 12.20, 12.00, 5.39; Na₂O 28.10, 28.00, 28.78; K₂O 0.74, 0.70, 0.47; Li₂O —, —, 0.24; H₂O 6.07, 5.67, 4.41; sum 100.15, 99.78, 99.76 percent. The first two lead to the formula H₂Na₂(Ca, Ce)(SiO₄)(PO₄) or (Na_{3.02}K_{0.08})(Ca_{0.41}Ce_{0.27})Si_{0.27}P_{0.94}O_{7.27}·0.80H₂O.

The rare earths of the Khibina and Lovozero samples contained respectively by spectrographic analysis La 16.8, Ce 53.9, Pr 4.4, Nd 19.5, Sm 3.0, Eu 0.5, Gd 0.7, Tb 0.3, Er 0.3, Y 0.6 percent. The DTA curve shows an endothermic break at 250° (loss of water); the Lovozero mineral also shows one at 600°. The mineral fuses at about 860°. It dissolves slowly in concentrated acids. Spectrographic analysis showed traces of Pb, Sn, Ca, Al, Cu. The infrared spectrum is given.

Single crystal study showed phosinaite to be orthorhombic, space group $P22_12$ or 22_12_1 , a 12.23, b 14.62, c 7.21 Å (Khibina); a 12.24, b 14.59, c 7.20 Å (Lovozero). The strongest lines (37

given) for Khibina material are 7.44 55 020, 6.92 50 001, 3.51 41 311, 2.74 100 340, 2.566 53 040. The Lovozero material gives a similar pattern.

Colorless, pale rose, to brownish-rose, luster vitreous. The Lovozero material is in columnar crystals up to 5 × 1 mm, the Khibina as colorless to pale rose accumulations of irregular form. Forms shown are {110} (predominant), also {100}, {010}, {001}. Cleavage perfect on {100}, imperfect on {010} and {110}. G 2.62 (K) 3.00 (L). Optically biaxial, neg., n_s α 1.567, β 1.569, γ 1.570 (K); α 1.570, β 1.572, γ 1.573 (L), $-2V = 68^\circ, 70^\circ$, $X = b$, $Y = c$, $Z = a$. H 3.5 (207-340 kg/sq mm)

The mineral occurs in alkalic pegmatites on the eastern slope of Mt. Koashva, Khibina, filling interstices between large crystals of anorthoclase, associated with nepheline, aegirine, lomonosovite, and barian lamprophyllite. It occurs in ussingite veinlets cutting alkalic rocks at Mt. Karnasurt, Lovozero, associated with belovite, nordite, neptunite, and vuonnemite. All the associations are characteristically high in alkalis, volatiles, and rare elements.

The name is for the principal components. Type material is at the Mineralogical Museum, Acad. Sci. USSR, and at I.M.G.R.E., both in Moscow. M.F.

Strelkinite*

M. A. ALEKSEEVA, A. A. CHERNIKOV, D. P. SHASHKIN, E. A. KON'KOVA, AND I. N. GAVRILOVA (1974) Strelkinite, a new uranyl vanadate. *Zapiski Vses. Mineral. Obshch.* **103**, 576-580 (in Russian).

Analyses by M.A.A., E. Ya. Slezkova, and N. N. Kuznetsova on 100 mg samples gave, resp., UO₃ 46.93, 61.48, 56.95; V₂O₅ 16.03, 21.30, 18.50; Na₂O 3.25, 8.35, 6.20; K₂O —, —, 0.20; CaO 0.55, 0.40, 1.44; SiO₂ 8.55, —, 4.40; Fe₂O₃ 9.13, —, —; Al₂O₃ 5.61, —, 0.22, H₂O⁺ 7.91, 8.12, —; loss on ign. —, —, 12.50 (=H₂O 10.27, CO₂ 1.15, reduction of U and V 1.08 percent), sum 99.51, 99.65, 100.41 percent. Sample 1 contained calcite, quartz, kaolinite, limonite; Sample 2, calcite; Sample 3, calcite, quartz, and hydromica. Spectrographic analysis showed also Ni, Co, Ti, Y, Cr, Mo, Cu, and Pb about 0.01 percent, As and Y about 0.001 percent, and in some samples Tl 0.1 percent. Heating sample 2 showed loss of weight 2.97 percent to 150°, 3.54 to 250°, 5.47 to 300°, 7.12 to 400°, 7.47 to 500°, 7.69 to 700°, 8.12 percent to 1000°, the mineral changing from yellow to green to brown to black. After deducting the indicated impurities, the formula is Na₂(UO₂)₂(VO₃)₂·6H₂O, i.e., the Na analog of carnotite.

Laue, oscillation, and Weissenberg photographs showed the mineral to be orthorhombic, space group $Pnmm$ or $Pnm2$, a 10.64, b 8.36, c 32.72, (all \pm 0.02) Å, $Z = 8$, G calc 4.22, meas (corrected for impurities) 4.0-4.2. The strongest X-ray lines (17 given) are 8.18 4 004, 7.68 10 103, 4.08 6 008, 3.95 8 120, 3.20 5 312, 2.007 4 1.0.10.

Color gold-yellow and canary-yellow, luster silky to pearly. Cleavage perfect perpendicular to {001}. G 3.7 to 3.91, H 2-2.5. Optically biaxial neg., n_s α 1.770-1.674, β 1.907-1.855, γ 1.915-1.880, $2V$ medium, pleochroism on basal section weak from pale yellow on Z to yellow on Y . Birefringence 0.143. $Z = a$, $Y = b$, $X = c$. Luminesces weakly in U.V. light in dirty green.

The mineral was first found in Paleozoic carbonaceous-siliceous shales "in one of the desert regions of the U.S.S.R." It was later found repeatedly in Devonian effusive rocks "in other regions of the arid zone of the U.S.S.R." It forms fine powdery crusts along fractures in the country rocks, associated with iron hydroxides, clay minerals, quartz, and calcite. Sometimes occurs in plates of nearly isometric form, not exceeding 1.5 mm in length.

The name is for Professor M. F. Strelkin (1905–1965), Russian mineralogist, student of U ores. Type material is in the Mineralogical Museum, Acad. Sci. USSR, Moscow. **M.F.**

Telargpalite*

V. A. KOVALENKER, A. D. GENKIN, T. L. EVSTIGNEEVA, AND I. P. LAPUTINA (1974) Telargpalite, a new mineral of palladium, silver and tellurium, from the copper-nickel ores of the Oktyabr deposit. *Zapiski Vses. Mineral. Obshch.* **103**, 595–600 (in Russian).

Microprobe analyses of 9 samples gave Pd 38.9–40.5, Ag 28.2–31.2, Pb 2.3–8.5, Bi 2.1–8.3, Te 19.6–21.0, Se none to 0.6, sum 98.5–101.8 percent. The formula may be calculated in several ways: (1) $(\text{Pd,Ag})_{16}(\text{Pb,Bi})(\text{Te,Se})_4$; (2) $(\text{Pd,Ag})_{8+x}(\text{Te,Pb,Bi,Se})(Z = 4)$, (3) $(\text{Pd,Ag,Pb,Bi})_{4+x}(\text{Te,Se})$, or approx. $(\text{Pd,Ag})_{4+x}\text{Te}$. Decision will have to wait on precise structural study.

X-ray study shows the mineral to be cubic, with $a_0 = 12.60 \pm 0.02 \text{ \AA}$. The strongest X-ray lines (23 given) are 3.05 **4 410**, 2.74 **3 421**, 2.42 **10 333**, 2.10 **5 600**, 1.475 **3 661**.

In reflected light in air and oil, the color is light gray with a lilac tint. Isotropic. Reflectances: 460 nm, 45.3; 540, 50.1; 580, 51.7; 660, 55.6 percent. Hardness 46 to 84, av. 62 kg/sq mm (10 g load).

The mineral occurs as rounded, often elongated grains 5–200 microns in size in chalcopyrite, rarely in bornite and millerite of copper-nickel ores of the Oktyabr deposit, Noril'sk region, U.S.S.R. It forms intergrowths with kotulskite, with unnamed minerals of composition $(\text{Pd,Ag})_3(\text{Ag,Pb})(\text{Te,Se})$ and $\text{Pd}_3(\text{As,Te})$, also native Ag, braggite, clausthalite, and unnamed mineral $\text{PdPb}(\text{S,Se})$.

The name is for the main components. Type material is at the Mineralogical Museum, Acad. Sci. U.S.S.R., and at I.G.E.M., both in Moscow. **M.F.**

Zirsinalite*

YU. L. KAPUSTIN, Z. V. PUDOVKINA, AND A. V. BYKOVA (1974)

Zirsinalite, a new mineral. *Zapiski Vses. Mineral. Obshch.* **103**, 551–558 (in Russian).

Analyses by A. V. B. gave SiO_2 52.10, 52.00; TiO_2 0.40, 0.56; ZrO_2 12.84, 12.84; Al, Fe_2O_3 , Tr_2O_3 , K_2O , Cl not found; FeO 0.40, 0.80; MnO 2.62, 2.60; CaO 4.80, 4.75; Na_2O 26.00, 25.67; H_2O 0.90, 0.80; sum 100.06, 100.02 percent. Spectrographic analysis showed HfO_2 0.42 percent, traces of Sr, Y, Be, K, Zn, Ba. These correspond to $\text{Na}_6(\text{Ca,Mn,Fe})\text{ZrSi}_6\text{O}_{18}$. The mineral is slowly decomposed in cold dilute acids, but readily decomposed at 60–80° by 10 percent HCl or H_2SO_4 , with separation of gelatinous silica. Slowly leached by cold water; finely ground material loses 1.71 percent Na in a few hours, 2.91 percent Na in a week; the residue gives the same X-ray pattern as the original. Hot water leaches 3.0 percent Na in 1 hour. DTA and TG curves show a small endothermic break at 300°C, corresponding with a loss of weight of 1 percent. Melts at about 1000° to a white enamel bead.

X-ray study shows the mineral to be trigonal, space group $R\bar{3}m$, $R\bar{3}m$, or $R32$, hexagonal cell a 10.29, c 13.11 \pm 0.04 Å; rhombohedral cell, a_{rh} 7.38 \pm 0.03 Å, α 88°28'. The strongest X-ray lines (85 given) are 3.26 **6 2131**, 2.637 **9 0224**, 2.569 **8 2240**, 1.842 **10 4044** (Fe-radiation). $Z = 3$, G calc 3.08, meas 2.90.

The mineral occurs as rounded or irregular deposits up to 1 \times 1.5 cm. Colorless, transparent, to slightly yellowish-gray, luster vitreous. Fracture granular or small conchoidal, no cleavage. H 5.5; microhardness 640–720 kg/sq mm, G 2.88–2.92. Optically uniaxial, negative, n_O 1.610, n_E 1.605.

The mineral occurs at 180 m depth in a drill core on the eastern slope of Mt. Koashva, Khibina massif, Kola Peninsula. It occurs in pegmatitic veinlets cutting alkalic rocks, associated with aegirine, lomonosovite, and barian lamprophyllite. It is replaced by lovozerite and by eudialyte. The mineral is rapidly corroded in air with the formation of a powdery coating of sodium carbonate.

The name is for the composition. Type material is preserved at the Mineralogical Museum, Academy of Sciences, Moscow. **M.F.**

NEW DATA

Freibergite

J. F. RILEY (1974) The tetrahedrite—freibergite series, with reference to the Mount Isa Pb-Zn-Ag orebody. *Mineral. Dep.* **9**, 117–124.

Freibergite has generally been considered to be an argentian tetrahedrite, $(\text{Cu, Ag, Zn, Fe})_{12}(\text{Sb, As})_4\text{S}_{13}$. In this paper, microprobe analyses and unit cell determinations are given of 21 samples from Mt. Isa, Australia, 9 of which have $\text{Ag} > \text{Cu}$. The complete analysis with highest Ag had Ag 36.0, Cu 12.4, Fe 4.1, Zn

0.6, Sb 25.1, As 0.5, S 21.8, sum 100.5 percent, corresponding to the formula $(\text{Ag}_{6.37}\text{Cu}_{3.72}\text{Fe}_{1.41}\text{Zn}_{0.18})(\text{Sb}_{3.95}\text{As}_{0.13})\text{S}_{13.00}$, a 10.47 Å. Other partial microprobe analyses showed up to 42.5 Ag. The unit cell size first increases with increasing Ag to a maximum of 10.560 Å at about 20–22 percent Ag, then decreases again.

The data verify those of Petruk *et al* (*Can. Mineral.* **11**, 196–231, 1971), who found up to 35.6 percent Ag in samples from Ontario (3 with $\text{Ag} > \text{Cu}$).

Freibergite is therefore not a variety, but a species of the tetrahedrite group, with $\text{Ag} > \text{Cu}$. **M.F.**

DISCREDITED MINERALS

Brostenite = mixture

ELENA A. PERSEIL (1973) Precisions mineralogiques sur la nature des "brostenites." *C. R. Acad. Sci. Paris*, **277D**, 2113–2115.

X-ray and infrared examination of samples of brostenite studied

by Butureau (1917; Dana's *System*, 7th ed., vol. 1, p. 569) showed that they consisted of cores of rhodochrosite, associated with tephroite and friedelite, and alteration products consisting of todorokite and birnessite. **M.F.**