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# NEW MINERAL NAMES

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## Sinnerite

F. MARUMO AND W. NOWACKI, The crystal structure of lautite and of sinnerite, a new mineral from the Lengenbach Quarry: *Schweiz. Mineral. Petrog. Mitt.* **44**, 439–54 (1964)

A "small crystal of a steel-gray mineral" was found with binnite in the Lengenbach quarry, Binnatal, Switzerland. Electron microprobe analyses by Applied Research Labs., Glendale, Calif., and Bur. Recherches Geol. Minieres, Paris, gave, resp., Cu 41.3, 39.1; As 29.2, 29.7; S 29.8, 28.7, sum 100.3, 97.5%, corresponding to a content of $Cu_{1.4}As_{0.9}S_{2.1}$ in the pseudo-cubic cell. G 5.2±0.3.

Weissenberg photographs yield a subcell $a'$ 3.72, $b'$ 3.70, $c'$5.24 Å., $\alpha' \doteqdot \beta' \doteqdot \gamma' \doteqdot 90°$, which after rotation becomes pseudocubic with $a''$ 5.25, $b''$ 5.25, $c''$ 5.24 Å., $\alpha'' \doteqdot \beta \doteqdot \gamma'' \doteqdot 90°$, similar to those of tennantite (binnite)($a = 2 \times 5.10$ Å) and of luzonite ($a = 5.27$, $c = 2 \times 5.20$ Å.). The $x$-ray photographs, however, show that spots on the reciprocal planes, k=4n (n=integer), are composed of at least two spots, indicating twinning. The true symmetry is therefore probably triclinic, with $a$ 21.7, $b$ 19.0, $c$ 19.7 Å., $\alpha$ 27°10′, $\beta$ 155°20′, $\gamma$ 137°55′ (The published value of $\alpha$, 15°35″, is due to an error in calculation, letter from W. Nowacki, Feb. 16, 1965). The structure is closely related to those of tennantite and sphalerite. The strongest $x$-ray lines are 1.010 (100), 3.04 (90), 1.073 (90), 1.859 (70), 1.584 (65), 1.206 (40).

The name is for the late Rudolf von Sinner, president of the Commission of the Naturhistorisches Museum, Berne.

The name was approved before publication by the Commission on New Minerals and Mineral Names, IMA.

DISCUSSION.—The $x$-ray lines given match closely lines given for luzonite by Gaines, *Am. Mineral.* **42**, 766–79 (1957), but the arsenic content and value of G are considerably different. It is therefore not certain that sinnerite is not twinned luzonite or possibly an oriented intergrowth of luzonite with binnite.

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## Tucanite

M. KARSULIN, Das Mineral $2Al_2(OH)_6 \cdot 1H_2O$—"Tucanit": *Acad. Yougoslav. Sci. Arts, Symposium Sur les Bauxites*, Zagreb, Oct. 1–3 (1963), 1964, V. II, p. 37–46.

White, chalky material from a bauxite deposit at Carev Most near Niksic, Montenegro, gave $Al_2O_3$ 52.94, $H_2O$ 46.30, $SiO_2$ 0.46, sum 99.70%, corresponding to $Al_2O_3 \cdot 4.95 H_2O$. Dehydration experiments are interpreted as leading to a composition $Al_2O_3 \cdot 3.5 H_2O$ below 150°; at 150°, dehydration gives $Al_2O_3 \cdot 3H_2O$ with $x$-ray pattern different from that of gibbsite. A thermogravimetric curve (starting at 100°) showed continual loss in weight to about 30% at 400°. The DTA curve shows a broad endothermal peak from 80–350°, with maximum peak at 260° and smaller effects at 100° and 150°. The $x$-ray powder pattern (38 lines) has strongest lines 8.66 (100)(vs), 9.81 (001)(s), 4.33 (200)(s), 4.91 (002)(ms), 3.74 (030)(ms). Electron microscope photographs showed thin rhombohedron-like plates. The $x$-ray data are indexed on a monoclinic unit cell, with $a$ 9.203, $b$ 11.225, $c$ 10.422 Å., $\beta$ 70°16′, the unit cell containing 8 $(Al_2(OH)_6 \cdot H_2O)$; G calc. 2.14, measured pycnometrically 2.21. Optical properties are not given.

The name is for Fran Tucan (1878–1954), Jugoslav geologist, student of bauxite deposits.

DISCUSSION.—Although the data are incomplete, they leave little doubt that tucanite is identical with the mineral scarbroite ($12Al(OH)_3 \cdot Al_2(CO_3)_3$), described in *Mineral. Mag.*, **32,** 353–365 (1960). The close correspondence of the *x*-ray powder data, electron microscope photographs, and dehydration curves is convincing; tucanite may be a partly dehydrated scarbroite.

## Thorbastnaesite

A. S. Pavlenko, L. P. Orlova, M. V. Akhmanova and K. I. Tobelko, A thorium fluocarbonate, thorbastnaesite: *Zapiski Vses. Mineral. Obshch.* **94,** 105–113 (1965) (in Russian).

Analysis of carefully selected material by L.P.O. gave $ThO_2$ 46.79, total rare earths 7.46, CaO 7.97, $U_3O_8$ 0.11, PbO 0.33, $CO_2$ 14.78, F 6.87, $H_2O^+$ 9.04, $H_2O^-$ 2.14, $Al_2O_3$ 1.76, $Fe_2O_3$ 3.62, $TiO_2$ 0.05, $SiO_2$ 2.01, sum 102.93 − (O = $F_2$) 2.89 = 100.04%. Another analysis is given of material containing more $Fe_2O_3$. Hydrous iron oxide, albite, and quartz were present. The rare earths, from spectrographic analysis, consist of $La_2O_3$ 1.59, $Ce_2O_3$ 1.28, $Pr_2O_3$ 0.34, $Nd_2O_3$ 1.22, $Sm_2O_3$ 0.25, $Gd_2O_3$ 0.25, $Dy_2O_3$ 0.32, $Ho_2O_3$ 0.12, $Er_2O_3$ 0.21, $Yb_2O_3$ 0.15, $Y_2O_3$ 1.73. The formula is $Th(Ca_{0.8}RE_{0.2})(CO_3)_2F_2 \cdot 3H_2O$. The DTA curve shows a diffuse endothermic break up to 350° (loss of water) and a sharp endothermic break at 410° (dissociation). The infrared spectrum is similar to those of parisite and bastnaesite, but differs in showing bands at 3000–3600, characteristic of molecular water, that disappear when the material is heated (to 200°, according to the text, to 300° according to the figure).

*X*-ray study (by K.I.T.) shows the mineral to be hexagonal, space group $D^4_{3h}-P\bar{6}2C$, $a$ 6.99±0.02, $c$ 9.71±0.02 Å. Indexed *x*-ray powder are given (32 lines); the strongest lines are 2.886 (10)(11$\bar{2}$2), 2.017, 1.976 (106)(30$\bar{3}$0, 30$\bar{3}$1), 3.499 (8)(11$\bar{2}$0), 1.863 (misprint? precedes 1.868 M.F.), 1.868 (7)(30$\bar{3}$2, 21$\bar{3}$3), 1.275 (6)(1452), 1.644 (5)(22$\bar{4}$2), 1.160 (5)(41$\bar{5}$4), 1.134, 1.133 (5)(50$\bar{5}$3, 33$\bar{6}$2).

The mineral is brown and forms cryptocrystalline structures with $n$ 1.670–1.678, G (pycnometer) 4.04, G calc. from *x*-ray data 5.70; the discrepancy is ascribed to the presence of molecular water.

The mineral occurs in exocontact alkaline metasomatic rocks of "one of the nepheline syenite intrusives of Eastern Siberia", as an accessory in iron-rich saccharoidal albitites. It appears to have been formed by the replacement of ferrian thorite by fluocarborate solutions.

The name is for the composition.

## Pseudo-autunite

A. S. Sergeev, Pseudo-autunite, a new hydrous calcium phosphate: *Mineral. Geokhim., Leningrad Univ., Sbornik Statei* **1,** 31–39 (1964) (in Russian).

Analysis by V. V. Firyulina gave $UO_3$ 53.10, $P_2O_5$ 22.95, CaO 7.78, loss on ignition 15.60, insol. residue 0.38, sum 99.81%. Spectrographic analysis showed Si 0.1–0.3, Al 0.03–0.1, Fe 0.03–0.1, Sr 0.03, Cu 0.001–0.003, Pb 0.001%, and traces of Mg, Ba, As and Be. The DTA curve shows endothermal effects at about 100°, 150° and 220°. Loss of weight on heating: to 80° 0, 80–100 1.3, 100–200 7.0, 200–300 2.8, 300–400 2.1, 400–500 1.6, 500–600 0.6, 600–900 0.5%. From these data, the formula is given as $(H_3O)_2\ Ca_{0.86}\ (UO_2)_{1.14}\ (PO_4)_2 \cdot 2.5\ H_2O$.

The mineral occurs as fine-platy and powdery crusts that consist of intergrowths of small hexagonal platy crystals, up to 0.1 mm, having a mica-like cleavage. Measurement on magnified photographs gave angles of 92.5° for one pair of faces, 131.5° and 136° for the other. Electron diffraction study by V. A. Shitov gave $a=b=6.94\pm0.02$ kX, $c=12.85\pm0.02$ kX, $c/a=1.808$. With Z=2, G calc.=3.29, measured pycnometrically 3.28. *X*-ray powder data are given (38 lines); the strongest are 6.20 (10), 3.254 (10), 1.915 (9), 3.379 (8), 2.948 (8), 2.191 (8), 2.058 (8), 1.294 (8), 6.78 (6), 1.316 (5).

Color pale yellow to white. Luminesces intensely in greenish-yellow in short-wave ultraviolet light and shows notable persistence. Weakly luminescent in long-wave ultraviolet light. Optically biaxial (−), $\alpha$ 1.541, $\gamma$ 1.570, both $\pm$0.002, 2V 32°, $\beta$ (calc.) = 1.568. Plane of optic axis parallel to (001), Y$\perp$ (001), extinction relative to (010) parallel or 1–2°. Dispersion r > v, distinct.

The mineral occurs in fenitized rocks of the exocontact zone of a massif of ultrabasic-alkalic rocks of Northern Karelia. It occurs in fissures and cavities of albite-acmite veins in association with oxonuim pyrochlore, calcite, limonitized sulfides, and sometimes apatite.

Discussion.—Even if one presumes that K and Na were sought and not found, which is not specifically stated, the validity of the oxonium formulation cannot be accepted until the absence of ammonium ion is proved. Failure to do this is surprising since the author discusses uramphite. Neither the chemical nor the $x$-ray results indicate the mineral to be a member of the autunite or meta-autunite group.

## Fluor-antigorite

Wang Pu and Juan Shou-Tsuen, Fluor-antigorite, a new variety of serpentine mineral: *Scientica Sinica* **14**, 327–328 (1965)

Analysis gave $SiO_2$ 43.38, $TiO_2$ 0.02, $Al_2O_3$ 0.22, $Fe_2O_3$ 1.35, FeO 0.76, MgO 39.74, MnO 0.02, CaO 0.00, $Na_2O$ 0.03, $K_2O$ 0.01, $P_2O_5$ 0.02, $CO_2$ 0.36, $H_2O^+$ 11.60, F 2.46%, sum (not given) 99.97 − (O = $F_2$) 1.04 = 98.93%. This corresponds to

$$(Mg_{5.55}Fe^{2+}_{0.06}Fe^{3+}_{0.10}Al_{0.03})_{5.74}Si_{4.06}O_{10}(OH_{7.25}F_{0.73}O_{0.02})_8.$$

The DTA curve shows a strong endothermal peak at 830°, higher than that of antigorite.

A Weissenberg photograph shows that the fiber axis is $b$; $b$ is approximately 9.15 Å., $c$ sin $\beta$ 7.10 Å. The strongest lines of the $x$-ray powder photograph are 3.59 (10), 2.53 (9), 7.10 (A), 1.549 (8), 1.524 Å. (6).

The mineral has perfect cleavage {001}. Biaxial (−), $ns$, $\alpha$ 1.540, $\beta$ 1.545, $\gamma$ 1.546, 2V 48° (calc.), Z = $b$, Y = $a$, X nearly perpendicular to the cleavage. Elongation positive. Pleochroism very weak. Hardness 2.9–3.2 (microhardness 89.32–133.3 kg/mm²), G 2.589. Color bluish-green, luster vitreous.

The mineral occurs in magnesian skarn, closely associated with magnetite and humite minerals, in the Shouwangfen polymetallic magnetite deposit, northern Hopei Province, China.

Discussion: An unnecessary name; OH greatly exceeds F.

## Mboziite

P. W. G. Brock, D. C. Gellatly and O. von Knorring, Mboziite, a new sodic amphibole end-member. *Mineral. Mag.* **33**, 1057–1065 (1964)

An amphibole from the Mbozi syenite-gabbro complex in southwest Tanganyika approaches very closely the theoretical end-member $Na_2CaFe^{2+}_3Fe^{3+}_2Al_2Si_6O_{22}(OH)_2$. Analysis by Mrs. M. H. Kerr gave: $SiO_2$ 38.56, $Al_2O_3$ 10.31, $TiO_2$ 0.96, $Fe_2O_3$ 13.12, FeO 18.72, MnO 1.91, MgO 1.24, CaO 5.78, $Na_2O$ 4.71, $K_2O$ 2.73, $H_2O^+$ 1.66, $H_2O^-$ 0.00, F 0.30, Cl 0.15, less O for F+Cl 0.16, total 99.99. The chemical formula based on 24(O, OH, F) is:

$$(Na_{1.47}K_{0.56})Ca_{1.00}(Fe^{2+}_{2.52}Mg_{0.30}Mn_{0.26})(Fe^{3+}_{1.59}Al_{0.15}Ti_{0.11})(Si_{6.20}Al_{1.80})O_{22.03}[(OH)_{1.78}F_{0.15}Cl_{0.04}].$$

An amphibole from the Darkainle nepheline-syenite complex, Borama district, Somali

Republic, has a composition between mboziite and hastingsite, but is closer to the former.

Mboziite is optically biaxial, $\alpha=1.705\pm0.003$, $\beta=1.713\pm0.004$, $\gamma=1.715\pm0.003$. It was not possible to measure 2V (from the indices, 2V(−) is 53°42′ J.A.M.). The mineral is strongly pleochroic with $\alpha$ pale to light yellow, $\beta$ deep blue-green, and $\gamma$ deep blue to green to black. Sections parallel to (010) show incomplete extinction. Anomalous bright orange-red birefringence colors are very distinctive. Because of the imperfect extinction, a precise orientation of the optical indicatrix could not be determined. The following orientation information was obtained, however: $\alpha$ near [100], $\beta$ near [001], $\gamma$//[010], maximum absorption in (010) for $\beta\wedge[001]$ is 9 to 12°, extinction for $\beta\wedge[001]$ is 7 to 14°.

No single-crystal $x$-ray data are given. Unindexed $x$-ray powder diffraction data are given for the Mbozi (38 lines) and Darkainle (30 lines) specimens. Strongest lines for Mbozi material (radiation not stated) are: 3.15 (100), 8.53 (70), 2.732 (50), 2.605 (30), 2.347 (30), and 1.447 (30) all in Å.

Mboziite from the type locality occurs in a 15-foot foyaite dike which cuts nepheline-bearing gneisses. The mode of the dike is: oligoclase 36.4, potash feldspar 28.0, nepheline 14.5, sodalite 0.8, mboziite 13.3, aegirine-augite 6.5, biotite 0.2, sphene 0.2, apatite 0.1, "iron ore" trace, zircon trace, and pyrochlore trace. The mafic minerals occur as prismatic grains up to 3 mm long and from 0.5 to 2 mm thick. The Darkainle material occurs in a pegmatitic nepheline-syenite dike as crystals (black in hand specimens) up to 10 cm long and 4 cm. thick.

The name is for the type locality.

Discussion.—The lack of single-crystal data and density determinations is unfortunate.

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## Sundiusite and Miyashiroite

R. Phillips and W. Layton, The calciferous and alkali amphiboles. *Mineral. Mag.* **33**, 1097–1109 (1964).

Sundiusite and miyashiroite are used, respectively, for the amphibole end-members $NaCaNaMg_3Al_2Si_6Al_2O_{22}(OH)_2$ and $NaNa_2Mg_3Al_2Si_7AlO_{22}(OH)_2$ which the authors use (with seven other end-members) in a new classification scheme for the calciferous and alkali amphiboles.

Discussion.—The authors state: "No minerals close to either composition are known to the authors, but several mineral analyses are equivalent to solid solution of these with other end-members," While it might be quite desirable to use these two hypothetical end-members for purposes of classification, the practice of naming them is open to argument. I do not think that there is any justification for coining a new name unless there is a specimen which contains the end-member in question as the dominant component.

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# NEW DATA

## Nomenclature of Polybasite, Pearceite, Antimonpearceite, Arsenopolybasite

D. C. Harris, E. W. Nuffield and M. H. Frohberg, Studies of mineral sulpho-salts: XIX Selenian polybasite: *Canadian Mineralogist* **8**, 172–184 (1965).

Frondel (*Am. Mineral.* **48**, 565–572, 1963) found that there were two isodimorphous solid solution series, $(Ag, Cu)_{16}Sb_2S_{11}$–$(Ag, Cu)_2As_2S_{11}$, the series polybasite–arsenopolybasite with $a\sim26$, $b\sim15$, $c\sim24$ Å., $\beta$ 90°, and the series antimonpearceite–pearceite with $a\sim13$, $b\sim7.4$, $c\sim12$ Å., $\beta$ 90°; he introduced the new names arsenopolybasite and antimonpearceite.

The present paper reports confirmation of a polybasite reported by Peacock and Berry (1947) to have *a* 26.17, *b* 15.11, *c* 11.94 Å., *β* 90°; parts of the same sample give the small cell (Frondel's antimonpearceite). It is considered that the doubled dimensions represent "less than fundamental differences" and that "one basic structural unit pervades the material and moreover is the dominant structural feature in all specimens of polybasite and pearceite".

It is therefore suggested that the original classification of pearceite (As dominant) and polybasite (Sb dominant) as members of a single series be retained, with an additional symbol to designate the type of cell. Thus, Frondel's pearceite=pearceite (1-1-1), his antimonpearceite=polybasite (1-1-1), his polybasite=polybasite (2-2-2), and his arsenopolybasite=pearceite (2-2-2). Peacock and Berry's sample would be polybasite (2-2-1).

## Strontioborite

V. V. KONDRAT'EVA, Unit cell and space group of strontioborite: *Kristallografiya* **9**, 916–917 (1964) (in Russian).

Laue rotation and Weissenberg photographs showed strontioborite to be monoclinic, space group $C^2_2$-$P2_1$ (piezoeffect noted), with *a* 9.83±0.03, *b* 8.22±0.02, *c* 7.55±0.02 Å., *β* 107°46′±10′. Sp. gr. 2.806 (detd. by A. I. Sokolova). With the composition 4(Sr, Ca)O $\cdot 2MgO \cdot 12B_2O_3 \cdot 9H_2O$ given for the mineral (see *Am. Mineral* **46**, 768, 1961), Z=1.35, an impossible result indicating that the formula is wrong.