

NEW MINERAL NAMES

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Allemonite

Discredited; see Stibarsen. (B. F. Leonard)

Atheneite*

A. M. CLARK, A. J. CRIDDLE, AND E. E. FEJER (1974)
Palladium arsenide—antimonides from Itabira, Minas Gerais, Brazil. *Mineral. Mag.* **39**, 528-543.

Electron microprobe analyses of 2 grains gave Pd 66.0, 65.6; Cu 0.1, 0.1; Hg 14.9, 16.1; Au 0.5, 0.3; As 19.0, 19.0; Sb 0.1, 0.3; sum 100.6, 101.4 percent, corresponding (av.) to $(\text{Pd}_{2.66}\text{Cu}_{0.01}\text{Hg}_{0.33})(\text{As}_{1.00}\text{Sb}_{0.01})$, or $(\text{Pd,Hg})_3\text{As}$.

The mineral is hexagonal, space group $P6/mmm$, a 6.798, c 3.483 Å, $Z = 2$, G . calc 10.16, meas 10.2. The strongest X-ray lines (48 given) are 2.423 (vvs) $(1\bar{1}\bar{2}1)$, 2.246 (vs) (2021) , 1.871 (ms) $(2\bar{1}\bar{3}1)$, 1.371 (s) $(2\bar{1}\bar{3}2)$, 1.302 (s) $(30\bar{3}2)$, 1.259 (s) $(32\bar{5}1)$, 1.034 (ms), $(41\bar{5}2)$.

In reflected light white with a yellowish creamy hue, shows very weak reflectance pleochroism in oil, none in air. The mineral does not extinguish under crossed polars, showing bright anisotropic colors from purple-brown to dark gray. Microhardness (2 grains), 419, 442, av. 431. Reflectances are given for 2 grains in air and oil; av. values R_1 and R_2 : 470 nm, 47.47, 52.97; 546 nm, 51.08, 56.19; 589 nm, 53.19, 58.14; 650 nm, 55.35, 59.95 percent.

The mineral was found as a few grains in residual concentrates from gold washings at Itabira, Brazil. Intergrowths with arsenopalladinite occur, and hematite inclusions are present. The name is "in oblique reference to its palladium content," the name palladium having been derived from the name of the Greek goddess Pallas Athene. Type material is at the British Museum.

Bicchulite*

CHIYOKO HENMI, ISAO KUSACHI, KITINOSUKE HENMI, P. A. SABINE, AND B. R. YOUNG (1973) A new mineral bicchulite, the natural analogue of gehlenite hydrate, from Tuka, Okayama Prefecture, Japan, and Carneal, County Antrim, Northern Ireland. *Mineral. J.* (Tokyo) **7**, 243-251.

The mineral was found and reported almost simultaneously to the I.M.A. Commission by groups in Japan and England. The mineral occurs in skarns at Tuka, town of Bicchu, Okayama Prefecture, associated with vesuvianite with or without hydrogrossular, gehlenite, and calcite, also in skarns at Carneal, Northern Ireland, associated with hydrogrossular and melilite in a buff-colored coating on wollastonite-rock.

* 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.

Analyses are given of 2 samples from Tuka, the first containing vesuvianite, the second small amounts of gehlenite, vesuvianite, and hydrogrossular. The X-ray powder data are given for Tuka and Carneal material. The strongest lines (16 given) are, respectively,

	211		310		222	
Tuka	3.60	90	2.786	100	2.547	30
Carneal	3.60	100	2.787	100	2.545	20
	321		411, 330		440	
Tuka	2.345	34	2.079	40	1.559	50
Carneal	2.38(b)		2.081	30	1.558	40

The a edge equals 8.829 (Tuka), 8.82 (Carneal), 8.837 (synthetic "gehlenite hydrate", $\text{Ca}_2\text{Al}_2\text{SiO}_7 \cdot \text{H}_2\text{O}$); Carlson (1964), who first synthesized it, gave a 8.83 Å.

Hydrothermal experiments showed the gehlenite-bicchulite boundary to be at $635 \pm 5^\circ\text{C}$, 1 kbar and at $595 \pm 5^\circ\text{C}$, 3000 bars. The mineral from Carneal is colorless, isotropic, n 1.625 (n of synthetic \pm 1.628, Carlson, 1964). Sp. gr. synthetic = 2.75 meas, 2.813 calc from unit cell data.

The name is for Bicchu, the type locality in Japan. Type material is at Okayama University, Okayama, Japan, and at the Institute of Geological Sciences, London.

Isomertieite*

A. M. CLARK, A. J. CRIDDLE, AND E. E. FEJER (1974)
Palladium arsenide—antimonides from Itabira, Minas Gerais, Brazil. *Mineral. Mag.* **39**, 528-543.

Electron microprobe analyses of 4 grains gave (range and av.): Pd 71.96-72.90, 72.4; Cu 0.93-1.13, 1.1; As 10.74-10.99, 10.9; Sb 15.41-15.74, 15.6, sum (of av.) 100.0 percent, corresponding to $(\text{Pd}_{4.88}\text{Cu}_{0.12})(\text{As}_{1.04}\text{Sb}_{0.92})$, or $(\text{Pd,Cu})_5(\text{As,Sb})_2$, the same formula as mertieite (*Am. Mineral.* **58**, 1-10, 1973).

X-ray study shows the mineral to be cubic, space group $Fd\bar{3}m$, a 12.283 Å, $Z = 16$, G calc 10.33, not measured. The strongest lines (49 given) are 2.356 (vs) $333,511$, 2.167 (vvs) 440 , 1.533 (ms) 800 , 1.253 (ms) 844 , 0.860 (s) $10.10.2$, $14.2.2$, 0.821 (s) $12.8.4$, 0.800 (s) $10.10.6$, $14.6.2$, 0.788 (s) 999 , $11.11.1$, and others, 0.780 (s) $12.10.2$, $14.6.4$.

In reflected light pale yellow-white; 3 of 5 grains studied were anisotropic in shades of dull brown, brighter in oil. Reflectances are given in air and oil; mean for R_1 and R_2 in air: 470 nm, 45.23, 45.66; 546 nm, 52.67, 52.88; 589 nm, 55.82, 55.93; 650 nm, 58.80, 58.82 percent. Vickers hardness, 587-597, av. 592 (100 g. load), 585-598, av. 591 (50 g. load).

The mineral occurs as grains 0.4 to 0.8 mm in size in concentrates from gold washings at Itabira, Brazil.

In one grain it was intergrown with arsenopalladinite,

which was free of hematite inclusions present in the isomertieite.

The name is in allusion to the relation of the composition to that of mertieite. Type material is at the British Museum.

Killalaitite*

R. NAWAZ (1974) Killalaitite, a new mineral from Co. Sligo, Ireland. *Mineral. Mag.* **39**, 544–548.

Electron microprobe analysis, using synthetic augite as standard, gave CaO 57.0 ± 1 , SiO₂ 39.8 ± 1 , H₂O (by difference 3.2 percent, corresponding to Ca₃Si₂O₇·1/2 H₂O (theory CaO 56.6, SiO₂ 40.4, H₂O 3.0 percent). MgO, Fe₂O₃, and Al₂O₃ were <0.1 and microchemical tests for CO₂ and F were negative: The mineral gives H₂O when heated in a closed tube.

The strongest X-ray lines (47 given) are 3.03 **80**, 2.824 **100**, 2.724 **60**, 2.275 **45**, 2.224 **45**, 1.413 **40**. Assuming $d = 2.88$ (calc from *ns*) and β 105°, approximate unit cell dimensions were calculated to be a 9.3, b 9.9, c 7.7 Å (all ± 0.1 Å).

The mineral occurs as crystals up to 2 mm long, cleavages {100} perfect, also {010} and {001} good. Monoclinic. Complex penetrative twinning with composition plane including the b axis, yielding cross "bow-tie" twins. Optically biaxial, neg., *ns* (Na) α 1.635, γ 1.642 (both ± 0.002), $2V - 26^\circ$, $Y = b$, $Z \wedge c = 16^\circ$.

The mineral occurs near Inishcrone, Killala Bay, Ireland, in a limestone thermally metamorphosed by a basalt-dolerite dike. It occurs, associated with calcite or aegirine, and replacing tilleyite, in spurrite-rich rocks; scawtite, cuspidine, and xonotlite are also present.

The name is for the locality. Type material is at the Ulster Museum, Belfast, and the British Museum of Natural History, London.

Paolovite*

A. D. GENKIN, T. L. EVSTIGNEEVA, L. N. VYALSOV, I. P. LAPUTINA, AND N. V. GRONEVA (1974) Paolovite, Pd₂Sn, a new mineral from copper-nickel sulfide ores. *Geol. Rudn. Mestorozhdenii*, **16**, 98–103 (in Russian).

Analyses by electron microprobe, using as standards Pd, Pt, Bi, and Pb metals, and galena, gave Pd 60.6, 64.8, 59.7; Pt 2.9, 2.5, 2.6; Sn 34.0, 35.5, 34.6; Pb 0.6, 0.3, 0.6; Bi —, 0.2, —; sum 97.5, 103.3; 95.5 percent, corresponding to (Pd_{2.00}Pt_{0.05})Sn, (Pd_{2.02}Pt_{0.04})Sn, and (Pd_{1.91}Pt_{0.04})Sn, or Pd₂Sn. Small amounts of Sb were found qualitatively. The compound was synthesized by heating the metals in a sealed silica ampule at 1300°, holding at 820° for 6 hours, cooling to 300° and quenching. The X-ray pattern was identical with that of the mineral.

X-ray study showed the mineral to be orthorhombic, space group *Pbnm*, a 8.11 ± 0.01 , b 5.662 ± 0.006 , c 4.324 ± 0.002 Å. Schubert *et al.* (*Z. Metallkunde*, **50**, 1959) gave a 8.11, b 5.65, c 4.32 Å for synthetic Pd₂Sn. Z and calcd. G . are not given. The strongest X-ray lines (24 given) are 2.36 **4 021**, 2.28 **10 121,301**, 2.16 **7 002**, 1.955 **5 112,320**, 1.397 **4 132**, 1.315 **4 610,731**, 1.120 **612,441,150,701**, 1.078 **5 503,004,532**.

In section the mineral is lilac-rose with noticeable birefractance and change of color from dark lilac-rose to pale

rose. Optically biaxial; the sign changes at 638 nm in sample 1, 712 nm sample 2, 596 nm sample 3. Microhardness 360–400, av. 380 kg/sq mm with 50g load. Reflectances were measured for 3 samples at 15 wave lengths (440–740 nm), including the following for R_p and R_g : 460 nm; no. 1, 41.8, 42.8; no. 2, 49.0, 51.2; no. 3, 45.0, 46.5 percent, 540 nm, no. 1, 45.4, 48.6; no. 2, 53.8, 56.6; no. 3, 50.6, 52.2 percent; 660 nm, no. 1, 56.0, 55.0; no. 2, 57.9, 59.2; no. 3, 61.8, 58.9 percent.

The mineral occurs in copper-nickel sulfide ores of the Oktyabr deposit, Talnakh ore field, in cubanite-chalcocopyrite, cubanite-talnakhite, and cubanite-mooihoekite ores. It occurs as polysynthetically twinned grains, commonly intergrown with sperrylite, native Ag, Pd Bi, and (Pt,Pd)₃Sn.

The name is for the composition, Palladium + Olovo (=Tin). Type material is preserved at the Fersman Mineralogical Museum, and the Institute of Geology, Moscow.

Stibarsen

The IMA Commission on New Minerals and Mineral Names has accepted by a vote of 11–1 the name *stibarsen* for the single-phase hexagonal As-Sb mineral whose composition is essentially AsSb (M. Fleischer, written communication to B. F. Leonard, May 14, 1974). The Commission recognizes allemontite as an intergrowth of stibarsen with either arsenic or antimony and rejects the name allemontite as a synonym for stibarsen.

B. F. LEONARD

Tantal-aeschynite* [=Tantal-aeschynite-(Y)]

M. S. ADUSUMILLI, C. KIEFT, AND E. A. J. BURKE (1974) Tantal-aeschynite, a new mineral of the aeschynite group from the Borborema region, north-eastern Brazil. *Mineral. Mag.* **39**, 571–576.

Analysis by electron microprobe by C.K. gave Ta₂O₅ 39.3, Nb₂O₅ 18.7, TiO₂ 11.7, Fe₂O₃ 0.9, CaO 6.2, La₂O₃ 1.3, Ce₂O₃ 3.7, Pr₂O₃ 0.6, Nd₂O₃ 1.9, Sm₂O₃ 0.6, Gd₂O₃ 0.6, Dy₂O₃ 0.4, Er₂O₃ 0.4, Yb₂O₃ 0.7, Y₂O₃ 4.6, ThO₂ 6.5, UO₂ 0.4, sum 98.5, corresponding to the formula (Ca_{0.88}(Y,Ce)_{0.425}(Th,U)_{0.11})(Ta_{0.75}Ti_{0.82}Nb_{0.80}Fe_{0.05})O₆. The DTA curve shows a sharp exothermic peak at 740°C.

The mineral was amorphous to X-rays. Material heated in air or nitrogen at 700°, 1000°, or 1300° gave the same X-ray pattern, similar to that of aeschynite. Material heated in air at 1300° gave strongest lines (30 given) 3.00 **10 130**, 2.94 **10 112**, 2.65 **5 200**, 1.70 **5 242**, 1.581 **7 312,134**. This corresponds to a cell with a 5.34, b 10.97, c 7.38 Å.

Crystals show the forms {010}, {001}, {110}, and {130}. Color brownish-black to black, luster resinous, streak light yellowish-brown. H. 5 1/2–6, fracture conchoidal. G. of material containing veinlets of unidentified impurity was 5.75–6.13, G. calc 6.39. In thin section, isotropic, color yellow-orange. In polished section dark gray in oil immersion with abundant internal reflections, white to dark red. Reflectance 470 nm, 14.5; 546 nm, 14.2; 589 and 650 nm, 14.0. Microhardness 657–673 kg/sq mm (100g load).

The mineral occurs in the Raposa pegmatite, N.E. Brazil, associated with quartz, red microcline, biotite, columbite, and beryl.

Discussion

The name tantal-aeschnite had previously been used by Kornetova *et al*, *Trudy Mineral. Muzeya Akad. Nauk. SSSR*, **14**, 108–121 (1963), but their mineral has Ti: Ta: Nb = 0.89: 0.565: 0.525 and was therefore a tantalian aeschnite. The mineral here described should be named Tantal-aeschnite-(Y) by the Levinson system, since $Y > Ce$.

Vincentite*

E. F. STUMPFL, AND M. TARKIAN (1974) Vincentite, a new palladium mineral from south-east Borneo. *Mineral. Mag.* **39**, 525–527.

Electron microprobe analyses of 2 grains gave Pd 61.3, 59.6; Pt 14.4, 17.6; As 7.3, 7.2; Sb 6.3, 9.3; Te 8.9, 6.3; sum 98.2, 100.0 percent, corresponding to $(Pd_{5.32}Pt_{0.68})(As_{0.60}Sb_{0.45}Te_{0.85})$ and $(Pd_{5.17}Pt_{0.83})(As_{0.89}Sb_{0.70}Te_{0.46})$. The name applies to $(Pd,Pt)_2(As,Sb,Te)$, with $Pd > Pt$ and $As: (Sb + Te) \approx 1:1$.

X-ray powder data gave lines (after deducting those of

Pt and Os) at 4.180, 3.952, 3.240, 2.750, 1.997, 1.749, and 0.944 Å (intensities not given). These have not been indexed; they cannot be matched by the patterns of arsenopalladinite, stibiopalladinite, mertieite, isomertieite, atheneite, or synthetic Pd_3As .

The mineral occurs in grains of average size 7–10 microns, rarely up to 40 microns, in iron-bearing platinum from concentrates from the Riam Kanen River, S.E. Borneo. In reflected light, color light brownish-gray, weakly anisotropic in some sections. Reflectances were measured on 2 grains: 470 nm, 463–475; 546 nm, 492–528; 589 nm, 51.7–53.9; 650 nm, 54.9–56.0 percent. Microhardness 494, 15 g load.

The name is for Professor E. A. Vincent of Oxford University.

Discussion

Needs further study, especially single crystal work and synthesis.

NEW DATA

Arsenopalladinite

A. M. CLARK, A. J. CRIDDLE, AND E. E. FEJER (1974) Palladium arsenide-antimonides from Itabira, Minas Gerais, Brazil. *Mineral. Mag.* **39**, 528–543.

Type arsenopalladinite, described in 1956 as hexagonal Pd_3As , was reexamined and found to be a mixture of three minerals, two of which are new (atheneite, isomertieite). Electron microprobe analyses of 13 grains gave (range and average): Pd 76.86–79.24, 78.1; Cu 0.02–0.12, 0.06; As 17.48–18.83, 18.2; Sb 5.01–6.10, 5.4, sum (av.) 101.8 percent, corresponding to $(Pd_{4.66}Cu_{0.01})(As_{1.66}Sb_{0.31})$ or $Pd_5(As,Sb)_2$.

X-ray study showed that the mineral gave a weakened diffuse powder pattern (not given), stated to differ from that of synthetic $Pd_5(As,Sb)_2$. The mineral is reported (data of R. J. Davis) to be triclinic, a 7.399, b 14.063, c 7.352 Å, α 92° 03', β 118° 57', γ 95° 54', $Z = 6$, G. calc

10.46, determined 10.4. The previously reported hexagonal cell was actually measured on atheneite.

The mineral occurs in grains 0.3 to 1.8 mm in size in concentrates from gold washing at Itabira, Brazil. Color in reflected light white with a yellowish creamy hue. Bireflectance weakly perceptible. Strongly anisotropic with colors from red and golden brown to blue-gray in air, khaki-brown to blue-gray and bright steel-gray in oil. Complex polysynthetic twinning; the mineral does not extinguish in any position. Reflectances are given in air and oil; mean values (8 grains) in air for R_1 and R_2 : 470 nm, 47.08, 48.48; 546 nm, 51.24, 52.35; 589 nm, 53.61, 54.39; 650 nm, 55.92, 56.65 percent. Vickers hardness (10 grains) 379–449, av. 407 (100 g load). Malleable.

A coating on the mineral contains approximately PdO 90, HgO 10 percent; it may be a mercurian variety of the hitherto doubtful species palladinite (*Dana's System*, 7th ed., v. 1, p. 515).