The identity of 'eggonite' with sterrettite.

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DURING the X-ray study of a new phosphate mineral, not yet published, the usual comparison was made with cell-side measurements of related minerals. One of these is 'eggonite', a rare hydrous aluminium phosphate said to occur on silver ores at Felsőbánya, Hungary. Rotation photographs of 'eggonite' are different from those of the new mineral, but yielded dimensions close to those of sterrettite, a new mineral from Fairfield, Utah, described last year by Larsen and Montgomery.[1] These authors generously presented a specimen of sterrettite to the British Museum, and rotation photographs taken in the Mineral Department not only give cell-dimensions close to those published but also identical with those of 'eggonite'. A brief account of this identification is now given not only to justify abandoning the mineral name 'eggonite', but also to place on record a European occurrence of a rare mineral so far described from only one American locality.

'Eggonite' has a strange history. Schrauf[2] first gave the name in 1879 to small, transparent, yellowish crystals resembling baryte which he found on crystallized hemimorphite in compact smithsonite from Altenberg, Moresnet (now in occupied Belgium). His accurate goniometric and optical work on the crystals provided the data tabulated below. Unfortunately his chemical data were few and inaccurate. He identified the mineral as cadmium silicate naming it 'eggonite' (ἔγγονος, a grandson) because he believed it occurred as the third generation in the series of natural zinc-cadmium compounds. Having noted the similarity in crystal form he set up 'eggonite' to correspond with baryte and obtained almost the same axial ratios. His two refractive index measurements in monochromatic light using a pair of domes as a refracting prism, yielded, however, values well below those of baryte. Schrauf considered that 'eggonite' only approximated to orthorhombic symmetry and deduced triclinic elements from his goniometric data.

Schrauf must have corresponded with E. S. Dana about the mineral

[1] E. S. Larsen, 3d, and Arthur Montgomery, Amer. Min., 1940, vol. 25, p. 513.

[2] A. Schrauf, Zeits. Kryst. Min., 1879, vol. 3, p. 352.

for in the 1892 edition of the 'System' (p. 905) is found a short entry mentioning as the result of a private communication that the mineral 'eggonite' was after all only baryte and questioning the association. Schrauf may have acknowledged his mistaken chemistry and also cast doubt upon the locality of the crystals, but it is difficult to believe that he is responsible for ignoring his refractive index values and calling 'eggonite' baryte.

Some years later Krenner[1] re-examined Schrauf's original material and discovered that the mineral was really a hydrous aluminium phosphate. He also added to the optical data and remeasured the crystals giving simpler indices to the faces, and deduced orthorhombic symmetry. Krenner identified the crystals as identical with those present on certain specimens of silver ores from Felsőbánya, Hungary. He did not explain, however, why crystals of 'eggonite' had been detached from Felsőbánya specimens and gummed to Altenberg ones, and probably we shall never know whether it was the result of somebody's carelessness or roguery.

Of the two specimens of 'eggonite' in the British Museum collection which were purchased from A. Krantz in 1885, one is a group of intergrown crystals and the other a single crystal about $\frac{1}{2}$ mm. across. Both specimens were found gummed to the matrix of hemimorphite on compact smithsonite and were originally labelled 'Eggonit auf Kieselzinkerz, Altenberg bei Aachen'. The 'eggonite' crystals have a slightly yellowish tint compared with the water-clear crystals of sterrettite. Schrauf's crystal drawing of 'eggonite' (loc. cit., pl. 10, fig. 1, facing p. 352), resembles closely fig. 1*a*, figuring sterrettite in Larsen and Montgomery's paper (loc. cit., p. 515). The single crystal of 'eggonite' referred to above (B.M. 56283) possesses, however, larger faces of the prism form (110) than those figured. X-ray photographs of this crystal confirm Krenner's conclusion that 'eggonite' is orthorhombic. Corresponding photographs of sterrettite are identical in pattern, yielding almost identical cell-edge measurements. The crystal structures of the two minerals must be identical. Since in addition the optical data agree within the limits of error of the methods used, there is a strong probability that the chemical composition of 'eggonite' approximates to that of sterrettite. Krenner applied only qualitative chemical tests to his material and showed that it was a hydrated aluminium phosphate. He suggested on the basis of similarity of axial ratios (if *c* for 'eggonite' is

[1] J. Krenner, posthumous, edited by K. Zimányi, Centralblatt Min., Abt. A, 1929, p. 27. [M.A. 4–332.]

doubled) that the mineral might belong to the strengite-scorodite series and possess the formula $AlPO_4.2H_2O$.

A more recent suggestion by McConnell[1] that the 'eggonite' might be identical with metavariscite is disproved by the work of Larsen and Montgomery, who have found that a powder photograph of sterrettite is completely different from those of variscite and metavariscite.

Table of optical and X-ray data for sterrettite, $Al_6(PO_4)_4(OH)_6.5H_2O$.

	Sterrettite.	'Eggonite.'
Optics:		
	$\alpha (= a)$ ... 1·572	$\alpha (= a)$ ... 1·575 (Schrauf)
	$\beta (= b)$ ... 1·590	$\beta (= b)$ ... 1·59 (Krenner)
	$\gamma (= c)$ ... 1·601	$\gamma (= c)$ ... 1·598 (Schrauf)
	2V ... 60°±10°	2V ... 60° 34′ (Krenner)
Axial ratios:		
	$a : b : c$	$a : b : c$
	0·8662 : 1 : 0·5325 (Goniometric)	0·877 : 1 : 0·532 (Schrauf)
	0·872 : 1 : 0·532 (X-ray)	0·8775 : 1 : 0·5369 (Krenner)
Cell-sides:		
	a. b. c.	a. b. c.
	8·90 10·20 5·43 Å.	8·90 10·24 5·40 Å. (F. A. B.)
Specific gravity (observed):	2·36	2·44 (F. A. B.)
Specific gravity (calculated):	2·47*	2·46

* Larsen and Montgomery give 493 Å^3 as the cell-volume $8{\cdot}90 \times 10{\cdot}20 \times 5{\cdot}43 = 490{\cdot}3$. Their value for sp. gr. 2·45 is in error.

I am indebted to Miss J. M. Sweet for assisting me in the scrutiny of silver ore specimens from Felsőbánya and zinc ores from Altenberg. We were unsuccessful in finding any crystals of 'eggonite' on Felsőbánya material and therefore Krenner's specimens are the sole evidence for this locality. It would be confusing to retain Schrauf's name 'eggonite' for a mineral he wrongly determined as cadmium silicate and named on account of its supposed association with zinc ores. It may be concluded, therefore, that the newly-named mineral sterrettite from Fairfield, Utah, also occurs in Europe and according to Krenner at Felsőbánya, Hungary.

[1] D. McConnell, Amer. Min., 1940, vol. 25, p. 723. [M.A. 8–50.]