On Struvite.

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At a meeting of the Cambridge Philosophical Society on May 20th, Mr. Robinson read a preliminary paper "On the formation of Struvite by Micro-organisms."

"The author had observed the formation of fine well-formed crystals in many tubes of nutrient gelatin and agar-agar, in which he was growing pure cultivations of various micro-organisms."

Mr. Robinson drew my attention to these minute crystals, which I was able to determine, by means of the goniometer and polarising microscope, to be in all probability struvite, and he then confirmed my determination by a qualitative analysis.

The most important papers on struvite are given by Sadebeck in his memoir, "Ueber die Krystallisation des Struvits," in Tschermak's *Mineralogische Mittheilungen*, 1877, p. 112.

To these may be added:—

Miller, 1852. *Phillips' Mineralogy*, p. 524.
Provostage, 1861. *Comptes Rendus*, 50.
Vohl, 1876. *Ann. d. Pharm.*, 88, 114.
Vom Rath, 1878. *Ber. Nied. Ges. Bonn.*
Haushofer, 1880. *Groth's Zeits. f. Kryst.* IV. p. 42.
Kalkowsky, 1886. ,, ,, ,, XI. p. 1.
Mac Ivor, 1887. *Chem. News*, 55, p. 215.

Table of Forms observed.

		Marx.	Meyn.	Naumann.	Provostage.	Ulrich.	Sadelbach.	Kalkowsky.	Solly.
a	100	*r*	..	*o*	..	*c* or *h*	*r*	*c*	*a*
b	010	*o*	..	*n*	..	*b* or *m*	*o*	*b*	*b*
c	001	..	..	..	*c*	..	..	..	..
s	101	*s* or *u*	..	*a*	..	*r* or *t*	*s* or *u*	*r*	*s*
p	011	*p*	..	..	..	2*p* or *n*	*p*	*p*	*p*
m	110	*h*	..	..	..	g^2 or *p*	*h*	*h*	*m*
n	210	*m*	..	..	..	*g* or *o*	*m*	*g*	*n*
t	111	*t*	..	..	..	*s*	*t*	*t*	*t*
β	180	..	..	*b*	..	..	..	..	..
μ	103	..	..	*m*	..	..	..	..	..
k	120	..	..	..	..	..	..	..	*k*
i	510	..	..	..	..	..	..	..	*i*

The following Table gives the optic axial angle in air as obtained by different observers.

$2E$.		
59° 30′	Miller.	
60° 30′		von Lang.
46° 32′	red	Des Cloizeaux.
47° 30′	yellow	
48° 46′	violet	
59° 45′	Li	Kalkowsky.
60° 56′	Na	

The optic axial angle obtained by myself was about 60°, agreeing with that of Miller.

The crystals of struvite received from Mr. Robinson had been grown by him from the micro-organisms of (*A*) yeast, (*B*) Cambridge water, and (*C*) tartar from human teeth.

(*A*) presented a combination of the forms *a s p t m n*, of which only the following faces were developed:—

a	(100)	($\bar{1}$00)	*t*	(111)	($1\bar{1}\bar{1}$)
s	($\bar{1}$01)	($\bar{1}$0$\bar{1}$)	*m*	(110)	(1$\bar{1}$0)
p	(0$\bar{1}$1)	(01$\bar{1}$)	*n*	($\bar{2}$10)	($\bar{2}\bar{1}$0)

This development may be described either as a combination of sphenoidal hemihedrism with hemimorphism along the macrodiagonal *a*, or as a tetartohedrism resulting from a combination of sphenoidal and parallel-faced hemihedrism; but the faces *s* and *p* constitute the semi-forms which do not correspond in position with the two faces of *p* by which they are accompanied. Sadebeck has concluded from the etched figures that struvite is not "tetrahedral."

(*B*) exhibited new faces *k* (120), *i* (5$\bar{1}$0) in the prism-zone which were hemihedrally disposed like *m* and *n*; the reflections were not good, but the planes were clearly developed.

010 : 120	calculated 15°14½′	measured	15°—15°45′
$\bar{1}$00 : $\bar{2}$10	,, 20°9½′	,,	19°45′—20°30.