

the appearance of the crystal that the faces enumerated are those which exist. In parallel light a plate parallel to the base becomes dark grey but shows variations of intensity in the different parts of the plates. In convergent light a black cross is observed which opens slightly when the stage is revolved. The size of the optic angle in different parts of the plate is very variable from one point to another. By means of a quarter undulation mica plate the character of the double refractions was determined as positive." This description fits that of catapleiite in so many respects as to leave little doubt of the identity of this mineral with catapleiite.

### A NEW MODE OF OCCURRENCE OF STRUVITE<sup>1</sup>

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In the summer of 1920 the writer received from Mr. C. H. Hickey of the Food and Drug Inspection Station in Boston some crystals, the identification of which was desired. The crystals were found in canned shrimp from Biloxi, Miss. Attention had been called to them by their hard, gritty character and their insolubility in either hot or cold water.

One of the few, minute, white crystals submitted proved measurable on the goniometer. It was found to be a twin crystal of orthorhombic system but in the absence of any chemical data its nature was not established. Later more of the material was secured by the chemists of the Station and qualitative tests were obtained for magnesium, ammonia and phosphorus. With this information it was easy to identify the crystal as struvite and renewed study of the forms revealed the characteristic hemimorphism of that mineral. As shown in the figure the crystal was elongated in the direction of the *a* axis, twinned on the basal pinacoid, and deeply grooved on both sides. Other crystals were flattened parallel to the twin plane. They showed cleavage and optical characters which agreed with the data given for struvite in Dana (Syst. p. 806).

The forms observed were the following:—*b*(010); *c*(001); *p*(120); *S*(101); *s*<sub>1</sub>(10 $\bar{1}$ ); *h*(021); *h*<sub>1</sub>(02 $\bar{1}$ ); *t*(121).

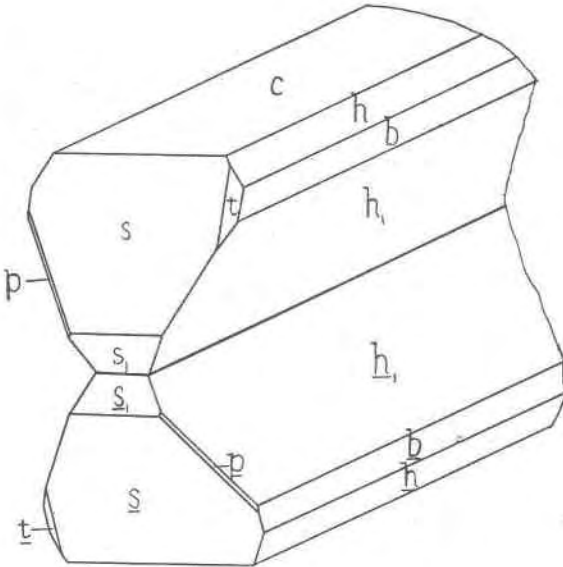
The reflections were poor but the following angles show the nature of the agreement of measured with calculated values:—

<sup>1</sup> These crystallographic notes and the figure of struvite have already been published in a paper by C. S. Purcell and C. H. Hickey. Note on an Occurrence of Struvite in Canned Shrimps, *The Analyst*; London. A reprint seemed desirable:

	MEASURED	CALCULATED
001 to 101	57°56'	58° 09½'
001 to 101̄	58 35	58 09½'
001 to 021 (4)	61 29	61 16
010 to 120 (2)	48 33	48 34

The distribution of the faces of the forms *p* and *t* indicated a lower symmetry than is usually ascribed to struvite; but the material was too poor and too limited in amount to permit of satisfactory conclusions being reached on this point.

Mr. Hickey states in a letter:—"\*\*\*\*\* as we found some of the crystals in a freshly opened can of shrimp, it is our opinion \*\*\*\*\* that the presence of ammonia in the substance, due to the breaking down of the protein of the shrimp, indicates decomposition."



TWIN CRYSTAL OF STRUVITE

This mode of formation is in agreement with that of other occurrences of struvite; it is a *guano* mineral and has been formed in artificial cultures as a product of bacterial fermentation. The nearest parallel to the present occurrence of struvite is recorded by Arzruni<sup>2</sup> who described minute crystals found in a bottle of peptonized meat; they were however of an entirely different habit.

<sup>2</sup> *Zeit. f. Kryst.*, 18, 60, 1890.