STRUVITE IN CANNED LOBSTER

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For an authentic mineral species struvite, $NH_4MgPO_4 \cdot 6H_2O$, has numerous strange occurrences. As given in Dana's *Manual* it has been "found in guano from . . . the coast of Africa; also under an old church in Hamburg, where quantities of cattle dung existed in the soil above a bed of peat which contained the crystals; (and) in the bat guano of the Skipton caves. . . ." A further interesting occurrence for the mineral is indicated by a recent discovery of a crystal group inside a lobster's claw.

The struvite was brought to the writer for identification at a time when he was attempting to find an orthorhombic crystal suitable for measurement on the two-circle goniometer. None of the faces was smooth enough for first-class images; nevertheless several of the crystals were mounted by a student, Paul W. Zimmer, and were found to give results sufficiently accurate for identification of the species. The average readings differed 4 to 20 minutes from the values given in Dana for the angles.

The crystal habit was found to be elongated parallel to the *a*-axis with the brachydomes *q* {011} and *h* {021} predominating, and terminated at the unattached end by the prism *p* {120}. The pinacoids *b* {010} and *c* {001} in the elongated zone gave in general scattered images, and a doubtful form corresponding to {013} was recorded. The only trace of hemimorphism was the presence of a single macrodome face of *s* {101}, instead of both in the termination of two of the crystals.

The orientation of the mineral is worthy of comment. Our first attempt was to choose what later turned out to be *q* as the unit prism and *p* as a brachydome, giving the $a:b:c$ ratio of 0.912:1:1.133. Neither the *c* nor the *a* values could be found in Wherry's Tables.[1] By interchanging the *a* and *b* axes and dividing by 2 we arrived at a Goldschmidt value of 0.548 for *a;* and by recalculating *c*, and again dividing by 2, we obtained 0.620 for *c*. Dana has a still different orientation, more acceptable because he places the hemimorphism along the *c* axis. In terms of Dana's $a:b:c$, Goldschmidt's and ours are respectively;

$$b/2:c:a \text{ and } c:b:2a.$$

After the mineral was determined crystallographically, confirmatory tests were made microscopically and chemically. The refractive indices, α, β, and γ, agreed with Larsen's values[2] and the two good cleavages gave flash field and acute bisectrix interference figures. The presence of phos-

[1] *Am. Mineral.*, **5,** 164 (1920).

[2] *U.S.G.S., Bulletin* **848,** The Microscopic Determination of the Nonopaque Minerals.

phorus was confirmed with the ammonium molybdate test, magnesium with titan yellow, and ammonia with Nestler's reagent.

That this occurrence of struvite in canned lobster has a close parallel is shown in *Chemical Abstracts*. L. H. James[3] reports that some supposed pieces of glass in canned salmon proved to be crystals of struvite; and that such crystals have been found in canned shrimp. C. H. Manley[4] suggests that local decomposition, not necessarily of a harmful character, is the origin of the crystals; and comments that struvite has been found in ambergris. Struvite has also been found in a human lung.[5]

[3] *Analyst*, **58**, 222 (1933).
[4] *Analyst*, **58**, 337 (1933).
[5] Porter, Mary W., *Am. Mineral.*, **9**, 93–94 (1924).