NOTES AND NEWS

GROWTH OF STALACTITES

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Several brief articles concerning the rate of formation of stalactites and stalagmites have appeared from time to time in various journals. The data here presented are the result of a continuous study of some calcareous deposits formed in an inspection tunnel of the Gulf Island Dam, Central Maine Power Company, on Androscoggin River, about five miles upstream from Lewiston, Maine.

The impounded water has a head of 52 feet. The tunnel at its lowest point is 65 feet below the pond level. The bed rock of the river is chiefly a limy schist cut by pegmatites. The river carries considerable sulphite obtained from the pulp mills along its banks.

A series of measurements were made on 28 stalactites growing from the concrete arches of the tunnel or from the offsets containing the sumps. The first study was made August 1, 1932. The average length of the stalactites was then 3.16 inches. Water was first impounded at Gulf Island, September, 1926. If the assumption is made that the stalactites began to form as soon as the water was impounded, the average rate of growth has been 0.53 of an inch per year.

On August 1, 1933, the stalactites were again measured. No increase was noted in 17 of the forms which had become dry sometime during the year. The remaining 11 stalactites showed an average increase of 0.70 of an inch. If the total length of the 11 growing stalactites is computed for a yearly average over the seven-year period of the dam's existence the rate is 0.66 of an inch.

A pipe two inches in diameter runs the entire length of the tunnel on the upstream wall. From this pipe 17 stalactites are forming. No measurements were made on these the first study period. Their growth is accordingly listed for seven years and the average growth per stalactite per year is 0.28 of an inch.

A comparison between the results of the present study and those of other writers is tabulated below.

	Longest Stalactite	Average Growth per Year
(1) Wilson Dam—Muscle Shoals, Florence, Alabama[1]	15.2″	3.04″
(2) Concrete Culvert[1]	3.5″	1.75″
(3) Coal Mine[1]	(min. av. 0.47″; max. av. 6.8″)	
(4) Lead Mine Timbers[1]	2.0″	0.8″
(5) Brick Arches in Fort Delaware, Del.[2]	5.0″	0.17″
(6) Brick Arches in Fort Pickens, Fla.[3]	10.0″	1.00″
(7) Roofs and walls, Fort Morgan, Ala.[4]	8.0″	0.14″
(8) From limestone railroad ballast[5]	12.5″	1.04″
(9) Gulf Island Dam		
a. stalactites on pipe	5.1″	0.28″
b. stalactites in arches (28) (on 7 year basis)	8.63″	0.53″
c. 11 of (b) now growing (1 year basis)	2.8″[6]	0.70″
d. 4 largest, Aug. 1, 1932	8.63″	0.95″
e. one stalactite[7]	11.50″	2.30″

No real correlation appears in the above taken as a whole. Stalactite growth in Fort Morgan and Fort Delaware is nearly at the same rate. Calcium carbonate in lime mortar supplied the material for the stalactites. An easily soluble limestone is represented in no. 8. The growths under nearly similar conditions are represented by nos. 1 and 9*e*, respectively. The head of water at these dams is respectively 90 feet and about 60 feet. W. M. Davis[8] says ". . . small differences of head beneath a peneplain will retard groundwater circulation and thus lessen its solvent power." Perhaps this explains in part the discrepancy between nos. 1 and 9*e*.

Several stalagmites deposited in Gulf Island Tunnel on an insulated pipe showed an average over 6 years of 0.25″ height and 0.36″ diameter of base. This growth compares rather favorably with 0.12″ and 0.21″, respectively, by von Steeg,[5] and 0.3″ and 4.0″, respectively, by Edwards.[6]

[1] Johnston, W. M. Jr., Rate of growth of stalactites: *Sci.* (ns.), vol. **72,** p. 299, Sept. 19, 1930.

[2] Richards, Gragg, Growth of Stalactites: *Sci.* (ns.), vol. **73,** p. 393, April 10, 1931; and vol. **75,** p. 50, Jan. 8, 1932.

[3] Ellis, E. W., Concerning rate of formation of stalactites. *Sci.* (ns.) vol. **73,** p. 67, Jan. 16, 1931.

[4] Edwards, H. M., The growth of stalagmites. *Sci.* (ns.) vol. **76,** p. 368, Oct. 21, 1932.

[5] Von Steeg, Karl, Stalactites from railroad bridge, *Boston Transcript*, March 12, 1932.

[6] Represents greatest increase noted in the elapsed year.

Wall coatings at Gulf Island are distributed uniformly on both upstream and downstream sides of the tunnel averaging one inch in thickness at right angles to the walls. Ridges of calcium carbonate extend from the junctions of the arches and are one inch thick and $1\frac{1}{2}''$ to $2\frac{1}{2}''$ wide.

A recording thermometer was installed in the tunnel from July 28, to August 4, 1933. The temperature of the tunnel was uniformly 62 degrees for $4\frac{1}{2}$ days and between 64 and 62 for $2\frac{1}{2}$ days. Outside temperatures during the same period varied from 62 to 86. The water in the tunnel does not freeze in winter despite zero temperatures outside. Atmospheric pressure inside the tunnel was determined by an aneroid barometer on six different occasions. No noticeable differences in tunnel and outside pressure was noted.

The writer expresses his thanks to Leon Ladd, Superintendent of Gulf Island Dam for permitting and aiding the study, and for protecting the measured stalactites from curious tunnel visitors.

[7] Broken off on Oct. 1, 1931, during inspection trip.

[8] Davis, W. M., Origin of limestone caverns; *Sci.* (ns.), vol. **73**, p. 329, Mar. 27 1931.

PARAGONITE FROM PIZZO FORNO, TICINO, SWITZERLAND

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A "paragonite" schist from the type locality for paragonite,[1] Pizzo Forno, near Faido, Ticino, Switzerland was donated by Ward's Natural Science Establishment and studied to determine the properties of paragonite.

In a hand specimen the paragonite is a white, flaky mica with a vitreous to pearly luster, forming the ground mass for small crystals of cyanite and staurolite. A portion of the rock was ground up and the constituent minerals separated by heavy liquid gravity methods. A variation in specific gravity in the paragonite from 2.82 to 2.90 was found and the cause determined by microscope methods as being due to minute inclusions of cyanite, staurolite and an opaque mineral, probably magnetite.

The gravity separates of paragonite were *x*-rayed by the powder method and the patterns thus obtained showed no apparent variation from a standard muscovite pattern. Measurements of the indices of refraction on grains from different gravity separates by

[1] Dana, E. S., Textbook of Mineralogy, 4th ed., p. 661.