

longest observed was 15.2 inches (38.7 centimeters). The average diameter near the tip was 0.2 inch (0.5 centimeter), and at the base the diameter ranged between 0.5 and 1.5 inches (1.2 and 3.8 centimeters). All had the form of hollow cylindrical tubes whose walls increased in thickness from the tip toward the point of attachment. With two or three exceptions the stalactites were symmetrical.

Impounding of the reservoir was accomplished early in 1925, and the stalactites were measured early in 1930 so that their present size represents five years' growth. Roughly the linear growth rate of the average specimens was between 1 and 2 inches a year. As pointed out by Allison,² the factors affecting stalactitic growth are rate of drip, air circulation, relative humidity, temperature and concentration of the mineral content of the water. As each of these factors has a wide range in different places, it is obvious that the rate of stalactitic growth in the Wilson Dam inspection tunnel is peculiar to the exact conditions there prevailing and is not generally applicable.

Recently Mr. F. E. Matthes, of the U. S. Geological Survey, showed the writer a tubular stalactite 3.5 inches (8.9 centimeters) long, 0.5 inch (1.3 centimeters) in diameter at the base and 0.25 inch (0.6 centimeter) at the tip, which he had collected from the arch of a concrete culvert in Rock Creek Park in Washington. The culvert was constructed in 1927, and the stalactite had attained the dimensions given two years later.

In connection with the stalactites already described two exhibits at the National Museum are of interest. One (U. S. N. M. No. 39089) is a group of tubular stalactites 0.5 inch (1.3 centimeters) in diameter and 4 inches (10.2 centimeters) long, which were formed under one of the old arches at the west side of the center of the Capitol. Although the time of formation is not exactly known, it is on the order of tens rather than hundreds of years.

A second exhibit (U. S. N. M. No. 68342) is a pint whisky bottle which was left for five years under a small drip in Weyers Cave, near Shenandoah, Virginia. The bottle is coated with a crust of calcium carbonate which has a maximum thickness of 0.25 inch (0.6 centimeter).

Allison² noted stalactites in a coal mine growing at the rate of 0.1 to 1.44 centimeters in length a month. Curtis³ observed aragonite aggregates growing in drops of water at the rate of $\frac{3}{8}$ inch in three months.

Mr. E. T. McKnight,⁴ of the U. S. Geological Sur-

vey, observed calcium carbonate stalactites as much as 2 feet in length and several inches in diameter suspended from old timbers in a lead mine in Arkansas. The maximum age of these stalactites is probably 30 years.

The observations cited indicate that the formation of stalactitic and stalagmitic deposits of calcium carbonate in caves can proceed at a fairly rapid rate when the essential conditions are favorable.

More soluble salts permit greater concentration of the solutions, and stalactites of such salts often grow very rapidly. A copper sulfate stalactite 27 inches (67.5 centimeters) long and 1 inch (2.5 centimeters) in average diameter on the 1,400-foot level of the Briggs mine, at Bisbee, Arizona, was formed in 17 months.⁵ On the assumption that the conditions were constant this represents a rate of 1.68 inches (3.95 centimeters) a month. Photographs showing the stalactites of chalcantite and limonite hanging from mine timbers at Butte, Montana, have been widely reproduced.⁶

WILLIAM DRUMM JOHNSTON, JR.

U. S. GEOLOGICAL SURVEY

BLACK PAPER FOR CAMERA LUCIDA DRAWINGS

IN the use of the camera lucida some difficulty is frequently experienced in seeing clearly the object when white drawing paper is used.

Quite accidentally, the writer discovered that the object stands out much more definitely when a black surface is the drawing medium.

Black drawing paper (charcoal paper) may be secured in any store that carries a good line of drawing materials, and it is very satisfactory. Some difficulty was experienced in getting a pencil that was, in the first place, hard enough to take a good point, and, in the second place, of a color that would stand out well on a black background. An Eversharp carrying yellow lead was found best for the purpose. This lead can be sharpened to a needle point on fine sandpaper and is sufficiently hard to hold this point.

A controllable source of illumination on the drawing paper has been found beneficial in making the point of the pencil stand out more clearly. This is particularly true if the work is being done in a dark room or at night.

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² V. C. Allison, "The Growth of Stalagmites and Stalactites," *Jour. Geology*, 31: 106-125, 1923.

³ J. S. Curtis, "Silver-lead Deposits of Eureka, Nevada," U. S. Geol. Survey Mono. 7, pp. 56-58, 1884.

⁴ Oral communication.

⁵ G. J. Mitchell, "Rate of Formation of Copper Sulfate Stalactites," *Am. Inst. Min. Eng. Trans.*, 66: 64, 1921.

⁶ W. H. Weed, "Geology and Ore Deposits of the Butte District, Montana," U. S. Geol. Survey Prof. Paper 74, pl. 8, 1912.