have grown much before the completion of the tunnel in 1890, they must have grown about 0.7 centimeters per year, at least.

Indeed, these stalactites might be considerably younger. For the tunnel was used as an air raid shelter in 1941-45. It would seem likely that many stalactites might have been broken off then, so that many might have grown in only about 33 years.

The tunnel is bored through London clay of a Tertiary formation.

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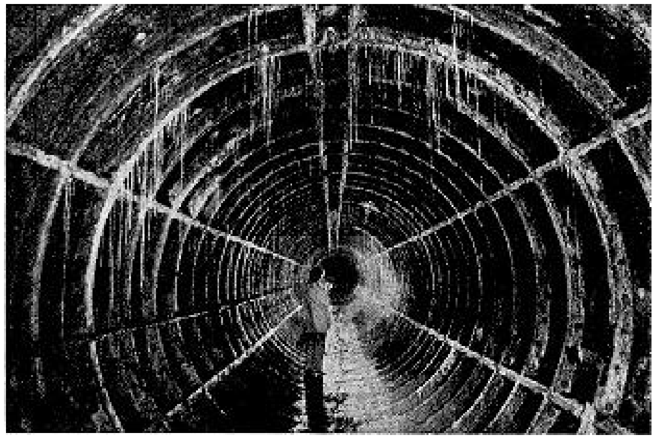

This picture, showing stalactites in an abandoned tunnel, is by the Times of London, as cited, and is used here by permission.

RAPID STALACTITE FORMATION OBSERVED

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Creationists have predicted that it would be found that dripstones, stalactites and stalagmites, can form very quickly under some conditions. Moreover, they have been able to find some instances in which such rapid growth is actually happening.

Here another piece of evidence is presented. Stalactites have been found growing rapidly in a cave-like environment. Some suggestions are made about circumstances which may have influenced the rate of growth.

Introduction

It is generally accepted by today's evolutionary-minded scientific community that dripstone is formed very slowly. Consequently large stalactites and stalagmites are considered to be hundreds of thousands to millions of years old. For those scientists who hold to a creation model of origins, however, such extensive time periods are inconsistent with their view of a young earth. Creationists are thus investigating the growth rates of stalactites and stalagmites and the conditions that affect their growth rates in search of evidence to support their rapid formation. Recent articles which have appeared in the *Creation Research Society Quarterly* show that creationists have achieved much success towards this goal.[1,2]

This article was written to report on observations of rapid stalactite growth in two cement tunnels in a water-treatment plant located on the Ottawa River in the Canadian province of Quebec.

Cement Tunnels Simulate Natural Caves

The water treatment plant was built in 1967 and was put into service in December of that year. It was designed to sterilize and reduce the color of 20 million U.S. gallons of water per day for use in a Kraft pulp mill. As of August 26, 1977, it has treated a total of 48,600 million U.S. gallons of water for an average of 13.7 million U.S. gallons per day over 9.7 years.

River water is continually pumped into the bottom of a pulsator clarifier (155' long x 90' wide). Chemicals are added to sterilize and clarify the water. (See Table 1). The pH in the clarifier averages 5.3 but ranges from 5.0-5.8. The water level is maintained at 16' by a system of overflow collection pipes. As the water leaves the top of the clarifier it is neutralized to a pH of 6.7 (ranges from 6.0-7.0). The water then enters a cement tunnel 210' long x 7.7' wide x 4.5' high which serves to distribute it to eleven sand filters. The water level in the tunnel is 3.5'.

Table 1. Chemicals added to the water.

Chemical	Main Components (% by wt)	Initial State	Addition Rate (lb/1,000,000 USG)
Alum*	48% $A1_2(S0_4)_3$, 52% H_2O	solution	270
Alkali*			
(1) 1967-'71	91% $Ca(OH)_2$ (hydrated lime)	powder	100
(2) 1971-'77	50% NaOH, 50% H_2O	solution	80
Polyelectrolyte	100% Polymer	powder	3
Chlorine	100% Cl_2	liquid	30

*Reacts together to form a floc, $Al(OH)_3$.

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The water temperature is virtually the same as the river temperature, ranging from 2°C in the winter to 24°C in the summer.

There are two tunnels in the water treatment plant in which stalactite growth may be observed. Tunnel A is located immediately below the clarifier, separated by 1.3' of cement roof. The tunnel is 155' long x 12.8' high x 10' wide. A two foot wide open-channel floor drain runs the length of the tunnel and there is a continual flow of water through it. Tunnel B is located immediately below the cement tunnel which distributes water to the sand filters. It is 210' long x 7.7' wide x 15' high and has a cement roof 0.7' thick. Because water is continually flowing along the floor of the tunnel, a walkway made of steel grating is supported 5' from the bottom. (See Figure 1).

The temperature in both tunnels is moderate the year-round (12°C in winter, 20°C in summer). The humidity is about 80%. There are no fans to force air circulation in the tunnels.

The conditions in these tunnels closely simulates those in natural caves. Tunnel A might be likened to a cave located under a small lake whereas Tunnel B is similar to a cave located below a small river.

High Stalactite Growth Rates

In Tunnel A there are about 300 stalactites, the majority of which are less than 75 mm in length. On August 26, 1977, the longest stalactite measured 425 mm long and 6 mm in diameter (Figure 2). This indicates a minimum growth rate of 44 mm/yr or 1.24 cm^3/yr over the 9.7 years that the water plant has been in operation. The largest stalactite was 395 mm long and 12 mm in diameter which indicates a minimum average growth rate of 41 mm/yr or 4.61 cm^3/yr (Figure 2). This is 28 times greater than growth rate of 0.164 cm^3/year (1 in^3/100 years) cited in geological literature.

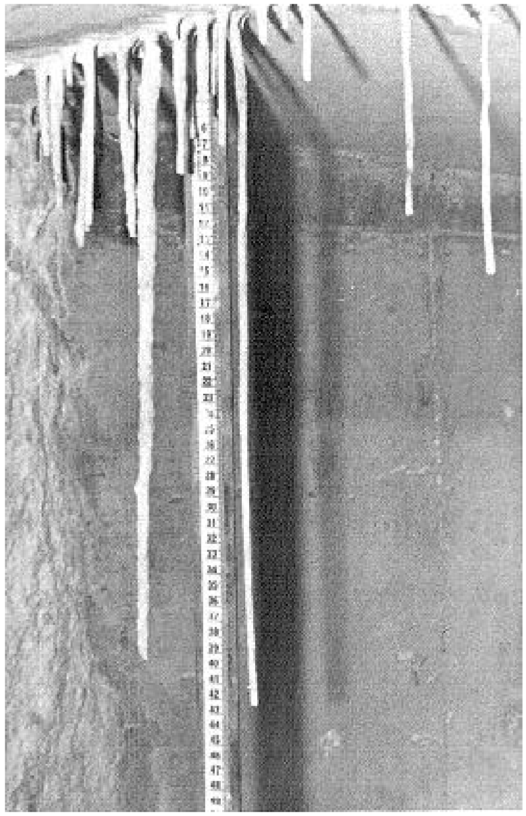

Figure 2. August 26, 1977, Tunnel A. The stalactite to the left of the scale measured 395 mm in length; the one to the right 425 mm. Notice the rock flow on the wall.

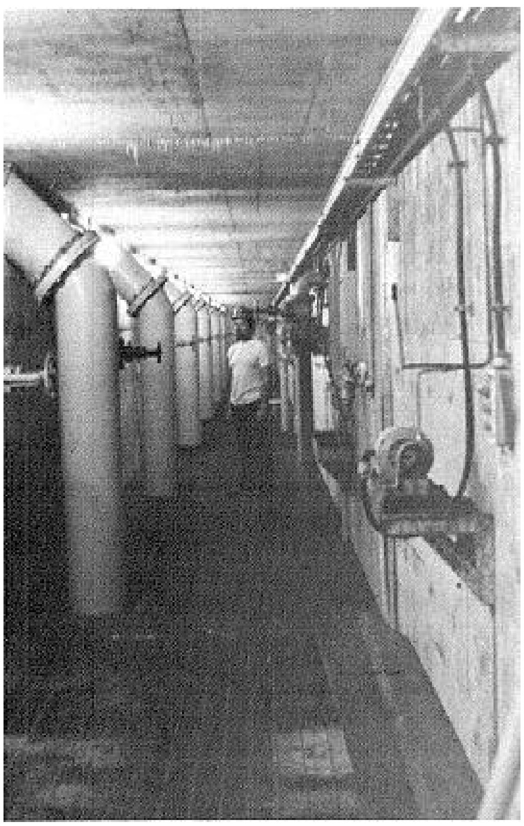

Figure 1. Tunnel B in Water Treatment Plant.

In Tunnel B there are approximately 350 stalactites and again most of them are less than 75 mm in length. On August 26, 1977, the largest stalactite in Tunnel B was 250 mm long and 6 mm in diameter which indicates a growth rate of 26 mm/yr or 0.73 cm^3/yr.

Because the date on which the stalactites started growing is not known, the growth rates calculated here should be considered minimum values.

Although there are no stalagmites in the tunnels, there is some rock buildup on the floor beneath the stalactites in Tunnel A, indicating the beginnings of stalagmite growth. In Tunnel B stalagmites cannot form because of the water flowing along the tunnel floor.

There are several examples of flowstone on the walls of the tunnels. The largest is in Tunnel B (Figure 3). It measured 22 mm thick at its widest point.

Some Parameters Affecting Stalactite Growth Rate

Although these stalactites are growing in conditions closely akin to natural caves, there are several "un-

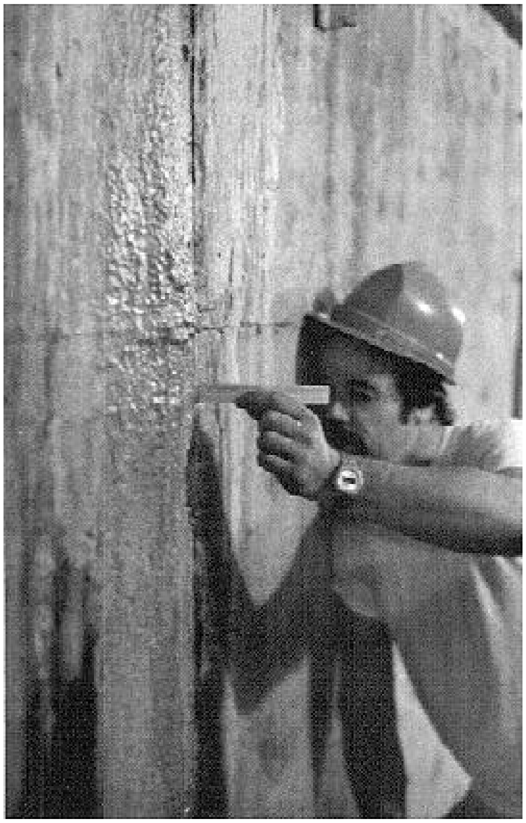

Figure 3. August 26, 1977. This rock flow in Tunnel B measured 22 mm thick.

natural" factors that may have affected their growth rate.

1. Chemicals are added to the water to facilitate floe formation in the clarifier (Table 1). The effect this would have on stalactite growth requires further investigation.
2. The acidic conditions of the water above Tunnel A (pH 5.3) and to a lesser extent above Tunnel B (pH 6.7) would aid in dissolving the cement as the water seeps through cracks in the roofs.
3. The $Ca(OH)_2$ in the cement roofs is more soluble than the $CaCO_3$ of natural limestone.
4. There is an average water flow of 9500 U.S. G.P.M. above the tunnels. The water level above Tunnel A is 16' and above Tunnel B, 3.5'. There is a large amount of available water.
5. The roofs of the tunnels are very thin in comparison with natural caves (1.3' in Tunnel A and 0.7' in Tunnel B). The water dripping through the roof has only a short distance in which to dissolve the cement. In natural caves the distance would be much greater.

Conclusion

Rapid stalactite formation has been observed in cement tunnels in a water treatment plant. Although conditions in the tunnels closely simulate natural caves, the large volumes of water, the acidity of the water, the chemical additives in the water and the higher solubility of the cement roofs may have promoted rapid stalactite formation. These considerations, however, do not detract from the observed fact that under certain conditions stalactites do form rapidly.

Acknowledgement

The data given here are used by permission of Consolidated-Bathurst Ltd., of whose plant the tunnels men tioned form a part.

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Creationists' Taxonomy

(Continued from page 38)

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