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COMET CONES: A VARIETY OF CAVE CONE FROM FORT STANTON CAVE, NEW MEXICO

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The name "comet cones" is suggested for a variety of cave cone, after their physical likeness with the images of comets. The comet cones of Fort Stanton Cave are constructed of millimeter-sized calcite cave rafts. A pre-existing stream environment is responsible for the small size of the rafts as well as the development of a "comet" tail on the cones. Drips from condensate water sank the rafts and formed the cones.

INTRODUCTION

An unusual type of cave cone occurs in Fort Stanton Cave. We refer to these as "comet cones." Their shallow height, millimeter-sized rafts, and tail, result in a resemblance to images of comets (Fig. 1a). These comet cones differ from common cave cones because they have formed in a more dynamic environment (gentle stream) and are constructed of very small rafts. We present a brief description of the comet cones, discuss their unique origin, and suggest the comet cone as a new variety of cave cone.

Cave cones are a speleothem subtype of cave rafts, and two common varieties of cave cones are "volcano cones" and "tower cones" (Hill and Forti 1997). Cave cones are constructed of rafts. Rafts form when calcite crystal assemblages precipitate on the surface of still water. Individual rafts can grow up to 10s of centimeters in diameter. Cave cones form when dripping water impacts floating cave rafts, sinking them, and subsequently piling the rafts under the drip point. The piles of rafts form the stalagmite-like cones. The heights of cave cones are limited by the depth of the pools in which they develop. We show an example of a nicely formed volcano cone from Cavenee Caverns, central New Mexico, in Figure 2. In contrast to the common varieties, comet cones form in gently flowing, shallow water. When a water drip sinks the tiny rafts, the pile is thin and a small tail forms in the direction of flow.

DESCRIPTION AND COMPOSITION OF COMET CONES

The comet cones of Fort Stanton Cave are thin cave cones with tails (Fig. 1a). They are only 1–3 centimeters high, 15–30 centimeters wide, and 30–50 centimeters long. They are constructed of millimeter-sized cave rafts. X-ray diffraction shows that the rafts consist of low magnesian calcite. The mineral assemblage of the comet cones was calcite, quartz, and dolomite. The minor to trace amounts of quartz and dolomite are probably detrital components. Quartz and dolomite are not common cave-authigenic minerals, and small amounts of these would be expected in this stream passage environment.

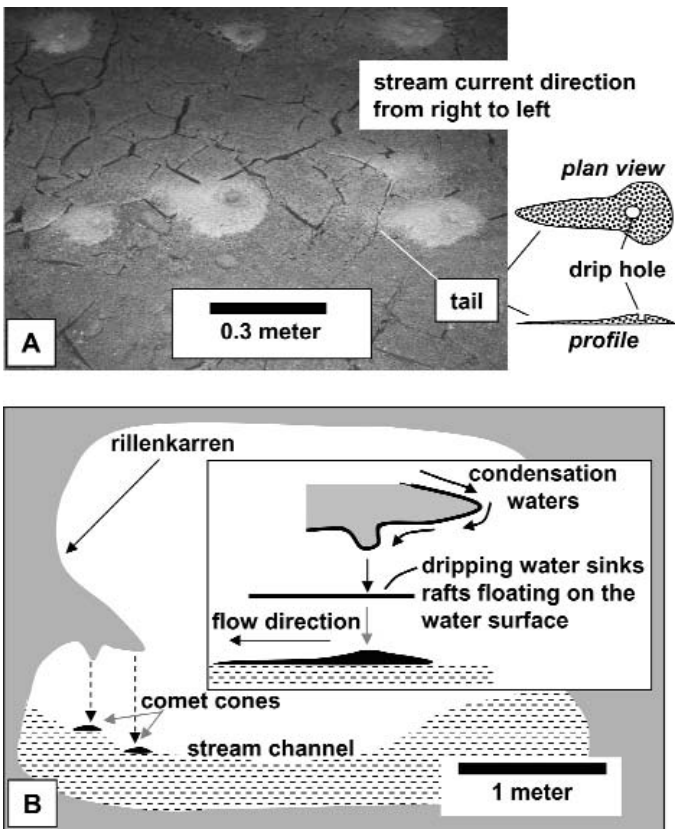

Figure 1. Depositional environment and morphology of the Fort Stanton Cave comet cones. (A) Image and sketch of cave cone morphology. (B) Cross-section of the Fort Stanton passage shows the importance of the shelf and condensate water to the origin of the cave cones.

ORIGIN OF COMET CONES

These cones have formed on stream silt and mud under a shelf along the margin of the cave passage (Fig. 1b). While this area is dry today, the stream water level must have been at about 0.1 to 0.5 m deep when the comet cones formed. Broad

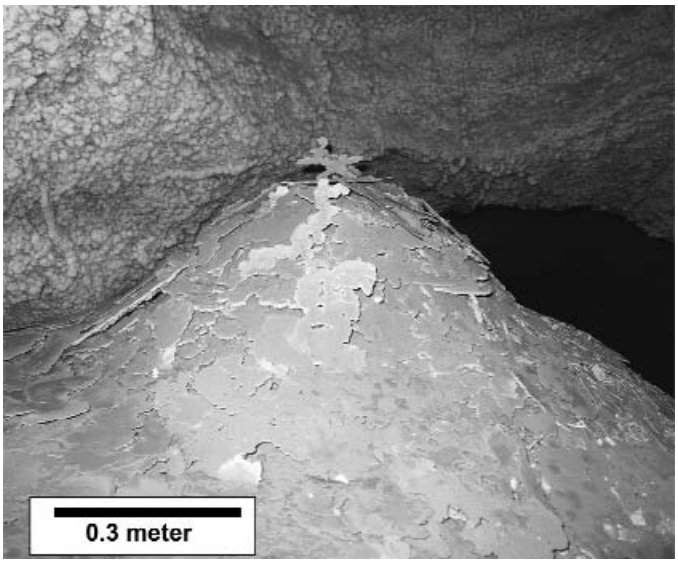

Figure 2. Example of well-developed cave cone. This cave cone that has formed in Cavenee Caverns, central New Mexico, is the volcano cone variety.

rillenkarren along the cave walls indicates that water vapor condensed along the upper walls and ceiling of the passage and then this condensate water descended to the shelf. The condensate water dripped from the lip of the shelf, and at projections under the shelf, and sank small cave rafts floating on the surface of the stream. The pre-existing stream flow, while very gentle, transported some of the rafts in the downstream direction past the cones. Deposition of the rafts by the gentle current tapered off away from the cones in the down stream direction to give the cones a comet's tail. Sometime after the water level descended below the cones and before the passage became dry as it is today, dripping continued and formed shallow drip holes in the center of the cones.

The comet cones of Fort Stanton Cave are delicate and probably short-lived features. It is likely that this area of the cave could become hydrologically active again and destroy the cones, or continue the cone-forming process in the not-too-distant future perhaps when climatic conditions are wetter. Even with their delicate, short-lived existence, we suggest the comet cone as a new variety of cave cone.

ACKNOWLEDGMENTS

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REFERENCES

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