

ANALYSIS OF MYSTERIOUS BLACK “DUST” COATING SEDIMENTS IN BUTLER CAVE, VIRGINIA

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Abstract

Butler Cave is located in the Valley and Ridge Province in Bath County, Virginia. The cave is formed in Silurian-aged lower Tonoloway Limestone. The tributary passages are primarily developed on the eastern flank of Jack Mountain on the gently dipping limb of the Sinking Creek Syncline. The main passage is proximal to the syncline axis. Multiple tributary passages and the main passage host diamicton deposits and Quaternary aged fluvial sediments in terraces of varying elevations. The fine component of these is siliciclastic sand, silt, and clay, and the clasts are a mix of sandstone, shale, and limestone. In undisturbed areas by cavers, the sediments are commonly coated in a very thin layer of black dust-like substance. It has been assumed that this black substance is manganese oxide or carbon. Samples were collected in the main passage at Sand Canyon Camp, in the tributary passages of Complaint Cave Section, Dave's Gallery, and in 90 Ugh Crawl. Samples of the black dust-like substance were collected using cellophane tape, masking tape, copper foil tape or by using a thin blade. Samples also included sandstone diamicton pebbles coated with the black dust-like substance. Energy dispersive spectroscopy (EDS) and scanning electron microscopy (SEM) techniques were used by the Pennsylvania Geological Survey to analyze the samples. Although some samples did reflect a strong amorphous manganese oxide presence, lower concentrations of pyrite, iron oxide, titanium dioxide, and apatite were detected. The detection of these metals has been seen in previous bulk sediment analyses from Butler Cave, what remains to be a mystery and needs further research is how and why the black sediment material was deposited within the cave system.

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