

## WHAT ARE “ANTHODITES”?—CONTINUED

DONALD G. DAVIS

441 S. Kearney St., Denver, CO 80224-1237

Having considered William White's (1995) response to my taxonomic challenge to his usage of “anthodite”, based on that of Hill & Forti (1986), I feel that further discussion is called for.

The central problem, which is not resolved by Dr. White's response, is that the name “anthodite” is being applied to two separate speleothem forms that are distinct in both morphology and growth mechanism. This, it seems to me, is not tolerable under any system of nomenclature. Nor is the question as trivially academic as might be supposed; such imprecision in definitions has ill effects on the ongoing practice of geologic inventory recording in caves (Bergthold, 1995).

Dr. White's point that most speleothem names were defined by laymen, and are often imprecise, is well taken. However, in the case of anthodites, we have a reasonably informative type description in Henderson's paper of 1949, whose text and illustrations show clearly that anthodites are quill-like growths having central canals. There is no indication that the name was intended to cover acicular aragonite without central canals, which had been called frostwork since the 1890s.

Dr. White disagrees with my suggestion that anthodites are a subclass, or “style,” of helictite. Because of the confusion that has arisen from the arbitrary changes in the usage of “anthodite,” I may need to clarify my suggestion: I suggest that anthodites as originally defined at Skyline Caverns may be a style of helictite. I do not suggest that “anthodites” in the sense of frostwork are helictites. (The need to make this clarification illustrates the problem!)

Dr. White rejects the original anthodites as falling under helictites. As part of his basis for this, he states that helictites “are composed of calcite.” This surprised me, as speleothem types are not ordinarily defined as restricted to a single composition; flowstone, dripstone, moonmilk, etc., may be composed of any of a number of minerals. Regarding helictites in particular, the literature has references to non-calcite examples—e.g., helictites of marcasite, galena and sphalerite (Peck, 1979). Hill and Forti also index helictites of a dozen other compositions—even lava—and refer explicitly to “aragonite helictites,” under which they categorize the beaded growths of Cave of the Winds, Colorado (which resemble the Endless Caverns anthodites more than they resemble frostwork).

However, if calcite produces morphology that is most characteristic of the “helictite” concept, this suggests one possible resolution of our problem: retain the word “anthodite,” but restrict its use to non-gravitogenic, helictite-like speleothems having central canals, and composed of—or originating as—aragonite; i.e., those which might otherwise be thought of as aragonite helictites. This would be consistent with the original anthodite definition, but would exclude frostwork and its vari-

ants from falling under anthodites. In this scheme, aragonite speleothems would fall into two general classes: anthodites, for those having internal canals; and frostwork and its elaborations such as “aragonite bushes,” for the acicular forms.

The above solution, however, makes the terms “anthodite” and “aragonite helictite” synonymous and therefore redundant. Alternatively, we could conclude that “anthodite” has been hopelessly confused and corrupted by contradictory use over the years, that it was not necessary in the first place, and that future authors would be better advised to abandon it entirely, and instead to employ “aragonite helictite” for the quill-like type and “frostwork,” “aragonite bush,” etc., for the acicular kind. This would be my own preference.

To “regard frostwork as an anthodite style,” as Dr. White suggests (which, in effect, is what Hill and Forti did), would go against his own definition of “style” as a variation on a basic depositional mechanism. Frostwork does not have the same fundamental origin as anthodites (as originally defined). Indeed, they may be even more radically distinct than formerly thought, if Klimchouk, Nasedkin and Cunningham (1995) are correct that acicular speleothems often crystallize from aerosols. Nor does it seem logical to classify frostwork as a subclass of an “anthodite” category that was not invented until decades after frostwork was described, and whose definition was inconsistent with the properties of frostwork.

In botany and zoology, there are controversies about the level of taxonomic entity that is valid for a population (leading to “lumping” or “splitting”), but there are nevertheless accepted rules in which priority of publication is primary in establishing validity of the names themselves. In the nature of cave mineralogy, such taxonomic rigor may not often be possible, but the more closely we can emulate it, the less confusing and ambiguous our literature will be.

### REFERENCES

- Bergthold, L. (1995). Geology/Mineralogy [Review]: What are “Anthodites”? *Guadalupe Hooter* 10(7):3. July.
- Henderson, E.P. (1949). Some unusual formations in Skyline Caverns, Va. *National Speleological Society Bulletin* 11: 31-34.
- Hill, C.A. & Forti, P. (1986). *Cave Minerals of the World*. National Speleological Society, Huntsville, Alabama. 238 p.
- Klimchouk, A.B., Nasedkin, V.M., & Cunningham, K.I. (1995). Speleothems of Aerosol Origin. *National Speleological Society Bulletin* 57(1): 31-42.
- Peck, S.B. (1979). Stalactites and helictites of marcasite, galena, and sphalerite in Illinois and Wisconsin. *National Speleological Society Bulletin* 41(1): 27-30.
- White, W.B. (1995). What are “Anthodites”? Reply. *National Speleological Society Bulletin* 57(1): 54-55.