

PRESIDENTIAL ADDRESS

Time's arrow in the trees of life and minerals

PETER J. HEANEY^{1,*}

¹Department of Geosciences, Penn State University, University Park, Pennsylvania 16802, U.S.A.

ABSTRACT



Charles Darwin analogized the diversification of species to a Tree of Life. This metaphor aligns precisely with the taxonomic system that Linnaeus developed a century earlier to classify living species, because an underlying mechanism—natural selection—has driven the evolution of new organisms over vast timescales. On the other hand, the efforts of Linnaeus to extend his “universal” organizing system to minerals has been regarded as an epistemological misfire that was properly abandoned by the late nineteenth century.

The mineral taxonomies proposed in the wake of Linnaeus can be distinguished by their focus on external character (Werner), crystallography (Haüy), or chemistry (Berzelius). This article appraises the competition among these systems and posits that the chemistry-based Berzelian taxonomy, as embedded within the widely adopted system of James Dwight Dana, ultimately triumphed because it reflects Earth’s episodic but persistent progression with respect to chemical differentiation. In this context, the pioneering work of Hazen et al. (2008) in mineral evolution reveals that even the temporal character of the phylogenetic Tree of Life is rooted within a Danan framework for ordering minerals.

Keywords: Mineral classification, mineral evolution, Linnaeus, Dana, Berzelius, Werner, Haüy, Invited Centennial article