Deciphering chemical and morphological patterns of mineralization

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The rise of biological minerals is one of the most remarkable events in the timeline of mineral evolution [1]. Of particular interest is the emergence of organisms that could actively control the nucleation and growth of minerals that conferred functional advantages. By the beginning of the Phanerozoic, organisms from many different phyla had developed the biochemical machinery to direct the location, timing, morphology and polymorphs that develop within mineralized tissues through genetic controls. The resulting structures, preserved as hard parts in the fossil record, document the co-evolution of earth and life. Through their skeletal composition, they chronicle shifts in environmental conditions over geologic time.

As evidenced by the many sessions at this Goldschmidt conference that explore mineralization in biological settings, there are expanding interests in understanding the fundamental processes by which biominerals are formed. Investigations of mineralization mechanisms and controls on composition and morpohological patterns are unprecedented in studies that are working to decipher biomineral construction from the nano- to organismal scale. This presentation will highlight some of those efforts with an emphasis on what we are learning about the processes that regulate the accumulation of mineral components, the role(s) of biochemical constituents in the organic matrix, controls on composition, and and the transformation processes that lead to biomineral assembly.

[1] Hazen (2010) Mineral Evolution, *Elements*, **6**.