

UNUSUAL APATITE COMPOSITES FROM THE SAPO PEGMATITE, MINAS GERAIS BRAZIL

The morphology and textures of apatite in bone (a complex composite of hydroxylapatite and collagen) and other hard tissues are integral to many of their properties, yet the formation of these textures is poorly understood. Molecular templating is certainly part of the formation of complex biomineralogic composites. In geologic apatites, particularly those that have grown from melt or hydrothermal solution, the morphology is usually rather simple and composite textures are usually weak (little preferred orientation if any). A recent find of some spectacular apatite specimens from the Sapo mine, Minas Gerais, Brazil, highlights an unusual composite texture, whose mechanism of formation is also not yet understood. The apatite crystals form in pockets from late-stage aqueous fluids in a granitic pegmatite. Elongated on [001] and flattened on [120], euhedral crystals of apatite with irregular development of prism, pyramid, and pinacoid faces comprise the columnar composites. An interesting feature of these composites is that they almost always appear to be hollow (FIGURE 1). The individual apatite crystals are faceted on both the outside of the intergrowths and on the inside, adjacent to the hollow cores. This suggests that the hollow cores did not form by growth over a preexisting substrate, or the substrate dissolved and then apatite growth continued. There is a definite but not exact (i.e. not crystallographically controlled) orientational relationship among crystals in the intergrowths, which frequently resemble a “herringbone” pattern.



Figure 1 Hollow-core columnar apatite composite of distorted euhedral crystals from the Sapo Mine, Minas Gerais, Brazil. The specimen is approximately 16 cm tall. JEFF SCOVIL PHOTOGRAPH



Figure 2 Columnar apatite composite of euhedral crystals, with no apparent hollow core, from the Sapo Mine, Minas Gerais Brazil. The large column is approximately 12 cm tall. JEFF SCOVIL PHOTOGRAPH

Often the columns bifurcate and intersect, forming very unusual specimens. A later stage of apatite growth in the same pocket produced equant to tabular crystals. These too are sometimes found in branching columnar composites (FIGURE 2), but the cores of these composites are not hollow.

Similar intergrowths, but not nearly as large, are found in specimens from the Palermo #1 pegmatite mine in North Groton, New Hampshire, and the Pomarolli Mine, Divino das Larangerais, Minas Gerais, Brazil. All specimens are from comparable geochemical environments; thus their formation may be related to the apatite structure, the environment, and mechanism of growth, or a combination thereof. It is interesting to ponder the possible connections between complex composite textures in organic and inorganic systems.

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PARTING QUOTE

SCIENCE IS BUILT UP OF FACTS, AS A HOUSE IS BUILT OF STONES;
BUT AN ACCUMULATION OF FACTS IS NO MORE A SCIENCE THAN
A HEAP OF STONES IS A HOUSE.

HENRI POINTCARÉ 1854–1912