Did Life Grind to a Start? A Brief History of the Origins of Homochirality

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Ever since Pasteur discovered the handedness of natural molecules there has been a nagging question: How was symmetry broken so that life on Earth came to use D-sugars and L-amino acids? The source of single-handed molecules has been the object of lively discussion among chemists, physicists, biologists, statisticians, geologists, and theologians for 150 years.

Until recently symmetry-breaking crystallization of solids like sodium chlorate and quartz has seemed to require kinetically controlled schemes that begin far from equilibrium. Although Viedma's 2005 announcement that an equilibrated racemic slurry can be converted to a single hand by grinding was met with initial skepticism, it has become firmly established. The mechanism of this novel process is being debated and suggests to us that solid-solid coalescence can play an important role in crystal growth. Such a mechanism is well-precedented in mineralogy, and we have attempted to confirm it by experiments with sodium chlorate.