The single chirality of biological molecules has fascinated scientists and laymen alike since Pasteur’s first painstaking separation of the enantiomorph crystals of a tartrate salt over 150 years ago. In the past decade, a number of theoretical and experimental investigations have helped to delineate models for how one enantiomer might have come to dominate over the other from what presumably was a racemic prebiotic world. Our work has highlighted mechanisms that include either chemical or physical processes, or a combination of both. While much of the scientific driving force for this work arises from an interest in understanding the origin of life, research focusing on mechanisms for the enantioenrichment of chiral molecules has the potential to impact a wide range of applications, most notably in the synthesis and formulation of pharmaceuticals.