Homochirality: The Signature of Life.

Meir Lahav
Department of Materials and Interfaces
Weizmann Institute of Science
meir.lahav@weizmann.ac.il

The appearance of the natural proteins and nucleic acids that is, biopolymers wholly consisting of homochiral subunits (L-amino acids and D-sugars, respectively) from the unanimated racemic pre-biotic world still provides an unsolved riddle. The origin of homochirality, like the origin of life itself, is a historical event that has not left relevant fossils; therefore it is unrealistic to reconstruct the chronology of its occurrence. Instead by performing laboratory experiments under conditions that resemble the pre-biotic world, one might validate feasible reaction pathways and reconstruct model systems of artificial life. Creating such life in a test tube should go a long way towards removing the shroud of mystery over how it began naturally. In this lecture I shall present examples of achiral or racemic systems that undergo spontaneous enantiomerization or de-racemization within periodic enantiomorphous architectures displaying non-linear behavior. Recent discoveries in the field, including the Soai and Tsogoeva autocatalytic reactions, the Viedma ripening model and the generation of homochiral peptides from the polymerization of racemic α-amino acids in aqueous solutions will be discussed.

References
I.Weissbuch and M.Lahav Chem Rev. in press dx.doi.org/10.1021/cr1002479
and references cited therein.