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A Symmetry Breaking in Design and Production of Enantiomeric Drugs

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Message from the Guest Editor

Chirality, as a fundamental property of 3D objects (including many molecules and ions) to be non-superimposable on their mirror images, is imprinted on such basic building blocks of life as amino acids and sugars; it is further reflected by the chirality of more complex biochemical objects such as DNA, and finally, by the chirality of entire bodies. Each chiral compound exists as one of two possible isomeric molecules (or as a mixture of those two stereoisomers) that are related to one another as an object (e.g., right hand) and its mirror image (left hand). The biological properties of such optical isomers are often different: One of them could be a drug (e.g., (R)-(+)-thalidomide) but another a poison (e.g., (S)-(-)-thalidomide). Today, approximately 50% of marketed drugs are chiral. According to the U.S. Food and Drug Administration (FDA) policy, published in 1992, regarding single optical isomers (enantiomers), although both mixture and single optical isomeric drugs will continue to be developed, a higher proportion of single optical isomers are being submitted for new drug approval.

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Message from the Editor-in-Chief

Symmetry is ultimately the most important concept in natural sciences. It is not surprising then that very basic and fundamental research achievements are related to symmetry. For instance, the Nobel Prize in Physics 1979 (Glashow, Salam, Weinberg) was received for a unified symmetry description of electromagnetic and weak interactions, while the Nobel Prize in Physics 2008 (Nambu, Kobayashi, Maskawa) was received for the discovery of the mechanism of spontaneous breaking of symmetry, including CP symmetry. Our journal is named *Symmetry* and it manifests its fundamental role in nature.

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