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Liquid crystals as a stereochemical artefact: Toward a new paradigm

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The historical evolution of liquid crystal theory begins with the measurement of optical rotations on the cholesteryl benzoate mesophase, which apparently presaged a stereochemical entanglement that continues to this day. Intriguingly, however, the significance of its generality and its fundamental import have not been grasped. Current theory does not adequately deal with the critical role played by polarized light in the observation of the mesophase - whether with crossed-polarizers or in the case of device displays. It may well be impossible to describe the mesophase without invoking the idea that the rotation of polarized light implies the existence of molecular chirality. Clearly, however, extending this requirement beyond the limited bounds of the cholesteric case is a supreme challenge! In this talk, it is proposed that certain now well-recognized stereochemical phenomena - related to the spontaneous generation of chirality under certain conditions - mediate the formation of the mesophase, in fact, across the board. The staggering generality of this phenomenon possibly indicates the direction toward a more comprehensive paradigm for liquid-crystalline behavior, and one that demands a rather drastic reappraisal of currently held views. (Any new proposal, of course, needs to be compatible with the gamut of known liquid-crystalline properties and responses, particularly toward electrical fields.)

Biography

Sosale Chandrasekhar obtained his PhD in London (England, 1977), and followed it up with several postdoctoral stints in Europe and N. America. Since 1984 he has been at the Indian Institute of Science, Bangalore, where he is currently a Professor in the Department of Organic Chemistry. He has published more than 80 papers in international journals of repute, for many of which he has also served as referee. His research interests span a wide swath of mechanistic organic chemistry and stereochemistry, with frequent incursions into peripheral regions, particularly bioorganic and materials chemistry.

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