

Asymmetric Synthesis—a foreword

Asymmetric synthesis, the selective generation of new chirality elements (as one definition goes), has developed from a specialty pursued by outsiders to an art cultured by some learned ones, and now may be considered a standard laboratory methodology for everybody's use. This development has taken place exponentially (explosively!) in the last two decades, triggered by a number of circumstances. Also the practitioners of pharmaceutical, vitamin, and agro synthesis need to produce enantiopure, rather than racemic active compounds (for registration!).

For many chemists (and, too often, for those making decisions about funding research), the invention of new reactions, the development of synthetic methodology, the systematic (retrosynthetic) analysis of target structures, the investigation of reaction mechanisms, and the total synthesis of complex natural products have lost their glory. Chemists' attention has shifted to areas such as combinatorial synthesis (driven by robot, computer, and miniaturization), material sciences, supramolecular chemistry, the origin of life, the biological and even the medical sciences. Yet, in all these fields chirality plays a central role—the molecules of life are chiral.

Organic synthesis has merged with transition-metal chemistry and with catalysis (homogeneous, heterogeneous, enantioselective). The increasing demand for efficient enantioselective synthetic methods was accompanied by, and it has in fact necessitated, a similarly dramatic development of the analytical tools for the determination of enantiomer ratios. In a 1990 *Angewandte Chemie* article I have stated: 'The primary center of attention for all synthetic methods will continue to shift toward catalytic and enantioselective variants; indeed, it will not be long before such modifications will be available with every standard reaction for converting achiral educts into chiral products.' A demonstration of this ongoing process are the volumes of monographs dedicated to the subject (see also the introduction of the present book): 450 pages in 1962 (Eliel, 'Stereochemistry of Carbon Compounds') and 450 pages in 1971 (Morrison-Mosher, 'Asymmetric Organic Reactions'), 1800 pages in 1983/84 (Morrison, 'Asymmetric Synthesis'), 900 pages in 1993 (Brunner-Zottmeier, 'Handbook of Enantioselective Catalysis with Transition Metal Compounds'), 1250 pages in 1994 (Eliel-Wilen, 'Stereochemistry of Organic Compounds'), 6000 pages in 1995 (Helmchen *et al.*, Houben-Weyl, 'Stereochemical Synthesis'). Numerous smaller works, some specialized (some superficial), new journals ('Chirality', 'Tetrahedron: Asymmetry'), and treatises in review organs have appeared concomitantly.

The authors of 'Principles of Asymmetric Synthesis' have managed to cover the theme (on *ca.* 350 pages) in a most condensed and masterly way. In contrast to many a competitor they have chosen well-defined topics (enolate alkylations, direct and conjugate addition to carbonyl compounds with formation of one or

two new chirality centers, rearrangements and cycloadditions, reductions and oxidations), they use clear-cut concepts and language to present not only synthetic results but also mechanistic considerations (with due care). They include a glossary of stereochemical terms (with some recommendations about which ones not to use: fight the brutalization of chemical language!), and they present a chapter on analytical methods. All of this is accompanied by extensive referencing (up to 217 per chapter, over 1300 total) to the very latest literature, and, in spite of the broad coverage, there are some insightful and profound sections (close to the authors heart of interest, *cf.* the discussion of the stereochemical course of the *Wittig* rearrangement).

The book meets the requirements for today's teaching of stereoselective reactions, and it is of a quality and competence which will make it a handy reference work even for those experts doing research in the various areas covered.

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