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BOOK REVIEW

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Book Review of New Frontiers in Chemical Biology

New Frontiers in Chemical Biology. Edited by Mark E. Bunnage. Royal Society of Chemistry, Cambridge, U.K. 2011. xi + 316 pp. 24 × 16 cm. ISBN 978-1-84973-125-6. £126.34.

It is both obvious and frustrating that the number of new drug approvals continues to decline, despite significant spending by pharmaceutical R&D. While attempts to improve drug discovery productivity and efficiency continue, there is a growing sentiment that real gains in success will only be made by a more thorough understanding of biological systems to nominate the most relevant therapeutic targets. "New Frontiers in Chemical Biology," edited by an industry expert, successfully reviews this promising field, highlighting the most recent and important developments.

The editor is a well recognized expert with significant pharmaceutical experience and is well aware of the growing gap between industry drug discovery investment and commercialization success, as well as public expectation. Interestingly, he draws most of the eight contributed chapters from global academics. The first chapter addresses chemical genetics and contrasts "forward chemical genetics" employing compound library screening to induce observable phenotypic cellular change by an unknown protein target with "reverse chemical genetics" where the modulation of a specific phenotype changing protein is examined by a compound library. It also offers guidance for the discovery of small molecule probes by both strategies. Chapter 2 discusses the emergence of activity-based probes, small molecules designed to bind at the active site of an enzyme and tagged with radioactivity, a fluorophore, or affinity label. These valuable substances are useful at all stages in the drug discovery process, from target identification to clinical efficacy.

Chapter 3 covers the field of intracellular protein degradation as a tool better to understand specific protein function and as an entry to therapeutic strategy. In particular, the heterobifunctional PROTAC molecule concept is reviewed. Succeeding chapters deal with chemical biology of stem cell modulation, histone modification, chemologics, and antibody−drug conjugates in oncology. The final chapter is especially informative and outlines the progress made in the past decade to advance the technology of DNA-encoded libraries. The authors clearly explain the concept, scope, and limitations of this clever biomimetic technique, employing DNA as a scaffold to assemble diverse complex molecules. Each of the chapters includes many relevant citations to the original literature, with some as recent as 2009. The volume also ends with a rather comprehensive subject index.

"New Frontiers in Chemical Biology" has been thoughtfully created by recruiting talented contributors to clearly explain a complicated and rapidly emerging field. It is very readable and well illustrated. Certainly, this timely volume will be a useful introduction and future reference to both life science investigators and experienced medicinal chemists involved in drug discovery.

Crist N. Filer

PerkinElmer Health Sciences, Inc.
940 Winter Street
Waltham, Massachusetts 02451, United States
E-mail: Crist.Filer@perkinelmer.com

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