

Science of Synthesis, Volume 15: Six-Membered Heteroarenes with One Nitrogen or Phosphorus Atom; edited by David Black; Georg Thieme Verlag: Stuttgart, 2004, hardcover, 1320 pp, € 2000, ISBN 3-13-118651-8 (RoW) / US\$ 2400, ISBN 0-86577-954-6 (US)

Science of Synthesis is a modern version of the classic *Houben–Weyl Methods of Organic Chemistry*. It aims to provide a critical, systematic survey of the synthetic chemical literature in 48 volumes. The majority of Volume 15 is devoted to the synthesis of pyridines, quinolines, isoquinolines and their derivatives such as pyridinones, pyridinethiones, pyridinium salts and the *N*-oxides. Later sections discuss quinolizinium salts, naphthyridines, acridines, phenanthridines and their derivatives. The book concludes with a survey of the unsaturated phosphorus-containing heterocycles, phosphinines and their benzo derivatives; these phosphorus compounds are less known than their nitrogen analogues but they form a fascinating range of complexes with transition metals, examples of which are discussed.

The review articles emphasize the preparation of the heterocycles, whilst also providing brief accounts of their structure, reactivity, spectroscopic properties and biological relevance. A distinctive feature of *Science of Synthesis* is the incorporation, in each volume, of hundreds of examples of experimental procedures that have been extracted from the literature. This could be very useful in helping one to determine the relative merits of rival synthetic methods, especially those from less accessible journals.

There are more than 5000 references in all. They are grouped together after each main section and it is very helpful that the page footers in the review articles indicate the locations of the corresponding reference lists. The earliest references relate to pioneering syntheses in the nineteenth century by authors such as Hantzsch. The most recent material, from 2003, concerns topics such as the generation of compound libraries on solid supports and the use of transition-metal catalysts. Few patents are cited; this is understandable given that the work does not claim to be comprehensive and that the emphasis is on reliable procedures, but it has meant the omission of some useful electrochemical dehalogenations of pyridines that were developed by an industrial group.

Great efforts have been made to present the various authors' contributions in a clear, uniform style and to ensure that even minor typographical errors are rare. The materi-

al has been arranged using a very structured and hierarchical division into sections and subsections. There can be up to nine levels of heading beneath that of the individual volume, but more often there are seven or eight such levels. For example, Section 15.1.1.4.1.4.3.4.1 concerns the synthesis of pyridines, which are not *N*-oxides or pyridinium salts, by substitution of an existing substituent, which is a halogen, and is replaced by a carbon functionality, using metal-catalyzed heteroaryl–heteroaryl coupling, specifically palladium-catalyzed coupling with a 2-pyridylboronate. The substantial sections on heterocyclic ring synthesis are organized on the basis of which bonds of the ring are formed in the synthesis. This treatment has a clear logic and enables one to identify the precedent for a particular reaction type, as well as revealing gaps in existing knowledge. However, the list of section headings runs to 64 pages and I feel that this would have benefited from the use of indenting or a greater range of font sizes and styles to make the organizational structure stand out more. On looking at a page of the main text, one typically sees only the highest and lowest levels of heading: taken by themselves these can be slightly enigmatic fragments such as 'Of Metals' or 'By a Carbon Functionality'. It would therefore help if the header or footer on each page were to indicate *all* levels of applicable headings.

The keyword index would benefit from more extensive cross-referencing to allow for variant forms of named reactions: for example, the Beyer–Combes quinoline synthesis cannot be found under 'Combes', the name by which it is exclusively known in some texts. Looking up 'Chichibabin' reaction leads to a section on quinoline amination, whereas the corresponding reaction of pyridines appears only under 'Tschitschibabin'.

Overall, this attractively produced volume provides a unique and authoritative survey of a vast amount of literature. It will be a real help to chemists requiring the synthesis of heterocycles. Those who have considered *Science of Synthesis* to be beyond their means will find the new 'workbench' edition of the ten heterocyclic volumes to be a welcome development.

Peter B. Wyatt, School of Biological and Chemical Sciences, Queen Mary, University of London, UK