Phosphorus: The Carbon Copy, from Organophosphorus to Phosphaorganic Chemistry. By Keith B. Dillon, François Mathey, and John F. Nixon. John Wiley & Sons, 1998; £100. ISBN 0471 97360 2.

Research on the chemistry of phosphorus appeared to have reached a natural boundary at the end of the 1950's. Phosphorus acid derivatives in various oxidation states, phosphanes, their oxidation products, and their quaternized derivatives had been investigated in detail and the scope of the olefination reactions associated with the names G. Wittig and L. Horner had been appreciated. The so-called double bond rule seemed to constitute an obstacle to further developments. However, with their discovery about three decades ago and subsequent explosive progress in the chemistry of low-coordinated phosphorus compounds completely new perspectives were opened up.

These developments were first comprehensively reviewed in 1990 in a monograph edited by M. Regitz and O. J. Scherer (Multiple Bonds and Low Coordination in Phosphorus Chemistry, Thieme, Stuttgart). The present three authors K. B. Dillon, F. Mathey, and J. F. Nixon have chosen a completely different concept for this monograph. As stated in the preface they have selected the astonishing similarities between the low-coordinated compounds of phosphorus with those of carbon as their guiding principle. This is further reflected in the title of the book and the selection of the topics discussed. Within this framework the authors have had to omit a discussion of low-coordinated phosphorus-nitrogen compounds although these species played a decisive role in the development of the field (E. Niecke).

In the introductory chapter (The Phosphorus-Carbon Analogy: Phosphaorganic Chemistry) the authors take us on a journey through the chemistry of π-systems, P-containing aromatic compounds, and electron-deficient species such as phosphinidenes while again emphasizing the diagonal relationships between phosphorus and carbon although neglecting the vertical relationship to nitrogen. The limitations of this point of view are shown by the comparison between cyclopropenylium and phosphirenylium ions, somewhat relativizing the statement made in the title. A further limitation is the fact that low-coordinated phosphorus compounds possess a not to be neglected lone pair of electrons and must be stabilized by voluminous substituents. Even so the promises made by the title of the monograph are clearly fulfilled.

In the following 8 chapters on phosphinidenes, terminal phosphinidene complexes, phosphaalkynes, phosphaalkenes, phosphapolyenes, diphosphenes, phosphorus-carbon heterocyclic systems (phosphiranes, phosphirenes, phospholes, phospholides, phosphinines) the competence of the authors who themselves made trail-breaking contributions to these developments is clearly apparent from the text and from the careful selection of the examples. However, a discussion of the diagonal relationship between phosphenium and carbenium ions is lacking.

In the concluding chapter (What Future for Phosphaorganic Chemistry) the synergy between phosphorus and transition metal chemistry which may lead to innovations in homogeneous catalysis is mentioned. The potential for developments in materials science and biochemistry is also discussed. We may expect some surprises in these fields in the future.

For whom is this highly topical, excellently written monograph with numerous well-arranged formula schemes intended? Certainly not only research workers in the field of phosphorus chemistry, it will surely also be of interest to all those who appreciate up-to-date information on synthetic chemistry in general. It is a must for all chemical libraries.

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