

the setting up and development of information services within the walls of academic, industrial and Governmental research stations, the second epoch is characterized by the establishment of national science information centres. Many of the 'developed' countries have entered this phase, and others are just about to do so. The third epoch, which has yet to come—but surely must if the development of science is even to maintain its present rate of growth—will see the setting-up of a superstructure encroaching on all that has come before. This would be a World Information Centre with its headquarters in The Hague. Probably The Hague offers the greatest advantages, for the International Federation for Documentation is situated there. Already this body has consultative or liaison status with Unesco, the World Meteorological Organization, the International Telecommunications Union, the International Atomic Energy Authority, the International Council for Building Research, etc.

Data would be collected and stored at the World Information Centre in tape form. Information would be received from, or disseminated to, the national centres in computerized form by means of telecommunication satellites. If one can judge by the success of *Telstar*, which it is claimed could transmit 870,000 pips per second, the efficiency of such a system would be well worth the investment. Already the meteorologists are making use of satellites, and have set up a World Weather Centre in Washington, and a comparable one is being established in Moscow. (The system is scheduled to come into effect in 1966 when the *Tiros* operational satellite system is launched.) Certainly an International Information Year based on the principles of the successful International Geophysical Year would test the feasibility of any World Information Centre.

Once such a centre has been established no country could afford not to be a member. The reasons for having full knowledge of the very latest developments as soon as they become available are self-evident. Any means of rapid dissemination of information would help to bring an end to wasteful duplication of effort.

All this is, perhaps, some time away, and cannot be reached until all countries have fully entered the second epoch of scientific and technological information. Unfortunately too many Governments tend to be parsimonious and indifferent towards the dissemination of scientific and technical information. However, they cannot afford to maintain such attitudes for long.

Britain, in her latest attempt to reach the second epoch, has estimated spending £181,000 in the current year—on all accounts an underestimate if the new Office for Scientific and Technological Information is to function properly and make the best of the opportunities now available. The United States spent a total of 10.6 million dollars in the year 1963-64 on its Science Information Service, and has been showing an annual increase in expenditure of 10 per cent on these services. This increase in expenditure would, at present, be necessary for any country embarking on any such schemes, for at present there is a doubling in the output of scientific and technical information every ten years. Few of even the developed countries could equal the expenditure of the United States in such a way. Together, however, they could make a valuable contribution to the dissemination and collection of scientific and technical information; but first a number of the larger ones must spend more on information services and set up their own national centres for scientific and technical information.

ORGANIC CHEMISTRY OF PHOSPHORUS

Methoden der Organischen Chemie

Von Houben-Weyl. Vierte, völlig neu gestaltete Auflage. Herausgegeben von Eugen Müller. Unter besonderer mitwirkung von O. Bayer, H. Meerwein und K. Ziegler, Band XII/2: Organische Phosphorverbindungen, Teil 2. Bearbeitet von K. Sasse. Pp. lxxxvii+1131. (Stuttgart: Georg Thieme Verlag, 1964.) 280 D.M.

PART 1 of Volume XII of *Methoden der Organischen Chemie* (*Nature*, 204, 1122; 1964) was devoted to a detailed account of the synthesis of those classes of organic phosphorus compounds in which the phosphorus was directly linked to carbon. The much larger Part 2 deals similarly with the synthesis of organic derivatives of hypophosphorous, hypodiphosphorous, hypophosphoric and the far more important phosphorous and phosphoric acids. The thio- and the (less important) seleno derivatives are included, so that the derivatives in this volume have their phosphorus atoms linked mainly through oxygen or sulphur (or selenium) to the carbon atoms. Many therefore are systematically esters, and the synthetic routes usually differ markedly from those discussed in Part 1. Many of the phosphoric esters are of natural occurrence; many of the sulphur and the fluorine derivatives have marked physiological action: the former factor attracted chemists very early into this synthetic field, and the second factor has provided much more recently a strong stimulus for rather wider investigations. It is not surprising therefore that the final Part 2, in actual pages of descriptive text, is about 65 per cent larger than Part 1.

It would not be possible, even in an extensive review, to do justice to the vast amount of detailed information given in this volume. The wide (and indeed surely complete) sweep of the field may be judged from the fact that the section on organic derivatives of phosphoric acid alone occupies 862 pages, and the main headings on this subject in the list of contents occupy 29 pages. The text contains many tables, each listing the known members of a particular class, with physical constants, and with the percentage yield recorded in specified references. For most classes of compound, brief experimental details are given for one or more syntheses: in spite of their essential brevity, important properties of the final product are stressed, for example, the final warning in bold type: "**Vorsicht! Starkes Gift!**".

The interest with which one reads this book is enhanced by the excellently clear type and the pleasantly 'open' arrangement of the pages, which avoids any appearance of crowding the contents.

The authors have accomplished a tremendous task magnificently, and their work has been excellently supported by both the printers and the binders of this volume.

The organic chemistry of phosphorus is being increasingly widely studied, and there is no other work on the subject which can remotely approach Parts 1 and 2 of Volume XII in this series.

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NUCLEIC ACIDS REVEALED

Die Nucleinsäuren

Eine Einführende Darstellung ihrer Chemie, Biochemie und Funktionen. Von Eberhard Harbers. Gemeinsam mit Götz F. Domagk und Werner Müller. Pp. xii + 303. (Stuttgart: Georg Thieme Verlag, 1964.) 68 D.M.

IN 1954 it was still possible to encompass comprehensively the chemistry and biochemistry of the nucleic acids in two volumes of quite modest bulk (*The Nucleic Acids*, 1 and 2, edit. by Chargaff, E., and Davidson, J. N., Academic Press). They appeared just in time: in consequence of