

Francis of Paula, 1416-1508, in Kirby Cemetery in Essex, England:

When pictures look alive with movements free;
When ships, like fishes, swim beneath the sea;

When men outstripping birds shall scan the sky;
Then half the world, deep-drenched in blood, shall die!

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SCIENTIFIC BOOKS

PLANTS AND VITAMINS

Plants and Vitamins. By W. H. SCHOPFER, director of the Botanical Institute, University of Bern. Authorized translation by N. L. Noecker. xiv and 293 pp. Foreword by W. J. Robbins. Waltham, Mass.: The Chronica Botanica Company. New York City: G. E. Stechert and Co. 1943. \$4.75.

TEN years ago no book could have been written about vitamins in plants, although plants were clearly recognized as an important source of accessory factors for human and animal nutrition. During the last decade extraordinary progress in the study of vitamins has resulted in a rich literature which supports the ambitious goal which the author of "Plants and Vitamins" has undertaken, namely, to crystallize our knowledge of vitamins in plants, to show the relations of this domain to general biochemistry and physiology and to suggest fertile areas for cultivation by future investigators. The book contains 24 chapters, an author index and a general index, and many illustrations and structural formulae of compounds.

The contents are organized into three parts. The first deals with the capacity for synthesis and the functions of vitamins in green autotrophic plants. In the second part, the author gives an extensive discussion of growth factor deficiencies in organisms which have lost the ability to synthesize vitamins. Part three presents some general phenomena which are wholly or partially explained on the basis of the vitamin concept. Well-deserved emphasis is given to the discussion of growth factors in microorganisms, because it is in this particular field that outstanding progress has been made in such a short time. Of special interest to both plant and animal physiologists are the chapters on biological synthesis and the roles of growth factors in protoplasm. The discussion of vitamins in enzyme systems could have been more extensive, and much remains to be said about competitive inhibition, sulfonic analogues, etc.

As stated by the author, his book does not by any means claim finality, but rather represents a stage of progress in research which continues to advance. Although some workers may not wholly agree with certain of the author's conclusions and the emphasis placed upon various topics, this book fills the need for a critical and authoritative appraisal of the advancement of our knowledge concerning vitamins in plants. The writing of such a book required the consultation

of a very extensive bibliography. It is a matter of regret that many interesting and important contributions mentioned briefly in the discussion are not cited by specific references to the literature. It is easy, however, to forgive omissions of literature published since 1941, when one considers the difficult circumstances surrounding the author in Switzerland.

Only in the past several years have we learned that the fundamental functions of vitamins are the same in regulating the metabolism of both plants and animals. A vitamin, according to Professor Schopfer, is an "organic substance, the need for which results from the loss of the capacity for its synthesis, whose action is catalytic (active in small amounts), quantitative and markedly specific." The book indicates that at all phylogenetic levels the requirements of living matter are approximately the same regardless of the structure of the organism. The only aspects that differ are the morphological expressions to which vitamin deficiency may give rise. The author shows how vitamins constitute the meeting ground for specialized sciences, where workers in organic chemistry, enzymology, human, animal and plant physiology all meet to solve fundamental problems.

The philosophical view-point of the author is indicated in the following quotations taken from his concluding chapter:

In order to understand the problem of vitamins in all of its ramifications it is no longer possible to confine oneself to one field. The plant physiologist has learned from his confrère, the human physiologist, what an avitaminosis and a vitamin is. The plant physiologist in turn has shown that plants are the seat of the biosynthesis of vitamins and thus has established a new intimate relationship between two kingdoms. The biochemist, by establishing the chemical structure of vitamins, has been obliged to create new groups of chemical compounds. The enzymologist finds to his surprise that these vitamins are nothing but the active portions of enzymes which have been studied for a long time. The microbiologist, who for years had been trying, without success, to isolate the "growth factors" of his microorganisms, proved that typical animal vitamins were the factors he was looking for. The concept of growth factors (in the exact sense) conforms with that of vitamins (in the strict sense) and is identical with it. . . .

The problem of vitamins started with man and, in the last analysis, it returns to man after an apparent departure from him. All the progress accomplished in this domain contributes to a better understanding of the prob-

lem in general and ultimately to human well-being. To speak of the well-being of Man at this time seems to be macabre humor. Why is it that skillful men from different nations can solve problems in fundamental biology

but can not do so when the matter directly concerns themselves? The question remains unanswered.

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REPORTS

A DEPARTMENT OF GEOGRAPHY¹

At least a hundred college heads have inquired as to our plans for geography in the post-war years and have invited help in the selection of personnel. This is true no less of women's colleges than of men's colleges. It shows deep and, we hope, permanent interest in research as well as thorough-going instruction in geography. This has been one of the most neglected fields in higher education. War and its related problems of peace-time organization for equity and freedom have at last taught the American people that modern geography is not children's geography to be finished in the seventh grade. That "imaginative grasp of space" which science shares with poetry seemed somehow to have been impossible to attain until our Army, Navy and Air forces had taken their stations and begun their operations in almost every part of the world. For a full generation we seemed unable in our thinking to synchronize time and space in a spreading network of technologies, trade and international relations. "The Map and the Clock" is the significant title of a brilliant editorial published recently in the London *Times Literary Supplement*. We shall be dealing with what we once regarded as the "outer world" for a long time to come, with such speed and responsibility, and with such a practical need for wide comprehension, that we can not escape corresponding educational demands if we would.

Geographical science has a significant part to play in national policy. The conviction seems to grow that we can not safely limit our future responsibilities to narrow zones of power. No line can be established anywhere in the world that confines the interest of the United States because no line can prevent the remote from becoming the near danger. Nor can danger be wished or talked away. Positive intentions and acts based upon deep understanding of both good and evil forces are required. The Western Hemisphere conferences of the past ten years are but one of several major forms of political association. This geographical term no longer implies political separation from the rest of the world and a sheltered retreat. Interwoven with the fate of the United States are the fates of countries on the farther side of the world organized on political and social hypotheses and conditions quite different from those that prevail among ourselves.

For nearly one hundred and fifty years the philosophy of geography has included the thesis of Hum-

boldt, that the diversified riches of the earth are a vast source of human enjoyment, and that man's highest development requires that we put the world's resources into a common world stream of understanding and use. We have become so accustomed to international trade that we are often insensible of the extent to which our comfort, our welfare and our safety depend upon the interchanges of products and ideas about them and the multiform agreements that implement their exchange.

More important still is the process of cultural interchange. If it were as free and full to-day as our exchange of products, the world, while retaining its picturesque and stimulating cultural differences, might have an agreed code of relationship and behavior with corresponding reduction of the risk of war. It will take further experience, long-continued persuasion and a determined will to bring such a code into being. Certainly ignorance and flippancy will not build a highway to this goal. We must gain experience and will power on a higher level of cultural interrelations than any we have yet known. This means knowing other peoples intimately, and gaining the ability to see their interests clearly as well as our own. Only in their natural settings can we fully understand the languages, literatures, codes, ideas, interests and moralities of peoples unlike ourselves. To give but one example, no policy of interrelated migration of people and of settlement of underdeveloped lands, no rational easement of so-called "population pressure," can be sound unless and until geographical and cultural studies are joined in the attainment of agreed purposes. Such great endeavors also require the union of the philosophical and the utilitarian, the theoretical and the practical. The result is of such profound consequence to a stable world order that it would be madness to exclude university participation. Only during the past two decades have some of our universities become aware of their long neglect of fields of inquiry and action that affect the peace or the ruin of the diverse peoples that share the planet. Once an honored part of the classical curriculum—Ptolemy, Strabo and Varenus having been almost as well and as generally known by educated men of an earlier generation as Virgil and Homer—geographical instruction declined in the nineteenth century and even at the time of World War I was limited to a relatively small number of universities.

For several years we have been giving instruction in geography at Hopkins on a modest scale. The Army Specialized Training Program has required the

¹ From the annual report of Dr. Isaiah Bowman, president of the Johns Hopkins University.