quickly with sphagnum bandages than with cotton-batting bandages. This is explained by the fact that, in addition to its draining qualities, the moss also contains certain disinfecting substances.

Under the guidance of botanists, large quantities of sphagnum bandages were prepared for the Leningrad front, and a short pamphlet on the gathering and preparation of moss was printed. Sphagnum is now prepared on a large scale in the northern regions of the Soviet Union.

Another item of interest to botanists was the preparation of fir balsam from the sap of fir trees. This balsam, mixed with other substances, has been used in many Leningrad hospitals for treatment of fresh wounds. The demand for this balsam is increasing rapidly as doctors are becoming acquainted with its use and its qualities. The number of fir trees in Siberia and the northern regions of European Russia is enormous and fir balsam can be prepared in unlimited quantities.

The search for vitamin-bearing plants has also given botanists a large amount of wartime work. Everybody knows the value of vitamins to the human organism, but in wartime these substances are more than ever essential. One of the most important of these substances is vitamin C. Even before the war it was known that one of the richest sources of vitamin C is the wild rose hip. Since the war, vitamin contents of hips in the eastern and northern districts of the U.S.S.R. have been studied to discover where the vitamin content is greatest. In some places wild roses have been planted in order to produce hips rich in vitamin. The collection and delivery of hips has been organized on a large scale. Hips of certain roses of Central Asia have been found particularly rich in vitamins and these sorts are being specially cultivated.

It has recently been discovered that green unripe walnuts growing in dense forests in Central Asia also contain vitamin C. Collection of these nuts and manufacture of vitamin-bearing preparations had been organized.

Quite recently it was discovered that needles of ordinary pine trees contain large quantities of vitamin C. Biochemists in Moscow and Leningrad have organized mass production of vitamin C concentrate from pine needles. Despite the fact that the percentage of vitamin contained in needles is very small, this source of vitamin C is of particular value to us on account of the huge pine forests throughout the whole territory of the Soviet Union with the exception of the Arctic and desert regions.

During the long siege of Leningrad lack of vitamin C made itself particularly felt, and the decoction made from pine needles played an important role in the prevention of scurvy. In its impure state the liquid has a bitter flavor, but a number of proposals have already been made for freeing the liquid of its bitterness. Since the war began, a number of grasses have also been discovered to contain vitamin C.

Botanists have taken an active part in gathering wild medicinal plants; in cultivation of plants for the manufacture of insecticides; and in the discovery of new plants which might be used medicinally.

Attention has also been paid to a number of wild plants which can be used as salads, for example, the dandelion, primrose, etc. Attention has also been devoted to the roots of other plants rich in starch and inulin, and to fruits of a number of wild trees and shrubs such as bird cherry, hawthorn and rowan. A flour is produced from dried rowan berries which may be added to ordinary flour in proportion up to 25 per cent. and used for baking pastry, etc. Flour made from bird cherries gave excellent results in cakes. These are all results of work done by botanists to help the inhabitants of Leningrad during the siege of last winter.

Much has also been done to find substitutes for tea and coffee among wild-growing flowers. One item of particular interest is the publication of an illustrated pamphlet for guerillas and raiding troops operating behind enemy lines, giving details of all wild-growing edible plants.

These are some of the ways in which botanists are employing their science in the service of the great cause of the war against Hitlerism.

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SCIENTIFIC BOOKS

ORGANIC CHEMISTRY[1]

Organic Chemistry. By W. T. CALDWELL. 760 pp. Houghton, Mifflin Company. $4.25.

THIS is an excellent text. It is carefully written and each subject is dovetailed into the following one with clear argument, proper insistence, repetition and reference, and with a cunning use of items of historical interest, a use which argues authorship by a person who delights in exposition as an art. The printing is well done, the formulae are clear, the pages please the eye and the reading pleases the mind. It is remarkable not only for the arrangement and style but also for its comprehensiveness and accuracy. It is thoroughly up-to-date and yet never fails to place the newer items of theoretical or practical interest in

[1] Corrected proof was received shortly before the recent death of Dr. Powell.

a framework which does not exaggerate their importance. This is an item too often neglected and it argues much for the sincerity of the author that he takes upon himself such obligation of balancing the new and spectacular against the old and dulled. It is suitable for a three-semester course in organic chemistry and yet so arranged that it can be left safely in the hands of a student for general reading preparatory to advanced work. No literature references or questions are included in the text and the saving of space so achieved is turned to good purpose in the inclusion of material and argument. This reviewer hopes that the merit of the work will be rewarded with widespread use. It is deserving of the widest support and is the best general text in organic chemistry that he has seen for many years.

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BLOOD GROUPING

Blood Grouping Technic. By F. SCHIFF and W. C. BOYD. Interscience Press, 1942.

THIS book by two outstanding investigators in the field of blood grouping is an authoritative compilation of methods of grouping, based in large degree on the experience of the authors themselves. While the book is supposed to be a translation and amplification of Schiff's small manual which enjoyed a well-deserved popularity for a long time in Germany, it is really a new book. The arrangement of the material is quite different and the book is nearly three times as large as the German manual on account of the inclusion of much new material. It is unfortunate that Dr. Schiff did not live to see this fine book in print, but the work was capably brought to its completion by Dr. Boyd.

The monograph opens with a brief introductory chapter outlining what is known of the individual differences in human blood and the secreting factor. In the succeeding extensive chapter, the general technic of blood grouping is described in great detail, including methods for determining the four blood groups, the subgroups of groups A and AB, the M-N types and the Rh-type. Detailed instructions are given for carrying out tests not only on blood by direct agglutination and hemolysis, but also on organs and secretions by the technics of absorption, inhibition and complement fixation. In addition, full directions are given for the preparation of suitable grouping sera, including immune sera in rabbits against agglutinogens A, B, M and N. In the remaining chapters of the book, further refinements in the technic are presented from the point of view of the specialized requirements in relation to the practical applications of the tests in blood transfusion, in forensic medicine in cases of disputed parentage and for the examination of blood stains and in anthropology.

Of considerable interest is the section discussing the anthropological significance of the blood groups, especially since Dr. Boyd has made significant contributions to this subject. Among the theories mentioned to explain the differences in the present distributions of the blood groups genes throughout the world the most plausible is that favored by Bernstein and Candela that there were originally two or more races, each belonging predominantly to one or two of the four blood groups, and that the present distribution in white races arose by crossing between the original races. Boyd himself, however, proposes a monophyletic theory and postulates that man originally had a blood group distribution represented approximately by the frequencies p (A) = 0.35, q (B) = 0.15 and r (O) = 0.65, and that as man spread to the four corners of the world, isolated groups by chance lost largely one or two of the three genes. The weak point in this theory is that no attempt is made to explain how the original blood group distribution arose, nor to apply to man the observations on apes and lower monkeys. To the reviewer the polemic between the sponsors of the monophyletic and polyphyletic theories appears largely academic, since undoubtedly numerous times in man's history there must have been periods of migration, isolation and inbreeding succeeded by periods of invasion and mixing of races. Accordingly, as the authors of the manual will probably agree, the choice between the two theories would depend to a great extent on the time selected as the onset of man's history as a distinct species.

All in all this book on blood grouping technic constitutes a valuable contribution and one destined to serve as a standard and authoritative reference work on the subject for a long time to come.

A. S. WIENER

SPECIAL ARTICLES

ENZYME SYSTEMS CONTAINING ACTIVE SULFHYDRYL GROUPS. THE ROLE OF GLUTATHIONE[1]

UP to now there has been published scattered information on this subject, and from time to time there have appeared observations on the presence of -SH groups essential for enzyme activity among some hydrolytic enzymes, certain lipid-splitting enzymes, several pneumococcal and streptococcal hemolysins, and a few oxidation enzymes. A comprehensive study of the presence of -SH groups essential for

[1] From the Chemical Division, Department of Medicine, the University of Chicago.