

advantage, have been given to this aspect of the subject. For example, four times as much space is devoted to reeling, and nearly as much to bundling, as to gassing. This is not commensurate with the relative importance of the operations.

It is when the author turns his attention from machinery to the material to be treated and after its treatment that lack of clearness, loose statements, over-statements, and errors are found. The matter on p. 17 relating to the diameter of yarns may be cited as an example of these defects. Mr. Taggart's book, as a whole, is so good that it is unfortunate that those parts which deal with cotton and its behaviour during and after spinning have not been revised.

How to Know the Ferns. By S. L. Bastin. Pp. viii+136. (London: Methuen and Co., Ltd., 1917.) Price 1s. 6d. net.

THIS book contains descriptions of the British ferns and their allies, prefaced by an account of ferns in general and an outline of their classification. The chapter on life-histories is well up to date, as is also that on fossil ferns, a group usually ignored in books of this kind. The species are described without unnecessary technicalities and on a uniform plan; first comes an explanation of the name, then a general account of the structure of the plant, followed by an indication of its habitat and, in most cases, hints on its cultivation. These descriptions, written in narrative form, give a good account of the general appearance and distinctive characters of the various species, but their use would have been greatly increased by adding a short key to genera to the synopsis of families on pp. 8-12. The last two chapters deal with collecting, preserving, and cultivating ferns.

Amongst the fern-allies there is a description of *Azolla caroliniana*, an American water plant, which has been naturalised and has spread with great rapidity during recent years in this country, but no reference is made to *A. filiculoides*, which is also naturalised in Britain.

There are thirty-three illustrations taken from photographs, which have not been reproduced very successfully. This book is a trustworthy and up-to-date addition to the many popular accounts of British ferns.

C. H. W.

Chemistry in the Service of Man. By Prof. Alex. Findlay. Second edition. Pp. xvi+272. (London: Longmans, Green, and Co., 1917.) Price 6s. net.

WE are glad that Prof. Findlay's enlightening account of the facts and ideas of chemical science of to-day has reached a public large enough to require a second edition within about a year of its original publication. The work was described in our issue of August 31, 1916, as "a distinct and valuable addition to the popular literature of science"; and the encomium then passed upon it has been fully justified. A new chapter has been added on "Fermentation and Enzyme Action," but otherwise the volume remains unchanged. Not many works on chemistry can be followed

with interest by lay readers, but this is one of the first rank, and it should long continue to perform the useful service of stimulating attention to chemical science for its own sake as well as for the value of its achievements to man.

CHEMISTRY AND THE WAR.

A RECENT issue of *Science* (June 15) contains an address by Prof. J. R. Withrow, delivered at the Columbus meeting of the Ohio Academy of Science, on "The Relation of War to Chemistry in America," which has certain features of interest for us at the present juncture. To begin with, it is a scathing indictment of the mentality of a people that can condone and even applaud the damnable conduct of their armies and Government at home and in the hapless countries for a time at their mercy. The nation seems to have become the willing, or at least the easily manipulated, pawn in the hands of unscrupulous statesmen.

* We have not forgotten that it was a chemist—Ostwald—in the early days of the war, when he was acting as a spokesman for Germany to men of science throughout the world, who was quoted, when Germany was in the flush of her initial victories over Belgium, as saying the world had outgrown the idea of freedom for little or weak peoples.

The *Kultur* that can lead men of great mental endowments and catholicity of thought into such a mental position stands self-condemned. It affronts every instinct of charity and fair-dealing and stinks in the nostrils of right-minded men.

The greater part of the address, however, is concerned with a question of more immediate practical importance to chemists, namely, the influence of the war upon the progress and development of their special branch of science. Of course, it need scarcely be said that this world-wide cataclysm, affecting directly the most powerful and most highly developed of nations, has profoundly modified the course and trend of chemical progress. But it would be untrue to affirm that it has stagnated or declined as a consequence of war.

"Since," says Prof. Withrow, "war requires brains, science is of course utilised, and since the demand is inexorable, science must produce, and when science and engineering are producing, they grow."

It is stated that it requires three men in the shops to maintain one man in the Army and seven men for one in the Navy.

It is evident therefore that it is the applied portions of science that are most used, and hence that grow most under war's influence. It is common experience, however, that the stretching into new domains and the striving for new goals by applied science enrich the feeding-ground of unapplied science, and uncover fertile fields for the patient and quiet research which follows.

But there can be no doubt that, whatever the future may have in store for us, in the meantime progress in pure chemistry all the world over has been greatly retarded, and in proof of this Prof. Withrow points to the serious and progressive decline in the number of *Chemical*

Abstracts published by the American Chemical Society since the beginning of the war. It is claimed for this publication that, as the organ of a society of some 9000 members, it has for years covered the field of chemistry more thoroughly than any foreign journal of the kind. It reviews some 600 journals from all parts of the world, and is therefore a sure index of the world's chemical activity. The effect of the war on current chemical literature is plainly evident from the following figures:—

Total number of abstracts published (patents included).

In 1913	...	...	...	25,971
In 1914	...	...	...	24,338
In 1915	...	...	...	18,449
In 1916	...	...	...	15,784

Certain foreign chemical journals have ceased to be published since the war started, although the number is not large. Most of the French and German journals are published less frequently than in normal times, two or more numbers being contained within one cover. No important English, Italian, or Russian chemical journal has ceased publication. Eight German, thirty-one French, and seven Belgian periodicals more or less connected with applied chemistry no longer appear. Owing to the increased cost of paper, wages, etc., the cost of production of such as continue to be printed has greatly increased. In America, however, to judge from the cost of *Chemical Abstracts*, the increase has not exceeded 10 per cent. But this was before the entrance of the United States into the war.

As regards applied chemistry war has had two mutually antagonistic effects—one retarding, the other developing and benefiting. In the outset the war struck at all the main factors of success in chemical industry, and many branches in the United States, such as petroleum refining, turpentine and other wood products, were hard hit. Important markets were suddenly lost, and the importation of certain essential products ceased. Capital was, of course, at once discouraged, and stagnation inevitably set in. That the great German combines foresaw this result was evident from the manner in which, prior to the outbreak,

they organised American branches of their colour works, eliminating American employees to conceal the market and its peculiarities, and placing all their business in the hands of "American citizens" of German name. Then when the U.S. Bureau of Foreign and Domestic Commerce attempted last September to publish the amounts of each dye consumed in that country, they vigorously protested that their rights as American citizens were being infringed by encouraging competition. The uncovering of this octopus to public gaze should be set down to the war's credit. It has long been a familiar animal to many industrial chemists.

The tentacles of the "familiar animal" stretch, as is well known, even to this side of the Atlantic, and have struck deep into our industries. We may hope, in spite of Chancellor Michaelis, it is in a fair way to be exorcised.

Much of Prof. Withrow's address is concerned

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with the efforts which America has made, and is making, to free herself from the toils of the octopus, and he utters words of warning against the feverish and unintelligent haste with which she has thrown herself into the struggle. He gives a number of instances in which inexperienced capital has been led to squander millions of dollars on the unsuccessful plants and futile schemes of ignorant or unscrupulous chemical engineers. It is a "hustling" time in a country of "hustle"—with, as we are told, "disastrous results to capital and grave loss of confidence in chemical research." At the same time there has been much real progress. "The evils mentioned are largely growing pains." The progress in industrial chemistry and chemical engineering in America during the last three years has been wonderful.

"All this progress," says Prof. Withrow, "is in spite of the war. War," he holds, "could force us to do nothing we did not possess capacity for before. . . . Industrial chemical tendencies during the war have been governed by unusual demands for chemicals from abroad in addition to war drains, healthy home requirements, new demands from industries formerly supplied from abroad or forced to use new material by scarcity or high prices, together with speculation, raising prices to unusual levels. This resulted in expansion of existing plants, rapid installation of new ones, hasty perfecting of new processes already slowly maturing, and the seizing of opportunities to profit by high prices through erection of small plants for the production of special chemical materials and through the development of processes hitherto existing as possibilities only in the minds of chemists."

As was to be expected, this extraordinary activity has reacted upon the developments of chemical engineering and upon the manufacture of chemical appliances and manufacturing plant, and it is asserted that the progress in these departments has been as great during the past three years as has been accomplished in many previous decades.

It is gratifying to learn that this country is fully awake to the necessity of studying the after-war conditions of our chemical industries, as shown by Dr. Addison's reply to a deputation of the Association of British Chemical Manufacturers which recently waited upon him, in which the Minister of Reconstruction suggested the formation of an advisory committee which should co-operate with him in considering the problems which had been created by the large number of new factors arising out of the war. He thought that if we did not succeed in placing some British industries on a much firmer and more scientific foundation than they were before the war, it would be very discreditable to us all as a nation. This is undoubtedly a step in the right direction. But Heaven helps those who help themselves. However benevolent may be the intentions of a Government department, success will only be assured by the intelligent initiative and firm co-operation of the manufacturers themselves. To attempt to shape their policy at the bidding of a bureaucracy would almost certainly end in disaster.

T. E. THORPE.