

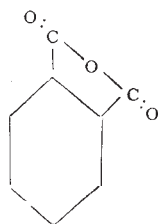
account of the subject of mustard gas poisoning extant. Let us hope that it will be long before such a book is needed again; should there be another big war in our time, this work will provide a complete account of the properties of a substance which, had it been used earlier in the recent war, would almost certainly have proved a deciding factor.

C. LOVATT EVANS.

Tinctorial Chemistry and Histology.

Untersuchungen über Echtfärbung der Zellkerne mit künstlichen Beizenfarbstoffen und die Theorie des histologischen Färbeprozesses mit gelösten Lacken.
Von Prof. Dr. Siegfried Becher. Pp. xx+318.
(Berlin: Gebrüder Borntraeger, 1921.) 10s. 6d.

THERE have been several attempts to evolve a scientific basis of the staining processes which are used in histology, but nothing as comprehensive as the book under review has so far been produced. It is the outcome of more than twenty years of research on the application of tinctorial chemistry to histology. The book contains a remarkable amount of sound chemistry, and one cannot but wonder how a professor of zoology and comparative anatomy could have found the time to acquire such profound knowledge of a subject so removed from his special lines of thought and study. Dr. Becher has been very successful in the manner in which he has combined histology with chemistry, and even the few peculiarities in his chemical terminology and chemical formulæ, such as, for example, his eccentric formula :



for phthalic anhydride, only add to the peculiar charm of the book. They vouch, at least, for the fact that the author has not blindly copied his chemical matter, which is too often the case when biologists develop chemical tendencies.

That the rituals of histology will have to give place to chemical common sense is evident from Becher's researches, which show conclusively that successful staining depends on one factor only, namely a well selected "triple-alliance" (a *bon mot* presumably chosen by Dr. Becher before the War) of tissue, mordant, and stain. Careful considerations of the individual and combined chemical properties of these three factors lead to success, their neglect spells

failure. This is the *leit-motif* of the whole research, which is abundantly supported by more than 2000 experiments. Becher's researches lead him also to the following generalisations, namely (1) the solubility of the "lakes" (metallic compounds of organic colouring matters) is of great importance, for good staining depends not on the solubility of the dye, but on that of the "lake," and (2) that all "lakes" of the hydroxy-anthraquinones are of general use for nuclear staining. The hydroxy-anthraquinones have been specially studied by Becher and the attention of histologists may be directed to pp. 271-275, which give a practical summary of these results.

However, not only histologists, but also chemists will find much in this book that will be of interest to them. There is too much belief in the infallibility of Griebler's stains in histological circles and the British dye industry would, perhaps, be well advised to pay some attention to this particular aspect of tinctorial chemistry. That not only Germany but also other countries manufacture dyes which give good histological results is again also evident from the work under review, since Dr. Becher has successfully used French, Swiss, Dutch, Belgian, and British dyes.

Reference might, perhaps, be made to a few minor errors, such as the statement on p. 121 that ellagic acid was synthesised by Georgievic in 1913, whereas it was actually synthesised by Perkin and Nierenstein in 1905. Such slight defects, however, detract little or nothing from the value of the book, which is certainly the best of its kind so far published.

M. NIERENSTEIN.

Mineral Resources of Yugoslavia.

The Geology and Mineral Resources of the Serb-Croat-Slovene State: Being the Report of the Geologist attached to the British Economic Mission to Serbia.
By D. A. Wray. (Department of Overseas Trade. Ref. No. F.E. 383). Pp. 111. (London: H.M. Stationery Office, 1921). 3s. 6d. net.

THE Department of Overseas Trade has rendered a distinct service to economic geologists in publishing an account of the mineral resources of Yugoslavia, because our knowledge of this subject has hitherto been decidedly fragmentary. A few of the mineral deposits have long been well known, such as the mercury mines of Idrija, the copper mines of Majdanpek and the iron mines of Vares, but systematic information was lacking, and this has now been supplied by the painstaking work of Mr. D. A. Wray.

After a brief introduction dealing with the more important general and economic features of the new

state of Yugoslavia, we have first a brief but clear account of the geological structure of the region under discussion; it is greatly to be regretted that this part of the work was not illustrated by a geological map of some kind, even though it were only a small sketch map, as this would have been extremely helpful for a proper understanding of the somewhat complex geology. The various mineral deposits are next described in much detail, this constituting the principal and indeed the most valuable portion of the work. Under the heading of coal it is shown that true bituminous coal is very scarce, but that there are considerable reserves of lignites, which amount probably to about 1900 millions of tons, whilst the possible reserves are even greater. With the exceptions of some of the smaller beds of Liassic and Cretaceous coal in Serbia, all the coals are of Tertiary age and are for the most part of inferior quality, their calorific power lying usually between 4000 and 5000 calories. They can, however, be used successfully on railways, for steam raising and for domestic purposes, but are not suited for metallurgical operations or other work where high temperatures are required. Apparently the coal resources of the State would cover satisfactorily the great majority of its requirements, were it not for the grave lack of means of communication, which also has hindered in no small degree the development of the various coal-fields.

There are quite a number of deposits of iron ore; according to Dr. Katzer, the Government geologist, the more or less known reserves of iron ore amount to some 22 million tons, of which 15 millions are limonite. Mr. Wray is of opinion that "the total reserve tonnage may safely be computed at 30 to 40 million metric tons." The iron industry is, however, quite insignificant; there are a few small blast-furnaces, chiefly in the Vares district, charcoal being apparently the only fuel used; one of these furnaces, situated at Krapuli, 2 kilometres south of Vares, is said to have a daily output of more than 100 tons of pig iron, probably the largest ever obtained from a charcoal furnace. Owing to the want of good coking coals and the defective means of transport, there seems at present little probability that this industry can attain dimensions of any importance.

There are well-known copper mines at Majdanpek, which have been worked since Roman times; the output from 1870 to 1890 is stated to have totalled about 2500 tons of copper. Another important group of mines is that of Bor, now being worked by a French company; the production is said to have gone up to the high figure of 7575 metric tons of copper in the year 1911-12. The famous quicksilver mines of Idria have been worked ever since the fifteenth century,

the annual output since 1900 having been of the order of 500 tons.

Among the other minerals that have been or are being worked may be named iron pyrites, manganese ore, chrome ore, antimony ore, gold, lead ore, zinc ore, bauxite, meerschaum and rock-salt.

It will be clear that Mr. Wray has done his work extremely well and has collected a great bulk of very valuable information. It is, however, to be regretted that he did not submit his proofs for revision to some competent metallurgist, as several blunders forming serious blemishes in the report would in this way have been detected. For instance, Mr. Wray states that there are at Majdanpek "three furnaces of the 'Knudsen' type (Sulitelma and Co., Norway)," whereas the Knudsen process is conducted in a special form of converter, and was worked out by the inventor at the well-known Sulitelma mines. Again, his description of the "Majdan" furnaces, evidently a primitive form of blast-furnace, is quite unintelligible; he writes: "The pig-iron came out in part with the scoriæ, and in part remained in the bottom of the furnace. The latter product was much preferred, as by the continual action of swiftly-moving hammers (driven by water-power) it lent itself directly to treatment." It is obvious that if this material was pig-iron, it could not have been worked under the hammer, and we are left in doubt whether it was malleable iron or steel, or whether it really was pig-iron which was converted into malleable iron in some kind of a finery; either of these might be the correct explanation, whereas the statement as it stands is obviously incorrect.

H. L.

Hydraulics.

Hydraulics with Working Tables. By E. S. Bellasis. Third Edition. Pp. viii + 348. (London: Chapman and Hall, Ltd., 1920.) Price 18s. net.

HYDRAULICS is largely an empirical science and as experience accumulates it is to be expected that the formulæ expressing the flow of water in particular conditions will be modified either in form or by a change in the experimental coefficients. The author of the book before us has had considerable experience in the irrigation department of India, and it might have been expected, therefore, that new data confirming or modifying generally accepted formulæ would have been incorporated; particularly additions to knowledge in those cases in which the experimental work has been small might have been forthcoming in this work. We look in vain, however, for such new data; the author has been content to discuss certain principles, to accept the generally accepted formulæ and to illus-