

literature, will prove useful to libraries, universities, and other institutions, besides appealing to the ever-increasing number to whom Spitsbergen is more than a geographical name. The absence of an index in a work like this is of no real importance, but one hopes that the printers, not the authors, are responsible for the occasional lapses in the spelling of geographical names and for the 'die-hard' form "Spitzbergen," which once or twice makes its way into the text.

The results of the further Oxford expeditions will appear as the second volume of these papers, while other results, notably ornithological, will appear in book form. Perhaps one can say nothing better for the present part than that one looks forward with interest to the arrival of these future works. In the preface, the committee expresses the hope that other young scientific workers may have equal opportunities for similar experience. All who read these results will heartily echo this wish. Few countries offer so much of value for the young natural historian as Spitsbergen, and the work of the Oxford expeditions will prove an admirable guide.

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### Products from Coal.

*The Industrial Applications of Coal-Tar Products.*

By H. M. Bunbury and A. Davidson. Pp. xi+284. (London: Ernest Benn, Ltd., 1925.) 42s. net.

THE numerous products obtained from coal-tar are ever increasing in importance, not so much, perhaps, because of the isolation of new substances or new derivatives of the older materials recognised as being present therein, but more by reason of the utilisation of compounds hitherto known to be present, which have previously found no industrial application. In the preface to the book under review, the authors direct attention to the fact that no commercial use has yet been found for phenanthrene and fluorene, and it is indeed remarkable that this should be the case when it is remembered that phenanthrene is the basis of some of our most important natural alkaloids. Nevertheless, the other side of the picture tells a different story, and there can be no question that in the near future use will be found for these hydrocarbons just as use has now been found for such substances as acenaphthene and carbazole, compounds at one time regarded as laboratory rarities.

The materials required by the chief users of the coal-tar products, the fine chemical industry and the dyestuffs industry, are steadily advancing in complexity and intricacy, because the competition between the various interests leads to the production of new compounds possessing some small advantage over the older ones which enables them to compete successfully in the world's markets. It does not necessarily follow that

complexity of structure implies commercial advantage, because some of the simpler products—for example, aniline black—still retain their places among the foremost of the dyes in use. But when the field of choice is so wide and the number of products so great, research will always find some particular substance which has special industrial advantages leading to a demand for its production, and the manufacturer is often prepared to meet this demand even though it entails a financial loss.

The progress of the dyestuffs industry, which is based on the products from coal-tar and the "intermediates" derived from them, is indicated by well-defined steps, each involving the utilisation of a new series of products. The initial production of the triphenylmethane dyes found employment for the coal-tar bases aniline, the toluidines, and so forth. The introduction of the substantive cotton dyes provided a use for naphthalene and the sulphonic acids of the naphthols and naphthylamines. The production of synthetic alizarine brought in anthracene and the tremendous step in advance made when Bohn discovered indanthrene provided a use for a variety of products hitherto either unknown or not utilised. Without question, the development of the industry depends on the production of new and suitable intermediate products or the preparation of old "intermediates" in a new and more economical manner, and it would seem that we are now about to enter a new era in this connexion which may affect our existing conditions of manufacture, because it entails a completely new kind of chemical technique.

The successful production of methyl alcohol (methanol) provides the "writing on the wall" and indicates the direction synthetic organic chemistry will take in the future. Every manufacturer interested in organic chemical reactions, and every organic research chemist, should keep the phrase "reactions at high temperatures and pressures in the presence of a catalyst" always before him, because we as a nation must not be behindhand in the new development.

The book under review is a well-thought-out attempt to group the industrially important material among the dyestuffs, explosives, and so forth, under the head of the industrial parent substance. The method is a good one, and enables the reader to find with little trouble any substance concerning which he may require information. The use of charts wherever possible facilitates reference and helps the reader to see at once the relationship between the various derivatives of some single parent substance. For example, Chart v. on pp. 116 and 117 gives a very clear and concise picture of the derivatives of naphthalene. The book is well printed, and the formulæ are clear and not too elaborate. It should find a place on the shelves of all those who are interested in the subject with which it deals.

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