REVIEWS

The Course of Evolution by Differentiation or Divergent Mutation rather than by Selection. By J. C. Willis. (Cambridge University Press, London), 1940. Pp. viii + 205. Price 12*sh.* 6*d.*

Natural selection as envisaged by Darwin supplied the mechanism through which it was possible to explain the course of Organic Evolution. Owing to the familiarity of the working of this mechanism it soon gained so great a footing as to enable the theory of Organic Evolution to be established in a firm and almost unassailable position. Since about the beginning of the twentieth century, however, the adequacy of this mechanism has been definitely questioned, and the author of the work under review, Dr. J. C. Willis, though trained in the strictest Darwinian School, began, as a result of his studies on tropical vegetation, to doubt its adequacy. According to him, Natural Selection, though an important factor in the Survival of the Fittest, does not offer either a satisfactory or the necessary explanation for Evolution. Since the last 35 years or so he has, therefore, been working "to find some definite laws underlying the welter of facts in distribution" of plants. The discovery of the "Hollow Curve" formed by the numbers of species in the genera of plants in the Ceylon flora in 1912 has been found by him to be of universal occurrence both in floras and faunas. This study led to the development in 1922 of his Theory of Differentiation which is associated with Age and Area, and according to which while large and "successful" genera are the oldest, the small and local ones are generally the youngest. Further there appears to be no special adaptational reason for the size or spreading of these genera. This theme was developed in the author's work *Age and Area,* but as it was a flat contradiction of the theory of gradual adaptation, it was not generally accepted by the evolutionists.

In the work under review the author describes in fair detail his "Hollow Curve", Mutation, Adaptation, Isolation, Differentiation and Divergences of Variation, and after discussing in the light of the rival theories a number of Test Cases under the headings Numerical, Morphological, Taxonomic, and Geographical Distribution, concludes that "the process of evolution appears not to be a matter of natural selection of chance variations of adaptational value. Rather it is working upon some definite law that we do not yet comprehend".

This highly suggestive and thought-provoking work is a welcome addition to the literature on Evolution, and biologists will look forward to the publication of the author's projected work on Distribution in which he proposes to deal more fully with this aspect of the subject. B. P.

The Microscope. By R. M. Allen. (Chapman & Hall, Ltd., London), 1940. Pp. viii + 286. Price 15*sh.*

In view of the relatively small number of works dealing with microscope in the English language this up-to-date work by a competent authority will be welcomed by all students of microscopy. The work is devoted to the theory and manipulation of an instrument, the uses of which have within recent years extended beyond all belief. A practical treatise on the subject for people who may not be able to understand the advanced mathematics of the optical science was, therefore, an urgent desideratum. In the work under review the author deals with the subject in a simple and easily understandable language, omitting all but the essential formulæ, but without sacrificing any important details. It would be impossible in a monograph of even twice the size to deal adequately with the multifarious phases of micro-technique, but in 7 chapters the author has succeeded in dealing with all important aspects, starting with an Historical Introduction, and passing on from Optical Principles of the Microscope, Modern Instruments, Illumination, Testing of Microscope Objectives, Getting the Most out of the Microscope, to, finally, the Preparation of the Material for Microscopical Examination. In addition to numerous illustrations in the text, 17 plates of beautifully executed half-tone reproductions of microphotographs are published to illustrate the variety of microscopic studies. A detailed bibliography of works on General Microscopy, Optical Principles, Older Works on General Microscopy and of the Objects Revealed by the Microscope, the Microscope in Specialized Use, etc., forms an appendix at the end of the work. Special mention must also be made of the very valuable glossary of about 20 pages in which various terms relating to

microscopy, the microscope, and its manipulation are explained in a very clear and concise language. Most of these terms are commonly used by microscopists, but are often a stumbling block to the uninitiated.

The work is beautifully printed, and considering the amount of matter and illustrations, is remarkably cheap at the published price of 15 shillings. B. P.

An Outline of the Mineral Resources of Andhra Desa. By C. Mahadevan, M.A., D.Sc. (Andhra University Series: No. 22, Madras), 1940. Pp. 81. Price As. 8.

Andhra Desa is endowed with an abundance of mineral wealth which is much greater than what is known of any comparable area in the Madras Presidency: the Mica mines of Nellore, the Manganese mines of Sandur, the Anantapur Gold Field and the famous Diamond fields of Golconda—all belong to Andhra Desa. Perhaps not less important is the fact that this country possesses India's best deposits of Asbestos and Barytes, in addition to having a number of other industrial minerals such as Bauxite, Graphite, Limestone, Ochres, etc.

In this "Outline of the Mineral Resources of Andhra Desa" which is based on the Andhra University Extension Lectures delivered by him in December 1936, Dr. Mahadevan introduces the subject with a brief summary of the general geological features of the country,—an introduction which helps the proper appreciation of the diversity of Geological Formations that contain within them a number of valuable minerals. This is followed by a detailed account of the occurrence of all the economically important minerals of the area, together with a large list of references which will prove useful to the prospector. A geological and mineral map of Andhra Desa on a scale of 42 miles to an inch, is also included. A chapter has been devoted to review the production of the principal minerals and to indicate the possibilities of utilizing them for several local industries. The author points out the scope which exists in the preparation of micanite sheets, the production of common salt, and the revival of indigenous iron-smelting by adopting improved appliances,—all of which are stated to be suitable for organization as small-scale cottage industries. He concludes with a strong plea for a thorough exploration of the area by qualified Geologists.

An attempt such as Dr. Mahadevan has made to take stock of the mineral position of Andhra Desa, is well worth following and it is the reviewer's opinion that if similar accounts are furnished in respect of each of the Provincial Units, they would toe the line for evolving a suitable Mineral Policy for India. M. B. R.

Practical Applications of Recent Lac Research. Edited by H. K. Sen. (The Indian Lac Research Institute, Namkum P.O., Ranchi), 1940. Pp. 75. Price Rs. 1–8–0.

This profusely illustrated and intensely practical volume on the practical applications of lac will be welcomed by all those interested in the continued prosperity and stabilisation of this exclusively Indian and time-honoured industry. Various extensions of the field of the application of lac in industry, have been rendered possible through the researches carried out at different centres in India and abroad, and the present volume is intended to promote the establishment of new lac-consuming industries.

This is unusual volume worthy of emulation by other Research Institutes in the country who are carrying on Industrial Research. If only all other institutions in the country could show the way of translating their investigations into commercially exploitable recipes, Indian research workers will, as a whole, earn the gratitude of the country which is on the threshold of a new industrial renaissance. We cannot resist the temptation of suggesting that the *Board of Scientific and Industrial Research* may issue publications of a similar character on the practical applications of the researches sponsored under its auspices. We wish to congratulate Dr. Sen on this commendable and daring venture. M. S.

Power Alcohol, Its Use as Motor Fuel in the United Provinces. By N. G. Chatterjee. (Department of Industries & Commerce, U.P., Allahabad), 1940. Pp. 17. Price Re. 0–2–6.

This pamphlet is a handy introduction to the public of general information about Power Alcohol, synonymous with "Absolute" Alcohol. The manufacture and cost of alcohol and some experiments in other countries of alcohol-petrol mixtures as motor fuel are described. Some tests with Mysore alcohol are outlined showing the volume change on mixing with petrol and comparative distillation ranges of the blends, in which gum formation does not increase, water tolerance is 0·6 to 0·9 per cent. and the Reid vapour pressure rises slightly.

The use of Power Alcohol in the U.P. is, however, nowhere described except some features of a Provincial Act of 1940 to foster the industry when it is permitted to come into existence.

It is of interest to note that in Mysore where the only Absolute Alcohol plant in India has been working, the State Act legislating for compulsory use of a 15 per cent. alcohol-petrol blend has been in force for over a year. This blend has proved a satisfactory fuel. To determine the best blend for the ordinary car and the proper working conditions for other proportions, experiments should be conducted co-ordinating Laboratory and Road tests. The results of such an enquiry by the Mysore Industrial Research Bureau are awaited with interest.

Y. K. RAGHUNATHA RAO.

Forest Research in India and Burma, 1938–39. Part I. *The Forest Research Institute, Dehra Dun.* (Manager of Publications, Delhi), 1940. Pp. 111. Price Rs. 2–14–0 or 4*sh.* 9*d.*

This annual publication summarises the work done at the Forest Research Institute, Dehra Dun; its six chapters are prefaced by a general review and followed by four appendices. The problems under investigation at the Institute are, as usual, many and varied and in addition, the report refers to the very large number of enquiries dealt with. The increasing number of such enquiries is attributed to "the impetus to indigenous industry given by the constitutional changes". This may be; at the same time, it is evidence, and welcome evidence, of the growing appreciation of the Institute's services to Indian industry. The criticism sometimes levelled that Forest research in India is divorced from the practical problems of industry would thus appear to be no longer well founded.

It is difficult to pick out individual items from this interesting although crowded report. Any selection which appear specially significant to the reviewer tends to be arbitrary. Mr. A. L. Griffith's contributions to the technique of raising teak plantations is recorded in the Sylvicultural Section. The reference to the laying of ecological quadrats in the "Controversial areas, Bamiaburu, Bihar" (p. 27) is presumably to the contour-trenching-climatic factors controversy. Under Entomology, mention is made of the "suspicious symptoms" produced by four species of insects in the sandal spike experiments but "these symptoms have not yet been transmitted by grafting". Further, the opinion is expressed that "the vector of spike disease is likely to be a species of Jassidæ associated with agricultural crops or weeds and thence intrusive in sandal forests." Under "Timber Testing", the facilities of the Institute are increasingly made use of by the aviation authorities and a report on aircraft timbers has been submitted to the Air Ministry in England. The work on "Ascu" is in progress in the "Wood Preservation Section". Special mention must be made of the experiments on wrapping papers from Ulla (*Anthristiria gigantea*) grass and it is pleasing to note that some members of the Paper Makers' Association have contributed money towards the research expenses of the "Paper Pulp Section". The Chemistry Branch gives an account of progress achieved under Drugs, Oils, Fats and Essential Oils. Work has just been begun on Forest Soils. One is rather surprised and disappointed to read that research under "Minor Forest Products" had to be greatly curtailed during the year during report *for want of funds.*

The publication is well got up and printed on paper made at the Institute from *Saccharum arundinaceum.*

A Review on the Indian Cotton Textile Industry. By H. P. Gandhi. (Gandhi & Co., Calcutta), 1940. Pp. 150. Price Rs. 3.

Mr. M. P. Gandhi has once again rendered service to the Indian Cotton Textile Industry by publishing his 1940 annual. He has arranged the information available on the Cotton Textile Industry in a comprehensive volume, which should serve as a very useful guide for those engaged in the Cotton Industry. He has followed more or less the same lines as in the past in arranging the data under various captions. As he has pointed out he was experiencing considerable difficulty in collecting statistical information on imports and exports, as official information was withheld owing to war conditions. The statistical tables are, therefore, incomplete. All the same, a review of the various tables forcibly brings home the importance of the Indian Cotton Textile industry in the national economy of India. There has been a steady increase in the number of mills, the number of active spindles, the number of active looms, number of workmen engaged in the industry and in the consumption of cotton in the past year compared with that of previous years. Table No. 15 sums up the economic position

of the industry. The figures indicated under several heads except those shown under hand-loom production are from authentic sources. They reveal that there has been a slight set-back in the past year compared with the steady progress the industry was maintaining in the past decade from year to year. Compared with 1929–30, the imports in piecegoods have fallen from 1900 million yards to 560 million yards in 1939–40, whereas the production of piecegoods in Indian mills and on hand-looms has increased from 2,290 million and 1,380 million to 3,790 million and 1,600 million yards respectively, the *per capita* consumption in the same interval varying from 15·97 to 16·5 yards during the same interval.

Mr. Gandhi has followed the same lines as in previous years in arranging the matter pertaining to the various phases of the development of the Indian Cotton Industry from its early days. He has forcibly brought out before the public, the view held by the industry that the New Indo-British Trade Agreement of 1939 is not in the best national interest and has for this purpose traced the history of the negotiations in the matter quite comprehensively.

Mr. Gandhi has also devoted much attention in presenting the difficulties that the industry was experiencing in matters connected with labour engaged in the industry in the different parts of the country and has made an impartial survey of the situation in the various provinces.

Under the caption "The Hand-loom Industry in India" Mr. Gandhi has merely mentioned the work of the Eleventh Industries Conference. In view of the importance of the hand-loom weaving industry which according to Mr. Gandhi accounts for nearly 27 per cent. of the total production of cotton goods produced in India, it is desirable to have a more comprehensive review of the industry in all its phases. Even if a detailed review of work done in each province and State, even of those to which grants are given from Government of India, can be included in future issues of Mr. Gandhi's annuals, a very useful service will be done to the industry as detailed information on each and every important phase of the cotton industry would become available.

Mr. Gandhi's review of the general conditions of the industry during 1939–40 is both instructive and convincing. After reading through the annual, one cannot resist the conclusion that the cotton textile industry of India is our largest industry, controlled, manned and financed by the nationals of the country. It is one of the few organised industries in India which the Indian industrialists have been able to develop against heavy odds, and indeed against severe competition from the industrially advanced countries. It occupies a very important position in the National Economy of India and with it the welfare of millions in this country is closely linked up.

B. K. MURTHY.

HYDROCARBON CHEMISTRY

THIS is a somewhat prosaic title to the interesting group of papers presented and discussed at the 70th General Discussion held by the Faraday Society (Gurney and Jackson, 1939, price 12*sh.* 6*d.*). To the present-day student of text-book organic chemistry and the high brow organic chemist pursuing the synthesis of vitamines, harmones, colouring matters and new medicinal chemicals, the chemistry and properties of hydrocarbons are perhaps the least inspiring. And yet the chemistry and technology of hydrocarbons presents one of the thrilling chapters in modern chemistry and none who has gone through the present monograph can lay it down without being deeply impressed by the immense importance and vast potentialities of the new synthetical methods applied to petroleum and coal. There are essentially two aspects of the subject. The first is concerned with the increasing demands for high grade aviation and automobile fuels with rising octane and cetane numbers. It is found that aromatic hydrocarbons have in general increased anti-knock characteristics and thus one of the problems is that of bulk production of aromatic compounds from the open chain raw materials available, by methods much more economical than those hitherto known for the syntheses of fine chemicals. Secondly, the various hydrocarbons, synthetic or natural, are likely to assume increasing importance as basic materials for a number of newer chemical industries, such as, to give outstanding examples only, the production of synthetic glycerol, and the new polymerisation processes for production of lubricants and plastics.

The technical development of several