Reviews.

Praktische Physik. By F. Kohlrausch. New and enlarged 17th edition, edited by F. Henning. (B. G. Teubner, Leipzig and Berlin, 1935.) Pp. x+958 with 512 Figures. Price 32 RM.

The book is a completely revised and enlarged edition of Kohlrausch's well-known work. The authorship, however, is now divided among nineteen authors, all of whom except one are or were in the Physikalisch-Technische Reichsanstalt, Berlin. The size of the book, the style and type of printing and the division and method of handling of the various topics have all been altered. Where originally we had a text-book, of primary interest to the student, we now have a condensed "Handbuch" almost, appealing even more to the research worker and industrial physicist. What strikes one is the immense amount of information given and the consequent condensed treatment. Another pleasing feature is the up-to-dateness: we may cite as examples the inclusion of Ritschl's method of silvering etalon plates, a description of Gehrcke and Lau's Multiplex Interference Spectroscope and a mention of Tomaschek and Schaffernicht's work on the time variation of gravity. The references to original papers are even more up-to-date and helpful, though sometimes, as in connection with the width of spectral lines, an individual author has contented himself with a reference to an old paper. There is, however, one difficulty here: many of the references are to journals not easily available in India since, naturally, German sources of information are cited in preference to those in other languages; but this is not a serious drawback since in all important cases the best sources are indicated without any preference to nationality and language. Another disadvantage to Indian readers is that the apparatus described is in many cases unfamiliar while the more usual varieties do not find a place. Thus we do not find any mention of the methods of determining Young's modulus familiar to us in this country and described in the usual text-books. The descriptions are very often so terse that unless one is already acquainted with the apparatus or method described, it is difficult to follow the procedure. It is therefore clear that an ordinary student cannot use the book as a text-book; in fact ordinary experiments intended for laboratory practice are almost entirely omitted. Only those methods are described in any case, as are susceptible to a high degree of accuracy, and the precautions necessary and the exactitude attainable have been mentioned in most cases. But the research worker will find the work invaluable in showing him what methods are best suited to his needs and giving the essentials of any measurements he might have to make, connected indirectly with his field of investigation; when the description actually given is found inadequate, he will always find a citation to original sources which will solve his difficulty. The industrial physicist will find the book a most useful companion and counsellor. Even the most advanced fields of research such as line and band spectra, X-rays and Radioactivity have found a brief but informative treatment so that whatever requirement the industrial scientist may meet with in connection with his problems, he is sure to find either the information he requires or at least a reference to the best sources of information. We thus find very good sections on the production of high vacua and their measurement or the production and maintenance of any required degree of humidity in any locality, or the insulating properties of dielectrics and the energy losses occurring in them or the methods of measurement in connection with high and low frequency alternating currents. The tables given at the end are also of very great service from this point of view. If sections on photography and glass-blowing are added the usefulness of the book will be still more enhanced. While the student will miss such a common instrument as the sextant, or such a common method as Schuster's for adjusting a spectrometer, and will find only the briefest indication of the procedure in such a case as the determination of the coefficient of cubical expansion of liquids, or the thermal conductivities of substances, the research worker will find descriptions of the methods of determining nuclear spins and isotopic constitution from atomic and molecular spectra. We have occasionally noticed a mis-statement such as the one which says that the method of determining the specific heat of a liquid by cooling depends on the truth of Newton's law of cooling, or the one according to which $\lambda 4916$ of mercury has no satellites. Misprints are even rarer and the get-up of the book is excellent. The

figures are so unusually clear and so generously supplied that it is a pleasure to handle the book. We heartily recommend the book to research workers, industrial physicists and post-graduate students with the confidence that they will never find it wanting when some perplexing problem faces them.

T. S. S.

Atomic Physics. By M. Born. (Blackie and Son. Ltd., 1935.) Pp. 352 ; Price 17*sh.* 6*d.* This survey over the vast field of modern atomic Physics is one of the most refreshing, we have read since a long time. It is amazing to see on such an occasion, how our knowledge has spread in the last years and only the existence of this book makes us believe, that it is at all possible to give such a survey in a comparatively not too large volume. In 342 pages Prof. Born has collected a short but complete description of the kinetic theory of gases, radioactivity and isotopes, wave theory of matter, structure of atom and line and X-ray spectra, wavemechanics, quantum theory of the molecules, quantum statistics and structure of molecules, including a mathematical appendix. It is difficult indeed, to give an adequate account of the contents of this book, the abundance of important subjects and interesting discussions makes it difficult to select and to mention any one of them particularly. We cannot, however, resist the temptation of drawing attention to the beautiful simple introduction to matrix mechanics. The matrix is described as nothing else but the most convenient way of tabulating experimental results, as for instance the intensities of spectral lines, according to the various possible transitions between the terms of an atom. If T_1, T_2 ..... T_n are the various terms, the possible transitions ν form a two dimensional scheme, in which

$$\nu_{11}, \nu_{12} \ldots\ldots \nu_{1m},$$
$$\nu_{21}, \nu_{22} \ldots\ldots \nu_{2m},$$
$$\nu_{n1}, \nu_{n2}, \ldots\ldots \nu_{nm},$$

are the single lines of the matrix. Quantum mechanics is now explained as the art, to use a particular mathematical method to calculate with these schemes instead of single quantities.

The book is full of surprisingly simple introductions to subjects, which are ordinarily supposed to be difficult to understand. Often the theoretical physicist gives us a formula without discussing it, leaving the experimentalist guessing as to its true physical meaning. The great charm of this book is that the near connection between experiment and theory is never lost sight of. It is not the mathematical skeleton but the physical meaning of the physical interpretation which again and again is impressed on the reader. This, together with a number of occasional remarks on future developments, make the reading of this volume a very great intellectual pleasure, for which we have to thank its author.

R. S.

High Speed Diesel Engines. By Arthur W. Judge. (Published by Chapman & Hall, London.) Pp. ix+347. Price 15/- net.

At a time when a good deal of original research work is being carried out on the high compression crude Oil Engines with a view to make them suitable for automobile, air-craft and locomotive work on a large scale, a book giving in a concise manner theoretical, practical and descriptive information, about these engines, covering all the experimental work done so far is indeed a necessity and is therefore very welcome. Though the book is entitled "High Speed Diesel Engines," the author refers throughout the book to the engine as compression ignition engine so as to be impartial both to Mr. Achroyd-Stuart and Dr. Diesel who worked on parallel lines on this type of engine.

To bring the compression ignition to the same level as that of a petrol engine, the slow running engine has been developed to a high speed one. Though the cycle on which this type of engine works is the dual cycle, it is shown that by suitably timing the injection of fuel and varying the period of injection, it is possible to follow either constant volume cycle or constant pressure cycle. The modern tendency is to make it approximate more to the constant volume combustion process, thereby getting better fuel economy, more suitable running conditions, and a combustion less sensitive to load fluctuations. From a sleeve valve engine of 15 to 1 compression ratio running at 1300 r. p. m. 53% thermal efficiency has been obtained, as compared with 30 to 34 for well designed petrol engines with compression ratio 5/6 to 1. One other advantage of the compression ignition engine over the petrol engine is brought out by the author from a series of experiments. A 6-cylinder C. I. engine

varying in speed from 600 to 1400 r.p.m. maintains almost constant efficiency throughout and the fuel consumption from less than half torque to full torque over the speed range was always less than ·5 lb. per B.H.P. hour, whereas with petrol engines the fuel consumption is initially much higher at full load and increases progressively as the load is diminished. Reference is also made to tests made with supercharging and curves are given to show (1) that the I.M.E.P. is increased from a maximum of 125 to 160 lbs., (2) that B.M.E.P. is increased from 93 to 130 lbs., (3) that the maximum cylinder pressure increased by 20% (from 550 to 700 lbs.), (4) that the fuel consumption was reduced at part and full loads. Supercharging also gives smoother running and enables higher injection advance angles to be used with good results.

One whole chapter is devoted to comparing the C.I. Engine with the petrol engine. In comparing the author has been fair to both engines, and he has dealt with the disadvantages of the C.I. Engine also.

Also much attention has been given to the phenomenon of Diesel knock which made the C.I. Engine very noisy, in the early stages. From investigations the author shows that this is associated invariably with a high rate of pressure rise during combustion and by regulating the combustion process so as to avoid a too rapid increase in pressure, smooth knockless running is obtained.

The three principal methods of fuel injection, *viz.*, the direct injection method, the pre-combustion chamber method, and the air turbulance method, are discussed in great detail in two chapters and sketches are given to illustrate some typical commercial cylinder heads. The longest chapter in the book is devoted to a detailed study of the two principal methods of fuel injection now popular, *viz.*, the storage system and the jerk pump system, illustrated throughout from actual working engines.

The two cycle C.I. Engine is comparatively more difficult of application to practice due to difficulty of high speed injection at twice the speed of the four stroke cycle, proper elimination of exhaust, prevention of loss of volumetric efficiency, provision of a suitable compressor, and prevention of excessive oil consumption. The constructional details of different makes of two cycle engines are given with a view to show how these defects are partially overcome in each case.

During the past two or three years there has been a fairly rapid and wide development in connection with high speed C.I. Engines for motor vehicles, and engines of many of the leading makers have been described by the author and studied in great detail with a view to bring out the constructional features.

Extending the use of C.I. Engines to air-craft purposes is not only attractive but also desirable from the points of view of safety and economy. The engines are still in the experimental stage, but the chief advantages claimed are, comparative freedom from fire risks, reliability, elimination of source of wireless interference and greater range of light, freedom from carburettor troubles which points are in its favour for commercial cars, etc. A few of the air-craft engines already constructed are shown and the results of tests on them are given. The use of C.I. Engines for stationary and railway work for shunting locomotives, rail coaches and rail cars, express train engines, is illustrated in one chapter.

The last three chapters are devoted to the care and maintenance of high speed engine with special reference to the trouble that are likely to occur and how to cure them and to the selection and use of the fuel oils.

The book is profusely illustrated not only with photos but with sketches which bring out the constructional details and enables one to understand the working better. The results of recent investigations have been condensed and numerous graphs have been included to make the conclusions arrived at clear. The publishers must be congratulated in bringing out the book with few mistakes and with such clear illustrations. On page 38 it is mentioned that loss to the exhaust and by reduction is rather more in the case of C.I. engines, while the figure 16 shows quite the reverse.

The book is a very useful one to engineers and also students as it brings the subject upto-date and as it contains references to the original papers which make this book a valuable one.

E. K. R.

Theoretische Grundlagen der Organischen Chemie. Volumes I & II. By W. Hückel. (Akad. Verlagsgesellschaft, M. B. H., Leipzig. Second Edition, 1935.) Vol. I: Pp. 475; Price RM. 19·8; Vol. II: Pp. 338; Price RM. 15·6.

These two volumes of W. Hückel's work are not text-books of organic chemistry. We do not find chapters on carbohydrates, aldehydes, etc., but the headings are such as Stereochemistry, Tautomerism, Constitution and Physical properties, Velocities of Reactions and many others. In other words, it is a cross-section through the facts and theories of organic chemistry from a quite unusual angle. Beginning with a development of theoretical concepts of organic chemistry, leading up to electronic theories of valency, the author gives an account of stereochemistry including, *e.g.*, that of N, P, B, and S. The next chapters deal with addition compounds and molecules with anomalous valencies of carbon, particularly free radicals. Six chapters follow, which together form a critical account of those concepts and experiments by which organic chemistry obtains its results, *i.e.*, determines the structure and constitution of organic molecules and the critical remarks appear to be of particular value. The next four chapters deal with physical properties and physical theories and both the Chemist and the Physicist will find some chapters on dipole moments, Raman effect and the theory of dispersion, which constitute the best accounts on these subjects. An account on velocities of reactions forms the last chapter. From this it will be clear, that the author aims at a description and a critical analysis of the present-day theories of chemistry, and this makes the work so valuable. Some of the most important questions of organic chemistry, as for instance the theory of valency or that of side chain reactions, cannot be overcome by purely chemical or purely physical investigations alone, and the methods both of chemistry and physics are needed to solve them. Hückel's book is very well qualified to acquaint the physicist with the method and results of organic chemistry and the chemist with those of molecular physics.

R. S.

The Translocation of Solutes in Plants. By Otis F. Curtis. (McGraw Hill Publishing Company, London, 1935.) Pp. ix + 273. Price 18*s*.

Every branch of science has presented certain difficult and fundamentally important aspects which have continued to remain either obscure or controversial in spite of the devoted efforts of a number of investigators. Such efforts defy complete solution more on account of the deficient state of our technique in that particular branch of the subject; a new impetus is often given to the investigation either by the discovery of some new technique applicable to the study of the problem in question or by a careful and critical presentation of the problem after discussing the several points of view. Such a presentation attains special significance when the task is accomplished by one who has contributed substantially to the advancement of the subject.

The present volume on the Translocation of Solutes in Plants by Otis F. Curtis deals with an aspect of plant physiology which is of fundamental interest. Commencing with a discussion of the earlier opinions regarding the tissues involved in the upward and downward transfer of solutes, the author proceeds to present experimental evidence in support of the upward transport of organic matter through the phlœm, and in this connection he has invoked the aid of the ringing experiments particularly those of Dixon, Mason and Maskell and others. The main objection to all such experiments is that the physiological injury inflicted on the organism in the process of experimentation, introduces responses abnormal to the plant. But in absence of any finer technique, there appears to be no other alternative. Progress in this field is therefore closely connected with the progress of science in other allied branches of science which may be helpful in evolving new methods of investigation.

The author and the publishers have done a service in bringing to the forefront a problem of the greatest interest in the domain of plant physiology. It is hoped that the book will stimulate new and vigorous research activity in this field.

M. S.

The Beginnings of Plant Hybridization. By Conway Zirkle. (University of Pennsylvania Press, Philadelphia. Humphrey Milford, Oxford University Press, London. 1935.) Pp. xii + 231. Price 11 *sh*.

This is the first of a series of monographs to be issued by the Morris Arboretum, University of Pennsylvania founded by Miss Lydia Thompson Morris "for the increase of knowledge through research and the communication of knowledge through publication." The author is the Geneticist at the Arboretum and Associate Professor of Botany, University of Pennsylvania. The book is

well got up and the few illustrations, some of them from rare sources, add greatly to the value and attractiveness of the book.

In this monograph the author gives fairly detailed references to the work of plant breeders of the eighteenth century and before the publications of Koelreuter (1761–64). An examination of extant literature showed that such work was little recognised, even the great work of Sachs being defective in this respect ; hence this attempt to fill up the gap. As many as thirty researchers previous to Koelreuter are mentioned and their contributions briefly reviewed. They include such names as Cotton Mather, Thomas Fairchild, William Knowlton, Philip Miller, Paul Dudley, Johannes Haartman and Carolus Linnæs.

The bulk of the book reads like a novel and it is interesting to be told of decorative Assyrian and Babylonian art depicting cherubs in the act of pollinating date palms. The book takes us back to the dim remote past when attempts at hybridization were considered impious and an " insult and outrage " on the Creator. The mule was one of the first to be recognized as hybrid and beliefs used to be current about phantastic hybrid creations such as between the eel and the viper, the panther and the lion and between man and the bear. The very curious shapes of certain mythological animals must have risen from such beliefs.

The diœcious date palm and the monœcious *Zea Mays* (the Indian corn) were the first to suggest to man the idea of sex in plants. Dates were hand pollinated during Babylonian times with the object of increasing crop production and the suggestion is made that the art of hand pollination " possibly anti-dated the invention of writing". The mule which has "neither pride of ancestry (because of its hybrid and hence disreputable origin) nor hope of descendants (being sterile) is mentioned several times in the Odyssey. Angels, it was believed, occasionally descended to the earth and from their matings with human beings arose the great warriors of mythical times, whose great prowess and strength found an easy explanation in such origin.

In prehistoric times even the precious stones were grouped into the two opposite sexes and were thus capable of multiplying themselves. During the Assyrian period plants were also divided into " male " and "female" according to their size and hardness. This reminds one of the classification of plants like the *Saccharum* into "male," "female" and " neuter " according to Indian medical science. During the eighth to tenth centuries the Arabian Natural History was superior to the European, though in itself highly speculative and romantic. Hybrids occurring in nature were often attributed to a degeneration of the species and the transmutation of one species to another, such as wheat into oats and rye into barley, was widely believed.

We may have to recognise Ibn-al-awwam (1150 to 1200 A.D.), the Arabian scientist, as perhaps the first Plant hybridiser of the world ; he carefully describes the effect of foreign pollen on plant progeny and had certainly carried out hand pollination in the date palm. Yet another Arabian scientist Abd-al-Latif (1162 to 1231 A.D.) reported hybrids between the orange and the lemon. The first real intimation that hybrid plants could be secured by cross pollination came, however, from Camerius (1694) but he was chiefly interested in plant hybridization as a proof that plants also reproduced sexually like animals.

The Indian corn (*Zea Mays*) looms prominent in the early records of plant hybridization owing to the obvious effects of foreign pollination (xenia). It was the first plant in which the effects of hybridization were early recognized and even to this day its hereditary factors or *genes* are known better than in most other plants. The book gives in some detail the work of various plant breeders from Cotton Mather (1716) to Koelreuter (1764) and a useful bibliography is added at the end.

Though the book may not be of much use in current work on Plant genetics or hybridization—no such claim is made by the author —it gives the reader a very rare and interesting glimpse into the dim prehistoric and historic past and this is both stimulating and exhilarating. It gives the correct and much needed background for understanding the " beginnings of plant hybridization".

A Description of the Physiological Laboratories of the Institute of Animal Husbandry, Leningrad. Edited by M. M. Lawadowsky. (Lenin Academy of Agricultural Sciences, Leningrad, 1935.) Pp. 252.

One has often heard in recent years of the advances being made in the U. S. S. R. in the development of Animal Husbandry in

that country, but in the absence of any opportunity to visit it, one has had to rely on publications to obtain any detailed information in regard to the progress that is being made.

In this case, however, the language difficulty often arises and it is, therefore, of considerable interest to find a publication, such as that now under review, which although written in Russian has alongside the original text a very readable translation in English.

This publication was prepared for presentation to the XV International Physiological Congress by the All-Union Institute of Animal Husbandry of the Lenin Academy of Agricultural Sciences, Leningrad, and consists of some general remarks under the heading "Science and Animal Breeding" by the Director of the Institute and six other articles dealing in more detail with such subjects as the Dynamics of the Development of the Organism, Experimental Endocrinology, Artificial Insemination, the Physioiogy of Digestion, the Physiology of Lactation and Biochemical Studies of Straw and other Foodstuffs.

Perhaps the most striking section is that written by the Director, who explains the problems which confront Animal Husbandry workers in the U. S. S. R. and gives an indication of the way it is proposed to tackle them. He commences by pointing out that because of the efforts that are being made to transform the country from a backward agricultural to an industrial one, the animal industry is confronted with a clear cut task of increasing the quantity of animal products, improving their quality and lowering the cost of production.

During the Second Five Year Plan it is proposed to increase the number of horses by 11·2%, cattle 61·1%, sheep 88·1%, and pigs 274·2%, and it is pointed out that to effect this enormously rapid rate of increase without lowering the quality of the produce it will be necessary to work along new lines founded on scientific data, which can only be obtained from a network of scientific research institutions, which it is hoped will rapidly find methods of protecting the existing herds from infectious diseases, provide for the proper conditions of maintenance to prevent sickness, determine the conditions necessary for obtaining an increase in such animal husbandry products as meat, wool, milk, eggs, etc., and work out satisfactory methods for grading up pure-bred herds.

In the U. S. S. R. there are at present 126 such scientific centres at which about 6,000 specialists are working at various problems connected with zootechnics, veterinary medicine and food production and the All-Union Institute of Animal Husbandry at Leningrad is one of the most important in this chain. Other All-Union Institutes deal with Acclimatization and Hybridization, Veterinary Research and Horse-breeding, while there are a number of subsidiary research institutes which deal with more specialized branches of Animal Husbandry, such as Sheep breeding, Poultry breeding, Bee-keeping, Rabbit breeding, Sericulture, Helminthology, etc. In addition a system of zootechnical stations financed by local funds and farm laboratories, which already number 20,000, have been set up to work in collaboration with the larger institutes.

The chief lines of work at the All-Union Institute of Animal Husbandry may be classified under the following heads:— Experimental breeding, Artificial Insemination, Physiology of Reproduction, Nutrition and Increasing the productivity of Farm Animals. To carry out these duties 16 separate laboratories have been provided and it is said that other institutes are furnished on a similarly lavish scale.

Turning to the more detailed part of work there is much to interest Indian readers. The subject in which perhaps the greatest advance has so far been made is that of artificial insemination which, when correctly used, widens the possibilities of livestock improvement by extending the use of valuable sires, allowing a study of the laws of inheritance in farm animals and experiments in hybridization, with the aim of producing new breeds. The use of this method in the field in the U. S. S. R. is said to have been particularly successful in sheep, in which species 5,000 ewes may be impregnated with the sperm from one ram, while even in cattle 2,000 cows may be inseminated from one sire.

Zootechnical endocrinology, the name given to a new branch of science dealing with the part that internal secretions play in the reproduction processes of the domestic animals, has also produced some striking results, particularly in connection with the production of artificial œstrus and ovulation, and the increase of fertility. As examples may be quoted the case of certain breeds of sheep, whose lambs are destroyed at birth for the sake of their pelt, being made

to produce young at double the rate than formerly, and the use of ovary-lyzates, *i.e.*, products of the primary disintegration of ovarian tissue, on hens, in which a 30 % increase in egg production is said to result within 4–6 weeks after each injection.

In connection with lactation in the cow good results have been obtained both with the products of the acid hydrolysis of fibrin and an alkaline extract of the anterior pituitary body, and in the case of the latter not only was the milk yield improved but there was also an increase in the fat content.

Altogether this is a most stimulating publication, and well worth perusal by anyone interested in the development of Animal Husbandry in India, for it shows very clearly what might be done, particularly in connection with those subjects which in the English Language are usually included in the term "Applied Animal Genetics," to improve the livestock industry of this country.

F. W

Commercial Marine Fishes of South Africa. (Fisheries Bulletin No. 2. Fisheries and Marine Biological Survey Division, Department of Commerce and Industries, Union of South Africa, Pretoria.) Pp. 160. Price 5 *sh.*

Students of ichthyology interested in the marine fish fauna of South Africa are already familiar with the admirable and indispensable work of Dr. K. H. Barnard entitled *A Monograph of the Marine Fishes of South Africa*, but to meet the requirements of professional fishermen, anglers, those interested in the fishing industry and amateur naturalists a handbook embracing semi-technical descriptions and illustrations of the commoner commercial fishes occurring in the seas of South Africa has now been published. This much-needed work has been produced by Mr. J. M. Marchand, Technical Assistant to the Survey Division and is entitled *The South African Marine Fishes of Commercial and Angling Importance.*

The book is divided into two parts, dealing with cartilaginous and bony fishes respectively. In the list that precedes the general account common and scientific names of the species dealt with are given; this is followed by 7 outline illustrations intended to explain anatomical terms; a glossary of anatomical and descriptive terms is given and then there is the systematic account of the various species which are arranged into families and genera mainly in accordance with Jordan's system of classification. Under the account of each species attention is directed to its taxonomy, chief characteristics, distribution, fishing season, commercial importance and the fishing-gear used in catching it. Each species is illustrated with a good photograph, mostly taken by the author himself from fresh specimens. In an appendix explanatory notes on names and types of fishing-gear are given and in the concluding section the meaning and use of scientific nomenclature are explained. The work contains an index of all names, commoner and scientific names of fish and of fishing-gear, and for convenience of reference the scientific names of genera and species are given in italics.

The value of such a work cannot be overestimated in so far as it provides a ready means of determining fishes in the field and of knowing the precise significance of one's catches. A handbook like this is sure to bring in more information about the species from quite unexpected sources, resulting in the advancement of knowledge regarding the habits and habitats of commercial fishes. The author and the department are to be congratulated on the production of such a useful and valuable work. A similar work on Indian fishes is badly needed for the development of fisheries in this country.

S. L. H.

Annual Report, 1934-35. Department of Industries, Bombay Presidency. (Printed at the Government Central Press, Bombay. 1935.) Pp. 50. Price 4 As. or 5 *d.*

This publication deals with all the activities of the Department of Industries during the year. The *Report* assumes considerable importance when it is remembered that industrially, Bombay is the most advanced part of India.

The first part dealing with the state of some important industries like Glass, Chemicals, Silk, Gas Mantles, Aluminium and Gold Thread makes very disheartening reading as the trade depression affecting all industries in general, continued. It is encouraging to note, however, that Cotton Textile Industry outside the island of Bombay, Woollen Industry and Sugar Industry registered improvement.

The information given in the next section dealing with new enterprises such as rerolling

steel mills, manufacture of canvas shoes, metal printing and manufacture of centrifugal pumps, oil engines, tricycles, perambulators, dry cells, bakelite and small electrical motors is rather more encouraging.

The activities of the Department are next dealt with. We note with interest that practical investigations, experiments and demonstrations for possible new industries were conducted and the lines tackled included Peppermint Oil, Lemon Oil, Alumina and Aluminium Sulphate, Mango Pulp, etc. Investigations on some Cottage Industries like Oil Industry, Pottery Glazing, Hemp Industry, Bone-manure and Glass-bangle Industry were also on hand.

It is stated in the *Report* that a summary of the progress of Scientific and Industrial Research during 1934–35 was sent to the Government of India for inclusion in the Annual Report of the Committee of the Privy Council for Scientific and Industrial Research, London. No indication is given that these results are published elsewhere. After all, the work done by the Department is primarily for the benefit of the Industrialists in India and one is entitled reasonably to expect that the results of all the scientific investigations conducted under its auspices would be published in detail in India as is being done by the Government of H. E. H. The Nizam of Hyderabad and other Provincial Governments.

K. A. N. R.

Electrochemistry, Vol. II. Applications. by W. A. Koehler. (John Wilby & Sons, New York; Chapman & Hall, London. 1935.) Pp. xiv+545. Price 25/-

The publication of this book by Professor Koehler has removed a long-felt want for a suitable and *up-to-date* text-book on Applied Electrochemistry. The author has succeeded well in the difficult task of making the book sufficiently complete and up-to-date without at the same time making it too voluminous for the use of colleges and technical schools. This has been made possible by a very judicious selection of materials, and by a concise but lucid style of exposition. A large number of well-arranged and neat diagrams has enhanced the value of the book, and has materially contributed to a clear understanding of the subject. As is to be expected, the chapters on storage batteries, electroplating, electro-metallurgy, and the electrical processes for the manufacture of chemicals are fairly comprehensive. The author has also discussed the problems of corrosion, electroanalysis, separation of materials by electrostatic and electromagnetic devices, thermionic and electrolytic rectification, the possible industrial uses of photoelectric and photovoltaic cells, and even the electrolytic process for the preparation of Deuterium.

The price of 25/- is perhaps a little too high for Indian students, but the reviewer has no hesitation in recommending it to every serious student of electrochemistry.

J. C. G.

Erratum.

Vol. IV, No. 7, p. 494, in the table under the heading Percentages in groups,

Read 62·40 *for* 60·40.

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