Acting Vice-Chancellor, during Sir Hari Singh Gour's absence.

Inter-University Board:

The following among other resolutions were passed at the eleventh meeting of the Inter-University Board, held at Aligarh, which concluded on Wednesday, February 26. Mr. Littlehailes, the Vice-Chancellor of the Madras University, presided:—

That a committee consisting of Mr. R. Littlehailes, Sir George Anderson and the Hon'ble Mr. Justice Khwaja Mohd. Noor be appointed to select two candidates to be recommended for the award of Carnegie Corporation Grants.

That the Universities in India be invited to consider whether it is not desirable to adopt the Intermediate Examination in Science as the qualifying test for admission to the courses of study of Medical Degrees.

That appropriate departments of Government of India be addressed to include: (i) Natural Science in the list of subjects for all the Competitive Examinations from which they have recently been omitted; (2) Philosophy as one of the subjects for the Indian Audit and Accounts Examination, and Ethics and Psychology in the list of subjects for the Indian Police Service Examination.

That the Trustees of the Carnegie Foundation be requested to include Indian Universities in the scheme of the provision of thirty-six Fellowships, intended for displaced German scholars.

That the Government of India be addressed urging upon them the necessity of securing for Indian students, who are granted foreign scholarships, or Fellowships by the different Universities, a definite number of seats without premium in different industrial concerns of the various countries from which supplies are purchased by India, by making suitable conditions at the time of giving contracts.

That the Universities be requested to consider the desirability of including Nautical and Aeronautical instruction in the University curriculum.

That the invitation of the University of Nagpur be accepted with thanks, and the venue of the next meeting of the Inter-University Board be there.

Pandit Amarnath Jha of the University of Allahabad was elected Chairman for the year 1936–37, Dr. J. C. Ghosh of Dacca, Prof. Parija of Cuttack, and Dr. L. K. Hyder, Member, Public Services Commission, were elected to represent the Inter-'Varsity Board on the Imperial Council of Agricultural Research.

Reviews.

The Restless Universe. By Max Born. Authorised Translation by Wirifred M. Deans. (Blackie & Sons, London, 1935.) Pp. 278; price 8*sh.* 6*d.*

There is a good stock of popular literature on modern physics in the English language. Jeans and Eddington are almost household words. Entirely new ideas as well as difficult and abstruse subjects have been presented in lucid manner with the discipline of English style by these master minds. Nevertheless Max Born's *The Restless Universe* (authorised translation) may be called a new venture in this line considering the high ambition with which the author sets out and the wonderful manner in which he seeks to realise it. The reading of the book is a first-rate intellectual treat.

The book is divided into five chapters, each of about fifty pages, on the air and its relatives, electrons and ions, waves and particles, electronic structure of the atom and nuclear physics. The author starts with the simplest type of matter, *viz.*, the gas and explains its essential properties by introducing the Kinetic theory of the molecules which are really the main objects of study in the first chapter. The statistical idea is introduced almost at the very start preparing the reader for the shocking surprise awaiting him in the later portion of the work that "all laws of nature are really laws of chance in disguise". After describing how actual beams of molecules can be produced to hit a target and how their number can be measured, the subdivision of molecules, chemically into atoms, their classification, the periodic table of elements are all brought in one sweep and the first step in the journey for the quest of the ultimate source of matter ends. The reader then crosses a boundary into a new realm populated with electrical beings: electrons and ions. The physicists now develop some refined sense organs to feel the existence of, to see and even measure these new creatures. The reader is now acquainted with Wilson Chamber, Geiger-Müller counter, and knows the charge of the electron, its mass and even the highly ethical unitary doctrine of identity of Mass and Energy. Then he comes almost to the heart of the problem. The electronic world often sends messengers to the outside world of ours in the form of radiation and in turn receives such messengers from outside. The mystery then deepens. What is the relation of this messenger to the electronic population?

The messenger, light, plays a dual rôle. While journeying in the outside world it is a wave but in the dealings with the atomic population it behaves as a particle of energy. On entering the realm of electrical charges it can knock out an electron with great speed to the outside world. The dual rôle is then found to be not only a characteristic of the messenger but also of the electron. Electron waves can be actually made visible on the photographic plate. The reader is then reconciled to the idea that matter is wave and wave is matter. The difficult subject of wave mechanics, probability wave and its bearing on the principle of causality are introduced gradually, and the reader learns that to understand the behaviour of the creatures of the new realm of electricity, one has to sacrifice the outside world law of causality which, as the author hints, is probably only a habit of thought.

Then comes Bohr's description of the new world of atoms. The electronic population within an atom is in a mad whirl round a citadel of positive charge called nucleus. This whirl may be described in terms of moving particles which curiously are restricted only to certain discrete paths which can be constructed only by adapting certain processes patented by the German physicist Planck more than thirty years ago. This was really the beginning of the modern quantum theory. Alternatively, a description in which the electrons are divested of their individualities and are regarded as waves in a certain conceptual space is also possible. The waves can only tell us about the odds that an electron will be found in a certain place but it will be quite in vain to think of the motion of the electron with time. Both processes are useful in understanding the observed behaviour of the electronic world but the latter ultimately proves to be more powerful. A host of phenomena previously considered to be unconnected or very imperfectly understood, now find unification within the electronic world of the atom.

The journey across the electronic realm takes the reader first through an outer region which is the region of activity of chemical changes and whence the messengers are responsible for what are called optical spectra. The uplands are populated by electrons having more vigorous motion, and which send out more energetic messengers outside in the form of X-rays. Right up on the top is the citadel called nucleus. This is too strong to be penetrated by the ordinary means of the physicist. The history of the present-day advance in physics is really an account of the attempt by the physicists to storm the citadel.

The last chapter of the book describes the fundamental particles discovered by the bombardment of the nucleus, and the nuclear transformation which is a realisation of the dream of the alchemists of the Middle Ages by modern physicists (but not from a sordid spirit of lucre the author assures us). But here the reader is compelled to stop. The journey remains unfinished. Born's printer was once pleased to compose 'nuclear physics' as 'unclear physics,' and the author admits that the printer was not far wrong. For, after a successful journey over many an unknown and difficult region, the reader is now left on the citadel, the deepest centre of the material universe with the mystery wall still rearing its head proudly before him while off and on missiles sent from outside, or some of the inner population mysteriously leaking through the wall bring very valuable information to the physicists. But the reader finds there is no solid ground underneath him anywhere. Starting from the outside world, looking into the sub-world of molecules shows them to be in continual motion colliding with one another. The electronic world inside the atom is in a mad whirl which becomes wilder and wilder the deeper one penetrates into the atomic layers. Besides, to be able to understand the workings of these lower sub-worlds one has to sacrifice his cherished outer-world ideas of wave and matter and even of casual principle. But the quest goes on and it is earnestly hoped that the scientists' love of truth will one day put him in possession of the secrets of matter, so far as it may be within the grasp of the human mind.

A novel feature of the book is the film and there are seven of them. I confess I have not been very successful with some of them but realise they will prove interesting to many, specially to the young readers. There are a few inaccuracies in the book, for instance on page 45 the proportion of hydrogen to oxygen has been inverted and the same defect occurs again on page 47, line 7.

N. R. S.

Experimental Atomic Physics. By G. P. Harnwell, PH.D. and J. J. Livingood, PH.D. (International Series in Physics.) (Messrs.

McGraw Hill Publishing Co., London. 1933.) Pp. 472. Price 30*s*.

This volume of about 450 pages covers in a general way the whole field of modern physics considered from the experimental standpoint. The following are the main chapter headings:—(1) The Velocity of Propagation and the Pressure of Radiation, (2) Black-body Radiation, (3) The Atomicity of Matter and Electricity, (4) The Ratio of Charge to Mass of Electrons and Ions, (5) The Wave Aspect of Matter, (6) Thermionic and Photo-electric Effects, (7) Line Spectra, (8) Atomic Energy States, (9) X-Rays, and (10) Radioactivity. There are two very useful appendices, one dealing with instruments for measuring small currents and potential differences and the second describing vacuum technique. The treatment is sufficiently detailed to give the student a grasp of principles and at the same time a very fair idea of the technique of the fundamental experiments on which modern physics is based. The volume is to be heartily recommended to Honours students in Indian Universities and to their teachers who desire to have a text on which to base their lectures.

C. V. RAMAN.

Physikalische Methoden Der Analytischen Chemie. By G. Scheibe, H. Mark and R. Ehrenberg. (Akademische Verlagsgesellschaft, Leipzig, 1933.) Erster Teil. Pp. 388. Price Unbound 34 RM and Bound, 36 RM.

This volume deals in an authoritative and useful manner with spectroscopic and radiometric methods used in analytical chemistry. The authors are G. Scheibe, H. Mark and R. Ehrenberg who deal respectively with the use of the spectroscope, with X-ray methods and with the use of radioactive indicators for the purposes of analytical chemistry. As might be expected from the fact that the authors are specialists in the fields dealt with by them, the treatment of the subject is clear and thorough. Scheibe's article includes an account of elementary spectroscopic theory, the production of spectra, apparatus for recording and measuring spectra, and a detailed account of both qualitative and quantitative analytical methods with the aid of emission and absorption spectra. Mark's article similarly deals with the production of X-rays, X-ray spectroscopes, the systematics of X-ray spectra and with qualitative and quantitative analysis with the aid of emission, absorption and fluorescent X-ray spectra. Ehrenberg's article is the shortest of the three and is of special interest at the present time owing to the recent great development of radio-chemistry. The book is fully illustrated and contains extensive tables which should go far to make it a very useful handbook in the laboratory besides being an excellent text for theoretical study. The volume should be in the hands of every worker interested in the modern developments of chemistry.

C. V. RAMAN.

Electrical Engineering Economics. By D. J. Bolton. (Chapman & Hall, London.) 1935. Pp. 365; Price 21*sh*.

Engineering may in some respects be considered a branch of economics including mainly the science of utilising materials in the most economic manner consistent with safety.

The average engineering graduate in this country appears to possess little, if any, knowledge of Engineering Economics. In these days of fierce competition it is very necessary that more attention be paid to this important subject and Mr. Bolton's book should prove a most admirable treatise for arousing the interest of the student in economics and providing a good foundation to his education as an engineer. To the more experienced man it would be of value as a reference book. A feature of the book is the treatment of economics of consumption as well as production.

Part I deals in a clear and convenient manner with general economic principles involving capital, interest, depreciation, sinking funds, etc., which should be of particular value to the student. Depreciation is a complex and much discussed subject to-day and its application in actual practice, is more a question of policy and judgment than of accounting or mathematics. The chapters on depreciation discuss the various causes of depreciation, loss of value, and the fact that the physically useful life may be and usually is shortened by obsolescence, inadequacy and other factors. This together with the short chapter on economic productivity should awaken the interest of the student and engineer sufficiently to warrant a deeper study into such important subjects.

Chapter VIII is of special interest as it discusses the economic desirability in some

cases of operating machinery underloaded. This of course is difficult of application when motors of different manufacturers are compared as their design characteristics, tolerances for heating, etc., do not correspond, while the cost of losses as discussed later must be applied with caution.

Part II is mainly devoted to losses and their economic significance. Annual costs are an elusive study. Electrical engineering, economic formulæ and principles are generally applicable to generating plants operated by steam or oil engines where the expenses of generation are a big item in the "all in" cost of a unit. In such cases higher capital expenditure to reduce losses is more often justified than in the case of hydro-plants. The economic treatment is somewhat different. In the one case a definite and tangible value can be applied to the losses of a system having a steam or oil engined station, but it is not so easy in the case of a hydro-electric system. Larger losses are usually permissible unless it can be shown that such power could be sold.

Again in applying such formula, particularly maxima and minima, considerable judgment is usually necessary to decide if the mathematically correct result is a practicable proposition. Formulæ for the most economic penstock line for instance, may often give a thickness too small to be mechanically practicable or thicker than permitted by standard practice. Generally speaking, the use of economic formulæ provides excellent training for the young engineer but they should only be applied in practice by experienced engineers who are able to understand the practical limitations involved.

Part III deals with electricity supply economics. Two chapters are devoted to an excellent discussion on power factor economics and contains much useful information on the causes and effects of bad power factor together with corrective methods and their costs. Bonus, penalty and K. V. A. demand tariffs are also explained.

The three chapters on tariffs should convey a clear idea of the factors upon which tariff structures are based and of the modern methods of charging. A brief note of the comparative merits of the "step" and "block" methods of charging on a sliding scale might have been included.

The book ends with a short chapter on some general notes on power supply and a useful appendix.

Taken altogether, a very useful and informative book which can be recommended.

H. G. H.

Introduction to Electric Transients. By Edwin B. Kurtz, and George F. Corcoran, (John Wiley & Sons, Inc., New York. Chapman & Hall, Ltd., London,) 1935. Pp. 335. Price 22*s*. 6*d*.

The study of transients is one of the most fascinating in engineering and physical science, perhaps because it affords extensive applications of differential equations to physical problems, the mathematics involved being, at the same time, of a comparatively simple order, the result is that the subject is a favourite with advanced students.

The first thing one notices about the book under review is that Heaviside's Operational Methods are used in addition to or as supplementary to the conventional solutions. This is a very valuable feature indeed as it enables the student to become familiar with this very interesting and useful method of solution and also to compare this method with the conventional method of solution. At the same time the book can be read, if desired, without paying any heed to the operational solutions which are alternative.

The book is divided into two main parts, *viz*., D. C. and A. C. transients and has an appendix on the mathematics employed in which the above is included. This is particularly convenient for electrical engineering students.

The method of treatment is what many people regard as the ideal teaching method, *i.e*., the physical conception of each problem is stated first, this is followed by the mathematical analysis and then by the verification by the oscillograph.

It is claimed by the authors that the subject of "power transients" is given prominent place in the text as well as in a special section in Chapter X, but the examples given are on the whole very poor examples of power transients and the more important aspects of these are not touched on at all. Most of the examples given are on ordinary small laboratory apparatus.

The book, which is very well produced, affords a very interesting, easily read and instructive introduction to transient phenomena and in addition serves as a method of thoroughly learning some of the different equations which are of utmost importance to the engineer and can be strongly recommended.

K. A.

Theorie der Elektrizitat: A New Edition of M. Abraham's work. By R. Becker. Vol. I.—Einführung in die Maxwellsche Theorie der Elekrtizität mit einem einletenden abschnitte über das rechnen mit vektorgrössen in der Physik, Tenth Edition. (B. G. Teubner, Leipzig and Berlin, 1935.) Pp. 265. Price 14-50 RM; Vol. II.—Elektronentheorie, Sixth Edition. Pp. 397. Price 17 RM.

New editions of books which have become classics on the subjects concerned are welcome indeed, for such editions not only retain the spirit with which the old classics were written but also present the newer ideas, resulting from the deepening of the classical foundations. The work on Maxwell's theory of electricity by Föppl was thoroughly revised and published by M. Abraham and this work called as *Abraham-Föppl* became a classic and is well known among all the students of electro-magnetism. *Abraham-Föppl* underwent as many as seven editions in the life-time of Abraham, a fact, which bears ample testimony to the great eminence of the work. The new editions of Abraham's work by R. Becker, while maintaining all the important features of Abraham's work, also include some of the recent developments in electron theory presented by Becker himself.

In the first volume the student is introduced to the theory of vectors and vector fields. A masterly exposition of the thermodynamics of field energy is also given in this volume. The second volume begins with a chapter on the general foundations of electron theory which contains a section on the determination of the elementary charge by what is called the "Schrot effect". The chapter on the electron theory of metals contains the earlier views of Drude and Lorentz and also the newer conceptions of Sommerfeld based on the Fermi statistics. This volume also contains a fair account of both the special and the general theory of relativity and their relation with the electromagnetic field. The last chapter in the volume is on the theory of radiation based on the quantum of action.

Becker's edition was published before the announcement of Born-Infield's work on electrodynamics. We venture to suggest that the inclusion of an account of this theory in a later edition would be most desirable.

No effort has been spared by the Editor to make his editions useful to the teachers and students alike. The number of diagrams has been increased many-fold and this will assist the students in obtaining a vivid comprehension of the text. A section on problems of great physical interest has been included and their solutions also suggested.

Becker should be congratulated for bringing out these new editions of Abraham's work which will undoubtedly prove invaluable to students and teachers. We have no hesitation in recommending these two volumes to all those interested in electro-magnetism.

N. S. N.

Fluorescence Analysis in Ultra-Violet Light. By J. A. Radley, B.Sc., A.I.C. and J. Grant, Ph.D., F.I.C. (Chapman & Hall; London.) 1935. Second Edition., Pp. 326. Price 21 shillings.

The book is one of the series of monographs on applied chemistry edited by Dr. E. H. Tripp. It contains two parts; the first part deals with the theory and technique of fluorescence analysis. Here, the authors discuss briefly the production of ultra-violet light and the method of analysing fluorescence both qualitatively and quantitatively. The various types of lamps and filters that are now in use are discussed and their advantages and disadvantages are pointed out. The authors are of opinion that "the varying results sometimes obtained by different workers for the same substance are often due to lack of precision in defining the technique". Research workers in this line will be in entire agreement with the authors of this book, for the importance of the method that is employed for the analysis and the pitfalls that are to be taken care of are well known. On the whole, this part of the book has been very well written and will serve as a useful guide to those workers who are interested in this subject.

In the second part, the authors give a large number of instances in which fluorescence analysis has been used for both pure and applied science subjects. Here, they had a difficult task to perform, for more than 800 papers had to be summarised. The result has been that information given in some cases is rather scanty. The research workers, however, will find a full list of references at the end of each chapter dealing with different subjects. Finally it may be said that, as far as we know, this is the only book in English language on the

subject of fluorescence analysis and that the appearance of its second edition within such a short time shows how much it has been in demand.

K. A. C.

Wireless—Its Principles and Practice. By R. W. Hutchinson; third edition, xii + 316 pages with 224 figures. Published by the University Tutorial Press. Price 3*s*. 6*d*.

This book obviously meets a real need: or it would not have gone through three editions and some ten impressions between December 1932 and November 1935.

It is expressly meant for the growing army of those who are interested in radio but whose knowledge of mathematics and physics is strictly limited.

In simple and straightforward language, the author deals with the elements of electrical theory and continuous and alternating current circuits, some of the methods of generating electromagnetic waves and the phenomena of wave travel in the earth's atmosphere. More than half of the book is devoted to the numerous types of thermionic vacuum tubes and the different circuits of a modern radio receiver in which they are used. The examples are of tubes of British make. There are also short descriptions of the chief features of the battery, all-mains and superheterodyne types of receivers and of small transmitters. The last chapter deals with the elements of television and of the cathode ray oscillograph.

It will be gathered from the above that the author has endeavoured to make the book up-to-date. The language is everywhere lucid and brief, and suitable for the class of readers for whom it is meant. The numerous excellent illustrations are very helpful.

The price is quite moderate and the book can be recommended in every way to the beginner and the amateur of radio.

R E

A Class Book of Magnetism and Electricity By H. E. Hadley. (Macmillan & Co., London, 1936.) Pp. x+512. Price 6*s*. 6*d*.

The author of this book needs no introduction to the students of secondary schools as they are all familiar with his text-books. The present publication intended for students of the Intermediate College comprises a somewhat advanced treatment of Magnetism and Electricity.

The volume begins with a chapter on the fundamental properties of the electric current and is followed by a chapter on some of the practical aspects of magnetism with which every reader ought to be familiar. In these two chapters the author gives the students a rough outline of the subject and introduces him into the various topics, which are more elaborately dealt with later. Theoretical considerations of the various properties of the electric current and magnetic fields are introduced and are amply supported by numerous numerical examples, which enable the student to acquire a thorough and comprehensive knowledge of the subject-matter. The addition of "Historical Notes" at the end of each chapter, will further give the student a chronological account of the theories and principles described; starting from the earliest conceptions of the ancient scientists, the author has chronicled the achievements of the scientists of the succeeding ages. A few chapters towards the end deal with many of the modern practical applications of magnetism and electricity, such as radio-activity, broadcasting, talky-films, television, etc., which have proved so inscrutable to the lay reader.

The book is invaluable not only as a class book to those students preparing for the Intermediate Examination, but also to every literate reader who is desirous of getting an easy and eminently readable introduction to the study of a branch of physics of wide interest on account of its extensive and rapidly increasing practical applications.

The treatment is elegant, simple and always to the point. The book is copiously illustrated and the addition of answers to numerical questions and an index, enhance the interest and usefulness of the publication. The get-up and printing of the book are of the traditional excellence of Messrs. Macmillan & Co.

H. L. N.

Indian Zoological Memoirs. V. Herdmania. By S. M. Das, D.Sc. (Lucknow Publishing House, Lucknow, 1936.) Pp. x + 103. Price Rs. 2.

The fifth of the series of the memoirs on Indian Zoological types deals with an account of the common Monascidian of the Indian seas, *Herdmania pallida*. The introduction includes the classification of Tunicata (after Garstang) which should prove useful to all students of the group. An account of the Bionomics and distribution of the genus is given which shows that it enjoys almost universal distribution and is represented in

the Indian seas by *H. pallida* and *H. ceylonica*. Of these, the former is the more common and the memoir deals with all the systems of organs in great detail. The figures are all original and amply illustrate the descriptions in the text. The high standard set by the earlier memoirs of the series is maintained by the book and it will doubtless be a valuable guide to students in many colleges in India, as well as a reference volume of considerable importance to workers all over the world.

Library Administration. By S. R. Ranganathan. (Published by the Madras Library Association.) Price 12/6.

The author himself says in the Introduction, "This is not a book to be read through like the *Five Laws of Library Science*. It is on the contrary a most prosaic manual full of details." The claim that is made for the book is that it is a reference work capable of guiding the Library Staff to discharge their duties "with highest possible accuracy, greatest promptness and economy". The author says that this should not be treated as a manual to fit every kind of library, but only as giving certain "patterns that can be varied according to local conditions".

Any administrative manual must have as its ultimate end the inculcation of fundamental and basic principles that govern the administration of the particular office, and rules and regulations must be so devised as to keep afresh these general principles in the minds of the staff responsible for the working of it. The accuracy and promptness in the observance of such rules will ultimately tell on the quality of service and the reputation of the office. Doubleday, in his *Manual of Library Routine*, says: "Working methods have to be carefully studied; their details have to be carefully comprehended, rules and regulations should be learnt and the allotted duties should be discharged with goodwill, interest and zeal. This and this alone is the royal road to success."

If the general principles are to be thoroughly grasped by the Staff, it is absolutely necessary that they must be of a fundamental nature, and as brief as possible. An undue elaboration of mechanical rules and devices for working methods, may foster in the minds of the Staff a love of red tape and fascination for administrative routine, and blind them to the real responsibilities of their position.

The chief defect of the book under review is that the rules for any section are too many, too minute and detailed and the whole book is 'over-weighted with details' (to use the language of the Introduction)—'details' which a Library Assistant, who is newly posted, can hardly be expected to master. It is a hard task even for Librarians to wade through the numerous chapters, covered with too many details and unnecessary amplifications of rules of working methods. One would wish that the author had left some of the minor points to the intelligence and resourcefulness of persons concerned in the several departments.

Obviously, the book, dealing with an infinite number of rules and regulations, is useful only for Libraries having at least a few dozens of members to man their staff, and several heads of sections to supervise their work. It can have no application to Libraries having a small staff and fewer number of books, like the School and College Libraries in India. Probably, the administrative machinery evolved may be found quite suitable and appropriate to the Libraries of the type of the British Museum and the Bodleian.

The book contains three parts. The first part is entitled the 'Groundwork'; the second is called 'Distinctive Library Functions'; and the third is named 'General Office Functions'.

The first part describes the general principles of administration and is simple in treatment. In the second part, there are eight different chapters covering subjects like 'Book Selection', 'Book Order', 'Periodical Publication', 'Accession Section', 'Technical Section', 'Counter Section', 'Reference Section' and 'Shelf Section'. The third part deals with twelve different topics, *viz.*,—'Committees', 'Staff Section', 'Staff Council', 'Over-seeing', 'Publicity Section', 'Finance', 'Accounts', 'Records', 'Correspondence', 'Printing', 'Binding', and 'Stores' and a chapter is devoted to each of these.

Each of these chapters contains the following headings—Planning, Job Analysis, Routine, Oversight, Correlation, Time Scheme, Forms and Registers—the same subjects are discussed again and again in different view points with minuteness and detail.

In the chapter on Book Order, a few suggestions regarding the sources for finding the addresses of the numerous Publishers would doubtless have enhanced the value

of the publication. In the Periodicals Section, the three-card system is advocated, which may be resorted to when the periodical publications range over a thousand, and this can have no application to smaller libraries. The author's advice to deal directly with the Publishers of periodicals is a wholesome advice to all Librarians. The work of entrusting them to an agent, with a view to effect a small saving, would result in irregularities in service and land the authorities in financial loss. The author feels, correctly that, in the revision of periodical publications, the Committee should treat the Librarian's views with consideration.

Instead of leaving the acceptance of all gift books to the individual discretion of the Librarian, it would have been better if a few rules had been framed for accepting them. The idea of an Indemnity bond mentioned in the chapter on Counter Section for lost tickets may not be agreeable to all Librarians. While it may check all unauthorized borrowings on lost tickets, the rule will work as a hardship on innocent users of the Library who might happen to lose their tickets by accident.

The chapter on Reference Work is well planned and written. It can have no application to School and College Libraries in India.

One would wish that the author had given suggestions for proof correcting in the chapter dealing with Printing, in Part III. The chapter on Binding is fairly exhaustive and sufficiently adequate.

All the subjects of day-to-day administration are very minutely and patiently described with great care and accuracy. One would only wish that the numerous details had been omitted and the book had been made readable and attractive like all other books on the same topic. There is no rule to the effect that books on Library Administration should not be read through and afford real pleasure in the grasp of the fundamentals of administration.

K. N.

Forest Research in India, 1934-35. Part I. The Forest Research Institute. (Manager of Publications, Delhi, 1935.) Pp. 89. Price Re. 1–8–0 or 2*s*. 6*d*.

This official publication summarises the work done during the year 1934–35 at the Forest Research Institute, Dehra Dun. A general review is followed by five chapters, each dealing in turn with the Silvicultural, Botanical, Entomological, Economic and Chemical Sections of the Research Institute.

Within the limits of so concise a publication, one could scarcely expect little more than a mere cataloguing of the different problems tackled. To the student who is specially interested in any of these, there are the Institute publications, a useful list of which is given as Appendix II at the end of the volume.

The admirable range, quality and quantity of the work turned out by the Dehra Dun Institute is at once an eloquent plea and a justification for the multiplication of such institutions in India. Many Forestry problems, while important, have no more than local significance, and even otherwise, a first-hand knowledge of local conditions is a *sine qua non* in this type of research. And in a country of continental dimensions like India—encompassing as it does many climes and types of forests—this need is all the greater. And a single Forest Research Institute like the Dehra Dun Institution is like a "light which makes the darkness visible". The ideal would be a central co-ordinating agency with different regional investigation centres on the model of the Imperial Institute of Agricultural Research. May the Dehra Dun Institute with its fine traditions and record of achievements prove to be such a co-ordinating agency!

The book is printed (as can be seen from the water-mark) on paper manufactured at the experimental plant of the Institute. It is curious that this fact finds no mention in the book itself.

EMMENNAR.

Sulphitation of Lac. By R. Bhattacharya and Lal C. Verman. Technical Paper No. 6. London Shellac Research Bureau, London. Jan. 1936. Pp. 20.

That lac can be dispersed in aqueous solutions of sulphurous acid or alkali sulphites and bisulphites is the latest discovery of the Indian workers on lac stationed at Teddington. The stability of the solution is secured by the addition of anti-oxidants like glycerol and ethanolamine which inhibit the oxidation of sulphurous acid. The possible chemical reaction between the lac and sulphurous acid is stated to be mainly the addition of sulphurous acid or bisulphite to oxygen atoms which exist between pairs of carbon atoms, with the formation of oxonium compounds.

The sulphited lac resin has a higher iodine value and there is also a definite increase in its saponification value. From the practical point of view the coatings of sulphited lac on baking, yield films which possess greater adhesion, flexibility and hardness while even air-dry films resist dilute alkalies, acids and ordinary solvents.

Shellac is used considerably as a thermoplastic binder in plastic moulding; the incorporation of fillers by the "dry" hot process consumes considerable power in grinding and mixing operations and the employment of alcohol for this purpose is expensive. It is suggested that the aqueous dispersions of lac in sulphurous acid offer a suitable and inexpensive medium in which fillers and fibres can be intimately incorporated. The sulphited lac is coagulated or caused to precipitate on to the filler, thus ensuring an extremely uniform distribution of the binding material. It should, however, be added in this connection that this principle has long been adopted in the course of the work carried out at the Indian Institute of Science, employing aqueous dispersions of lac in sodium carbonate which are often bleached with hypochlorite, when a pigmentation of the moulding powder is desired.

But the great merit of sulphited lac from the point of view of moulding appears to be the fact that the product is brought to an advanced stage of polymerisation; and its softening point is raised to about 130° C. The time of "after curing" is therefore shortened and the additions of accelerators are found to be unnecessary.

M. S.

Errata.

(1) Vol. IV, No. 9, p. 650, under the rational constitution of formic acid,

Read $(H^+) \leftarrow C = O$ with $\uparrow (OH^-)$

Ray and Sarkar

for $(H^+) \leftarrow C = O$ with $\uparrow (OH^-)$

Ray and Sarkar

(2) On page 767, under 'Recent Advances in Sanitary Science,' line 1 (first column) should read thus: "The following is the *abstract* of an address.....".

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