

soda process of Dyar and Hemming. The Leblanc process lives mainly on account of the commercial value of its by-products, but its continued existence even from this cause is seriously threatened by the rapid extension of the methods of producing electrolytic chlorine. Dr. Lunge, no doubt, has it in contemplation to complete his picture by the republication, revised and enlarged, of the third volume of the former edition of his work, in which he dealt with what was then publicly known of the methods of carrying out the ammonia-soda process, as developed by the Solvays, their coadjutors and successors. The appearance of this volume will be awaited with great interest.

In its essential features this edition differs in no material particular from its predecessors. The plan of the original work is substantially unchanged. During a large portion of his long career as a technologist, Dr. Lunge was intimately associated with the practical conduct of the Leblanc process—a process which was nowhere more successfully worked than in England, which constituted, indeed, the chief of our chemical industries, and brought in the aggregate great wealth to those concerned in it. The quondam head of the chemical department of the famous school of technology at Zürich long ago constituted himself the historian of this time-honoured process, which, whatever the future may have in store for it, will always be accounted as one of the most considerable and important of the manufacturing methods of which chemical technology has any record. It occasionally happens that threatened processes, like threatened men, live long. We may express the hope, then, that the days of the Leblanc process are not numbered, and that Dr. Lunge may still long be with us to note and chronicle the changes which may come over it.

GEOMETRY AND ALGEBRA.

- (1) *A New Geometry*. By W. M. Baker and A. A. Bourne. Pp. xxii+246+vi. (London: G. Bell and Sons, Ltd., 1911.) Price 2s. 6d.
- (2) *Algebra. Part II., for the Use of Students preparing for the Intermediate and Previous Examinations of Indian Universities*. By Prof. K. P. Chottoraj. Pp. iv+486. (Simla, Calcutta: A. K. Chottoraj, 1910.) Price 1.12 rupees.
- (3) *Parametric Coefficients in the Differential Geometry of Curves*. By Dr. S. Mukhopadhyaya. Pp. 31. (Calcutta: The University, 1910.)

(1) **T**HIS text-book is an abbreviated and condensed form of the well-known work by the same authors published eight years ago, and therefore requires little comment. The suggestion made in the Board of Education circular on the teaching of geometry that propositions should so far as possible be taken in groups has been adopted. Thus theorems on parallels form the first, properties of a single triangle the second, tests for congruence the third, and constructions the concluding section of book i. The authors have throughout included considerably more material than is required by the Cambridge

schedule, particularly in reference to proportion and areas. The last fifty pages of the book are devoted to solid geometry. The properties of line and planes are treated in a fashion very similar to Euclid XI.; this is followed by a number of properties of the tetrahedron, pyramid, cylinder, cone, and sphere. An excellent collection of examples on the mensuration of solid figures is included.

(2) The subject-matter of this volume ranges from quadratic equations to the exponential and logarithmic series, and in doing so covers more than four hundred closely printed pages. It is therefore evident that the treatment is very thorough. There is indeed far too much detail; all sorts of special and artificial cases are dealt with, apparently in order to fortify the student against every possible difficulty he may be likely to encounter. For those whose sole object is to pass examinations this may be advantageous, but on general grounds it is highly undesirable. The author has a lucid style, and has evidently arranged both the text and the examples with the greatest care. His book should be most useful to the teacher, but we are inclined to think it will be rather oppressive for the student.

(3) This pamphlet is the result of a series of investigations the author has made in differential geometry. The method of parametric coefficients was evolved from an attempt to obtain by elementary means expressions for the radius of curvature and aberrancy in terms of the arc. The first part of the paper deals with the properties of parametric coefficients of n -dimensions, and then applications are made to plane curves; these include the deduction of the equation of the osculating cubic and the general differential equation of the cubic. It is stated that additional applications will be found in a further paper by the author which will be published shortly.

MECHANICS AND TESTING OF MATERIALS.

- (1) *Elements of Mechanics, with Numerous Examples for the Use of Schools and Colleges*. By G. W. Parker. Pp. ix+245. (London: Longmans, Green, and Co., 1911.) Price 4s. 6d.
- (2) *A Handbook of Testing*. By Prof. C. A. M. Smith. Materials. Pp. xii+284. (London: Constable and Co., Ltd., 1911.) Price 6s. net.

(1) **T**HIS book is intended for the use of students having only a comparatively elementary knowledge of mathematics; great care has been taken to ensure that the student should acquire thoroughly clear ideas of the first principles which form the groundwork of the subject, and this has been borne in mind in working out the numerical examples illustrating the various laws. The first part of the book is devoted to statics, the branch of the subject of perhaps the greatest importance to the engineer; composition and resolution of forces in one plane, moments of forces, parallel forces, couples and their composition, centres of gravity, and conditions of equilibrium are successively dealt with, and then the application of the laws, which have been deduced, to

the case of the so-called simple machines, all of them considered as frictionless, is taken up.

The last chapter of this section is devoted to an elementary treatment of the laws of friction, the rough inclined plane being used as an illustration. As a frictionless machine is a mere mathematical fiction, adopted probably with the idea of smoothing the path of the student, it is a pity that the author did not in the chapter on friction take one of the simple machines, say the screw, and show how materially such a formula as that deduced in the previous chapter for the relation of power to weight is modified directly friction is taken into account, and the problem changed from a mere exercise in applied mathematics to the practical question a young engineer is constantly called upon to face. It is doubtful if it is beneficial to students to set them to work out problems on frictionless machines.

In part ii. dynamics is taken up—velocity and acceleration; the laws of motion and their application to motion on rough planes, Attwood's machine, &c.; composition of velocities and accelerations are fully discussed. The last three chapters treat of uniform motion in a circle, work, and simple harmonic motion.

The author is to be congratulated on the excellent series of examples given at the end of each chapter.

(2) Laboratory work on the testing of materials forms an important part of the training given in engineering colleges at the present day, and many teachers and students have felt the need of a good text-book on the subject. Mr. Smith has done excellent research work on the effect of combined stress, and has devised ingenious strain-measuring apparatus for use in his researches, and he is now to be congratulated on having written a book which will be welcomed by all those who are engaged in the branch of experimental work known as the testing of materials, whether they are students just beginning to feel that they are entering upon a new field of fascinating work, practical men engaged in the daily task of commercial tests, or advanced students busy with research work upon one or other of the difficult problems which still require elucidation. The book is well illustrated, and the illustrations are so drawn that they show the essential principles of the machine or apparatus, a matter of great importance to the student who wishes to design similar appliances in connection with his own experimental work; the chapters on strain-measuring instruments and on alternating stress tests deserve special praise in this respect.

In the last chapter the author has given valuable advice and suggestions as to the best lines on which experimental work can be carried out in college laboratories, and a table of suitable experiments with notes as to the necessary apparatus. The book concludes with four appendixes, a bibliography, and a table of constants; the third appendix is devoted to a discussion on all the recent researches on combined stress, including the author's own work, and forms one of the best summaries which have yet appeared of the present state of knowledge on this important question.

T. H. B.

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OUR BOOK SHELF.

General Index to the Monthly Notices of the Royal Astronomical Society, volumes liii. to lxx., 1892-1910, together with the General Index to Illustrations in the Memoirs, volumes i. to lxx., and the Monthly Notices, volumes i. to lxx., 1822-1910; appendix, List of Comets, 1892-1910. Pp. viii+198. (London: Royal Astronomical Society, 1911.) Price 5s.

THIS index is one of fundamental importance to all workers in astronomy, and is a sequel to those previously published for vols. i. to xxix. and vols. xxx. to lii. respectively; it is hoped in future to publish general indices covering successive even periods of twenty years. The arrangement of the present volume from the annual indices prepared by Mr. Wesley has been carried out by Mr. Levander, under the general direction of the secretaries, and he is to be congratulated on the success attained.

Many of the headings have, by reason of the progress in astronomical work during the past twenty years, had to be rearranged or modified, and the changes are carefully explained in the preface. The present section dealing with the "Monthly Notices" takes up 168 pages, with something like forty references on each page, a tribute to the energy displayed by the authors of papers as well as to the completeness of the index.

Mr. Knobel has prepared the index to the illustrations, and this should prove exceedingly useful, as the items are arranged under subject headings, e.g. moon, planets, instruments, &c., the authors' names being given in approximately the chronological order of the papers.

Dr. Crommelin's appendix gives particulars of all the comets observed during the period 1892-1910, commencing with an apparition of Barnard's periodical comet in 1892, and ending with Brooks's second periodical comet 1910d. In view of the plenitude of comets during the present year it is interesting to note that the average number per annum, for 1893-1910 inclusive, works out at 4.7, the greatest number being 10 in 1898.

Many copies of the previous general indices remain in stock, and will be presented to such institutions and observatories as receive the "Monthly Notices," but have not the indices; application should be addressed to the assistant secretary.

Evolution, Life, and Religion: a Study. By the Rev. E. B. Kirk. Pp. 321. (Glasgow: John Smith and Son, Ltd.; London: James Clarke and Co., n.d.) Price 5s. net.

THE author of this book states his personal interpretation of cosmic and human evolution, which he considers from a philosophical and theological point of view. There has been material and spiritual progress from the simplest forms towards those of ever-increasing complexity, and the author interprets this as a continued expression of the Logos. He illustrates this by a fundamental diagram which he calls the "Logos-mirror." He has hold of the sound idea that scientific and intuitive interpretations must be regarded as complementary, not as antithetic, but his own personal equation bulks so large that it is difficult for the reader to get alongside of him. As it seems to us, Mr. Kirk intermingles different "universes of discourse" in a manner which is always unprofitable, as when he seeks to show that various fundamental doctrines of theology are expressions of fundamental laws of nature.

We have great sympathy with the proposition that "the mental continuity of creation in our world is as marked as the physical, and the lower