THURSDAY, JUNE 26, 1913.

ORGANIC CHEMISTRY IN MANUFACTURES.

Industrial and Manufacturing Chemistry, Organic. A Practical Treatise. By Dr. Geoffrey Martin. Assisted by Wm. Barbour, T. Beacall, and others. Pp. xx+726+plates. (London: Crosby Lockwood and Son, 1913.) Price 21*s.* net.

THE editor of this volume has set himself a rather formidable task. His aim has been "to cover the whole range of subjects," based on organic chemistry, with which the industrial chemist and the manufacturer are usually concerned. In pursuance of this aim the book is arranged with the intention of meeting "the requirements of all business and practical men interested in chemical processes"; and the list of these given includes "manufacturers, consulting chemists, chemical engineers, patent workers, inventors, technical lawyers, students in technical institutions, lecturers on technology, fire insurance inspectors, and others." This is a somewhat motley crew to cater for; but a good attempt has been made to do it, and on the whole a successful one.

The text is divided into twenty-three sections, each dealing with one branch of chemical industry —*e.g.* the sugar industry, the cellulose industry, and so on. With so large a number, even in a work of 700 pages, there could be no such detailed and comprehensive treatment of the subjects as is found in works devoted to only one or two—as, for instance, Lunge's treatise on coal-tar and ammonia. Nevertheless, the volume is not a mere dictionary. Space for detailed discussion and for chemical formulæ, even complicated structural formulæ, is not begrudged (see, for example, the chapter on synthetic dyes); and there are plenty of diagrams and photographs.

A number of experts have collaborated with the editor in the production of the book, and contribute authoritative articles on their special subjects. A very good list of references to the literature of each branch is supplied; this will often be a valuable help to users of the book. Statistics of production, value, imports and exports are given, and frequent references to patents. Furthermore, it is claimed that much of the information respecting the processes is now published for the first time, many descriptions of methods and modern plant having been privately supplied.

As a typical section dealing with well-established manufactures may be instanced that devoted to the fermentation industries. In about 100 pages this gives a good condensed account of enzymes and ferments, and of their applications to the production of wine, beer, alcohol, vinegar, lactic acid, and butyric acid. It includes an article on modern distilling plant, in which the principles of the "continuous" stills are lucidly explained, and illustrated with photographs and lettered diagrams. A subsection of different type is that on the new industry of synthetic rubber. Here the descriptions are largely given by means of chemical formulæ; apparatus is represented by a small form of chlorinating still only. The various methods of obtaining butadiene and its homologues (for example, from butyl alcohol, petroleum, aldehyde, phenol, acetylene, turpentine, starch, or acetone) are explained at some length, together with the processes of polymerising the products to form synthetic rubber.

In addition to the larger industries dealt with—sugar, oils and fats, dyes, explosives, coal-tar products, and so on—there are articles devoted to smaller branches such as inks, glue and albumen, synthetic drugs, and photographic chemicals. The author directs attention to minor industries on account of their potential importance in some cases as the germs of future large undertakings, remarking that they often afford through absence of competition larger profits than those of fully-developed manufactures.

The impression gained on reading through a number of the sections is that a very good outline of the subject is presented, but one that would often want filling up. Looking at the work for a moment from the point of view of a young chemist who contemplates taking up some branch of chemical technology, one may say that the descriptions would serve as an excellent introduction, and the list of books indicated would show him where to supplement his knowledge to any extent he might require.

Very few slips of importance have been noted. There is an error on p. 281, where the composition of "industrial methylated spirit" is given quite wrongly. Such phrases as "the majority of the vinegar" (p. 315), "the great majority of the formaldehyde" (p. 375), "potato manufacturers" (p. 176) are rather slipshod; and it should surely be unnecessary (p. 638) to explain 0·023 as "$(\frac{23}{1000})$." Nor was it really necessary to tell readers four times on the same page (314) that the fusel oils obtainable by Fernbach's fermentation process can be produced at 35*l.* to 45*l.* per ton.

C. S.

THE ANIMALS OF THE ANCIENTS.

Die antike Tierwelt. By Otto Keller. Zweiter Band: Vogel, Reptilien, Fische, Insekten, etc. Pp. xv+618+2 plates. (Leipzig: W. Engelmann, 1913.) Price 17 marks.

EVERYONE interested in the identification of the species of animals known to the ancients should be grateful to Dr. Keller for carrying to completion an exceedingly laborious task, the difficulties and perplexities of which can only be realised fully by those who have essayed investigations of a kindred nature. Exception may indeed be taken to some of his conclusions—as was pointed out in our review of the first volume—but the general results of the work are of the highest value and importance, and form a solid foundation on which superstructures may be laid later.

As the first volume was devoted solely to mammals, all the other groups of animals have had to come in the one now before us. Anything like a detailed review of such a work is manifestly impossible in the space at our disposal, and it must consequently suffice to refer to a few points of special interest. Among such is the statement that the golden pheasant, which was occasionally brought from China to ancient Greece and Rome, was identified, doubtless on account of its rarity, with the mythical phœnix (*phoinix*) of the Egyptians. And this leads to the query whether there is any connection between phœnix and Phœnicopterus (*phoinikopteros*), the name of the flamingo, and between both and Phœnicia—the land of the palm-tree (*phoinix*).

Dr. Keller has, of course, much to tell us about snakes, and it is interesting to note that, in addition to the cobra and the horned viper, he has been able to identify the Æsculapian snake among the species familiar to the ancients. Incidentally it is mentioned that viper (Vipera) is an abbreviated form of *vivipera*, that *aspis* comes from *sepa* (doubtless connected with *seps*), the name of a very poisonous snake; and that *coluber* and *colubra* are derivates from *scolopendra*, a name now assigned to the centipedes. The blind-snake (Typhlops) of the ancients appears to have been the amphisbæna, and not the wormlike species now classed under the former name. Crocodile (or "korkodile") appears to have been used in early days in a more elastic sense than at present, having been applied, with the prefix "land," to the great monitor-lizards, as well as to the animals to which it rightly pertains.

From the section on insects we learn, with regret, that the *melolontha* of Aristotle is neither the cockchafer nor the rose-chafer, but, as demonstrated by the statement that its grubs feed on dung, the dor-beetle, and therefore a near relative of the sacred scarab, of which a full account is given. Did space permit, we would fain quote the author's observations on the pearls and pearl-fisheries of the ancients, particularly the famous pearls of Cleopatra; but as it is, we must refer the reader to the book itself, which is a very mine of etymological and antiquarian information.

R. L.

MOSQUITOES.

The Mosquitoes of North and Central America and the West Indies. By L. O. Howard, H. G. Dyar, and F. Knab. Vol. i., pp. vii+520. Vol. ii., pp. x+150 plates. (Carnegie Institution of Washington, 1912.)

IT is with pleasure that we are able, at last, to announce the appearance of this work. Its publication was expected some few years ago, but, as stated by the authors in their introduction, the material accumulated at this time was by no means complete, and, in order to enhance its value, investigations were continued over a considerably extended period.

Under the title of "A General Consideration of Mosquitoes, Their Habits and Their Relationship to the Human Species" we have in vol. i. a very comprehensive work relating to the subjects under this heading. At the outset, however, we regret to note that the well-known scientific names of two common disease-bearing forms have undergone drastic treatment—*Stegomyia fasciata*, Fabr., being referred to as *Aëdes calopus*, Mg., and *Culex fatigans*, Wied., as *Culex quinquefasciatus*, Say. It is indeed unfortunate that this should be the case with these important species, as much confusion inevitably arises, and it is a question whether, as regards the specific names, the law of priority should be so rigidly adhered to in such circumstances. The validity of the genus Stegomyia is a point for the systematist to decide, but at present its abolition appears to be somewhat premature. The authors direct attention to these changes, and also state that *Anopheles maculipennis* is confined to the Old World, and does not occur in America, the form previously known under this name not being referable to the species, and, in fact, comprising two distinct species, viz. *A. quadrimaculatus* and *A. occidentalis*.

The text very suitably opens with an interesting résumé of the earlier literature and work concerning these insects, and is followed by some eighty pages relating to the morphology of the adult and other stages in the life-cycle. This is entered into in detail, and includes an extensive account of the thoracic structure of the adult; it also con-

tains extracts from numerous workers, and, owing to the limited time available, the portion relating to the internal anatomy has been taken entirely from Stephens and Christophers's work on malaria, &c. The bionomics and natural enemies are next considered, and prove extremely interesting and instructive, much original work having been performed, especially in connection with the former subject. A few pages on technique follow, and we then reach the part dealing with the relation of mosquitoes to man. This, of necessity a somewhat lengthy contribution, covers some 130 pages, and deals successively with the carrying of disease by mosquitoes in general, malaria, yellow fever, dengue, filariasis, suggested relations with other diseases, and the effect of mosquito bites.

Under malaria an account is given of the organisms concerned in its production, and of the demonstration of its carriage; thirty-three species of Anopheles, some of doubtful validity, being cited as transmitters. The general biology of the Anopheline mosquitoes is also satisfactorily dealt with, and the section concludes with reference to the distribution, appearance, and disappearance of the disease. Yellow fever is treated on similar lines, the bionomics of the mosquito, under the name of *Aëdes calopus,* being considered in great detail. As regards filariasis, fourteen species are enumerated, and have apparently been directly incriminated as transmitting agents.

More than one hundred pages are devoted to the consideration of economic loss from mosquitoes, the subject being discussed in relation to disease, real estate, and agriculture. Under this section, too, we find references to the flight and transportation of these flies, and lastly an exhaustive treatise on protective and remedial work in connection with mosquitoes generally. The volume concludes with numerous examples of mosquito control and an extensive bibliography.

Vol. ii. is devoted exclusively to plates. These deal with the structure of the male genital organs of a large number of species, the wings of certain Anophelines, and the earlier stages in the life-cycle. Illustrations are given of numerous species of larvæ, including no fewer than fifty-nine plates relating to their detailed structure. Many of the plates are beautifully executed, and the authors are to be congratulated upon the production of this volume, which points out very clearly the large amount of original work performed.

The work will undoubtedly prove a most valuable addition to the literature of the subject, and will be heartily welcomed by all who are interested in these noxious insects.

TWO FRENCH MATHEMATICAL BOOKS.

(1) *Notions de Mathématiques.* By Prof. A. Sainte-Laguë. Avec Préface de Prof. G. Kœnigs. Pp. vii + 512. (Paris: A. Hermann et Fils, 1913.) Price 7 francs.

(2) *Propriétés Cinématiques Fondamentales des Vibrations.* By M. Guillet. Notes de Dr. M. M. Aubert. Pp. 405. (Paris: Gauthier-Villars, 1913.) Price 16 francs.

(1) THE development of mathematical teaching in this country has been greatly influenced during the last decade by foreign methods. For this, if for no other reason, English teachers will do wisely to watch the evolution of these methods, and this can most easily be done by studying the tendencies of recent text-books.

M. Sainte-Laguë's work on the elements of mathematics is one which will repay such study. Unlike the majority of school-books dealing with this subject, it is not intended for the beginner, but aims at giving a condensed account of results and processes essential to those who have to use mathematics in simple practical applications.

The book is divided into four parts, devoted respectively to arithmetic, algebra, trigonometry, and geometry. Those principles which are continually used in practical applications are kept to the front, and exercises which merely require skill in manipulation are generally excluded. Thus the algebra contains no reference to permutations and combinations, and the binomial and exponential theorems are left to a more advanced stage. On the other hand, the use of logarithms and of the slide rule is explained, and the section on arithmetic contains a valuable chapter on errors and approximate calculations.

It is remarkable that, although the derived function is used and defined, no use is made of the classical notation of the differential and integral calculus. In the section on trigonometry the discussion of the inscribed and circumscribed circles is omitted, and the solution of triangles is compressed into a very few pages. One or two results of spherical trigonometry are included.

The book works throughout in *grades,* instead of degrees; to the English reader this will certainly prove a stumbling-block. The grade has never won recognition outside France, and has not displaced the degree for astronomical purposes.

The section on geometry is the longest in the book. Space geometry is introduced very early. The method of superposition is employed throughout, and the theory of parallels is based on the notion of the motion of translation of a rigid body. Although, according to the best authorities, this may be faulty from the logical point of view, it

is probably psychologically sound. There are also chapters on graphical constructions, on plan and elevation, and on contour lines. The work concludes with a section on kinematics. A good set of graduated examples, together with numerical tables and formulæ, will be found at the end.

(2) M. Guillet's book on vibrations is of the nature of a monograph in which the mathematics of "small oscillations" have been collected and classified, with numerous illustrations taken from the theories of light, sound, and electromagnetism.

The whole is a reprint from notes taken by Dr. M. M. Aubert of lectures given in the University of Paris by the author. The first part of the book deals with the theory of simple harmonic motion, free and damped. Several chapters are devoted to the composition of such motions, of plane and elliptically-polarised vibrations, and to phenomena of interference. A number of examples of the calculation of differences of path are given, having special reference to well-known problems of diffraction.

The second part deals with the propagation of waves in elastic solids and fluids. The author establishes the equations of equilibrium and small motion of an elastic solid, and deduces solutions of the problems of flexure and torsion in the simplest cases. He considers the propagation of dilatational and distortional waves in elastic media, and also the vibrations of rods and wires.

The book concludes with a consideration of the elastic-solid theory of the luminiferous æther, the elastic constants being adjusted to give Lord Kelvin's well-known "contractile" æther; certain vectors found are then interpreted in terms of the electromagnetic theory.

A work of this nature, which touches upon a number of different theories, is always liable to fall into the defect of "scrappiness," and it cannot be said that the present volume altogether escapes this reproach; it is, however, both instructive and stimulating, and contains a great deal of valuable information—information which is usually widely scattered, and therefore largely unavailable for the learner. In this sense the book supplies a distinct want. L. N. G. F.

OUR BOOKSHELF.

Abhandlungen und Vorträge zur Geschichte der Naturwissenschaften. By Prof. E. O. von Lippmann. Zweiter Band. Pp. x+491. (Leipzig: Veit and Co., 1913.) Price 8 marks.

PROF. VON LIPPMANN presents in this volume a second collection of the valuable historical studies which he has contributed to *Chemiker-Zeitung* and other periodicals. The articles are thirty-six in number, and, like those published in the former volume, range over the whole history of chemistry. They exhibit the author as a man of wonderfully wide learning and remarkable security of scholarship.

The studies are divided into eight sections upon a chronological basis. The first section contains an analysis, from the point of view of chemical knowledge, of the famous medical papyrus, of the sixteenth centry B.C., discovered by Ebers at Luxor. A second article, on the term "caput mortuum" (=iron oxide), throws interesting light upon the mystical interpretations of chemical phenomena which originated, like the "black art" itself, in Egypt. The second section deals with Greek and Hellenistic chemistry. Here, as is fitting, Plato and Aristotle have the pride of place, the great achievements of Aristotle receiving particularly careful attention. A short note upon Archimedes's method of determining specific gravity leaves the "eureka" story unassailed in principle, but proves that the "crown" of Hiero was really a golden wreath. On the other hand, the author robs that early precursor of Mme. Curie, the alchemist Maria (possibly of the first century A.D.), of the credit of inventing the water-bath ("balneum Mariæ") and Papin of his "digester," showing that the former was known before Aristotle and the latter in the third century A.D. These two destructive articles illustrate very well Prof. von Lippmann's encyclopædic knowledge of the literature of his subject. Among the most interesting of the later articles are those on the chemical names used by Marco Polo, on J. J. Becher's observations anticipatory of Mendel and De Vries, on Jean Rey, on the word "gas," which van Helmont is declared to have adopted from the "chaos" of Paracelsus, and on E. C. Howard, the inventor of the vacuum apparatus for sugar-refining. But the author has touched no subject which he has not adorned.

Mineral and Aërated Waters. By C. Ainsworth Mitchell. Pp. xiii+227. (London: Constable and Co., Ltd., 1913.) Price 8*s.* 6*d.* net.

THE author takes us back to the beginnings of the mineral-water industry by interesting descriptions of natural mineral springs, spas, and holy wells; for it was from the first attempts to copy the actual or supposed healing virtues of such waters that the extensive manufacture of mineral waters began, developed, and expanded into the great industry of to-day. The analyses of the more famous natural waters are given in the first part of the volume, devoted to the history of the subject, and perhaps the most striking feature of this history is the changed aspect of current belief in the efficacy of such waters by the known presence of radio-active substances contained in some of them. The chemical constituents being accurately known, a natural water can be produced in the laboratory, but, as is frequently asserted, without the therapeutic action of the natural product. The author states, however, that "recently bottles of special construction, containing artificial radio-active mineral waters, have been put upon the market in Sweden."

The methods of qualitative and quantitative analysis employed by the chemist are not included, since there is nothing specially applicable to this particular industry in them. The historical account of the apparatus devised for the purpose of aërating natural water by carbon dioxide is an instructive example of the slow and gradual stages required to effect a comparatively simple process. From the first experiment of Bergmann in 1770 the invention and elaboration of apparatus for aërating and bottling has extended, and the latter half of the book is devoted to descriptions of the machines employed to-day. The commercial production of liquid carbon dioxide has simplified the process, and most ingenuity is centred upon the charging and bottling machinery and the gas-tight fastenings. The description of the machinery is somewhat superficial, and is the least effective part of a commendable work. The examination of mineral waters for bacteria and metallic contamination is of special interest in view of the various containers for such waters on the market.

Vorlesungen über allgemeine Histologie. By Prof. Alexander Gurwitsch. Pp. v+345. (Jena: Gustav Fischer, 1913.) Price 11 marks.

PROF. GURWITSCH'S work is not a text-book of histology in the ordinary sense. It is arranged in the form of a series of lectures, in which the subject is dealt with not as an end, but as a means to the solution of the wider problems of biology; a good deal of space, for instance, is taken up with a discussion of the meaning of heredity. The lectures, written as they are from a critical and philosophical point of view, are full of interest, and examples are taken from every branch of the kingdom of life to illustrate the subject. The drawings of microscopic appearances which beautify the text are numerous, well selected, and well executed. W. D. H.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Submerged Valleys and Barrier Reefs.

IN a letter on "Dana's Proof of Darwin's Theory of Coral Reefs," published in NATURE for April 3, Mr. Cyril Crossland points out that "land valleys which extend beneath the sea are not always proof of subsidence. Such valleys, like coral reefs, may owe their existence to different factors in different cases." He adds that certain harbours on the east coast of Africa "are the high parts of submarine fault valleys," which, although they simulate embayments produced by the general depression and partial submergence of a dissected coastal region, really result from the local depression of fault blocks, and hence cannot be taken as evidence that any coral reefs which may occur near them have been built up during a period of submergence.

There can be no two opinions on this point; but the discussion of fault-block depressions is aside from the problem involved in Dana's proof of Darwin's theory, which is concerned with valleys of erosion. To imply that an argument which involves only such valleys is vitiated because some "land valleys" are due to down-faulting or other causes is unwarranted. If "land valleys" due to faulting were called "troughs" instead of "valleys," their irrelevance would be more apparent.

Some of the harbours on the Red Sea coast, mentioned by Mr. Crossland as due to down-faulting, are regarded by Mr. John Ball as partly submerged valleys of normal erosional origin above sea-level; so he states in a letter which appeared in NATURE for May 22. Which of these two opinions is the correct one may be best left to observers on the ground, as neither of the writers here cited adduces detailed evidence to support his conclusion. Mr. Crossland's remarks on the relation of certain coral reefs to abrasion I will not discuss here, because, probably on account of the brevity of his note and the lack of explanatory diagrams, his meaning is not clear to me. But his statement that "land valleys which extend beneath the sea are not always proof of subsidence" calls for comment, because it indicates a misunderstanding of the question at issue.

The embayments considered in my article on "Dana's Proof of Darwin's Theory of Coral Reefs," published in NATURE for February 6, were not such as occupy down-faulted troughs, or over-deepened fiords of glacial origin, neither of which indicate subsidence of their region, but only such as occupy valleys of normal erosion; that is, valleys which have been excavated by the ordinary processes of subaërial weathering and washing, and can therefore have originated only on land above sea-level. The peculiar and essential consequence of Darwin's theory, which remained unnoticed by its author, is the invasion of the previously eroded normal valleys of a dissected and subsiding coast by the sea; and the whole point of the long-neglected confirmation of Darwin's theory lies in the evidence that Dana gave to the effect that the drowned valleys of the Pacific islands had been formed by the action of land waters above sea-level before they were drowned, and not by any other process, such as down-faulting or glacial erosion, or by marine erosion, as Darwin apparently thought. Hence, interesting as are the complications which Mr. Crossland mentions, they do not touch the question in discussion, which has to do, not with shore-line embayments of whatever origin, but with embayments of a highly specialised kind, occupying valleys of normal erosion. So far as the evidence of the Admiralty maps and of various recent observers goes, the embayments of the central islands enclosed by barrier reefs in the Pacific are practically all of this highly specialised kind; the occurrence of other kinds of embayments elsewhere is no more relevant to the case than the occurrence of upraised platforms of marine erosion.

The real point raised by Mr. Crossland's letter is the possibility of distinguishing between embayments of different origins. I cannot accept his opinion that embayments which occupy troughs produced by locally down-faulted blocks simulate embayments formed by the submergence of normally eroded valleys, unless in a very rough manner, from which no confusion should arise. Even if the two kinds of embayments do in some superficial manner simulate each other, they can be distinguished readily enough. A normally eroded main valley is joined by branch ravines and side valleys, all systematically related as parts of a valley system; they may have young, mature, or old forms, according to their stage of development. Submergence of a main valley must therefore produce an indented or branching embayment, like the "rias" of north-western Spain or the drowned rivers of Devonshire-Cornwall. A down-faulted trough must at first

be bordered by escarpments of simple pattern; the escarpments will gradually be dissected by ravines and valleys, but these cannot be eroded beneath sea-level; hence the arm of the sea that takes possession of such a trough cannot have lateral branches or indentations, unless the sides of the trough as well as the trough block itself suffer depression—that is, unless regional depression takes place. Likewise, a coastal valley may be occupied and over-deepened by a glacier, and invaded by the sea after the glacier withdraws, thus producing a fiord; but a fiord can be easily distinguished from a drowned fault trough or from a ria. Evidently, then, in applying Dana's proof, it is essential to see that glacial fiords and fault troughs are not confused with normal valleys; and it still appears to me that my article of February 6 made it clear that only normal valleys were under consideration.

A few words as to terminology. Various popular terms, like "fish" and "valley," which entered our language in a pre-scientific period, have to-day two meanings; first, their original general meaning, and second, a later acquired and more precisely limited scientific meaning. "Fish" originally meant an animal living in the sea, and included whales and oysters. The latter are still known as shellfish, and a certain kind of whale is still named blackfish; but under the influence of scientific zoology whales are now classed by most persons not with fish but with mammals. So with "valley"; the original meaning of the word is simply an enclosed lowland, more or less elongated, of whatever origin, and this vague meaning is still in common use, as in naming the valley of the Wye, purely the work of normal erosion; the valley of the Ticino, greatly modified by glacial erosion; the valley of the middle Rhine, a fine example of a down-faulted trough; and the valley of California, a broad and relatively shallow down-warp. But "valley" has also been used, since the time of Hutton and Playfair, in the scientifically limited sense for forms of normal erosion under the action of rain and rivers; and when thus used it implies an origin above sea-level, as well as the systematic arrangement of certain significant features, such as slope of stream line, manner of junction of tributary and main valleys, and so on, by which the normal origin of a valley may be easily recognised. The Norwegian term "fiord" (fjord), and the Spanish term "ria," both locally used without scientific definition or implication of origin for the sea-arms that they designate, have in recent years both been given a more limited meaning in scientific geographical literature. It was only, as the context shows, in the scientific sense of a form of normal erosional origin above sea-level that the term "valley" was used in my article; and manifestly it is only to coasts which exhibit branching or indented embayments, such as were shown in the middle block of my diagram, and such as are caused by the submergence of true valleys of erosion, that Dana's proof of Darwin's theory applies.

W. M. DAVIS.

Harvard University, Cambridge, Mass., June 7.

Uniformity in Radio-active Nomenclature.

IN a letter to NATURE of June 5, Mr. W. H. Ross and Mr. H. J. Creighton point out the present want of uniformity in radio-active nomenclature, and suggest that some definite system should be adopted by all writers on this subject. Every worker in radio-activity recognises the importance of some agreement in regard to this matter. It is difficult, however, for a single individual to suggest a scheme which would be likely to gain universal support. The only international body existing at present which is in a position to deal with such a question conveniently and expeditiously is the International Radium Standards Committee. The constitution of this committee is fortunately very suitable for the consideration of this question, as it comprises about an equal number of physicists and chemists representing five nations. As president of the International Committee, I should be glad to bring the matter to the attention of the other members, and will do so if there is no objection to this proposal. E. RUTHERFORD.

Radio-activity and the Age of the Earth.

MR. HOLMES, in his interesting letter in NATURE of June 19, brings out the embarrassments in which the superabundance of radio-activity in the accessible crust of the earth and the enormous antiquities deducible therefrom have plunged physics. His explanation is that since the earth as a whole cannot be as radio-active as the crust, without liquefying, there cannot be as much radium in it as might be inferred from the samples we can take, and that its "heavy metallic core" must be "completely destitute of radium." This, however, involves the improbability that the heaviest metal of all, uranium, has not gravitated to the "metallic core," and does not explain why this core should be destitute of radio-active substances.

It may be pointed out, therefore, that the whole reasoning rests on an assumption to which alternatives might be considered. It is assumed that the dissociation of uranium has been proceeding always and everywhere at the rate we can now observe on the earth's surface. But it is possible that under the physical conditions obtaining in the interior uranium does not dissociate, or does so much more slowly. It is even possible that it has not always proceeded at this rate in the past. Radio-activity may be an acquired habit of the substances that exhibit it.

There is no scientific objection to the suggestion that the existing "laws of nature" are not immutable but "evolving," beyond the methodological inconvenience that this would greatly complicate our calculations and detract from the exactness of our predictions. But of improbabilities, as of evils, we must always choose the least. F. C. S. SCHILLER.

Corpus Christi College, Oxford, June 23.

Pianoforte Touch.

THREE variables appear to be possible in pianoforte touch, namely:—

(1) The energy of the blow of the hammer.

(2) The duration of contact of hammer with wire.

(3) The resonance of the woodwork.

Of these, (1) will be admitted by everyone; (3) should be in abeyance as much as possible, since it is brought into evidence chiefly when the key is struck too hard—beyond the capacity of the wire for harmonic response. But the mechanism of some pianos (even by first-class makers) is so resonant that a "xylophone" effect is only too easily produced. This effect evidently has its admirers, being cultivated by performers as well as ministered to by piano-makers.

(2) Is assumed by many persons; but the possibility is doubted by others, because the player cannot hold the hammer in contact with the wire. The hammer, as mentioned by Prof. Bryan, is disconnected from the key, so that at the time of striking the wire it is a projectile.

At some point in the mechanism, between the key and the hammer, is an arrangement called the "escapement," which disconnects the key from the hammer when the player's touch is so deep or firm as to cause the risk of blocking; but when his touch is shallow the escapement is scarcely brought into action.

In the upright pianos of fifty years ago the hammer was hinged on to a vertical rod called the "hopper" or "sticker," which pulled it back with a variable force, the escapement being *below*, between the hopper and the key. With a shallow touch in such an instrument it is just possible to avoid bringing the escapement into action, and thus not to hasten the return of the hammer, but the effect is decidedly difficult to produce, and the mechanism has become obsolete owing to its unsatisfactory working.

In modern uprights the hammer is more free, for the escapement is *a stage higher*, between the hammer and the hopper; a piece of tape passing from the hammer to the hopper exerts an elastic pull on the hammer, assisting gravity in causing the return of the hammer, but only when the key is released.

In the grand piano the hammer is left as independent as possible, so as to ensure rapid repetition; and I have not yet found or read of a horizontal action in which any accessory mechanism can influence the return of the hammer. Therefore in the horizontal piano (and probably in the ideal upright) the hammer at the moment of hitting the wire is an unencumbered projectile, and the variables (1) and (2) are not separable.

It should be remembered that *staccato* and *legato* effects are functions, not of the hammer, but of the damper. But after all, the most important element in a good touch is the player's ability to strike the different notes in chord with different intensities. The artist instinctively gives their relative importance to the various notes of a chord as surely as to those of a melody; and this is one of the features which distinguish him from the mere executant or the most perfect player-piano.

F. J. ALLEN.

Cambridge, June 10.

A Mechanical Vacuum-Tube Regulator.

THE mechanical vacuum-tube regulator, in which the position of a movable glass sheath relatively to the kathode determines the speed of the kathode rays, mentioned in NATURE of June 19 (p. 415) as recently brought before the Cambridge Philosophical Society by Mr. R. Whiddington, is not new, Mr. J. C. M. Stanton, Mr. H. L. T. Wolff, and myself having, in 1898, devised a similar arrangement, which is described and illustrated in the discourse which I gave at the Royal Institution in that year.

We had previously shown, in a Royal Society paper read in 1897, that the speed of the kathode rays is increased by diminishing the size of the kathode itself, and what is new and interesting is Mr. Whiddington's discovery that the mechanical regulator operates by reason of the effective size of the kathode being diminished owing to the electrostatic repulsion of the rays by the negatively charged glass sheath.

A. A. CAMPBELL SWINTON.

66 Victoria Street, London, S.W., June 20.

The Crossing of Water by Ants.

IT may not be new to observers of animal life, but I have been much interested in watching the common house ant here. We have an American fly-trap: the sugar was one day covered with ants, so I placed the trap on a finger-bowl standing in a plate of water. The ants, when they came to the edge of the water, ran round the bowl until convinced there was no way across, and then calmly "took to the water," and ran across it by aid of surface tension without getting their feet wet. Having presumably been home to the nest, they returned for more sugar, crossing in the same way, and this went on regularly, a steady procession crossing the water.

JOHN C. WILLIS.

Jardim Botanico, Rio de Janeiro, June 4.

ETHNOGRAPHICAL WORKS.[1]

(1) THIS magnificent monograph of the races of Borneo, by Dr. Hose and Mr. McDougall, illustrated by an unrivalled gallery of artistic views, covering the life of the natives of that island from the swinging-cot to the grave, will be welcomed with enthusiasm by all classes of readers. The ground had indeed to some extent been prepared by the publication in 1896 of Mr. H. Ling Roth's "Natives of Sarawak and British North Borneo," which actually contained (i., 37), seventeen years before the appearance of the present work, a "List of Tribes in Borneo," specially prepared by Dr. Charles Hose.

The book before us is a singularly happy example of joint authorship. Dr. Hose, with his record of twenty-four years' service and priceless experience under the Sarawak Government, supplemented (as he tells us himself) by his travels in other parts of Borneo, the neighbouring islands of the Archipelago, and the Malay Peninsula, was, indeed, more than ordinarily fortunate in securing a collaborator whose special qualifications as reader in mental philosophy at Oxford were crowned by his experience in the field as a member of Dr. Haddon's famous expedition to the Torres Straits and Borneo in 1898. The chief corner-stone of the book is, of course, the invaluable classification (ii., ch. xxi) of the tribes of Borneo, which is supplemented by an admirable appendix on the statistics and comparative literature of the same subject by Dr. Haddon, who correlates so far as possible the ethnological work of the best Dutch authorities. The classification in the text, described (ii., 224) as resting only "on a slight basis," gives us the mature views of Dr. Hose's unequalled experience, and satisfies us that the foundations of anthropological science in Borneo have here, once for all, been "well and truly laid."

Excluding the coastwise "Malays," the authors recognise six main ethnic groups, viz., Kayans, Kenyahs, Klemantans, Muruts, the nomadic Punans, and Ibans, or Sea "Wanderers," commonly called "Sea Dayaks." But since (ii., 245) both Kenyahs and Klemantans are "sections of the aboriginal population of nomadic hunters (Sc. Punans) who have absorbed Kayan culture," these six clearly represent but four original stocks, viz., Kenyah-Klemantan-Punans, Kayans, Muruts, and Ibans; and this agrees with the statement made elsewhere that "the present population of the island is derived from four principal sources," the last three being regarded by the authors as later immigrants.

The members of the first group are identified as "Indonesians," that much-misused term which, as

[1] (1) "The Pagan Tribes of Borneo." A description of their Physical, Moral, and Intellectual Condition, with some Discussion of their Ethnic Relations. By Dr. Charles Hose and William McDougall, F.R.S. With an Appendix on the Physical Characters of the Races of Borneo, by Dr. A. C. Haddon, F.R.S. Vol. i., pp. xv+283+143 plates. Vol. ii., pp. x+374+211 plates+4 maps. (London: Macmillan and Co., Ltd., 1912.) Price 42*s.* net. 2 vols.

(2) "In the Shadow of the Bush." By P. Amaury Talbot. Pp. xiv+500+plates+map. (London: W. Heinemann, 1912.) Price 18*s.* net.

(3) "Monumental Java." By J. F. Scheltema. Pp. xviii+302+xl plates. (London: Macmillan and Co., Ltd., 1912.) Price 12*s.* 6*d.* net.

defined by the authors, means a predominantly "Caucasic" (and dolichocephalic) race modified by Mongol admixture, the latter strain supplying an element which, as the authors remark (ii., 228), has been wrongfully ignored by some writers. The second main stock is the brachycephalic "Malayan" or "Southern Mongol" element, called "proto-Malays" both by our authors and Dr. Haddon. This element is described (ii., 229) as "a blending of the Mongol stock (or of a part of the Indonesian race) with darker" proto-Dravidian stock, "of which the Sakai of the Malay Peninsula (and perhaps the Toala of Central Celebes) seem to be the surviving representatives in Malaysia." Thus the chief factors in the population are due to varying blends of two main stocks, the one Indian, the other Mongolian, these elements agreeing with those that are found, though quite differently blended, on the neighbouring mainland of Asia. Yet the negrito element, which occurs both in the Malay Peninsula and the Philippines, seems now to be in total default in Borneo, and of Melanesians, according to Dr. Haddon, there are also no traces. It should be noted that Dr. Haddon (ii., 313) regards the Punans and Kenyahs as "mainly proto-Malayan in origin," whereas the authors classify them definitely as Indonesians.

FIG. 1.—Youthful Sea Dayaks in gala dress. From "The Pagan Tribes of Borneo."

It would take many pages of NATURE to do full and adequate justice to all sections of this book. A veritable museum of Bornean ethnology, its cases contain, as in the matter of the Kayan headhunting cult (the stupid European exaggerations about which receive satisfactory castigation, i., 76), weird forms of burial, *tatu* rules, strange forms of spirit-worship and possession, and so forth, many of the most suggestive specimens of modern race-lore.

We may conclude with an item of personal interest in reference to totemism. In vol. ii. (p. 112 and footnote) Messrs. Hose and McDougall, boldly heterodox, avow and give reasons for their belief in the possibility of deriving the clan totem from that of the individual. Upon this very point Mr. Lang, in 1908, remarked to the present writer: "I am unable to conceive the reason, when everybody has his own *ngarong*, which he has not hitherto bequested, for a rule that Mary's or Jane's *ngarong* must for ever belong to her descendants. . . . Given the individual with his *rapport*, no one has shown how it became hereditary, in the female line, at a time, too, when the man's children (or the woman's) had also *their* individual *rapport*."

The writer of the words just cited *silet*, alas, *aeternumque silebit*, but the controversy continues, and it should, perhaps, in justice be conceded that the case made out by Messrs. Hose and McDougall is, so far as it goes, a strong one. It would have been interesting if they could have told us of any communities where the children were regularly named after plants or animals, or other natural objects. We must not, however, be led into a discussion on the origin of totemism, which is too large a question to discuss here, and must therefore recommend the authors' views to the attention of the advance guard of totemic experts.

(2) Mr. P. Amaury Talbot's "In the Shadow of the Bush" gives us an intensely vivid and illuminating picture of the Ekoi, a semi-Bantu people of the south-east corner of Nigeria, a region that recalls the mingled mystery and horror of—

> Enter these enchanted woods,
> Ye who dare. . . .
> Thousand eyeballs under hoods
> Have you by the hair!

Here all is blasted by the terrible blight of negro witchcraft. Indeed, the attention will doubtless

be immediately riveted by the account of the Human Leopard and Alligator Societies (first revealed to most Englishmen by the writings of the late Mary Kingsley), the late (1912) activity of which recently drove the local Government to action and provoked an interchange of questions in the Imperial Parliament.

Ethnography in the widest sense, linguistics (especially on the Bantu affinities of Ekoi and on its secret signary, "Nsibidi"), folklore, native art, even archæology, all these, with much valuable natural history, go to make up a fascinating volume full of direct and irresistible appeal. The achievement is worthy of one who, besides his administrative experience, can claim to have made defiance of the protests of Dutch scholars, whose noble efforts, like those of Raffles (pp. 55, 76, 238), are freely acknowledged. The work clearly illustrates the real significance of "Boro Budoor" as a sculptured record of the history of Buddhism, the type being that of the Mahayanistic or northern Church (pp. 222,235), not the Hinayanistic or southern type, as was claimed for his Church by the late royal visitor. W. W. SKEAT.

THE BRILLIANT FIREBALLS OF JUNE 14.

ON June 14 at 8h. 4m., when the sun was shining, and at 10h. 0m., in the bright moonlight, very large meteors made their appearance.

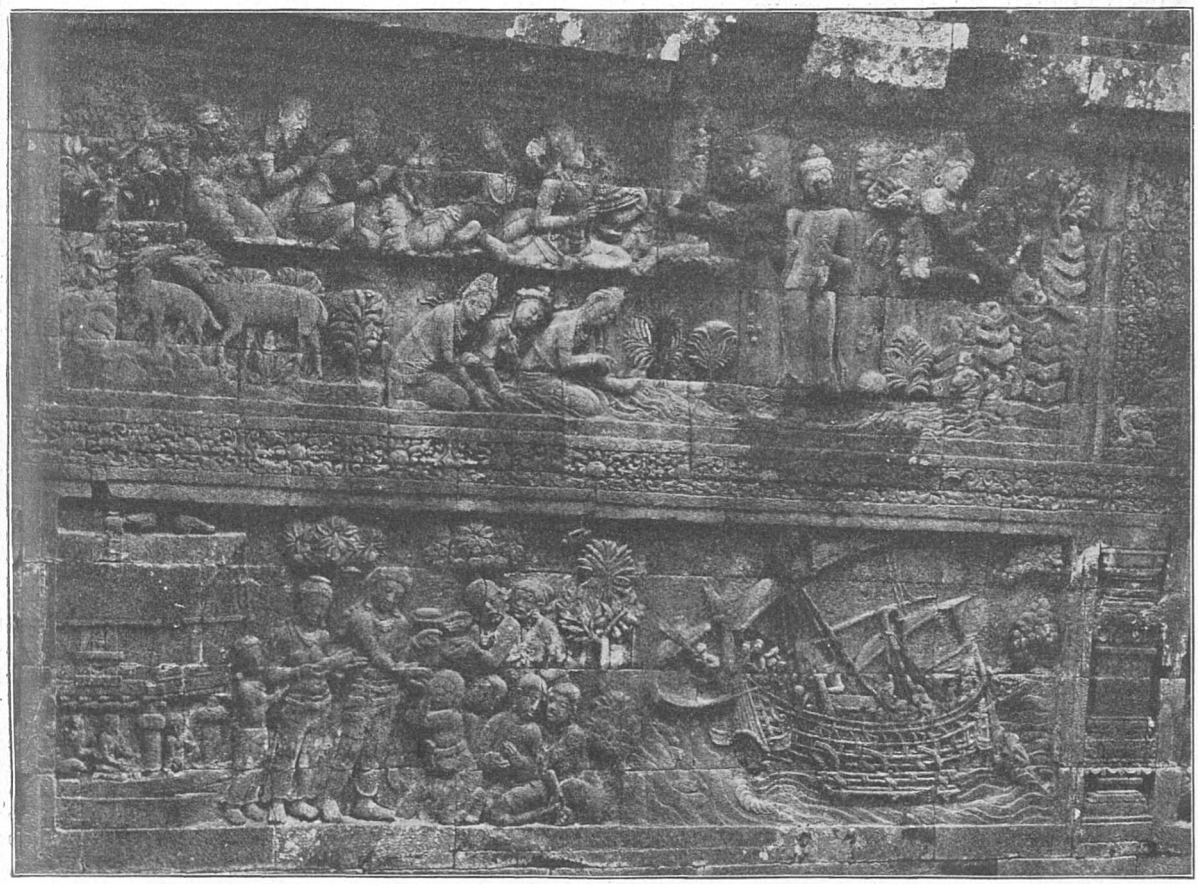


FIG. 2.—Reliefs of the Boro Budoor. From "Monumental Java."

history in companionship with the late Boyd Alexander.

(3) The record of official ineptitude and rapine pictured in Mr. Scheltema's erudite and enlightening "Monumental Java" is almost incredible. Thus (p. 240) Mr. Scheltema, with biting sarcasm: "We are told in legendary lore of statues which flew through the air . . . dissolving into space; the statues of the Boro Budoor developed that faculty in an astonishing degree!" The climax was reached in 1897, when the late King of Siam, on his visit, was invited and allowed to remove (p. 244) from that "superb temple, whose soul is the soul of Java," eight cartloads of irreplaceable statuary! Such vandalism was in

The former gave a startling flash, even in the daylight, and the latter was strikingly brighter than the moon, according to the testimony of several observers.

Neither of the fireballs passed over any part of England, though witnessed by many persons from the eastern and south-western counties respectively. The earlier fireball at 8h. 4m. appeared over the sea off the eastern coast near Harwich and Aldborough, and it had numerous spectators in Kent, Essex, Suffolk, and Norfolk. The other passed above the sea far west of Land's End, and had a long and horizontal flight of 490 miles directed from south-east to north-west from over L'Orient, about sixty miles south-east of Brest

in France, to eighty miles west of Dunmore Head in the south-west of Ireland.

The following are the resulting heights, velocities, &c., of the two fireballs, which have been computed from a considerable number of descriptions forwarded to me from many parts of the country:—

1913, *June* 14.

G.M.T.		8h. 4m. ...	10h. 0m.
Magnitude	=	much brighter than ☽	brighter than ☽
Height at first	=	77 miles	54 miles
,, end	=	29 ,,	54 ,,
Luminous course	=	58 ,,	490 ,,
Velocity per second	=	22 ,,	26 ,,
Radiant point	=	263°+64°	282°−23°
Name of meteor	=	ζ Draconid	ψ Sagittarid

Long as the flight of 490 miles undoubtedly is for the second fireball, it is probably much less than the actual course. When the object was last seen from Ireland it was really rising in the air, and was still burning strongly when low apparent altitude carried it behind either trees or buildings, as viewed by several observers. I suppose it is possible for a meteor to escape out of the atmosphere when its flight is horizontal and its material capable of withstanding absolute disintegration. We want more observations from the west of Ireland.

The daylight fireball at 8h. 4m. left a streak for about three minutes, and several of the observers state that a noise like thunder followed its disruption in two or three minutes. One person at Watford avers that he is certain the meteor was not more than twenty yards distant from where he stood, for he witnessed the object descend in front of some trees. W. F. DENNING.

THE STATE AND MEDICAL RESEARCH.

A COMMITTEE with executive functions, to be known as the Medical Research Committee, has been appointed for the purpose of dealing with the money made available for research under the Insurance Act. The Committee is constituted as follows:—

The Right Hon. Lord Moulton of Bank, F.R.S. (chairman).
Dr. C. Addison, M.P.
Mr. Waldorf Astor, M.P.
Sir T. Clifford Allbutt, K.C.B., F.R.S., Regius professor of physic, University of Cambridge.
Mr. C. J. Bond, senior honorary surgeon, Leicester Infirmary.
Dr. W. Bulloch, F.R.S., bacteriologist to the London Hospital, and professor of bacteriology in the University of London.
Prof. M. Hay, professor of forensic medicine and public health, Aberdeen University.
Dr. F. Gowland Hopkins, F.R.S., reader in chemical physiology in the University of Cambridge.
Sir W. B. Leishman, F.R.S., professor of pathology, Royal Army Medical College.

The appointment of the Committee is the outcome of the final report of the Departmental Committee on Tuberculosis, which was summarised in an article in NATURE on April 24 (vol. xci., p. 191). In this report the Committee recommended the appointment of an Advisory Council and an Executive Committee, and both have now been constituted. The Advisory Council is to make suggestions, and to submit the Executive Committee's budget to the Government, and to advise the Executive Committee.

The Executive Committee is to frame a budget to be considered with the Advisory Council before being submitted to the Government; to determine the scheme of research work; to make periodic reports, and generally to organise and supervise research work.

The Departmental Committee suggested that the work of research could be carried out advantageously on the following, among other, lines:—

(*a*) A central bureau should be established and should be the headquarters of the Advisory Council and Executive Committee. The central bureau should have a statistical and sociological department, in the work of which should be included the coordination and correlation of results. With regard to statistical investigations, every effort should be made to utilise, where possible, and cooperate with the statistical departments of the different Government departments. Statistics should be so collected and framed as to be comparable with the existing statistics of mortality.

There should also be a library and publishing department. The central bureau should be under the immediate control of the Executive Committee.

(*b*) Clinical, pathological, bacteriological, chemical, and other scientific researches should be carried out by competent investigators employed by the Executive Committee in institutions approved by it.

(*c*) When the Government, on the recommendation of the Executive Committee, and after consulting the Advisory Council, deems such arrangements desirable, researches of the same nature as those referred to in the preceding paragraph should be carried out in an institution or institutions (including laboratories and hospital wards) which should be under the immediate control of the Executive Committee to the extent and for the purpose in question.

(*d*) Money should be available in order that special inquiries—*e.g.* of a statistical and sociological nature—should be carried out by the Executive Committee if necessary, independently of any particular institution.

(*e*) The question whether a sum of money, not exceeding 1000*l.* per annum, should be available as a prize or prizes for the best original research work done should be considered. The money should only be awarded if the discovery is of sufficient importance and utility.

As regards research workers the Departmental Committee recommended that some workers of proved and exceptional ability should be enabled to devote their whole time to research work, and should be given a definite and adequate salary, and be entitled to a pension. The Committee also considered that efforts should be made to retain for research work young and talented investigators who would otherwise tend to drift into other lines.

The Departmental Committee computed that the income for the purposes of research under the Insurance Act will amount to about 57,000*l.* a year, and the Medical Research Committee will be called upon to draw up a general plan of research to be entered upon at once, and to be carried out year by year. But before the Minister respon-

sible for national health insurance consents to the adoption of the plans of the Research Committee they will be subjected to examination and criticism by the Advisory Council, which is a large and representative body including most of the members of the Departmental Committee. It was appointed by Mr. Lloyd George after receiving suggestions for suitable names from each of the universities of the United Kingdom, from the Royal Colleges of Physicians and of Surgeons, from the Royal Society, and from other public bodies interested in the question. It includes medical representatives of the four National Health Insurance Commissions, and the other Government departments concerned in medical work.

SIR JONATHAN HUTCHINSON, F.R.S.

WHEN the history of modern medicine comes to be written it is certain that Sir Jonathan Hutchinson, who died in his eighty-fifth year at Haslemere on June 23, will occupy a more prominent position than that usually assigned to him by his contemporaries. He had the misfortune to be at work when Pasteur and Lister opened up new, attractive, and practical fields of research, carrying with them all the eager intellects of a younger generation, and leaving the subject of this notice to explore the inexhaustible fields of clinical medicine. From the year 1844, when he was apprenticed to Dr. Caleb Williams, of York, at the age of sixteen, until the day of his death, within a month of finishing his eighty-fifth year, he never ceased to study the manifestations of health and disease, and to place his observations and inferences on record.

Sir Jonathan Hutchinson was an inductive philosopher who patiently and accurately collected facts to provide a sure basis for the principles of scientific medicine. The monument he leaves behind him is seen in the volumes of the "Archives of Surgery," "Atlas of Illustrations of Clinical Surgery," and the hundreds of clinical records which are to be found in medical literature of the last fifty years. He leaves behind him no brilliant discovery to fix his name in the public memory, and yet it may be claimed for him that he did more than any man of his time to solidify the foundations of the surgeon's art.

He was a self-made surgeon, neither the follower nor the leader of any school. It is true that after coming to London in 1850, at the age of twenty-two, he came under the influence of Lawrence and of Paget at St. Bartholomew's Hospital for a few months, but the spirit which dominated him when he ultimately settled in London was the quiet inquiring and observing mood which he acquired in the seclusion of his Quaker home in Selby. Before he was in his thirtieth year he was on the staff of the leading eye hospital (Moorfields), Blackfriars Hospital for Diseases of the Skin, the Metropolitan and the London Hospitals, where he had to deal with all the problems of general surgery.

With those great and varied clinical fields at his disposal he was able, in less than ten years from the time he settled in London, to produce convincing proof that a host of conditions which were regarded as separate diseases were really the remote manifestations of syphilis, and amenable to specific remedies.

The varied and puzzling diseases to which the skin was liable had a special attraction for Sir Jonathan Hutchinson, and it was at an early stage of his career that he began a systematic investigation of the cause and nature of leprosy. In 1859 he came to the conclusion that it was due to eating imperfectly preserved fish, and that the disease was therefore non-contagious and preventable. Fifty years later found him still searching in various parts of the earth for evidence to support his original contention.

The persistency which he applied to the study of leprosy he gave to all the various lines of research he took up. He was a student of growth; he never ceased recording facts and cases which were likely to reveal the principles which regulate the growth and development of the animal body. His lectures at the Royal College of Surgeons in 1881 on the pedigree of disease are happy illustrations of the methods by which he sought to advance this kind of knowledge. He was a surgeon who made a reputation not by the use of the operating knife, but by the application of his intellect to the understanding and cure of disease. He operated with success; he introduced new procedures, but he recognised that recourse to operation was necessitated by the imperfections of the healer's art.

He was an educationist, believing that all teaching should be objective. He did much as chairman of the Museum Committee and as president of the College of Surgeons for the great museum founded by John Hunter; he established and furnished three museums in the Polyclinic (Medical Graduates' College) in Chenies Street, in his native town of Selby, and in Haslemere, where he latterly made his home.

NOTES.

WE heartily congratulate Dr. A. F. R. Wollaston on his return from a successful visit to the Ingkipulu Mountains (Nassau range), Netherlands New Guinea. Last year Dr. Wollaston gave an account of the unlucky attempt of the British Ornithologists' Union Expedition in "Pygmies and Papuans," and quite recently Capt. C. G. Rawling has published another book on the same expedition, "The Land of the New Guinea Pygmies." On the present occasion Mr. C. B. Kloss, curator of the Kuala Lumpur Museum, accompanied Dr. Wollaston, and, in addition to an engineer and five native collectors, they took with them seventy-five "Dyaks," and a large escort was provided by the Netherlands Government. Four and a half months were occupied in reaching the mountains from the coast. The geographical results cannot be worked out for some time. Extensive zoological collections were made which comprise many new species; among

them is a very beautiful bird of paradise which may be new. A hitherto unknown tribe of a rather short people of Papuan type were met with at an elevation of some 4000–6000 ft. Despite the very cold nights they wear no clothing. They are mainly collectors and hunters, but also grow sweet-potatoes, tobacco, and sugar-cane. They carry bows and arrows and shoulder-bags containing apparatus for making fire, tobacco, knives, spoons, and other small belongings in true Papuan style. Their knives are made of a hard, slaty stone that can be brought to so keen an edge that bamboos can be cut with them. The people are said to be extremely attractive, most friendly, and in some respects more intelligent than the people on the coast. We await with interest Dr. Wollaston's account of his adventurous journeyings, and sympathise with him in the loss of a considerable proportion of his notes due to the capsizing of a canoe.

A SHAMEFUL outrage has just been perpetrated at the Gatty Marine Laboratory of St. Andrews, the gift of Dr. C. H. Gatty to the University. The laboratory has always been freely open to scientific workers of both sexes without distinction of religion or political feeling, and might therefore have been expected to be immune from attack; yet it has been fired, apparently by militant suffragettes, who have thus destroyed much of the work of members of their own sex. Several large original coloured drawings—all the exquisite work of a lady, the late Mrs. Albert Günther—have been irretrievably ruined by the fire. Fortunately most of the fine original drawings of marine animals made by Mrs. Günther were in the corridor and other rooms, away from the main workroom, and so securely framed that though begrimed with soot, they are practically as before. The coloured and uncoloured plates for the next Ray Society work had been lying for four or five months on a table in an adjoining room, and they also escaped. It appears that on Saturday, June 21, the incendiaries effected an entry by smashing one of the windows on the south side of the laboratory, after plastering it with soft soap and paper. Explosives and combustibles were placed in one of the cubicles and lit, and the perpetrators of the outrage escaped through a window. The print of a small shoe, and suffragette literature stuck between the wall and a rain-pipe, were the only traces left. Fortunately the fire was seen by a fisherman, who gave the alarm, but the large workroom was wrecked and the roof ruined before the firemen obtained control of the fire. We sympathise with the director, Prof. McIntosh, who has always done so much to help on the scientific education of women at the University of St. Andrews.

THE Gustave Canet lecture of the Junior Institution of Engineers will be delivered by Dr. Dugald Clerk, F.R.S., on the working fluid of internal-combustion engines, on Monday evening, June 30, at the Institution of Electrical Engineers, Victoria Embankment, W.C. The chair will be taken by the president, Sir A. Trevor Dawson, R.N.

THE death is announced, in his thirty-fourth year, of Prof. C. C. Poindexter, one of the most promising of the younger negro educational leaders in America. After graduating at Ohio State University in 1903, he spent two years as a graduate student at Cornell. Four years ago he went to Fisk University, Nashville, as assistant-professor of biology, from which post he was promoted, after two years' service, to a full professorship.

THE annual exhibition of antiquities discovered during excavations at Meroë, Sudan, carried out in connection with the Institute of Archæology, University of Liverpool, will be held in the rooms of the Society of Antiquaries, Burlington House, Piccadilly, W., from Tuesday, July 8, to Friday, July 18, inclusive. The exhibits will include decorated pottery vases, objects of faience and of bronze, intaglio-rings, &c., plans and photographs, and copies of frescoes and sketches in colour.

IT was announced in the issue of NATURE for May 29 (p. 338) that of the 100,000*l.* bequeathed by the late Sir J. Wernher, Bart., for charitable and educational purposes, 5000*l.* was a grant to the Institution of Mining and Metallurgy. At a recent meeting of the institution, the president, Mr. Bedford McNeill, announced that Lady Wernher had added a second 5000*l.*, making a total of 10,000*l.* The only condition attached is that Lady Wernher desires that the principal sum shall remain intact as an aid in permanently strengthening the institution. The income is to be devoted to the ordinary purposes of the institution.

THE *Japan Chronicle* reports the death, at St. Petersburg, on May 27, at fifty-one years of age, of Dr. Shogoro Tsuboi, professor of anthropology at the Tokyo Imperial University. The deceased, who had been attending the meeting of the International Association of Academies at the Russian capital on behalf of the Japanese Academy, was regarded as the greatest authority on his subject in Japan. In 1884 he established the Tokyo Anthropological Society, and started a vernacular magazine which has done much to further the development of the science in Japan. Dr. Tsuboi was an honorary member of our Royal Anthropological Society, and a corresponding member of the Berlin and Paris Anthropological Societies.

THE sixth of the series of International Fishery Congresses, established at Paris in 1900, is appointed to be held at Ostend on August 18–20, under the patronage of his Majesty the King of the Belgians. The Board of Agriculture and Fisheries has arranged to be represented officially at the congress, and has also sent a fisheries exhibit to the International Exhibition now being held in Ghent, of which the section devoted to fisheries will be closely associated with the congress. It is hoped that British fishery interests will be fully represented at the congress, and all interested in fish and fishing and the various related industries, and in the studies connected therewith, are invited to take part in the proceedings, by the reading of papers and otherwise. The subscription for members, giving the right to take part in the discussions and excursions, and to receive the publications of the congress, has been fixed at 10 francs (8*s.* 4*d.*). Full particulars can be obtained

from the general secretary to the congress, Kursaal, Ostend, Belgium, direct, or through the Board of Agriculture and Fisheries, 4 Whitehall Place, London, S.W.

THE annual congress of the Royal Sanitary Institute is to be held this year at Exeter on July 7–12, under the presidency of Earl Fortescue, who will deliver the inaugural address. A popular lecture on imported foods from a Colonial point of view will be given by Sir John McCall, Agent-General for Tasmania. Sir William Collins will lecture to the congress on "The Chadwick School of Thought: An Appeal from the New Sanitarians to the Old." The work of the congress will be divided into four sections, which, with their presidents, will be:—Sanitary Science and Preventive Medicine, Mr. A. Wynter Blyth; Engineering and Architecture, Mr. H. P. Boulnois; Domestic Hygiene, Mrs. Michelmore, Mayoress of Exeter; Hygiene of Infancy and Child Study, Mr. E. J. Domville. During the meetings the following associations will hold conferences:—Municipal representatives, medical officers of health, engineers and surveyors to county and sanitary authorities, veterinary and sanitary inspectors.

THE report of the council of the Concrete Institute, recently presented at the annual general meeting, shows a gratifying increase in membership, and an increasing interest in everything pertaining to the theory and practice of construction in concrete, plain and reinforced. The science committee has under consideration a system of standard notation for calculations in structural engineering, and also, in conjunction with the reinforced concrete practice standing committee, a proposed standard specification for reinforced concrete work. Among other work in hand the committee is investigating the effect of oils and fats on concrete, and the adhesion of and friction between concrete and steel. The practice standing committee of the institute has drafted reports on the surface treatment of concrete, and cracks in concrete, which were submitted for discussion at a general meeting, while the committee on tests has many matters under investigation, including the collection of data regarding the moduli of elasticity of concrete for stresses within working limits. The activity of the institute is a healthy sign of the attention which English engineers are giving to the vast possibilities of reinforced concrete, already more fully developed and realised in some other countries.

MR. STEFÁNSSON'S expedition has started for the Beaufort Sea, and will be followed with intense interest by all interested in polar exploration. It means to attack the last great problem of the Arctic. It has been maintained by certain authorities of the highest standing that there is an extensive land to be discovered in the Beaufort Sea quadrant, but the question has long been disputed. Mr. Stefánsson hopes to settle it, and is giving himself nearly four years in which to do so. There will be much occasion for scientific research, and these are days of large scientific staffs on polar expeditions. The staff of the present expedition numbers no fewer than fifteen, and if land is discovered and the expedition is in proper state to take advantage of the discovery, there will be unsurpassed opportunities for scientific work. So far as it is possible to judge in advance, the leader of the expedition appears to expect moderately favourable conditions for the voyage northward from the North American Arctic coast. With easterly winds a clear sea is practically assured; westerlies will pack the ice. It is believed that a condition of balance between these two extremes is to be expected, and the resulting conditions should not offer serious obstacles to a well-tried vessel under so well experienced a commander as Captain Bartlett.

IN the House of Commons on June 18 Mr. Cathcart Wason asked what percentage of men have failed with the colour-vision tests introduced on April 1, and how this percentage compares with that of former years; and how many men have passed with the wool test and failed with the lantern test, and *vice versâ*? The Parliamentary Secretary to the Board of Trade (Mr. Robertson) replied:—"The total number of men examined in colour vision from April 1 to May 31 was 1689, and of these 105, or 6·22 per cent., failed. Of the 105 failures, fifty-five failed in both the wool test and lantern test, and fifty in the lantern test only. None failed in the wool test only. I regret that it is not possible to give corresponding figures for previous years, since the statistics available for previous years relate to examinations, and not to individuals. I may mention, however, that in 1912, out of 7326 examinations in colour vision, 163, or 2·22 per cent., resulted in failure. The figures for the two periods are not comparable, both because of the difference of basis and because the Board of Trade have reason to believe that the number of candidates examined in the last two months includes an abnormal proportion of persons who have never been examined before, among whom, naturally, the percentage of rejections is disproportionately high."

THE committee of the twelfth International Geological Congress has now issued the third and final general circular. Applications to join excursions have been received more rapidly than was anticipated, therefore intending participants should delay no longer. Delegates appointed by universities, &c., are reminded that their application for membership should be sent in at once. The monograph on coal resources will be issued in three volumes (not two) and folio atlas—price, to members, 20 dollars, if ordered from Morang and Co., Toronto, before August 15. Changes are announced in several excursion programmes. Excursion A9 will start from Kingston at the foot of Lake Ontario. The visit to the Dinosaurian bone beds near Munson, Ex. C1, may not be possible, but those who specially desire to visit the deposits should advise the secretary. The Sudbury ore region will be visited on Ex. C1, in order that participants in excursions C1 and C2 may meet in Victoria, B.C., on August 26. Special attention is directed to Ex. C5 on account of its many attractions, including a "show" by native Indians on Grand Manitoulin Island. Ex. C8, Juneau-Yakutat section, will afford a unique opportunity for studying active glacial phenomena. Particulars are given of reductions in

railway fares in Canada and the United States, and a list of hotels with their charges is provided.

THE Chemical Industry and Engineering Exhibition at the Agricultural Hall, which was opened by Lord Desborough last week, is an interesting and successful development of a similar exhibition held two years ago. Its essential aim is to give chemical manufacturers an opportunity of inspecting the most recent forms of machinery and appliances rather than to display the actual products of chemical manufacture, although a number of the latter, of a more special character, are included. The bulk of the floor-space is accordingly allotted to apparatus and machinery, of which a large proportion is concerned with the transport and treatment of the products dealt with in chemical industries. Acid-resisting materials of so-called "passive" iron ("Ironac" and "Tantiron"), and acid-proof stoneware suitable for pipes, pumps, valves, taps, the cascade concentration of acids, &c., are prominent in this connection, together with a number of new forms of air-compressors, boiler-furnaces, and vacuum drying apparatus. Safety appliances for use in works are also well represented. These include safety-helmets, face-masks, respirators, &c., and a variety of appliances for life-saving and first-aid in case of accidents. The exhibits of chemical products comprise a well-selected collection of mercurials, bismuth compounds, and other pharmaceutical preparations, an exhibit designed to show the progressive stages in the manufacture of coal-tar colours from the raw materials to the finished dyestuffs, and such varied products as china clay, hydrogen peroxide preparations, and materials for the generation of acetylene. Good exhibits of laboratory apparatus are contributed by a number of well-known firms, and an exceptionally interesting collection of old glass apparatus which had been in actual use by Brandt, Hennell, and Warington has been loaned by the Society of Apothecaries. Mr. Walter F. Reid has acted as president of the exhibition, Mr. Thos. Tyrer as chairman of the advisory council, and Mr. F. W. Bridges as organising manager.

THE *Daily Malta Chronicle* of May 31 reports a lecture delivered by Mr. Francesco Calleja on the early culture of the island. He laid stress on the importance of Phœnician influence, and quoted a number of words to prove that the Greek language was largely indebted to the Semitic tongues. These are positions which many modern archæologists decline to accept. For instance, Mr. D. G. Hogarth is inclined to regard the Phœnicians as mere huckstering traders, who followed sea-ways long before opened by others; and Dr. Farnell shows that Babylonia exercised practically no influence upon Greek cults and beliefs. On the philological side, until the Minoan inscriptions collected by Sir A. Evans are interpreted, it is premature to postulate the origin of the Ægean languages; and when the new material is available it will probably be found that Phœnician influence is much less important than the lecturer is inclined to believe.

Naturen for May contains an obituary notice, with a portrait, of Vilhelm Ferdinand Johan Storm, late conservator of the zoological collections of the Klg. Norske Videnskapsselskaps, who died on May 19 of the present year. Dr. Storm, who was born on September 28, 1835, took an active part in the affairs of the museum for more than fifty-seven years.

As a supplement to the second edition of his "Herpetologia Europæa" (Jena, G. Fischer), of which a notice appeared in NATURE at the close of 1912, Dr. E. Schreiber has published a German translation of the Latin diagnoses of the various genera and species of reptiles and amphibians given in the original work.

ACCORDING to the June number of *The Museums Journal*, the executive committee of the Museums Association is endeavouring to enlist the services of members of that body possessing expert knowledge of particular subjects—both in science and art—for the purpose of naming specimens that may be submitted to them by members and associates. Several gentlemen have already consented to undertake these duties, and it is proposed, if the scheme is well taken up, to publish lists of the names of the experts in *The Museums Journal*.

THE very remarkable success that has attended the appointment of personal guides at the British Museum and its Natural History branch in Cromwell Road induced Lord Sudeley to inquire in the House of Lords of his Majesty's Government on April 29 whether arrangements could not be made for a similar system of popular instruction in other museums and institutions in the metropolis. The motion was supported, on behalf of the Education Committee of the London County Council, by Lord Greville, and was also favourably received by other speakers. It was, however, pointed out that there were certain difficulties in the case of the National Gallery on account of students' days, and in the Wallace Collection owing to the limited amount of standing room.

IN the recently published volume of the Journal of the Royal Agricultural Society for 1912, Mr. A. D. Hall discusses the value of soil analyses to the farmer. He shows the anomalous results often obtained by a chemical examination of the soil, and deals at greater length with the importance of a better knowledge of the physical conditions in the soil. Although chemical methods may indicate certain manurial requirements of any given soil, a more trustworthy pronouncement as to its suitability or otherwise for the growth of particular crops can only be made after a soil survey.

A COMPREHENSIVE survey of the conditions of the date-sugar industry in Bengal and an account of its chemistry and agriculture are contributed by Messrs. H. E. Annett, G. K. Lele, and Bhailal M. Amin to the Memoirs of the Department of Agriculture in India (vol. ii., No. 6, 1913). Covering as it does such a wide range of questions, and being to a large extent technical in character, it is not possible to do justice here to the greater part of the paper. Much interest, however, attaches to the suggestions for future improvements, among which may be men-

tioned the introduction of the Palmyra palm, so that the production of sugar by this and the date palm would extend over the whole year. In this way the erection of large central factories might be rendered possible. Consideration of the amounts of sugar obtainable from various sugar-yielding plants shows that greater quantities are to be expected from the date palm than from sugar cane in this district, and that the average yield of the former per tree is about seven times that of the sugar maple. Greater output of sugar and greater purity of product would also accrue from the disinfection of the tapped surface and of the collecting vessels by means of formalin.

THE whole of vol. xxii., part i., of the Memoirs of the Indian Meteorological Department is devoted to tables containing monthly and annual rainfall normals at all stations maintained by the Imperial and provincial Governments where records for at least five years are available. There is no discussion attached to this very valuable mass of materials, but the number of years over which the data extend has been given for each station, in order that an estimate may be formed of the trustworthiness of the results. As might be expected from other publications of the department, some of the figures are very remarkable. Among the average annual amounts may be mentioned:—Cherrapunji (Assam), 426 in.; Málkompeth (Satara, Bombay), 274·8 in.; Launglon (Burma), 234·3 in.; Rújanpur (Punjab), 3·7 in.; Rohri (Sukkur, Bombay), 3·1 in.; Jhatput (Baluchistan), 3·0 in. At "stations outside the Indian land area" still smaller values are quoted: 2·7 in. at Aden, 2·5 in. at Bahrein (Persia) and at Perim (Asiatic Turkey).

THE October, 1912, number of the *Sitzungsberichte* of the Vienna Academy of Sciences contains a short paper by Dr. W. Altberg, of Odessa, on the use of the resistance offered by a small sphere to the passage of a current of gas past it as a measure of the velocity of the gas. He used a steel sphere 0·6 cm. diameter, suspended by a metal filament 0·0025 cm. diameter, 75 cm. long, in the centre of an air duct through which a stream of air of known velocity could be passed. The deflection of the suspension from the vertical was measured by means of a microscope reading to 0·001 cm. The author finds that the arrangement is easily set up, adjusts itself almost instantaneously to changes of velocity, and allows velocities from 70 to 270 cm. per second to be determined with accuracy by means of the relation shown by Becker to hold for lower velocities, *i.e.* the resistance offered by the sphere is the sum of two terms, the first representing Stokes's law—resistance proportional to the radius of the sphere, the velocity and viscosity of the medium—the second representing Newton's law—resistance proportional to the square of the radius, the density and the square of the velocity of the medium.

THE *Verhandlungen* of the German Physical Society for April 30 contain a preliminary account of the measurements made by Dr. R. Reiger, of the University of Erlangen, on the effect of introducing exploring electrodes of various kinds into the positive column of the discharge through a vacuum tube. The change in appearance of the discharge was studied by photography, and the effect on the total fall of potential down the tube was measured. As a result the following conclusions are drawn:—In the immediate neighbourhood of the exploring electrode free electric charges are produced, and the total fall of potential is increased by an amount which increases with the diameter of the electrode and with the gas pressure in the tube. The material of the electrode and whether it is covered with glass or not make little difference for small electrodes, but for those of large diameter metals produce greater disturbances than insulators. On both anode and kathode sides of the electrode there are large falls of potential, that on the anode side being the greater. This produces serious errors when observations with double electrodes near together are made. In all cases it is advisable to use as thin exploring electrodes as possible.

WE have received an illustrated pamphlet of seventy pages, by Herr Walther Dix ("Das selbstgefertigte Lichtbild," Quelle and Meyer, Leipzig, price 1 mark), which seems to indicate that even in Germany it is desirable to urge the advantages of photography and its applications in connection with the teaching and the study of chemistry and physics. The author divides his subject into sections, and gives examples of the various uses of photography, after referring shortly to methods of making lantern-slides and paper prints. He says that photographs can well illustrate the details of various pieces or series of apparatus and the methods of using them; the methods of experimental work; the arrangement of important technical installations, if possible, by way of preparation for a visit to the works; the latest progress in connection with recent discoveries that the student deals with in his course of study; and the graphic representation of various matters, as by curves, which, by showing clearly the points to be demonstrated, will make them more easily remembered. The examples given are taken from many different sources and well illustrated.

A REMARKABLE advance in the preparation of "conductivity water" is described by Mr. R. Bourdillon in the Transactions of the Chemical Society. In the case of one sample of water, which was stored in a vacuous vessel during five years in contact with platinum electrodes, the conductivity was reduced by Kohlrausch some years ago to 0·04 gemmho; but when the water is to be used in contact with air it has been regarded as a high standard to attain to a conductivity as low as 1 gemmho in ordinary laboratory practice. The production by Bousfield of unlimited quantities of "gemmho water" by continuous fractional distillation of tap-water satisfied this requirement admirably. A further substantial improvement was subsequently effected by fractionally distilling the product under reduced pressure. In Mr. Bourdillon's apparatus the fractionation is intermittent and not continuous, but by passing purified air through the steam as it condenses a large middle-fraction amounting to 6 or 7 litres can be collected with a conductivity of the order of 0·1 gemmho. Such highly purified water

cannot be used in contact with air, but in an enclosed vessel (protected by a current of purified air whenever it is opened) the rise of conductivity is only 0·004 gemmho per hour in contact with clean electrodes, or 0·01 gemmho in contact with electrodes that have recently been used for dilute salt-solutions. The value of this new development in measuring the conductivity of very dilute solutions is too obvious to require further emphasis.

THE second number has reached us of a new periodical, *Zeitschrift für Betonbau*, dedicated to the science of construction in reinforced concrete; it contains descriptions of various works carried out in this material, besides theoretical investigations from various engineers. The most novel feature of this number is a description of a swimming bath 25 metres long and 12 metres wide, containing 510 tons of water. This is supported on three points on the top of low piers, and is housed in a large building, the construction of which is described. A large bridge near Pressburg, with one span of 30 metres and another of 18·40, is described, and the computations of bending moments and reactions leading to the determination of the necessary reinforcement are set out very fully. The character of this paper bears ample testimony to the thorough manner in which Austrian and German engineers are taking up the designs of structures in this material.

Engineering for June 20 contains an illustrated account of the Hamburg-Amerika liner *Imperator*. This vessel left the mouth of the Elbe on Wednesday, June 11, for her first regular voyage. Her dimensions are approximately 50,000 tons register, 880 ft. in length, 98 ft. in beam, and 63 ft. in depth from main deck to keel. The depth from the upper boat-deck to keel is 101 ft. 8 in. The *Vaterland* was launched recently for the same company, and a third sister vessel is on the stocks; these vessels will be only slightly greater than the *Imperator*. The horse-power of the latter is 62,000, derived from Parsons turbines, and the speed is 22·5 knots. The vessel is equipped with eighty-three boats, sufficient for 5500 people, *i.e.* 300 more than she will carry, counting both passengers and crew. The boat-lowering gear is very complete; there is one electric motor on the boat-deck for every three boats, and there are special arrangements for maintaining horizontal the boat while being lowered. In addition to the commodore, the ship carries four captains, who have commanded large steamers successfully, and one of these will be always on watch, while the fourth takes general control of the crew.

THE Cambridge University Press has arranged for the issue of a series of volumes under the general title of "The Cambridge Psychological Library," to be edited by Dr. C. S. Myers, University lecturer in experimental psychology and director of the psychological laboratory. Among the volumes already arranged are:—"Psychology," Prof. James Ward; "The Nervous System," Prof. C. S. Sherrington, F.R.S.; "The Structure of the Nervous System and the Sense Organs," Prof. G. Elliott Smith, F.R.S.; "Psychology in Relation to Theory of Knowledge," Prof. G. F. Stout; "Mental Measurement," Dr. W. Brown; and "Collective Psychology," Mr. W. McDougall, F.R.S.

MESSRS. JOHN WHELDON AND CO. have just issued an ornithological catalogue containing titles and other particulars of more than 1500 books and papers, and including selections from the libraries of several eminent ornithologists.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES FOR JULY:—

July 1. 15h. 26m. Saturn in conjunction with the Moon (Saturn 6° 30′ S.).
3. 16h. om. Venus at greatest elongation west of the Sun.
5. 3h. om. Jupiter at opposition to the Sun.
,, 13h. 39m. Mercury in conjunction with the Moon (Mercury 3° 49′ S.).
7. 3h. om. Mercury at greatest elongation east.
16. 15h. 29m. Jupiter in conjunction with the Moon (Jupiter 4° 47′ N.).
18. 13h. om. Neptune in conjunction with the Sun.
,, 13h. 49m. Uranus in conjunction with the Moon (Uranus 3° 24′ N.).
20. 6h. om. Mercury stationary.
21. 12h. 52m. Venus in conjunction with Saturn (Venus 1° 18′ S.).
28. 3h. 12m. Mars in conjunction with the Moon (Mars 5° 41′ S.).
,, 20h. om. Uranus at opposition to the Sun.
29. 6h. 12m. Saturn in conjunction with the Moon (Saturn 6° 42′ S.).
,, 19h. 30m. Venus in conjunction with the Moon (Venus 7° 40′ S.).

MINOR PLANETS.—The April number (vol. ix., No. 9) of *The South African Journal of Science* contains an article by Mr. Robert T. A. Innes, entitled "The Minor Planet MT. 1911: and on Minor Planets in General." The Union Observatory at Johannesburg devotes a considerable portion of its time to these small bodies, and the work it does is shown in relation to the minor planet problem in general. This article will be found of particular interest to those whose astronomical work lies in other directions, for Mr. Innes writes generally on the subject of these bodies, and particularly of MT. 1911. To mention one or two points of prominent interest, he states that in 1893 no minor planet would be given a permanent number until five observations were available, but to-day such a number is not allotted until observations spread over six weeks are available, and a satisfactory orbit is computed. Reference is made to Eros, to the nearly simultaneous publication of Sir David Gill's result of the solar parallax determination from observations of the minor planets Victoria, Iris, and Sappho, the value he obtained being 8·802″±0·005″, and to Hinks's value of 8·806″±0·004″ from his fine Eros work. Dr. Metcalf's method of minor planet search, that of guiding the telescope so that the plate remains approximately at rest with regard to the usual motion of the minor planet while the stars trail, is mentioned, and numerous other important items, such as the different groups of minor planets, the arrangements for organised effort, the discovery of Palisa's MT. 1911, and its subsequent rediscovery.

CORDOBA CATALOGUE OF 5791 STARS.—Dr. C. D. Perrine, in the twentieth volume of the Results of the

National Argentine Observatory in Cordoba, presents a catalogue of 5791 stars. The work is the outcome of 28,718 observations made with the 5-in. Repsold meridian circle during the six years 1885–90. The observations are of a general nature over the southern sky, and form a continuation of the general catalogue. Auwers's list of 303 fundamental stars was observed in 1889 by Prof. Updegraff, and the results are included in this catalogue. There is also included a list of sixty-three comparison stars for the minor planet Victoria, observed in 1889 by Prof. Updegraff, and this is given separately, in addition to being included in the regular catalogue. There was no unusual change or condition of the meridian circle during the period mentioned, so far as is known, and the reductions were made in precisely the same manner and with the same system of constants as in the general catalogue. The catalogue also includes the results of a comparison with Boss's Preliminary General Catalogue of the stars common to both.

THE MILKY WAY AND THE DISTRIBUTION OF STARS WITH PECULIAR SPECTRA.—The distribution with reference to the galaxy of the many stars having peculiar spectra classed by the late Mrs. Fleming has been analysed by Mr. T. E. Espin, and the results appear in the March-April number of the Journal of the Royal Astronomical Society. The distribution evidence suggests that the order A, F, G, K, M of the Harvard classification of stellar spectra requires rearranging thus, A, G, M, K, F. The author makes some interesting speculations on the structure of the galactic system.

THE MICROSCOPE SUBSTAGE AND ITS ADJUSTMENTS.

THERE are one or two points, particularly in the substage arrangements, which are distinct and characteristic of English and Continental microscopes. In the English instrument of any pretensions it has always been the custom to provide a centring substage, and this carries both the optical portion of the substage condenser and the iris diaphragm. It has to be assumed, therefore, that the iris diaphragm is centred permanently and accurately to the optic axis of the substage condenser, its perfection therefore depending on the extent to which this assumption is justified.

In the case of the Continental microscope, where a centring substage condenser is provided, it is mounted so that the optical part is centred independently of the iris diaphragm, the latter, in fact, being mounted below the substage condenser and having certain adjustments which are in no way connected with the centring arrangement. It therefore follows that in the Continental type the iris diaphragm may be, and indeed often is, permanently out of centre with the optic axis of the objective. The substage condenser has therefore to be centred in relation to two axes, the centre of the iris diaphragm and the optic axis of the objective, which themselves are not in exact alignment. It is obvious that under such conditions the provision and use of a centring appliance for the adjustment of the optical part of the condenser will never result in correct alignment of the various parts. With the object of overcoming this defect, at least in part, some of the better Continental models have been provided with an independent adjustment to enable the mechanic to centre the condenser to the optic axis, after he has centred the iris diaphragm. The condenser is mounted in a ring provided with three screws, the setting of which admits of the optical part of the condenser being centred, but this is, of course, not an adjustment of which the average user would care to avail himself. In the English arrangement, where the iris diaphragm is correctly centred to the substage condenser, centration of the whole substage fitting results in correct alignment with the remainder of the optical system of the microscope.

For the most critical work, therefore, it would appear that the English method is to be preferred. On the other hand, where a microscope is being used for laboratory work, and is only occasionally being used for the testing of objectives or for critical purposes, there is no doubt that the Continental type has much to recommend it. The fact that the iris diaphragm may be contracted to any desired degree, and may then be shifted laterally so that oblique illumination in any azimuth and in any zone of the field of view can be obtained at will, is a great convenience, and for anything like rapid testing of objectives is almost essential.

In the English stand it becomes necessary to provide stops of various sizes and shapes, which can be placed at the back of the substage condenser, to enable oblique illumination to be obtained in any desired manner.

Where absolute accuracy is required it would appear that an arrangement in which both substage condenser and iris diaphragm are capable of independent centration might be a desideratum. In such a case the iris diaphragm would be centred first, and then the optical part of the substage condenser introduced, and that centred independently. By this means the iris diaphragm, the substage condenser, and the objective would be in exact alignment, and the arrangement would be such that work of the most critical character could be carried out. It must be admitted, however, that the conditions under which such a method would become necessary rarely, if ever, arise, so that a well-made instrument provided with the Continental type of substage, in which the iris diaphragm may be decentred, is a very desirable adjunct to any good microscope.

As an indication of the perhaps unnecessary elaboration that has obtained in English stands, one may mention the provision of a fine adjustment to the substage condenser. It is difficult to conceive under what conditions this becomes necessary. A well-made rackwork should provide all the accuracy of adjustment that is required. If it does not it either implies that the mechanical construction of the microscope leaves something to be desired, or that the user has not acquired the necessary manipulative skill to focus his substage condenser with sufficient accuracy, the latter alternative being the more probable.

AUSTRALIAN METEOROLOGY.

THE Australian Meteorological Bureau has issued a series of interesting maps showing the normal distribution of temperature and rainfall over the Australian continent. The variety of climate which Australia offers is well illustrated by these charts. The mean summer temperature of the south coast of Victoria (between 60° and 65° F. for January) is about the same as the mean summer temperature of London, while 400 miles to the north the heat is tropical, with a mean temperature of more than 80° F., increasing to more than 85° F. in the greater part of the north-west and central regions. The trend of the isotherms near the coasts shows the usual oceanic effect; they bend southwards in the winter and northwards in the summer in passing from continent to ocean. The isotherms are closest together near the southern coast in summer and near the northern coast in winter.

A fault which might be remedied in future issues is the omission of any scale of distances or parallels of latitude and longitude from the charts.

The rainfall charts have been compiled from data extending over twenty to forty years, with a few stations with only fifteen years' record, indicating that, meteorologically at any rate, Australia is no longer in relative infancy. During the summer months, when the variation of temperature is most rapid near the south coast, the rainfall is greatest on the north and north-east coasts, and the isohyets are closest together in these regions. The distribution gradually changes, and during the winter months the rainfall and its variation are greatest in the south and south-east districts. The change in the position of the isohyets from month to month is very regular; the motion is similar to that of a pendulum, the distribution in the warm months being at one end of the swing and that in the cold months at the other.

In New South Wales, at Forbes, near the centre of gravity of Australia's population, and not far from the site of the new Federal capital, there is practically no variation in the rainfall from month to month; each month has about 2 in. of rainfall. Utilising this fact and the regularity of the change for other regions, the Commonwealth Meteorologist has constructed a rainfall "clock." Isohyets of appropriate shape are drawn on a card placed beneath another card with the outline of Australia cut out of it. The lower card is rotated about an axis through Forbes, and as it moves the rainfall distribution for different months appears, the appropriate positions for each month being shown by an index mark. The remarkable regularity which renders possible this simple device leads the Commonwealth Meteorologist to suggest that Australian meteorology may be of such importance for general investigations as to warrant the establishment of observatories there, internationally supported and controlled. E. G.

THE RESEARCH DEFENCE SOCIETY.

THE Research Defence Society held its annual general meeting on Tuesday, June 24, at the Royal College of Physicians. The chair was taken by the president of the society, Sir David Gill, and there was a very large attendance. The speakers were:—Bishop Frodsham, founder of the Australian Institute of Tropical Medicine; Sir Thomas Barlow, president of the Royal College of Physicians; Lord Cromer, Sir Hugh Bell, and Mr. Waldorf Astor. The report, presented by Mr. Sydney Holland, chairman of committee, gave a good account of the society's work during the past year with special reference to the campaign against anti-vivisection shops. It stated also that the council of the Royal Society for the Prevention of Cruelty to Animals is sending out a referendum to all the members of that society. The point is, whether it was right or wrong to reject Lord Cheylesmore from the council of the Royal Society for the Prevention of Cruelty to Animals on the ground that he is a vice-president of the Research Defence Society. Seeing the advantages which animals have gained from experiments on animals, and the many restrictions placed on experiments on animals in this country, we think that a man may very properly hold office in both societies; and we are glad that Lord Cromer and Sir Hugh Bell spoke very strongly on this point.

Mr. Waldorf Astor, in an admirable speech, referred to the good news, this week, that the Government has allotted 57,000*l.* annually to research in relation to tuberculosis, and has appointed the Committee and the Advisory Council for this great work. Sir Thomas Barlow spoke of that unity of purpose which is between the men of science and the men in practice: how the doctor and the surgeon are indeed guided and helped by the physiologists and pathologists. Bishop Frodsham spoke of the Christianity of all work done, carefully and wisely, for the relief of suffering humanity; and, as Bishop of North Queensland, he has seen more than most of us of the misery caused by certain obscure tropical diseases, and has done more than most of us to alleviate it. Thus the subject which the Research Defence Society exists to popularise was presented from diverse points of view. Take what point of view we will, it is a subject of national importance.

THE BELFAST MEMORIAL TO LORD KELVIN.

THE statue of Lord Kelvin which has been subscribed for by the citizens of Belfast was unveiled by Sir Joseph Larmor, M.P., F.R.S., on Thursday last, June 19, in the presence of a large and distinguished gathering. The Chancellor of the Queen's University (the Earl of Shaftesbury, K.P.) presided, and the attendance included the Lady Mayoress of Belfast, the Vice-Chancellor of the Queen's University of Belfast, members of the Senate of Queen's University, and many of the leading citizens of Belfast.

In the course of his remarks, the chairman said that from the time of the death of Lord Kelvin the wish was uppermost in his (Lord Shaftesbury's) mind —as indeed he felt sure it was in the mind of everyone present—that there should be erected within the city of Belfast a fitting memorial to a man whose fame had gained for him a paramount position in the city of his birth and in the city with which he and his family were so intimately connected, as well as in the whole world. That day they were to see the consummation of their aspirations, and he offered his warmest thanks to Sir Joseph Larmor, who had so kindly come to perform the unveiling ceremony.

Sir Joseph Larmor then delivered an address, of which the main part is subjoined:—

I am deputed to represent on this occasion a company of subscribers, our fellow-citizens, who have thought it right that the genius of Lord Kelvin, and the great activities which kept him in the forefront of the advance of physical science in an age in which it has transformed the world, should receive permanent commemoration in the city of his birth and parentage, in the community among whom he passed the early years of his life, and to whom, in his later years, he put in an almost passionate claim that he belonged. We do not forget how profoundly he was moulded by the great city of Glasgow, with which his active career was so conspicuously associated. The intimate conferences from his early manhood with the pioneers of industrial development such as that city has possessed ever since the days of James Watt—discussions along the lines of unfolding problems of mechanical power, of naval construction, of the art of navigation—were just what was required to develop the student and natural philosopher into his other aspect, more familiar to the world at large, as the prophet and guide in the utilisation of the vast opportunities opened up, for the practical convenience of life, by modern scientific discovery. By no amount of mere natural ingenuity, after the manner of an inventor or a man of affairs, could anyone have attained to this position; an essential condition was sustained intellectual discipline such as Lord Kelvin enjoyed from his early years.

Fortunate in his home training, here and at Glasgow, under the careful and most competent direction of his father, he had completed the excellent general education which the University of Glasgow then afforded at an age when, in our leisurely days, he would still have been a schoolboy. He was thus able, like many a Scotch and Irish student before and since, to enjoy to the full the opportunities for advanced study, for initiation into the flowing tide of knowledge, which the University of Cambridge has always afforded to those who have known how to search for them with self-reliance and sincerity. And he had the good fortune to be able to combine serious studies, in a noteworthy degree, with active and fruitful relaxation; for he was one of the founders of the University Musical Society, and at the same time a prominent and successful oarsman. Thus he was not tempted to blunt his intellect, even temporarily, by early over-exertion; and though the examiners were not able to assign him the first place in the race for degrees over the limited prescribed course, even that was prejudged, for they were well aware, as one of them expressed it, that there was a man among the candidates they were to test whose pens they were scarcely qualified to mend. By the continued forethought of his father he passed on from Cambridge to Paris, then the chief centre of mathematical and physical science; he arrived provided with ample personal introductions, so that the diary which he sent home gives a most interesting account of the lives and activities of the investigators who were there at work in the middle of the last century. Young as he was, we can recognise that he moved among them on equal terms, and could impart as much as he gained. Inspection of his notebooks of this period, which fortunately have been preserved, and may in time be given to the world, shows that, as has been the case with so many men of genius, the main formative ideas came to him in early years. These rough records reveal that in his student time at Cambridge, or very soon after, he was already in effective possession of most of the advances which he gradually matured and made public during the next ten years: the period in which he was chiefly concerned with the theoretical side of electrical science. When, nearly twenty years ago, in the height of his fame, he took part in the centenary celebration of the Institute of France as one of its eight foreign associate members, he recalled his obligations to Paris and to her great men of fifty years before, in words of dignity and charm which sent a thrill of patriotic pleasure through the brilliant audience that he addressed. He was equally at home, and enjoyed equal affection and honour, among his compeers in Berlin, in Rome, in Washington; in fact, he had come in his later years to be venerated as embodying the universal ideal of the scientific spirit, transcending all limitations of nationality.

The fame and achievement of Lord Kelvin thus belong to all the world; yet we of Ulster have taken care to assert our special interest in his career. I am sure he would have cordially welcomed our claim that he is of ourselves. The connection of the Scottish universities, especially that of Glasgow, with the Ulster people has been intimate and prolonged. In the eighteenth century these great institutions were, owing to racial and religious affinities and geographical proximity, a main centre of our own higher education. But if we were thus under obligation to Scottish learning and intellect, there is also the other side of the account. In Francis Hutcheson, Ulster gave to Glasgow the pioneer of the Scottish school of philosophy, and one of the great names in the history of ethical speculation. Somewhat later we sent from Belfast to Glasgow and Edinburgh one who will always be held in honour, as chief among the founders of modern chemistry, Joseph Black, the clear-sighted discoverer of latent heat and of fixed air, the congenial friend of Adam Smith, David Hume, and Lavoisier. In our own time we gave the great man whom we now commemorate, supreme both in unfolding the intellectual foundations of physical science and in stimulating its fertile applications in an age of which they have been the special characteristic.

Our interest in Lord Kelvin has another aspect, namely, that in this city we have been in a very direct sense his scientific pupils. When some of us were students at the Queen's College, now the University, the chair of natural philosophy was held by Prof. Everett, who had come to us direct from service as Lord Kelvin's assistant in the University of Glasgow, and whose whole scientific activity and enthusiasm were directed towards the exposition of his master's fundamental work with which he had been thoroughly imbued in Glasgow; it was then fresh, and indeed largely in the making, and, it must be admitted, no easier for us (his students) to understand on that account. We had here, as professor of engineering, his elder brother, James Thomson, afterwards also given to Glasgow, a pioneer, greater than we then knew, in the consolidation of science with practice; the volume containing his scientific papers, recently published, bears witness to his ample share in the genius of the family, and to his intimate relations with Lord Kelvin. We had Thomas Andrews as professor of chemistry, whose profound scientific achievements, executed with modest apparatus of local construction, have shed permanent lustre on his native province. And not least, we had John Purser as professor of mathematics, a congenial scientific and personal friend of Lord Kelvin, at the same time in close contact with his own famous mathematical school of the University of Dublin, one of the choice minds of the time, who was wont to enchant those of us who could follow him by brilliant informal discourse about the problems of the day. The scientific work of Lord Kelvin was thus closely appreciated and studied among us here, as early as it could have been anywhere; he has been a permanent element in the intellectual life of the city of his early years, and on that account this local memorial, so spontaneously provided by his fellow-citizens, is a most appropriate tribute to his memory.

His name will pass down the ages as the outstanding guiding spirit of the period when the weapons of physical science were brought out of her secluded armoury, and turned to the reconstruction of our material civilisation. For we have now passed on rapidly from the age of steam into the age of electricity; we have had the good fortune to watch in our own day the progress of that subtle agency of silent power, until it has transformed most of the departments of industrial and social life. The dreams which were mixed with the wonder of the early electric discoverers have been more than accomplished. But this advance has become possible only by being the most conspicuous example of ordered and persistent scientific method that the world has seen. Every minute natural manifestation of electric agency, whether detected by the foresight of men like Faraday, or revealed in part by accident, has had to be accurately and closely analysed, as a prelude to eliciting its possibilities on an industrial scale. The method of true progress must have been impressed especially upon Lord Kelvin during those strenuous telegraphic years, when he was by force of circumstances dragged out of his study to battle with practical engineering difficulties—when, by submitting every phenomenon to that refined measurement and

calculation which alone can lead to long secure trains of prediction and adaptation, he transformed the problems of submarine telegraphy from a blind, impracticable tangle into an ordered science. That achievement proved to be the crucial step in preparation for the present age of electricity. His disinterested persistence, through many subsequent years, in the same self-appointed task of rational measurement of electrical quantities and their relations, with the aid of the colleagues whom his zeal enticed into the service, formed the preparation, in all essentials, for uninterrupted progress, as soon as opportunity came in the world of affairs for the larger industrial electric developments to be pushed on. When these immense engineering advances were in full evolution, he was growing old, but his eager foresight still dominated the practical field.

Only in one respect did he fall short, in the theoretical electric advance, when he arrested his fruitful trains of inference on the interconnections of these partially concealed agencies, in order to search strenuously during long years for their complete elucidation, in some form such as could be exhibited and probed in a mechanical working model. Through this partial lapse of faith, this logical reluctance to take risks in following up the incomplete clues offered by nature, it fell to the most illustrious of his pupils and disciples, Clerk Maxwell, with greater daring and temporary disregard of difficulties, yet ever stimulated and guided by his master's own most instructive and inspiring though halting efforts, to connect light and heat in close linkage with electricity and magnetism, and so embrace all branches of physical science in one compact synthesis. This has been the great fundamental achievement in physical science of our age, probably the greatest since Newton announced and developed the law of gravitation. With the eye of faith, waves precisely the same in kind as those of light, only vastly magnified in size, had thus already been familiar to the initiated for twenty years, with fully mental vision of their constitution and behaviour, flashing across space in electric pulses, when at length, by an accident such as comes only to the worthy, the crowning honour of first detecting their actual bodily existence was grasped by Hertz. Then, as is usual in such cases, once a practical start has been gained—the more recent advance in the practice of artificial flight is another example—development was pushed rapidly on in many hands, by theory and experiment working together, until phenomena that it had taken a quarter of a century for eager expert searchers to detect at all, have now become, in the form of wireless telegraphic signals, almost a commonplace of everyday life.

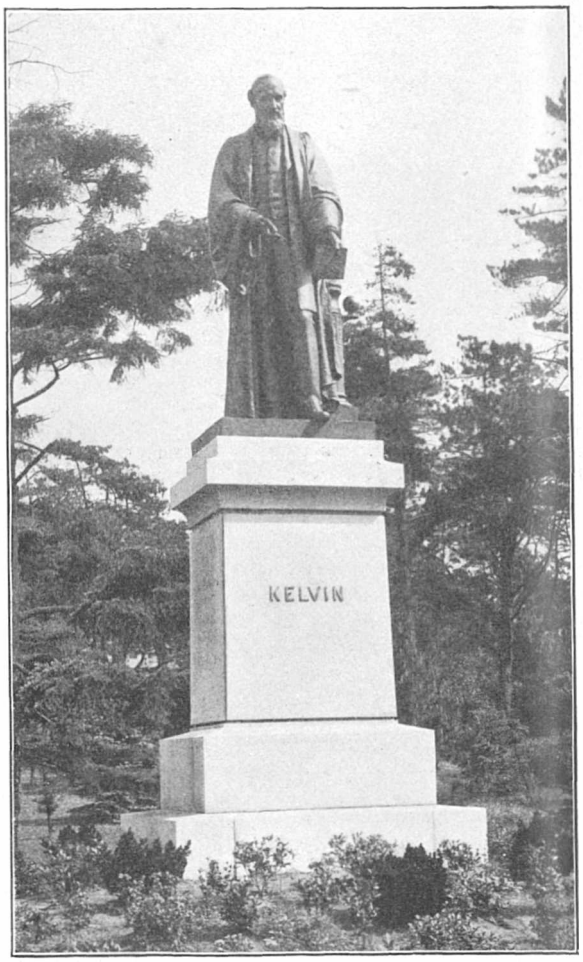
We can recall some of the personal qualities of the great man whom we here commemorate, his splendid unconscious humility, his gentleness, his keen interests and enthusiasm, and readiness to learn from every true worker and to help him onward, his patience in controversy combined with the tenacity that indicates seriousness of purpose. In the words transferred to him by Huxley, a stout opponent in more than one discussion, "Gentler knight there never broke a lance."

Sir Joseph Larmor, on concluding his address, said it was his privilege to ask Sir Robert Anderson to accept, on behalf of the city of Belfast, that memorial to one of the great men whom Belfast and the province of Ulster had given to the Empire.

Sir Robert Anderson said that he esteemed it a very high honour to be asked to occupy the place on that occasion of the Lord Mayor, and to take over from his townsmen the custody of that beautiful memorial. He could assure them for the Corporation that the statue would receive every care and attention. He had no doubt that future generations would appreciate that memorial, not only as a work of art, but also for the influence it would exercise in stimulating students to try to emulate Lord Kelvin.

The Vice-Chancellor of Queen's University proposed that the best thanks of the subscribers be given to Sir Joseph Larmor for unveiling the memorial, and for his address. Proceeding, he referred in eulogistic terms to Sir Joseph Larmor's scientific work, and spoke with pleasure of the early association of Sir Joseph Larmor as a student of the Queen's College, Belfast. The proposal was seconded by Sir Otto Jaffé, and carried with acclamation.

At the close of these proceedings, the statue was unveiled by Sir Joseph Larmor amidst the applause of the assembled company. The ceremony concluded with a vote of thanks to the sculptor.



Lord Kelvin's statue, Botanic Garden Park, Belfast. Photographed by Mr. A. R. Hogg, Belfast.

Description of the Memorial.

The Botanic Gardens is one of the public parks of Belfast, and is situated about a mile and a half from the centre of the city. The position chosen for the statue adjoins the site of the new public museum which is shortly to be built.

The statue is the work of the well-known sculptor Mr. Albert Bruce-Joy. The figure itself is about 10 ft. high, and stands on a granite pedestal of about 13 ft. in height. As our illustration shows, the late

Lord Kelvin is represented standing erect. In the extended left hand there is a design of one of his discoveries—the adaptation of a gyroscope—and in the right hand is a pencil pointing to the drawing. By the side of the figure stands a representation of the Kelvin compass.

The inscriptions are as follows:—

The front of the pedestal bears the single word "Kelvin." On the right side is the following inscription:—

Sir William Thomson, Knt.,
Baron Kelvin of Largs,
P.C., O.M., G.C.V.O.,
Born in Belfast, 1824,
of Ulster Lineage.
Died at Largs, 1907.
Lies interred in Westminster Abbey.

The inscription on the left-hand side of the pedestal reads as follows:—

President of the Royal Society,
Chancellor of the University of Glasgow,
Following 53 years of service in the
Chair of Natural Philosophy.
Pre-eminent in elucidating
The Laws of Nature and in applying them
to the service of Man.

Memorial Tablets.

It may be mentioned that the committee in charge of the memorial has made provision for the placing, in the Hall of Queen's University, of a brass tablet in memory of Lord Kelvin's brother, Prof. Sir James Thomson, who filled the chair of engineering in Queen's College, Belfast, from 1857 to 1873.

A brass tablet is also to be placed in the Common Hall of the Belfast Royal Academical Institution as a memorial to Lord Kelvin's father, Prof. James Thomson, who was professor of mathematics in the Belfast College from 1814 to 1832. In addition, a memorial plate to Lord Kelvin is to be placed in the City Hall, as well as a tablet upon the house in College Square East, Belfast, where Lord Kelvin was born.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

LEEDS.—Dr. H. S. Raper, lecturer in pathological chemistry in the University of Toronto, has been appointed lecturer in chemical physiology.

The chair of applied chemistry (chemistry of leather manufacture), which becomes vacant on October 1 by the resignation of Prof. H. R. Procter, will be occupied after that date by Dr. E. Stiasny. Dr. Stiasny has been assistant-professor in the department for the last four years, and was previously professor in the Imperial Institute for Leather Industries at Vienna.

The University has recently received a valuable addition to its scientific collections in the presentation by Mrs. A. H. Clarke, of Earl's Court, of the collection of Continental and exotic Macrolepidoptera made by her late husband. The collection enriches the entomological resources of the University by more than 12,000 specimens, all carefully set, arranged, and labelled, and to this Mrs. Clarke has generously added her husband's working library of entomological literature, itself a present of great value and utility. The University authorities wish it to be known, in conformity with Mrs. Clarke's desires, that, after the immediate work of arranging and cataloguing has been concluded, the collections will be available for reference by entomologists generally upon application to the professor of zoology at the University.

LONDON.—The Senate on June 18 re-elected Dr. W. P. Herringham as Vice-Chancellor for a second year. Four new appointments were made to University professorships, including Mr. E. H. Lamb to the chair of civil and mechanical engineering, tenable at East London College, and Dr. C. G. Seligmann to a part-time chair of ethnology at the London School of Economics. The title of emeritus professor was conferred upon Sir William Ramsay. Lord Haldane was appointed Creighton lecturer for next session.

The D.Sc. degree has been granted to E. R. Watson, an external student.

An anonymous donor has offered 300*l.* towards the institution of a lectureship in palæobotany at University College.

THE prize distribution and conversazione of King's College, King's College for Women, and King's College Theological Department will be held at King's College, Strand, on Wednesday, July 2.

THE HON. MRS. RONALD GREVILLE, daughter of the late Mr. William McEwan, a munificent benefactor of the University of Edinburgh, has presented to the University Mr. McEwan's Edinburgh residence.

THE title of emeritus professor of engineering has been conferred by the governing body of the East London College (University of London) upon Prof. D. A. Low, professor of civil and mechanical engineering, who has served in that institution for twenty-six years.

THE prize fellowship of 120*l.* offered by the Federation of University Women has been awarded to Miss M. A. Whiteley, D.Sc. Dr. Whiteley is assistant-lecturer in chemistry at the Imperial College of Science and Technology, and is the author of several communications dealing with compounds of the barbituric acid series, and published in the Proceedings and Transactions of the Chemical Society.

THE West Riding of Yorkshire Education Committee has decided to include in the vacation course to be held during August at the Bingley Training College, a laboratory course of experimental science, with lectures and discussions, under the direction of Prof. A. Smithells. This course is intended for science teachers in secondary schools, and especially for those who teach the subject to girls and desire to acquaint themselves with methods of correlating it with domestic subjects. It will relate chiefly to the subject of combustion and will discuss general questions connected with the teaching of elementary physical science, with special reference to experimental work; provide examples of the teaching of science in relationship to the phenomena and appliances of daily life and especially of domestic life; and give a connected account of the modern science of combustion and the chemistry of flame. The course is open to all teachers of science on the payment of the fees. Full particulars can be obtained on application to the Education Department, County Hall, Wakefield.

THE Royal Commissioners for the Exhibition of 1851 have made the following appointments under their scheme of science research scholarships, upon the nomination of the universities and colleges mentioned. The scholarships are of the value of 150*l.* per annum, and are ordinarily tenable for two years:—University of Edinburgh, H. Levy; University of Glasgow, A. Gray; University of St. Andrews, R. F. Thomson; University of Birmingham, W. E. Garner; University of Bristol, F. G. Wilson; University of Leeds, H. Ogden; University of Liverpool, J. H. T. Roberts; University of London, W. B. Haines; University of Manchester, J. Chadwick; Armstrong College,

Newcastle-on-Tyne, S. Robson; University College, Nottingham, T. A. Smith; University of Sheffield, C. C. Bissett; University College of North Wales, Bangor, R. Jones; University College, Cork, J. C. Johnson; University College, Galway, H. N. Morrison; McGill University, Montreal, O. Maass; Queen's University, Kingston, Ontario, J. R. Tuttle; University of Sydney, S. E. Pierce; University of Melbourne, N. R. Junner; University of New Zealand, P. W. Burbridge.

WE learn from *Science* that the total State grant to the University of California for the next biennium amounts to about 771,400*l*. Among the items contributing to this large sum may be mentioned:—Support and maintenance of the University, 80,000*l*.; agriculture—support and maintenance of all branches —140,000*l*.; replacement of buildings and equipment at Lick Observatory, 10,000*l*.; University extension, 10,000*l*.; Scripps Institution for Biological Research, 3000*l*.; 200 acres for experiment station in southern California, 12,000*l*.; laboratory building for experiment station in southern California, 20,000*l*.; the State University fund to be automatically appropriated during the coming two years for the support and maintenance of the University, amounting in total to 361,000*l*. From the same source we find that Yale University will received 95,000*l*. from the estate of Dr. Francis Bacon, who died last year. Mrs. Mary Emery has contributed 25,000*l*. to the Ohio-Miami Medical College of the University of Cincinnati for the endowment of a chair of pathology; and a sum of about 16,000*l*. from the estate of Dr. Francis Brunning has also been received by the University, the income of which will be used for the endowment of a second chair.

AN appeal for funds for the Home Science Department of King's College for Women has been issued. It is signed by Lord Rosebery, as Chancellor of the University of London, as well as by the Vice-Chancellor and Principal of the University. A site of $2\frac{1}{2}$ acres of Blundell House grounds on Campden Hill has been secured, and private gifts to the amount of 100,000*l*. have been subscribed during the last year and a half towards endowment, building of laboratories, and hostel. The London County Council has also made a maintenance grant to the department, thereby showing appreciation of the value of the courses, and the Exchequer grant to King's College for Women was made partly in respect of the work of the Home Science Department. The University has approved the granting of a diploma in household and social science, and in view of the new status thus assured it is necessary to complete the college by providing, in addition to laboratories and the hostel, lecture rooms and teaching rooms, common rooms for staff and students, and that accommodation essential to the life of a college or institution of a university character. A library will be needed, also a refectory. For this purpose a further sum of 50,000*l*. is required. Donations may be sent to the bursar, Home Science Department, King's College for Women, 13 Kensington Square, W.

DR. F. W. MOTT gave the third Chadwick lecture at the Royal Society of Arts on Friday, June 20. Sir James Crichton Browne was in the chair. The subject of the lecture was "The Influence of Nutrition and the Influence of Education on Mental Development." Dr. Mott commenced by pointing out the close association of body and mind; he observed that the child's brain, in order to grow and develop mental powers, must have the innate capacity to grow, and a proper supply of pure oxygenated blood wherewith it can take up the necessary materials for growth and function. A pure blood-supply, he argued, could only occur in a normal healthy body in which all the organs and tissues were cooperating for the common weal; the body could only be maintained in health by adequate and proper nourishment amidst hygienic surroundings. He next referred to collective and individual responsibility in respect to the child's nurture and mental development, and proceeded to give physiological reasons why the brain required stimulus from without for development. The importance of the tactile muscular sense, which contributes to every other sense, was emphasised, and he showed how the minds of Laura Bridgeman and Helen Keller were developed to a high degree of intelligence through the finger-tips. Sleep, rest of the brain, and the storage of mental energy were next touched upon as an important factor in the development of mind. Dr. Mott then passed on to consider the improvements in some modern systems of education; the happy passing away of the old system of payment of teachers by results, the desirability of educating according to physiological principles of development of function. The object of education should be to develop the physical, intellectual, and moral characters of the individual so as to make a final efficient product to fill a place in the social organism.

SOCIETIES AND ACADEMIES.

LONDON.

Geological Society, June 11.—Dr. Aubrey Strahan, president, and afterwards Mr. W. Whitaker, in the chair.—Dr. Hans **Salfeld**: Certain Upper Jurassic strata of England. The localities dealt with are the Dorset coast from Kimmeridge to Abbotsbury, and the Wiltshire exposures at Swindon and Westbury. The formations concerned are the Portlandian, Kimmeridgian, and for a starting-point the Upper Oxfordian. The Upper Oxfordian = upper part of the English Corallian (+Kimmeridge Clay locally) is divided into three zones, found at Osmington, Westbury, and Swindon. The Kimmeridgian is divided into five zones, and is equal mainly to the Lower Kimmeridge Clay of English authors. The Portlandian is divided into nine zones; but the term as used includes the Portland Oolites, Portland Sands, and Upper Kimmeridge Clay of British authors. Three new genera of ammonites are named, and two new zonal species of ammonites defined.—A. **Jowett**: The volcanic rocks of the Forfarshire coast and their associated sediments. In Forfarshire these sediments are frequently amygdaloidal, the production of the cavities having been accompanied by the buckling and fracturing of the layers of sediment. Such effects may result from the pouring of molten rock over wet unconsolidated sediment; steam being produced within the sediment, but unable to escape owing to the presence of the overlying rock. Further evidence of the pouring of molten rock into water is furnished by the occurrence of a rude pillow-structure in some of the lavas. Several lenticular conglomerates are interbedded with the volcanic rocks, resting upon eroded surfaces of the latter. Most of the volcanic rocks are olivine-basalts, rhombic pyroxene as well as olivine sometimes being present. Some contain rhombic pyroxene to the exclusion of olivine. The fine sediments consist of a variable proportion of quartz and mica and a little felspar, together with chlorite, iron oxides, and occasional minute fragments of volcanic rock. Calcite, quartz, chalcedony, and chlorite are the commonest minerals in the amygdales, in both

lavas and sediments.—J. **Parkinson**: A group of metamorphosed sediments situated between Machakos and Lake Magadi in British East Africa.

Physical Society, June 13.—Prof. C. H. Lees, vice-president, in the chair.—G. E. **Bairsto**: Some experiments on tinfoil contact with dielectrics. This paper describes some experiments showing how the accuracy of the different kinds of electrical measurements that are made on condensers is influenced by the use of an imperfect tinfoil contact. While considerable errors are liable to be made in deducing the specific direct-current conductivity of a dielectric between tinfoil armatures, the same is not true for measurements of the alternating-current conductivity. The influence of the bad contact is twofold. First, it decreases the apparent capacity by inserting in series with the condenser under test a very large but still finite air condenser. This causes a decrease in the measured conductance. Secondly, because of the decrease in area of contact, it decreases the magnitude of that component of the conductivity which is independent of the frequency—*i.e.* the purely ohmic conductivity. It is shown experimentally, even under the worst possible circumstances, the dielectric being only lightly bound up with the interleaved tinfoil, that for telephonic frequencies the maximum difference between the observed conductivity and true conductivity is 15 per cent., and of capacity 5 per cent. With the condenser tightly bound with tape and wedges of wood inserted, the maximum difference was only 4·5 per cent. in the conductivity and 2·5 per cent. in the capacity. Finally, the influence of imperfect contact upon the accumulation of residual charge is considered.—G. D. **West**: A method of measuring the pressure of radiation by means of thin metal foil. The pressure of the radiation emitted by a carbon filament lamp at a distance of a few centimetres is sufficient to cause a microscopically measurable deflection of the end of a suspended strip of gold or aluminium foil, and by this means the radiation pressure can be calculated knowing the weight of the strip. The results agree to within about 10 per cent. with the energy content per cubic centimetre as measured by the initial rate of rise of temperature of a copper plate exposed to the radiation. The best results are obtained by working in an atmosphere of hydrogen, 1 cm. to 2 cm. pressure, but good results are obtained with hydrogen at atmospheric pressure. Air at 1 cm. to 2 cm. pressure also gives good results.—Dr. W. **Wilson**: The emission of electricity from hot bodies and the quantum theory. The paper gives a theory of the emission of electricity from hot bodies which is based on the quantum theory of energy. A formula connecting the thermionic current and the temperature of the emitting body is deduced. This formula closely resembles that of Richardson, and agrees slightly better with experimental results.

Mineralogical Society, June 17.—Dr. A. E. H. Tutton, F.R.S. president, in the chair.—W. L. **Bragg**: Crystal-structure as revealed by Röntgen radiation. An analysis of the diffraction patterns obtained when X-rays traverse a section of a crystal shows that in many simple crystals the diffraction is caused by a set of points arranged on a space-lattice. That is the case when the molecule contains either a single heavy atom of at least twice the atomic weight of the other constituents, or only two atoms of nearly the same atomic weight. By comparison of the patterns given by certain alkaline halides, such as KCl and KBr, a definite structure of these cubic crystals is clearly indicated, and it would appear that the atoms are arranged on a space-lattice the elementary parallelopiped of which is a cube, alternate atoms being along the axes, so that the atoms of one kind form a face-centred cubic space-lattice. These conclusions are confirmed by a comparison of the distances between planes parallel to the various faces of these crystals carried out by means of the X-ray reflection-spectrometer, and it appears that a single atom is associated with each point of the space-lattice which diffracts, in the case, for instance, of the alkaline halides, calcite, fluor, blende, and pyrites. If the suggested structure of the crystals is correct, a simple calculation gives the absolute wave-length in centimetres of the homogeneous components in the X-ray beam from a platinum antikathode.—H. V. **Ellsworth**: The crystal habit of topaz from New Brunswick, Canada. Topaz, a rare mineral in Canada, occurs in York County, New Brunswick, associated with wolframite, molybdenite, and a little fluor. On the crystals the forms 110, 120, 011, 112, are prominent, but other pyramid and prism forms are sometimes present, sixteen forms altogether being observed. Dull faces were coated with silver by Brashear's process, in which an ammoniacal solution of silver nitrate is reduced by a sugar solution.—Dr. G. T. **Prior**: The meteoric stone which fell at Baroti, Punjab, India, in September, 1911. The stone, which belongs to the "intermediate chondrite" group of Tschermak's classification, was found on analysis to contain about 9 per cent. of nickel-iron and 7 per cent. of troilite, which were disseminated in small particles through a colourless matrix of enstatite and olivine showing only few chondrules.—Dr. A. W. **Gibb**: Kämmererite from Unst, Shetland Islands.

Royal Meteorological Society, June 18.—Mr. C. J. P. Cave, president, in the chair.—J. S. **Dines**: Pilot balloon observations in Barbados, 1911–12. These balloon ascents were carried out by Prof. J. P. d'Albuquerque and other gentlemen, on behalf of the joint upper air committee of the Royal Meteorological Society and the British Association. Great difficulties were experienced in carrying out the work, the most serious of which was due to the adverse effect of the climate of Barbados on the rubber fabric of the balloons, thus causing them to deteriorate more rapidly than in colder regions. Consequently no very high ascents could be obtained.—H. W. **Braby**: The Harmattan wind of the Guinea coast. This is a north-east wind which blows during the winter months along the coast of Upper Guinea from French Guinea to the Cameroons. It is exceedingly dry and brings with it fine sand which enters the crevices of doors and windows, covering everything with a film of dust. The sun is partially obscured and distant objects become invisible. This wind, which blows intermittently from November to March, is locally known as "the doctor."—Dr. E. C. **Snow** and J. **Peck**: The correlation of rainfall. The authors dealt with the monthly rainfall from a number of stations in the south-eastern counties of England for the four years 1908–11, and found that the rainfall in two or three of the months is more highly associated with that in certain other months than with the rainfall in the remaining months.

DUBLIN.

Royal Irish Academy, June 9.—Prof. Sydney Young, F.R.S., vice-president, in the chair.—R. **Southern**: Clare Island reports. (1) *Polychaeta errantia*. In this paper the families Syllidæ to Paraonidæ were treated systematically. The total number of species found in these families was 143. Of these, nine were described as new, belonging to the genera Sphærosyllis (1), Pionosyllis (1), Streptosyllis (2), Opistho-

donta (1), Pholoë (1), Prægeria (1), Mystides (1), and Paronides (1). A new genus, Prægeria, was described, belonging to the family Pisionidæ, previously known only from the west coast of South America. In addition, twenty species were added to the British fauna. (2) Hirudinea. The leeches found in the Clare Island area comprise eleven species, of which six are freshwater species, and five are marine. Of the freshwater forms, *Hemiclepsis marginata* was found for the first time in Ireland.—E. **Heron-Allen** and A. **Earland**: Foraminifera from the area of the Clare Island Survey. The authors have worked out as independent units of their study thirty-seven stations in the area. Of these, eleven were shore-sands, five were dredgings taken by themselves from small boats, and the rest were dredgings made by them on board the fisheries cruiser *Helga*, kindly placed at their service by the Irish Fisheries Board. The authors record fifteen species new to science, thirty-five species new to Great Britain, and twelve species recorded for the second time in British waters. The most important contribution to zoology is a complete revision and rearrangement of the genus Discorbina, the affinities of which have become almost hopelessly confused in the literature of the subject. Altogether two hundred and ninety-nine species are recorded from the district.

PARIS.

Academy of Sciences, June 16.—M. F. Guyon in the chair.—P. **Appell** and H. **Vergne**: A transformation of a movement of a given conservative holonomial system into the movement of another system given the same freedom.—Charles **Moureu** and Georges **Mignonac**: The ketimines. It is suggested that imines derived from aldehydes of the type R.CH : NH should be termed aldimines, whilst those derived from ketones of the type RR′.C : NH are called ketimines. A new general method of preparing the latter is described based on the condensation of a nitrile with alkylmagnesium bromide, and the treatment of the compound thus formed with hydrochloric acid in dry ether under special conditions. Eight ketimines have been prepared, the properties of which are given.—M. de **Forcrand**: The Trouton coefficient and the heat of vaporisation of pure bodies boiling at low temperatures. Data for helium. The empirical formula recently proposed by the author is applied to the cases of chlorine, radium emanation, oxygen, nitrogen, hydrogen, and helium, and the values calculated for the latent heats of vaporisation compared with the experimental figures; the agreement is fairly satisfactory. The case of helium is dealt with in detail.—Eugène **Fabry**: An attempt at a demonstration of Fermat's theorem.—H. **Jonas**: A transformation which depends on a partial differential equation of the third order.—Paul **Montel**: Total differentials and monogenous functions.—Michel **Petrovitch**: Hypertrigonometric series.—Ch. **Platrier**: The holomorphic solutions of certain linear integral equations of the third species.—Theodor **Poschl**: The canonical equations of non-holonomial systems.—Z. **Carrière**: A new method of measuring the velocity of fluids. A small jet of steam is introduced into the flowing gas the velocity of which it is required to measure. A series of small isolated clouds is formed, which are studied by a rotating mirror and a formula deduced giving the velocity.—Marcel **Moulin**: The terminal curves of a chronometer balance spring.—Pierre **Weiss**: The magnetisation of crystals and the hypothesis of the molecular field.—G. **Sagnac**: Interferential strioscopes and simplified interferometers with inverse circuits. Stationary vibrations on a transparent silver film.—F. **Bodroux** and F. **Taboury**: The bromination of some ketones and some secondary hydroaromatic alcohols. The method of bromination of *cyclo*hexanone and *cyclo*hexanol described in a previous paper has been extended to some homologues of these compounds.—J. **Durand**: The fossil shells in inclusions in the clear crystals of gypsum of the Oligocene at Narbonne. The shells observed include Potamides, Lymnœa, Planorbis, and Helix. The inclusion of such shells in gypsum crystals appears not to have been noted before; it is of interest as regards the theory of the formation of certain gypsums.—L. **Reutter**: Chemical researches on cocoa seeds.—P. A. **Dangeard**: The action of radiation in a mixture of colouring matters. A mixture of chlorophyll and pinaverdol was exposed on a collodion film to light; the pinaverdol is transformed and finally destroyed by the energy absorbed by the chlorophyll. Pinaverdol exposed under similar conditions in the absence of chlorophyll to light is unaffected.—Y. **Manouélian**: Researches on the cardiac plexus and on the innervation of the aorta.—Marcel **Belin**: The action of oxidising substances on toxins *in vivo*. The experiments were made with guinea-pigs and the oxidising substance employed was sodium chlorate in doses of 0·08 gram per kilogramme of body weight. A favourable action was observed with typhoid fever and streptococcus infections.—Charles **Nicolle** and A. **Conor**: Vaccinotherapy in whooping-cough. Inoculation with living cultures of Bordet's micro-organism resulted in cure of about one-third of the cases, improvement in a third, and the remainder were stationary. One hundred and twenty-two children were treated, and in no case was the inoculation followed by any general or local reaction.—M. Emm. **Pozzi-Escot**: Researches on the mechanism of the acclimatisation of yeasts to formaldehyde. Formaldehyde loses its antiseptic properties in yeast solution owing to its combination with the amido-compounds present. There is no evidence that formic acid is formed by oxidation.—W. **Kopaczewski**: An analytical dialyser.—Henri **Agulhon**: The action of boric acid on zymase; comparison with the action of phosphates.—Mme. and M. A. **Chauchard**: Quantitative study of the action of monochromatic ultra-violet rays on amylase. The photochemical action of the ultra-violet rays on amylase is proportional to the absorption of these rays by the solution containing the ferment.—Jean **Bielecki** and Victor **Henri**: Quantitative study of the absorption of the ultra-violet rays by monoamines, djamines, nitriles, carbylamines, amides, and oximes of the fatty series.—H. **Zilgien**: The transformation of calomel into soluble mercury salts in the digestive fluids.—Emile **Haug**: The western termination of Sainte-Baume.—Léon **Bertrand** and Antonin **Lanquine**: Tectonic observations in the neighbourhood of Grasse.—E. Hernandez **Pacheco**: The Miocene mammals of Palencia in the Spanish *Meseta*.—Carl **Störmer**: An expedition for the observation of the aurora borealis at Bossekop in the spring of 1913. Six hundred and thirty-six pairs of simultaneous photographs of the aurora were taken, of which 450 pairs were good enough to furnish material sufficient to calculate with great precision the form, situation, and altitude of the principal species of the aurora borealis.

CAPE TOWN.

Royal Society of South Africa, May 21.—The president in the chair.—A. G. **Stigand**: Notes on Ngamiland. A general account of Ngamiland and its inhabitants.—H. A. **Wager**: Some new South African mosses.—W. A. Douglas **Rudge**: Magnetic observation taken at Bloemfontein. In this paper some account is given of the diurnal range of the declination at Bloemfontein during the period from August to December, 1912.

Tables are given showing the daily range of the variation, and also the times of the maximum and minimum declinations to the east. The mean value of the declination is about 24° W. The greatest deviation from this occurs during the afternoon, and amounts in some cases to 7·2 minutes of arc, less than 24°. The total change in the declination has been as much as 10·8 minutes in the day. Twelve curves are given. The change in the position of the maximum, and also of the range, is of the same order as that noted by General Sabine in the records taken at Cape Town more than sixty years ago.—R. B. **Thomson**: Note on the vertebral column of the Bushman race in South Africa. The object of the investigation was to determine whether racial character could be said to exist in the cervical and thoracic vertebræ, such having already been pointed out in the lumbar and sacral regions. The results would tend to show that the bodies of the cervical and thoracic vertebræ are relatively narrower in their anterior-posterior diameter, and deeper in their vertical depth by about 5 per cent as compared with Europeans. The vertebral foramen in both regions is relatively longer, but not to such a marked extent in the thoracic region. The vertical anterior and posterior depths of the bodies of the cervical and thoracic vertebræ show that these vertebræ, in common with the lumbar, are not adapted to the vertebral curves. The adaptation of the curves must therefore be purely undertaken by the cartilaginous disc.

CALCUTTA.

Asiatic Society of Bengal, June 4.—Rasik Lal **Datta**: The action of nitrosyl chloride on secondary amines, methylbenzylnitrosamine and ethylbenzylnitrosamine. The amines experimented with were methylbenzylamine and ethylbenzylamine, the corresponding nitrosamines being obtained as yellowish oils.—Sarat Chandra **Jan**: A new compound of ethylacetoacetate with mercuric oxide. The preparation of the compound $3HgO,4CH_3COCH_2COOC_2H_5$ is described.—Rasik Lal **Datta** and Haridas **Mukherji**: The double mercuri-periodides of substituted ammonium bases. Terrapropylammonium mercuri-periodide. A description of the preparation of the salt $5N(C_3H_7)_4I,HgI_6$ is given.—Hem Chandra **Das-Gupta**: Two-shouldered stone implements from Assam. A short note describing two small stone adzes approaching the Burmese type, obtained from the districts of Tezpur and Cachar in Assam and now in the collection of prehistoric antiquities of the Indian Museum. The occurrence of these implements in areas through which the wave of Khasia immigration may have passed is of some interest in view of the relationships which exist between this tribe and the Mon-Hkmer peoples of Burma.—Prof. George H. **Carpenter**: A new springtail from Galilee. In describing a new species of Cyphoderus from near Tiberias the author notes its resemblance to forms from the valley of the White Nile.—Dr. N. **Annandale**: Polyzoa from the Lake of Tiberias. A large number of specimens of Phylactolæmatous Polyzoa were obtained in the Lake of Tiberias, but only two species were represented, a hitherto undescribed Plumatella, remarkable for its yellow lophophore, and *Fredericella sultana*, Blomh. Reasons are given for regarding the Galilean race of the latter as distinct from the common European form, and particulars of its biology are noted.—Dr. N. **Annandale**: Note on a sponge larva from the Lake of Tiberias. Free-swimming larvæ of Nudospongilla were found to agree in the more important characters with those of Spongilla. In view of the resemblance between the skeleton of the former genus and that of some marine sponges the point is of interest.

BOOKS RECEIVED.

U.S. Department of Agriculture. Weather Bureau. Bulletin x. Hurricanes of the West Indies. By Prof. O. L. Fassig. Pp. 28+xxv plates. (Washington: Government Printing Office.) 1.50 dollars.

Die Süsswasser-Flora Deutschlands, Oesterreichs und der Schweiz. Edited by Prof. A. Pascher. Heft 2, 3, 9, 10. (Jena: G. Fischer.) 5 marks, 1.80 marks, 1.50 marks, 4 marks respectively.

Le Monde Polaire. By O. Nordenskjöld. Traduit du Suédois par G. Parmentier et M. Zimmermann. Pp. xi+324+xx plates. (Paris: A. Colin.) 5 francs.

Les Pyrénées Méditerranéennes. Etude de Géographie biologique. By Prof. M. Sorre. Pp. 508+xi plates. (Paris: A. Colin.) 12 francs.

L'Espèce et son Serviteur (Sexualité, Moralité). By Prof. A. Cresson. Pp. 347. (Paris: F. Alcan.) 6 francs.

Der Manihot-Kautschuk. Seine Kultur, Gewinnung und Präparation. By Prof. A. Zimmermann. Pp. ix+342. (Jena: G. Fischer.) 9 marks.

The Archæological Survey of Nubia. Report for 1908–9. Vol i., part i., Report on the Work of the Season, 1908–9. Part ii., Catalogue of Graves and their Contents. Pp. v+209. Vol ii., Plates and Plans accompanying vol. i. Pp. 16+56 plates+xx plans. (Cairo: Government Press.) L.E.2 the two vols.

Memoirs of the Indian Museum. Vol iii., No. 3. Indian Trypaneids (Fruit-flies) in the Collection of the Indian Museum. By Prof. M. Bezzi. Pp. 53–175 +plates viii–x. (Calcutta: Baptist Mission Press.) 6 rupees.

Measures of Proper Motion Stars, made with the 40-inch Refractor of the Yerkes Observatory in the Years 1907 to 1912. By S. W. Burham. Pp. iv+311. (Washington: Carnegie Institution.)

An Introduction to the Chemistry of Plant Products. By Dr. P. Haas and T. G. Hill. Pp. xii+401. (London: Longmans and Co.) 7*s*. 6*d*. net.

Dent's Practical Notebooks of Regional Geography. By Dr. H. Piggott and R. J. Finch. Book vi. (London: J. M. Dent and Sons, Ltd.) 6*d*. net.

Practical Mathematics. First Year. By A. E. Young. Pp. vii+124. (London: G. Routledge and Sons, Ltd.) 1*s*. 6*d*. net.

Bacon's New Series of County Contour Hand Maps. 16 Maps. (London: G. W. Bacon and Co., Ltd.) 1*d*. net each.

Transactions of the Royal Society of South Africa. Vol. iii., part 2. Pp. 187–339+xiv. (Cape Town: Royal Society of South Africa.) 15*s*.

Livingstone College Year Book. Centenary Number. (Leyton: Livingstone College.) 6*d*.

Carnegie Endowment for International Peace. Year Book for 1912. xvi+165. (Washington.)

Die Bestimmung der Elemente des Erdmagnetismus und ihrer zeitlichen Aenderungen. By Dr. H. Fritsche. Pp. 96+12 charts. (Riga: Müllerschen Buchdruckerei.)

Gas Analysis. By Prof. L. M. Dennis. Pp. xvi+434. (London: Macmillan and Co., Ltd.) 9*s*. net.

Liquid Air, Oxygen, Nitrogen. By G. Claude. English edition, corrected and brought up to date by the author. Translated by H. E. P. Cottrell. Pp. xxv+418. (London: J. and A. Churchill.) 18*s*. net.

The Resistance of the Air and Aviation. Experiments conducted at the Champ-de-Mars Laboratory. By G. Eiffel. Second edition, revised and enlarged.

Translated by J. C. Hunsaker. Pp. xvi+242+xxvii plates. (London: Constable and Co., Ltd.) 42*s*. net.

Catalogue of the Lepidoptera Phalænæ in the British Museum. Vol. xii. By Sir G. F. Hampson, Bart. Plates cxcii–ccxxi. (London: British Museum; Longmans and Co.)

Catalogue of the Ungulate Mammals in the British Museum (Natural History). Vol i. By R. Lydekker. Pp. xvii+249. (London: British Museum; Longmans and Co.)

Catalogue of the Books, Manuscripts, Maps, and Drawings in the British Museum (Natural History). Vol iv. Pp. 1495–1956. (London: British Museum; Longmans and Co.)

The Oxford Geographies. Edited by A. J. Herbertson. Animal Geography. By Dr. M. I. Newbigin. Pp. 238. (Oxford: Clarendon Press.) 4*s*. 6*d*.

Modern Electrical Theory. By Dr. N. R. Campbell. Second edition. Pp. xii+400. (Cambridge University Press. 9*s*. net.

The Land of the Blue Poppy: Travels of a Naturalist in Eastern Tibet. By F. K. Ward. Pp. xii+283+xxxix plates+v maps. (Cambridge University Press.) 12*s*. net.

Treatise on General and Industrial Organic Chemistry. By Dr. E. Molinari. Translated from the second enlarged and revised edition. By T. H. Pope. Pp. xix+770. (London: J. and A. Churchill.) 24*s*. net.

Tables Annuelles de Constantes et Données Numériques de Chimie, de Physique et de Technologie. Vol. ii. Année 1911. Pp. xl+759. (London: J. and A. Churchill.) 28*s*. 6*d*. net.

Junk's Natur-Führer. Tirol, Vorarlberg und Liechtenstein. By Prof. K. W. von Dalla Torre. Pp. xxiv+486+map. (Berlin: W. Junk.) 6 marks.

Eine geographische Studienreise durch das westliche Europa. By W. Hanns and others. Pp. iv+75. (Leipzig and Berlin: B. G. Teubner.) 2.40 marks.

Chemische Plaudereien. By L. Wunder. Pp. v+42. (Leipzig and Berlin: B. G. Teubner.) 1 mark.

Physikalische Plaudereien. By L. Wunder. Pp. v+47. (Leipzig and Berlin: B. G. Teubner.) 1 mark.

Mittelmeerbilder: Gesammelte Abhandlungen zur Kunde der Mittelmeerländer. By Dr. T. Fischer. Zweite Auflage. By Dr. A. Rühl. Pp. vi+472. (Leipzig and Berlin: B. G. Teubner.) 7 marks.

Handwörterbuch der Naturwissenschaften. Edited by E. Korschelt and others. Lief. 45 and 46. (Jena: G. Fischer.) 2.50 marks each Lief.

La Région du Haut Tell en Tunisie. By Dr. C. Monchicourt. Pp. xiv+487+plates. (Paris: A. Colin.) 12 francs.

Société Française de Physique. Procès-Verbaux et Résumé des Communications Faites Pendant l'Année 1912. Pp. 124. (Paris: Gauthier-Villars.)

Société Française de Physique. Annuaire 1913. Pp. xvi+90. (Paris: Gauthier-Villars.)

Reports from the Laboratory of the Royal College of Physicians, Edinburgh. Vol. xii. (Edinburgh: (Oliver and Boyd.)

Anaphylaxis. By Prof. C. Richet. Translated by Dr. J. M. Bligh. Pp. xii+266. (Liverpool University Press; London: Constable and Co., Ltd.) 3*s*. 6*d*. net.

Further Problems in the Theory and Design of Structures. By E. S. Andrews. Pp. viii+236. (London: Chapman and Hall, Ltd.) 7*s*. 6*d*. net.

DIARY OF SOCIETIES.

THURSDAY, JUNE 26.

ROYAL SOCIETY, at 4.30.—Phosphorescence of Mercury Vapour after Removal of the Exciting Light: F. S. Phillips.—Light Sensations and the Theory of Forced Vibrations: Dr. G. J. Burch.—The Fluctuation in the Ionisation due to γ Rays: P. W. Burbidge.—The Force Exerted on a Magnetic Particle by a Varying Electric Field: J. G. Leathem.—The Luminosity Curve of a Colour-blind Observer: Dr. W. Watson.—A Critical Study of Spectral Series. Part iii. The Atomic Weight Term, and its Import in the Constitution of Spectra: Prof. W. M. Hicks.—A Band Spectrum attributed to Carbon Monosulphide: L. C. Martin. *And other Papers.*

FRIDAY, JUNE 27.

PHYSICAL SOCIETY, at the National Physical Laboratory, Bushy House, Teddington, from 3.30.—Demonstrations of Work in Progress in the Laboratory.

MONDAY, JUNE 30.

JUNIOR INSTITUTION OF ENGINEERS, at 8.—Gustave Canet Lecture: The Working Fluid of Internal Combustion Engines: Dr. Dugald Clerk.

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