THURSDAY, JUNE 23, 1910.

INDIAN ENTOMOLOGY.

Indian Insect Life; a Manual of the Insects of the Plains (Tropical India). By H. Maxwell-Lefroy, assisted by F. M. Howlett. Pp. xii+786. (Calcutta and Simla: Thacker, Spink and Co.; London: W. Thacker and Co., 1909.)

THIS handsome volume reflects great credit upon its authors, who occupy the posts of entomologists to the Imperial Department of Agriculture for India; and also upon the staff of the Agricultural Research Institute at Pusa, under the auspices of which the observations and specimens have been collected on which the present work is based.

In some prefatory remarks Mr. Maxwell-Lefroy informs us that the book is largely a product of his spare time and scanty holidays, adding that "such a volume has been so much required that he has felt that even an imperfect one was better than none." His estimate of his own work is modest—

"It may be," he says, "that a better volume will be built up on this basis, when the study of Indian entomology is further advanced. I may also emphasise the fact that where little is said, little is known, and the blanks in the book are designedly prominent to emphasise the enormous scope there is for work. I trust also that the volume may be a real stepping-stone to better things, and may help those who are advancing our knowledge of the insect life of India."

Bearing in mind the limitations thus indicated by the author himself, we cannot but congratulate him and his collaborators on the amount of useful information they have contrived to embody in their work, and on the care which has evidently been expended on its get-up and general appearance. So sumptuous indeed is the book in these latter respects that the title of "Manual" seems to be somewhat of a misnomer.

A marked feature of the book is its admirable series of illustrations. These have mostly been prepared by the artist staff of the Pusa Institute. Both the half-tone blocks and the line engravings show good workmanship; while the colour-plates, carried out by the Calcutta Phototype Company, "under very trying climatic conditions and for the first time in India," bear comparison with the best of their class. Many of the artists engaged on these illustrations are, we are informed, natives of India, trained in art schools of that country. Their work is highly creditable to all concerned.

The plan of the book is simple. It opens with an introduction of about forty pages, in which are briefly discussed the structural characters of the class Insecta, with its position in the zoological scale, the instincts and habits of insects, their classification, and the principles of nomenclature as applied to the group. The methods of identification of specimens and the existing appliances for the study of entomology in India are also noticed, and a section is devoted to a useful exposition of Indian zoogeography. The food and habitat of insects are dealt with in a practical manner, and the introduction closes with a reference to the beneficial and other activities of insects in relation to man.

Following the introduction comes a systematic account, profusely illustrated, of each of the nine orders into which for present purposes the authors divide the class of insects. There is, of course, much divergence of opinion, and more of practice, among entomologists on the subject of classification; and the authors do wisely in warning the student against "getting to attach too much importance to any classification systems except as working conventions which have as much regard to truth as circumstances will allow." The characteristics of each order, and those of its subdivisions, are carefully given, and the most noteworthy specific forms under each head are more or less fully dealt with, sometimes, especially those of economic importance, in considerable detail. Many valuable observations on habits and life-histories are incorporated in this portion of the work, which covers the ground in as satisfactory a manner as could be expected from the limited space at the authors' disposal.

Finally, we have, somewhat after the manner of the excursuses in Scudder's well-known work on the butterflies of the eastern United States, a number of brief treatises of a general kind, dealing with such subjects as cosmopolitan insects, gregarious habits, attraction to light, insects and flowers, migration, deceptive colouring with other means of protection, galls, silk, the size of insects, and insect noises. These essays, which are interspersed among the systematic sections of the book, include observations many of which are of great interest and value. As an example of a good field observation, which many travellers will be in a position to confirm, we may cite the following:—

"If one goes into a grass field, intent on observing large grasshoppers, one will suddenly see a brightly coloured insect jump up, fly a little distance and disappear. . . . The eye has followed the bright colours and loses the insect as these disappear with the closing of the wings at the completion of the flight. One's eye is not seeking the cryptically-coloured grasshopper, which thus escapes attention, even if one could easily see the motionless insect."

The modesty of the claims put forward by the authors tends to disarm criticism; nevertheless, it may perhaps be suggested that some of the topics, especially those dealt with in the introduction, might with advantage have been treated more fully. It is unfortunate, too, that the authors allow themselves to be influenced by the somewhat silly outcry that has been raised in some quarters against bionomic conclusions "drawn from museum specimens." No naturalist ought to undervalue either museum study or field observation. Each is an essential factor in unravelling the problems of evolution, and each has furnished the other with important suggestions for further research. Field work on mimicry, in especial, owes much to the stimulus afforded by the careful study of material preserved in collections.

We do not agree (p. 419) that there is much difficulty in distinguishing *Terias hecabe* in all its forms from other species of Terias, nor that the colouring

of the upper surface of *Coletis* (or *Teracolus*) *amata* is well described as "orange." "Thaxter" on p. 405 is a misprint for Thayer. These, and a few similar slips, are but slight blemishes on a thoroughly useful book. F. A. D.

THEORETICAL STUDIES IN RELATION TO NAUTICAL SURVEYING.

Hydrographic Surveying: Elementary—for Beginners: Seamen and Others. A Practical Handbook. By Commander Stuart V. S. C. Messum. Pp. xiv+504. (London: C. Griffin and Co., Ltd., 1910.) Price 12*s.* net.

THEORETICAL considerations dealing with the effect of errors of observation constitute one of the distinctive features of this book. It may be doubted whether such investigations are appropriate to a practical handbook intended for beginners; and in some instances, where they are merely of academic interest, their introduction is unnecessary. The dissertations on the manipulation of the station pointer, for example, are diffuse and of little practical utility. The chapter on the principles governing the selection of objects for fixing positions contains certain theorems which will be of interest to those already familiar with the subject; but beginners would find concise directions as to what goes to make a good fix more helpful to them. The discussions bearing on the "circle of equivalents" bring out a useful fact in a form somewhat different from that in which it has usually been presented. The principle involved is an important one, but it is possible to strain unduly its practical application. So much stress has been laid on it that beginners might easily be misled; the author himself appears to have misapplied the principle on more than one occasion.

This is notable in the example of plotting given on p. 197, where it is suggested to accept an intersection of two lines cutting each other at an angle of a little more than 30°, in preference to an intersection of about 90°. In this case primary points are alone concerned, and the considerations indicated by the author are not applicable. A similar misapprehension is noticeable on p. 201, in the paragraph relating to the projection of check lines from the best lines of reference. It is here implied that in the case of primary points, one of the lines on which they are plotted might have been laid off with a length of radius so short as to vitiate any lines laid off from it subsequently.

The question is discussed at some length as to the best zero to select for shooting up other objects when the position of the observer is not accurately determined. The problem is one of frequent occurrence, and is of great importance, but the treatment it receives is not satisfactory, and is liable to misapprehension. In this, as in some other cases, the broad practical rule of choosing a zero situated at about the same distance as the object to be shot up and making as small an angle with it as possible is not stated; whilst the investigation rests on assumptions not realisable when drifting in a boat or the ship in an unknown direction, as always happens in practice. In the paragraph on measuring a base by chained portions, the rule of sines is used for solving triangles having one very obtuse angle and two acute angles. The proper method of solving such triangles might have suggested to the author the fact that since cosines of small angles change very slowly, small errors of observation are practically of no account, and consequently that the measurement of the off-set is unnecessary and less accurate than using each separate section of the base as measured.

Other instances of misapplication of theory to practice might be quoted, but those mentioned suffice to indicate a want of appreciation of practical requirements, and suggest the possibility that the author is more familiar with the theoretical study of the subject than with the conduct of a survey.

In discussing the question of false station, there is no reference to the simple method of eliminating all errors from that source by the expedient of observing at equal distances on opposite sides of the true station. There is, moreover, an easier method than that given by the author for calculating the correction for false station.

The use that might be made of a distant peak in connection with the angle of elevation of the masthead when sounding a shoal has also escaped attention; neither is there any reference to the use of angles of elevation in making a running survey of an island when circumstances admit.

The investigation of the error of parallax in connection with sextant angles, due to the use of the long telescope when reflecting objects close to the observer, is of some theoretical interest, and is worthy of mention. As a matter of fact, the error from this source is not nearly so great as the author assumes, since it only exists in a minor degree with the short telescope which in practice is always used, being more convenient.

The various instruments and the methods of using them are fully described, and the ordinary operations connected with surveys of small extent are given in detail, together with a number of examples of suc surveys, besides a useful chapter on amending the details of a chart. A. M. F.

PRODUCTION OF SEED-OILS.

Linseed Oil and other Seed Oils: An Industrial Manual. By Prof. W. D. Ennis. Pp. xiv+316. (London: Constable and Co., Ltd., 1909.) Price 16*s.* net.

IN this work the author aims at the production of a manual which will serve as a fairly complete guide for the manufacturer of certain seed oils, more particularly linseed oil. He notes that, with one or two exceptions, the principal publications dealing with this subject hitherto have discussed it chiefly from the chemical standpoint. Accordingly in this volume the chemistry—which, after all, is relatively simple—is subordinated to the manufacturing and commercial aspects of the industry.

The work is written from the American point of

view, and this no doubt detracts somewhat from its value to the English manufacturer. On the other hand, the latter will probably find some compensation in seeing how his problems are regarded by other eyes.

After a short historical description, the first eight chapters deal with the standard forms of equipment used in extracting oil from seed by the pressure process. Such matters as the location and planning of the mill, the selection of the best type of apparatus, the handling of the seed, the treatment of the oil, and the moulding of the oil-cake are discussed in ample detail. Economical production is kept in view throughout.

In the second and some later chapters we come across pages of algebraical formulæ which at first sight look like extracts from a mathematical text-book. They are the author's method of analysing in general terms various problems of manufacture, in order to show definitely the effect of adopting certain processes or courses of treatment. For example, the question is discussed algebraically whether in given circumstances it pays best to separate the "screenings" from the seed and sell them, or to pass them through the mill with the seed, or, thirdly, to separate them and grind them up with "cake." When all the factors have been combined into a formula, the man with an eye for an equation can readily see what effect an alteration in any factor will tend to produce. The man not endowed with such an eye can readily puzzle the matter out, and be all the better for the exercise. In such a way an intelligent control over the operations can be maintained.

In the subsequent chapters the method of extracting oil from seeds by percolation with a volatile solvent is described and discussed. Only about 10 per cent., however, of the oil produced in the United States is obtained in this manner.

Questions of output, shrinkage, and cost of production are dealt with at some length; and there are chapters on refining, on boiled oil, and on miscellaneous seed oils. The author contrasts the great development of the cottonseed oil industry in the United States with the comparative neglect shown in regard to other oils—linseed excepted. Rapeseed oil is the most conspicuous failure; but more olive oil should be produced, he thinks, in California, more cocoa-nut oil on the Pacific coast, and more pea-nut oil in the eastern States.

A section on the chemical characteristics of linseed oil gives briefly the chief items which the oil-works chemist requires to know. Information on various technical points, collected from scattered trade journals, has also been included, and certain official rules and regulations, such as those of the New York Produce Exchange and the Minnesota Grain Commission, have been laid under contribution in respect of the commercial aspects of the industry.

Many illustrations of apparatus are given, and the treatment is throughout of eminently practical character. Probably there are few intelligent oil manufacturers who would not be able to get at least some useful hints from the book. C. S.

ZOOLOGY OF THE INDIAN OCEAN.

An Account of the Alcyonarians collected by the Royal Indian Marine Survey Ship "Investigator" in the Indian Ocean. By Prof. J. Arthur Thomson and J. J. Simpson. Part ii., The Alcyonarians of the Littoral Area. With a Report on the Species of Dendronephthya by Dr. W. D. Henderson. Pp. xviii+319+ix plates. (Calcutta: Indian Museum, 1909.)

THE first part of the memoir of the Alcyonarians of the Indian Ocean was published in 1906, and reviewed in NATURE of May 2, 1907. The second part deals with the shallow-water species, and fully maintains the high standard set by the first in wealth of detail and sumptuous illustration.

The authors of this volume have set themselves a task which is far more difficult than that of naming and describing the deep-sea species, and they have faced it boldly and, on the whole, satisfactorily. In the order Alcyonaria there are certain genera of wide distribution in tropical shallow waters which exhibit an infinite variety of form, of mode of branching, of colour, and of detail in skeletal characters, and the zoologist to whom the task is assigned of naming the spirit specimens sent to him by the collectors has to form an opinion as best he can on the vexed question of what characters or groups of characters in combination are sufficiently important to constitute a specific difference. In the absence of any knowledge of the development of the colonies, or of the relation of the different forms of growth to their surroundings on the reef, or of the transmission by heredity of the different characters he uses for purposes of classification, his opinion is rarely one of very great scientific value. Nevertheless, if his task is conscientiously performed, his descriptions accurate, and his illustrations adequate, our science is enriched by a number of recorded facts which may be of considerable value when the solution of the underlying biological problems is seriously taken in hand.

No better illustration of this difficulty could be found than that of the genus Spongodes, so excellently treated in this volume by Dr. W. D. Henderson. Following the example of Prof. Kükenthal, in whose laboratory he worked for some months, Dr. Henderson has distributed the specimens in the collection among no fewer than sixty-one species, of which fifty-three are described as new to science. But the question must occur to anyone who has seen Spongodes in abundance in its natural surroundings whether these numerous species could be maintained, even by the author himself, if another consignment of the same or greater dimensions were sent to him from the same locality. There is an advantage and a disadvantage in creating a large number of specific names for a common genus like Spongodes. It enlarges our knowledge by giving us detailed descriptions and illustrations, and in so far as it does that it is a gain; but, on the other hand, it tends to underestimate the importance of what may be a very definite character of all these common shallow-water genera, the power of adaptability to their immediate

surroundings. An animal that is able to move about can, within certain limits, choose its own immediate surroundings, and is not, therefore, so much in need of adaptability, but a sedentary animal or colony of animals must either adapt itself to the surroundings of the spot to which the larva happened to become fixed or it must perish. The evidence that there is really more than one variable species of Spongodes does not appear to be at all conclusive, but it is at any rate satisfactory to feel, when we contemplate the results of Dr. Henderson's labours, that we have some further knowledge of the varieties of form it may assume.

One word of protest may be said about the use of the generic name Dendronephthya for Spongodes. Whether the application of the strict rules of priority justifies the change or not, and those who study the literature of the genus may fairly claim that it does not, the inconvenience and confusion which the change of such an old and well-known generic name as Spongodes introduces are quite sufficient justification for our refusal to accept it.

As might be expected in the description of a shallow-water fauna, the number of new genera (four) is very small. Of these the curious cup-like genus Studeriotes, with its retractile polyparium, is the most interesting. The new nephthyid Cactogorgia, with its dense armour-plated walls of large spicules, is a remarkable example of the extreme limits to which spiculation in the Alcyonaria may be carried.

The suggestion made by the authors that the genus Chironephthya should be fused with Siphonogorgia is clearly a move in the right direction.

Among the many useful and valuable features of the volume, attention may be specially directed to the summary of the characters of the pennatulid genus Pteroeides. A hope may be expressed that before long a similar summary of the genera and species of the Juncellidæ may be published. This family is evidently under the consideration of the authors, but in the present volume they have only given a tabular statement of the specimens in the collection, without assigning them to specific groups. The excellent coloured plates and numerous illustrations in the text add very materially to the volume, which is a very noteworthy addition to our knowledge of the Alcyonaria. S. J. H.

THE PHYSIOLOGY OF THE PROTOZOA.

Einführung in die Physiologie der Einzelligen (Protozoen). By Dr. S. von Prowazek. Pp. v+172. (Leipzig and Berlin: B. G. Teubner, 1910.) Price 6 marks.

THIS work differs from all other treatises on the growing subject of protozoology in being largely devoted to the problems of function. It is a condensed account of our present knowledge of this highly important and difficult subject, and consists of summaries of physiological results, often too short to be easily intelligible, but of considerable value to that increasing number of investigators who are interested in recent advances in this field. The author is a well-known and active worker, and does not hesitate to press certain views which have not as yet obtained complete adherence. On the whole, however, he gives an impartial view of the state of each problem so far as the kaleidoscopic nature of the case allows.

With regard to the question of protoplasmic structure, von Prowazek concludes that Bütschli's alveolar theory does not account for all the facts. He holds that protoplasm may be absolutely structureless, and must, therefore, be regarded as polymorphic. Each protozoan cell is; according to him, at least binuclear. This view, though well known to be shared by Hartmann, is not generally accepted, and it would have been advisable for more and better figures of the nuclei of such common forms as those of amœba to have accompanied the statement, which, as it stands, is not rendered quite convincing, though we are aware of the evidence in its support. The functions of the nucleus are dealt with at some length, and their discussion involves the consideration of much experimental evidence; in fact, it would be difficult to name any function of the organism which is not assigned by some writer to the activity of the nucleus. Form, motion, enzymes, or at least proenzymes, respiration, division, reproduction, heredity, regeneration, are all more or less confidently assigned to this versatile structure. Not only are its functional activities increasingly stressed, but the importance of the nucleus in originating structures hitherto supposed to be cytoplasmic is also fully considered. An interesting exception that is noted in this discussion is the fact that amœbæ can live for at least a month without a nucleus, and a portion of a Stentor deprived of its nucleus may regenerate the lost parts of its body.

Attention is directed to the importance of the membrane that encloses the protozoan cell, and to the mode whereby osmosis or absorption is performed. The suggestion of Overton that the membrane contains "lipoids" (*e.g.* lecithin and cholesterin), and that these take an active part in the absorption of substances into the cell, is somewhat over-emphasised, since it is by no means certain how far these "lipoids" contribute to the formation of the ectoplasmic structures. At the same time, so much attention is now being paid to this aspect of biochemistry that the discussion is a very timely one and should lead to further research.

The latter half of the book is occupied by summaries of what is known as to the functions and "tropisms" of protozoa. With regard to respiration, attention is directed to the natural or induced anærobic character of many ciliates as well as to the behaviour of other infusoria when supplied with excess of oxygen. Loeb's view that the presence of a nucleus is essential to the oxidation of the cell is not upheld. An interesting account is given of the nutrition and movements of protozoa, but the behaviour of forms such as amœba, which contain chlorophyll corpuscles, is almost entirely neglected, in spite of the work of Grube and Doflein, and there is room for direct observation on the supposed ingestion of bacteria in the case of many infusoria. With regard to the significance of fertilisation, the author concludes very much in the sense of Doflein as given in his recent

large work, reviewed in this journal on March 3. The act is regarded as one of harmonising the discrepancies that arise through specialisation of chromatic and motor organs in the male, and of assimilative structures in the female.

In conclusion, we have to regret the absence of an index or of a list of references, but we may recommend the work as an extremely useful and compact summary of recent work on the physiology of the protozoa.

AMATEUR ASTRONOMY.

An Easy and Concise Guide to the Starry Heavens, arranged as a Companion to the Umbrella Star Map and Revolving Star Dome for Instruction in Astronomy. By D. McEwan. Pp. 137. (London: Kegan Paul, Trench, Trübner and Co., Ltd., 1910.) Price 5*s*.

THE idea of using the concave surface of an umbrella as a star map is excellent, but, of course, not new. The portability and convenience of manipulation of such a stellar guide are obvious advantages, while the aspect in which the constellations are seen, unlike the view in a celestial globe, corresponds to the reality. The actual construction of such a chart of the sky might quite well form part of the practical work of every elementary course of astronomy.

A simple guide to the heavens, to be used in conjunction with, and in explanation of, such an adapted umbrella should be worthy of notice. It is to be regretted that the present book, while pretending and seeming at the first glance to fulfil just such a function, cannot be recommended. Somewhat scrappy and not always trustworthy, it gives the impression of being the work of an amateur.

After a preface and an introduction, chapter i. devotes a page and a half to astronomical magnitudes and units, and also describes a chart of the north circumpolar stars, which is reproduced. The stars contained in the various "segments" of the "Umbrella Star Map" are dealt with in chapter ii. The persistently miscalled "segments" are really the sectors formed by the ribs and circumference of the umbrella. In the text a certain amount of information is given about the constellations and the principal stars as they occur in each "segment," while charts show their relative positions and make a very rough attempt to indicate stellar magnitudes. The scheme to represent magnitude described for the actual umbrella is not in use, apparently, in the companion book. A separate key-map in each case is used to indicate names. A table, giving for each star a serial number, the Greek letter, constellation, magnitude, right ascension, and declination, completes the information for a typical "segment." General astronomical information is introduced relative to special objects as they are encountered, so that, without reference to the index, it is difficult to find the treatment of any particular subject.

The information given is often amateurish and sometimes in error, while plausible misstatements which would trouble a beginner are to be found. The solar spectrum, for example, is "well known to consist of the seven colours," while by observations made through a long tunnel, or from the bottom of a well, "any star coming into the field of view would be seen even in daylight." Under the title "Major Planets" are described Jupiter, Saturn, Uranus, and Neptune, while the "Minor Planets" are Mercury, Venus, and Mars. To Jupiter is ascribed only five moons, the date of discovery of the fifth being given.

Chapter iv. describes a folding key to the "Umbrella Star Map," and the next chapter deals with the solar system in a bald way. In the pages devoted to time, the sun is described as being due east at six o'clock, while amplitude is misdefined in the following chapter.

A section devoted to scouting and an index to constellations bring to a conclusion a book which needs a thorough revision if it is to be of service.

ELEMENTS OF PHYSICS.

(1) *A First Book of Physics.* By Dr. L. Lownds. Pp. vii+145. (London: Macmillan and Co., Ltd., 1910.) Price 1*s*. 6*d*.

(2) *An Elementary Text-book of Physics.* Part IV., Heat. By Dr. R. W. Stewart. Pp. iv+246. (London: C. Griffin and Co., Ltd., 1910.) Price 3*s*. 6*d*. net.

(3) *Matriculation Magnetism and Electricity. A Text-book for Use in Schools and Colleges arranged for Modern Methods of Teaching.* By Dr. R. H. Jude and J. Satterly. Pp. vii+415. (Cambridge: University Tutorial Press, Ltd., 1910.) Price 4*s*. 6*d*.

(1) THIS book is intended for those beginning the study of physics. The contents do not cover the whole ground usually dealt with, but are confined to the principles of measurement, mechanics, and heat. The reason given for this is that it is now customary in secondary schools to limit the courses of study to these subjects for the first two years. Students reading this book are expected to be acquainted with the elements of mathematics, and to be able to perform for themselves the numerous experiments described in the text. Descriptive and numerical test questions form the conclusion of each chapter.

There is no doubt it will be found a very useful book. The most pleasing feature is the exactness with which statements are made, at the same time preserving great simplicity of language. Added to this, the printing and diagrams are good, and advantageous use is made of heavy type for the more important statements of principles.

(2) Dr. Stewart's fourth volume is written in much the same style as the three preceding ones. It is suitable for those possessing no previous exact knowledge of the subject of heat. Attention is paid to all the elementary thermal phenomena, the order of treatment being the usual one. What has been said above in reference to Dr. Lownds's book applies also here. Few difficulties should present themselves to an earnest reader of the subject. Here also many experiments are described, but, with the exception of a few worked in the text, examples are absent.

There is rather a surprising omission, however, in the chapter on the transference of heat by radiation.

Although the essential similarity of light and radiant heat is insisted upon, and the distinction between heat and radiant heat clearly drawn, no experiments to illustrate the application of the laws of reflection to the latter are given. The experiment with two concave mirrors in which heat is transferred by radiation from one focus to the other is surely one of the best for impressing on students the connection between the various radiations.

(3) This much longer volume is not nearly so good as those just commented upon. It is written specifically for the London matriculation examination, and it may be said at once that it is much too difficult. It would have been better if less material had been treated more fully. As it is, the book is overcrowded with statements which it would be impossible for the elementary student to deduce for himself—he must merely commit them to memory. He is told, for instance, that the "dyne" is the weight of one gram divided by 981, a statement which is not only incorrect, but conveys no impression of the importance of the absolute unit of force. A long discussion is entered upon as to the relative merits of the two-fluid and one-fluid theories of electricity. The matriculation student is advised in the text to accept the one-fluid theory, and then a footnote tells him that probably he will have to revert to the two-fluid theory because recent experiments point to the existence of positive electricity. Controversies of this kind are altogether out of place in elementary text-books; they only confuse the student.

There is a profusion of examples at the end of each chapter. These are, as a whole, good; but it is doubtful whether the pupil would be in a position to answer them intelligently if left to himself.

OUR BOOK SHELF.

Studien über die Bestimmung des weiblichen Geschlechtes. By Prof. Achille Russo. Pp. v+105. (Jena: Gustav Fischer, 1909.) Price 3 marks.

PROF. RUSSO has published a general account of very interesting experiments which he has made on the determination of the female sex in rabbits. His method was to dose the animals with lecithin—a well-known constituent of yolk of egg—administering it in various ways. He injected it into the peritoneal cavity or subcutaneously; he even introduced it through the mouth. From control experiments it seemed clear that one of the results of introducing the lecithin in considerable quantity into the system, where it normally occurs in many different tissues, was the accumulation of deutoplasmic material in the ovarian follicles and in the oocytes; and Russo found that rabbits treated in this way, and subsequently mated, had more female than male offspring. Sometimes all the offspring were female. The security of the conclusion that the lecithin treatment was the condition of this disproportionate number of female offspring depends on the number of cases investigated and on the avoidance of selected stocks. Russo is well aware of this, and he does not betray any dogmatism.

In the normal ovary, or in what he believes to be the normal ovary, Prof. Russo distinguishes two kinds of ova, one kind rich in nutritive material deposited in the zona pellucida and in the vitellus, the other kind with little or none. The lecithin treatment increases the number of the richly equipped, highly anabolic ova, and they are (if the correlation has been adequately substantiated) the female-producing ova.

In young rabbits of five or six months the ova show little vitelline material, no chromidial corpuscles, and a clear zona pellucida. This is a sign of deficient nutrition, and there is some evidence that these very young ova tend to be male-producing. As the nutrition of the ovary improves with age, the ova become better equipped with "embryoplasmic" material, and tend to be female-producing. The general result of Prof. Russo's interesting experiments is to show that the ovary is a very plastic organ, responding to the lecithin treatment by an increase in the number of female-producing ova. He suggests that the lecithin treatment of males may affect the spermatozoa in an analogous way—in their mitochondrial apparatus. In developing his thesis, the author communicates many valuable observations on the germinal epithelium, the granulosa, the zona pellucida, and the various chromatic substances which appear in the ooplasm. Statistics of the experiments and details as to methods employed are duly submitted, and the whole discussion is conducted in an admirable scientific temper.

Report on the Mines and Mineral Resources of Natal (other than Coal). By Dr. F. H. Hatch. Pp. xii+155+vii plates. Published by order of the Natal Government. (London: Printed by R. Clay and Sons, Ltd., 1910.)

THIS little volume, which contains the results of an eight months' prospecting trip in the colony of Natal, undertaken by Dr. Hatch on behalf of the Natal Government, is extremely disappointing, as the only conclusion that can be drawn from it is that Natal possesses no mineral, other than coal, that is deserving of any serious attention. Dr. Hatch sums up his impression in the words, "no large well-developed metal mines, either of the precious or of base metals, exist in Natal." To which may be added that the report indicates that no deposit has yet been met with which promises to be worth developing or to be likely to be mined with any measure of success, and the same is true of the non-metallic deposits—coal, of course, being always excepted. Deposits of gold, copper, tin, iron, manganese, chromium, lead and silver, molybdenum, of limestone, phosphate, graphite, asbestos, gypsum, salt, nitrate, oilshale and petroleum, building stone, slate, clay, &c., are known to exist and have here been reported on, but nothing of commercial value seems to have been met with anywhere. The value of the mineral output of Natal for 1908 is given as 741,158*l*., out of which the value of the coal is 737,169*l*. Further comment is needless.

Modelling from Nature. A New and Original Method of Clay Modelling. By Lilian Carter. Pp. 32; and 16 plates of models copied from nature. (London: Cassell and Co., Ltd., n.d.) Price 1*s*. 6*d*. net.

THOUGH we are sceptical as to the newness and originality of Miss Carter's method of teaching clay modelling, there is no doubt that work of the kind she describes interests young children, and assists in making them accurate and alert in examining natural objects, as well as deft with their fingers.

The Time of the Singing of Birds. Pp. 126. (London: Henry Frowde, 1910.) Price 3*s*. 6*d*. net.

THIS anthology of verse will appeal to all bird-lovers. Three compilers have been able, with the cooperation of authors and publishers, to bring together a charming collection of modern poems, as well as the better known older verses dealing with bird life.

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.]*

The Tail of Halley's Comet on May 18–19.

PERHAPS the following observations I made of Halley's comet on the night of May 18, when it crossed the sun's disc, may be of interest as a record.

On that evening I crossed by steamer from Palermo to Naples, as I wished to have a clear horizon all round to see what would happen. The vessel leaves Palermo at 7 p.m. and arrives at Naples at 7 the following morning, and it seemed the best place for a view.

I may say that I had been watching the comet every night from May 7, and was quite familiar with its appearance. I say this because it was quite different from that of any other comet I can remember. The first time I saw the tail was when I came on deck on May 7 about 4 a.m.; the nucleus was not visible, but right across the sky was a long white streak just like a cloud, quite as opaque as a cloud, and I could not believe it was the tail of the comet at all; but on coming on deck the next morning at 2.15 I saw the same white streak, but this time with the nucleus, also of a very white colour.

I had no instrument with me to measure the length of the tail, but I got the quartermaster to lay it off on the ship's compass; he put it down on paper; it was E. ½ N., and the end of the tail was E. by S. ½ S., which is about 22½° horizontal measurement; the real length of the tail itself I could only estimate as "about half-way across the sky."

On the night of May 18, as soon as it got sufficiently dark, the tail was plainly visible; there was a ten-days' old moon which rather interfered with the view, but about 2 a.m. it had got sufficiently low and behind a thin but convenient bank of cloud, so that it did no further harm to my observation. Of course there was no nucleus to be seen; that was down below with the sun, but the tail was quite different in character from that which I had seen on the previous nights. It was not a long streak of white, but a confused mass of pinkish light extending along the horizon for 40° or 50°, and then stretching right across the sky, coming gradually to a point at the wide naked-eye double star (α and β Capricorni) below Altair, in line with the three stars. The tail narrowed in on its course upwards, and passed just below the Great Square of Pegasus, γ Pegasi being well in the tail, but α Pegasi was clear of it.

I continued watching the tail for shooting stars in its neighbourhood, but I only saw three or four; there was nothing particular about them, except that they seemed to start from the edge of the tail, which was well defined, and only travelled 4° or 5° from it.

But there still remains a curious sight to describe which I saw on the other side of the ship.

About 2.15 a.m. I went aft to get the time from the chart-room clock, and, happening to look over the port side of the ship to the west, I saw a pillar of light on the opposite side of the earth to that from which the comet's tail came up; it was about 45° (roughly) high and 50° or 60° broad at the horizon; it was straight up and down, and was much brighter in the middle than at the sides, and the bright part seemed like a pillar of light, but the lighter and more transparent sides came up and formed a large cone. The setting moon was a good deal to the right of the cone, and was somewhat clouded out, and had no connection with it. At the time I took the cone to be the Gegenshein, and did not pay much more attention to it, beyond looking now and then to see that it was still there.

Both the cone and the tail were visible from 2.15 to 3.5 a.m. It is quite possible that at this time the earth may have been passing through some of the tail, and had divided it in two.

I was up at Monte Casino the next night; unfortunately a fog came down on the mountain, but I heard that at the observatory they had seen an arch of light over the part of the horizon from which the tail came. I did not see this; but I was at sea-level, and the observatory is up some 1500 feet.

HOWARD PAYN.

20 Hyde Park Place, London, W., June 17.

AN observing party was organised at this college for the purpose of taking note of any physical disturbances which might occur during the passage of the earth through the comet's tail, particulars of which will be published later. Our object in now writing is to put on record a remarkable appearance which presented itself at about 3.30 on the morning of May 19.

The comet has been visible here to the *unaided eye* since April 12, and up to the morning of May 18 the tail presented what may be termed a normal appearance, *i.e.* smaller at the nucleus than at the extremity, but on the morning of May 19 the character had altogether changed. At about 3.30 a luminous patch was seen at an altitude of about 20° from the horizon, and in the place where the tail formerly appeared. There were some clouds near the horizon, and as these cleared away the whole of the tail became visible, extending at 4.30 right up to the zenith, and there being lost in the Milky Way.

When there were no clouds the sky was remarkably clear, the Milky Way shining most brilliantly. The light from the tail of the comet was polarised, but not so distinctly as was the case with the normal tail on previous mornings. The tail persisted until daylight. It, to some extent as regards shape, simulated the Zodiacal Light, but at the same time was essentially different, and did not appear in the usual situation of the light, as it was many degrees to the north of the sun. It was much longer, narrower at the base, and ten times brighter. There is no question but that it was the comet's tail.

At 4.30 the upper half of the tail was quite free from cloud, and the gradual narrowing towards the upper end was most marked. It seemed from the curvature of the edges that a portion was missing from the under side of the tail. The conviction was borne in upon us that we saw a portion of the tail blotted out or cut off in some way, and this was certainly not done by cloud. Was it done by the earth's atmosphere? The following morning was cloudy, and nothing was seen at 3.30, but the comet appeared in the western sky at 5.40 in the evening.

Observations were not taken on succeeding mornings, which perhaps was a mistake, as something may have been left behind after contact with the earth, if contact really happened.

W. H. FINLAY.
W. A. DOUGLAS RUDGE.

University College, Bloemfontein.

The Colour of Pure Water.

HAVING noticed the colour of the sky, of air, and of water under different conditions, I was reminded on reading the report of Lord Rayleigh's lecture (NATURE, March 10) of a few notes I had made from time to time, and now think they may prove of interest.

First, optically pure water cannot be obtained by distillation. Prof. Tyndall asked me to prepare some pure water for him, which I attempted, first by distillation with acid permanganate, and then re-distilling this from a copper vessel and collecting the liquid in a bottle placed in a large bell-jar of hydrogen, a gas which is known to provide an optically pure atmosphere. The resulting water was not optically pure. Pure water was prepared by Tyndall by melting clear block-ice in a vacuum. Its colour was blue when seen through a tube 3 feet long.

The colour of a hard water which has been softened by Clark's process may be seen at the Colne Valley waterworks, visible from the train on the up line just south of Watford Station, and at Joynson's paper works at St. Mary Cray, in Kent. When the members of the Society of Chemical Industry visited these works some years ago, they were much struck by the very beautiful blue of the water. It was even suggested that it had been purposely coloured with a very pure blue dye. Water of similar purity, containing very little mineral matter, being remarkable for its softness, comes from the Greensand below the London Clay. Such blue water I have noticed

in the bed-rooms and bath-rooms of the Euston Hotel, the supply coming from an artesian well.

There are two natural sources of extremely pure water with which I am acquainted, and I cannot believe that the water from the second source receives any colour or appearance of blue through the reflection of light by fine particles in suspension. The first is in the Fairy Loch beside Loch Lomond, situated on a little promontory south of Tarbert. It is difficult to see that there is any colour in the water except at a point where it wells up from a fissure in the rock and passes over a vein of milk-white quartzite which crosses the bottom; here it exhibits a beautiful blue colour.

The second source is the Wells of Dee, situated in the Larig (Learg Gruamach) at the foot of Ben Macdhui, and between it and Braeriach, about half-way between Deeside and Speyside. It is a small tarn or pool with a bottom like that of three miles of the pass—nothing but large pieces of splintered red granitic rock. It stands about 2700 feet above the sea. The water, according to my recollection, passes down underneath broken rocks in a narrow rift in the mountain side, and is derived from the melting of snow on its northern slope near the summit, which is 1598 feet (1500 feet by my aneroid) higher and above all vegetation. The pool is too small to be shown, but the stream which runs out of it appears on the Ordnance map (Sheet 64, 1-inch scale), springing from the highest point of the pass. Some small lochs on the opposite side of the pass, about 1¾ miles further south, are also called Wells of Dee, and are the principal source of the river of that name. The bottom of the small pool is visible everywhere, and its apparent colour varies in proportion to its depth, being dull red near the sides, to a brownish-purple where it is apparently deepest. The pure blue colour of the water was only seen on putting a white object, such as a piece of porcelain, into it. The effect of the blue colour of the water on the light reflected from the red rock at the bottom is to give it a purple tint.

It is evident that the blue is wholly due to the absorption of rays of complementary colour, because if it were not the reflection of blue rays by suspended fine particles would be seen against a dark ground on looking into the water. As a matter of fact, the water when undisturbed on the surface was not visible; it was very difficult to form any idea of its depth, everything on the bottom being sharply defined. These observations were made under a diffused and subdued light in a very clear atmosphere, the light being of uniform intensity over the whole sky, which was entirely covered with small greyish clouds, no direct sunlight or blue sky being anywhere visible. A fact adverse to the view that the blue could be reflected light is that the light which escapes reflection has a reddish-golden colour. In a hazy atmosphere when the sun is low and we look towards it, we see the golden colour; in the opposite direction we see the blue opalescence. The white light from the sky traversed the water in two directions to the bottom, and then, by reflection, back again, and it is safe to say that these two opposite colours would neutralise each other. W. N. HARTLEY.

Royal College of Science, Dublin.

The Temperature Conditions in Clouds.

As one of those who expressed doubt as to the possibility of the existence of the temperature conditions in a cloud described by Prof. Rotch at Winnipeg, I have been greatly interested by the letters of Dr. Aitken and Mr. Palmer (NATURE, November 18, 1909; June 2, 1910), but the examples which they quote do not present the same difficulty as Rotch's result, nor do they explain it.

The increase of temperature at or above the *upper* surface of clouds, which Dr. Aitken mentions, has been frequently observed in kite ascents at various places, while the two examples given by Palmer are (1) alto-cumulus, a wave cloud of the Helmholtz type formed at a surface of discontinuity: the temperature decreases upwards in the cloud itself; (2) alto-stratus, a shallow cloud formed also at a surface of discontinuity; here, too, the temperature decreases upwards in the actual cloud. In neither case do we attribute the temperature peculiarity to the clouds, but regard the clouds rather as the result of the temperature conditions.

Rotch, however, found that in a cumulus cloud, 2 km. thick, the temperature increased from the *base* upwards by more than 5° C., and the increase was most rapid in the *lower* part of the cloud.

Dr. Aitken suggests that the sun, shining on the upper part of a cloud already formed and warming it, would account for the phenomenon, or at least for inversions near the upper surface of a cloud; but if the sun raised the temperature of the upper part of the cloud, that part would be no longer in equilibrium with its surroundings, and would rise upwards. Its temperature would, in consequence, fall under ordinary conditions until equilibrium with the surrounding atmosphere again supervened. The sunshine could only result in an actual increase of *temperature* if there existed already above the cloud an atmospheric layer of higher temperature than that in the cloud itself.

Now if Rotch's cloud were formed by convection currents according to the generally accepted ideas, the summit would be initially at least 10° C. colder than the base, and consequently its temperature must have been raised 15° C. to bring about the observed state of affairs. It is not easy to imagine how this could be done without dissipating the cloud, because it is unlikely that a cloud 2 km. high would be formed by convection currents without the upper parts losing some of the water-vapour which they originally contained, and in the present instance evaporation would begin before the temperature had risen 10° C. Moreover, the ascent took place about 9 a.m. in May; while assuming that 35 per cent. of the incident sunshine is absorbed by the cloud (Abbott and Fowle found 65 per cent. reflected) and that no loss of heat by radiation occurred, it would take a twelve-hour day near the equator to raise the mean temperature of a hemispherical cloud 2 km. high by 9° C. It appears certain, therefore, that solar radiation incident on the cloud cannot account for the phenomenon.

The only reasonable explanation I can put forward is that air below and above an inversion surface is lifted bodily upwards sufficiently far for condensation to take place on both sides. The balloon ascent must have been made in a region of convergence, and the mechanism by which the conditions were produced appears to have consisted of a cold, damp easterly wind penetrating beneath a warm upper current from a more southerly point.

Cambridge, June 6. E. GOLD.

The Fertilising Influence of Sunlight.

WITH reference to Dr. Russell's remarks on this subject in NATURE of April 28, I should like to remark (1) that my point was not so much that toluene removed toxic material from the soil as that it rendered it insoluble. The question of washing out material from the soil was not raised by me. (2) and (3) Dr. Russell seems to beg the question by taking "fertility" and "bacterial activity" as synonymous. He has not, so far as I can find, proved that the addition to partially sterilised soil of an aqueous extract—or of a portion—of an untreated soil increases *crop production* (in contradistinction to soil fertility as indicated by bacterial activity and ammonia-production). If such is found to be the case, it would certainly require further experiment before it could be explained on the toxic theory.

With regard to water cultures, in one experiment the water was boiled every two days in some of the cultures, while in others it was not boiled. At the termination of the experiment—two days after the last boiling—the bacterial contents were found to be (per c.c.):—

In unboiled cultures ...	2500, 2100	Mean = 2300
In boiled cultures ...	350, 400	Mean = 375

The quantity of material precipitated by potassium sulphate from the two solutions was (per million):—

Unboiled solution	30
Boiled solution	30

It would appear that if this substance had been produced by the bacteria there ought to have been *at least* seven times as much produced in the unboiled as in the boiled solution, since the bacterial content of the latter was never more than one-seventh of the former, and must have been for most of the time almost *nil*.

I have now completed an experiment in which the following results (among others) were obtained with the "great millet" (Sorghum), single plants of which were grown from germinated seeds for ten days in soil (1) unheated; (2) heated to 97°; and (3) heated to 170°:—

Treatment of soil	Green weight of plants (in grams)		
Unheated ...	145·5 ...	Mean of 8; max.	314, min. 0
Heated to 97°	151·7 ...	,, ,,	353, ,, 36
,, 170°	1055·6 ...	,, ,,	1470, ,, 835

At 170° the soil was obviously sterilised completely, but the yield was four times that from the partially sterilised soil. F. FLETCHER.

School of Agriculture, Giza, May 14.

POT experiments are carried out by Dr. Hutchinson and myself to run parallel with the chemical and bacteriological examinations of the soils. Productivity is not regarded as synonymous with bacterial activity, although in general the two are intimately related. An exception occurs when the soil has been heated sufficiently to decompose some of the organic matter present with formation of plant food. As stated in my letter, the addition to toluened soil of an aqueous extract of untreated soil increases crop productiveness. E. J. RUSSELL.

Rothamsted Experiment Station, Harpenden.

Ooze and Irrigation.

THE interest which my former letter has aroused (NATURE, June 9) induces me to offer a few further remarks. For a hundred years it was usually thought that all our earthworms were of one kind, and the term *Lumbricus terrestris* was glibly used. Thanks to the help I have received from curators, gardeners, and nature-lovers at Kew, Chelsea, Oxford, Cambridge, Edinburgh, and elsewhere, my list of British Lumbrici now stands at nearly forty species, belonging to upwards of half-a-dozen genera.

In like manner, nearly all fresh-water worms have, until recent times, been relegated to one species, and *Tubifex rivulorum* was the magic name. Our knowledge of these wonderful ooze-workers is still deplorably limited, but a little progress is being made in their study. We now know that the so-called Tubifex is not a tube-maker, and that it includes such genera as Limnodrilus, Stylodrilus, Trichodrilus, and others, which represent more than one family, with upwards of twenty known British species. Every year is bringing new forms to light, and each new discovery supplies a missing link.

But, in addition to the ooze-makers belonging to the Tubifex group, I now find that certain species of white worms, which are destitute of red blood, and are usually grouped together as Enchytræids, frequently find employment in this capacity, and often get introduced among valuable plants in garden and field, to the great loss of the horticulturist. Hence the need of a fuller and more systematic study of this branch of science. Here is a subject worthy of Earl Carrington's new committee.

One correspondent remarks that the subject is "very suggestive." He adds a query which needs attention. "I suppose the worms cannot take nitrogen directly from the air like the legumes? If they could assimilate it, of course a very important point would be settled by establishing that fact, though the probabilities are that they connot." I should like to know what biologists have to say.

Great Malvern. HILDERIC FRIEND.

New Development in Library Work.

WITH the permission of the council of this society, I have recently instituted a departure in library practice, which I have been asked to describe to you, in the belief that other learned societies may think it worth while to try the experiment.

Fellows of medical and other scientific societies living abroad suffer many disadvantages as compared with their resident brethren, and none so great or so much felt as the deprivation of the use of their libraries. To all our fellows living abroad we now offer to prepare for them, *gratis*, short abstracts of papers, and even of books, upon any medical subject, and to search for or check references to medical literature.

The innovation has been most warmly welcomed, and from remote parts of the world we have received many grateful letters. Men living in the Chitral Valley, in the Sudan, in Christmas Island, and equatorial Africa, who for years have had their work hindered by lack of library conveniences, say that what we now do for them is even better than they could have done for themselves had they been in London, for even here they would probably not be able to devote the many hours requisite for the research required to produce the results which our machinery can procure for them with a minimum of time and labour.

J. Y. W. MACALISTER.
(*Secretary.*)

The Royal Society of Medicine, 15 Cavendish Square, W., June 16.

Altruism in Animal Life.

YOUR Deal correspondent, Mr. Christopher Morse, has told you (p. 437) of an ablutionary caterpillar; let me tell you of life-saving "eels" in vinegar. I was examining the creatures with a microscope when one of them became stranded, owing to its having strayed into the shallower portion of the vinegar-drop, and there it wriggled the while the fluid grew shallower still. Just as it seemed on the point of giving its last expiring wriggle, what was my amazement to see three or four other "eels" make a dash from the deeper vinegar, and force themselves across the shallow to where lay their stranded comrade.

Then occurred the most singular thing it has ever been my lot to witness in the world of minute life. These tiny life-savers rushed with all the energy of desperation at their now quiescent comrade, and worked it slowly towards the deeper part of the fluid, and they reached it, too, in time to save their own and the other's life. J. H. ELGIE.

72 Grange Avenue, Leeds.

Colours of Plasmodia of some Mycetozoa.

FROM my experience in this part, I here note the colours of plasmodia of a few Mycetozoa to supply the desiderata in the late Mr. Lister's "Monograph," London, 1894:—

Physarum melleum, Mass.	Yellow, then orange-yellow
P. tenerum, Rex.	Bright primrose-yellow
P. crateriforme, Petch, *in litt.* (Ceylon and Japan)	Dull ochreous
P. pyrosum, Rost.	Dingy ochrey-yellow, then dirty pink
Arcyria insignis, Kalchbr. and Cke.	Colourless, then milky-white
Perichaena variabilis, Rost.	Watery cinnamon

The following species have their plasmodia mostly of the colours as recorded by Mr. Lister, but at times of the subjoined colours:—

	Normally coloured	Occasionally coloured
Physarum cinereum, Pers.	Watery-white	Pale yellow
Stemonitis splendens, Rost., *B. Webberi*.	Creamy-white	Sulphur-yellow
Lycogala miniatum, Pers.	Rose-red	Bright yolk-yellow or milky-white

As regards the last-named species, Miss Gulielma Lister writes to me:—"Since my father's 'Monograph' was written we have several times had instances of the æthalia arising from a white or cream-coloured plasmodium."

Now a few words on the number of species of the Japanese Mycetozoa. In the *Journal of Botany*, April, 1904, pp. 97–9, Mr. and Miss Lister noticed eighteen species collected by Mr. S. Kusano in Tokio, eleven of which had been enumerated in Prof. Matsumura's "Index Plantarum Japonicarum," published a few months previously in the same year. Since my return home from England in 1900, in order to keep my promise to Mr. George Murray, then keeper of the Botanical Department, Natural History Museum, I have sent for determination to Mr. and Miss Lister every characteristic specimen I could find in this province, which has resulted in the Japanese species of Mycetozoa actually reaching a total number of eighty-six, including the two new species *Arcyria glauca*, Lister, and *Hemitrichia minor*, G. Lister, not to mention several new varieties and forms.

KUMAGUSU MINAKATA.

Tanabe, Kii, Japan, May 21.

KOREAN GEOLOGY.[1]

BEFORE the year 1883, when treaties were made by which Europeans were admitted to the country, Korea was a *terra incognita* to geologists. Captain Basil Hall had, indeed, made a few observations upon rocks examined by him on the coast during his voyage in 1818, and casual references may be found in other authors concerning what could be seen from the sea. In 1883 and 1884, however, a German geologist, Dr. Gottsche, made a rapid geological reconnaissance of the country, and the rock specimens he obtained were described by Prof. Justus Roth. Almost simultaneously with Dr. Gottsche, Prof. Gowland, then head of Imperial Mint of Japan, made a journey through the country for the purpose of archæological investigation, and the numerous specimens which he collected were described by Mr. (now Sir Thomas) Holland in the Geological Society's Journal for 1891. In the accounts of his explorations in China (1900–3), the late Baron F. von Richthofen was able to give additional particulars concerning the geological structure of the country. Dr. Bundjirô Kotô, the author of the work before us, published his account of the orography of the peninsula in 1903, a memoir which has given rise to a considerable amount of controversy.

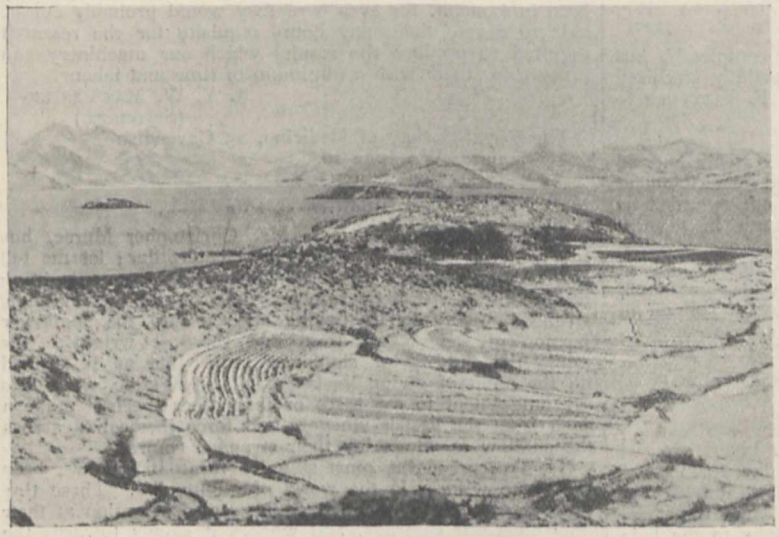


FIG. 1.—Whirlpool of Myŏng-yang ferry showing special topography with narrows and indentations which probably cause the eddy produced in the shore current by the reflex motion.

As the result of the Russo-Japanese war, however, the country has been much more fully opened up, and the Japanese Government has sent out a number of expeditions for the purpose of inquiring into the natural resources of the country. Unfortunately, most of the reports of these explorations are written in Japanese, but Dr. Kotô has rendered a great service to geologists by embodying the most important results of these recent researches in his memoir.

The work deals mainly with the southern part of the peninsula, and describes three traverses made by the author; the important discoveries made by Mr. Yabé of fossil plants and foraminifera have been of great service in determining the geological age of some of the rock-masses.

Overlying a great mass of gneiss, mica-schist, and phyllite rocks, which may be Archæan in age, though Dr. Kotô inclines to the view that they are metamorphosed Mesozoic deposits, there are great masses of granitic rocks, including some very interesting types. Above these granites are found a series of strata, which are shown by the plants they contain to be of Jurassic age. With these deposits are found evidences of contemporaneous volcanic action, while quartz-veins with gold also occur in them. In Japan these Jurassic strata appear to be underlain by Fusulina limestones of Carboniferous age, and anthracite beds containing Rhætic plants. Rocks of this age appear to occur in other parts of the peninsula, but not in the district examined by Dr. Kotô.

Of younger age than the Jurassic appear to be the series of eruptive rocks which our author classes as "Neogranites." These consist of quartz-porphyry (quartz-tsingtauite) and orthoclase-porphyry (tsingtauite), with a variety of granite-porphyry for which the author proposes the term "Masanite"—the name being derived from the port of Ma-san-pho—and an aplite-granite ("Granomasanite"). Dr. Kotô regards his masanite as worthy of receiving a distinct name, from the peculiar mode of the intergrowth of quartz and plagioclase felspar of which it is mainly composed. These plutonic rocks pass into a series of effusives classed by the author as different types of "felsophyres."

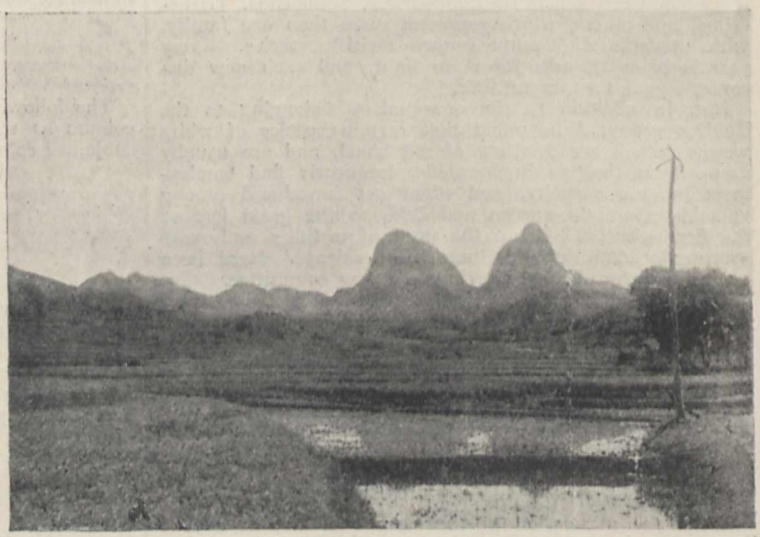


FIG. 2.—Remarkable erosion-form, viewed from the south. It is a double-peak, formed of Mesozoic conglomerate resting upon a gneiss-granite.

Lying unconformably upon the greatly disturbed Mesozoic strata, are found sandy strata with seams of poor lignite, while more recent deposits are only

[1] "Journeys through Korea." By Prof. B. Kotô. From the Journal of the College of Science, Tokyo, Japan, vol. xxvi. Pp. 207+36 plates. (Tokyo: The University, 1909.)

represented by lava sheets of basalt and hornblende-andesite.

The author indicates many points in the geology of Korea on which conflicting opinions have been maintained by different authors, and it is evident that much work remains to be done in the country before some of these problems can be regarded as settled. But, in the meanwhile, this work may be accepted as giving a first sketch, clear and accurate, of what is known on the subject, with full references to the works of other authors.

The plates accompanying this memoir are by no means the least valuable part of the production. From Dr. Kotô's own photographs a hundred small but admirably executed views of Korean scenery have been prepared, two of which are here reproduced.

J. W. J.

IN THE TORRID SUDAN.[1]

ONE feature about this and all other recent books dealing with the Egyptian Sudan which arrests the attention is the singular lack of picturesque scenery characteristic of this vast region away from the frontiers of Abyssinia or the temples and rocks of Dongola. Apparently one has to reach almost to the verge of the Congo Basin on the south-west, or to enter the Uganda Protectorate on the south, before the eye is gratified by remarkable landscapes. Even the river-courses outside desert influence are poor and unimpressive in their vegetation as compared with Equatorial, West, and South Central Africa. The branching dūm palms, with their half-circle fronds, an occasional monstrous baobab or banyan-like fig-tree—perchance a clump of tall acacias in the gracious aspect of the rainy season—alone relieve the monotony of grassy plain and stony, sun-smitten wastes; while, of course, a considerable portion of the area of the Anglo-Egyptian Sudan is swamp, and swamp which is singularly unprepossessing, for it offers an unbroken horizon of dull bluish-green, unmarked by a single palm-tree or other noteworthy object.

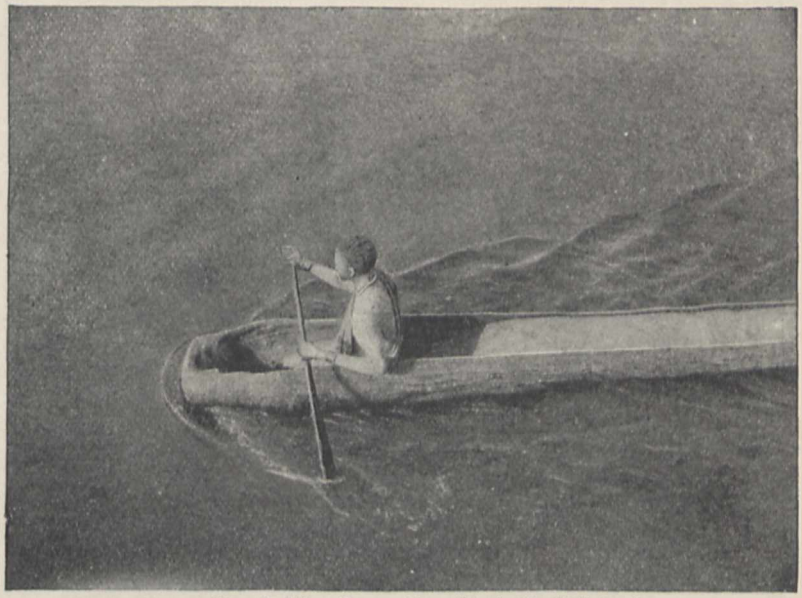


FIG. 1.—Nuer Paddling Canoe From "In the Torrid Sudan."

The swamps of Central and Western Africa provide some of the most striking pictures to be obtained by the painter or the photographer in all Africa; immense Raphia palms, tall and exquisitely beautiful Phœnix palms, and gigantic trees two hundred feet in height rise above the stagnant water and the masses of papyrus, arums, terrestrial orchids, and amarantaceous plants. Mr. Tangye is conscious himself of the lack of picturesqueness in the Eastern Sudan (as compared with other parts of Africa). "The country, as a rule, is either too dry during a great portion of the year, or, farther south in the great swampy regions, too wet. It is annually devastated by destructive grass fires, which scorch and stunt the trees, leaving the deep-seated grass-roots unharmed and manured by the salts of the burnt ash." The trees are "small, straggly specimens" of acacias for the most part, with a few Borassus and Hyphæne palms.

As to these palms, it is interesting to learn that the elephants apparently feed on the fruit of the Borassus (afterwards ejecting its stone). This fact was mentioned by the writer of this review some years ago, but was denied by other "Africans," who alleged that it was only on Hyphæne fruits that the elephant regaled himself.

The author has some interesting remarks to make on pp. 56 and 57 as to the "painted forests" of acacia, the appearance being due to the irregular peeling of the bark, together with the exudations of red gum. In these acacia woods the guinea-fowl are present in thousands.

There are interesting notes on the baboons (p. 78) and on the giraffe (pp. 79–80). The manners and customs of elephants are well described, together with their apparent, if often misplaced, sense of humour (they will pass through native villages demolishing the huts, but refraining from injuring the people; they will also come and stamp out native gardens, or in attacking native caravans will merely scatter their luggage right and left).

There is a good deal of information about the Nilotic negroes, much of which is original. The author mentions that an average of height taken by the late Dr. Pirrie gave 5 ft. 11 in. for the men, while heights of more than 6 ft. were quite common. He also directs attention to certain points of similarity between the Nilotic negroes and the Melanesians which are not unworthy of notice, considering that they are here and there backed up by evidence of physiological affinity, though, of course, the gap between these two manifestations of the negro type is enormous both in millenniums and miles. Quite recently Dr. A. Keith has pointed out the craniological affinities between certain tribes of the Congo Basin and the Andamanese. The present writer has noted also certain similarities in weapons and body adornments between the Australoids and the people living on the north-eastern verge of the Congo Basin.

The awful ravages of the bush-fires in the Sudan have been already alluded to. This, no doubt, is the principal cause of ancient and modern deforestation, which has done so much to affect the surface and climate of this part of Africa.

A determined effort out of somewhat needless concern for the feelings of the French (who had nothing to be ashamed about over Marchand's marvellous

[1] "In the Torrid Sudan." By H. Lincoln Tangye. Pp. xii + 300. (London: J. Murray, 1910.) Price 12s. net.

journey) is being made by the Anglo-Egyptian authorities to erase the name of Fashoda from the map and to call it instead Kodok. But the earlier and more picturesque name seems likely to survive, and the place itself (according to the author) is distinctly going ahead in spite of its evil reputation for malaria. On p. 286 the author gives an interesting account of a tame lion belonging apparently to a British officer resident in Omdurman at one time. When a small cub he had been soundly thumped by his master's fist to reduce him to order. As he grew into a large beast he remained mortally afraid of a thump, though its actual meaning to him then was nothing. He was perfectly good-humoured and kindly, but too playful, and delighted in jumping out on people in order to startle them, or leaping on to them in order to bear them to the ground. He would also climb the telegraph-poles (for, despite current belief to the contrary, lions are able to climb, as the present writer can bear witness). On one such occasion, from the top of the pole on which he was resting his chin to get a good look out, he descried his master coming from a distance, and, fearful of punishment, slid down the pole on to the ground with a bump which sobered him for days.

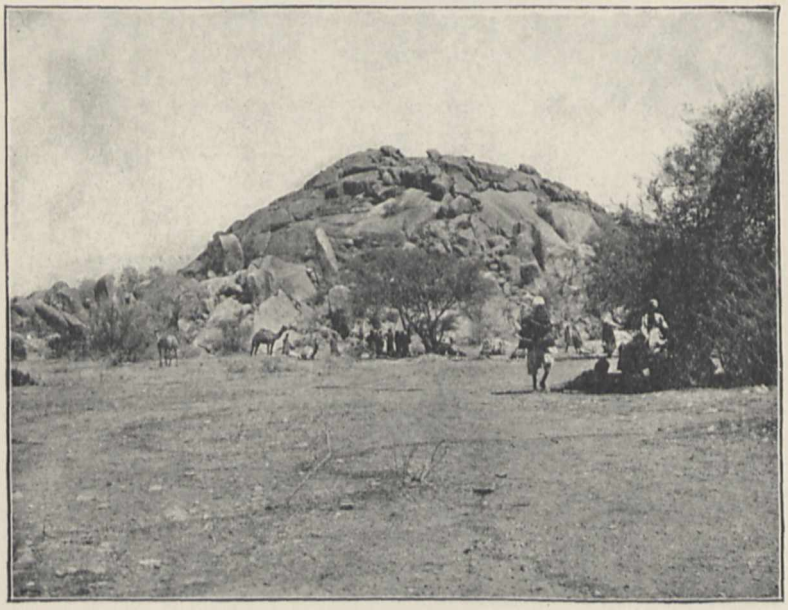


FIG. 2.—Gebel Kordi: a typical Hill 350 feet high. From "In the Torrid Sudan."

This book is not an easy one to review, for its information is put together in a scattered and unpretentious form, but it is very readable, and gives one as a reward for its perusal a remarkably vivid picture of the general aspect and conditions of the Sudan between Khartum and the Bahr al Zeraf, the White Nile, the Blue Nile, and the river Dinder.

H. H. JOHNSTON.

PWDRE SER.

IN my boyhood I often lived on the coast of Pembrokeshire. Wandering about with my gun I was familiar with most natural objects which occurred there. One, however, which I often came across there, and have seen elsewhere since, greatly roused my curiosity, but I have not yet met with a satisfactory explanation of it.

On the short, close grass of the hilly ground, I frequently saw a mass of white, translucent jelly lying on the turf, as if it had been dropped there. These masses were about as large as a man's fist. It was very like a mass of frog's spawn without the eggs in it. I thought it might have been the gelatinous portion of the food disgorged by the great fish-eating birds, of which there were plenty about, as kingfishers eject pellets made up of the bones of the fish they eat, or that possibly there might be some pathological explanation connecting it with the sheep, large flocks of which grazed the short herbage. But the shepherds and owners of the sheep would have known if such an explanation were admissible. They called it "pwdre ser," the rot of the stars.

Years afterwards I was in Westmorland, on the Geological Survey, and again not unfrequently saw the "pwdre ser." But I now got an addition to my story. Isaac Hindson, of Kirkby Lonsdale, a man whose scientific knowledge and genial personality made him a welcome companion to those who had to carry on geological research in his district, told me that he had once seen a luminous body fall, and, on going up to the place, found only a mass of white jelly. He did not say that it was luminous. I have never seen it luminous, but that may be because when it was light enough to see the lump of jelly, it would probably be too light to detect luminosity in it.

Then, in my novel reading, I found that the same thing was known in Scotland, and the same origin assigned to it, for Walter Scott, in "The Talisman,"[1] puts these words in the mouth of the hermit:—"Seek a fallen star and thou shalt only light on some foul jelly, which in shooting through the horizon, has assumed for a moment an appearance of splendour." I think that I remember seeing it used elsewhere as an illustration of disappointed hopes, which were "as when a man seeing a meteor fall, runs up and finds but a mass of putrid jelly," but I have lost the reference to this passage.

Thus it appeared that in Wales, in the Lake District, and in Scotland, there existed a belief that something which fell from the sky as a luminous body lay on the ground as a lump of white jelly.

I asked Huxley what it could be, and he said that the only thing like it that he knew was a nostoc. I turned to Sachs[2] for the description of a nostoc, and found that it "consists, when mature, of a large number of moniliform threads interwoven among one another and imbedded in a glutinous jelly, and thus united into colonies of a specifically defined form. . . . The gelatinous envelope of the new filament is developed, and the originally microscopic substance attains or even exceeds the size of a walnut by continuous increase of the jelly and divisions of the cells."

All the nostocs, however, that I have had pointed out to me have been of a green or purplish or brown-green colour, whereas the "pwdre ser" was always white, translucent in the upper part, and transparent

[1] "Waverley Novels," Border edition, chapter xviii., p. 278.

[2] Sachs, "Text-book of Botany, Morphological and Physiological." Translated and annotated by Alfred W. Bennett and W. T. Thiselton-Dyer. (1875.)

in the lower part, which appeared to occur among the roots of the grass, as if it grew there. Moreover, the mass was much larger than a walnut, in fact, would generally about fill a half-pint mug.

The only reference I can find from which it would appear that the writer was describing a nostoc is the passage in Dryden and Lee [1] (1678).

"The shooting stars end all in purple jellies." In the following note, appended to this passage, it is clear that the writer thought that the jelly-like matter found where shooting-stars had seemed to fall, was white.

Note.—"It is a common idea that falling stars, as they are called, are converted into a sort of jelly. Among the rest, I had often the opportunity to see the seeming shooting of the stars from place to place, and sometimes they appeared as if falling to the ground, where I once or twice found a white jelly-like matter among the grass, which I imagined to be distilled from them; and thence foolishly conjectured that the stars themselves must certainly consist of a like substance."

Poets and divines carry the record of this curious belief far back into the seventeenth century.

Suckling [2] (1541) says:—

"As he whose quicker eye doth trace
A false star shot to a mark't place
Do's run apace,
And, thinking it to catch,
A jelly up do snatch."

Jeremy Taylor [3] (1649):—

"It is weaknesse of the organ that makes us hold our hand between the sun and us, and yet stand staring upon a meteor or an inflamed gelly."

Henry More [4] (1656):—

"That the Starres eat . . . that those falling Starres, as some call them, which are found on the earth in the form of a trembling gelly, are their excrement."

Dryden [5] (1679):—

"When I had taken up what I supposed a fallen star I found I had been cozened with a jelly."

William Somerville [6] (1740):—

"Swift as the Shooting Star that gilds the night
With rapid transient Blaze, she runs, she flies;
Sudden she stops nor longer can endure
The painful course, but drooping sinks away,
And like that falling Meteor, there she lyes
A jelly cold on earth."

Several old writers, however, while agreeing as to the mode of occurrence of the "pwdre ser," and recognising the widespread belief that it was something which fell from the sky and was somehow connected with falling stars, have tried to find some more commonplace and probable explanation of the phenomenon, and most of them refer it to the stuff disgorged by birds that had fed on frogs or worms.

Merrett [7] (1667), for instance, in his work on meteors and wandering lights, says:—

"Sequuntur Meteora, ignita, viz. Ignis fatuus, the Walking fire, or Jack of the Lantern, Castor and Pollux, Helena, Ignis lambens. Draco, Stella cadens: Est substantia quaedam alba et glutinosa plurimis in locis conspicua quam nostrates 'Star-faln' nuncupant, creduntq; multi originem suam debere stellae cadenti hujusq; materiam esse. Sed Regiae Societati palam ostendi solummodo oriri ex intestinis ranarum a corvis in unum locum congestis, quod aliis etiam ejusdem societatis viri praestantissimi postea confirmarunt."

The Rev. John Morton,[1] of Emmanuel College (1712), is, however, the only one who, so far as I can ascertain, ever tried any experiments with the view of finding out what it really was. He set some of it on the fire, and when he had driven off all the watery part, there was left a film like isinglass, and something like the skins and vessels of animal bodies. He records many observations as to its time and mode of occurrence; for instance, he says that "in 1699–1700 there was no star-gelly to be found about Oxenden till a wet week in the end of February, when the shepherds brought me above thirty several lumps." This and other observations suggest that it is a growth dependent upon the weather, &c. On the other hand, he says that he saw a wounded gull disgorge a heap of half-digested earth-worms much resembling star-jelly, and that Sir William Craven saw a bittern do the same in similar circumstances.

The Hon. Robert Boyle,[2] 1744, explaining how clammy and viscous bodies, such as white of egg, are reduced to a thin and fluid substance, says:—

"And I remember, I have seen a good quantity of that jelly, that is sometimes found on the ground, and by the vulgar called a star-shoot, as if it remained upon the extinction of a falling star, which being brought to an eminent physician of my acquaintance, he lightly digested it in a well-stopt glass for a long time, and by that alone resolved it into a permanent liquor, which he extols as a specifick to be outwardly applied against Wens."

Pennant [3] seems to have supposed that its origin was that suggested by Morton, for in his description of the winter mew he says:—"This kind (*i.e.* the Coddy Moddy or Winter Mew) frequents, during winter, the moist meadows in the inland parts of England remote from the Sea. The gelatinous substance, known by the name of star shot, or star gelly, owes its origin to this bird or some of the kind, being nothing but the half digested remains of earth-worms, on which these birds feed and often discharge from their stomachs."

I have found it commonly near the sea, but have never seen any trace of earth-worms or other similar food in it.

Here, then, we have a well-known substance which may be of different origin in different cases, respecting the general appearance of which, however, almost all accounts agree. The variety of names under which it is known point to its common and widespread occurrence, *e.g.* pwdre ser, star-slough, star shoot, star shot, star-gelly or jelly, star-fall'n.

We have in every name, and in every notice in literature, a recognition of the universal belief that it has something to do with meteors, yet there does not appear to be any evidence that anybody ever saw any luminosity in the jelly. Nor has anybody seen it disgorged by birds, except in the case of those two wounded birds where some half-digested gelatinous mass was thrown up. Nor has anyone watched its growth like nostoc from the ground.

In 1908 I was with my wife and one of my boys on Ingleborough, where we found the "pwdre ser" lying on the short grass, close to the stream a little way above Gaping Ghyl Hole. For the first time I felt grateful to the inconsiderate tourist who left

1 "Ædipus," ii., 1, a tragedy in 5 acts in verse, with notes, &c., by Sir Walter Scott, revised and corrected by George Saintsbury. Vol. vi., p. 159.
2 "Poems Farewell to Love." Fragmenta Aurea; a collection of all the incomparable pieces written by Sir I. Suckling, p. 45. (London, 1546.)
3 "The Great Exemplar of Sanctity, &c." Preliminary Exhortation, par. 7, p. 5.
4 "Enthusiasmus Triumphatus," p. 45; D.N.B., vol. xxxviii., p. 422a.
5 "The Spanish Friar." Dedication, p. 404.
6 "Hobbinol, or the Rural Games": a Burlesque Poem in Blank Verse, 3rd edition, p. 70.
7 Merrett, "Christophorus, Pinax: Rerum naturalium Britannicarum, continens vegetabilia, Animalia, e. Fossilia in hac Insula reperta inchoatus," ed. 2der Lond., 1667, p. 219.

1 "The Natural History of Northamptonshire, with some Account of the Antiquities, &c." By John Morton, M.A., F.R.S., Emanuel College, Cambridge, Rector of Oxenden. (London, 1712, p. 352.)
2 "The Works of the Hon. Robert Boyle," in 5 vols. Vol. i., p. 244, of Fluidity, Sect. xi. (London, Millar.)
3 "Zoology Folio," 1766, p. 142.

broken bottles about, for I was able to pack the jelly in the bottom of one, tie a cover on, and carry it down from the fell. I sent it, with the sod on which it appeared to have grown, to my colleague, Mr. E. A. Newell Arber, with a brief sketch of my story and the reason why I thought it of interest. Mr. Arber reported that it was no nostoc, and said that he had sent it over to Mr. Brookes, in the Botany School, who reported that it was a mass of bacteria.

That is the end of my story, but I confess I am not satisfied. The jelly seemed to me to grow out from among the roots of the grass, and the part still tangled in the grass was not only translucent but quite transparent.

What is it, and what is the cause of its having a meteoric origin assigned to it? Has anyone ever seen it luminous?

Should anyone come upon it I should be very grateful if they would send it, and the sod on which it is found, to the Botany School at Cambridge, with a label indicating what the parcel contains, so that it may be attended to before decay has perhaps obscured important features.

T. McKENNY HUGHES.

THE TOTAL SOLAR ECLIPSE OF MAY 9, 1910.

UP to the time of writing (May 28) no account has been received from Mr. F. K. McClean with regard to the erection and adjustments of the various instruments he took out with him for the solar eclipse. It will be remembered that the observing station he chose was near Port Davey, and he selected a small island, called Hixson Point, for the actual site of the camp. The accompanying illustration (Fig. 1) indicates the position of this island in relation to the neighbouring country, and is from a photograph taken towards the east from Morning Hill.

Mr. McClean has, however, sent an intermediate letter, which will, no doubt, be read with considerable interest, describing the first week's operations from the time of the arrival of his entire party by the *Wainui* on April 7, with their whole kit and instruments. This account shows vividly the strenuous life which the party had continually to undergo during the initial stages of their settlement, and in a letter Mr. McClean states that so far "this trip is a triumph of matter over mind, as the latter has not had a look in yet, and never would have if it were not for the muscles of the party."

The accompanying illustrations, from photographs taken by Mr. H. Winkelmann, will serve best to show two specimens of the work which had to be undertaken. The first (Fig. 2) shows the avenue which had to be made from the camp to the instrument site. The figure standing up is Mr. Young, the bending figure Mr. Dowsett. In Fig. 3 is shown the method adopted for carrying the loaded packing-cases from the water's edge to the site; the figures from right to left are Messrs. McClean, Young, Brooks, Dowsett, and the last one, on the extreme left, unknown, probably one of the miners who was in the locality, and who assisted the members of the expedition.

The communication to which reference above has been made was dated April 17, and was dispatched from Port Davey by the steamer *Wainui*. The contents are as follows:—

"On April 5 Mr. Hughes, of the Union S.S. Co., supplied us with a time-table of the *Wainui*, and informed us that the steamer would call in when passing in each direction if weather permitted, but at the absolute discretion of Captain Livingstone.

"News arrived the following day that the 6-inch Cooke O.G. of 30 feet focus would arrive by the *Athenic* on April 14, and arrangements were made for its dispatch to Port Davey.

"A telegram was also received from Mr. J. Short, of Sydney Observatory, in answer to an invitation to set up his instrument alongside of ours, in which he said that he was awaiting Government sanction, and would be glad to join us.

Finally, on April 9, the *Wainui* arrived from Melbourne, and all our instruments, tents, timber, ironmongery, food, drink, clothing, and a whale-boat were put on board, altogether about 140 cases and packages, and we left Hobart at 9 p.m.

"The following morning we entered Port Davey in a strong south-west wind and a heavy swell, but as soon as we passed the Breaksea Islands the sea became calm, and the landing was effected without trouble. One of the ship's boats took the instruments and cement to the foot of Hixson Point, where they were hauled up the low bluff on planks by block and tackle, and left in a pile covered with a large tarpaulin until they could be carried to the observatory site. Our whale-boat took the camp equipment up the cove to where a small stream ran through a clump of bush, and here we set up our tents after the steamer left. The landing was done between 9.30 a.m. and 2.0 p.m. with the help of some of the officers and crew of the *Wainui* and two miners who were hunting in the neighbourhood. The weather all the time was fine, but rain started in the evening after we had set up three tents, in which we spent the first night.

"The following day we completed the camp and cut a path some 100 yards long through the bush with the help of the two miners, who later continued it on through the 2-foot scrub to the observatory site. We then set up the instrument tent close to the site of the observatory, but

FIG. 1.—The Country about Hixson Point, the site of the Eclipse Camp.

on Thursday, April 14, we had to remove it, as the strength of the wind was so great that even with additional guys the whole thing threatened to collapse, and we cut

FIG. 2.—Cutting a path to reach the Eclipse Camp from the shore.

a rectangular space in the middle of some low bush where there was very fair shelter. Our camp consists of a dining tent 12 feet square, a dark-room tent 6 by 9 feet with red lining, three sleeping tents 9 by 12 feet and two of 8 by 10 feet, situated on both sides of a small stream on a site cut out of the bush, and at the head of a small bay.

"Then it was necessary to cut a path from the top of the hill to the instrument cases—some 200 yards of very bad ground—and carry the cases up. This was done mostly by four persons on two timbers 2 inches square, but some of the siderostat parts proved too heavy, and had to be left until they could be unpacked and placed directly in position. Also the case containing the large dark-slide for the spectrograph had to be unpacked *in situ*, and the dark-slide alone required two persons to carry it.

"During the whole of the week there was bad weather, nearly always cloudy—night and day—always wind, and frequently rain, so that the foundations for the siderostat and cœlostat had to be oriented by compass only. All the sand and water for the concrete had to be carried up from the stream by hand—a quarter of a mile uphill—which was a big additional labour, but stone was quarried on the hill. Finally, on the Sunday morning (April 17), the foundation of the siderostat was completed, and all but seven cases were on the top of the hill, and, after the severe physical work of the last seven days, we proposed taking a half-holiday for fishing and washing clothes, or anything that the members of the expedition chose to do. But this was not to be, for on finishing lunch we saw an ominous smoke cloud across the sky, and from the top of the bush found that the scrub was ablaze close to the instrument tent. As we came up the flag-pole collapsed, but by much beating we kept the flames from the tent. Within 6 feet of it Worthington's cases—happily empty—were burning furiously, and the large case for the dark-slide of the spectrograph was a mass of flames, as into it had been put all the straw packing from three other cases.

"Having got the fire under control near the instrument tent, half the party were drafted off to prevent it reaching the camp, and later all but two, who were required to watch the smouldering remains on the top of the hill and the line of fire in the neighbourhood of the cases still at the landing place. In spite, however, of the efforts of these six, the fire reached the bush within 60 yards of camp, and it was only due to the constant wet weather of the previous week that it stopped there, as the trees were so saturated that nothing could burn them. Most of the camp equipment was quickly moved to the shore to be covered with a wet tent-fly, and food was placed in the whale-boat, but happily these precautions were not necessary. A constant inspection was kept of the still smouldering hillside, and at 6.30 a fresh blaze started on the edge of the bush close to the bay. This was temporarily overcome by beating and by buckets of water; but the soil was red-hot, being peat, and only constant attention and lengthy rain can put it out. In addition to this there has been a small peat fire the whole time in the bush within 50 feet of the dining tent, which has been watched, but not considered dangerous until now.

"The result of the fire is that two of Worthington's cases have been burnt and one of mine, and the legs of Worthington's equatorial have been singed. The fire was round more than two sides of the instrument tent, and within 4 feet of it at one point.

"The spectrograph dark-slide had already had one narrow escape, as, soon after it left Watson's workshop, the building was burnt to the ground, and now its case is destroyed by fire the day after it was unpacked. It was a near thing, and as we came up the hill we expected to leave by the *Wainui* the following day without instruments or kit."

FIG. 3.—Carrying the instrument cases from the shore to the camp on the hill.

WILLIAM J. S. LOCKYER.

NOTES.

UPON the recommendation of the National Academy of Sciences of the United States, the trustees of Columbia College, New York, have awarded the Barnard medal for meritorious service to science, for the five-year period ending with the year 1909, to Prof. Ernest Rutherford, F.R.S., Langworthy professor of physics and director of the physical laboratory in the University of Manchester, for meritorious service to science resulting especially from his investigations of the phenomena of radio-active materials. The medal is "of gold, nine-tenths fine, of the bullion value of not less than two hundred dollars." Previous awards of the medal are:—1895, Lord Rayleigh and Sir William Ramsay; 1900, Prof. W. C. von Röntgen; 1905, M. Henri Becquerel.

THE death is announced of Prof. Louis Raffy, who for twenty-six years was on the staff of the University of Paris. Since 1904 Prof. Raffy occupied the chair of analysis and geometry. At the funeral, orations were delivered by Prof. Paul Appell, dean of the faculty of sciences in the University of Paris, and by Prof. Bricard, president of the Paris Mathematical Society.

AN International Hygiene Exhibition is to be held at Dresden from May to October, 1911. The exhibition will include five sections: the scientific, the historical, the popular, sports, and industry. The scientific section will aim to present as completely as possible a picture of the science of hygiene. The general secretary for the scientific department is Dr. Weber, member of the Imperial Board of Health, Berlin.

WE regret to announce the death, at College Place, Camden Town, on June 19, in his one hundredth year, of Mr. E. Gerrard, formerly on the staff of the British Museum, and founder of the well-known firm of taxidermists in College Place, Camden Town. Mr. Gerrard, who was born on October 20, 1810, joined the British Museum as special attendant to Dr. J. E. Gray in 1841, and for many years had charge of the osteological collections. He was the author of the "Catalogue of the Bones of Mammalia in the British Museum," published in 1862. After fifty years' service in the museum Mr. Gerrard retired in 1896.

LORD CREWE, Secretary of State for the Colonies, has appointed a committee, formed of representatives of the Colonial Office and of the Natural History Branch of the British Museum, to consider the protection of plumage-birds. The main object in view is to consider to what extent it may be practicable to prevent, either by legislation or by departmental control, the indiscriminate slaughter of such birds now prevalent in certain parts of the Empire. Action of this nature can be effectual only by the cooperation of the Governments of all the countries included in the British Empire, and it is hoped that this may be obtained. The names of the committee will be published in due course. A provisional meeting of the members has been held already.

THE ninety-third annual meeting of the Swiss Society of Natural Sciences is to be held this year at Bâle on September 4–7. During the meeting lectures will be delivered by Prof. W. Ostwald, of Leipzig; Prof. E. von Drygalski, of Munich; Prof. P. Guye, of Geneva; Dr. L. Rollier, of Zürich; Prof. A. Ernst, of Zürich; Dr. Paul Sarasin, of Bâle; and Dr. H. G. Stehlin, of Bâle. The Swiss Societies of Botany, Chemistry, Geology, Physics, Zoology, and Mathematics will meet at Bâle at the same time. The secretary for the meeting is Dr. H. G. Stehlin, Museum of Natural History, Augustinergasse, Bâle, from whom all information may be obtained.

ON Monday last, June 20, at the invitation of the Lord Mayor of Birmingham, a meeting of the most prominent naturalists of the city was held in the Council House to consider the establishment of a Natural History Museum. The Lord Mayor, in opening the meeting, stated that the City Council is willing to allot considerable space for a natural history museum, but cannot undertake to provide the collections. Sir Oliver Lodge moved "that this meeting heartily approves of the establishment of a natural history museum worthy of the city." In the course of an interesting speech he remarked that the study of natural history is of special value to town citizens, and it has become more difficult to carry on the study save by such means as the meeting had assembled to promote. Birmingham is a great city, and can well afford a natural history as well as an art museum. Sir George H. Kenrick seconded the motion. He emphasised the responsibility that rests on individual effort to make the museum a success. He laid particular stress on the value of a library attached to the museum, and well stocked with books dealing with the subjects illustrated only perhaps partially in the galleries. Alderman Beale, chairman of the Art Gallery Committee, and other speakers, including Prof. Carlier, strongly advocated the formation of a museum. If the City Council carries out its intention of allotting the space, there will apparently be no difficulty in filling it, to the great advantage of all branches of the community. An influential committee was formed, and the motion was carried unanimously.

THE council of the Association des Ingénieurs électriciens sortis de l'Institut électrotechnique Montefiore, Liége, has issued the conditions which will govern the triennial award of the prize—the "Fondation George Montefiore"—which is to be awarded for the first time in 1911. The prize will be the accumulated interest on 150,000 francs in Belgian three per cent. funds, and is to be given for the best original work in French or English on the scientific advance and the progress in the technical applications of electricity. The last date for the reception of works to be submitted to the committee of award is March 31, 1911. Competitors should address M. le Secrétaire-archiviste de la Fondation George Montefiore, à l'Hôtel de l'Association, rue St. Gilles, 31, Liége.

THE annual report, dated May 13, of the Society for the Astronomical Study of Ancient Stone Monuments, Cornwall Branch, shows increasing interest in the work undertaken. The "most important excursion the society has ever had" was made on July 16, 1909, to the Wendron Circles. The leading object kept in mind is to follow up some preliminary observations of monuments with a more detailed examination, with the sure result of discovering features which at the first visit escaped attention. A striking feature of the kind is reported from Tregaseal and Wendron. The summer meeting this year was held at Boskednan Circle, Madron, on June 17. The treasurer's report shows an increasing balance in hand. The president is the Right Hon. Viscount Falmouth, and the honorary secretaries Mr. Henry Thomas and Mr. H. Bolitho.

A CORRESPONDENT, after hiving a swarm, noticed certain bees standing on the ledge before the entrance, rapidly moving their wings. It may be observed that when many

bees behave in this way they act as a lure to those outside the hive, and that each bee elevates the tip of her abdomen, and exposes a membrane there, situated between the fifth and the sixth dorsal segments. This membrane gives off a pungent scent, which the waving of the wings disseminates; no doubt the scent attracts bees that have lost their way to the entrance. A bee that has had a difficulty in finding the entrance, before she passes into the hive, stands for a short while on the alighting board to fan and expose her scent membrane. Thus, when many bees are uncertain about the position of the entrance, they are attracted there by the scent. A description of this scent-producing organ of the worker honey-bee, and the vibration of the wings to which our correspondent refers, will be found in Mr. F. W. L. Sladen's "Queen-Rearing in England," published at the office of the *British Bee Journal*, 23 Bedford Street, Strand, W.C.

A NATIONAL committee (of which the King, when Prince of Wales, acted as honorary chairman), representative of the colonies, of the Navy, of the shipping industry, and of the learned societies, has been formed under the auspices of the British Empire League to secure the erection in London of a memorial to Captain Cook. It is a reproach to the nation that no recognition should have been paid to the memory of a man whose intrepid explorations resulted in such notable additions to the British Dominions, and whose scientific work has been of the greatest value to mankind. For the purpose a fund of at least 3000*l.* will be needed, to which the committee now invites contributions. Nearly one-third of this amount has been subscribed by members of the committee. Cheques should be crossed Robarts, Lubbock and Co., and made payable to the treasurer, Lord Brassey, G.C.B., 24 Park Lane, London, W.

THE interesting speeches made on the occasion of the presentation of a marble bust of the late Dr. John Hopkinson, F.R.S., to the Institution of Electrical Engineers on November 11, 1909, are printed in the journal of the institution (vol. xliv.). In making the presentation on behalf of his mother, Prof. B. Hopkinson did not claim too much when he said that "so long as dynamos are made, so long will the designers of such machinery, and the inventors of new forms of it, have first to master and then to use the fundamental principles which my father laid down." Mr. W. M. Mordey, president of the institution, in expressing the thanks of the council and members to Mrs. Hopkinson for the gift, pointed out some of the landmarks laid down by Dr. Hopkinson in connection with the development of electrical engineering. Dr. Hopkinson not only raised the knowledge of the dynamo from chaos into engineering and scientific order, but also made valuable contributions to subjects of purely physical interest. He was distinguished as an investigator, inventor, and teacher, and the marble bust at the Institution of Electrical Engineers will remind all who see it of a life to be emulated as well as honoured.

THE third annual exhibition of the Society of Colour Photographers is now open at 24 Wellington Street, Strand, and will close on July 9. There is manifest a general levelling up in quality, and many, such as Mr. Hollyer's three-colour collotypes and Mr. Clifton's three-colour carbon prints, show what skilful manipulation can do with methods that allow much scope for error. Among the transparencies by the autochrome and similar processes are several examples on the new "Dufay" plates. The Thames Plate Company is bold enough to show four duplicates made from the same negative, and though any one alone might perhaps be accepted as satisfactory, the slight differences between the colours in the four prints demonstrate in an interesting way the difficulty of making two colour photographs exactly alike. Messrs. Mees and Pledge show an interesting series of photomicrographs of eight different kinds of three-colour screens, with various spectra and resolving power tests of colour plates. Dr. Mees also shows one of Mr. Ives's new colorimeters. The exhibition presents in a small space an excellent summary of the present condition and possibilities of colour photography from a practical point of view, together with many analytical results of especial interest to the scientific student.

THE seventy-eighth annual meeting of the British Medical Association is to be held in London on July 22–29. The main business of the congress will be done in sections, which are, with their presidents, as follows:—anæsthetics, Dr. F. W. Hewitt, M.V.O.; anatomy, Prof. Arthur Keith; bacteriology, Dr. C. J. Martin, F.R.S.; dermatology, Dr. P. Abraham; diseases of children, Dr. A. E. Garrod; gynæcology and obstetrics, Dr. Mary Scharlieb; laryngology, Mr. H. Tilley; medical sociology, Dr. J. A. Macdonald; medicine, Dr. R. W. Philip; navy, army, and ambulance, Colonel A. Clark; odontology, Mr. J. H. Mummery; ophthalmology, Mr. C. Higgens; otology, Dr. E. Law; pathology, Mr. S. G. Shattock; pharmacology and therapeutics, Prof. A. R. Cushny, F.R.S.; physiology, Prof. W. H. Thompson; psychological medicine and neurology, Dr. T. B. Hyslop; radiology and medical electricity, Mr. J. M. Davidson; State medicine, Sir William Foster; surgery, Sir Victor Horsley, F.R.S.; and tropical medicine, Dr. F. M. Sandwith. The address in medicine will be delivered on July 27 by Dr. J. Mitchell Bruce, and the address in surgery on July 28 by Mr. H. G. Barling. The second annual meeting of the Medical Library Association, under the presidency of Prof. Osler, will be held on the mornings of July 27 and 28, at which papers will be read dealing with matters likely to be of practical interest and assistance to medical librarians, members of library committees, and readers. It is also intended to hold a bibliographical exhibition in connection with this meeting.

THE Horniman Museum at Forest Hill continues to advance in popularity and in the interest of its collections. In the ethnological department the most important accessions during the past year have been collections from the north-west of North America and the Eskimo region, and a series illustrating the structure of the anthropoid apes. Arrangements have also been made for a good series of illustrative lectures. In that of natural history some progress has been made in collecting a series describing the structural adaptations of animals to the chief modes of progression, and increased accommodation for vivaria and aquaria has been provided.

THE *National Geographic Magazine* for April, under the title of "The Spirit of the West," continues the graphic and well-illustrated series of articles by Mr. C. J. Blanchard, of the United States Reclamation Department, on the extensive works completed and in progress for extending irrigation in the Mississippi Valley. Thirteen million acres now produce harvests valued at 50,000,000*l.*, and support more than 300,000 families at present, with hopes of large increase in the immediate future. One of the most important of these works is the gigantic concrete dam, said to be the highest in the world, which bars the cañon of the Shoshone River collecting the drainage from the lofty mountains east of Yellowstone Park. This rises to a height of 328 feet, slightly higher than the summit of the dome of the Capitol at Washington.

IN the second issue for the present year of the *Bulletins et Memoires* of the Société d'Anthropologie of Paris, Dr. A. F. Legendre publishes an elaborate anthropometrical study of that strange race, the Lolos of the Kien Tch'ang Valley, who have hitherto been a puzzle to ethnologists. In spite of the domination of the Chinese, who have taught them many vices, such as alcoholic drinking, they preserve some measure of independence, and in consequence of the ill-treatment to which they are accustomed they are so suspicious of strangers that there is much difficulty in investigating their ethnical characteristics. They seem to have decided affinity with the Tibetan stock, but they combine certain negroid characters with a curious fairness of skin. Dr. Legendre does not venture to give a decided opinion on their origin, but the elaborate measurements which he supplies will greatly assist in the solution of the problem.

IN reference to the confirmation of the existence of pygmies in New Guinea, referred to in NATURE (p. 433), it should have been noted that Dr. A. B. Meyer in 1908 wrote ("Die Papuasprache in Niederländisch-Neuguinea," *Globus*, Bd. xciv., p. 192):—"The question whether the Papuans are a uniform race with a great breadth of variation or a mixed race was pronounced by me to be not yet ripe for decision ('Negritos,' 1893, 87, and 1899, 87). Now, however, after Ray's discovery of the Papuan linguistic family, I incline to the view that they are a mixed race of 'Negritos' and Malays (in the wider sense). I am eagerly looking forward to the exploration of the interior of the great island, when here too the Negrito element may perhaps be brought to light in its old and more constant form as still existing in the Philippines, Andamans and Malakka."

IN the April number of *Biometrika* there is an article by Prof. Karl Pearson on "Darwinism, Biometry, and some Recent Biology." The article, which apparently is to be continued in the next issue, is a general criticism of recent biological work in which more or less inadequate statistical methods have been used, with unfortunate results, but the greater part is devoted to a useful discussion of some of the difficulties that arise if the theory of "pure lines" is accepted in its most stringent form—*i.e.* the hypothesis that there is absolutely no individual inheritance within the "pure line." As Prof. Pearson correctly points out, if this conception were true the correlation between offspring and parent, and that between offspring and grandparent, would be the same in any case in which the reproduction was mono-sexual. The work of Warren on Daphnia and on Hyalopterus, and that of Johannsen himself on Phaseolus, indicate that this is not the case, the grandparental coefficient being very distinctly smaller than the parental coefficient. The fact that Johannsen, Raymond Pearl, and Jennings have failed to find any sensible effect of selection within the pure line may probably be ascribed to the fact that they have all been working with characters for which the coefficient of inheritance is exceedingly low; to arrive at an appreciable result a character should be selected for which the inheritance is relatively high. In any case, of course, it remains true that for breeding purposes it will be much better to select by the method of pure lines than by selection of the characters of individuals, but the effect of selection of individuals from the mass of the population is of vital importance for the theory of evolution.

IN the June number of the *Selborne Magazine* Mr. G. S. Boulger directs attention to the enormous crop of seeds borne by many elms in England in the spring of 1909, the abundance of the crop being attributed to the fine autumn of 1908 and the sunny character of the following spring. The species which produced the seed is the smooth-leaved elm (*Ulmus glabra*), the common *U. surculosa* (or *campestris*) being infertile in this country. To the same issue Mr. J. Buckland contributes an article on the slaughter of egrets for the sake of their plumage.

MR. N. N. WORONICHIN contributes to the botanical section (parts iii. and iv., 1909) of the *Travaux de la Société des Naturalistes de St. Pétersbourg* a list, with descriptions, of Rhodophyceæ collected in the Black Sea. The number of species amounts to ninety-seven, of which Polysiphonia and Ceramium supply twelve and ten respectively; some new varieties are distinguished. Two species are cited as endemic, while a Laurencia and Ceramium are noted as being recorded from the Atlantic Ocean and North Sea, but not from the Mediterranean.

A REVISED catalogue of microscopes and accessories issued by Messrs. W. Watson and Sons, High Holborn, London, contains descriptions of the essential working parts and full particulars of their various instruments, ranging from the school pattern to the microscopist's van Heurck type; a new introduction is the inexpensive naturalist's microscope intended for general use. Great variety is offered in the shape of objectives and condensers; for low-power photomicrographic use a series of holostigmatic lenses have been designed, which are used without eye-pieces. Accessories of all kinds are listed for microscopists, bacteriologists, biologists, and for commercial purposes.

A DESCRIPTION of a singular purple-flowered Cytisus hybrid, for which an award of merit was given at the Temple Show, is communicated by Mr. R. A. Rolfe in the *Gardener's Chronicle* (June 18). The hybrid, *Cytisus* × *Dallimorei*, was raised in Kew Gardens by Mr. Dallimore from a crimson-winged variety of *Cytisus scoparius* crossed with pollen of the white broom, *Cytisus albus*. Of two seedlings obtained, only one produced purple flowers; the other bore flowers of a bright yellow. The purple colour of the seedling is traceable to the variety which is characterised by a deep crimson pigment in the wings and a slight tinge at the tip of the upper petal, the brown pigment, as the author suggests, being probably a suffusion of purple and yellow. Self-fertilised plants have been raised from both the yellow and purple hybrids, but, so far, the latter have not flowered.

THE steady progress that is being made in the application of science to agriculture in the West Indies is well shown by a comparison of the Bulletin of the Department of Agriculture, Trinidad, recently issued (No. 64, vol. ix.), with the corresponding number for last year (No. 63, 1909). The earlier issue was filled with short notes, many of which were extracted from other journals, and did not represent anything in the way of original observations; the notes might be helpful to the planters, but they were more of the nature of useful hints than of reasoned discussions of the planters' problems. The present issue is a distinct advance. It contains papers by the members of the staff on important problems connected with rubber, cacao, and cocoa-nut. Mr. Carruthers discusses the possibility of growing rubber successfully, and points out that, in spite of certain obvious similarities, there are certain fundamental differences in the conditions obtaining in Ceylon or Malaya and those in Trinidad. Chief among these is the supply of labour, which is only small in Trinidad; in consequence, the planters could not keep the plantations anything like so clean as is done in the East, nor could the tapping be done as frequently. It does not

appear, however, that the difficulties are insuperable. Mr. Carruthers also writes on the cacao canker, caused by a fungus, probably by *Spicaria colorans*, but possibly also by others; Mr. Rorer is working at the problem, and will, it is hoped, be able definitely to allocate the responsibility for the mischief. Mr. Rorer describes the witch-broom disease of cacao, Mr. Johnston writes on the cocoa-nut palm diseases, and Mr. Urich on "froghoppers" in the sugar-cane (*Tomaspis postica*, Walk.). Messrs. Carmody and Verteuil record certain analyses of local value.

IN a circular published by the U.S. Department of Agriculture (No. 118, Bureau of Entomology) Mr. F. M. Webster gives a description of a mite (*Pediculoides ventricosus*, Newport) occurring in grain which preys on the larvæ of the grain moth, adults of the barley joint-worm, &c. It also attacks man, causing an itching skin eruption.

AN excellent little "Guide to the Preservation of Health in West Africa," by Dr. Strachan, C.M.G., principal medical officer of southern Nigeria, has been published by Messrs. Constable and Co., Ltd., price 6*d*. net. It deals in simple language with anti-malarial measures, the collection and storage of water, clothing, food, &c.

THE Bulletin of the Sleeping Sickness Bureau (vol. ii., No. 17, May) contains a very complete scheme of investigation on the bionomics of the tsetse-fly, *Glossina palpalis*, which conveys sleeping sickness, and should be in the hands of all who desire to do research in this subject. So much still remains to be done that probably everyone in the endemic areas might, with the aid of a scheme like this, add his mite to our sum of knowledge.

THE *Philippine Journal of Science* for December, 1909, contains several papers of considerable medical interest and importance. Messrs. A. F. Coca and P. K. Gilman record several cases of cancer treated with a "vaccine" prepared by grinding up a portion of the tumour removed by operation. The results seem promising. Dr. Clegg, by cultivating leprosy material on agar in symbiosis with amœbæ and cholera vibrios, claims to have grown an acid-fast bacillus which he believes to be the leprosy bacillus.

PROF. MINCHIN, in his presidential address to the Quekett Microscopical Club, discusses the phenomena of parasitism among protozoa. He concludes that "in the origin of species among parasites there are, as in other organisms, two steps: first, the appearance of variations, with the resultant disharmony seen in the lethal forms; secondly, by a gradual process of reciprocal adaptation between host and parasite, the establishment of more normal harmonic relations, associated with definite specific characteristics and reactions on the part of the parasite and the host" (Journ. Quekett Microscop. Club, April).

A RECENT publication from the Ottawa Government Printing Bureau contains a report by Mr. Einar Lindeman to the Canadian Department of Mines on the iron-ore deposits of Vancouver and Texada Islands, British Columbia. Mr. Lindeman dwells on the importance of local magnetic surveys in the immediate vicinity of the outcrops of magnetite, which are a common feature in the district referred to, and gives two interesting charts based on such surveys. Unless an appreciable disturbing magnetic force exists for some distance all round an outcrop, Mr. Lindeman thinks it is pretty safe to conclude that the extent of the deposit is very limited.

IN the *Mémoires de l'Observatoire de L'Ébre*, No. 4, the Rev. J. García Mollá, S.J., describes the equipment of the electric section of the Observatory of the Ebro, founded a few years ago. The work—a French translation from the Spanish—is handsomely illustrated, and extends to more than 120 quarto pages. It describes the apparatus, including a water-dropping electrograph, an Elster and Geitel dissipation apparatus, a Gerdien instrument for air conductivity measurements, a ceraunograph, or wireless installation for recording thunderstorms, and an earth-current apparatus. Father García Mollá also discusses in a practical way a number of the difficulties encountered in working the instruments, and goes in considerable detail into the theory of the observations and their reduction. The electrical section is but one of several, and, so far at least as equipment is concerned, the observatory promises to afford remarkable facilities for the study of geophysics.

IN a paper entitled "Storms and Storm-warnings on the German Coast in the Years 1896–1905," published in *Aus dem Archiv der Deutschen Seewarte* (vol. xxxii., part ii.), Dr. L. Grossmann discusses in great detail the storm frequency for various seasons and districts, and checks the accuracy of the signals hoisted by the Deutsche Seewarte in every imaginable way. An idea of the labour entailed in the investigation may be gathered from the fact that storm statistics have been tabulated from some 10,000 monthly registers supplied by the signal stations. The distribution of storms is divided into two principal types, those which spread in a W.-E. direction and those which take place in connection with depressions over north-east Europe and spread to the westward. About 70 per cent. of the storm phenomena over the North Sea reach the Prussian coast, while only some 47 per cent. of the storm phenomena on the latter coast also occur on the coast of the North Sea. The success obtained in warnting of storms from easterly directions is not very satisfactory, especially in the summer months, but the success for those from westerly directions, especially in the winter season, is very considerable. These results agree in the main with those obtained in a similar inquiry for the preceding ten years (*Aus dem Archiv*, 1898).

PROF. CARL BARUS, in a report published by the Carnegie Institution of Washington (pp. vi+83), gives an account of further experiments on "Condensation of Vapour as induced by Nuclei and Ions." The report begins with a chapter on the nuclei left behind on the evaporation of the pure water drops which are produced in moist, dust-free air when a sufficient degree of supersaturation is brought about by sudden expansion. The colour phenomena associated with clouds formed by expansion—a subject to which Prof. Barus has devoted much attention in previous researches—are dealt with in a second chapter. The principal advance here has been in the use of an approximately monochromatic source of light—the mercury green light—in the study of coronas. The rest of the report deals with the application of the corona method of estimating the number of cloud particles to the study of the ions due to radium, and the determination of the ionic charge. On the assumption that only the negative ions are caught in his experiments, he obtains for the charge carried by the ion values agreeing fairly well with those which have been arrived at by other methods. The object of the author's investigation was primarily to test the accuracy of his optical method of determining the number of nuclei. An interesting feature of the experiments is the scale on which they were carried out. Other physicists who have used the condensation method of measuring the ionic charge have worked with expansion apparatus in which the cloud chamber contained only a few c.c. of air; Barus used a fog chamber containing many litres, the number of ions

per c.c. being also large, ranging up to a million or more. The electrical quantities to be measured were thus of considerable magnitude.

PART viii. of the *Verhandlungen der deutschen physikalischen Gesellschaft* contains a paper by Dr. H. G. Möller on the calculation of the Foucault currents in iron. He considers the case of a cylinder of iron surrounded by a coil through which an alternating current is sent, and calculates the magnetic induction at any instant, taking into account the induced currents produced in the iron itself. With 100 cycles per second the B-H curves for low values of the maximum impressed H are almost identical with the ordinary magnetisation curves, but as the value of H is increased the hysteresis loop contracts near the origin. This result is in exact accord with the experiments made last year by Dr. Hausrath, and justifies the conclusion that the magnetisation in iron responds instantaneously to changes in the resultant magnetising force.

WE have received from Prof. Merczyng, of St. Petersburg, a separate copy of his paper on the indices of refraction of liquids for electric waves of small wave-length, which appeared in the April Bulletin of the Academy of Science of Cracow. The electric waves were generated by a Righi oscillator, and were measured by means of the interference produced by reflection at two metal surfaces, one a little in front of the other. The measurement gave 4·5 cm. The indices of refraction of the liquids were calculated by Fresnel's formula from observations of the relative intensities of the incident beam and the beam reflected from the surface of the liquid. They lie, for the five liquids tested, between the indices found previously by the late Prof. Drude for waves of 75 cm. and the values for light waves.

A SERIES of measurements of the temperatures of the metallic filaments of incandescent electric lamps has recently been made by Dr. M. v. Pirani at the lamp works of Messrs. Siemens and Halske, and the results are given in part vii. of the *Verhandlungen der deutschen physikalischen Gesellschaft*. The filaments were of platinum, tantalum, and tungsten, and were, in general, stranded. They were heated in an inert gas or *in vacuo* either by an external heating coil or by the current traversing them, and the temperature was measured by a standardised thermo-element of fine wire introduced between the strands. Up to a temperature of 1600° C. it was found that temperature t and current i were connected by the relation $i=a+b.t^n$, where a and b are constants and n has a value between 1·5 and 2·5. This relation was used to determine the temperature above 1600° C. Observations were also made of the "black-body temperature" of the filaments by a standardised radiation thermometer of the Holborn-Kurlbaum type using red light. Tables are given of the resistances of the filaments up to temperatures just below the melting points, and it is shown that at these points the black-body temperatures are about 150° C. below the actual temperatures.

THE quality of surface waters in the United States, by Mr. R. B. Dole, is the subject of water-supply paper No. 236, issued by the United States Geological Survey. The numerous analyses are chiefly of local interest, but the account of the methods employed is worthy of note. The highest accuracy consistent with rapidity of analysis was aimed at, and an estimate is given of the limits of accuracy achieved for each constituent. The methods of presenting the results of water analyses are also discussed, the ionic form of statement being regarded as the best, as it gives a statement of facts and not of opinion.

THE Stumpf uni-directional flow steam engine forms the subject of an illustrated article by Prof. Stumpf, of the Charlottenburg Technical High School, in *Engineering* for June 10. In this engine the steam is carried through the engine in an unchanged direction. The live steam is admitted from below into the cover, which it serves to jacket, and enters the cylinder through the valve. At the completion of the working stroke it is exhausted through slots or ports which are provided in the middle of the cylinder, and are uncovered by the piston. This avoids the losses common to ordinary engines by the cooling of the live steam ports produced by the flow of wet exhaust steam through them, and the consequent condensation in the cylinder. Prof. Stumpf claims that the remarkable advantages offered by this type of exhaust, notably the great simplicity of construction, render the uni-directional flow principle particularly valuable for engines working with superheated steam. Stationary and portable Stumpf engines of a great variety have already been built on the Continent, and their manufacture has been taken up in this country.

COMMENTING on the salving of the French submersible boat *Pluviose*, *Engineering* for June 17 states that the practice in all British submarines is to have a diving dress for each member of the crew stowed away adjacent to the station which he occupies when the boat is submerged. There is a flexible lead from the usual air service, with a valve in close proximity to each dress. In the event of an accident the dress can be put on in half a minute and supplied with air by means of the flexible lead. A purifier is fitted to the dress, which ensures a supply of air sufficient to last the man for an hour and a half. Training of the members of the crew to effect exit, in the British service, is conducted in a tank, the bottom of which is fitted up to resemble a submarine boat, and the test imposed upon the prospective members of a crew is to plunge to the bottom of the tank in an air lock, where he is required to put on the diving dress, proceed across the tank, ascend the counterfeit of a conning-tower in a submarine, and open the hatch, when he is enabled to rise to the surface. The period occupied for training the men in this important work has been found by experience to be not more than five days. Although the conditions are not quite those existing in a submarine after an accident, yet the method appears to offer the only likely solution of a very difficult problem; it is simple, and provides, at any rate, that each member of the crew will have a chance of saving his life.

WE have received from the Caxton Publishing Company, Ltd., the first volume of "Nature-study on the Blackboard," by Mr. W. P. Pycraft and Miss J. H. Kelman, to be completed in three volumes at 7*s*. 6*d*. net each. We hope to review the work when the remaining volumes are available.

A SEVENTH edition of Mr. Charles Pendlebury's "Exercises and Examination Papers in Arithmetic, Logarithms, and Mensuration" has been published by Messrs. G. Bell and Sons, Ltd. About two-thirds of the contents of the present issue consist of new matter, and the portions of the older book which have been retained appear in a somewhat different order.

THE Selborne Society has issued the third of a series of leaflets on the Brent Valley Bird Sanctuary. This deals with curious nesting places, and, like those previously issued, is profusely illustrated, having been reprinted from *The Country Home*. Copies of the leaflet may be obtained

from Mr. Wilfred Mark Webb, honorary secretary of the Selborne Society, at 42 Bloomsbury Square, W.C., post free for three halfpenny stamps.

MESSRS. SWAN SONNENSCHEIN AND CO. will publish at an early date an English translation of "Spiritism and Insanity," by Dr. Marcel Viollet. This book forms part of the Library of Experimental Psychology and Metapsychism published under the direction of Dr. Raymond Marcel, of Paris, and has been translated by Mr. Dudley Wright, editor of the *Annals of Psychical Science*.

THE report and transactions of the East Kent Scientific and Natural History Society for the year ending last September have reached us. The society is affiliated with the British Association and the South-eastern Union of Scientific Societies. The pamphlet, which has been edited by Mr. A. Lauder, the honorary secretary of the society, contains an account of the annual meeting in October, 1908, abstracts of the lectures delivered during the session, notes on the work done by the various sections of the society, and useful meteorological statistics for 1909.

MR. W. ENGELMANN, of Leipzig, has lately issued the third (enlarged) edition of Ostwald and Luther's well-known work, "Hand und Hülfsbuch zur Ausführung physiko-chemischer Messungen." The first edition was reviewed in NATURE of January 4, 1894 (vol. xlix., p. 219), and the second in the issue for December 4, 1902 (vol. lxvii., p. 101). The volume provides teachers and students with details of apparatus and practical hints on manipulation not found in any ordinary text-book, and the new edition claims a place in every chemical and physical laboratory. A second edition of Prof. M. Verworn's lectures on the mechanism of psychical life ("Die Mechanik des Geisteslebens") has been published by Mr. B. G. Teubner, Leipzig. This little work appeared in 1907, and the original edition was reviewed in NATURE of April 16, 1908 (vol. lxxvii., p. 557).

Erratum.—In NATURE of June 9 (vol. lxxxiii., p. 445), column A, line 15 from bottom, for "Thaumatocrinus" (a recent genus) read "Traumatocrinus" (a genus characteristic of Upper Trias).

OUR ASTRONOMICAL COLUMN.

JULY AND AUGUST METEORS.—With the advent of July every meteoric observer is induced to make preparation for the active campaign which the season offers. After the middle of July meteors usually become extremely abundant, and any patient watcher of the skies may record a plentiful harvest of meteor-tracks. In May and June there are comparatively few shooting stars, and perhaps the average horary number is not more than four or six, but in the two succeeding months the rate of appearance often equals twenty or twenty-five per hour.

In July there is a very active display from Aquarius, which apparently reaches its maximum on July 27–31, though the meteors continue to fall from the same centre at about 339—11 during the first half of August—and in July there are many early Perseids displayed, though the latter are a different class of meteor to the Aquarids. Those which are directed from Perseus are of the swift, streaking order, while those from Aquarius are of the slow, trained variety, and they have long flights, the radiant being in low altitude.

This year both the Aquarids and Perseids may be observed to advantage, as the moon will offer little interference. On August 12, when we are led to expect the greatest abundance of meteors, our satellite will set at 10.9 p.m. and leave us with a dark sky, on which the meteors may be seen at their best; but, of course, in our English climate atmospheric conditions are always very doubtful. What we require is a series of beautifully transparent skies such as we experienced during the first half of August, 1909. Observers should seize such opportunities as are available and determine the place of the radiant and horary rate of meteoric apparitions on every clear night. The individual paths of those meteors equal to or brighter than first magnitude should be carefully recorded. The last few years have furnished average displays of Perseids; there is some reason to expect a richer shower this year.

THE LACINGS BETWEEN JUPITER'S BELTS.—Circular No. 124 from the Kiel Centralstelle contains a telegram from Prof. Lowell, dated June 14, announcing that the "criss-cross filaments interlace all Jupiter's belts." This refers to the lacings first observed between the equatorial belts by Mr. Scriven Bolton, and apparently means that similar lacings have been observed between *all* the belts.

OBSERVATIONS OF ORIONIDS IN 1909.—To No. 4418 of the *Astronomische Nachrichten* Prof. Dubiago communicates the results of the Orionid observations made at the Engelhardt and Kasan Observatories during October 17–20, inclusive, 1909. The times and apparent paths of ninety-six meteors were observed at the former station, and of forty-eight meteors at the latter. Eight meteors were observed at both stations, and for these real paths have been computed; the heights vary from 35 to 890 km. The following is the position of the radiant as determined from these observations:—$\alpha = 88° \pm 2{\cdot}9°$, $\delta = +21° \pm 1{\cdot}7°$.

THE CAPE OBSERVATORY.—Mr. Hough's report of the work done at the Cape Observatory during 1909 contains several items of special interest. Among other things, we learn that Dr. Halm's new spectrometer, giving direct readings of wave-lengths, was extensively employed for the measurement of stellar spectra, and the results found not to be inferior in accuracy to those secured by the older methods. It is also of interest to learn that arrangements have been made to take daily photographs of the sun to supplement those taken at Greenwich and other observatories in the Empire. A large number of stellar spectra were secured and measured in the research on the solar parallax and for the examination of the systematic motions of stars in the line of sight. For Prof. Kapteyn's "Selected Areas" programme a number of proper-motion and parallax plates were secured; satisfactory progress in the *Carte du Ciel* programme is also reported.

THE TRANSIT AND TAIL OF HALLEY'S COMET.

THE question as to whether the earth passed through the tail of Halley's comet is discussed, from the point of view of the Helwan observations, by Mr. Knox Shaw in No. 4418 of the *Astronomische Nachrichten* (p. 31). On May 18, at 13h. G.M.T., the tail was seen to stretch as far as α Equueli, where it was 2° broad, although 8° broad where it involved γ Pegasi. At 13h. on May 19 there was no sign of the tail in the west, but it was traced to θ Aquilæ, where it merged with the Milky Way. The form was still tapering, and was 15° broad at α Pegasi. Similar observations followed on May 20, when still no tail was seen in the evening; but at 14h. it was traced to the Milky Way, and was about 10° broad in Pegasus. At 6h., G.M.T., on May 21 the tail was visible for a distance of 20°, but none could be seen at dawn. The narrowness of the tail (8°) on May 18 and the increased breadth next morning suggest that it was bent back in the orbit, and probably did not begin to sweep past the earth before 12h. on May 20. At this time the earth was some four million miles south of the comet's orbit plane, and consequently the tail probably passed well to the north of the earth, for the Helwân observations, during May, suggest that it was not nearly wide enough to envelop the earth at that distance. They also show that its length was well over twenty million miles, and would therefore have enveloped the earth had the planes coincided. No sign of the comet's transit of the sun's disc was observed, although observations were made with the 4-inch Cooke equatorial. Dr. Meyermann also reports that, at Tsingtau, no trace of the comet was seen during the transit, nor were any extraordinary magnetic or meteorological effects recorded by the respective instruments.

Observations at the Stockholm Observatory were interfered with by heavy skies, but Dr. Bohlin reports that some photographs were obtained on orthochromatic plates used in conjunction with a yellow screen.

Further negative results, accruing from careful observations made on May 18 and the following days, are recorded by Father S. Chevalier in a special circular from the Lô-Sè Observatory. The sun was observed directly and by projection by several observers, but no trace of the comet was seen on the disc about the computed time of transit. Photographs were also obtained, and clearly showed dark pores of 2″ diameter on the disc, but no trace of the comet. It therefore appears unlikely that any part of the comet having a diameter of 0·5″, or, actually, 60 km., was dense enough to be registered on the plate. The magnetic curves, of which reproductions accompany the circular, obtained at the Lu-Kia-Pang Observatory on May 17, 18, and 19, show no perturbations which could with certainty be ascribed to cometary influence.

The *Comptes rendus* for June 13 (No. 24) contains several interesting notes concerning observations of the comet at various observatories.

M. Marchand reports that at the Pic-du-Midi station the solar halo seen from May 19 to 25 was still visible on May 31 and June 2 with the same diameter, 3° or 4°, but much paler, and a notable sunset effect was seen on May 31. Such an effect has not been recorded for several years, and is ascribed to the presence of very tenuous matter in the atmosphere at great altitudes.

MM. Cirera and Pericas describe the varying forms of the comet as observed at the Observatoire de l'Ebre (Spain) from May 1 to June 6. A table of the apparent and real lengths—the latter given in astronomical units—shows that up till May 12 the increase in the length of the tail was continuous, but a decrease was noted on May 26, followed by further progressive increase until June 2; observations on some of the intermediate dates were interfered with by clouds. It is suggested that the fluctuation was possibly produced by the earth capturing several million kilometres of the tail during the predicted passage on May 19. Photographs were secured on a number of dates during May and the first week in June, but bad weather prevented a continuous series from being obtained. The series shows, however, some striking changes in the form, extent, and brightness of the nucleus and head, especially about May 27; on May 30 the coma was much less bright and extensive.

M. Eginitis reports on the observations of the tail, made at the Athens Observatory on May 18, 19, and 20. On the Thursday morning, about an hour before the computed time of passage, the tail was seen to be nearly straight, but having a slight curvature, which may have been due to the proximity of the earth to the comet's orbit plane. At 3 o'clock on the Friday morning the tail was nearly 130° long, but no trace of it could be found on the Saturday morning. On the Friday evening, however, it was seen, like a crescent moon, and on Saturday evening was some 30° long. Observations of the sun's disc during the time of transit failed to reveal any sign of the comet.

MM. J. Baillaud and Boinot discuss, in detail, the transformations of the nucleus depicted on the photographs taken at the Paris Observatory on May 30 and 31 and June 2. A sudden transformation took place in the nucleus on May 31, the previously extensive elliptical form giving way to a circular condensation with bright extensions. Secondary condensations appeared, some of which were only temporary; but one of them persisted undiminished until June 2, and the authors liken the phenomenon to the doubling which occurred in the case of Biela's comet.

In No. 6, vol. lxx., of the Monthly Notices (R.A.S.) Dr. Rambaut publishes positions of the comet determined from photographs secured at the Radcliffe Observatory, with the 24-inch telescope, between November 7, 1909, and February 11. Such places depending upon stars generally taken from the Astrographic Catalogue will be invaluable in the subsequent discussions of the orbit; the comet was first picked up at the Radcliffe Observatory on November 5, 1909.

Mr. H. H. Gruning, of Ealing, sends us an interesting account of his observations of the comet. Between April 18 and June 18, using five-times field glasses (2-inch aperture), he saw the comet fourteen times, and on ten of these occasions it was visible to the naked eye. No tail was seen except on May 31 and June 1, when, with the glasses, he was able to follow it to a distance of 1°. These carefully made observations well illustrate, when compared with the glowing reports from lower latitudes, the disadvantages under which we, in this country, have laboured during the present return of the famous comet.

Another correspondent sends us a cutting from the *Lancashire Daily Post* for June 1, in which Mr. L. Whitaker reports a remarkable phenomenon observed at Salterforth at about 3.30 a.m. on May 26. According to this report, a tail about 40° in length was seen rising from the eastern horizon. It would be of interest to have further records of this curious phenomenon.

THE ROYAL SOCIETY OF NEW SOUTH WALES.

THE Royal Society of New South Wales is the oldest scientific society in Australasia and in the southern hemisphere, unless there are older ones in South America or South Africa, and it will be able to celebrate its centenary in another eleven years.

It was started in 1821 in a similar way to the Royal Society of London, under the name of the Philosophical Society of Australasia, by a small band of friends, ten in number, under the presidency of the Governor, Sir Thomas Brisbane, K.C.B., F.R.S., who met at each other's houses, where papers were read and discussed; there was a penalty of 1*ol.* for any member failing to present a paper in his turn. They also lent each other books, as there was no public library in those days and hardly a bookseller in the whole of Australia.

The first members were Mr. Alexander Berry, whose brother, Mr. David Berry, died in 1889 at the age of ninety-seven, and left 100,000*l.* to his Alma Mater, St. Andrews University, N.B., and the same amount to found a hospital in New South Wales—the writer of this, a member of the society, knew Mr. A. Berry, and thus the chain of membership has been kept up since 1821; Dr. Henry Grattan Douglas, who in after years was one of the prime movers in founding the first university of Australia, viz. the University of Sydney; Judge Barron Field, of the Supreme Court of Australia, author of a work upon Australia, published by John Murray in London in 1825; Major Goulburn, Colonial Secretary; Mr. Patrick Hill, Colonial Surgeon; Captain Philip Parker King, R.N., afterwards F.R.S. and Rear-Admiral, a son of Philip Gidley King, third Governor of New South Wales, who surveyed the north coast of Australia, and later on was engaged in the *Adventure* and *Beagle* surveying expedition along the coast of South America—it is interesting to note that the Hon. Philip Gidley King, M.L.C., a son of Admiral Philip Parker King, born in 1817, served as an officer on board the *Beagle* with Charles Darwin, and was a member of the society until four or five years ago; Lieut. John Oxley, R.N., Surveyor-General, who was one of the distinguished early explorers in Australia; Dr. Charles Staggard Rumker, astronomer, who started the first observatory in Australia; and Mr. Edward Wolstonecraft. As previously stated, the Governor, Sir Thomas Brisbane, F.R.S., was the president. For many years the Governor of Australia, and later of New South Wales up to 1874, was always the president, and some of the earlier ones, like Sir T. Brisbane and Sir W. Denison, F.R.S. (afterwards, for a short time, Governor-General of India), were men of scientific attainments who not only took a special interest in the society, but attended its meetings regularly and contributed several papers.

Some of the first papers read before the society were collected by His Honour Judge Barron Field, and published by John Murray in a book entitled "Geographical Memoirs of New South Wales," and it is interesting to note that the subjects which engaged the attention of the members in those early days are typical of the majority of the papers presented to the society ninety years later; *e.g.* the following were amongst those read in 1822:—(1) on the aborigines of New Holland and Van Diemen's Land, by Barron Field; (2) on the geology of part of the coast of New South Wales, by Alexander Berry; (3) on the astronomy of the southern hemisphere, by Dr.

Rumker; (4) on the maritime geography of Australia, by Captain Philip Parker King, R.N.

After a period of inactivity the society was resuscitated in 1850 under the title of the "Australian Philosophical Society," instead of Australasian, because, as the colony of Tasmania had been taken out of New South Wales in 1825, the term Australasian was no longer applicable. In 1856 the name was again altered, this time to that of Philosophical Society of New South Wales, a further slice of New South Wales having been cut off to form the colony of Victoria. In 1866, by permission of H.M. Queen Victoria, it assumed its present title of "Royal Society of New South Wales," and in 1881 it was incorporated by an Act of the New South Wales Parliament.

The principal reason for discarding the term "Philosophical" was because the object and work of the society could not be considered as coming under the head of philosophy, and as the ground covered by the Royal Society of London was so well known, the then members decided to apply to the Crown for permission to use the more comprehensive title of "Royal"; this title had already been granted to the corresponding society in Tasmania. In later years the Philosophical Societies of Victoria, South Australia, and Queensland also changed their names in the same way.

The society was not in a position to publish until 1862; prior to that date some of its papers were printed in the daily newspapers, and others, up to 1859, appeared in the *Sydney Magazine of Science and Art*; several of these early papers are still of value, apart from the interest attached to the efforts of the authors to do what they could for the progress of science in a new country; and all honour is due to the early pioneers, for they worked under great difficulties, without the aid of libraries, collections, and modern instruments and appliances, and at a time when it took from six to nine months to get a reply from home, and their work should not be forgotten.

So early as 1851 the society endeavoured to encourage the development of the natural resources of the colony by offering gold medals for the growth and production of madder, cotton, and sugar, and for the extraction of metals from colonial ores.

Later on, to stimulate and encourage scientific research, the society for some years, viz. from 1882 to 1896, offered a medal (and a grant of 25*l.* to help defray the expenses of the investigations) for original researches and observations upon certain specified subjects, of which notice was given three years in advance, but after fourteen years' experience it was decided to discontinue these competitions. The following list gives an idea of the range of the subjects:—the chemistry of the Australian gums and resins; the tin deposits of New South Wales; the iron ore deposits of New South Wales; the marine fauna of Port Jackson; the silver ore deposits of New South Wales; on the origin and mode of occurrence of gold-bearing veins and of the associated minerals; influence of the Australian climate in producing modifications of diseases; on the Infusoria peculiar to Australia; anatomy and life-history of the Platypus and Echidna; anatomy and life-history of Mollusca peculiar to Australia; the chemical composition of the products from the so-called kerosene shale of New South Wales.

The society now awards one medal only, viz. the medal which was established, together with a lectureship, in memory of the late Rev. W. B. Clarke, F.R.S.; amongst the non-resident recipients of this medal have been:—Sir Richard Owen, F.R.S., 1878; Prof. George Bentham, F.R.S., 1879; Prof. Huxley, F.R.S., 1880; Prof. James Dwight Dana, 1882; Baron von Mueller, 1883; Alfred R. Selwyn, F.R.S., 1884; Sir Joseph Dalton Hooker, 1885.

From 1866 to 1875 the papers read before it were published under the title of "Transactions," but this was considered rather pretentious, and in 1876 they were brought out as the "Journal and Proceedings" as an annual volume; later they were issued for a few years in parts, and this method has been revived.

The volumes, of which forty-three have been issued, vary in size, but those for the last thirty years run from 300 to more than 600 pages. They are well printed in good type on good paper, and well illustrated.

The papers naturally are, for the most part, devoted to Australasian subjects; those upon astronomy, meteorology, geology, mineralogy, botany, ethnology, water supply and irrigation, and similar matters bulk most largely; some of the papers are, and will remain, of permanent interest. The first eleven volumes are out of print and are difficult to obtain, but, fortunately, the volumes have been widely distributed to public institutions and societies in all parts of the world, so that anyone really interested can generally manage to refer to them.

It is not proposed to give any specific account or review of the recently published volumes, inasmuch as abstracts of all the principal papers read have appeared in the columns of NATURE month by month during recent years under the head of "Societies and Academies." The volume for 1909 has been issued in four parts instead of the single annual volume, in the hope that its usefulness may be increased, and the society is to be congratulated upon having done so.

In 1875 a series of sections was inaugurated in order that the members might be able to meet together for the discussion of matters of scientific interest with less formality than at the ordinary meetings of the society; some of these were very successful, and they helped to make the society more popular, and the number of members rapidly increased to 494, the largest during its history; but of late years interest in the sections has decreased. The medical section was a very active one for several years, and did useful work until it was superseded by the formation of an outside independent professional society.

The engineering section is at the present the only active one, and it is doing extremely good work, as shown by the papers and proceedings appearing in the society's volumes; it practically supplies all the advantages afforded by an independent society, and, further, has the use of the Royal Society's library, meeting rooms, printer, office staff, &c., without any extra subscription.

Most of the other sections will probably re-awaken to their former activity in due course. The sections are:—A, mathematics, physics, astronomy, meteorology, &c.; B, chemistry and mineralogy, and their application to the arts and agriculture; C, geology and palæontology; D, botany and zoology; E, microscopical science; F, geography and ethnology; G, literature and the fine arts, including architecture; H, medical science; I, sanitary and social science and statistics; J, engineering science; K, economical science.

The society distributes its publications to about 400 similar societies, institutions, and public libraries, not only to all parts of the British Empire, Europe, and America, but to China, Japan, Mexico, the Philippines, Straits Settlements, Chili, Peru, Mauritius, Brazil, &c., and in almost all cases receives publications from these places in exchange. At one time the society undertook the collection and delivery of scientific publications for other institutions in New South Wales, but this is now done by the Government Bureau for Scientific Exchanges. In addition to the exchange of publications, the society endeavours to maintain touch with scientific workers in other parts of the world by appointing a limited number of non-resident men of science as honorary members; the society has had special pleasure in the acceptance of its honorary membership by such men as Darwin, Hooker, Wallace and others, who have done scientific work in Australasia and Oceana.

In addition to its ordinary meetings, the society arranges for series of popular lectures, to which friends of the members are freely invited, and short courses of lectures are also given upon the geology of Australasia, known as the Clarke lectures, founded in memory of the Rev. W. B. Clarke, F.R.S., a former president of the society, who gave a large part of a long life to geological research in Australia.

It also gives an annual conversazione, which is held at the University, on account of the extensive and suitable accommodation afforded by it, as the conversazione is very popular and largely attended; all the scientific departments, laboratories, the libraries, and lecture rooms are thrown open for the occasion, and suitable exhibits of new apparatus and specimens are shown in them, as well as experiments and practical illustrations where possible. Lecturettes are given upon recent discoveries or matters of interest.

Usually some of the visitors attending the lectures and conversazione become sufficiently interested to join the society and become useful members; the University also profits in turn, as the conversazione enables many persons to see it and learn what it is doing who otherwise would not have an opportunity.

The society does not restrict itself to work which is done by its own members, but, where possible, it is always willing to assist others; *e.g.* it greatly assisted in the formation of the Australasian Association for the Advancement of Science; it also took an active part in the foundation of a marine biological laboratory near the entrance to Sydney Harbour, which, unfortunately, was required a few years afterwards by the Government for defence purposes, and it is to be hoped that the trustees, who received compensation from the Government, will see their way before long to start a new marine station and laboratory; it has on several occasions brought matters of importance under the notice of the Government where legislation has been necessary for the good of the public health, the preservation of the native flora and fauna, also for the assistance of scientific exploring expeditions in the Antarctic and elsewhere and in other similar matters, and it has helped in the extension of the British Science Guild in Australia.

For many years it has been one of the main objects of the society to get together a good library of the principal British, American, French, German, and other scientific journals, and it now has complete series of many of these, some by purchase, others by gift and in exchange for its own publications, so that, taking the limited resources of the society into account, quite a creditable and useful library has been gradually built up. Without such books of reference the research student is at a great disadvantage, and the society regards the formation of such a reference library as of equal importance to the publication of papers read before it.

In 1878 the society obtained possession of its present freehold premises in Elizabeth Street, Sydney. Since then it has twice added to them, in 1896 and again in 1905; the last time it was to increase the accommodation required for the growing library, and also to provide accommodation for kindred societies by sub-letting some of the rooms, not immediately required, to them at low rentals; in this way it affords (as was stated in an article on the Australasian Association for the Advancement of Science, NATURE, December 30, 1909) some of the advantages enjoyed by the English societies in Burlington House.

The Parliament of New South Wales has generously helped the society for some years; for several years the Government printed the society's annual volume of papers and proceedings; of late years, in place of printing the volume, it has contributed 10*s.* per annum for each 20*s.* of the members' subscriptions; but, in spite of this, the society's income is insufficient to enable it to undertake many things it would like to do for the advancement of science, and it finds difficulty in carrying on its present efforts.

A. LIVERSIDGE.

THE AMERICAN PHILOSOPHICAL SOCIETY.

THE general meeting of the American Philosophical Society was held at Philadelphia on April 21–23, and we have been favoured by the secretaries with a report of the proceedings. The afternoon of April 23 was devoted to a symposium on experimental evolution, the principal papers being given by Prof. H. S. Jennings, on inheritance in non-sexual and self-fertilised organisms; Mr. G. H. Shull, on germinal analysis through hybridisation; and Dr. C. B. Davenport, on new views about reversion.

At the session on April 22 the following were elected to membership:—*Residents of the United States:* Dr. S. E. Baldwin, Dr. F. G. Benedict, Dr. C. F. Brush; Dr. D. H. Campbell, Dr. W. E. Castle, Dr. G. B. Gordon, Dr. D. J. Hill, Dr. H. C. Jones, Dr. L. Loeb, Mr. J. McCrea, Dr. R. C. Maclaurin, F.R.S., Dr. B. O. Pierce, Dr. H. F. Reid, Dr. J. F. Rhodes, and Dr. O. W. Richardson. *Foreign residents:* Dr. A. von Baeyer, Madame S. Curie, Sir David Gill, K.C.B., F.R.S., Dr. E. Meyer, and M. C. E. Picard.

In addition to the symposium on evolution, fifty-one papers were presented. Brief summaries of the contents of a few of these papers are subjoined.

Physical notes on Meteor Crater, Arizona, Prof. W. F. Magie. Meteor Crater is a vast crater situated in Coconino County, Arizona, formed by the impact of an iron meteorite or group of meteorites. Scattered specimens of these meteorites (the Canyon Diablo siderites and the "shale ball" siderites) are found around the crater, but the main mass has not yet been found. It probably is buried 1000 feet below the surface. (1) The Canyon Diablo iron shows a magnetic permeability not very different from that of cast iron. The shale ball iron seems to be generally similar to it in its magnetic properties. Several observations indicate an intrinsic magnetisation, peculiarly arranged, in the shale ball iron. The magnetic field of the crater shows no local peculiarities such as would be expected from the presence of a large continuous mass of iron. The inference is that the mass is fragmentary, perhaps intrinsically magnetised, and also, perhaps, largely oxydised. (2) The distribution of the ejected material and the inclinations of the exposed strata around the crater wall show a remarkable symmetry with respect to a nearly north and south axis. This symmetry, even in details, appears in holes made by bullets in a suitable mass of compacted powder. The inference is that the crater was formed by a projectile. (3) The mass ejected is estimated at 330 million tons. The energy used to lift it out of the hole is a negligible fraction of the energy expended. Most of the energy expended was used in crushing the rock. An estimate based on the assumption that the powdered sandstone was heated to 2500° C. would indicate an expenditure of $92{\cdot}5\times10^{12}$ ft. tons of energy. Taking everything into account, it seems reasonable to estimate in all an expenditure of 60×10^{12} ft. tons of energy. Taking this for the energy expended, and estimating the probable velocity of the meteor as lying between three and forty-eight miles a second, the mass of the meteoric group would lie between fifteen million and sixty thousand tons. The size and shape of the crater lead one to estimate a mass larger than this lowest limit, and the final estimate is that the mass is 400 thousand tons, and that its velocity was from eighteen to twenty miles a second.

The conversion of the energy of carbon into electrical energy by solution in iron, Prof. Paul R. Heyl. It is found that carbon dissolves in molten iron with a liberation of energy, which, by providing a suitable negative element, may be obtained as an electric current. The electromotive force thus developed has not yet been definitely determined, but is probably not more than one- or two-hundredths of a volt. There is no possibility of compounding this electromotive force with the accompanying thermal effect, as the two are opposite in direction.

The one-fluid theory of electricity, Prof. F. E. Nipher. The author has shown in a former paper that what have been taken for discharges from the positive terminal of an electrical machine are really optical illusions. The positive discharge is really an inflow of the electrical discharge which flows outward from the negative terminal. This is in harmony with the one-fluid theory of Franklin. With this paper he presents photographic plates showing the discharge from its first stages until the disruptive spark appears. These plates fully confirm the former conclusion that there is no positive electrical discharge. The discharge comes from the negative terminal and goes to the positive. The illusion which has led to the idea of a positive discharge is compared to one which might prevail if Niagara Falls should suddenly recede from Lake Ontario to Lake Erie. It might deceive us into the idea that there had been a positive discharge into Lake Erie.

The past and present status of the æther, Prof. A. G. Webster. The history of the conception of the luminiferous æther was covered from the time of Newton and Huygens to the present. For the last hundred years the belief in the æther as necessary to transmit light has been universal. Lord Kelvin devoted most of his life to establishing its properties. The various mechanical theories were succeeded by Maxwell's successful electromagnetic theory, confirmed twenty years later by the electric wave experiments of Hertz. To explain astronomical aberration and the phenomena due to the earth's motion, Maxwell's theory was severely strained, and was perfected by Lorentz. The

classic experiment of Michelson on the apparent fixity of the æther of the earth in its motion was explained by Lorentz, though by the violent assumption that motion changes the dimensions of bodies, and that the local time of a moving observer is different from that of an observer at rest. From this comes Einstein's principle of relativity, which profoundly modifies our ideas of space and time, and leads many radicals to abandon the æther.

The æther drift, Prof. Augustus Trowbridge. Prof. Trowbridge spoke very briefly upon the general question of relative motion of matter and the æther-nest to point out that, in spite of the experimental work of various investigators, we are still in doubt as to whether the earth in its motion through æther-filled space entrains the æther in its motion or not. Next, he explained in what respect the experimental method adopted by Prof. Mendenhall and himself differed from that of former investigators so as to be free from the objections which have rendered the previous work inconclusive.

The effects of temperature on fluorescence and phosphorescence, Prof. E. L. Nichols. A summary of observations on the fluorescence and phosphorescence from temperature of liquid air to ordinary temperatures, showing that the theory of Lenard is inadequate to correlate all the facts.

Infra-red and ultra-violet landscapes, Prof. R. W. Wood. Photographs taken with infra-red and ultra-violet, using appropriate absorption screens, show greatly altered contrasts. Thus some substances which are white when viewed by ordinary light appear black when photographed with ultra-violet light. By such photographs it may be possible to obtain additional details concerning the surface markings of the moon and planets.

The cause of epidemic infantile paralysis, Dr. S. Flexner. A report on the experimental study of piliomyelitis in monkeys, which has yielded a large number of important facts relating to the spontaneous disease in man. The nature of the virus has been discovered, many of its properties have been ascertained, some of its immunity effects have been established, the clinical and pathological peculiarities of the disease have been elucidated, and a basis has been secured on which to develop measures of prevention.

Dermal bones of Paramylodon from the asphaltum deposits of Rancho La Brea, near Los Angeles, California, W. J. Sinclair. This paper describes the mode of occurrence, shape, and microscopic structure of the skin bones of an edentate animal from the Los Angeles asphaltum beds. These bones, which are small, pebble-like elements in the skin, resemble closely similar bones occurring in a piece of skin found in a cave at Last Hope Inlet, Patagonia. They are also known to occur in Mylodon, a genus of ground sloths formerly living in North and South America. As the structure of the skin bones in Mylodon is quite different from what it is in Grypotherium, the form from the Last Hope Inlet locality, it was a matter of interest to find out to which of these genera the specimens from the asphalt showed the closer resemblance. Thin sections of the bones were cut, and these prove that Paramylodon from the asphaltum beds is almost identical, in the structure of the skin bones, with Grypotherium, a contemporary of early man in Patagonia.

A note on Antarctic geology, Prof. W. M. Davis. It is well known that fossil plants have been found in various formations in the Arctic and Antarctic regions, indicating the former prevalence there of a much milder climate than that of to-day. Our prepossession naturally favours the present polar climate as having been the ordinary or normal polar climate of all geological time; but inasmuch as milder climates have sometimes occurred, it is eminently possible that they, and not the present rigorous climate, may have been the usual polar climate through the geological ages. Hence a peculiar interest attaches to studies of the minute structures of stratified formations, particularly of such as are of continental origin, for from such studies it may well be possible to determine climatic conditions even in the absence of fossils.

Some recent results in connection with the absorption spectra of solutions, Prof. H. C. Jones. The absorption spectra of dissolved substances are not simply a function of the nature of the substances, but also of the nature of the solvents. When a salt like uranyl chloride is dissolved in water we have one spectrum in water, another in alcohol, still another in acetone, and a spectrum in glycerol which is very different from any of the above. The only way in which we can account for these results is in terms of the solvate theory. The different solvents combine with the dissolved substance and form solvates having very different compositions. These affect the resonance of the vibrators that are the cause of light absorption differently, and, consequently, the absorption in the different solvents is different. The second point upon which stress is laid has to do with the action of one acid on the salt of another acid. In terms of prevailing chemical theories, when a salt of one acid is treated with a small amount of another acid, a part of the salt is transformed into the salt of the second acid. With the addition of more and more of the free acid, more and more of the initial salt would pass over into the salt of the second acid. In such solutions we should expect to have the bands of both salts occurring simultaneously, with varying intensity, depending upon the amounts of the two salts present. The fact is that when a salt is treated with a free acid we have neither the bands corresponding to the initial nor the final salt present, but bands occupying positions intermediate between those of the two salts, and these bands can be made to occupy any intermediate position by suitably varying the amount of the free acid relative to the salt. This shows that between the initial salt and the one finally formed there is a series of intermediate compounds or systems corresponding to the various positions of the bands. The number of reactions showing the above relations is not small, and this raises the question whether chemical reactions in general are not much more complex than is usually represented by our chemical equations, which deal only with the initial and final stages.

Suppression and extension of spore-formation in *Piper betel*, Prof. D. S. Johnson. The interesting feature of the structure of the flower in this plant is the presence of male flowers, female flowers, and flowers bearing the organs of both sexes, on three separate kinds of spikes; but flowers of each sex often bear some rudiments of organs of the other sex. This shows that while some flowers are apparently of one sex only, they really possess, in some degree, the power to develop the organs of the opposite sex. In other words, the cells from which the flowers arise are capable of forming the organs of both sexes, and the fact that one sex only is formed is probably due to some influence, internal or external, affecting the cells at the time that the flowers are being initiated. Experimental work on certain plants has shown that a change in the light or soil supplied to apparently unisexual individuals may cause the organs of the other sex also to appear. This seems clear evidence that both sexes may really be present in all apparently unisexual plants, but that sometimes one, sometimes the other, of these is suppressed or fails to become evident. The only plants of which this seemingly cannot be true are those well-known unisexual plants like the sago palm, cottonwoods and willows, in which each individual bears only male flowers or only female flowers year after year throughout the life of the plant. Another case is that of one of the mosses, in which it has been shown by Noll that the sex remains constant for thirty generations when male or female plants are propagated by budding.

Solar activity and terrestrial magnetic disturbances, Dr. L. A. Bauer. A recent examination of the times of beginning of magnetic disturbances, as recorded at observatories over the entire globe, showed that, without doubt, magnetic storms do not begin at absolutely the same instant of time, as heretofore believed. Instead, they progress around the earth, the times generally increasing as we go around the earth eastwardly; for the quick and abrupt disturbances, which are usually comparatively minute in their effect on the compass needle, the complete passage around the earth required from three to four minutes. For the bigger effects, or for the greater magnetic storms, the rate of progression is slower, so that it would take them half an hour or more to get around the earth completely. There is thus introduced a new point of view in the investigation of the origin of magnetic storms. In addition to negatively charged electrified particles coming from the sun, to which recent theories sought to attribute our magnetic storms, but which the author found would produce effects not in harmony with

those actually observed, we also receive radiations, such as the Röntgen rays, for example, which are not deflected by the earth's magnetic field, as they do not carry electric charges. Their chief effect will be to ionise the gases of which the atmosphere is composed, *i.e.* make the air a better conductor of electricity. Ultra-violet light has the same effect. It is known that a small part of the magnetic forces acting on a compass needle is due, not to the magnetism or electric currents below the earth's surface, but to electric currents already existing in the atmosphere, and which the speaker showed were brought about by the atmosphere cutting across the earth's lines of magnetic force in its general circulation around the globe. If the regions of these upper electric currents are at any time made by some cause more conducting, electricity will be immediately set in motion, which in turn affects our compass needles. This new theory, called "the ionic theory of magnetic disturbances," satisfactorily explains the principal features of magnetic storms. As the currents get lower down in the atmosphere their velocity is checked, so that, instead of taking but three to four minutes to circulate around the earth, as do the higher currents, it may take them half an hour and more; however, their actual effect on the magnetic needle would be greater, because of their coming nearer to the earth. The theory also opens up the possibility of accounting for some of the other changes and variations experienced by the earth's magnetism, and likewise has a bearing on the peculiar formation of the magnetic fields in sun-spots discovered by Prof. Hale.

Magnetic results of the first cruise of the *Carnegie*, Dr. L. A. Bauer. The non-magnetic vessel *Carnegie* completed on February 17 the first cruise, covering in all, since September 1, 1909, 8000 miles. Special tests made at Gardiner's Bay, Long Island, and at Falmouth, England, proved conclusively that there are no corrections to the magnetic instruments of the kind encountered on vessels in which more or less iron occurs in the construction. Thus in a single voyage errors could be disclosed in the compass charts used by mariners on their Transatlantic voyages between New York and England of importance, not alone from a purely scientific standpoint, but from that of practical and safe navigation as well. The errors found by the *Carnegie* in the declination at various points along the track followed by the vessel amounted, on the average, to about 1 degree—an error which persisted in the same direction for long distances. After leaving Falmouth the *Carnegie* headed for Funchal, Madeira. From thence she sailed to Bermuda, and finally arrived at Brooklyn on February 17. In spite of the unusually adverse conditions frequently met with during this first cruise, more or less extensive magnetic observations were secured almost daily. The errors of the compass charts were found, in general, even more pronounced for the southerly half of the cruise, viz. Madeira to Bermuda, than for the northerly half, and were again shown to be systematic in their nature. Some of the charts were in error 2 to 3 degrees. For the entire cruise important corrections were also disclosed for the magnetic charts which give the lines of equal magnetic dip and of equal magnetic force. The *Carnegie* is now being fitted out for a circumnavigation cruise of about three years. In the meantime, the magnetic surveys of unexplored countries are pushed on, so that it is confidently expected that by the year 1915 the general magnetic survey of the greater part of the globe will have been completed in sufficient detail to permit the construction and issuing of a new set of magnetic charts.

On the distances of red stars, Prof. H. N. Russell. Comparison of the parallaxes of stars, derived by the author from photographs taken at the Cambridge Observatory (England) by Mr. A. R. Hinks and himself, and their spectra, determined at Harvard under the direction of Prof. Pickering, shows a marked correlation between spectral type and parallax. The proportion of orange and red stars (types K and M) among those of large proper motion, and especially among those shown by direct measurement to be our near neighbours, is very much greater than among the general run of stars of the same apparent brightness. Conversely, stars of the same apparent brightness and proper motion are, on the average, nearer to us the redder they are. It follows that these stars are intrinsically fainter the redder they are, the reddest ones being, on the average, only one-fiftieth as bright as the sun. On the other hand, many bright red stars (such as Arcturus) are at great distances, and are actually at least 100 times as bright as the sun. All this can be explained on the hypothesis (now well established on other grounds) that the reddest stars are the lowest in temperature. With the latest determinations of temperature and surface brightness, it appears that the fainter red stars are somewhat smaller, and presumably denser, than the sun, while the brighter ones are very much larger than the sun, and presumably of very small density. The latter class probably represent an early stage of evolution, and the former the latest stage that can be observed.

A standard system of photographic stellar magnitudes, Prof. E. C. Pickering. Since 1879 about two million photometric observations of one hundred thousand stars have been made at the Harvard College Observatory. The results, published in vols. l., liv., and lxx. of the "Harvard Annals," furnish a standard scale for determining the brightness of the stars in all parts of the sky, according to a uniform system. The general introduction of photography in nearly all departments of astronomy has created an urgent need for a similar scale to give the photographic magnitudes of the stars. The two scales will differ, since red or yellow stars will always give fainter images. The scale proposed will be the same for white stars as the visual scale. Three methods are adopted in this work for determining the photographic brightness—first, correcting the visual magnitude by the class of spectrum; secondly, by measuring with great care the photographic brightness of a sequence of stars near the North Pole, and superposing this photographically on the stars to be measured; thirdly, by attaching to the object-glass of the telescope a small prism, a second image of each star, five magnitudes fainter than the principal image, is formed. All three of these methods are in use on a large scale at the Harvard Observatory, and it is hoped that, as the result of many thousand measures, a satisfactory solution of the problem will be found.

Some interesting double stars, Prof. Eric Doolittle. The many thousand double stars in the sky may be divided into two classes. There are some in which the two stars are not really near each other, but merely happen to lie in the same direction as viewed from the earth, and there are others which form true systems composed of two suns revolving about their common centre of gravity. In the latter case, measures show that one sun revolves about the other in an elliptic orbit. It often happens that a very few measures of such a system secured at certain critical times throw unusual light on the nature of the motion and the size of the orbit. This is especially the case when the companion star apparently ceases its motion in one direction and begins to move backward, and also when the companion is passing nearest the principal star. Several diagrams were shown describing measures of this kind which had recently been secured. An account was also given of the discovery of a very close double star during its occultation by the moon.

THE ROYAL OBSERVATORY, GREENWICH.

READ at the annual visitation of the Board of Visitors on Saturday last, the Astronomer Royal's report of the work done at the Greenwich Observatory during the year ended May 10 contains many items of general interest.

On the transit circle the new central illumination was further compared with the annular illumination of the field, and it was found that, with the latter, transits were observed 0·24s. earlier than they are with the new form. Six stars from Newcomb's Fundamental Catalogue are observed each night in order to connect the observations of the reference stars for the Oxford Astrographic Zones with any system that may ultimately be adopted by the Permanent International Committee.

Observations of the diurnal changes of level and nadir during 1909 showed that changes of level were less, and of nadir slightly greater, than the means for 1897–1905. The lunar observations with transit circle and altazimuth are in good agreement, and, for 1908, show the mean error of the tabular place to be −0·395s. in R.A. and

0·00″ in N.P.D. The moon was observed on 146 days during the year, and observations of Mars and of Halley's comet, in and out of the meridian, were also secured.

Double stars and planetary diameters were measured with the 28-inch refractor, 150 of the pairs having separations less than 0·5″ and 296 pairs less than 1·0″.

With the 26-inch refractor 146 planetary photographs were secured, including sixty-two of Mars, taken between July 23, 1909, and May 14, for an investigation of its orbit.

Planets, satellites, and comets 1909*a*, *b*, *c* (Halley's), and *e* were also photographed with the 30-inch reflector; among these were twelve photographs of Saturn and Phœbe, thirteen of Jupiter and J. viii., and forty-four of Halley's comet. The first photograph of J. viii. during this opposition was secured on January 19, and the observed correction to the position given by the Cowell-Crommelin-Davidson orbit was only 7″; this satellite has now performed one complete revolution since its discovery. A slight elongation of the images taken with the 30-inch reflector was attributed to a small shift of the mirror cell, and has been completely eliminated by rounding the ends of the supporting screws and making hollows to receive them in the bed on which the cell rests. A 6-inch lens, kindly lent by Mr. Franklin Adams for photographing the extensions of the tail of Halley's comet, and a prismatic camera for photographing the spectrum, were attached to the 30-inch reflector, but the bright twilight and low altitude of the comet prevented the latter observations.

The work on the Greenwich astrographic zones being complete, the 13-inch astrographic refractor was employed until April for cometary and various other photographic observations. Since then it has been used for photographing the astrographic zones +25° to +31°, originally allotted to the Oxford University Observatory. The stars on these chart plates are also to be counted at Greenwich, as are also those on the catalogue plates, which are being re-taken for the purpose. For photographing Halley's comet a new Ross lens of 4 inches aperture and 16 inches focal length has been attached to the 10-inch finder of the astrographic instrument.

Of the 3·07 days' difference between the perihelion passage of Halley's comet and the date predicted by Drs. Cowell and Crommelin, one day has been accounted for in a rediscussion of the perturbations during 1828–42, but the further discordance of two days is as yet unaccounted for by any attraction of known matter in the solar system. The observations show that none of the other elements was so much as 1′ in error.

During the period dealt with by the report the sun was photographed at Greenwich on 194 days, and the Royal Observatory contributed 171 days towards the record for 1909, which is now complete, with the assistance of the Dehra Dûn and Kodaikanal Observatories, except for two days. In this work the Cape Observatory now replaces the Royal Alfred Observatory, Mauritius, and the hope is expressed that the yearly record may be made up almost entirely from the plates taken at the two Royal Observatories, Greenwich and the Cape; during March their record was complete except for one day.

The magnetic observations were carried on as usual, but the registration of earth currents was discontinued at the end of 1909 because new wiring was found to be necessary, and was considered unjustified owing to the disturbances produced by the electric trams, &c.

For 1909 the principal magnetic results were :—

Mean declination	15° 47·6′ W.	
,, horizontal force	{ 4·0179 in British units { 1·8526 ,, metric	,,
,, dip (3-inch needles) ...	66° 53′ 57″	

Two days of "greater" and six days of "lesser" disturbance were registered by the magnets.

The reductions of the meteorological observations are complete to date, and show that the mean temperature of 1909 was 48·6°, 1° below the 65-year average 1841–1905. The rainfall for the year ended April 30 was 27·72 inches, 3·6 above the average, and the number of "rainy days" was 192, the highest for many years.

The performance of the chronometers tested was satisfactory, and in future non-magnetic watches are to be received and submitted to the same tests as the chronometer watches. A new trial of box chronometers commenced on June 18, and the next trial of pocket chronometers and chronometer watches will commence on July 30. The time-signal service was also satisfactory, and the performance of the Westminster clock ("Big Ben") left little to be desired. On 41 per cent. of the days its error was less than 0·5s., on 77 per cent. less than 1·0s., and on 98 per cent. less than 2·0s.; it never exceeded three seconds.

The vacancy on the *personnel* caused by the resignation of Dr. Cowell has not yet been filled, and, in closing the report, Sir William Christie tenders his hearty thanks to the staff for their loyal cooperation in the prosecution and extension of the observatory's work during his tenure of the office of Astronomer Royal. Although the work has been enormously extended during the past thirty years, the financial provision for it has been increased by only 2200*l.* per annum.

AGRICULTURAL RESEARCH.

THE need for widely extended facilities for agricultural research is being more and more recognised both by men of science and by our administrative authorities. At the last meeting of the executive committee of the British Science Guild a memorial to the Prime Minister on the subject of research in agriculture was approved. The President of the Board of Agriculture and Fisheries has now appointed a committee to advise the Board as to how agricultural research may be best encouraged and improved. Lastly, a society has been incorporated to secure the development and extension of the investigations inaugurated and endowed by the late Sir John Lawes. These are all excellent indications that a determined and united effort is to be made to place agricultural practice upon a scientific basis, and to secure for the British farmer all the help science is able to provide.

The committee appointed by Earl Carrington to advise the Board of Agriculture on all scientific questions bearing directly on the improvement of agriculture will deal especially with the methods to be adopted (*a*) for promoting agricultural research in universities and other scientific schools; (*b*) for aiding scientific workers engaged in the study of agricultural problems; and (*c*) for ensuring that new scientific discoveries are utilised for the benefit of agriculturists.

The committee will consist of the Duke of Devonshire, Lord Reay, Sir Edward Thorpe, C.B., F.R.S., Mr. David Davies, M.P., Dr. J. J. Dobbie, F.R.S. (principal of the Government Laboratories), Prof. J. B. Farmer, F.R.S., Dr. S. F. Harmer, F.R.S. (keeper of zoology at the Natural History Museum), Dr. R. Stewart MacDougall (technical adviser in zoology to the Board of Agriculture and Fisheries), Mr. T. H. Middleton (one of the assistant-secretaries to the Board of Agriculture and Fisheries), Mr. Spencer P. Pickering, F.R.S., Lieut.-Colonel David Prain, C.I.E., F.R.S. (director of the Royal Botanic Gardens, Kew), Mr. H. S. Staveley-Hill, M.P., Mr. Stewart Stockman (chief veterinary officer of the Board of Agriculture and Fisheries), Dr. J. J. H. Teall, F.R.S. (director of the Geological Survey and Museum), and Dr. David Wilson. Mr. Middleton will act as chairman of the committee, and one of the officers of the Intelligence Division of the Board will act as secretary.

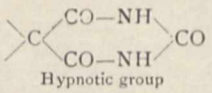
A meeting of the Society for Extending the Rothamsted Experiments was held at Rothamsted on June 16 under the presidency of the Duke of Devonshire. The society has been incorporated with the object of obtaining additional funds for the development of the agricultural investigations which have been carried on so long under the late Sir John Lawes and the Lawes Agricultural Trust which he afterwards founded. The immediate object of the society is to obtain a sum of 5000*l.* in order to secure about 200 acres of land adjoining the present experimental fields, and erect thereon the buildings required for feeding experiments with the crops under investigation.

An appeal for subscriptions towards thus securing a small self-contained farm for the Rothamsted Experimental Station is now being circulated, and at this meeting of the society a first list of donations was reported from the Duke of Devonshire, Lord Iveagh, Sir J. T. Brunner, Colonel E. H. Carlile, M.P., Mr. J. F. Mason, M.P., and Mr. J. Martin White, amounting to 1450*l.*

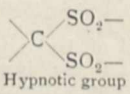
CHEMISTRY AND PHARMACO-THERAPEUTICS.

THE Hurter memorial lecture was delivered recently before the Liverpool Section of the Society of Chemical Industry, by Dr. C. A. Keane, on modern iatrochemistry (Journal of the Society of Chemical Industry, Liverpool Section, April 15). Dr. Keane traced the development of various synthetic products used in pharmacy, and discussed the relations of physiological properties to structure so far as they may be said to be known. He illustrated his discourse by three typical groups of compounds—the antipyretics derived from *p*-aminophenol, the hypnotics derived from malonyl urea, and the local anæsthetics related to cocaine. Referring to the first group, he showed that the toxic properties of aminophenol may be reduced and its antipyretic action increased by introducing radicals into the hydroxyl and amino groups. He pointed out the importance of a sufficiently stable combination to resist decomposition by the acid of the gastric juice, as otherwise the radical is split off in the stomach with the production of the parent substance. The practical outcome of these investigations has led to the recognition of phenacetin as the most suitable for medicinal use.

Among the substitutes for salicylic acid as an antirheumatic he mentioned salol (phenyl ester), aspirin (acetyl salicylic acid), and salophen (salicyl acetaminophenol), substances which, being stable towards acid, pass through the stomach unchanged, but are subsequently hydrolysed by the alkaline pancreatic juice, when the constituents begin to exert their specific effect. Passing on to the hypnotics, veronal and sulphonal and their analogues, it was observed that each contains a hypnotic group in which alkyl radicals (R, one of which must be ethyl) are necessary to produce hypnotic action.



Hypnotic group



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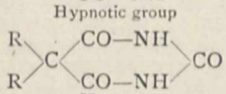
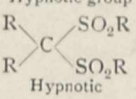


Hypnotic



Hypnotic

Dr. Keane then gave an account of cocaine, the nature of the groups which are responsible for local anæsthesis, and the successful application of this knowledge to the production of new drugs, such as α and β eucaine, orthoform, stovaine, novocaine, holocaine, &c.

The address concluded with a table of statistics giving the quantity of synthetic drugs imported from Germany (the seat of the industry) to this country, which on six drugs alone amounts to about 20 tons, of the value of 16,000*l.* annually.

THE BEGINNINGS OF HUMAN SPEECH.

AN interesting attempt by Dr. C. Täuber to trace human speech back to its first beginnings appears in *Globus* for May 12 (Bd. xcvii.). For this purpose the writer classifies the simplest conceptions and the sounds representing them into six divisions, as follows:—(i.) *m*+vowel, meaning liquid food (*e.g.* milk, melt, Germ. Ge-müse, &c.); (ii.) *p* (*b* or *v*)+vowel, solid food (*e.g.* bread, Germ. Futter, Lat. panis, &c.); (iii.) *n*+vowel, sometimes *sn*, fluidity (*e.g.* Lat. navis, Germ. nass, snow, &c.); (iv.) dental+vowel, sometimes *st*, wood or forest (*e.g.* timber, Germ. Stuhl, throne, Germ. Tanne, &c.); (v.) liquid+vowel, feeding or drinking place (*e.g.* Gk. libadion, lake, Germ. Loch, &c.); (vi.) guttural+vowel, animal world (cow, Lat. caper, Germ. Hund, &c.).

For each division Dr. Täuber draws up a table of derived ideas represented by the same root-syllable in various Indo-Germanic languages, *e.g.* under (i.) we find Mama, Germ. Mutter on one side and Germ. Meer, Lat. mare, &c., on the other. From mater, mother, is derived the idea of to feed, and from that, again, the conception well-fed, large. It must be confessed that considerable ingenuity is required to trace the connection in some instances, but the author freely owns to setting forth speculative results.

It is extremely interesting to note that these six sound-groups appear *with the same force* in many non-Indo-Germanic languages; for instance, (i.) *m*+vowel in Hebrew manna (food), māim (water), māṭār (rain), māhal (wine mixed with water); in Bantu languages *ma*= water occurs very frequently in compound words; also in Chinese (in Siamese n-am); in the form *mu* in the Ural-Altaic languages (Tungus and Manchurian mu-ke=water, Japanese u-mi=sea, a-me=rain); ma, meaning water, rain, or drink, is widespread in the Australian, Polynesian, and Malay languages; the Eskimo have the word muk for water. The derived conception mag=large occurs in Caucasic, Ural-Altaic, and Dravidian languages. Instances from Semitic, Caucasic, and other languages are also given for the other five sound-categories. Dr. Täuber would like to see his scheme worked out and amplified and the *Ursprache* established beyond question, after which it might be possible to ascertain the points at which the great linguistic branches differentiated.

ASSOCIATION OF TEACHERS IN TECHNICAL INSTITUTIONS.

THE annual conference of the Association of Teachers in Technical Institutions was held at Birmingham in the Birmingham Municipal Technical School on Friday and Saturday, June 17 and 18. In his address, the president of the association, Mr. J. Wilson, Battersea Polytechnic, emphasised the importance of scientific and technical education to industrial progress. As an example of this, it was pointed out that, owing largely to the limited appreciation of technical education by the English manufacturing world as a whole, nearly all the chief industrial developments of the last twenty years are either of German, French, or American origin or commercial development. The present national and municipal expenditure on technical education in Great Britain is approximately one and a half millions sterling per annum. This is very small when compared with the "gross" annual output of the engineering and chemical industries alone, amounting to about 258 millions per annum. Mr. Wilson discussed the position of the London polytechnics with reference to the London University. He considered that any diminution in the effective facilities now offered by the polytechnics to the working and lower middle classes to participate, not only in advanced technical education, but in higher and university education, would be a grave retrograde step.

In a paper read at the afternoon session by Dr. Price, of the Birmingham Technical School, on "The relation between the technical school and the university," it was pointed out that, generally speaking, the average technical student, however highly qualified he may be by previous study and experience, cannot possibly attend the university, owing to the high fees and cost of maintenance. In reply to certain criticisms by Prof. Meldola and Sir William Ramsay on the value of evening instruction, it was stated that at the present time many evening students in technical institutions are taking courses in the highest branches of technical knowledge, with advantage to themselves and to the industry with which they are connected. In Birmingham, for instance, there are men holding responsible positions who have received all their scientific training in the evening classes at the technical school. Many drawbacks in the highly valuable system of external examinations of the London University could be obviated if a satisfactory system could be devised by means of which technical institutions of sufficient standing could be affiliated to the local universities. Many of the larger technical schools are well equipped and have a highly trained staff which is able to, and does, carry out research.

A number of general resolutions on technical education were passed dealing with subjects such as:—(*a*) the co-ordination of education in the primary, secondary, and continuation schools with technical school work; (*b*) the necessity for the provision of technical education of a more advanced and more highly specialised character than exists at present; (*c*) technical schools to be allowed to develop their work as highly as local requirements demand; (*d*) urging upon the Government the desirability of appointing a Royal Commission to inquire into the need for the organisation of technical education throughout the country.

KEW AND ESKDALE MUIR OBSERVATORIES AND THE METEOROLOGICAL OFFICE.

BY arrangements recently concluded between the Lords Commissioners of H.M. Treasury, the Royal Society, the National Physical Laboratory, and the Meteorological Office, the administration of the work of the Kew Observatory, in so far as it is concerned with observational and experimental work in meteorology and geophysics, will be transferred to the Meteorological Office as from July 1. The Kew Observatory will be the central observatory for the office. All communications respecting that side of the work of the observatory should thenceforth be addressed to the director of the Meteorological Office, Kew Observatory, Richmond, Surrey.

By another provision of the arrangement the administration of the observatory at Eskdale Muir will be associated by the Royal Society with the Meteorological Office instead of, as heretofore, with the National Physical Laboratory.

In the conduct of the administration of the observatories the director of the Meteorological Office will have the assistance of an advisory committee—the Gassiot Committee, appointed by the Royal Society to administer the funds of the Gassiot Trust, representing an endowment of 10,000*l.* vested in the Royal Society in 1871 by Mr. J. P. Gassiot.

One of the provisions of the new scheme is that the superintendents of the three observatories—Kew, Eskdale Muir, and Valencia—under the direction of the Meteorological Office shall be appointed by the Meteorological Committee upon the nomination of the Gassiot Committee. On this nomination the appointments of Dr. C. Chree, F.R.S., as superintendent of the Central Observatory, and of Mr. G. W. Walker, of Eskdale Muir Observatory, have been continued by the Meteorological Committee. Dr. Chree has further been appointed assistant-director of observatories for the Meteorological Office. Mr. J. E. Cullum remains superintendent of Valencia Observatory.

The work of testing instruments now carried on at Kew Observatory by the National Physical Laboratory will be removed to Teddington as soon as the necessary provision for its transference can be made. The laboratory will retain the well-known K.O. mark for use with those classes of instruments which have hitherto been tested at the observatory. For the time being the work will be carried on at the observatory as a department separate from the observational work, but under the superintendence of Dr. Chree. Communications respecting this side of the work should be addressed to the director of the National Physical Laboratory, Observatory Department, Richmond, Surrey.

INDUSTRIAL WORK AND EDUCATIONAL DEVELOPMENT.[1]

LOCAL authorities have tried in various ways to secure in their work for further education the cooperation of employers of labour in their areas. Under present industrial and educational conditions, great importance attaches to any action taken by employers either in increasing their employees' opportunities for attending technical classes or in urging, and granting practical recognition to, the gain which systematic study in such classes brings to workmen who attend them. In 1905 the Board prepared a circular describing some of the more fruitful efforts which had been made in securing the cooperation of employers in these and similar ways, and the issue of this circular stimulated further efforts of the kind in various parts of the country. It is now generally recognised that one of the duties of managers of technical schools is to establish and maintain the closest possible relations with those under whom their students are employed.

The development and strengthening of the relation which the work of the teaching institution bears to the practice and to the commercial aspects of industries may do much to promote industrial progress, and it is not unreasonable to expect that in making their arrangements with their younger workpeople employers should give some consideration to the conditions necessary for the work of the school. Individual employers and groups of employers have in practice found it compatible with economy of production in trade workshops to allow some reduction in the ordinary working time to those of their employees who attend approved courses of instruction in technical schools. The usual combination of workshop and school in the preparation for industrial work assigns the evening only to school, and requires the young worker during the day to give full-time attendance in the workshop. It is true that even in these conditions large numbers of students have made great progress in their technical education. For students of energy, strength, and ability evening classes have afforded, and still afford, opportunities of advancement in knowledge which, when coupled with the experience of practical work, of men, and of commercial conditions which they acquire in their daily occupations, enables them to qualify for positions of responsibility in the industries. Evening classes have indeed provided an open avenue for talent—an avenue by which not a few have advanced to positions in which they have done marked service for the industrial welfare of the country. Where, however, studies have to be carried on in evening classes alone, they are subject to difficulties which in all cases retard the student, and in many cases dishearten him before he has obtained even such knowledge of principles as he requires if he is to be an intelligent hand-worker. The movement towards an extension of the opportunities for part-time study during the day is therefore one which may have far-reaching results.

The forms in which additional facilities for school work are afforded differ considerably; the main cause of this variety of form is that the conditions of different trades vary considerably both as to the nature of the part taken in the work by young workmen and as to the continuity of the demand for work throughout the year.

There are now, however, in successful operation courses of part-time study under arrangements involving time off from the works for such periods as one or two afternoons a week, one day a week, three days a week, or, it may be, daily during two months of a slack period of the year. In all cases of this kind the authorities of the local technical school arrange courses of instruction for the hours available, and that instruction is definitely related to the requirements of the groups of students in attendance. Under these conditions the students have the advantages of class instruction in the daytime, and they can without strain supplement this by home-work in the evenings, and yet have time throughout the year for other interests. Part-time study in the day in this way has been proved possible and of much advantage in connection with engineering and building trades, with painters' work, with plumbers' work, and other trades.

Coupled with schemes of this kind, as well as in connection with the ordinary evening-school system, there have been established in many places scholarships or other facilities by which promising students may devote longer periods entirely to study—periods in some cases six months, in others one, two, or even three years.

There can be no doubt that the increase of day classes for part-time students will do much to advance technical education. Such an increase would not be costly, for in most towns there have now been provided technical schools on a scale commensurate with the demand for specialised technical instruction in the evening, and during the day these schools are generally but little utilised. The extension of such day work gives occasion for a better division of the time of technical teachers, and thus makes it possible for school authorities to obtain greater value for their expenditure in retaining the services of well-qualified teachers.

The possibilities involved in even a slight re-distribution of the hours young people devote to work and to instruction, respectively, are so important that it is of special value to have good tests of what can be attained in this way in actual practice without disturbance of economic conditions. The arrangements made in connection with day classes recognised under the Board's regulations afford numerous examples of methods by which employers of labour and local education authorities have been able to work together in providing special classes adapted to a particular trade or industry and to local conditions of

[1] From the Report of the Board of Education for the Year 1908-9. [Cd. 5130.] Price 9½*d.*

employment, and details of some such instances of part-time day work may be indicated here.

In a town in the north of England a number of apprentices are set free from their employment at certain times so that they may attend classes which have been specially arranged for them in the local technical school in engineering and allied trades; the courses extend over two sessions of eight months each; students in their first year attend for one morning and one afternoon a week, and those in their second year for two afternoons a week, or four hours in all. The fees are paid by the employers; the apprentices pay for books and materials, but receive their wages for the periods of absence from work granted to enable them to attend the classes. The time spent by apprentices in attendance at the day classes is counted in their term of apprenticeship, and preference is given by the employers in filling vacancies in their works to those who attend the classes. The employers are represented on the governing body of the technical school.

The local education authority at a railway centre in the south of England has provided in the technical institute classes for engineering apprentices in the employment of the railway company. The apprentices are allowed to attend a four years' course, arranged in the case of the first year of instruction for 2½ hours for one morning a week, and in the case of the second and third and fourth years for 3½ hours a week, spread over two mornings. Again, at a railway centre in the north of England, the technical school carries on a course on the construction and management of the locomotive to meet the requirements of engine drivers, firemen, and engine cleaners; the instruction here is for two hours on one morning a week, and is given by teachers who are district locomotive foremen.

In a centre of chemical manufacture we find special arrangements for the instruction of trade apprentices of large engineering and chemical works. In the case of one firm the employers require that their employees shall attend an evening school until they are nineteen years of age, but some of the apprentices of this and of another firm are allowed to attend for instruction for four hours on two afternoons a week for forty weeks in the year during the last two years of their apprenticeship, without loss of wages during their absence from the works at the classes; the employers pay the fees, and attendance at these classes is regarded by them as a very important part of the apprenticeship.

In a large industrial centre the local education authority has provided apprentice day courses for engineering, plumbers' work, and painters' and decorators' work; the various courses range over two or more years, and meet for one whole day a week throughout the year. Seasonal periods of less pressure or slackness of work are peculiarly liable to occur in summer in some departments of the building trade, such as painting and plumbing, and accordingly the same authority has succeeded in establishing a suitable special summer course for plumbers who can utilise the opportunity in order to improve their knowledge and efficiency by attending on four full days and two half days weekly throughout a complete month for instruction in subjects cognate to plumbing.

Again, in the case of a closely related trade (gas-fitting), where, however, the conditions of work are somewhat different, another local authority has arranged that boys who are under training to become gas-fitters may have the advantage of concurrent technical education in the daytime. The boys attend at the local technical institute for three hours on each of three afternoons a week. The instruction they receive is in continuation and development of their previous work at the public elementary school, and includes English, workshop arithmetic, and mechanical drawing.

Among the advantages of close relations between school authorities and the employers of the students who attend the schools, not the least is the increased confidence with which school authorities can advise their pupils—especially young pupils—as to the studies they ought to take up. In the arrangements made for giving such advice there is room for great improvement; at present it is not possible to say more than that this is an essential feature in all schemes of evening-school work that succeed in securing large and continued attendance of pupils.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The following are the speeches delivered by the Public Orator, Dr. Sandys, on Tuesday, June 14, in presenting Sir Oliver Lodge, principal of the University of Birmingham, and Prof. William Henry Perkin, professor of organic chemistry in the Victoria University of Manchester, for the degree of Doctor in Science *honoris causa*:—

Adest vir scientiarum physicarum in regione quadam caelesti investiganda iam per annos triginta praeclare meritus, qui praesertim aethera illum exploravit, per quem solis stellarumque lux et calor "immemorabile per spatium" confestim, sine ullo phaenomenorum terrestrium impedimento, in orbem terrarum nostrum transmittuntur. Idem diligenter inquisivit, fulgurum vis electrica quomodo fila tectorum securitati inservientia percurrat, quamobrem subito deserat. Inde progressus, etiam vim electricam, non aliter quam lucem, undarum more moveri eo ipso tempore argumentis idoneis ostendebat, quo vir quidam insignis, Henricus Hertzius, illud ipsum experimentis comprobavit et Maxwellii nostri vaticinationes veras esse demonstravit. Iure igitur optimo Regia Scientiarum Societas numisma lucis et caloris legibus investigandis propositum huic potissimum viro donavit; iure optimo nos quoque, et haec et alia eius merita plurima admirati, eundem inter scientiarum doctores nostros honoris causa collocamus. Eum certe, qui Anglia in media, ipsius Volcani in domo dilecta Sapientiae sedem serenam nascentem fovit, crescentem adiuvit, etiam nostra Mater Alma voltu benigno respicit.

Praesentatur vobis Universitatis illius novae praeses dignissimus, rerum naturae explorator felix, eques insignis, Oliver Lodge.

Abhinc annos quattuor et quinquaginta unus e nostratibus (iuvat gloriari) primus omnium indicavit etiam e liquore piceo, qui carbonis fossilis e bitumine exsudat, colores quosdam roseos posse exoriri. Utinam etiam inventi tam pulchri repertorem illustrem purpura nostra decorare nobis contigisset! Laetamur tamen patris tam illustris in filio insigni eandem laboris patientiam, eundem scientiae, eundem veritatis amorem simplicem sincerumque agnoscere. Vir in experimentis elaborandis sollertissimus, in experimentorum interpretatione perspicacissimus, (ne plura commemorem) non modo "narcotinam" iliam, quae papaveris in succ est, sed etiam rerum naturae odores quosdam suavissimos artificio suo aemulatus est. Viro tali idcirco praesertim gratulamur quod ei, propter labores eius assiduos, primum a Societate Regia Londiniensi numisma aureum donatum est; deinde Victoriana in Universitate Mancuniensi, viri huius e studiis novam gloriam adeptae, cathedra nova constituta. Laetamur denique tot colorum inventoris filium, in eadem scientiarum provincia exploratorem felicem, honoris causa purpura nostra vestitum v'dere.

Duco ad vos scientiae chemicae professorem Mancuniensem, nominis magni heredem magnum, Willelmum Henricum Perkin.

LEEDS.—At a meeting of the council of the University held on June 15, the following resolution was passed:—"The council record their deep sense of the honour done to the University by the offer of a fund raised as a memorial to the late Sir George Livesey for the endowment of a professorship of applied chemistry relating to the coal-gas and fuel industries. The council gratefully accept the offer, and hereby establish a Livesey professorship of coal-gas and fuel industries, subject to the conditions prescribed in the deed of gift submitted on behalf of the donors or the Livesey Memorial Fund." The fund referred to amounts to about 11,000*l*., and has been collected from corporations, companies, and private donors associated with the industries with which Sir George Livesey was so honourably connected.

LONDON.—At a meeting held on June 15 the Senate re-elected Dr. M. J. M. Hill, F.R.S., Astor professor of mathematics, to be Vice-Chancellor of the University for a second term of office, viz. until June, 1911.

OXFORD.—The electrical laboratory presented to the University by the Drapers' Company, and erected on the north side of the University Museum at a cost of 23,000*l*.,

was opened in the presence of a large company on June 21. The Master of the Drapers' Company, Mr. K. R. Fletcher (upon whom the degree of Doctor of Civil Law *honoris causa* was conferred), made the presentation of the laboratory, and the Chancellor (Lord Curzon) acknowledged the gift in a speech, in the course of which he said that eight years ago, when a statement was drawn up of the needs of the University, a very prominent place was given in it to the need for a laboratory for the Wykeham professor of physics, and only three years ago, when the Vice-Chancellor and he wrote their first letter to the Press on behalf of the appeal for the re-endowment of the University, they summed up the requirements of the University in this respect in the laconic phrase, 'We need an electrical laboratory.' Oxford needed it, not merely to enable the professor to give the best teaching to candidates for honour degrees, but also to enable him to keep in touch with the most modern scientific discovery by the pursuit of independent research with the aid of the most recent appliances, and also, of course, to provide opportunities for similar investigations to outside people. He would not, however, like anyone to go away with the idea that, even after this splendid gift, the scientific requirements of the University were exhausted. The department of chemistry, both in respect of teachers and of laboratories, was quite unfit for the great institution to which it belonged. He was sure, also, that in the department of engineering science a laboratory was badly wanted.

COLUMBIA UNIVERSITY has conferred its doctorate of science on Sir William White, K.C.B., F.R.S.

IT is announced in *Science* that Bryn Mawr College has obtained money sufficient to pay its debts, and in addition 50,000*l*., which entitles it to the appropriation of 50,000*l*. of the General Education Board. The sum raised by the Alumnæ Association was 60,800*l*., which is to be used for the endowment of chairs in mathematics, English, and economics.

THE Imperial University Congress, which will be held in London in 1912, is likely to be one of great importance and of far-reaching influence. All the universities of the Empire are to be invited to send representatives to the congress, and the invitations are being issued in the names of the Universities of London, Oxford, and Cambridge, while the University of London will have the duty of organising the congress. It has been suggested that a preliminary meeting of representatives of British universities might be held next year with the view of preparing materials for the congress. Dr. R. D. Roberts, formerly Fellow of Clare College, Cambridge, and one of the registrars of the University of London, will act as secretary of the congress.

As announced already, the third International Congress on School Hygiene is to be held in Paris on August 2–7 next. The organising committee of Great Britain and Ireland, of which Sir Lauder Brunton, Bart., F.R.S., is president, is appealing specially to all who were associated with the London congress in 1907 to attend the Paris meeting. Travelling and hotel accommodation are being arranged by the committee at moderate charges, and full particulars concerning them can be obtained from Mr. Durrie Mulford, assistant secretary, 90 Buckingham Palace Road, S.W. The general meetings of the congress will deal with uniformity of method for physical examinations in schools, sexual education, and the training and appointment of the school doctor. The other business of the congress will be done in eleven sections, dealing with every aspect of the question of securing the health of the teachers and pupils in schools.

THE Johns Hopkins University Register, 1909–10, which has reached us from Baltimore, contains an interesting historical statement. From this we find that the original endowment of the University amounted to a little more than 600,000*l*. This sum has been supplemented by several gifts, including the endowment fund of 1902, amounting to 200,000*l*., and the John W. McCoy fund of 100,000*l*. The income-bearing funds have a "book value" of 916,000*l*. The real estate and buildings, books, scientific apparatus, and general equipment are valued at 380,000*l*. The total value of the assets of the University is thus about 1,300,000*l*. In June, 1909, the General Education Board offered to contribute 50,000*l*. towards the endowment of the University provided the institution is able to secure 150,000*l*. on or before December 31 next. It is expected that the conditions of the gift will be met by the date specified. The Legislature of Maryland recently made an appropriation of 5000*l*. a year for 1911 and 1912.

WE have received a copy of a syllabus for the "teaching of science of home affairs," drawn up by a committee of the Association of Teachers of Domestic Science, in conjunction with certain teachers of chemistry and hygiene. The object of the syllabus is to indicate a course of instruction up to a "matriculation" or "school-leaving" standard suitable for girls in a secondary school. The course is designed to include those portions of elementary physics, chemistry, hygiene, and physiology necessary for the proper understanding of the scientific principles underlying home management. It is hoped that courses, somewhat on the lines of those suggested in the syllabus, will in the future be generally adopted in girls' secondary schools, thereby bringing about a much needed correlation of the science teaching with the instruction in cookery work, laundry work, &c. The committee suggests the desirability of the inclusion of this modified science course as one of the optional subjects for girls in the scheme of examinations held by the authorities now conducting public examinations of a "matriculation" or "school-leaving" standard.

THE Royal Commission on University Education in London has issued its first report, which consists of the minutes of evidence taken up to April, 1910. It will be remembered that the commissioners were appointed to inquire into the working of the present organisation of the University of London, and into other facilities for advanced education (general, professional, and technical) existing in London for persons of either sex above secondary-school age; to consider what provision should exist in the metropolis for university teaching and research; to make recommendations as to the relations which should in consequence subsist between the University of London, the incorporated colleges, the Imperial College of Science and Technology, the other schools of the University, and the various public institutions and bodies concerned; and, further, to recommend as to any changes of constitution and organisation which appear desirable, regard being had to the facilities for education and research which the metropolis should afford for specialists and advanced students in connection with the provision existing in other parts of the United Kingdom and of our dominions beyond the seas. In a letter to the *Times* of June 17, Prof. M. J. M. Hill, Vice-Chancellor of the University of London, points out that, in addition to the evidence already published, further evidence from persons representing other views held in the University will be submitted to the Royal Commission, and suggests that it would be well to suspend judgment and to abstain from drawing conclusions from the evidence now available until the whole inquiry has been completed and the commission has issued its final report.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 16.—Sir Archibald Geikie, K.C.B., president, in the chair.—D. **Thoday**: Experimental researches on vegetable assimilation and respiration. VI.—Some experiments on assimilation in the open air. In these experiments Sachs's half-leaf dry-weight method has been employed, with modifications suggested in a previous paper for avoiding errors due to shrinkage of the insolated half-leaves. Turgid leaves of *Helianthus annuus* were found in bright sunlight to increase in dry weight 17 mg. per hour per sq. decim.; thus Sachs's high value is confirmed. Even a slight loss of turgor, however, was accompanied by a diminution in the rate of increase. For this high rate of assimilation a leaf-temperature of 23° C. to 24° C. is probably required. It is suggested that Brown and Escombe's low results in bright diffuse light indicate that the stomata of Helianthus leaves open to their full extent only in light which is similar in quality to sunlight and approaches it in intensity. Detached leaves of

Catalpa bignonioides when fully turgid increased 5–6 mg. per hour per sq. decim. in bright sunlight; in this plant stomata occur only on the underside of the leaf. The effect of detachment from the plant upon the rate of assimilation is considered, and evidence is adduced in support of Sachs's assumption, in the case of *H. annuus*, that, concurrently with assimilation, part of the products of photosynthesis are translocated from leaves still attached to the plant.—Prof. Ronald **Ross** and D. **Thomson**: A case of sleeping sickness studied by precise enumerative methods; regular periodical increase of the parasites disclosed. The enumerative methods referred to consist of modes of detecting blood parasites when very scanty, and of counting them accurately. The methods have been applied to a case of sleeping sickness in the clinic of Prof. Ross in Liverpool for seventy-three days continuously, and have shown that the numbers of *T. gambiense* in this patient's blood undergo remarkable periodical variations about every seven to eight days. The authors state that, so far as they can ascertain, though the numbers of trypanosomes had been known previously to vary from time to time, the regular periodicity revealed in their case appears to have been overlooked, possibly owing to insufficient methods of counting. The authors report that numerous parallel researches are being conducted, and give a chart.—Dr. C. **Todd** and R. G. **White**: The recognition of the individual by hæmolytic methods (preliminary communication). (1) The immunisation of the ox with the red blood corpuscles of other oxen gives rise to the formation of a hæmolytic amboceptor in the blood of the immunised animals. (2) The amboceptor so formed is an *isolysin*, but not on *autolysin*. (3) The race of the animal appears to have very little influence on the resulting hæmolysins. (4) The serum of an animal so treated acts very differently on the red blood corpuscles of different individual oxen. (5) The sera of different individuals similarly immunised differ from one another in their action on the corpuscles of different individuals. (6) If the serum of a single immunised animal be "exhausted" with excess of the corpuscles of one other individual, the serum loses its power of hæmolysing the corpuscles of this individual, while retaining the power of hæmolysing the corpuscles of many, but not all, other individuals. (7) If, however, a polyvalent serum be made by mixing the sera of a large number of immunised animals, and this serum is exhausted with the corpuscles of any one individual, the serum entirely loses its power of hæmolysing the corpuscles of this individual, but remains strongly hæmolytic for all other individuals not closely related to the individual the corpuscles of which were employed for the exhaustion of the serum. (N.B.—It is possible that exceptions may be found, but these have not yet been met with, except in the case of close blood-relations.) (8) The red blood corpuscles of any individual are thus characterised by a definite individuality of their own, and can be distinguished from those of any other individual of the same species.—F. M. **Tozer** and Prof. C. S. **Sherrington**: Receptors and afferents of the third, fourth, and sixth cranial nerves. Examination of the several extrinsic muscles of the eyeball in the monkey, cat, and rabbit, shows that these muscles contain, besides nerve-endings of the motor kind, large numbers of receptive (sensorial) nerve-endings, both in the fleshy part of the muscles and in the tendons. Investigation of these by experimental methods shows that all the receptive end-organs, as well as the motor endings, derive their nerve-fibres from the third, fourth, and sixth nerve-pairs respectively. These cranial nerves are therefore not purely motor, as generally supposed, but are sensory as well as motor. The number of afferent nerve-fibres they contain is very considerable. In addition to their sensory and motor supply from third, fourth, and sixth nerves, these muscles and their tendons receive a small supply of nerve-fibres from the ciliary ganglion. This ciliary-ganglion supply is largely, if not wholly, vasomotor in function, and no evidence was found that it is in any way sensorial. Nor does the fifth cranial nerve supply any sensory nerve-fibres to these extrinsic eye muscles. The afferent divisions of the third, fourth, and sixth cranial nerves are entirely proprioceptive in function; the receptive organs they subserve are entirely proprioceptive.—Sir David **Bruce**, Captains A. E. **Hamerton** and H. R. **Bateman**, and Captain F. P. **Mackie** (Sleeping Sickness Commission of the Royal Society, 1908–9): (i.) Trypanosome diseases of domestic animals in Uganda, I. (ii.) Experiments to ascertain if cattle may act as a reservoir of the virus of sleeping sickness (*Trypanosoma gambiense*). (i.) The commonest trypanosome disease among cattle in Uganda is caused by a trypanosome of the *dimorphon* type, which is probably similar to that sent from the west coast by Dutton and Todd under the name of *T. dimorphon*, and described by Laveran and Mesnil, and Thomas and Breinl. It seems now that probably Dutton and Todd's *T. dimorphon* is quite different from that which they sent to Liverpool under that name. The original strain of *T. dimorphon* described by them had well-marked dimorphic characters, whereas the trypanosome sent to Liverpool was monomorphic. There is some evidence forthcoming that the *T. dimorphon*, as described by Dutton and Todd, really exists, and has been described as occurring in north-west Rhodesia by Montgomery and Kinghorn, and also on the west coast. In these circumstances it seems better to give the monomorphic form, which has up to the present been known by the name of *T. dimorphon*, a new name. It is a small trypanosome, short and stout in form, averaging 13·2 microns in length, with a maximum of 16·0 and a minimum of 10·6. It has no free flagellum, and is restricted in its movements. The conclusions are that:—(1) there is an important trypanosome disease of domestic animals in Uganda; (2) the trypanosome is similar in morphology, action on animals, and cultural characters, to *T. dimorphon*, as described by Laveran and Mesnil, and to Dr. Edington's trypanosome from Zanzibar, except that this trypanosome is not pathogenic to guinea-pigs; (3) the carrier is unknown, but is probably a Tabanus, possibly a Glossina, and improbably a Stomoxys.—Clement **Reid** and E. M. **Reid**: The lignite of Bovey Tracey. In 1863 Heer and Pengelly published in the Philosophical Transactions an account of these lignite beds and their flora. Heer classed the lignite as Lower Miocene, considering it equivalent to the Aquitanian of France and to the Hampstead beds of the Isle of Wight. These latter are now referred to the Middle Oligocene. A statement by Starkie Gardner, that Heer's Bovey plants are the same as those found in the Bournemouth beds (Middle Eocene), has caused the Bovey beds to be classed as Eocene in recent text-books and on recent maps of the Geological Survey, leaving a great gap in the geological record in Britain. The authors' researches have not supported this view, but tend to show that Heer was right, the Bovey lignite being highest Oligocene, or perhaps lowest Miocene. The authors made a collection in the Bovey deposits, so far as the state of the lignite pit would allow, in order to settle, if possible, the true age. The results were unexpected, for, by using new methods, they obtained a considerable number of species, mainly identical with well-known plants of the lignite of the Wetterau, which is generally classed as Upper Oligocene. In certain cases better specimens showed also that Heer's supposed peculiar species of Bovey belong to well-known forms of the Rhine lignite, his *Vitis britannica*, for instance, being only a crushed seed of *Vitis teutonica*. Several curious new species were discovered, including the earliest known Rubus, a peculiar Potamogeton, and a new genus of Boragineæ. A study of the cone and leaf of *Sequoia couttsiae* proves that it is a true Sequoia, and not a species of Athrotaxis.

Mineralogical Society, June 7.—Prof. W. J. Lewis, F.R.S., president, in the chair.—A. **Russell**: The occurrence of phenakite in Cornwall. Phenakite was unknown in the British Isles until the discovery by the author in 1905 of a single specimen at the Cheesewring Quarry, Linkinhorne, Cornwall. In 1906 he collected further specimens showing numerous small, but well-formed, crystals from a tin lode at South Phœnix Mine, Linkinhorne. In an old Cornish collection acquired by him in 1909 he found a specimen with as many as forty fine crystals; it was labelled "Topaz on Quartz from St. Agnes." Phenakite was also recognised on a specimen found about the year 1870 by Mr. J. H. Collins at South Crofty Mine, Illogan, Cornwall. Search at the Natural History Museum and the Museum of Practical Geology brought to light other specimens of phenakite placed under apatite.—Dr. G. F. H.

Smith: (1) Phacolite from near Belfast. Two types were described. In the first the crystals were large (about 10–14 mm. across) and much striated, and in the second they were small (about 1–2 mm. across), but with plane faces; in both instances the crystals were twinned about the trigonal axis, the individuals interpenetrating one another, and the forms present were $r(10\bar{1}1)$, $t(3142)$, $e(01\bar{1}2)$, $s(02\bar{2}1)$. The measurements accord closely with the data given for chabazite. (2) The crystalline form of nitrogen sulphide. Crystals of this rare substance have recently been prepared by Mr. F. P. Burt, University College, London, by sublimation. The constants obtained were $a : b : c = 0{\cdot}8879 : 10{\cdot}8480 : \beta = 90° 23'$, and the observed forms were (100), (010), (001), (110), $(\bar{1}01)$, (011), (101), (210), (111), $(\bar{1}21)$, the last four being new. The crystals were invariably characterised by polysynthetic twinning about $(\bar{1}01)$. A biaxial interference figure with strong positive double refraction was visible through $(\bar{1}01)$.—Dr. G. T. **Prior** and Dr. G. F. H. **Smith**: A new arsenate and phosphate of lime and strontia from the Indian manganese deposits. Chemical analysis showed that the mineral approximates to the arsenic analogue of apatite. The crystals were not well formed, but the physical characters, so far as they could be determined, accord with those of apatite. The name fermorite, after Dr. L. L. Fermor, of the Geological Survey of India, who has made an exhaustive study of the manganese deposits, is proposed for this analogue. The presence of strontium, which has not yet been detected in apatite, is of interest.—L. J. **Spencer**: A (fifth) list of new mineral names.

Royal Meteorological Society, June 15.—Mr. H. Mellish, president, in the chair.—J. I. **Craig**: England, Abyssinia, the South Atlantic; a meteorological triangle. The idea that there may be an organic connection between the annual or seasonal total of rainfall in western Europe and the amount of the Nile flood is no new one, for in 1882 Prof. Balfour Stewart gave reasons for claiming such a connection between the flood of the Nile and the flow in the Thames. More recently Colonel H. E. Rawson has indicated a connection between the weather in South Africa and that in Africa north of the equator, and in particular the Nile flood. Dr. G. T. Walker has found a connection between the monsoon rainfall in India and pressure six months previously in Argentina, and Sir Norman and Dr. W. J. S. Lockyer have proved the existence of an inverse barometric relationship between India and Argentina. Dr. W. N. Shaw has also directed attention to certain correspondences between the velocity of the wind at St. Helena and the intensity of rainfall in the south of England, and pointed out that in the steady current of the south-east trade wind we may expect to find evidence of the throbbing of the aërial pulse consequent on the greater or smaller supply of solar radiation that reaches the earth and is transformed into kinetic energy. Within the last few years an organised meteorological service has been started in Egypt, and the results obtained therefrom have enabled Mr. Craig to carry out this investigation more closely. He finds that there is a distinct tendency for the south-east trade wind of the South Atlantic to divide into two branches, the first continuing the general northward movement, and the second turning to the right and moving across into the interior of Africa. He concludes that the moisture for the Nile flood comes from the South Atlantic, and that an increase in the velocity of the current will show itself in a proportional increase of the flood. There are too many gaps in the velocity records for the summer months to allow of a statistical test being applied, but it is not improbable that an intensification of the Transafrican current is connected with a similar intensification of the south-east trade wind of the Atlantic, which, as Dr. Shaw has shown, is not improbably connected with an increase of rainfall in the south of England.

DUBLIN.

Royal Irish Academy, June 13.—Dr. F. A. Tarleton, president, in the chair.—Miss M. C. **Knowles** and R. A. **Phillips**: *Leucojum aestivum*, the summer snow-flake. This well-known garden plant is a native of Asia Minor and Europe. In these countries it grows in swamps and wet, marshy meadows along river banks and on the shores of large lakes. In England the plant has a wide range on the southern rivers under exactly similar conditions. The snow-flake has recently been found in Ireland, growing spontaneously and abundantly with exclusively native vegetation, along the banks of the Shannon, the Slaney, the Nore, and the Suir, and with surroundings and associates in no way differing from those prevailing on the Continent, where the plant has always been considered native.

PARIS.

Academy of Sciences, June 13.—M. Émile Picard in the chair.—G. **Lippmann**: A brake for the balance in the form of a plumb-line. A silk fibre, stretched by a small weight, is arranged so that it can be brought lightly in contact with the beam of the balance. The oscillations are thus rapidly reduced, and the weighings rendered more rapid.—Armand **Gautier**: The action of hydrogen upon carbon monoxide; the formation of water and methane. The action of water at a red heat on the same oxide. Applications to volcanic phenomena. Hydrogen and carbon monoxide commence to react at 400° C., water and carbon dioxide being formed. The production of water passes through a maximum at about 1200° C. At higher temperatures some methane is also produced. Carbon monoxide and water at temperatures between 500° C. and 900° C. give minute traces of formaldehyde.—Paul **Sabatier** and A. **Mailhe**: The formation of the thiols and their decomposition: synthesis of the neutral alcoholic sulphides. Starting with isoamyl alcohol, the yield of sulphide in the presence of seven catalytic substances has been studied, the best result (70 per cent.) being obtained with thoria. With phenol, thoria again proved the best catalytic agent, although the yield even with this reagent was poor. For the catalytic decomposition of the thiols cadmium sulphide was used at temperatures between 300° C. and 380° C. The principal reaction was the formation of the alkyl sulphide and hydrogen sulphide, but some hydrocarbon, C_nH_{2n}, was formed by a secondary reaction.—Émile **Marchand**: New observations concerning the effects of the passage of the earth through the tail of Halley's comet. A correction in the date mentioned in an earlier communication (May 30), together with some remarks on the appearance of the solar corona.—MM. **Cirera** and **Pericas**: A *résumé* of the observations on Halley's comet made at the Observatory of Ebra, Spain. Observations of the length of the tail showed a distinct diminution after the passage of May 19. A series of photographs taken on thirteen days between May 5 and June 6 brought out the changes in aspect and dimensions of the comet.—D. **Eginitis**: Observations of Halley's comet.—J. **Baillaud** and A. **Boinot**: Changes in the nucleus of Halley's comet. A detailed account of the change of the nucleus from elliptical to circular form, and the appearance of a secondary nucleus.—Léon **Autonne**: The commutative groups of hypercomplex quantities.—A. **Buhl**: The transformation of asymptotic series into series of convergent Taylorian polynomials.—N. **Saltykow**: The applications of the theorem of S. Lie generalised.—René **de Saussure**: Opposed solid bodies.—J. **Le Roux**: Bending.—J. **Arnoult**: The movement of a wire in space.—Rodolphe **Soreau**: The thrust on the bearing surface of aëroplanes.—Paul **Mercanton**: The stability of magnetisation of lake pottery. The method of G. Folgheraiter for determining the sense and magnitude of the magnetic inclination by means of natural and artificial baked earths depends essentially on the hypothesis that the magnetisation taken by the clay in the course of its baking has not sensibly varied in the course of ages. By means of a study of the magnetic properties of the pieces from a single pot (Neuchâtel) the author comes to the conclusion that the method of Folgheraiter is justified.—M. **Barre**: Some double sulphates of thorium.—P. **Roger-Jourdain**: The oxidation of aluminium amalgam. From a study of the gases evolved from the product of the oxidation of aluminium amalgam, it is shown that there is present a mixture of aluminium carbonate and peroxide.—P. **Mahler** and E. **Charon**: The examination of the liquids produced by the action of air on coal at temperatures between 125° C. and 200° C. The liquid obtained by passing air over heated coal and cooling the issuing gas contained considerable quantities of acetic acid, together with traces of formic acid, acetone, and methyl alcohol.—P. J. **Tarbouriech**:

1-Methyl-2-ethanoyl-cyclohexane.—Marcel **Delépine**: Some new cases of spontaneous oxidation with phosphorescence. The compounds $CH_3.O.CS.Cl$, $C_2H_5O.CSCl$,

$$CH_3O.CS.CH_3, \text{ and } CSCl_2,$$

all show this phenomenon.—H. **Gault**: Remark on the acidity of the derivatives of oxalacetic acid. These acids can be titrated with phenolphthalein as indicator either in alcohol or acetone solution.—MM. **Brocq-Rousseu** and Edmond **Gain**: The excretions of roots.—Jean **Daniel**: The structure of the short old branches of some trees.—E. **Voisenet**: The formation of acrolein in the disease causing bitterness in wines. The presence of this aldehyde in bitter wines was conclusively proved.—C. **Gessard**: The fibrin ferment.—Mieczyslaw **Oxner**: Biological analysis of the phenomenon of generation in *Lineus ruber* and *Lineus lacteus*.—Lucien **Mayet** and Laurent **Mauretto**: The discovery of a burial cave, probably Neolithic, at Montouliers (Hérault). Fourteen human skulls and other bones were found, probably of Neolithic age.—H. **Guilleminot**: Exposure in medical radiography, with or without a reinforcing screen.—Armand **Dehorne**: The mechanism of reduction in *Sabellaria spinulosa*.—Jules **Welsch**: The peat deposits on the coast of the west of France.—Carl **Störmer**: Photographs of the aurora borealis and a new method of measuring their altitude. More than 400 successful photographs have been taken of the aurora, and by means of simultaneous photographs at two stations 4·3 kilometres apart the height has been determined. The altitudes found were between 50 and 190 kilometres.

FORTHCOMING CONGRESSES.

JULY 10–25.—International American Scientific Congress. Buenos Aires. Address for inquiries: President of the Executive Committee, c/o Argentine Scientific Society, 269 Calle Cevallos, Buenos Aires.

JULY 27–31.—International Congress on the Administrative Sciences. Brussels. Secretary of British Committee: Mr. G. Montague Harris, Caxton House, Westminster.

AUGUST 1–6.—International Congress of Entomology. Brussels. Chairman of Local Committee for Great Britain: Dr. G. B. Longstaff, Highlands, Putney Heath, S.W.

AUGUST 1–7.—French Association for the Advancement of Science. Toulouse. President: Prof. Gariel. Address of Secretary: 28 rue Serpente, Paris.

AUGUST.—International Congress of Photography. Brussels. Correspondent for United Kingdom: Mr. Chapman Jones, 11 Eaton Rise, Ealing, W.

AUGUST 2–7.—International Congress on School Hygiene. Paris. General Secretary: Dr. Dufestel, 10 Boulevard Magenta, Paris. Hon. Secretaries for Great Britain: Royal Sanitary Institute, 90 Buckingham Palace Road, S.W.

AUGUST 15–20.—International Zoological Congress. Graz (Austria). President: Prof. Ludwig von Graff. Address for inquiries: Präsidium des VIII. Internationalen Zoologen-Kongresses, Universitätsplatz 2, Graz (Österreich).

AUGUST 18–26.—International Geological Congress. Stockholm. General Secretary: Prof. J. G. Andersson, Stockholm 3.

AUGUST 29 TO SEPTEMBER 6.—International Union for Cooperation in Solar Research. Mount Wilson Solar Observatory. British Member of Executive Committee to whom inquiries should be addressed: Prof. A. Schuster, F.R.S., Victoria Park, Manchester.

AUGUST 31 TO SEPTEMBER 7.—British Association. Sheffield. President: Prof. T. G. Bonney, F.R.S. Address for inquiries: General Secretaries, Burlington House, W.

SEPTEMBER 8–14.—International Congress of Americanists. Mexico City. General Secretary: Sr. Lic. D. Genaro Garcia, Museo Nacional, Mexico, D.F.

SEPTEMBER 13–15.—International Congress of Radiology and Electricity. Brussels. General Secretary: Dr. J. Daniel, 1 rue de la Prévôte, Brussels. Correspondents for United Kingdom: Prof. Rutherford and Dr. W. Makower, University of Manchester, and Dr. W. Deane Butcher, Holyrood, Ealing, W.

SEPTEMBER 18–24.—German Association of Naturalists and Physicians. Königsberg. Secretaries: Prof. Lichtheim and Prof. F. Meyer, Drummstr. 25–29, Königsberg.

SEPTEMBER 27–30.—International Physiological Congress. Vienna. President: Prof. S. Exner. General Secretary for United Kingdom: Prof. E. B. Starling, University College, London, W.C.

OCTOBER 6–12.—Congrès International du Froid. Vienna. Correspondent for United Kingdom: Mr. R. M. Leonard, 3 Oxford Court, Cannon Street, E.C.

DIARY OF SOCIETIES.

THURSDAY, JUNE 23.

ROYAL SOCIETY, at 4.30.—The Damping of Sound by Frothy Liquids: A. Mallock, F.R.S.—Dispersion of Light by Potassium Vapour: Prof. P. V. Bevan.—Additional Refractive Indices of Quartz, Vitreous Silica, Calcite and Fluorite: J. W. Gifford.—The Absorption Spectra of Sulphur Vapour at Different Temperatures and Pressures, and their Relation to the Molecular Complexity of this Element: J. I. Graham.—The Wave-making Resistance of Ships: a Study of certain Series of Model Experiments: Dr. T. H. Havelock.—The Blood Volume of Mammals as Determined by Experiments on Rabbits, Guinea-pigs and Mice: and its Relationship to the Body Weight and to the Surface Area Expressed in a Formula: Dr. Georges Dreyer and William Ray.—Autotoxæmia and Infection: E. C. Hort.

FRIDAY, JUNE 24.

PHYSICAL SOCIETY, afternoon.—Visit to National Physical Laboratory.

TUESDAY, JUNE 28.

ROYAL ANTHROPOLOGICAL INSTITUTE, at 8.15.—The Classification of the British Stone Age and some New and little-known Horizons and Cultures: W. J. Lewis Abbott.

WEDNESDAY, JUNE 29.

BRITISH ASTRONOMICAL ASSOCIATION, at 5.

THURSDAY, JUNE 30.

ROYAL SOCIETY, at 4.30.—*Probable Papers*: A New Method for the Quantitative Estimation of Hydrocyanic Acid in Vegetable and Animal Tissues: Dr. A. D. Waller, F.R.S.—On the Comparative Toxicity of Theobromine and Caffeine as measured by their Direct Effect upon the Contractility of Isolated Muscle: Dr. V. H. Veley, F.R.S., and Dr. A. D. Waller, F.R.S.—(*a*) "Muhinyo," a Disease of Natives in Uganda; (*b*) The Natural Food of *Glossina palpalis*: Sir David Bruce, F.R.S., and others.—The Relation of Light Perception to Colour Perception: Dr. F. W. Edridge-Green.—The Anatomy and Morphology of the Leaves and Inflorescences of *Welwitschia mirabilis*: Miss M. G. Sykes.—The Relative Atomic Weights of Nitrogen and Sulphur: F. P. Burt and F. L. Usher.—And other papers.

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