THURSDAY, MAY 1, 1913.

THE CARBONISATION OF COAL.

The Carbonisation of Coal. A Scientific Review of the Formation, Composition and Destructive Distillation of Coal for Gas, Coke and By-Products. By Prof. V. B. Lewes. Pp. xiv + 315. (London: John Allan and Co., 1912.) Price 7*s*. 6*d*. net.

THIS book is a welcome addition to the literature of a subject which is increasing in importance with each successive decade. Practical men are at length beginning to realise that the utilisation of the store of potential energy in coal by more rational methods than have hitherto prevailed is a problem that has to be grappled with seriously if our supremacy in the chief manufactured products of the world is to be maintained Authorities of the highest competence have repeatedly pointed out that enormous economies might be effected if more scientific—that is, more common-sense—methods were employed in the consumption of coal. The waste is universal and extends practically to every industry, although in some to a much greater extent than in others. In the blast furnaces it is relatively small, for the reason that ever since the introduction of the hot-blast, the connection between potential energy and output has received an amount of consideration such as has not been bestowed upon any other aspect of the general problem. On railways, in factories, in brickworks, potteries and glassworks the waste is simply appalling.

It has been calculated that our annual consumption of coal is from 143 to 168 million tons per annum, of which from 30 to 36 million tons are used for domestic purposes. Of this huge amount it is estimated that from 40 to 60 million tons are practically wasted; that is, this quantity could be saved if gas-generating plant, electric motor and traction, gas heating and gas cooking, briquettes and coke were more generally employed than they are at present.

We think, therefore, that Prof. Lewes has been amply justified in putting together and in enlarging his Cantor lectures on the carbonisation of coal, given to the Society of Arts in 1911, and we trust that his appeal to a wider public will meet with the success it undoubtedly merits. The subject, indeed, is admittedly of national importance, but the fear is that this country will only waken up to the full significance of that fact when the pinch of necessity has tightened to a real grip—so tight, indeed, that it will be too late to shake it off.

The purpose of this work is to point out how the methods known comprehensively as "carbonisation processes"—that is, processes involving the preliminary treatment of coal by heating it under such conditions that initial products are formed capable of being turned to economical account as sources of power—may tend to minimise this waste. To understand fully the *rationale* of the effect of heat upon coal implies some knowledge of the proximate nature of coal and of the essential differences in composition between one coal and another. On this matter knowledge is confessedly very imperfect, but at the same time a certain amount of information has been gained by the study of the action of various solvents upon coal and by an examination of the nature of the products so obtained, as well as of the changes which the coal has experienced by the treatment. Incidentally, Prof. Lewes has been led to speak of the influence of storage, *i.e.* oxidation, on the nature of coal, and its effect on its coking properties and on the products of its destructive distillation. He is naturally induced to treat of the causes of the spontaneous ignition of coal, and he points out that the phenomenon is certainly more complicated than is generally supposed, and is not wholly, or in all cases, due to the occurrence of "brasses," or any readily oxidisable form of finely divided iron sulphide, but is connected with the character of its proximate constituents.

A special chapter is devoted to the question of the classification of the various kinds of coal. Strictly speaking, the most rational method would be one dependent upon proximate composition, and perhaps in time to come we may arrive at such a system. At present our knowledge on this matter is far too partial and imperfect to warrant even the attempt, and accordingly we have to content ourselves with the admittedly empirical and irrational systems which the metallurgists have devised for us. Of course, in practice, the systems we owe to Fleck, Gruner, Seyler and others—mainly German and Austrian writers—have a certain measure of convenience, and are probably remotely based upon intrinsic differences of chemical nature, but the correlation has not been definitely traced, and is certainly not capable of being stated with precision.

The greater part of the rest of the work is concerned with the effect of heat upon coal, or, to speak more precisely, on its behaviour during the process of destructive distillation. Of course, this is a very wide subject, and has been treated at great length in many standard treatises. It has, however, not been Prof. Lewes's object to traverse well-trodden ground. His purpose has been rather to direct attention to novel points, or to offer his testimony on disputed matters. This

feature of the work will commend it to the attention of those who are concerned practically with the carbonisation of coal, whether in gas manufacture, coke-oven work or tar distillation. They may not always agree with Prof. Lewes, but it will be admitted that he speaks as a well-trained chemist with the experience of a generation on practically every aspect of the subject, and that his opinions are fairly and temperately stated, such as becomes a man of science whose sole object is to elucidate the facts.

A commendable feature of the book is the excellence of the illustrations. Many of them are novel and all are of the character that experts will appreciate. T. E. THORPE.

THE TRAINING OF GOLDSMITHS.

Metalwork and Enamelling: a Practical Treatise on Gold- and Silver-smiths' Work and their Allied Crafts. By Herbert Maryon. Pp. xiii + 327 + plates. (London: Chapman and Hall, Ltd., 1912.) Price 7*s.* 6*d.* net.

THE abolition of the apprenticeship system of training and the establishment of technical institutions for the education of young goldsmiths and silversmiths have created a demand for text-books which have in view the wants both of technical students and of those who are already practically engaged in these crafts.

The modern practice whereby the worker in the precious metals confines himself to a single branch of the craft results in technical skilfulness and in cheapness of production, but its influence is definitely against the production of craftsmen who are masters of their art. There will, however, always be a demand, and we hope an increasing demand, for work executed throughout by one man—a man who can both design and carry the work through—and text-books which will assist in the production of such men are rendering great service to the ancient craft of precious metal working. The information must be given in a form not too academic, and expressed in language that the worker of ordinary intelligence can understand.

This book is an important addition to this class of technical literature, and will be of value not only to the student but to those already engaged in gold- and silver-smiths' work. It deals with metalwork and enamelling from the essentially practical and technical rather than from the artistic or historical point of view. The author has departed from the course adopted by most writers on the subject, which consists in describing in detail the making of single articles, such as a brooch, cup, or casket.

The operations of soldering, raising, stone-setting, enamelling, &c., are fully discussed in a clear and concise manner, and the descriptions are accompanied by good illustrations.

Two chapters are devoted to a description of the materials and tools used, and to the making of small tools required for special work. The sharpening, hardening, and tempering of tools, which are matters of considerable importance to the craftsman, have also been dealt with. Designing, which is the essential basis of the gold- and silver-smiths' art, is ably discussed, and the method of teaching design adopted by Mr. Catterson Smith, at the Birmingham Municipal School of Art, for training lads who propose to enter the jewellery and metal trades is described and well illustrated.

Twenty-three plates illustrative of some of the finest examples of Greek, Etruscan, Renaissance, Celtic, and modern gold- and silver-smiths' work are given. These are taken from masterpieces exhibited in the British Museum and the Victoria and Albert Museum, and the publishers are to be highly congratulated on the excellent way in which these have been reproduced. The plates, which are fully described, will be of considerable assistance to students in studying the numerous styles of ornamentation, &c. A short chapter on the life and work of Benvenuto Cellini is appended.

A bibliography is given, but several important modern works have been omitted.

ERNEST A. SMITH.

GAS, OIL AND PETROL ENGINES.

The Gas, Petrol and Oil Engine. Vol. ii.: The Gas, Petrol and Oil Engine in Practice. By Dr. Dugald Clerk, F.R.S., and G. A. Burls. New and revised edition. Pp. viii + 838. (London: Longmans, Green and Co., 1913.) Price 25*s.* net.

THE first volume of this book, which we reviewed some three years ago (November 11, 1909), was devoted chiefly to thermodynamics. Dr. Dugald Clerk, with the help of Mr. Burls, has now issued the companion volume treating of the gas, petrol and oil engine in practice. The current volume is much bulkier than its predecessor, and is one calling more for the skill of an editor in its composition than for that of an author. "Practice" with gas, oil and petrol engines now covers such a ramification of diverse uses that it is exceedingly difficult to write any treatise on the subject which shall show at the same time breadth of knowledge and unity of conception; and it is characteristic of Dr. Clerk's writings that the former is always the more pronounced.

In the present volume we have one-third of the chapters attributed to each of the two authors, and the remainder a joint production, whilst the whole "correctly represents the opinions of both writers." The subjects dealt with in the various chapters include the development of the Otto and Clerk cycles, ignition arrangements, speed regulation, governing, gaseous fuels, petroleum and its products, petrol engines, carburettors, heavy oil engines, marine engines, and the future of internal combustion motors. There is also a somewhat forbidding appendix on the acceleration of reciprocating parts.

Since its first publication in 1886 the book has had for numerous reasons to be increased greatly. It is only in comparatively recent years that the petrol engine has become prominent; now, of course, it is without exception the most widespread of all prime movers. In this volume Mr. Burls deals chiefly with the petrol engine, and he has certainly made it an interesting part of the book; he discusses ably and fully those problems on which he is well known to hold decided views, although his processes of argument are occasionally obscure, especially when mathematical treatment becomes necessary. The graphical construction at the early part of chapter iv. for finding the tangential effort at the crank-pin is unnecessarily complicated, and is not likely to be much used.

A very interesting statement occurs on p. 433, where Dr. Clerk describes his method of overcoming the pre-ignition difficulty when working with coke-oven gas or with other gases rich in hydrogen. His plan is to replace some of the air in the gaseous charge by cooled exhaust products; the effect is thus described: "The inert gas addition reduces inflammability by diminishing the oxygen and by the diluting effect of the carbonic acid and nitrogen, without reducing the total mass of the charge." This is a most ingenious plan, and it would be interesting to learn how much of its beneficial effect is due to the lowering of the compression temperature on account of the greater specific heat of the carbonic acid, particularly at the higher temperatures.

The most useful recent work on the theory of the internal combustion engine has been done by the Gaseous Explosions Committee of the British Association, of which until quite lately Dr. Clerk was joint secretary. One of their discoveries was the enormous proportion of the heat loss during the expansion stroke which occurred at the crest of the temperature wave. This was shown to be a radiation loss and not a surface-cooling loss. Nevertheless, we see on p. 517 that the rating of petrol engines is discussed on the basis of the heat loss being proportional to exposed surface irrespective of temperature limits, and it would have been better to have added to this assumption some qualification.

These are, however, minor points, and for the book as a whole we have only praise. We have no doubt it will be welcomed by British engineers, who are accustomed to look on Dr. Clerk as the chief authority on all that pertains to the gas engine. His concluding remarks cannot fail to hold not only engineers, but all who are interested in the future of the internal combustion motor. Dr. Clerk considers that although the problem of improving efficiency is a fascinating one from the scientific point of view, it is not at present of vital importance, since present thermal efficiencies are sufficiently good, and it is, he considers, much more important to improve internal combustion engines in other respects. He foresees much difficulty in the way of making a gas turbine, and suggests that progress is most likely to lie in the development of the Humphrey idea, in which water propelled by gaseous explosions is made to do work in turbines. He thinks also that more attention should be concentrated on the bituminous fuel producer as a means of gas production, since for this country coal is and must long remain the chief source of power.

COMPARATIVE BIOLOGY.

(1) *Vorlesungen über vergleichende Tier- und Pflanzenkunde.* By Prof. Adolf Wagner. Pp. viii + 518. (Leipzig: Wilhelm Engelmann, 1912.) Price 11 marks.

(2) *Vergleichende Physiologie wirbelloser Tiere.* By Prof. H. Jordan. Erster Band: Die Ernährung. Pp. xxii + 738. (Jena: Gustav Fischer, 1913.) Price 24 marks.

(1) THIS excellent book is a sequel to Claude Bernard's famous "Leçons sur les phénomènes de la vie communs aux animaux et aux végétaux" (1878), and we are aware that this is saying a great deal. It has not the luminosity and fascination of the French classic, but it is a substantial and original piece of work, to which we would give the heartiest welcome. Many books have compared the plant cell and the animal cell, the plant metabolism and the animal metabolism, and so on, but Prof. Wagner's aim is different. It is to show how the plant-organism and the animal-organism tackle the everyday problems of life. Organisations built on different lines find different, but in their way equally successful, solutions of the same problems, and the comparative study has been too much neglected. We have in this book an admirable guide.

The lectures begin with nutrition—the taking in of food, the treatment of this food within the body, its distribution, storage, and transformation, and so on. The respiratory function in plants and animals is then dealt with. Then follow very interesting lectures on movement and irritability, and the author is particularly successful in his treatment of the various senses in plants and animals. The general facts and laws of response to various kinds of stimulus are admirably discussed, and the lectures end with an inquiry into the regulation and unification of functions. The reproductive function has been left for separate treatment.

Prof. Wagner has given us a very thoughtful book, which makes one reflective, and to our mind there is convincingness in its cumulative argument that biology is autonomous, and that it cannot do its own business with the instruments of chemistry and physics alone. Thus we are led at the end of these lectures to a deliberate, but by no means dogmatic, "Psycho-biology."

(2) Prof. Jordan has tackled an enormous piece of work—a comparative physiology of the invertebrates—and he is to be congratulated on the completion of the first volume, which deals with nutrition. With colossal learning, which must have meant many years of work, he discusses the nutritive function in the various classes. Incidentally, he has a good deal to say in regard to habits. The material is very well arranged; the style is clear; there are numerous good figures; and there is an index of about seventy pages. Prof. Jordan has himself made numerous contributions to comparative physiology, and he is at once critical and fair in the way he deals with the huge mass of facts which the active prosecution of a relatively young inquiry has placed at his disposal. After tracing the nutritive functions from class to class, he takes in the concluding chapter an interesting general survey of the different kinds of diet, the different ferments, the processes of secretion, digestion, and absorption, the *rôle* of phagocytes, and the process of storage. Zoologists and physiologists will be grateful to Prof. Jordan for this valuable book of reference.

OUR BOOKSHELF.

Notes on Sampling and Testing. Second edition: revised and enlarged. Pp. 96+plates. (Manchester: Marsden and Co., Ltd., 1913.) Price 1*s.* 6*d.*

THE testing-house of the Manchester Chamber of Commerce was established some eighteen years ago for the examination of yarn and cloth as regards proportion of moisture, "strength," and other physical properties. To these objects have since been added others, including the analysis of sizing materials used on textile fabrics; the testing of wood pulp, oils, metals, fuels, and water; and also investigations respecting the causes of defects in fabrics—for example, mildew, stains, and "tenderness" or deficiency in strength. The handbook contains notes explaining certain of the processes used, the standards adopted, and the reasons for the choice of methods and standards. Examples of calculations are given, and tables of numerical data, with various diagrams and curves, one showing, for instance, the effect of atmospheric moisture on the strength of different kinds of cloth. Notes on the precautions to be taken in sampling articles for testing are included.

The services of the testing-house are not restricted to the members of the Chamber of Commerce, but are available to the public generally: and during the last ten years the number of samples submitted annually has more than doubled. One notable function of the establishment is to afford help in settling differences between manufacturers or merchants, especially where the experience of the testing-house is of value and analyses are required.

For those interested in textile industries, to whom it is more particularly addressed, the book will no doubt prove useful.

Physik der Gestirne. (Bücher der Naturwissenschaft. Vol. xiii.) By Prof. J. B. Messerschmitt. Pp. 195+13 plates. (Leipzig: Philipp Reclam, jun., n.d.) Price 1 mark.

FOR German readers this small volume affords an interesting and useful summary of the astrophysics of to-day. The introductory chapters deal with spectrum analysis in general, the solar spectrum and the spectroscope; the various conditions, *e.g.*, pressure, radial motion and magnetic fields, which modify the radiation are briefly but sufficiently discussed.

A considerable space is devoted to solar physics; and, for so small a volume, the general principles are stated very clearly and completely. On debatable subjects, such as the spectroscopic proof of water-vapour in the Martian atmosphere, Prof. Messerschmitt is commendably reserved, and states the views of both sides with judicial equanimity. More space might usefully have been devoted to the subject of stellar spectra, but the main points are enumerated, and a short, special chapter is devoted to the consideration of stellar temperatures.

Various tables, such as that showing the brightness of the sun's surface at different distances from the centre, and another giving the relative brightness of the chief nebula line in various nebulæ, afford the student a clear view of many important special problems, while the excellent plates will go far in fixing the general ideas in his mind.

W. E. R.

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.]*

Atmospheric Electrification during Dust-storms.

OBSERVATIONS which have been made at the Patna College since the beginning of the present year indicate that the remarkably high negative potential gradient noticed as a feature of South African dust-storms in Prof. Rudge's letter, published in NATURE of March 13, also exists while the ordinary westerly winds of the hot weather are blowing in north India. At Patna they usually blow from about 9 a.m. to 6 p.m. from the middle of March until June, and they raise a great deal of dust, though the real dust-storms seldom occur so far to the east of India. This year they are unusually late in starting, and their place has been taken on most days by east winds, during which the potential gradient is of the ordinary positive type and magnitude.

So far, measurements have only been made with a portable electrometer and water dropper, the latter mounted on a post 5·6 metres from the ground with good exposure. Until March 15 nothing abnormal was noticed. The positive gradient was rather lower than usually recorded, seldom exceeding 60 volts per metre. Negative gradients of about 30 were measured on the afternoons of January 19 and March 11, but only lasted for a few minutes. At 3 p.m. on March 15, with a hot west wind blowing in gusts, the negative gradient was about 120 volts per metre. Under similar conditions on March 16 it rose to above 400 during some of the stronger gusts. On March 23, when the wind had once more shifted to the west, the negative gradient was too high to be measured with the electrometer.

Since the copy of NATURE containing Prof. Rudge's letter reached me, April 7 has been the only day with a strong west wind. On the morning of April 6 a squall, due to a local disturbance, blew from the north from 9 to 11 a.m. It raised a certain amount of dust on the sandbanks of the Ganges, but the atmosphere was unusually clear. While the wind was blowing hard the negative gradient was about 180 volts per metre, but this gradually diminished as the wind died away, and the usual positive gradient was re-established about 11.30 a.m.

A summary of the observations made on April 7 is given below:—

Time	Gradient (volts per metre)
7.15 a.m.	... ... 24+
9.10	... ... 32−
11.30	420− rising to 500−
12 noon	much above 500−
1 p.m.	,, ,, 500−
2	... about 1500−
3	... ,, 1650−
5.30	... ... 180−
6.30	... ... 30+
8.30	... above 250+
10	... about 250+
10.20	... ... 130+
12	... ... 100+
12.30	... ... 36+

The rough value at 2 p.m. was obtained by a spark micrometer, the sparks being from 1·9 to 2 mm. in length. At 3 p.m. the water dropper was mounted on another post 1·6 metres from the ground, and it was just possible to measure the potential with the electrometer. After 10 p.m. the wind began to veer to the east, and it has remained in that quarter.

It is evident that a continuous record of these changes would have resembled Prof. Rudge's record of a severe dust-storm, except that the latter does not show such marked signs of a high positive gradient after sunset. Later on in the season even higher negative gradients will probably be observed, for the conditions on April 7 were scarcely typical of the hot weather, the temperature not rising above 94 and the clouds of dust not dense.

More measurements are, of course, necessary, but at present it does not appear unreasonable to suppose that from about 9 a.m. to 6 p.m. on the majority of days from March or April until June the potential gradient over a large portion of north India is reversed, and that under these conditions the negative gradient is from ten to fifty times as great as the ordinary positive change.

V. H. JACKSON.

Bankipore, April 9.

X-Rays and Crystals.

IN my former letter of March 18 (published in NATURE of April 10) I briefly pointed out that the transmitted beams of X-rays may be made visible by means of an ordinary fluorescent screen. The results of further experiments by visual method are favourable for the explanation suggested by Barkla and Bragg, in so far as the planes rich in molecules or atoms behave as reflecting planes for rays at grazing incidence.

A piece of colourless transparent fluorspar, crystallised in regular octahedron, and rock-salt in the form of a cube, were examined, with an incident beam of 1 cm. diameter. As already noticed, groups of transmitted beams are arranged on circular cones, always in contact with the incident beam, having their common vertex in the crystal, and *their axes fixed relative to it,* so that all the spots belonging to a certain cone converge into the central incident spot, as the axis corresponding to the cone approaches the incident beam. Moreover, the elongated spots are all directed towards the point of the cone diametrically opposite to the incident spot. By rotating the crystal about one of its principal axes, or about an axis bisecting the angle between two principal axes, the position of the axes of these cones was determined, leading to the result that all these axes correspond with the lines of intersection of several planes "rich in" reflecting particles, if we assume that these points are arranged in a simple space-lattice. The number of spots belonging to every cone may also be accounted for on this assumption. Even the brightness seems to conform with the "richness" of these points in the corresponding plane.

I was also able to reconstruct graphically the complete sets of spots shown in the photographs obtained by Laue, Friedrichs, and Knipping (Figs. 5 and 7) on the above assumption. Details of the investigation will appear in the near future in the Proceedings of the Tokyo Mathematico-Physical Society.

T. TERADA.

Physical Institute, Tokyo, April 6.

The Use of Alcyonarians as Money.

THERE has just been presented to the Royal Scottish Museum by Dr. E. MacKenzie, of Espiritu Santo, New Hebrides, a large Cœlenterate colony found on the shores of the island after a storm. Dr. MacKenzie supplies the information that such colonies are held in great esteem by the natives, who use them as charms,

wearing constantly a few twigs contained in a small bag or basket slung to the wrist, in the assurance that so good fortune will follow. But few other than chiefs are fortunate enough to possess this valuable jetsam. The twigs are also used as a medium of barter, a fragment of a colony, say, a branch seven or eight inches long, with its associated branchlets, having the exchange value of half a dozen pigs—the staple wealth of the island—or a wife.

In view of these interesting customs a few particulars regarding the Alcyonarian colony referred to are given. The specimen in the museum is a large and much-branched Gorgonid axis, intensely black in colour, with shiny surface marked by many fine grooves and ridges, and entirely devoid of flesh or spicules. By the characters of colour, branching, and general structure of the axis it is clearly a "black coral"—the "schwarze Horncoralle"—*Gorgonia* (now *Plexaura*) *antipathes* of Esper, or some closely related species. Such forms are widely distributed in Oceania, and are known to the natives by various names, frequently signifying "sea-wood," "sea-roots," "iron-wood," and such like. The present specimen is more than 2 ft. high, but examples 5 or 6 ft. high are on record. The colonies are most frequently cast ashore after storms, but they grow in five to six fathoms off Amboina, and belong to a typically shallow-water family.

It is natural that the large and thick stems of very old colonies used by East Indian peoples for the manufacture of ornaments should be considered of great value, but it is peculiar that the small twigs of an Alcyonarian widely distributed in Polynesia, an inhabitant of shallow water, and therefore likely to be often cast ashore, should be sufficiently rare in Santo to be a highly coveted medium of exchange.

JAMES RITCHIE.

The Royal Scottish Museum, Edinburgh, April 18.

Mechanically-formed Grikes in Sandstone.

THE grikes, or channels, frequently formed by the corrosive action of carbonic and organic acids upon the surfaces of exposed limestone beds are known to most geologists, but a case I recently met with, where similar surface-features have been naturally produced upon a sandstone ledge footing a part of the cliff at Orcombe Point, near Exmouth, is, I venture to think, a phase of marine erosion sufficiently unusual to merit a detailed description.

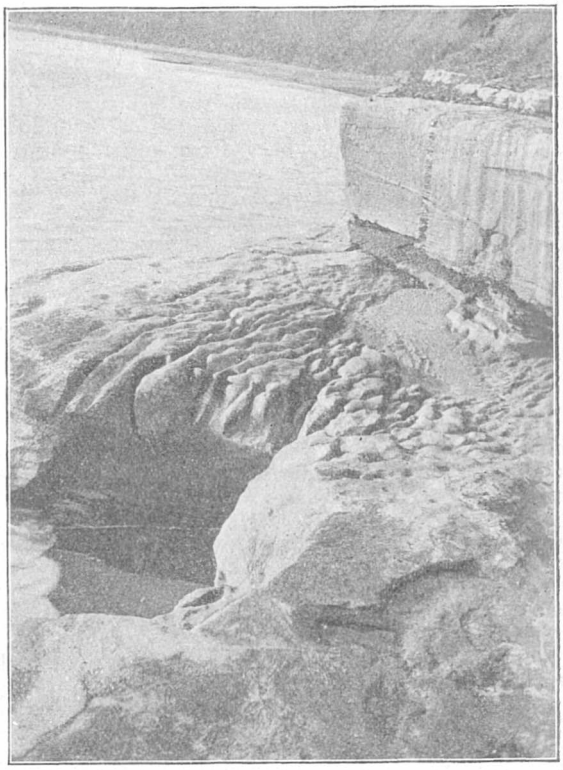
Here the Red Marls, with intercalated sandstones, rest on Permian (?) Sandstone. This, owing to its superior hardness, forms a ledge rising abruptly from the beach to a height of about 9 ft. This ledge of sandstone, which has a fairly level surface, is backed by a mass of a somewhat softer variety in the cliff, which, at its greatest distance, is about 20 ft. from the margin of the ledge.

The surface of this ledge is grooved and channelled to a remarkable extent, and presents an appearance similar to that of limestone grikes. The longest channel has a length of between 15 and 16 feet, the deepest is 2 ft. 3 in. in depth, and the widest has a width of about 2 ft. at the top. In this widest channel is a ridge, about 1 ft. from the top, running along its centre, clearly representing an eroded parting which originally separated this widest channel into two parts. All the channels run seawards, and are deepest near the edge of the ledge. They are veritable cañons in miniature. A photograph taken from a point above the surface of the ledge is here reproduced.

These unusual features have been produced as follows:—During stormy weather the pebbles, grit, and sand on the beach are cast upon the ledge by the waves. The advancing and receding water causes the beach material to move to and fro on the top of the ledge, and thus the pebbles and sand have literally sawn out these grooves, and the work of deepening and enlarging still goes on.

The position and direction of the channels was probably originally determined by slight "fossil" ripple-marks which existed on the surface of the rock.

The sandstone forming the ledge is a fairly hard, red, ferruginous rock, composed chiefly of quartz grains, the larger being smooth and rounded, or sub-angular, and the smaller rough and angular. The beach material is chiefly made up of quartz, quartzite, vein-quartz, sandstone, flint, jasper, and shell fragments.



Grikes in sandstone at Orcombe Point, near Exmouth (looking west).

CECIL CARUS-WILSON.

April 21.

Gain of Definition obtained by Moving a Telescope.

THE phenomenon described by Mr. M. E. J. Gheury in NATURE of March 27, p. 86, is familiar to me in telescopic work.

Many years ago, when I used to sweep for comets, sometimes nebulæ would be seen to enter the field which were so faint that when the telescope came to rest they were only just discernible or invisible altogether. By slowly swinging the telescope back and forth they would become readily visible, as if the process of motion had the effect of greatly multiplying their light. This was not an unusual occurrence. I remember also that it made quite a difference as to whether the object entered from the right or left side of the field. It was easier to detect a very faint nebula or comet when it entered from a certain side. I cannot now remember whether this was from the right or left (the sweeps being horizontal), but I know

I used to take advantage of the fact and sweep so that the stars should enter from the favourable direction.

E. E. BARNARD.

Yerkes Observatory, Williams Bay, Wisconsin, U.S.A., April 15.

A Brilliant Meteor on April 23.

A MAGNIFICENT meteor was seen here by me at 9h. 8m. this evening. Starting from near β Leonis, the body travelled, nearly overhead, to near η Draconis. The head was yellowish and distinctly pear-shaped, pouring out behind it a shimmering tail of reddish material. The flight occupied some 5 sec. or more, for I had time to direct the attention of the Misses Baxandall—with whom I was talking—to it, and they then saw quite half the flight. The matter left behind was quite bright, tapering off for some 3°, and then quickly fading away. There was no sound and no violent disruption. The meteor, in flight, reminded me strongly of the photographs of Borrelly's comet published by the Lick observers in 1903. A marked feature was the leisurely flight and the appearance of matter being poured out from the receding head.

WILLIAM E. ROLSTON.

"Broadwater," Fulbrooke Road, Cambridge, April 23.

Spectacles for Use with Observing Instruments.

I DO not remember ever reading or seeing any article on how people who wear spectacles should look correctly through capped lenses of scientific instruments, such as telescopes, spectroscopes, microscopes, &c., nor what sort of spectacles weak-sighted people should use for that purpose, whether their long-sighted or reading spectacles, or whether special lenses should be obtained for that purpose. If the latter, a special form of lens cap might be made for the correct spectacle glass to fit into at the proper distance from the lens cap—when it is known what is the proper distance. At present this subject seems to be ignored, and it may be worth the attention of opticians to make rules and give hints or advice on the subject, so that people with deficient eyesight, especially the aged, may have more pleasure in their observations. Perhaps some of your readers may be able to give some useful hints as to what they find it best to do in the circumstances gained by many years of practical experience.

J. W. SCHOLES.

Grimscar, Huddersfield, April 21.

THE REPORT OF THE COMMISSION ON UNIVERSITY EDUCATION IN LONDON.

WHATEVER may be the ultimate result of the report of the Royal Commission on University Education in London, there can be no doubt that the Commissioners have performed, and performed admirably, a much-needed task. For success in any great enterprise it is essential that those who are engaged in it should have a clear mental vision of what they want. It need not be precise in detail, but it must be definite in outline.

The Commissioners have produced for the first time a faithful sketch of what the University of London may and should be. It is the conception of statesmen, and not merely of educationists interested chiefly in their own subjects, their own institutions or their own degrees. It is courageous, for the Commissioners do not hesitate to express their opinions even when they know that they must be opposed to sectional views and sectional interests. It is far-sighted, for it is linked with impending reforms in secondary education, and contemplates changes which are admitted to be temporary and preparatory only to further developments, such as the establishment of a south-eastern university outside the London area. It faces for the first time the question of the cost of a great metropolitan university. Whatever other purpose it may serve, it will for long be regarded as a self-consistent and well-conceived scheme which will serve as a standard with which other proposals must be compared. Those who object may at least be expected to state their objections in a specific form; to indicate whether those objections are to some general principle or to particular details; to make it clear what alternatives they suggest, and whether those alternatives would directly or indirectly modify the whole scheme, and, if not, how they can be incorporated into it.

In discussing the report in these pages it may be assumed that the readers of NATURE are generally acquainted with the past history of the University of London, and know that the development of the internal University under the constitution established thirteen years ago has been very great, but has been hampered by disunion in the Senate. Nor was that constitution framed so as to enable the Senate to deal with the difficult problems caused by the establishment of so strong and efficient an institution as the Imperial College.

Indeed, the whole question was raised, not only as to whether a new technological university should be established in London, but whether the Imperial College should not be regarded as a super-university institution to which other universities should be expected to send their best technical students, and which should gradually eliminate all teaching of undergraduates from its curriculum. With both these proposals the Commissioners deal very faithfully. For their arguments we must refer our readers to the report itself (sections 194–198). Suffice it to say that they sum up in the statement "that the analogy of the German Hochschule fails to support the claim for a technological university in England, and that the policy of establishing a super-university is neither a possible one nor to be desired on its merits."

But while thus decisively deciding on the main questions, the Commissioners have done much, indeed, it may be said, all that is possible, to secure both to the technical colleges and to the teachers of technology in general that freedom in educational matters the securing or retention of which was the main motive of those who feared the too complete absorption of the Imperial College in the University. The safeguards provided are described below. Turning from this point, which was largely the cause of the appointment of the Commission, we come to what logically precedes it, namely, the constitution proposed by the Commissioners for the University. It is chiefly on this point that the arrangements under which it has been working since 1900 have broken down.

The work of the University was then classed under two main heads, the internal and external sections respectively. The Senate consisted of fifty-six members, of whom thirty-two were equally divided between the graduates and the teachers, or practically between the external and internal sections, the remainder being chiefly representatives of learned and professional bodies. It is the opinion of the Commission that this scheme has not been successful, and that it has led to ambitions on the part of the external side of the University which, if fulfilled, would seriously hamper the development of a true teaching university in London.

The Commissioners, after describing the claims put forward in the report of the Council for external students, state that, "in our opinion it is these claims which, far more than anything else, form the real ground of the defective working of the University in so far as that is due to the present relations of the internal and external sides."

How far the External Council has departed from its true position is shown by the fact that it desires to be called the Imperial Council, while the present Academic Council is to be designated the Metropolitan Council, a title which implies, and is no doubt intended to imply, an inferior status. A house thus divided against itself cannot stand, and, as has been generally expected, the time has come for another drastic reform.

In outlining the measures necessary for this purpose the Commissioners propose to assimilate the constitution of the University of London to those of its northern sisters. In London, as in Manchester, the supreme legislative body will be a Court, consisting in London of about 200 persons, on which ample room can be found for all interests connected with the University.

The executive powers will be exercised by a small Senate, consisting of the Chancellor, Vice-Chancellor, and Chairman of Convocation, five persons appointed by the Crown, two by the Court, two each by the Academic Council and the London County Council, and one by the Corporation of the City of London.

Large powers of delegation are given both to the Court and the Senate, and, subject to the statutes and to the financial oversight of these bodies, the educational work of the University will be in the hands of faculties, the constitution of which differs in different cases, though in all the members will be wholly or in the main teachers of the University. These bodies are to have the power to determine generally the conditions for the award of degrees and diplomas, the courses of study, and the conduct of the examinations. They will present candidates for degrees and advise the Senate on the needs of the faculties. They are expressly prohibited from issuing detailed syllabuses, "for this is a matter for the professor, in consultation with his colleagues in the same branch of learning." They are to determine the respective parts played by written, oral, and practical examination, and by records of work, in the tests for the several University examinations, and to appoint the assessors who are to take part therein.

The rights of the teachers as a body and as individuals are therefore amply secured.

These privileges can, however, only be conferred if the standing of the professors is commensurately high, and the Commissioners accept provisionally the standard already practically set in the appointment of University professors.

An Academic Council will consist primarily of the deans of the faculties and of eight members elected by the faculties in common session. This Council may be regarded as exercising a coordinating influence on the faculties, as advisory to the Senate, but as capable of exercising such powers of the Senate as may be delegated to it.

Full privileges of separate examination will be enjoyed only by constituent colleges and departments which have either been established by the University or have consented to incorporation. The teachers in institutions which do not satisfy these conditions will practically have the same position as the schools of the University now occupy. Their teachers will be banded into boards which will lay down the courses of study and supervise the tests for degrees, &c., reporting to the Senate through the faculties. The system of the separate recognition of teachers in minor institutions will be abandoned, and the common or general examination, devised for the schools which are not constituent colleges of the University, will serve for the examination of external students, or, as they are to be called, unattached students, except in the cases of medicine and technology.

This is no hardship to external students. At present they are examined by specially appointed examiners who have in general no common experience, who need not necessarily be teachers, or may have ceased to be teachers.

They will now be examined by men necessarily and actually engaged in teaching. But these men will be drawn from a number of institutions, and the papers will only contain questions which they, acting in common with assessors, or, if the term is preferred, external examiners, think are fair to all their own students, however differently the students may be taught. The possible vagaries of one or two men will therefore be neutralised by the opinions of their colleagues and assessors. At present two "hanging judges" may affect the results. In future their influence will be tempered by more merciful colleagues, and the same scheme which prevents undue severity will also check a too exuberant leniency. The absence of detailed syllabuses will tend to defeat the crammers, but the fact that the papers are to be set to the students of the examiners themselves, and that those students are taught in various institutions, will check individual excursions outside the limits of a syllabus which the majority of unprejudiced experts would regard as fair.

The arrangements for technology are of a special character. The interests of that subject

will be entrusted to a committee of fifteen members, including the Vice-Chancellor, the rector of the Imperial College, and other members appointed as to a bare majority by the Senate, and as to the remainder by the governing body of the Imperial College. University and King's Colleges would each be represented by two of the appointees of the Senate, and three-fourths of the whole would consist of men of affairs and experts in the branches of technology dealt with. The income of the Imperial College and that available for the departments of engineering in University and King's Colleges would be at the disposal of this committee; and the annual budget of the committee would be submitted to the Senate, the governing body of the Imperial College, and the delegacies of King's and University Colleges.

Such, in very brief outline, and with many omissions, especially that of the important proposals with regard to medical education, is the scheme of the Commissioners, and they estimate that 99,000*l.* a year will be required to carry it into effect. They also consider that the headquarters of the University should be situate in Bloomsbury.

They have evidently done their best to meet the reasonable desires of all interests. The professors will have a freedom of teaching and testing their pupils which they have not enjoyed before. The internal students will be members of a more real and efficient teaching university. External candidates will probably have a better test than that to which they have been accustomed. These advantages must no doubt be purchased by some sacrifices in so far as they touch vested interests, but the whole scheme provides a much more satisfactory prospect both for internal and external students than that now in force.

RECENT HYDROGRAPHIC INVESTIGATIONS.[1]

IN the first of the publications referred to below, Dr. Rolf Witting gives an account of the hydrographic observations—sea-temperatures, salinities, oxygen-contents, current and ice observations—made in the Gulfs of Bothnia and Finland during the year 1911 by the Finnish hydrographers. The paper consists almost entirely of tables, and these are models of clear and orderly arrangement.

The second publication contains the hydrographic data collected during the voyage to Spitsbergen, in 1910, of the Norwegian ship *Farm*. The observations are discussed by Drs. Helland-Hansen and Nansen, and deal chiefly with the distribution of the Atlantic current in the sea to the west of Spitsbergen. A considerable part of the paper is taken up with a discussion of the errors of the hydrographers who had previously investigated the same area; but in addition to this the authors describe the gradual disappearance of the Atlantic current to the north-west of Spitsbergen, as this water becomes diluted by lighter arctic water flowing round the South Cape. There is a discussion of the parallelism in the annual variations in temperature of this Atlantic Spitsbergen current, and those of the Atlantic Norwegian stream. "Temperature anomalies" are compared—that is, the deviations, in each year, from the mean of a number of years. The variations in temperature of the Atlantic Spitsbergen stream are, then, roughly parallel to those of the Norwegian stream, *if the former are compared with the latter of two years' previous date.* That is, the water flowing to the north from the Faröe-Iceland channel takes about two years to travel from the latitude of 62° N. to that of about 78° N. The variations in temperature anomaly in the sea to the west of Spitsbergen are also parallel to the variations in the area of ice-free water in the Barentz Sea in May of the same year.

The third paper is of considerable interest and importance. After indulging in a polemic with reference to the erring Swedish hydrographers, Dr. Nansen considers the mode of origin of the cold water occupying the basins of the North Atlantic and Norwegian seas. These water-masses are very homogeneous. At the bottom of the Norwegian Sea there is a salinity which varies only between 34·90 per cent. and 34·92 per cent., and thus requires very careful investigation in order to disclose differences of a real nature. The submarine Faröe-Iceland ridge divides the northern ocean into two masses with respect to the temperature of the bottom water: at a depth of about 1000–2000 mètres the water on the Atlantic side of the ridge has a temperature of about +2° C. to +3° C.; on the Norwegian side the temperature of the sea-water at the same depth is about −0·5° C. to −0·8° C.

How does this cold and dense bottom water originate? It does not come from the southerly-flowing, cold polar currents, for this water is of low salinity, and in spite of its low temperature its density is less than that of the bottom Atlantic and Norwegian water, so that it cannot sink to near the sea-bottom. It does not proceed from melting ice, for water of such origin has also a very low salinity, and, notwithstanding its low temperature, its density is also low. The southerly-flowing polar currents, indeed, protect the underlying warmer water-masses from cooling, and melting ice has the same effect. In both cases the sea is covered with low-saline water which does not mix by convection with that beneath it. In order that a vertical circulation, accompanied by the formation of a cold bottom stratum of water, may occur, certain conditions are necessary:—(1) The water at the surface of the sea must not be in rapid horizontal movement; the best conditions are those in the centre of an area possessing a cyclonic circulation.

[1] (1) "Abhandlungen der finländischen hydrographischen-biologischen Untersuchungen." No. 10. Pp. 132+4 Taf. (Helsingfors, 1912.)
(2) "The Sea West of Spitzbergen. The Oceanographic Observations of the Isachsen Spitzbergen Expedition in 1910." Vidensk. Skrifter. I., Mat.-Naturv. Klasse, No. 12. Pp. 89+6 plates. (Christiania, 1912.)
(3) "Das Bodenwasser und die Abkühling des Meeres." *Internat. Revue Ges. Hydrobiologie u. Hydrographie*, Bd. v., Heft i. Pp. 42+12 figs. in text. (Leipzig, 1912.)

(2) The surface water must be of approximately the same salinity as that of the sea bottom; if it has a much lower salinity, its density may not be increased by a reduction of temperature to an extent sufficient to set up convection movements reaching to the sea-bottom. (3) It must be cooled to a slightly lower temperature than that of the water at the sea-bottom, for its adiabatic contraction, by pressure, as it sinks, must warm it slightly; this may be the cause of the slight increase in the temperature of oceanic water as we approach great depths—an increase which has been attributed to the emission of heat by radio-active substances in the oceanic bottom-deposits. (4) The *formation* of ice on the sea-surface may favour convection currents by raising the salinity of the superficial water; but this is not an important factor.

The cold bottom water of the North Atlantic Ocean originates in a restricted area of sea, outside the boundaries of the southerly-flowing polar current, and lying to the south-east of Greenland. Some of this water may also proceed from the surface of the Norwegian Sea after flowing over the Faröe-Iceland ridge.

Incidentally Dr. Nansen directs attention to the presence of Mediterranean water in the channel between Ireland and Rockall. This originates from warm and dense water flowing out as an intermediate current through the Straits of Gibraltar. The presence of this water in British seas was pointed out by Dickson in 1909 as the result of observations made in 1903 by Wolfenden. Dr. Nansen in 1909 referred to the methods of these observations as "so inaccurate as to be of little use." Nevertheless, he now adopts the conclusions drawn from them, without, however, referring to Dickson's prior discovery.

J. J.

SOUTH AFRICAN INSTITUTE FOR MEDICAL RESEARCH.

SOUTH AFRICA has decided to have an institute for medical research on the same lines as the Pasteur Institute in Paris, the Lister Institute of Preventive Medicine in London, or the Rockefeller Institute in New York. To this end a new building is now in process of erection in Johannesburg, and is expected to be complete in about twelve months.

A site has been provided by the Government, and we understand that the cost of building and equipping the new institute will be provided by the Witwatersrand Native Labour Association. The maintenance of the institution will be undertaken by the Government of South Africa and the association in equal shares.

A very satisfactory feature of the institute will be its close proximity to the largest hospital in South Africa, with which it is intended that it should work in conjunction. It will also be equipped with four wards for the purpose of treating patients, who will be the subject of special study.

From the present plans, the institute seems to be suitably arranged, and will be an imposing structure. It will comprise, in a main block, forming a two-storied quadrangle, the institute offices, experimental and observation hospital, animal house, mortuary, and director's house. Ample space is allowed here for future extension. Of this main block the northern and southern sides are prolonged eastwards and westwards to form two further quadrangles. These will contain the hospital wards and research laboratories, also library, museum, and further laboratories. The building will carry as well a lecture theatre, basement workshops and storage rooms, and a number of rooms for miscellaneous scientific purposes. A dome eighty feet in height will crown the building, and will carry a finial emblematic of the surrender by Death of his secret, and we understand that a second dome of equal magnitude is aspired to. Although we realise that an institute which is intended to render valuable service to the State should be housed in fashion suitable to the importance of the work it is to undertake, we sincerely hope that contemplation of the domes and the finial will not distract the attention of the authorities from the fact that the success of their scheme will essentially depend upon the *personnel* of the staff and the funds made available for scientific investigation.

The research work of the institute is, we understand, to be primarily directed towards the industrial diseases of the Transvaal, but all diseases will come under its scope. It is intended that research fellowships shall be available for medical men, in order that they may carry out special lines of investigation; also it is hoped that in the near future medical students will be enabled to undertake courses in pathology and bacteriology at the institute, of a character which can now only be attended in Europe.

Two appointments to the staff of the institute have already been made: the director of the institute will be Dr. Watkins Pitchford, and the statistician Dr. G. D. Maynard, both of whom have already accomplished sound work in connection with one or other of the public health organisations of the colonies now forming the Dominion of South Africa.

EDUCATION OF THE AUDITORY CENTRES.[1]

PROF. MARAGE, who is well known as an otologist and for his researches in physiological acoustics, has issued a small but suggestive pamphlet on what he terms the education of the auditory centres. It is known that there are cases in the clinique of the aurist where there is sensitiveness to even feeble noises while there is deafness to music and to speech. In others the patient may hear noises, music, and even speech sounds, but without any understanding of the meaning of the speech sounds. Prof. Marage

[1] "Education et Rééducation des Centres auditifs." By Prof. Marage. Pp. 15. (Paris, 19 Rue Cambon.)

explains these facts on the supposition that the cause is not to be sought in the mechanism of the ear alone, but in the relation of this mechanism to different parts of the brain.

The paths by which nervous impulses, generated by a sonorous vibration, say, in the cochlea, are communicated to the brain, are very complicated, and come into anatomical connection with many nervous centres. Such centres may be considered as being of higher and lower orders, and the nervous impulses may pass from lower to higher, calling forth at each stage a particular sensation—say, that of a noise or of musical sensations—until they reach the highest cerebral centres where there is the appreciation of all kinds of auditory sensations, such as noises, music, and speech.

Prof. Marage's method of stimulating the ear by his ingenious syren is well known. This instrument can transmit to the drumhead sonorous waves of a measured intensity (that is, the air-pressure is measured), and the special quality of each vowel tone is produced by sending the waves of pressure through resonators moulded on the form of the mouth and throat cavities for each vowel. Thus, by using the syren methodically, the ear may be stimulated by tones that, as regards both intensity and quality, are natural to it, instead of tones produced by tuning-forks, or noises, or by spoken words. Thus the ear and the nerve centres may be put through a course of education, a kind of drill, in short, produced by the syren. The results are said to be very encouraging with cases of whole or partial deaf-mutism.

Prof. Marage also gives in this pamphlet copies of tracings of vowel-forms produced by this syren which are well worthy of study, but he does not mention how these beautiful photographs were obtained. The gist of the whole matter is that in attempting to explain auditory mechanisms, we must not confine our attention to the ear alone, but to the ear as associated with auditory nerve centres. The investigation, in short, becomes more and more complicated.

JOHN G. MCKENDRICK.

NATURAL HISTORY IN CEYLON.

SPOLIA ZEYLANICA is an excellent quarterly publication designed to promote a knowledge of the natural history of Ceylon and its surrounding seas. It was established by Prof. A. Willey (now at Montreal) some eight or nine years ago when he was director of the Colombo Museum, and has been kept up since with admirable skill and energy by his successor, Dr. Joseph Pearson, the present editor. The part for January, 1913, contains, along with several notes on land and fresh-water animals, three articles of special interest on pearl-oyster fisheries.

The first article, by Captain Legge, "Master Attendant" at Colombo and inspector of the pearl banks, is semi-popular, and is written rather from the navigator's and the historian's point of view, containing notes and stories of fisheries and celebrated pearls. Here and there in Captain Legge's chatty account of his personal adventures on the pearl banks one comes on quite important observations, such as, when describing a walk in diving-dress over the sea-bottom:

> Immediately I walked off the "paar" I was upon very loose sand, in waves like giant furrows in a ploughed field; whilst for quite two feet high above the ground there was sand in suspension. Here oysters are covered up, buried and destroyed immediately.

Yet some recent writers have argued that there can be no movement of the sand on the bottom, and that beds of oysters cannot be silted up by moving sand.

Captain Legge gives us an additional instance of the now well-known danger to beds of oysters from predatory elasmobranch fish, as follows:

> At the inspection in November, 1902, I decided that a certain bed was quite the gem of those to be fished in March, 1903; the oysters were larger and older than any others I had inspected, and were very plentiful; however, as I was passing over this spot on my way back at the end of the inspection, I observed a very large shoal of rays in the vicinity. In the following March, about the second week of the fishery, I moved to this my pet bed of oysters, only, however, to be told by the divers that there were no living oysters there. I at once descended in the diving dress and found the bottom of the sea strewn with empty oyster shells, each valve turned nacre upwards and shining, giving a very curious effect, whilst each shell or valve was broken obviously by external pressure into three pieces. This could only have been done by the powerful jaws and teeth of the ray.

The second article is a well-considered, judicial account of the scientific work on the Ceylon pearl banks in the last decade, 1902 to 1912, by the editor, Dr. Pearson, director of the Colombo Museum and Government Marine Biologist. Dr. Pearson passes in review the scientific exploration of the pearl banks in 1902, the recommendations in Prof. Herdman's report to the Government, the formation of a financial syndicate in 1906 to take over a twenty years' lease of the fisheries at a large annual rental, their two highly profitable fisheries which cleared the ground of adult oysters, and then the subsequent failure of yield and resulting barren condition of the banks. The various operations suggested and performed are discussed, and the conclusion is reached that:

> The work subsequent to Herdman's reports gives very little evidence that his recommendations have been carried out seriously.

Dr. Pearson brings together a good deal of argument in favour of the possibility of oyster-beds being buried and lost by movements of the sand, and he quotes some personal observations, made on the bottom by the inspector of pearl banks, such as:

> What impressed me most was that the spots I dived on last March, which were then level rock, with a coating of 3 or 4 in. of sand, had now as much as a foot of sand in places. All over the sand was in fairly deep ridges, not so deep as the ridges of the

paar proper, but quite distinct from the appearance of the sea bottom last March.

The third "pearl-oyster" article, also by Dr. Pearson, is a report on the remarkable "window-pane oyster," *Placuna placenta*, in the great inland sea at Tamblegam, near Trincomalee; and other papers, by various authors, on fresh-water fishes, Oligochætes, Termites, &c., all show that the investigation of the natural history of Ceylon is in capable hands, and bids fair soon to make the fauna and flora of that charming island better known than those of most other parts of the eastern tropics.

NOTES.

As we went to press last week a case was concluded in the course of which the methods of anti-vivisectionists were again exposed. A Swedish lady, Miss Lind-af-Hageby, brought an action against *The Pall Mall Gazette* and Dr. Saleeby for alleged libel published in *The Pall Mall Gazette*. The jury, after listening to sixteen days of talking, gave their verdict for the defendants, and the judge received their verdict with most emphatic and outspoken approval. It has all happened before. There comes an opportunity for legal action: the statements of anti-vivisectionists are brought to the test of evidence on oath; the whole thing is thrashed out in the Law Courts, and the inevitable verdict is given. *The Pall Mall Gazette* has done a great service to the nation by thus exposing, once more, the uncharitableness—to say the least—of anti-vivisectionists. The Research Defence Society, likewise, deserves the thanks of lovers of truth. We trust that the public will bear in mind the lesson of this case, and will treat with contempt the methods upon which the obscurantism of anti-vivisection thrives. A campaign which appeals to those who have been least fortunate in the matter of education, inflames passion, stirs up hatred, and delights in imputing evil to men who are devoting their lives to the increase of knowledge of diseases which afflict mankind, may not be stopped on its downward course by the verdict given last week, but the light which was thrown upon it in the course of the evidence will perhaps do something to scatter the thick darkness of prejudice which anti-vivisection requires for its existence.

THE Bill to consolidate and amend the law relating to ancient monuments was read a second time last Thursday in the House of Lords. Such a measure must necessarily be tentative, and Earl Beauchamp admitted that it was not ideal. But he claimed justly that it was a considerable step for the object in view, while in no way penalising owners or interfering with the rights of property. The same difficulties occur as in other branches of the movement to make the country a decentralised museum, both of antiquities and of natural history and scenery. But there are also special difficulties in the case of ancient monuments. The Marquess of Salisbury pointed out that consideration would have to be given to the resident owner of a historic house. The question might arise as to whether he could be precluded from throwing two bedrooms into one. The case of cathedrals is peculiar, as Earl Curzon of Kedleston showed; they are not protected by a faculty, as churches are, but are the absolute property for the time being of the dean and chapter. Earl Beauchamp had not seen his way to include ecclesiastical buildings, but it appears that the bishops would not object to the inclusion of cathedrals. The power of purchase by the State is eliminated from the Bill; full powers for a Preservation Order are considered to render this unnecessary. The power of purchase is given to the local authorities, chiefly in view of the smaller monuments of local interest. Here comes in the difficulty of funds; even for small purchases there must be an increase of the rates. Meanwhile the larger monuments seem to be unprotected. There is no doubt that owners of great historic heirlooms do treat them as in trust for the nation. But the modern tendency is to bring this spirit into the machinery of organisation. The passing of such a Bill may be expected to react favourably on the connected questions of nature reserves and the endowment of science.

THE relation between insect-eating birds and the abundance or otherwise of insects, ticks, and other creatures which may act as hosts for organisms associated with various diseases, is known to every biologist. A correspondence between Sir Harry Johnston and the chairman and secretary of the Plumage Committee and Textile Trade Section of the London Chamber of Commerce, published in *The Times* of Tuesday, April 29, deals with some points of this relationship, with particular reference to tsetse-flies, mosquitoes, and other blood-sucking insects of Africa. Sir Harry Johnston points out that tsetse-flies of the genus Glossina are particularly abundant in all those parts of West and Central Africa where the plumage trade has done so much to lessen the numbers of the insect-eating birds—more especially white herons (egrets, large and small), ibises, rollers, bee-eaters, glossy starlings, drongo and "cuckoo" shrikes, bishopfinches, and kingfishers. As remedial measures to prevent the disturbance of the balance of nature caused by the destruction of these birds, he suggests "that the secretary to the British Museum (Natural History) or the secretary to the Zoological Society, or perhaps the two jointly, should be asked to compile a list of species, genera, and perhaps families of birds which should be placed on the prohibited list. That is to say, that the skins or other trophies of such birds should be forbidden as an article of import into Great Britain and Ireland and into all parts of the Empire of which the fiscal affairs are influenced by the Foreign and Colonial Offices; and that we should use our best endeavours with the Governments of the self-governing portions of the British Empire to secure a like prohibition in their own Customs regulations."

IN a letter to the Lord Mayor, the Prime Minister has announced the extent of the provision which the Government proposes to make for the dependents of Captain Scott and of those who so heroically lost their lives with him in the Antarctic. The Government intends to ask Parliament to sanction a Special

Vote sufficient to provide as follows :—For Lady Scott (in addition to the Admiralty pension of 200*l.* per annum for herself and 25*l.* per annum for her son, until he reaches the age of eighteen) an annuity of 100*l.* For Mrs. Scott, the mother, and Mrs. Campbell and Miss Grace Scott, the sisters, of Captain Scott, a joint annuity of 300*l.* For Mrs. Wilson, the widow, and Miss Mary Souper, the sister-in-law, of Dr. E. A. Wilson, a joint annuity of 300*l.* For Mrs. Evans, the widow of Petty Officer E. Evans (in addition to the pension and allowances awarded to her by the Admiralty, amounting to 13*s.* 6*d.* a week), a further annuity of 12*s.* 6*d.* a week for herself and 3*s.* a week in respect of each of her children up to the age of eighteen. The Government of India, in the service of which Lieutenant Bowers was before joining the expedition, has offered to provide pensions, amounting in all to 100*l.* per annum, for his mother and sisters. Captain Oates, the fifth member of Captain Scott's southern party, was unmarried; and as no mention is made of any relatives, it may be assumed that he was possessed of ample means. In addition to the provision referred to above, the total amount subscribed by the public as a memorial for the dead explorers and kindred purposes is 55,760*l.*

ON Monday last Sir Clements Markham, at the meeting of the Royal Geographical Society, gave a paper on Vasco Nuñez de Balboa, in commemoration of the fourth centenary of the discovery of the Pacific Ocean in 1513. The anniversary actually falls in September. The author did full justice to the discoverer's strength and many other excellences of character, which stand out in contrast with the majority of his compeers in the same field; the question, often asked, was repeated, What would the history of western South America and its highly civilised native races have been if Nuñez and others such as he had been allowed the chance to establish friendly relations with them and assimilate their ideals with those of Europe, instead of their suffering the extreme penalty of extermination? Two noteworthy efforts of geographical theorising were discussed as following upon Nuñez's discovery. The first was the well-known and successful endeavour of Magellan to turn the flank of the South American barrier, and to sail his vessel directly from the Atlantic into the Pacific. The second, less familiar, was the brilliant reasoning by which Andres de Urdaneta, in 1565, succeeded in piloting a return voyage across the Pacific from west to east, for the first time, by following a northerly course, on which were found favourable winds, the reverse of those which prevailed on the more southerly course followed by the earlier navigators across the ocean from east to west. Reference was made to the work still awaiting trained explorers in the very area of Nuñez's crossing of the isthmus of Darien.

WE are glad to learn from the annual statement on the work of the Post Office, made in the House of Commons on April 24 by the Postmaster-General, that it is proposed to establish a new service for the synchronising of clocks. For a small fee per annum the Post Office will send every day an hourly time signal. Any institution, business house, or industrial establishment to which it is important to have the correct time and which is willing to provide the internal apparatus for the clocks can obtain for a small fee an hourly time service. The fee may vary with the distance, but if there are a sufficient number of subscribers it will be about £2 a year. The Greenwich time signal will be transmitted once daily over telegraph circuits for the regulation of master clocks fixed at suitable "distributing centres" at head or branch post offices, and these master clocks will transmit hourly impulses to the premises of persons requiring the service. The Post Office will provide and maintain the distributing wire up to a suitable point at the renter's premises, but it will rest with the renter at his own expense to fix and maintain to the satisfaction of the Post Office all other wiring within his premises, as well as the clock and the synchronising mechanism. The arrangement will be confined for the present to the central districts of large towns. It will be recalled that the British Science Guild has taken a leading part in directing attention to the importance of synchronising all clocks publicly exhibited. In the fifth annual report of the guild a committee appointed to deal with the subject described the position of the subject at home and in some other countries, and stated the results of representations made to the Post Office, the London County Council, the Corporation of London, and other authorities. The hope was expressed by the committee that the Post Office would before long be in a position to offer facilities to the public for the synchronisation of clocks at such rental rates as should remove the main objections which have been urged to the general adoption of the principle. The announcement now made by Mr. Samuel seems to represent the realisation of this desire.

THE first conversazione of the Royal Society for this year will be held in the rooms of the society at Burlington House on Wednesday, May 7.

THE death is announced, on April 25, of Prof. J. Park, professor of logic and metaphysics in the Queen's University (formerly Queen's College), Belfast, since 1868.

THE Berlin correspondent of *The Times* announces that Prof. Fritz von Bramann, professor of Halle University, and director of the surgical laboratory there, died on April 26, at fifty-eight years of age.

WE learn from the *Revue Scientifique* that the teachers of the Normal School at Avignon, of which M. J. H. Fabre, the entomologist, was a pupil, are taking steps to raise a fund with the view of erecting a monument to "The Insects' Homer." The general council of Vaucluse has voted 1500 francs to the fund.

ON Saturday, May 10, Mr. H. A. Humphrey will begin a course of two lectures at the Royal Institution on Humphrey internal-combustion pumps. The Friday evening discourse on May 9 will be delivered by Mr. F. Balfour Browne on the life-history of a water-beetle, and on May 16 by Captain Cecil G. Rawling on the Pygmies of New Guinea.

THE Geologists' Association has arranged a Whitsuntide excursion to Nottingham, from May 9 to May

14. The directors are Prof. J. W. Carr, Prof. H. H. Swinnerton, Mr. G. W. Lamplugh, and Rev. E. H. Mullins. The party will travel *viâ* Great Central Railway on Friday, May 9, by the train leaving Marylebone Station at 4.45 p.m., and due at Victoria Station, Nottingham, at 7.37 p.m.

DR. ALEXANDER SMITH, professor of chemistry at Columbia University, New York, has accepted election to the chair of that subject at Princeton. Prof. Smith is a Scotsman by birth, and graduated in science at Edinburgh University, where he was for a short time an assistant in chemistry. He went to America in 1890, and held professorships successively at Wabash College and the University of Chicago before his appointment to Columbia.

IN our issue of December 19, 1912, Prof. Milne announced that Mr. Shinobu Hirota had been compelled by ill health to return to his native country, Japan. We regret now to learn that Mr. Hirota died on April 24. During the eighteen years he lived in England as assistant to Prof. Milne, he played an active part in establishing a new branch of geophysics, and had he recovered he might well have continued in Japan the work to which he was devoted.

AT an extraordinary general meeting of the University of Durham Philosophical Society, to be held in the Physical Lecture Theatre, Armstrong College, Newcastle-on-Tyne, to-morrow, May 2, Sir J. Alfred Ewing, K.C.B., F.R.S., will deliver a lecture on the structure of metals. The occasion is the first meeting to be presided over by the Duke of Northumberland, and has been arranged in connection with his installation as Chancellor on the following day.

THE council of the Institution of Civil Engineers has made the following awards for papers read and discussed during the session 1912–13 :—A Telford gold medal to Mr. Murdoch Macdonald, C.M.G. (Cairo); a George Stephenson gold medal to Mr. G. D. Snyder (New York); a Watt gold medal to Mr. H. A. Humphrey (London); Telford premiums to Messrs. C. W. Methven (Durban), B. Hall Blyth, jun. (Edinburgh), C. J. Crofts (Durban), Frank Grove (Canton), B. T. B. Boothby (Hankow), and Francis Carnegie (Enfield Lock), and the Manby premium to Capt. C. E. P. Sankey, R.E. (London).

THE French aviator, M. Gilbert, on April 25 covered a distance of some 512 miles, from near Paris to Vittoria, in northern Spain, on a biplane, in 8 hours 23 minutes, without once alighting. He is reported to have travelled from Paris to Bordeaux at a speed averaging seventy-four miles an hour. Between Bordeaux and Biarritz he flew at a height of nearly 10,000 ft. Starting again after two hours' rest, he added another 155 miles to his flight, arriving at Medina del Campo, thus covering, in less than eleven hours, 668 miles.

A DISTINGUISHED committee has been formed, with the King of Italy as president, to obtain funds by public subscription for the institution of suitable memorials of the late Prof. Giovanni Schiaparelli, whose work for astronomical science is of the first rank of importance. It is proposed to erect to his memory a monument at Savigliano, his birthplace, and to place a tablet bearing his effigy in the Brera Palace at Milan, where he described his observations and conclusions. Among the members of the honorary committee are the presidents of the chief scientific societies in Italy, rectors of the universities, and directors of astronomical observatories. The president of the executive committee is M. Gullino, the Syndic of Savigliano (Cuneo), to whom subscriptions should be sent.

THE executive committee of the British Science Guild has issued a report on the Milk and Dairies Bill and on further legislation desirable on the subject. While expressing general approval with the Bill as a whole, the committee fears that its largely permissive character will allow local authorities to ignore the powers conferred upon them. It considers that the medical officer of health is placed in a difficult position by having to criticise, and possibly to be instrumental in instituting legal proceedings against, those who appoint him, who may have the power to terminate his appointment. The committee also regards the provisions as inadequate to check the supply of tuberculous milk. Comment is made on bovine tuberculosis and the means for stamping it out, and the opinion is expressed that the Bill grapples with the evil of bovine tuberculosis only in its fully developed form, and not with the less manifest or latent forms of the disease, which it is equally, or even more, important should be dealt with.

WE are informed that the Crocker Land expedition, which was postponed for a year on account of the death of Mr. George Borup, has been completely reorganised during the past year, and that the plan now is to send it northward in July next. The object of the expedition is the scientific exploration of the land supposed to lie north-west of the line of islands stretching from Grant Land to Prince Patrick Land. In addition to the mapping of the new land and of the uncharted coast lines in the vicinity of Grant Land and Axel Heiberg Land, the party will carry on studies during a period of more than two years in many other branches of science, including meteorology, terrestrial magnetism, wireless telegraphy, seismology, geology, zoology (both vertebrate and invertebrate), botany, ethnology, and archæology. The *personnel* of the expedition is as follows :—Mr. Donald B. Macmillan, leader of the expedition; Ensign Fitzhugh Green, U.S. Navy, map work, electrical work, terrestrial magnetism, and seismology; Mr. W. Elmer Ekblaw, geologist and ornithologist; Mr. M. C. Tanquary, zoologist, with particular reference to invertebrate zoology.

IN addition to the appropriation for defraying the expenses of the current work and operations of the department of terrestrial magnetism, the trustees of the Carnegie Institution of Washington, at its annual meeting last December, set aside one hundred thousand dollars for the purchase of a site and erection of a building for the department. After an inspection of various sites, one embracing about seven acres, situated in the district of Columbia, near Rock

Creek Park, was finally found suited for the purpose, and has now been purchased. The building will be about 52 by 101 ft., and will consist of two stories and a basement. It will contain adequate facilities for office, laboratory work, and instrument shop, and will be ready for occupation early in 1914. The magnetic survey yacht *Carnegie* left St. Helena on April 9 bound for Bahia, and is expected to return to her home port at the end of the year, thus completing the three years' circumnavigation cruise begun in June, 1910. After leaving Bahia she will once more call at St. Helena, and proceed next to Falmouth, where she is due early in September. It will be recalled that the *Carnegie* made Falmouth one of her chief ports on the cruise of 1909.

ONE of the most beautiful objects in western England is the famous screen in Banwell Church, about seventeen miles south-west of Bristol, in co. Somerset. Among the most treasured possessions of the parish is a record of churchwardens' accounts between 1515 and 1602, which give full particulars of the cost of the screen and of the workmen engaged upon it. These have been abstracted, with good illustrations of this fine piece of woodwork, by the vicar, Rev. C. S. Taylor, in part i., vol. xxxv., of the Transactions of the Bristol and Gloucestershire Archæological Society for 1912.

NIGERIA presents a promising and almost unworked field for the collection of folk-tales. Major A. J. N. Tremearne, in his recently published "Hausa Superstitions and Customs," has issued a large number of tales. From Southern Nigeria Mr. E. Dayrell, District Commissioner, in continuation of his "Folk Stories from Southern Nigeria," published in 1910, has now published, through the Royal Anthropological Institute, a series of Ikom folk-stories. These are of much ethnological interest, as they throw much light on matrimonial customs, of which female circumcision forms part. He also deals with human sacrifice and the Ju-ju form of sorcery, on which our information is still incomplete. "The more," he says, "one learns about Ju-ju the more hopeless it seems. It must seem incredible to people at home that a man can die because a Ju-ju has been made against him—for example, two sticks crossed on the path with, say, a rotten egg and a fowl stuck on a stick, the man's name having been 'called.' And yet one knows of numerous instances where men have died, and young, healthy men, too, against whom such a Ju-ju has been made." Parallel instances from Australia at once suggest themselves. Mr. Dayrell thinks it possible, in such cases, that poison may have been administered, but it is most difficult to get any proof.

THE power of the body to adapt itself to its needs is one of the most familiar of physiological truths. It has long been known that among the organs the heart shows ready adaptability. This is very strikingly illustrated by numerous measurements recently published by Dr. Grober, of Jena (*Naturwissenschaftliche Wochenschrift*, April 6 and 13). The figures refer to men in different employments, and to various animals with varying activities. The most remarkable fact (the explanation of which is not clear) recorded is that the right side of the heart usually increases in bulk more than the left side does.

The British Review for April contains an interesting article, entitled "Colour-hearing," in the form of a dialogue between the writer ("C. C. Martindale"), an "exceedingly eminent specialist" ("the Doctor"), a lady ("Mrs. X."), a scoffer ("the Metaphysician"), and "N. K.," who is able to "hear colour" (or, more accurately, to "see sounds"). No one acquainted with the characteristics of synæsthesia can doubt that it is a substantially accurate account of a conversation that took place. Indeed, the anonymity of "the Doctor" and "Mrs. X." is but thinly veiled. The article is hence of value to those interested in the study of this attractive but obscure subject.

THE Adamson lecture for 1913, delivered by Prof. Bernard Bosanquet, in the University of Manchester, entitled "The Distinction between Mind and its Objects," consists in a brilliantly critical examination of the claims of Modern Realism—a twentieth-century philosophical school of thought, "which, whether unsatisfactory or not, is definitely new." Prof. Bosanquet reaches the conclusion that neither Realism nor its antagonist, Mentalism, is satisfactory *per se*. "What special use or gain," he asks, "is there in saying that knowledge is physical, when you have to subjoin an elaborate explanation admitting into this physical reality all the ignorance, errors, and illusions that the feeblest or most fantastic of minds could be guilty of? Or what gain for mentalism is there in treating knowledge as a part of your mind, when you must say in the same breath that it is only knowledge in virtue of the reality that appears in it? The double nature of knowledge, as the continuity of mind and reality, is the ultimate truth to insist on."

TWO very interesting lectures on the present position of the sex-determination problem, by Profs. Correns and Goldschmidt, have been published by Borntraeger (Berlin), under the title "Die Vererbung und Bestimmung des Geschlechts" (pp. 149, price 4.50 marks). Prof. Correns deals with the subject largely from the botanical side, but devotes ten pages to the case of *Abraxas grossulariata*, and has numerous shorter references to other experiments with animals. Prof. Goldschmidt devotes the greater part of his section to an account of the cytological side of the subject. One of the difficulties in the study of this question has hitherto been that observations and experiments on the zoological and botanical side have been published largely in different periodicals, so that the worker on one side has been in some danger of overlooking results obtained on the other. For the zoological investigator, therefore, Prof. Correns's summary of our present knowledge of the phenomena of sex in plants is of great value. Prof. Goldschmidt gives a carefully chosen and lucid account of "sex-chromosomes," but the most valuable part of his section is probably the demonstration that there is no discordance between the cytological and experimental investigations; they are, in fact, complementary, and each confirms and amplifies the other. Both lectures are illustrated with excellent diagrams.

ACCORDING to the April number of *Museum News*, the Brooklyn Museum has installed an antarctic exhibition. On the walls of the alcove in which it is displayed are hung a map of the south polar region and prints illustrative of antarctic life. Among the specimens are a group of king-penguins, a young sea-elephant, various petrels (including the miscalled Cape pigeon), an albatross, and a black-footed penguin.

FROM the report for 1912 we learn that the Zoological Society has had, on the whole, a successful and prosperous year, the number of fellows being the highest on record, while, despite the enhanced cost of provisions, the income shows a healthy excess over normal expenditure. During the year the president and council have directed their attention to the subject of zoological nomenclature, and have expressed the opinion that "an absolutely invariable application of the rule of priority . . . is not to the advantage of zoological science, and that they would welcome a modification of it, as, for instance, by the establishment of an authoritative fiat list of reserved names." The compilation of such a list formed, we believe, a part of the deliberations at the recent Zoological Congress at Monaco. Reference is made to the loss of the valuable services of the society's librarian, Mr. F. H. Waterhouse, who retired on a well-earned pension after forty years' work.

THE annual report of the Norwich Castle Museum for 1912 records a decrease in the number of visitors on the previous year, due to the disastrous floods following on the unprecedented rainstorm in Norfolk on August 26 last, when the city of Norwich was practically isolated from the rest of the country. The success of the attempt to stimulate public interest, benefit the studious, and give point and purpose to the collections has again been evidenced by the large and appreciative audiences at the lantern lectures and demonstrations given at the museum under the auspices of the Norwich Museum Association. The subjects of lectures during the year 1912, to which a limited number of the general public were admitted free, were:—Food fishes, Prof. Garstang; poultry, Mr. Edward Brown; old-time methods of lighting, Mr. L. G. Bolingbroke; artistic glasswork, Mr. R. F. Martin; winged insects and their larvæ, Prof. F. V. Theobald; wild flowers and photography, Mr. H. E. Corke; and African big-game, Miss Cara G. Buxton. During the summer months a weekly exhibit of living specimens illustrative of nature-study was carried out by members of the association. A pleasing feature of the year is the interest evinced in the museum collections by the pupils from the council schools, 151 visits being arranged by the organiser of elementary education and 4789 pupils recorded.

VOL. xxxii. of the Observations made at the Royal Magnetical and Meteorological Observatory at Batavia refers to the year 1909. The preface, however, by the director, Dr. W. van Bemmelen, brings the history of the observatory down to 1912. It mentions the recent establishment of several mountain meteorological stations. Upper air and seismological observations have recently received considerable attention at Batavia, but are dealt with in different publications. The present volume comprises meteorology and terrestrial magnetism. Like previous volumes of the series, it contains numerous tables of meteorological data for the year. On p. 110 there is a summary of mean values based on from twenty-one to forty-six years. The annual variation of rainfall is unusually regular and marked, the monthly amount varying from 38 mm. in August to 332 mm. in January. As befits a station only 6° 11′ south of the equator, the annual variation of temperature is exceedingly small, the mean temperatures of the warmest and coldest months differing by only 1·04° C.

FOR some years magnetographs have been run at Buitenzorg, an electrically undisturbed station some twenty-five miles south of Batavia. There are two sets, one by Adie and a recent set by Töpfer and Schultze. Both sets record vertical force, but while the Adie set records as usual declination and horizontal force, the other set records the N.-S. and E.-W. components, and hourly values are given of these components in vol. xxxii. of the Observations made at the Royal Magnetical and Meteorological Observatory at Batavia. Declination at Buitenzorg is less than 1°, so that the diurnal variation of the horizontal force and its N.-S. component are almost identical, and the same is true of declination and the E.-W. component when the former is expressed in terms of force. Thus the departure from the ordinary procedure is more apparent than real. The introduction states that the magnetic character data for individual days are based entirely on the horizontal force, as being much the most disturbed element. The effects of magnetic storms are very readily traced in curves at the end of the volume showing the variation from day to day throughout the entire year in the absolute values of the several elements.

THE *Verhandlungen* of the German Physical Society for March 30 contains a communication made to the society on March 14 by Dr. E. Grüneisen, on the effects of temperature and pressure on the electrical resistivities of pure metals. He finds on examination of the results for the resistivities of copper, silver, platinum, gold, and lead down to very low temperatures that for each of them the resistivity varies as the product of the absolute temperature and the atomic heat at constant volume. Assuming Wien's law that the number of impacts between electrons in the metal and metal atoms is proportional to the square of the amplitude of oscillation of the atoms, he deduces that the resistivity of a metal at constant temperature should decrease as the pressure is increased, at a rate which is of the same order as that found experimentally by Williams, Beckmann and others. Alloys the resistivities of which can be calculated correctly by the law of mixtures from the resistivities of their constituents follow the same law.

IN the course of his address as president of the Institution of Mechanical Engineers, Sir H. F. Donaldson referred, among other matters, to the

value of systematic research in engineering works. For example, in the heat treatment of steel, no amount of rule-of-thumb or the possession of an expert eye could ever ensure uniformity in results which vary enormously with but slight alterations in temperature; some system of pyrometry is called for as a protection against failures. The president suggests the establishment of an engineering research committee with a view to coordinate the work, to prevent overlapping, to ensure the carrying out of individual researches to absolute results, and to publish such results. In time the committee would acquire so large an accumulation of data as to make it the first source upon which the public would draw for information as to any research already effected, and as to the possibilities of extending research on lines which might seem to require investigation. The success which has attended the engineering standards committee might be regarded as holding out possibilities of success for an engineering research committee.

THE Cambridge University Press will publish shortly a book on "Rubber and Rubber Planting," by Dr. R. H. Lock, dealing with the history of the use and cultivation of rubber, its botanical sources, the botanical physiology of rubber and latex, the diseases, chemistry, and manufacture of rubber, and with rubber planting.

THE April edition of the catalogue of second-hand scientific instruments which are for sale or hire at the establishment of Mr. Charles Baker, 244 High Holborn, London, W.C., has reached us. The list includes some 2000 items, and an examination of the catalogue shows that customers can obtain second-hand practically every class of scientific instrument. Every instrument in the second-hand department is guaranteed to be in adjustment.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES FOR MAY:—

May 1. 20h. 24m. Mars in conjunction with the Moon (Mars 0° 48′ S.).
4. 12h. 0m. Venus in conjunction with the Moon (Venus 1° 26′ N.).
5. 9h. 0m. Jupiter stationary.
7. 10h. 35m. Saturn in conjunction with the Moon (Saturn 6° 20′ S.).
10. 21h. 19m. Neptune in conjunction with the Moon (Neptune 5° 21′ S.).
12. 9h. 0m. Uranus stationary.
13. 17h. 0m. Venus stationary.
18. 3h. 0m. Mars in perihelion.
23. 10h. 23m. Jupiter in conjunction with the Moon (Jupiter 4° 56′ N.).
25. 0h. 50m. Uranus in conjunction with the Moon (Uranus 3° 38′ N.).
29. 1h. 0m. Saturn in conjunction with the Sun.
30. 15h. 0m. Venus at greatest brilliancy.
31. 2h. 25m. Mars in conjunction with the Moon (Mars 3° 9′ S.).
31. 6h. 31m. Mercury in conjunction with Saturn (Mercury 2° 4′ N.).

THE SUN'S POLAR AND EQUATORIAL DIAMETERS.—The *Annales de l'Observatoire Astronomique de Lô-sè* (China), tome vi., contains three parts, the second of which is devoted to an account of a photographic study of the polar and equatorial diameters of the sun as deduced from observations made during the period of 1905–10. The investigation was carried out by Le R. P. S. Chevalier, S.J., and had for its first object the discovery, if possible, of variations in the mean diameter of the sun. The results obtained may be briefly summarised as follows:—There is a difference between the polar and equatorial diameter, the former diameter being the greater of the two. This difference does not seem to be constant, and the variations indicated cannot, according to the author, be attributed to errors of observation, and, so far as he can see, must be due to the sun itself. Here are the values for each of the six years:—

Year		Pol.-Equat.
1905	...	+0·07″
1906	...	+0·17″
1907	...	+0·31″
1908	...	+0·29″
1909	...	+0·13″
1910	...	+0·17″
Mean	...	+0·19″ ± 0·015″.

With regard to the value of the mean diameter, he obtains 31′ 59·93″, which differs somewhat from that usually adopted, namely 31′ 59·26″, on the authority of Dr. Auwers, after a series of measures with the heliometer. While Chevalier points out that there is evidently a systematic error in one of the two sets of measures, and it may be in the photographic series, but he has not been able to trace it, yet, he asks, is it quite certain that it is excluded from the heliometric series, these measures all being made with instruments of the same type and short focal lengths?

UNITED STATES NAVAL OBSERVATORY.—We have received a copy of the annual report of the Naval Observatory for the fiscal year 1912. This modest and admirably concise account of the year's work of three active and important departments, corresponding to our Greenwich and Kew observatories and the Nautical Almanac Office, merely forms appendix No. 2 to the annual report of the chief of the Bureau of Navigation. The department of the Nautical Almanac, under the direction of Prof. W. S. Eichelberger, U.S. Navy, who represented the observatory at the Congrès International des Ephémérides Astronomiques, held at Paris in 1911, has expressed, under authority of the U.S. Congress, its willingness to adopt the programme of exchanges of data recommended at the Paris meeting. Particulars are given of various significant changes it is proposed to make in the American Ephemeris and Nautical Almanac, beginning with the edition of 1916. Considerable progress appears to have been made in the adoption of the Sperry gyro-compass in the U.S. Navy; six battleships and two submarines are supplied with sets, and ten additional sets have been ordered. The ordinary magnetic compass is still retained in ships fitted with gyro-compasses. We are informed that the noon signal has been transmitted by radio-telegraphy to ships at sea since so long ago as January, 1905. Special attention is being devoted to making improvements in the instruments of nautical astronomy. Among a long list of novel apparatus we note that a gyroscopic artificial horizon has been tried.

DISTRIBUTION OF SPECTROSCOPIC DOUBLE STARS.—In the April number of *L'Astronomie*, Prof. P. Stroobant, of the Observatoire Royal de Belgique, using Campbell's second catalogue of spectroscopic binary stars, published in 1910, shows that representatives of this class of stars are most abundant in the neighbourhood of the Milky Way—a similar result to that already found by E. Zinner for variables of the Algol type, to which the spectroscopic doubles bear a strong analogy. Stroobant shows that in this condensation the stars in question obey the law of distribution found by Pickering for the helium stars, being almost precisely proportional to the number of class B stars amongst the binaries.

JADE IN CHINESE SECULAR LIFE AND RELIGION.[1]

THE sumptuous monograph on the Bishop collection in New York entitled "Investigations and Studies in Jade" is so rare as to be inaccessible, and consequently there is room for another work on the subject. The authorities of the Field Museum of Natural History of Chicago were well advised to entrust the Blackstone expedition to Tibet and China to Dr. B. Laufer, and to encourage him to describe the jade objects he collected in a comprehensive monograph. As a matter of fact, his specimens largely supplement, and only slightly duplicate, the wonderful collection in New York, as most of them were exhumed from ancient graves, whereas the majority of the specimens in the Bishop collection are modern. Similarly, his monograph supplements the other; he does "not deal with jade for its own sake, but as a means to a certain end; it merely forms the background, the leading motive, for the exposition of some fundamental ideas of Chinese religious concepts which find their most characteristic expression and illustration in objects of jade."

The oldest Chinese term for jade is just as general and comprehensive as our word, and includes nephrite, jadeite, bowenite, and occasionally serpentine, &c.; at present only the first two are acknowledged as true jade by the Chinese. The jades of the Chou and Han dynasties are made of indigenous material from the Shensi province, but the supply was exhausted long ago, and about the beginning of the Christian era Turkestan became the chief source for the supply of jade to China, Yünnan and Burma also contributing later. The importance of the trade in jade can be realised when one remembers that "for the last two millenniums Turkestan has furnished to China the greater supply of her jade, wrought and unwrought, and the most colossal boulders of the mineral were constantly transported from Khotan to Si-ngan-fu and Peking, over a trade route unparalleled in extent and arduousness in Europe, and requiring a four to six months' journey."

In dealing with stone implements, Dr. Laufer points out that none of Palæolithic type have as yet been found; all are polished, they are found scattered in certain parts of the country, and are generally scarce. In the present state of our knowledge it is not justifiable to speak of a Stone age in China, and still less of a Stone age of the Chinese, since at the time when they were settling and spreading they were already in possession of metal implements. Four centuries ago Chinese antiquaries spoke of "thunder-axes," and in the eighth century they were described as "stones of the God of Thunder"; sometimes they were made of jade.

The ancient spade-shaped stone implements of the Kolarian-Mon peoples were reproduced in jade and bronze in the Han period, but in the earlier Chou period there was a bronze currency of similar shape. The first sovereign of the Han dynasty (B.C. 206–195) announced his accession to the throne by sacrificing to heaven an engraved jade tablet, a custom which continued for a thousand years or so; these writing tablets were developed from the ancient bamboo slips or wooden splints which served as writing material before the invention of paper.

There is a correlation between the jade objects used in nature-worship and those buried in the graves of the Chou era. Heaven, earth, and the four quarters were six cosmic powers or deities, and the jade carvings serving their worship were nothing but the real images of these deities under which they were worshipped. Anthropomorphic conceptions are lacking in the oldest notions of Chinese religion, and therefore no anthropomorphic images are known. The shapes of these images are geometric in design: a jade disk, round and perforated, representing heaven, a tube surrounded by a cube earth, a semicircular disk the north, &c.

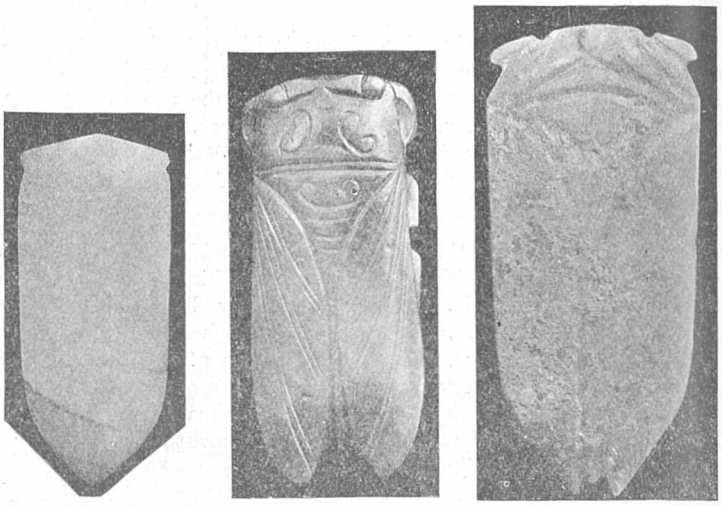


FIG. 1.—*a*, Plain type of tongue-amulet; *b*, tongue-amulet carved in shape of realistic cicada—upper face; *c*, tongue-amulet showing conventionalised form of cicada. From "Jade: A Study in Chinese Archæology and Religion."

In addition to the use of jade in religious worship its employment in coins, seals, and personal ornaments is fully dealt with, and a very interesting account is given of the various kinds of jade amulets for the dead, other objects being buried besides these. The belief prevailed that jade had the property of preserving the flesh of the body and keeping it from decay, and it was also believed that immortality could be obtained by eating from bowls made of a marvellous kind of jade called "the perfection of jade." Among the amulets worn by the corpse, those placed on the tongue were the most important, and were shaped in the outline of that organ; many are in the form of a cicada, doubtless as an emblem of resurrection; indeed, the

[1] Field Museum of Natural History, Anthropological Series, Publication 154. "Jade: A Study in Chinese Archæology and Religion." By B. Laufer. Pp. xiv+370+68 plates. (Chicago, 1912.)

philosopher Wang Ch'ung said, "The vital spirit of a dead man leaving the body may be compared to the cicada emerging from the chrysalis." There were also eye, lip, and umbilical amulets.

Dr. Laufer has a very extensive knowledge of Chinese literature and of folk-usage and beliefs, and as he has discussed the matters studied with Chinese savants, we have a remarkably complete and discerning monograph, which will appeal alike to connoisseurs, artists, ethnologists, and students of comparative religion and folklore. There are sixty-eight plates, six of which are coloured, and 204 text figures, most of which are reproductions of Chinese drawings. The Field Museum of Natural History is to be congratulated on the publication of a monograph worthy of its most important and interesting collection of jade objects.

A. C. HADDON.

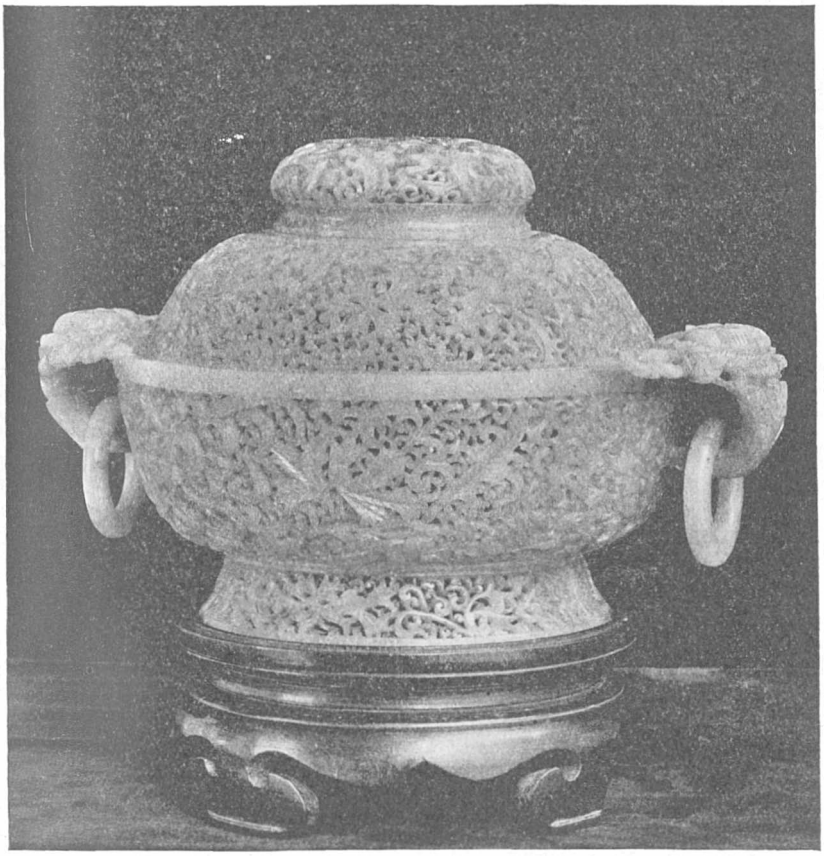


FIG. 2.—Incense-burner carved from white jade in open-work, Ming period. From "Jade: A Study in Chinese Archæology and Religion."

TECHNICAL EDUCATION IN INDIA.[1]

A REPORT on the results of an inquiry into the relation of technical instruction in India to the actual requirements of employers, which has recently been published, contains some valuable suggestions on the industrial outlook in that country. The inquiry is, however, strictly limited in scope. The report is not concerned with the general question of technical education, nor with the organisation or improvement of local industries; it deals with the more restricted and definite question of the value of the instruction now provided in Indian technical institutes in qualifying the students of those institutes to undertake positions as managers, heads of departments, foremen, and assistants in engineering, and in some few other industrial works.

Extensive inquiries have been made from the heads of engineering firms in different parts of India and also from the directors of instruction and the managers of some of the principal schools and technical institutions, and the results of these inquiries are embodied in certain definite recommendations, which have for their object the bringing into closer relation of the teaching of the schools with the actual needs of employers. The writers of the report, whilst giving due weight to the views of British engineers and educational authorities, have wisely recognised the fact—too often overlooked—that the conditions of industry differ very widely in India and in Western countries, and that the character, disposition, and aptitudes of native students must be considered in any proposals as to their education and training. The endeavour to impose upon institutions in India methods of instruction which may be well adapted to European students has produced results which are by no means satisfactory, and those who approach the problem of education from a scientific point of view realise that the character of the student, which is a product of his environment, must be considered in all educational schemes, and that the conditions of his training must be adapted to his habits and surroundings. This fact is recognised by the writers of the report when, at the outset of their inquiry, they state:—"It is useless training a man in mechanical engineering who will not take off his coat and work, whose physique will not stand the strain, or whose social customs make manual work repugnant."

The efforts already made to organise and develop education in India have clearly shown that the native student has a strong preference for studies dealing with the theories and principles of his subject over those demanding severe practical work or protracted scientific investigation. In many of the higher branches of handicraft the Indian is proficient, and it is a matter of some regret that greater efforts have not been made to develop technical instruction along lines which would have improved, and given greater artistic value to, many of the native industries. That suggestion, however, opens up a subject beyond the scope of the inquiry with which the report deals. The main object of the Commissioners was to ascertain what arrangements can be made for systematic co-

[1] Report on the Inquiry to Bring Technical Institutions into Closer Touch and More Practical Relations with the Employers of India. By Lieut.-Col. E. H. de V. Atkinson, R.E., and Tom S. Dawson. Pp. 100. (Calcutta, 1912.)

ordination between the work of technical institutes and the needs of employers with a view to active cooperation in the interests of the students and employers and for the general welfare of the country.

To effect this desirable end, great importance is wisely attached to affording to students ample facilities for practical work, not only in school laboratories and school shops, but under strictly commercial conditions in engineering and other industrial firms. Among the causes of the partial failure of Indian students to obtain suitable employment after leaving the technical institute some of the employers who were consulted state that "in most cases students from technical institutions will not work with their hands, will not observe factory hours, ask too high wages for learning their practical work, and generally think they know everything."

It is a fact that in their desire to obtain employment, whether as engineers or civil servants, Indian students undoubtedly attach too great a value to their school teaching, and the Commissioners recommend that school instructors and school managers should make it clear to their students that they are totally unfit for any position of authority immediately on leaving the institute, and must gain, under appropriate conditions of discipline, practical acquaintance with the details of the work in which they hope to be occupied. "Otherwise," they state, "there will always be a large number of men who fail to go further than the end of their college course." This is sound advice, which is not altogether inapplicable to British students. It is satisfactory to gather from the report that the writers are of opinion that Indians "if possessing the necessary character, theoretical knowledge, and practical experience, have more than equal chance of employment in India with Europeans." This statement will be read with equal gratification by those who are responsible in this country for the government of India as by the natives concerned.

Among the valuable recommendations set forth in the closing pages of this report, the importance of practical work is repeatedly emphasised. "The education given in the institute," we are told, "should be essentially practical, be capable of being applied commercially, and not of such high scientific character as is often considered necessary in the West." It is also pointed out that the "best method of training men in mechanical and electrical engineering to meet the existing demand is by a course at a well-equipped institute, followed by an apprenticeship in works."

India is waking up to the necessity of developing new and important industries. For the supply of the machinery needed to equip the increasing number of cotton mills now being erected in India, there will be a growing demand, and endeavours are being made to meet this demand by Indian enterprise and skill. The number of bleaching and dyeing works must be gradually increased with the development of the textile industries; and if only qualified students can be found who have received an adequate training in the technical institutes, new fields of employment will be opened up for native workers.

The report shows how the school may help the factory, and how the factory may offer a continually increasing number of remunerative posts to the trained students of the technical school. In addition to the general recommendations, the report contains useful suggestions for adjusting facilities for technical instruction to meet the demands of employers in the various provinces of India.

RESEARCHES IN RADIO-ACTIVITY.

SEVERAL communications from the Radium Institute at Vienna are before us, and a few of the most noteworthy are here mentioned.

In one of the recent communications from the institute Dr. O. Hönigsmid gives the result of a fresh atomic weight determination from the bromide, which confirms the value, 225·95, previously obtained from the chloride. Two determinations by conversion of the chloride into the bromide and *vice versâ*, the method adopted by Whytlaw-Gray and Sir W. Ramsay, also gave practically identical results. In conjunction with E. Haschek, a spectrographic examination of the preparations for barium was made. The barium line 4554·24 was not seen, and it was calculated from the effect of the addition of known small amounts of barium that the standard preparations could not have contained more than 0·004 per cent. of barium. This settles the question of the purity of the international radium standard, and of the true atomic weight of radium. It is characteristic of the time and of the accurate researches radio-activity has called forth, that the atomic weight of radium should now be one of the best-known constants, and far more certain than that of uranium and thorium.

In another communication, Dr. F. Paneth finds that polonium resembles a colloid in that it does not pass appreciably through animal membranes or parchment paper. Radio-lead may readily be separated from polonium by dialysis, the crystalloid salts of lead readily passing through the membrane and carrying the radio-lead with them in unaltered proportion.

Some further results of H. Molisch bring out the harmful effects of the radium emanation on growing plants when it is present above a certain degree of concentration. In lesser amounts a slightly favourable action on the growth is sometimes observed. The injury is a permanent one, the organs of the plant being affected and the leaves falling off. It appears to work like a poison chemically upon the cells, and considering the minute absolute amount of the emanation, there can be very few poisons which would produce in such small quantity so far-reaching destructive effects.

A. Brommer discusses the influence of the partial solar eclipse of April 17, 1912, on atmospheric electrification. During the first phase of the eclipse a well-marked diminution occurred in the number both of positive and negative ions in the atmosphere, the latter decreasing more rapidly than the former, so that an initial excess of positive ions was converted into a deficit. As the sun's disc again became uncovered, the number of ions increased and regained nearly their initial values, establishing a direct influence of sunlight on the ionisation of the atmosphere.

Exner and Haschek describe an unsuccessful attempt to find spectroscopic evidence of the existence of ionium in the thorium-ionium preparations separated from ten tons of Joachimsthal pitchblende by A. v. Welsbach. A similar attempt, with the same negative result, by A. S. Russell and R. Rossi, with the Royal Society's ionium preparation, is described in a recent number of the Proceedings of the Royal Society (p. 478). In view of the estimated period of ionium being from forty to one hundred times as long as that of radium, both these preparations should have contained a considerable proportion of ionium, and the failure to detect in their spectra a single line other than those due to known substances raises very important and fundamental questions.

A. Kailan, in three papers, deals with the influence

of ultra-violet light and of the penetrating rays of radium on various organic and inorganic compounds, and Meyer and Przibram discuss, among other phenomena, the effect of exposure to radium rays in increasing the "Hallwachs effect" in minerals.

Meyer and Paneth have undertaken a re-investigation of the proportion of α rays in a uranium mineral due to the uranium and radium respectively, which they find to be 100 : 57·3, instead of 100 : 45, as found initially by Boltwood. The new ratio agrees perfectly with the present view that uranium consists of two elements, uranium I. and II., each emitting one α ray per atom disintegrating, of ranges respectively 2·5 and 2·9 cm. of air at 15°, with which the older ratio was seriously in disagreement.

Lastly, Hess deals with the heat generated by a pure radium salt at the moment of its preparation, when it is free from the products of disintegration, and finds it to be 25·2 calories per hour per gram of radium (element). In the course of a month, in which the first four products accumulate to the equilibrium quantity, the heat generated increases by 107·1 cal. per hour, the total (for α and β rays, and 18 per cent. of the γ rays) agreeing perfectly with his previous measurements in collaboration with Prof. Meyer on a different preparation. As an example of the perfection to which our knowledge of the processes of atomic disintegration has been brought, and to which it would perhaps be difficult to find a parallel elsewhere in the molecular sciences, it may be mentioned that the figure 25·2 calories per hour per gram of radium agrees, within 1 per cent., with the value deduced from Rutherford's direct measurements of the number, mass, and velocity of the α particles expelled by radium, taking into account the kinetic energy of recoil. An analogy to this would be a determination of the "heat-drop" of steam by counting the number, measuring the individual mass, and determining directly the velocity of the molecules leaving a turbine-jet. F. S.

SCIENTIFIC WORK OF THE CENTRAL CHEMICAL LABORATORY OF THE ITALIAN CUSTOMS.

THE report of the year's work of the Central Chemical Laboratory of the Italian Customs at Rome (*Annali del Laboratorio Chimico Centrale delle Gabelle*, vol. vi., 1912, pp. xxxvii+707), under the direction of Prof. V. Villavecchia, which has recently been issued, contains an introductory article by the director on the history of its twenty-five years' activity since its inauguration in 1885. In this period 225,679 analyses have been made, and 1524 special reports prepared for various Government departments, whilst 127 original papers have been published in the *Annali* issued from the laboratory. Recently a museum of commercial products and raw materials has been established in connection with the Central Laboratory, care being taken to ensure the genuine character of all the specimens, so that they can be used as standards of reference by the Government chemists; an account is given in the report of the 32,382 samples collected for this museum, and a description of the building.

In the present report some of the most important original contributions are as follows. I. Barboni has investigated comparatively the different methods which have been used for the analysis of commercial calcium citrate, and reports on their suitability. A. Capelli, in examining the alkaloids contained in maté, has been able to separate only caffeine, although the statement has been recently made that caffeine is present only in traces, the principal alkaloid being matteine. There is a series of papers by R. Belasio on the electrolytic estimation of zinc, the separation by electrolysis of iron and manganese, the analysis of white metals and tinfoil, the detection of antimony and of tin in metallic alloys, and a description of the electrolytic methods of analysis in use in the laboratory of the *Gabelle*. Among papers dealing with organic analysis the following may be cited:—G. Testoni, the estimation of sucrose in the presence of other sugars; E. Castaldi, the Halphen test for cotton-seed oil; L. Settimj, a characteristic colour reaction for soja-bean oil; S. Camilla and C. Pertusi, the detection and estimation of the xanthine bases in cocoa, tea, and coffee; V. Villavecchia and A. Capelli, the quantitative estimation of cotton, wool, and silk in mixed fabrics.

Independently of its work of routine analyses for the control of commercial and dutiable articles, the laboratory is carrying out valuable work in investigating the many different and often conflicting methods of analysis in current use, and, when necessary, devising new processes to meet freshly arising needs.

THE HYDROMETER AS AN INSTRUMENT OF PRECISION.[1]

MR. J. Y. BUCHANAN publishes in the Transactions of the Royal Society of Edinburgh (vol. xlix., part i., 1912) the results of extended researches on the specific gravity and the displacement of some saline solutions. The memoir, which occupies 225 quarto pages, deals with the densities and variations in densities of certain groups of saline solutions; but although the results obtained are themselves of interest and value, the importance of the work centres rather in the detailed study of the use of the hydrometer as an instrument for work requiring a high degree of accuracy. This importance, of course, arises mainly from the fact that ever since the days of the *Challenger* expedition, Mr. Buchanan has been the principal champion of the hydrometer method for determining the specific gravities of samples of sea-water for purposes of oceanography, and that the method has now for many years been practically disused by most oceanographers.

Two forms of hydrometer are described. In the "closed" type—that ordinarily used for, *e.g.*, sea-waters—the weight of the instrument is varied by adding to or subtracting from a number of weights placed on the top of the glass stem of the hydrometer. The additional weights are obviously limited by questions of stability, for if too much weight is accumulated at the top of the stem the whole instrument will tend to capsize. Solutions of high density are therefore treated with an instrument of the "open" type, in which the stem is left open at the top instead of being hermetically sealed, and the paper scale is replaced by one etched on the stem itself. The internal ballast can then be altered by varying the amount of mercury or the number of lead pellets, as the case may be, and the final adjustment by weights at the top of the stem made without risk of the instrument swinging out of the vertical.

Every worker with the closed type of instrument (that used on board the *Challenger*) knows that the real difficulty is not to get consistent results, but to get accurate results, or results which will either agree with those obtained by other methods or differ from them in some way which can be accounted for. Much labour has been expended by many investigators in efforts

[1] "Experimental Researches on the Specific Gravity and the Displacement of Some Saline Solutions." By J. Y. Buchanan, F.R.S. (Trans. R.S.E., vol. xlix., part i., 1912.) Pp. 227. (Edinburgh: Neill and Co., Ltd., 1912. Price 7*s.* 6*d.* net.

to reconcile the differences observed. Mr. Buchanan, however, does not enter into the question, but restates the position he took up in a paper read at the International Geographical Congress in 1895, to the effect that this type of hydrometer gives not comparative but absolute results, and is "a pyknometer where the volume of liquid *excluded* up to a certain mark is weighed instead of that *included* up to a similar mark."

GERMAN METEOROLOGICAL REPORTS.

THE organisation reports of (1) the Royal Prussian Meteorological Institute (Berlin) and (2) the Deutsche Seewarte (Hamburg) for the year 1912 have been recently published. The operations of these establishments are quite distinct; the institute dates from 1847, as a department of the Statistical Bureau, under Dr. W. Mahlmann, to whose life and work a special article is devoted in the report for this year. The work of the institute (which became an independent meteorological organisation in 1886) consists to a considerable extent of special scientific researches which appear in the *Abhandlungen* and elsewhere, and in the preparation and publication of the observations made at a large number of stations, separate departments dealing specially with meteorology, rainfall, and thunderstorms. It also controls the work of Potsdam Observatory, which undertakes various branches of geophysical investigation. Among the various discussions in this year's report we may mention an interesting inquiry into the Thuringian deluge of May, 1613, by Dr. Hellmann (director).

The Deutsche Seewarte (Hamburg) may be said to date from 1867, under Dr. W. v. Freeden, and was established as a Government institution in 1875; its great work, which is well known to our readers, will always be associated with the name of Dr. v. Neumayer. It deals with all branches of maritime meteorology and weather telegraphy, and controls a limited number of meteorological and storm signal stations. Among its many useful publications may be mentioned (1) monthly meteorological charts of the North Atlantic, observations at many oversea stations and colonies, a laborious and useful atlas of daily synchronous weather charts for the North Atlantic (in conjunction with the Danish Meteorological Institute), also scientific discussions in the *Archiv der Deutschen Seewarte* and elsewhere. During the year 1912 it received 4391 months' observations taken on board ship, and made 351 ascents by kites, captive and pilot balloons, in connection with the exploration of the upper air.

ORNITHOLOGICAL NOTES.

ACCORDING to the Journal of the South African Ornithologists' Union for December, 1912, a special effort is being made to arouse interest in the dates of arrival and departure of the local migratory species, such as the bee-eater, red-legged kestrel, swallow, and golden oriole. With this object in view, school teachers willing to assist are to be admitted to associate membership at a greatly reduced subscription.

Mr. Gregory Mathews is to be congratulated on the completion, with No. 8, of the first volume of *The Austral Avian Record*, this part including a notice of birds described by Gould from Norfolk, Lord Howe, and Philip Islands.

It has long been known that certain kinds of birds—especially hornbills—are in the habit of periodically shedding and casting the lining membrane of their gizzards. According to a letter from Mr. D. Macintyre published in *The Field* of March 31, and an article by Mr. H. H. Smith in the April number of *British Birds*, the curlew must be added to the small list of species in which this strange act occurs.

In the January issue of *The Ibis* Dr. Sclater contrasts the new "Hand-List of British Birds," by Dr. Hartert and others, with the list issued by the British Ornithologists' Union in 1883, and points out that out of the 376 species included in the latter the names of no fewer than 200 would have to be changed if the nomenclature of the "Hand-List" were accepted. Dr. Sclater considers it undesirable to take the tenth, in place of the twelfth, edition of the "Systema Naturæ" as the basis of our zoological nomenclature, and points out that according to the Stricklandian code "tautonyms" are prohibited, while liberty to correct mistakes and bad grammar is permitted. "If," he adds, "we take Latin for the language of science, we are surely bound to follow its grammatical rules."

PROMOTION OF RESEARCH BY THE CARNEGIE INSTITUTION OF WASHINGTON.

THE Year Book for 1912 of the Carnegie Institution of Washington has now been issued. The record of work accomplished contained in its pages shows there has been no diminution in the efforts of the trustees to secure a wise expenditure of the funds placed at their disposal for the advancement of research in science.

The following list shows the departments of investigation to which the larger grants were made by the trustees and the amounts allotted from these grants by the executive committee during the year:—

	£
Department of Botanical Research	7,600
Department of Economics and Sociology ...	2,500
Department of Experimental Evolution ...	7,500
Geophysical Laboratory	15,000
Department of Historical Research	5,300
Department of Marine Biology	3,600
Department of Meridian Astrometry	5,200
Nutrition Laboratory	9,700
Division of Publication	2,000
Solar Observatory	51,000
Department of Terrestrial Magnetism ...	19,600
	129,000
Transferred from Nutrition Laboratory to unappropriated fund	1,000
	130,000

Numerous minor grants were made, amounting to very nearly 40,000*l*., and grants for publication authorised during the year reached a total of about 8600*l*. During the year 1912 the income of the institution was almost 250,000*l*., and the total expenditure some 229,600*l*.

The following extracts from the *résumé* of the investigations of the year included in the report of the president of the institution, Dr. Robert S. Woodward, will give some indication of the work which has been inaugurated and encouraged:—

Although the departments of investigation, like the institution as a whole, have fallen short of popular expectations in the rapidity of their growth, it now appears plain, in the light of their actual experience, that this growth has been somewhat too rapid for safety. Along with this rapid growth and with the signal success of the departments in their several fields of research, there are now coming also numerous requests for cooperation with other organisations and

with individuals. But while these requests are in general gratifying and often praiseworthy, they present some obvious hazards. There is need, therefore, of constant caution against the dangers of undue expansion and affiliation which lead to dissipation of effort and resources. It should be kept in mind that concentration on definitely limited programmes, continuity of effort, and energetic assiduity are the factors most essential to progress in the domain of research.

The geographical range of the work of the department of botanical research, which centres in the Desert Laboratory at Tucson, Arizona, has been extended during the past year to include certain portions of the deserts of northern Africa. Studies have been continued at the Desert Laboratory, at the Carmel Laboratory on the California coast, at Salton Sea, and at various substations where observations are made on the phenomena presented by plants under strikingly varying conditions. One of the most important investigations undertaken during the past year is that of a comprehensive study of the large and highly diversified family of cactus plants.

The advances made by the department of experimental evolution during the past year have been chiefly along the lines of studies in cytology, in the chemistry of pigmentation, in the factors of mutation, and in the problems of human heredity. These studies have been carried on by aid of experiments with plants and animals and by aid of rapidly accumulating statistical data concerning human traits and their transmission through successive generations. The director has been able to give much of his time to studies in human heredity by reason of his connection with the Eugenics Record Office. Very interesting chemical studies have been carried on by Dr. Gortner, a member of the staff, in respect to the chemical nature of pigments which determine colour characteristics, especially of the plumage in birds, of the wool in sheep, and of the skin in men. Dr. Shull has continued his fertile studies into the heredity of plants, including further investigations into the connection between heredity and environment in the case of corn. These further studies confirm his earlier conclusions and show also that the hereditary traits of different strains are maintained irrespective of environmental influences.

Two specially noteworthy publications of the geophysical laboratory have been issued during the year by the institution, namely No. 157, "High Temperature Gas Thermometry," and No. 158, "The Methods of Petrographic-Microscopic Research." The purpose of the first of these was to give an account of the apparatus and methods for accurate measurement of the critical temperatures incident to mineral combinations; and the object of the second is to place, so far as practicable, microscopic study of minerals upon a quantitative basis.

Special attention is directed in the director's report to extended studies on quartz and other forms of silica, which is the most widely diffused ingredient in rock masses; to further experiments on the conditions of association of the three oxides, lime, alumina, and silica, which in addition to being the commonest components of igneous rocks, are also incidentally the three principal ingredients of the so-called Portland cement; to mineral sulphides, which are often of great economic importance; and to mineral and rock densities.

Perhaps the most interesting of the more recent investigations of the laboratory are those of the physics and chemistry of active volcanoes undertaken tentatively a year ago and pursued with very gratifying success during the past summer. It has proved practicable for members of the staff to descend into the crater of Kilauea and to collect considerable quantities of gas as it emerged from the liquid lavas of the crater. Specimens of gases were collected in glass tubes without contamination from the air, and these have been brought to the laboratory at Washington for detailed study. There seems little reason to doubt that the phenomena of vulcanism will be ultimately revealed by the methods, apparatus, and technique developed by the staff of the laboratory.

The independent transportation facilities furnished by the new vessel, *Anton Dohrn*, and the repairs and improvements to the laboratory completed a year ago, have proved highly advantageous to the department of marine biology. By means of the *Anton Dohrn* the entire Gulf and West Indian region becomes open to investigation by the department. The director records with appreciation a gift to his fleet by Hon. John B. Henderson, of Washington, D.C., of a 23-ft. 6-h.p. launch, which has already proved a very useful adjunct in the diversified work of the department, since many different investigations are carried on simultaneously by different individuals at the laboratory headquarters. During February and March of the current year the director established a temporary laboratory at Montego Bay, Jamaica, a region which sustains important biological relations to the vicinity of the Tortugas group of islands. The director of the department has issued, as No. 162 of the publications of the institution, an additional volume of his series on the jelly-fishes of the world, the title of this volume being "Ctenophores of the Atlantic Coast of North America."

Special attention has been given in the department of meridian astrometry to the reduction of the meridian observations made at San Luis, Argentina. The determination of the two coordinates of stars from this work, namely right ascension and declination, have proceeded simultaneously. The assignment of stellar magnitudes, however, must await the photometric determinations which have been made at San Luis since the meridian measurements were completed. Late advices announce that it will be completed by the end of the present calendar year. The great quantity of priceless observational and derived data accumulated by the department rendered it imperative that special provision should be made for their safe storage. Accordingly the executive committee authorised the construction of a fireproof vault within the walls of the Dudley Observatory. This vault is now ready for occupation and the records will be placed therein as soon as practicable.

One of the most interesting of the many investigations under way in the nutrition laboratory during the year is that of the metabolism of a subject who underwent a prolonged fast, extending to thirty-one days without food, and drank only distilled water during this time. This investigation required the cooperation of a number of chemical, pathological, and psychological experts. A detailed report on this elaborately observed experiment is at present in preparation. Another noteworthy investigation of the year is that on metabolism during severe muscular work, undertaken by Dr. E. P. Cathcart, of the University of Glasgow, who was a research associate of the institution during the winter of 1911–12. Amongst other important results of the latter research is the measure it affords of the mechanical efficiency of man. An account of this investigation is likewise in preparation for publication.

Highly effective progress has been made by the department of terrestrial magnetism during the past year in its magnetic survey of the globe. By means of the non-magnetic ship *Carnegie* it is now easier to make a magnetic survey of the ocean areas than of

the land areas, for the former are now more readily accessible than the latter. At the end of the preceding fiscal year the *Carnegie* was at Batavia, Java. On November 21, 1911, she set sail for an additional circuit of the Indian Ocean, when she proceeded to Manila, Philippine Islands, where she arrived February 3, 1912. From Manila she proceeded to Suva, thence to Tahiti, and afterwards to Coronel, Chile. During the fiscal year she traversed about 28,000 miles. Her courses are arranged to intersect as frequently as possible her own previous tracks, those of the *Galilee*, and those of previous expeditions on which magnetic elements were observed. Valuable checks on the determinations of these elements are thus secured, and in case of considerable intervals between the dates of different determinations, data for secular variation of the magnetic elements are also obtained. As related in the report of a year ago, unexpectedly large errors were found in the best magnetic charts of the Indian Ocean and for some parts of the Pacific Ocean.

Observations have been continued simultaneously on land areas, embracing portions of five continents and about twenty different countries. Many noteworthy series of transcontinental stations have now been completed. Of these, one extending across the entire continent of South America, beginning at Para, at the mouth of the Amazon, and extending to Callao on the Pacific coast, by way of the Amazon and Ucayali rivers and Lima, has been finished during the past year.

The past year has been one of minimum sun-spot activity; but effective progress has been made in many other branches of solar and stellar research undertaken by the solar observatory. The wide range of this work may be indicated by the fact that the results of the investigations of the year are summarised by the director under thirty-five different heads. The new tower telescope has been completed, and important auxiliary apparatus has been added to the equipment of the 60-in. reflector. A fireproof office building, which will afford adequate quarters for the staff and safety for the original records and photographic plates of the observatory, has been constructed and made ready for occupancy during the year.

The 150-ft. tower telescope with its spectrograph and spectroheliograph has been tested and found to be quite up to expectations. The 60-in. reflector has proved increasingly effective in the wide variety of work undertaken with it. Between forty and fifty new spectroscopic double stars have been found; and amongst the many stars the radial velocities of which have been measured is one which surpasses all others hitherto observed, its velocity being about 150 miles per second.

Two eminent research associates, namely Prof. Kapteyn, of Groningen, and Prof. Störmer, of Christiania, have taken part in the work of the observatory during the year.

The laborious task of shaping and testing the glass disc for the proposed 100-in. telescope has proved a disappointment in showing that this disc, which was accepted provisionally from the makers several years ago, will not answer the requirements. It appears possible that some expedients may be adopted to overcome the instability of this disc; but the probability that it may be made to work satisfactorily is small. In the meantime the makers of such large discs have not succeeded in making one of sufficient uniformity in density. In view of these difficulties the director is disposed to try a thinner disc if one can be found possessing the requisite degree of homogeneity. Thus this project must suffer further delay, although it is practically certain that the difficulties presented may be ultimately overcome.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The subject selected for the Adams prize in 1914 is "The Phenomena of the Disturbed Motion of Fluids, including the Resistances encountered by Bodies moving through them." A theoretical re-discussion of the problem of fluid resistance may be undertaken, either in general or in simple cases, in the light of the experimental knowledge regarding the resistances and the nature of the broken motion of the fluid which is becoming available in the publications of the aëronautical laboratories of various countries. Information has been accumulating regarding the nature and mode of travel of meteorological atmospheric disturbances, such as cyclonic movements and line squalls, the propagation of minute waves of barometric pressure, and the nature of the lower boundary of the upper calm region of the air. A dynamical discussion of these topics, or of simpler problems in illustration of them, might be undertaken. The prize is open to the competition of all persons who have at any time been admitted to a degree in the University of Cambridge. The value of the prize is about 220*l*. The essays must be sent to the Vice-Chancellor on or before the last day of December, 1914.

The Linacre lecture at St. John's College will be delivered by Dr. Norman Moore, on Tuesday next, May 6, on the physician in English history.

The professor of botany has recently received for the botanical museum a collection of 100 water-colour studies of Italian and other South European flowering plants from Mrs. Latimer-Jackson. The sketches, which were made by Mrs. Latimer-Jackson in the course of several visits to Sicily and different parts of the mainland, have not only great artistic merit, but will be useful to students and of considerable interest to many members of the Senate other than professional botanists.

A syndicate has been nominated to consider what changes, if any, are desirable in the regulations relating to the Previous Examination, in the mutual relations of the Previous Examination and the examinations held by the Highest Grade Schools Examination Syndicate and the Local Examinations and Lectures Syndicate, and in the relations of the Previous Examination to examinations held by other bodies. The syndicate has power to confer with the Highest Grade Schools Examination Syndicate, the Local Examinations and Lectures Syndicate, and such other bodies and persons as it may think fit. This is another attempt to bring what is practically the entrance examination of the University into line with modern thought.

OXFORD.—On April 29 Congregation approved a decree authorising the expenditure of 600*l*. in adapting the chemical laboratory at the museum to the immediate needs of the Waynflete professor of chemistry (Prof. W. H. Perkin).

WE learn from *Science* that Princeton University has received three gifts: 20,000*l*. from Mr. and Mrs. Russell W. Moore, of New York City, to endow a professorship of chemistry; 25,000*l*. given anonymously for a professorship not named; and 6000*l*. from Mr. J. D. Cadawallader, of New York City.

THE London County Council will be prepared to award for the session 1913–14 a limited number of free places at the Imperial College of Science and Technology, South Kensington, S.W. The instruction will be of an advanced nature, and therefore only

advanced students who are qualified to enter on the fourth year of the course should apply. There is no restriction as to income, but intending candidates must be ordinarily resident within the area of the administrative County of London, and must be students who have been in regular attendance at appropriate courses of instruction for at least two sessions. The free studentships do not entitled the holders to any maintenance grants, but cover all ordinary tuition fees. The free places will be awarded on consideration of the past records of the candidates, the recommendations of their teachers, the course of study which they intend to follow, and generally upon their fitness for advanced study in science as applied to industry. Candidates will not be required to undergo a written examination. Application forms (T. 2/268) may be obtained from the Education Officer, L.C.C. Education Offices, Victoria Embankment, W.C., and must be returned not later than Saturday, May 24.

VACATION courses for foreigners are to be held in Hamburg from July 24 until August 6 next. In all seventy-five lectures and courses have been arranged in connection with the scientific institutions of the State of Hamburg, with the hospitals and the Colonial Institute. The courses will aim at acquainting foreigners with the position of scientific studies in Germany. Scientific problems of the day will be treated by competent specialists in a manner intelligible to educated persons. Some sixty-five professors from German universities and institutes will assist at the courses. For the convenience of foreigners, special practical courses in German have been arranged daily between June 16 and July 26. These courses offer an opportunity of acquiring a practical knowledge of the language. Courses have been arranged also for medical students, including practical work at the Eppendorf Hospital, and a series of lectures on diseases of the heart and lungs. Students will be given opportunities of sight-seeing in Hamburg and its environs. Prospectuses and all information may be obtained gratis on application to "Geschäftsstelle der Akademischen Ferienkurse," Hamburg 20, Martinistrasse 52.

THE organiser for technical education in the Transvaal, Mr. W. J. Horne, has amplified a paper he read before the South African Institution of Engineers at Johannesburg shortly after the establishment of the Johannesburg Trades School, and the result is a volume on the Trades School in the Transvaal, a copy of which has been received. After explaining the need for vocational instruction, he gives a description of the character and scope of the work done in the urban trades schools of the Transvaal, explains the nature and cost of the buildings and equipment in different centres, and reviews what is being done to meet the special needs of rural areas on one hand, and of girls on the other. The volume shows that considerable progress has been made already in the provision of technical education in the Transvaal. The Pretoria Trades Schools and Polytechnic, for example, has accommodation for 200 pupils, and is provided with shops for blacksmiths and farriers, workers in wood, electricians, mechanical engineers, plumbers, wagon-builders, and printers. As Mr. J. Percy FitzPatrick, the chairman of the Witwatersrand Council of Education, says, in the introduction he contributes to the volume, "the motto of the Transvaal Trades Schools is 'theory and practice.'" and Mr. Horne insists that the mission of the trades schools must be to unite and harmonise these two essential things. The volume is full of practical suggestions for ensuring this end and of providing means for boys and girls to proceed as far in their study of technology as their capabilities permit.

THE Indian newspapers recently received in this country contain fuller particulars of what is in future to be the Government policy with regard to education in India. The statement circulated in India in February last, we learn from *The Times*, after a recognition of the beneficial effects of the Universities Act of 1904, refers to the new decentralising policy. It is pointed out that there are only five Indian universities for 185 art and professional colleges in British India, besides several affiliated institutions in native states. The day is probably far distant, it is remarked, when India will be able to dispense altogether with the affiliating university. But it is necessary to restrict the area over which the universities have control, securing in the first instance a separate university for each of the leading provinces, so far as possible on a teaching and residential basis. A university of this new type is being founded at Dacca, and the establishment of universities at the provincial capitals of Rangoon, Patna, and Nagpur is contemplated. The Government is also prepared to sanction, under certain conditions, teaching and residential universities at Aligarh and Benares, and elsewhere as occasion may demand. The importance of secondary- and high-school education as the basis of all professional or industrial training in India is emphasised. Private enterprise in this field is so extensive that of 3,852 high and middle English schools only 286 are Government institutions. Unsatisfactory schools have in certain cases gained recognition and eluded the control of inspection. The Government intends to increase largely the grants-in-aid in order that non-State institutions may keep pace with improvements in Government schools; to multiply and improve training colleges; and to found Government schools where a survey of local conditions leads to the conclusion that they are needed. The provision for technical, industrial, and scientific studies is surveyed, and incidentally the statement is made that "the grave disadvantages of sending their children to England to be educated away from home influence at the most impressionable time of life are being realised by Indian parents."

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, April 24.—Sir Archibald Geikie, K.C.B., president, in the chair.—A. G. **Huntsman**: (1) Protostigmata in Ascidians. (2) The origin of the Ascidian mouth.—F. A. **Bainbridge**, S. H. **Collins**, and J. A. **Menzies**: Experiments on the kidneys of the frog. When the frog's kidneys are perfused through the aorta and the renal portal veins with oxygenated normal or hypotonic Ringer's solution the urine formed is hypotonic to the perfusing fluid and is derived entirely from the glomeruli, since the tubules secrete no urine under these conditions. When the tubules are poisoned with corrosive sublimate or (temporarily) with caffein the urine becomes isotonic with the perfusing fluid. On the contrary, if the glomeruli are killed by the arterial perfusion of boiled Ringer's solution, while the tubules still receive an adequate supply of oxygen through the renal portal veins, the urine formed continues to be more dilute than the perfusing fluid.—Cecil **Revis**: (1) The probable value to *Bacillus coli* of "slime" formation in soils. When kept in sterilised soils, particularly if these contain excreta, *B. coli* shows a great tendency to the formation of "slime," a property which is retained for some time when the organism is plated out on ordinary

nutrient media. It has been found that soils so inoculated with *B. coli*, together with other soil organisms of a sporogenous type, are able to retain and absorb moisture from the air in a remarkable manner, so that during a period of three years flasks containing these soils and only closed with cotton-wool plugs retained and even increased the original water added to them, whilst controls which did not contain the colon organism rapidly dried up.—C. **Revis**: Variation in *B. coli*. The production of two permanent varieties from one original strain by means of brilliant green. From the experiments it appears (1) that from one single cell there may arise new cells differing in the power of resistance to the same environment and consequently modified by it in a different manner; (2) that the exhibition of physiological activity is not an intrinsic and integral part of the protoplasm, but that such powers may be entirely lost without loss of vitality in the organism itself.

Zoological Society, April 15.—Sir J. R. Bradford, K.C.M.G., F.R.S., vice-president, in the chair.—C. Tate **Regan**: (1) Fishes from Easter Island collected by Prof. F. Fuentes. The collection included examples of ten littoral species, four widely distributed in the tropical Indo-Pacific and six new to science; of the latter two were related to tropical forms and the rest to species described from New South Wales or from Norfolk Island. (2) A revision of the fishes of the genus Kuhlia; twelve species were recognised, including three described as new to science.—R. I. **Pocock**: The affinities of *Canis antarcticus*. It was shown that (1) *C. antarcticus* and *C. latrans* are not closely related, as has been claimed; (2) the affinities of *C. antarcticus* lie with certain South American species of Canidæ; and (3) *C. latrans* must be affiliated with the wolves and large jackals of the northern hemisphere. These conclusions were based mainly upon cranial and dental characters, and the points were illustrated by a series of lantern-slides of the skulls of several species of Canidæ.—Major G. E. H. **Barrett-Hamilton** and M. A. C. **Hinton**: A collection of mammals from the Inner Hebrides. This collection was made during an expedition organised and managed by Mr. W. R. Ogilvie-Grant. Three new forms were discovered: of these one (*Sorex grantii*) is regarded by the authors as an insular development of *S. araneus*, whilst they are inclined to think that the other two (*Evotomys alstoni* and *Microtus agrestis macgillivrai*) are slightly modified survivals from the Pleistocene period. The authors argue that the evidence shows that Islay, and perhaps Jura, were separated from the old Hebridean land-area as well as from the mainland of Scotland earlier than were the other islands. Secondly, they think it likely that the severance of the Hebridean district transpired before that of the Orkneys. Lastly, they consider that the evidence of the mammals supports the suggestion of a former direct land-connection between western Norway and the Hebrides, put forward by Stejneger.—R. **Lydekker**: *Bubalis caama selbornei*, subsp. n., a male hartebeest from the Transvaal.

Royal Meteorological Society, April 16.—Mr. C. J. P. Cave, president, in the chair.—W. H. **Dines**: The vertical distribution of temperature in the atmosphere and the work required to alter it. It seems likely that the vertical distribution of temperature is the result of two opposing tendencies, one the effect of radiation, and the other the forced mixing produced by the general circulation, aided perhaps by the convection caused by the heating of the earth by solar radiation and by the latent heat set free by condensation.—J. E. **Clark** and R. H. **Hooker**: Report on the phenological observations for the year ending November, 1912. The chief factors affecting the field crops were probably the dry warm April and May, followed by the cold wet sunless summer. The spring was perhaps the more important of the two; it affected the corn crops and the hay. All the crops in the United Kingdom were below the average of the preceding ten years, although in Great Britain alone meadow hay was a little better than usual, and hops were also above the mean by fully 23 per cent. The harvest of 1912 must thus be classed as very deficient, and one of the worst experienced for many years.—R. **Corless**, G. **Dobson**, and Dr. C. **Chree**: Meteorological, electrical, and magnetic observations during the solar eclipse of April 17, 1912. The observations discussed were mostly made at the Meteorological Office, South Kensington, and Kew Observatory. The temperature fell nearly 3° during the eclipse, the minimum occurring ten minutes after the maximum phase. At stations in the south of England the loss of recorded sunshine due to the eclipse varied from about twenty to twenty-five minutes.

DUBLIN.

Royal Irish Academy, April 14.—Rev. Dr. Mahaffy, president, in the chair.—H. **Kennedy**: The large ions in the atmosphere. This paper is a continuation of work by Prof. McClelland and the author. The previous work had reference to the air of the city, and it was suspected that flames of various sorts were chiefly responsible for the large ions observed. This view was supported by laboratory experiments showing that ions of the same mobility (1/2000 cm. per sec.) were present in flame gas when allowed to cool. Observations were therefore made at Dalkey, about eight miles from Dublin, at a point on the coast, so that tests could be made of air from over the sea, from country districts, or coming from the city. The average number of large ions per c.c. previously observed in Dublin was 16,000, with a maximum of 54,000. At Dalkey the average was about 1000, and numbers as low as 200 were observed. Only when the air was coming from the city to the place of observation or during fogs were large numbers observed. The paper also contains further data on the relation between the numbers of small and large ions present. The small ions increase in number with the decrease of large ions present.—R. **Southern**: (1) Oligochæta (Clare Island Survey); (2) Gephyrea (Clare Island Survey). (1) Oligochæta. Thirty-four species were recorded. The earthworm fauna of Clare Island was poor, only fourteen species being found. Two new species of the family Enchytræidæ were described, the first, *Enchytraeus cliarensis*, living in weeds on the shore. The second species was of considerable interest, being the first undoubted Oligochæte found below low-water mark. Its remarkable characteristics necessitated the creation of a new genus, and the species was named *Grania maricola*. It was dredged in twenty-four fathoms in Clew Bay. It is closely related to *Enchytraeus monochaetus*, described by Michaelsen from South Georgia, an island in the South Pacific, a species which evidently belongs to the genus Grania. The chief character of the genus is the great reduction in the number of setæ, which are quite absent from the anterior end of the body. (2) Gephyrea. Ten species were recorded from the district. The most interesting were *Aspidosiphon müller*i, Diesing, and *Phascolosoma intermedium*, a new species dredged in twenty-four fathoms, showing characters intermediate between the genera Phascolosoma and Phascolion.

PARIS.

Academy of Sciences, April 21.—M. F. Guyon in the chair.—A. **Haller**: The formation of tetra-alkyl derivatives of *cyclo*hexanone and β-methyl*cyclo*hexanone and of trialkyl derivatives of menthone.

Using the method with sodium amide, previously described by the author, all of the four hydrogen atoms of the two carbon atoms adjacent to the ketone group can be replaced by methyl or allyl; the introduction of the ethyl group offers difficulties. Full details of the preparation and properties of the compounds obtained by the application of the reaction are given in the paper.—M. de **Forcrand**: Thermochemical study of uranyl nitrate and its hydrates.—M. **Sabatier** was elected a member of the section of non-resident academicians, and M. Jules Boulvin a correspondant for the section of mechanics.—H. **Burkhardt**: A theorem on the gamma function.—Michel **Petrovitch**: The entire transcendentals generalising exponential and trigonometric functions.—A. **Bilimovitch**: Conservative non-holonomial systems with linkages dependent on the time.—Jules **Andrade**: Friction and isochromism of the double spiral. A remarkable property of a group of double spirals suitably chosen. A solution of a problem in chronometry.—Louis **Roy**: The motion of indefinite viscous media.—L. **Décombe**: The electronic theory of gravitation.—Henri **Bénard**: The structure of vortices behind an obstacle. The motion has been studied with the aid of the kinematograph, and a reproduction of a film is given.—C. **Dauzère**: A new species of cellular vortices. A study of the eddies produced in the surface of molten stearic acid.—M. **Deslandres**: Remarks on the preceding communication of M. Dauzère, pointing out the analogy between the phenomena observed by M. Dauzère and those occurring in the atmosphere.—A. **Blondel**: The nitometer, an apparatus for rapidly measuring the brilliance of a luminous surface.—G. **Sizes**: The transversal vibrations of strings.—A. **Portevin**: The elastic limit of alloys. The method used was based on the appearance of the slip bands on the polished surface of the specimen. Six reproductions of microphotographs illustrating the results obtained with different alloys are given.—Georges **Charpy** and André **Cornu**: The transformations of the alloys of iron and silicon. The measurement of the coefficient of expansion of the alloy was utilised as a means of following the transformations instead of the more usual cooling velocity. The critical points obtained by the two methods do not agree.—Daniel **Berthelot** and Henry **Gaudechon**: The dissociation of gaseous compounds by light. The gases ammonia, phosphoretted hydrogen, arseniuretted hydrogen methane, silicon hydride, zinc ethyl, phosgene, sulphur hexafluoride, were submitted to the light from a mercury-vapour lamp. Of these sulphur hexafluoride and methane were the only gases unaffected.—Ch. **Maguin**: The orientation of liquid crystals by sheets of mica.—G. **Lafon**: The use of fat in the animal organism. Fats can be utilised directly, similarly to glucose, particularly in muscular work.—E. **Wertheimer** and G. **Battez**: The mechanism of the salivary secretion produced by the injection of saline water into the vessels. It is shown that the action is almost entirely due to the effects on the nerve system.—André **Mayer** and Georges **Schaeffer**: Lipocytic coefficients and the imbibition of living cells by water. It is proved that there is a numerical relation between the lipocytic coefficient of tissues and their maximum imbibition by water.—Maurice **Arthus**: Experimental researches on the poison of *Buthus quinquestriatus*.—L. C. **Soula**: The relations between anaphylaxy, immunity, and autoproteolysis of the nervous centres. The state of anaphylaxy is accompanied by a marked increase of autoproteolysis of the nerve centres.—Marcel **Belin**: The relations existing between anaphylaxy and immunity. A study of the effect of the injection of oxidising agents on the toxines of tetanus, colibacillus, and vaccine.—Albert **Robin**: The metabolism of the urinary chlorides in cancerous subjects.—Em. **Bourquelot** and Em. **Verdon**: Researches on the biochemical synthesis of β-methylglucoside in a neutral fluid, not taking part in the reaction. This synthesis can be effected by emulsin in aqueous acetone solutions.—E. **Kayser**: Contribution to the study of ropy beer.—Venceslas **Moycho**: Study of the action of ultra-violet light on the ear of the rabbit. The influence of intensity and of intermittent radiations. A continuation of work described in an earlier paper.—Œchsner de **Coninck**: The presence of propionic acid in the secretions of rheumatic subjects. Propionic acid was isolated from the urine.—G. R. **Blanc**: Parasitic typhlitus of the Nandou. The disease appears to be due to a new species of Heterakis, for which the name *H. parisi* is proposed.—Raphael **Dubois**: A micrococcus from the calcareous concretions of tuberculous origin.—J. A. **Samuels**: Cytological studies on the relations existing between the nucleus and the development of crystals in the parenchymatous cells of the perianth of Anthurium.—François **Bochin**: Hydrographical phenomena in the western region of the Paris basin.—Louis **Mengaud**: Contribution to the study of the Wealdian in the province of Santander.—Edmond **Bordage**: The Eocene gulf of Royan.—Jacques **Deprat**: The geology of Tonkin.—Ph. **Négris**: Contribution to the geology of Greece.—F. **Dienert**: The use of absorbent pits. A reply to a communication of M. Dollfus relating to a means of combating floods in the Paris basin.—A. **Boutaric**: A relation between the atmospheric absorption and the polarisation of light diffused by the sky.

BOOKS RECEIVED.

Life and Evolution. By F. W. Headley. New edition. Pp. xx+272+plates. (London: Duckworth and Co.) 5*s*. net.

Geologischer Führer für Exkursionen im Wiener Becken. By Dr. F. X. Schaffer. III. Teil. Pp. x+167+x plates+map. (Berlin: Gebrüder Borntraeger.) 5.80 marks.

New Zealand. Department of Mines. Geological Survey Branch. Bulletin No. 15 (New Series). The Geology of the Waihi-Tairua Sub-division, Hauraki Division. By J. M. Bell and C. Fraser. Pp. vii+192+plates. (Wellington: J. Murray.)

Java. Zoologisch en Biologisch. Afledering I.–V. By Dr. J. C. Koningsberger. Pp. 254. (Batavia: G. Kolff and Co.) 5 francs.

Single-Phase Commutator Motors. By F. Creedy. Pp. x+113. (London: Constable and Co., Ltd.) 7*s*. 6*d*. net.

Rainfall Reservoirs and Water Supply. By Sir A. R. Binnie. Pp. xi+157+xvi plates. (London: Constable and Co., Ltd.) 8*s*. 6*d*. net.

Report on the Danish Oceanographical Expeditions 1908–1910 to the Mediterranean and Adjacent Seas. Vol i., Introduction, Hydrography, Deposits of the Sea-Bottom. Pp. 269+xx plates. (Copenhagen: A. F. Host and Son.)

Earthquakes and other Earth Movements. By Prof. J. Milne. Sixth edition. Pp. xvi+388. (London: Kegan Paul and Co., Ltd.)

Mathematics, Science, and Drawing for the Preliminary Technical Course. By L. J. Castle. Pp. vi+149. (London: G. Routledge and Sons, Ltd.) 1*s*. net.

The Game of Mind. By P. A. Campbell. Pp. iii+80. (New York: Baker and Taylor Co.) 75 cents net.

Practical Physiological Chemistry. By S. W. Cole. Third edition. Pp. xii+230. (Cambridge: W. Heffer and Sons, Ltd.) 7*s*. 6*d*. net.

Earthwork Haul and Overhaul, including Economic Distribution. By J. C. L. Fish. Pp. xiv+165. (New York: J. Wiley and Sons; London: Chapman and Hall, Ltd.) 6s. 6d. net.

DIARY OF SOCIETIES.

THURSDAY, MAY 1.

ROYAL SOCIETY, at 4.—Election of Fellows. At 4.30.—The Capacity for Heat of Metals at Different Temperatures: Prof. E. H. Griffiths and Ezer Griffiths.—The Transition from the Elastic to the Plastic State in Mild Steel: A. Robertson and G. Cook.—Studies of the Processes Operative in Solutions. XXVIII. The Influence of Acids on the Rotatory Power of Cane Sugar, of Glucose and of Fructose: F. P. Worley.—The Attainment of High Potentials by the Use of Radium: H. G. J. Moseley.—The Decrease in Velocity of α Particles in passing through Matter: E. Marsden and Dr. T. S. Taylor.

ROYAL INSTITUTION, at 3.—The Progress of Hittite Studies. III. Cults of Northern Syria: Prof. J. Garstang.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—The Use of the Electrostatic System for the Measurement of Power: C. C. Paterson, E. H. Rayner, and A. Kinnes.

LINNEAN SOCIETY, at 8.—The Structure of the Wood of East Indian Species of Pinus: Prof. P. Groom and W. Rushton.—Branching Specimens of *Lyginodendron oldhamium*, Will: Dr. Winifred Brenchley.—A Problem in Weismannism: A. C. F. Morgan.—Note on *Sphenopus marsupialis*: Mrs. L. J. Wilsmore.—Polychæta of the Indian Ocean, with some Species from the Cape Verde Islands—The Serpulidæ, with a Classification of the Genera Hydroides and Eupomatus: Miss Helen L. M. Pixell.—Report on the Arachnida of the Seychelles: S. Hirst.—*Gypsina plana*, Carter: Miss Marjorie Lindsay.—Nitidulæ, Heterocidæ: A. Grouvelle.—Pselaphidæ de l'Archipel des Seychelles: A. Raffray.—Anthribidæ of the Seychelles: Dr. K. Jordan.—Hispinæ from the Seychelles: S. Maulik.

FRIDAY, MAY 2.

ROYAL INSTITUTION, at 9.—Blood Parasites: H. G. Plimmer.

GEOLOGISTS' ASSOCIATION, at 8.—The Farnham Gravel Beds in Relation to Palæolithic Man: H. Bury.

SATURDAY, MAY 3.

BRITISH PSYCHOLOGICAL SOCIETY, at 3.30.—Notes on a Case of Morphomania: Dr. F. Aveling.—Wonder, Fascination, and Curiosity: Prof. Carveth Read.—A New Tachistoscope: Prof. C. Spearman.

ESSEX FIELD CLUB (at the Essex Museum of Natural History, Stratford), at 6.—Annual Meeting.—*Dalyellia diadema*, a Turbellarian New to Britain: H. Whitehead.—Prehistoric Art: S. Hazzledine Warren.

MONDAY, MAY 5.

SOCIETY OF ENGINEERS, at 7.30.—Tidal Waters as a Source of Power: C. A. Battiscombe.

ROYAL SOCIETY OF ARTS, at 8.—Antiseptics and Disinfectants.: Dr. D. Sommerville.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—Frontier Work on the Bolivia-Brazil Boundary: Capt. H. A. Edwards.

ARISTOTELIAN SOCIETY, at 8.—The Notion of the Truth in Bergson's Theory of Knowledge: Miss L. S. Stebbing.

SOCIETY OF CHEMICAL INDUSTRY, at 8.—The Methods and Apparatus used in Petroleum Testing. II. Viscometry: W. F. Higgins.—(1) The Ore Deposits of Hu-Nan and Hu-Peh; (2) Experiments on the Hydrometallurgical Treatment of Slimes: W. R. Schoeller.—Hydrazinel Nitrate: W. R. Hodgkinson.

TUESDAY, MAY 6.

ROYAL INSTITUTION, at 3.—(1) Recent Physiological Inquiries; (2) Equilibrium and the Sixth Sense: Prof. W. Stirling.

ZOOLOGICAL SOCIETY, at 8.30.—Contributions to the Anatomy and Systematic Arrangement of the Cestoidea. X. Two Species of Tapeworms from *Genetta dongolana*: Dr. F. E. Beddard.—Pacific Salmon: an Attempt to Evolve something of their History from an Examination of their Scales: J. A. Milne.—Note on *Peripatoides woodwardii*, Bouvier: Kathleen Haddon.—Field-observations on the Enemies of Butterflies in Ceylon: J. C. F. Fryer.

ROYAL ANTHROPOLOGICAL INSTITUTE, at 8.15.—Some Recent Work on Post-glacial Geology and Anthropology: Rev. Dr. A. Irving.

VICTORIA INSTITUTE, at 4.40.—The Origin of Life: What do we know of it?: Prof. G. Sims Woodhead.

RÖNTGEN SOCIETY, at 8.15.—Theory and Practice in Ray Therapeutics: Dr. H. Johnson.—Demonstration of a New X-Ray Couch: Dr. Hampson.

WEDNESDAY, MAY 7.

SOCIETY OF PUBLIC ANALYSTS, at 8.—A New Apparatus for Maintaining Constant Temperatures: F. H. Dupré and P. V. Dupré.—The Proportionate Determination of Cocoanut Oil and Palm Kernel Oil in Mixtures: H. R. Burnett and C. Revis.—The Composition of Milk.—H. D. Richmond.—Examination of the Oils from *Manihot ceara* and *Funtumia elastica* and a Comparison of their Properties with those of Linseed and Hevea Oils: Dr. Rideal and L. H. D. Acland.—The Recovery of Iodine from Residues: H. W. Gill.

AËRONAUTICAL SOCIETY, at 8.30.—Atmospheric Waves, Eddies and Vortices: Col. H. E. Rawson, C.B., R.E.

ROYAL SOCIETY OF ARTS, at 8.—Life-saving at Sea: A. Welin.

ENTOMOLOGICAL SOCIETY, at 8.—Pupal Coloration in *Papilio polytes*, Linn., and the Larval Habits of the Tineid Moth *Melasina energa*, Meyr.: J. C. F. Fryer.

FARADAY SOCIETY, at 8.—(1) A Re-determination of the Electric Modulus of Aluminium; (2) The Density of Aluminium: Dr. F. J. Brislee.—The Potential due to Liquid Contact. III.: Dr. A. C. Cumming and Elizabeth Gilchrist.—Note on the Electrolytic Determination of Copper in Solutions containing Nitric Acid: Elizabeth Gilchrist and Dr. A. C. Cumming.—New Experiments on Colloids: T. A. Coward.—Overvoltage: Prof. J. W. Richards.

GEOLOGICAL SOCIETY, at 8.—The Bathonian Rocks of the Oxford District: M. Odling.—The Petrology of the Kalgoorlie Goldfield (Western Australia): J. A. Thomson.

THURSDAY, MAY 8.

ROYAL SOCIETY, at 4.30.—*Probable Papers*: The Various Inclinations of the Electrical Axis of the Human Heart: A. D. Waller.—Trypanosome Diseases of Domestic Animals in Nyasaland. III.: *Trypanosoma pecorum*: Surg.-Gen. Sir D. Bruce, Major D. Harvey, Major A. E. Hamerton, and Lady Bruce.—The Excystation of *Colpoda cucullis* from its Resting Cysts and the Nature and Properties of the Cyst Membranes: T. Goodey.—The Experimental Hybridisation of Echinoids: C. Shearer, W. de Morgan, and H. M. Fuchs.—The Action of Radium Rays upon the Cells of Jensen's Rat Sarcoma: Dr. S. Russ and Dr. Helen Chambers.

CONCRETE INSTITUTE, at 7.30.—Shear and Problems arising therefrom: H. K. Dyson.

FRIDAY, MAY 9.

ROYAL INSTITUTION, at 9.—Life History of a Water Beetle: F. B. Browne.

ROYAL ASTRONOMICAL SOCIETY, at 5.

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Editorial and Publishing Offices:
MACMILLAN & CO., LTD.,
ST. MARTIN'S STREET, LONDON, W.C.

Advertisements and business letters to be addressed to the Publishers.

Editorial Communications to the Editor.
Telegraphic Address: PHUSIS, LONDON.
Telephone Number: GERRARD 8830.