THURSDAY, NOVEMBER 16, 1916.

NORTHERN COUNTIES LORE.

(1) *Highways and Byways in Galloway and Carrick.* By the Rev. C. H. Dick. Pp. xxix + 536. (London: Macmillan and Co., Ltd., 1916.) Price 6*s*. net.

(2) *Cleator and Cleator Moor: Past and Present.* By the Rev. Cæsar Caine. Pp. xviii + 475. (Kendal: Titus Wilson, 1916.) Price 21*s*. net.

(1) GALLOWAY, comprising the county of Wigtown and the Stewartry of Kirkcudbright, is probably less pervaded by tourists than any other attractive part of Scotland. Messrs. Macmillan have done well to commit to the Rev. C. H. Dick and Mr. Hugh Thomson the task of dealing with this district in their admirable "Highways and Byways" series, for these two gentlemen between them, one with his pen, the other with his pencil, have produced an ideal volume—not a guide-book in the ordinary sense so much as a *vade mecum* for the traveller. Mr. Dick, while not neglecting the highways, finds his chief delight in the byways and in those great tracts of moorland and mountain which constitute the southern upland of Scotland. Here he pursues his leisurely way, dropping off his bicycle at little wayside inns and lonely shepherds' cottages, at solitary pele-towers and immemorial kirkyards, wherever he may glean armfuls of legendary and historic lore. Galloway was the chief stronghold of the westland Whigs; memorials of the heroes and martyrs of the Covenant are as holy in his eyes as the sculptured crosses of the primitive Celtic church or the ruins of such noble fanes as Sweetheart and Dundrennan.

> Grey recumbent tombs of the dead in vacant places,
> Standing stones on the vacant wine-red moor,
> Hills of sheep, and the homes of silent vanished races,
> And winds austere and pure.

The killing, however, was not all done by Claverhouse and Lagg. The Covenanters did not shrink from shedding blood on occasions.

"Carsphairn abounds in hills of sheep and has its circle of standing stones, but is the only parish in the Glenkens where there is no martyr's grave. The village, however, has its story of the killing time. Pierson, the Episcopal minister, maintained a persecuting policy towards the Covenanters in the parish, and kept Lagg informed of those who absented themselves from church. The people were not cowed, but merely exasperated, and, led by James MacMichael, proposed to make some sort of treaty with the minister to secure peace in the parish. Pierson received a deputation in the manse, but on learning their errand was enraged, would listen to none of their remonstrances, barred the door, and drew out his pistol. Companions of the deputies, who had remained outside, hearing cries from within, broke down the door with MacMichael at their head. He, seeing the pistol outstretched and conceiving his friends to be in imminent danger, shot Pierson dead."

In treating of the scenery of Galloway Mr. Dick deals only with its external beauties and its association with legend and history. In a single volume so full of interesting matter it would be too much to expect detailed notice of fauna and flora. The geology of the district has been admirably explained in Sir Archibald Geikie's "Scenery of Scotland." There is, however, one feature which has long occupied the attention of geologists and deserves notice in any traveller's handbook. The prevailing formation in this region is Lower Silurian, the beds of which are tossed to a height of 2764 ft. in the Merrick, the loftiest summit in southern Scotland. Twelve miles S.S.W. of Merrick stands Cairnsmore-of-Fleet, 2331 ft., an intrusive mass of granite, altering the Silurian beds around it. On the very summit of Merrick lie many huge blocks of Cairnsmore granite, some of them as big as a small cottage. Ice-borne, no doubt, but how have they been carried to an elevation 400 ft. greater than that of the hill whence they came? The easiest explanation is that Cairnsmore has lost much of its original height by sub-aerial denudation.

We have but a single fault to find with Mr. Thomson's masterly pencil sketches, namely, that in his otherwise accurate drawing of the Peter Stone at Whithorn (p. 239) he has left out the Chi-Rho loop on the right of the upper limb of the cross. This is a serious omission, seeing that this feature, derived from the Emperor Constantine's *labarum*, occurs only on two other sculptured stones in Scotland, both in Galloway.

(2) Very different in scope and purpose from Mr. Dick's rambling notebook is the Rev. Cæsar Caine's "Cleator and Cleator Moor," which is a record, historical, industrial, geological, and biographical, of this famous ironfield. The earliest documentary evidence of iron-mining in West Cumberland is a deed of gift by William Earl of Albemarle, who died in 1179, of a mine at Egremont and a forge at Wynefell to the Abbey of Holm Cultram; but relics of the industry in prehistoric and Roman times have been found at Cleator and Furness. Mr. Caine discusses the various theories about the formation of hæmatite ore, such as aqueous deposition in solution, igneous injection, and chemical displacement or substitution, and agrees with J. D. Kendall in regarding the metasomatic replacement of limestone by ferrous carbonate as the prevailing cause, while less frequently hæmatite has probably been deposited in fissures by filtration.

The output from the Cleator mines shows so serious a falling off, namely, from 4,505,951 tons in the decade 1871–80 to 1,266,208 tons in the decade 1901–10, as to indicate the approaching close of the industry at no very distant date. Mr. Caine, however, looks forward to a day when "a man with large means and equal courage to carry out his ideas may bore through the coal measures which are known to overlie the car-

boniferous limestone in a large part of the neighbourhood of Cleator and find immense bodies of ore to reward him."

It is claimed for the Cleator Linen Thread Mill (now included in the great Thread Combine) that it is "the oldest flax-spinning mill in the country, and perhaps in the world." Winding thread on spools was first started here, the thread having previously been done up in hanks. It is strange, therefore, that Mr. Caine, in a dissertation upon place-names, should seek to connect that of a field close to the mill, Linethwaite, with the Anglo-Saxon "linde," a lime tree. It is plain Norse for "flax-field"—*lin-thveit*. A list of the flora and fauna of Cleator is given in an appendix, but it is valueless for any scientific purpose, inasmuch as none but English popular names are given. It does not carry one very far to be told that in this parish are found the linnet, the goose, the orchis, the gentian, etc., with no indication of species.

A COMPOSITE AMERICAN TEXT-BOOK OF GEOLOGY.

A Text-book of Geology. By Prof. L. V. Pirsson and Prof. C. Schuchert. Part i., *Physical Geology*. By Prof. L. V. Pirsson. Pp. vii + 444. Price 10*s*. net. Part ii., *Historical Geology*. By Prof. C. Schuchert. Pp. vi + 405–1026. Price 12*s*. net. (New York: J. Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1915.)

GEOLOGY, being such a many-sided science, is especially handicapped in regard to text-books. It is provided with a library of books dealing with its various subdivisions and aspects, but the provision of an up-to-date manual which deals with the whole range of the subject in about a thousand pages, and of the standard required by students in higher technical schools and by those taking geology as a secondary subject in universities, is a perennial difficulty. Specialisation in geology has gone so far that it is becoming impossible for any one author to deal with the whole science in the detail required in such a work. The new text-book of geology by Profs. Pirsson and Schuchert, with chapters by Profs. Barrell and Lull and Dr. Ulrich, show the effort to overcome this difficulty by joint authorship. That method has its own drawbacks, for it is very difficult thus to secure that unity of view and uniformity of standard which are indispensable in an educational text-book.

The first part of this work, by Prof. Pirsson, deals with physical geology. It is divided into two divisions, dynamical and structural, and in the course of 400 pages gives a most excellent summary of these subjects. Its illustrations are numerous and clear, and are all useful. Those illustrating the geological conditions of arid regions are especially good. His account of the igneous rocks is short and conservative, and British teachers may be grateful for the fact that he does not mention the American classification or adopt its terminology. A few relatively unimportant slips occur, such, for example, as the remark on p. 178 that the one boring in a coral atoll in the Pacific shows a thin cap of coral "on the volcanic rock which forms the main mass." The author attributes (p. 79) the fact that the Caspian is fresher than ordinary seas to the precipitation of its salt in Karabugas; but it would appear more probably due to the former dilution of the Caspian by the Volga. Prof. Pirsson introduces into geology the term "nonconformity" for those varieties of unconformity in which the dip of the formations is visibly different; for the other section of unconformities he accepts Grabau's term of disconformity. His description of potholes as a minor feature would appear to underrate their significance, for their formation is probably the main process by which mountain streams deepen their valleys in hard rock.

The chapter on the formation of mountains is one of the most interesting in the volume. In spite of some American opinions to the contrary, the author concludes that the crust is contracting in consequence of the lessened volume of the earth as a whole; and he is disposed to attribute the shrinkage, not to cooling, but to chemical changes in the internal material. He adopts also the steadily growing view that crustal movements occur with a rhythmic periodic progression; but the author will surprise many of his readers by his conclusion that the earth, "except locally or to a superficial depth, may not be hot, at least in any such sense that it could experience the notable contraction from loss of heat demanded for the origin of the folded ranges" (p. 366). The author refers to recent suggestions throwing doubt on the origin of the West American block mountains by faulting; but he concludes that the dominant processes in the formation of many, if not most, of these ranges are the faulting of the region and the tilting of the blocks. In his classification of mountains it is perhaps a pity that the author has not adopted the usual sequence of terms. He reverses the order of chain and system, and represents several mountain systems as forming a mountain chain; and he continues that a combination of mountain chains constitutes a cordillera. The term "cordillera" seems best restricted to a mountain system such as the Andes, composed of parallel chains.

Prof. Schuchert's part of the work, which is also published as a separate volume, consists of a most interesting series of essays. But it would appear of less use to British students as a college text-book than the first part. It is overweighted at the start by the long hypothetical pre-geological history of the earth. The arrangement of the material, and such illustrations as the portraits of geologists, are less suitable for the technical student than for the general reader; thus most students would probably have found it more convenient to have the descriptive palæontology all

together instead of distributed between the stratigraphical chapters.

Among the excellent features of this part is an explanation of the binomial nomenclature, which students are often expected to understand without any such help; but though the first edition of the "Systema Natura" was published in 1735, that is not accepted as the date of the establishment by Linnæus of the binomial system. The relegation of the technical names of the fossils illustrated in the text to an appendix is symptomatic of the present state of palæontological nomenclature; only general names are given in the legends of the figures. The use of popular names has the drawback that they vary so much locally, and English students are not likely to know what are meant by Sowbugs or Pillbugs (p. 605). The author accepts as undoubted the identification of some impressions in pre-Cambrian rocks of Brittany as radiolaria, though this conclusion is rejected by some who have examined the material. There is less evidence for the author's view that Eozoon is a calcareous alga than for its original reference to the Foraminifera, and it seems rather a "bull" to refer to some of these plants as fresh-water seaweeds.

In the historical geology the chief departures from the usual classification are the adoption of two additional systems; of these the Ozarkian System occurs between the Cambrian and the Ordovician, but as the Beekmantown beds are excluded its value appears doubtful. If the Beekmantown and allied faunas be included in the Ozarkian System a much stronger case could be made out for it. The Lower Cretaceous is raised to a system, the Comanchian, which includes from the Wealden to Albian inclusive. Prof. Schuchert's account of the historical geography is illustrated by admirable maps of geographical distribution; it gives a most useful summary of the stratigraphy of North America, and its up-to-date account of the principles of stratigraphy could be read with advantage by all British teachers of geology; but as the historical geology of the British area is incomplete and less accurate, this part of the volume will be of less value to British students than Prof. Pirsson's section.

The most serious drawback to this valuable text-book is the absence of references.

J. W. G.

RADIOGRAPHIC METHODS.

Localization by X-rays and Stereoscopy. By Sir J. Mackenzie Davidson. Pp. xi+72+xxvi plates. (London: H. K. Lewis and Co., Ltd., 1916.) Price 7*s.* 6*d.* net.

IN this book the author describes in detail several of the methods which have been devised for the accurate localisation of foreign objects in the human body.

The first two chapters deal with the experimental conditions which should be observed in order that good radiographs may be obtained, and with some simple yet excellent experiments illustrating the radiographic advantage of a good focus-point on the anti-kathode. The undesirable effects of secondary radiation receive mention; they are responsible for a good many of the defects which occur in radiographs, and constitute a danger (second only to the primary rays) to the operator, which the author does well to insist upon.

The main facts of X-ray stereoscopy are described and illustrated. By transposition of two stereoscopic photographs the point of view of the observer becomes reversed; some explanation of this would be of great assistance to the beginner.

The advantages of stereoscopy to the surgeon who is to remove the foreign object are obvious, and we agree with the author that some successful method of rendering stereoscopic images upon a fluorescent screen would be a great advance on present procedure. There are, however, many experimental difficulties to be overcome before this can be effected.

The author has done much to elaborate a precise means of localising foreign objects in the human body, and all the details of the "cross-thread" method are entered into. In cases where a foreign body is lodged in the eye or the orbit, precise localisation is absolutely essential; the chapter devoted to such cases is perhaps the best in the book.

The author directs attention to the misleading nature of a single X-ray photograph, but describes a method by which the depth of a foreign body below the surface may be obtained by means of a single X-ray exposure; this method entails the use of two sets of cross-wires which are placed at a known vertical distance apart. An oblique ray from the anti-kathode casts a shadow of the foreign body and of the lower set of cross-wires with respect to the other set of cross-wires, which is in contact with the photographic plate; simple measurements from the single photograph give the vertical depth of the foreign body below any point previously selected on the surface.

The book closes with a series of twenty-one stereoscopic illustrations on plates, which will repay careful study; it is worth noting that stereoscopic vision may be very considerably improved by practice.

Much of the wreckage of human life occasioned by the war would be past repair were it not for the extra vision vouchsafed to the surgeon by X-rays; whether in dealing with projectiles which have entered the body or in the damage to the structures, bony and otherwise, methods have been evolved which enable the surgeon to know exactly where to look and almost as surely what to find. The attitude of the author is that too much information cannot be given to the surgeon thus engaged, and it is safe to say that the methods of localisation described, together with a stereoscopic picture of the foreign body giving its relation to the neighbouring anatomical parts, inspire confidence.

OUR BOOKSHELF.

Economics in the Light of War. By Prof. R. A. Lehfeldt. Pp. 56. (Johannesburg: The South African School of Mines and Technology; London: Wm. Wesley and Son, 1916.) Price 1*s*.

IN this slight, but well-reasoned, essay Prof. Lehfeldt contemplates the influence which the present war has had on economic theory. He deals only with consumption and production, "not," he says, "because the problems of distribution are not urgent, but because there seems to be less that is novel to say about them." This is surely a remarkable finding in view of the experiments in Germany and France. If there be little novel to say, there must then be many striking new proofs of old tenets of belief.

More attention will, Prof. Lehfeldt thinks, have to be given in the future to the human factor in economics. We are beginning to realise the necessity of a qualitative as well as a quantitative analysis of consumption. The human powers of production are more dependent than we have supposed on the human will to produce.

The essay is strikingly sound, if somewhat uninspiring; and it is refreshing after the cant which has been talked on the former and the absurdities which have been written on the latter to read the sound common sense of the author on the two problems of the size of the family and social welfare, and of the influence of taxation for the war loan on supplies of capital. It is, however, presumably popular in purport, and Prof. Lehfeldt does not venture on the treacherous currents of finance. A. L.

Interpolated Six-Place Tables of the Logarithms of Numbers and the Natural and Logarithmic Trigonometric Functions. Edited by H. W. Marsh. Pp. xii+155. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1916.) Price 5*s*. 6*d*. net.

THE publication of these tables helps to mark a change in the use of logarithms, both for teaching and practical purposes. Nowadays most teachers use four-figure tables for teaching purposes, even in the laboratory; on the other hand, the reason given for the issue of this volume is that in many technical problems five significant figures are essential, so that a six-figure table is necessary. The contents of the book are: (1) logs of numbers, with differences and full tables of proportional parts; (2) logarithmic sines, etc., interpolated to the second; (3) natural sines, etc., tabulated to the minute, with proportional part for the second; (4) lengths of circular arcs to radius unity; (5) various tables of length, specific gravity, etc. Change of a leading figure in a mantissa is indicated in an unusually clear way; the figures used are mostly "old faced," and, although rather fine cut, do not seem to be tiring. But in using the tables it will be almost unavoidable to use a card to guide the eye along the lines; this is suggested in the introduction, which gives other useful hints. It seems to us that it would add considerably to the convenience of the book to give the values and the logarithms of certain constants, such as π, e, $\sqrt{\pi}$, Euler's constant, and so on; this would not require more than a page.

The World's Wonder Stories for Boys and Girls. By A. G. Whyte. Pp. xiv+270. (London: Watts and Co., 1916.) Price 6*s*. net.

THESE stories take the form of brightly written and interesting answers to a number of questions propounded by the author. How was the world made? Where did the plants and animals come from? Who was the first man? are specimens of questions which provide the opportunity for giving much biological and geological information, and for introducing a simply worded explanation of evolution.

A second type of question is made to serve another and additional purpose. Where did all the religions come from? Where did the Bible come from? Where did right and wrong come from? are questions asked to enable the author primarily to give moral instruction on a rational basis.

The chapters throughout are written in easy English which young children can understand; the information is correct and modern; and the language is dignified and circumspect. Orthodox teachers and parents whose teaching of morality follows conventional lines would undoubtedly derive benefit from the method of presentation adopted, while no child could read the book without understanding something of the scientific method and what it has accomplished.

Petit Atlas Céleste. By G. Bigourdan. Five charts. Pp. 59. (Paris: Gauthier-Villars et Cie, 1915.) Price 2.75 francs.

AN admirable introduction to the study of the heavens is provided by this little book, which has been prepared by a distinguished member of the staff of the Paris Observatory. The constellations over the entire sky are represented in considerable detail in five excellent maps, the stars being shown in black on a white ground, and names and index letters in red. The introductory text includes a brief history and description of the constellations, and two very useful lists of stars. One of the catalogues is arranged in order of right ascensions, and is notable as indicating the spectra, in addition to the proper names, positions, and magnitudes, of 195 of the principal stars. The other is arranged according to constellations, in alphabetical order, and will be convenient as a means of quickly finding particulars of a star which is indicated only by its constellation and letter. The book is of a convenient size (9 in. × 5½ in.), and may be recommended as a handy work of reference for use in the observatory as well as to beginners in observational astronomy.

LETTERS TO THE EDITOR.

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

The Concilium Bibliographicum of Zürich.

THERE appears to be in England some misapprehension in regard to the Concilium Bibliographicum of Zürich. All zoologists are probably aware that the international agency founded by the International Congresses of Zoology and Physiology has for twenty-one years been concerned in editing the "Bibliographia Zoologica"; but many seem to believe that the ownership has remained vested in the hands of Wilhelm Engelmann, of Leipzig, and that the undertaking has consequently fallen a victim to the war. To give the proper historical perspective to the work, its genealogy may be tabulated as follows:—

Series		Titles
I. ("Bibliotheca historica naturalis," I.)	1700–1846	13,560
II. ("Bibliotheca Zoologica")	1846–1861	40,750
III. ("Bibliotheca Zoologica," II.) ...	1861–1880	125,000
IV. (*Zoologischer Anzeiger*)	1861–1895	115,000
Prior to Concilium ...		294,310
V. ("Bibliographia Zoologica")	1896–	202,500
Total...		496,810

On the death of Prof. J. Victor Carus, in 1903, the Concilium Bibliographicum became sole editor of the "Bibliographia Zoologica"; but the work remained a part of the *Zoologischer Anzeiger*, and was printed and distributed in Leipzig. In 1909 arrangements were made for printing in Zürich. Three years later the Concilium Bibliographicum acquired all rights over the "Bibliographia," and the relationship with the *Zoologischer Anzeiger* was severed. Vols. xxiii.–xxv. (1912–13), however, were still distributed to the book trade through the intermediary of Wilhelm Engelmann, the last part being ready in March, 1914. Vol. xxvi. went to press in April, 1914, and a circular announcing the fact that all services had been brought together in Zürich and that the new volume would be sent only to such as filed a new order was issued in June and July. The vacations and the outbreak of the war have caused this circular to be entirely overlooked, so that many zoologists have fancied that the great historic work had been suspended. This is far from being the case. Despite formidable difficulties, vols. xxvi.–xxix. have appeared, and vol. xxx. is in the press.

There has doubtless been a great falling off in the scientific output of all European countries, and the postal service is to blame for many gaps, but, in general, the experience of the past two years has shown the wisdom of the choice of a small neutral State as the centre for international co-operation. It is also worthy of being pointed out to the world of science that Switzerland, in spite of financial difficulties, which made it necessary for the Government to suspend almost all its support of Swiss science, made an exception for this international agency. The President of the Confederation proclaimed allegiance to the "Red Cross" of science, and our international institute continued to receive State subsidies. At the same time a public subscription brought together the necessary funds for covering the war-time deficit.

HERBERT HAVILAND FIELD,
Director of the Concilium Bibliographicum.
Sunnyside, Mayow Road, Forest Hill, S.E.,
October 31.

Scarcity of Wasps.

JUDGING from the correspondence which has recently appeared in NATURE, the dearth of wasps this autumn in many parts of England has been most pronounced, but I have not noticed any reference to the county of Somerset.

From August 26 to September 12 I was staying, with my wife and son, in a cottage on Christon Hill, on the Mendip Hills, situated between Loxton and Banwell, and although sunshine was only occasional, and rain somewhat frequent and often very heavy, we were simply besieged by wasps, which were particularly tiresome at the breakfast-table. They were so numerous at times, coming in from the open windows, that we frequently had to abandon our meals temporarily to punish the offenders, my son continuing his captures often for half an hour at a time. They were killed by the score daily, but still they seemed to infest everything, not only preserves and other food, but one's clothing also. In neighbouring houses we heard of the abundance of wasps. About 150 yards from our cottage we found a large nest of wasps in a bank by the roadside.

I cannot recollect ever having seen so many wasps in a house, unless it was during the hottest part of 1911 (August 31 to September 9), when I was conducting archæological excavations on Exmoor. At the hotel we were greatly pestered by the quantities of wasps which attacked the food.

H. ST. GEORGE GRAY.

Taunton Castle, November 4.

A Peculiar Thunderclap.

REFERRING to Mr. Don's letter (NATURE, August 17), it may be of interest to note that for many years I have been observing thunderstorms, often from high places on Etna, and from a distance, and I have never seen a lightning flash which was a single one. Lightning flashes from the clouds to the earth are always two, three, or more, either very rapidly repeated on the spot and along the same track, or in different places, sometimes very far apart, and simultaneously.

In connection with the remarks by "H. O. F." (NATURE, August 24), it may be worth mentioning that, as is well known, a lightning stroke induces in volcanic rocks a permanent magnetisation, often strong enough to make the needle of a pocket compass turn through an angle of 180°. From a large number of observations on Etna and Stromboli, my brother, Prof. Gaetano, and I have noted that, when lightning strikes a wall, or a large lava block, or the earth-wire of a lightning rod near a wall, south polarity is found in the lava, or in the bricks of the wall, to the right of the observer, and north polarity to the left. Such a disposition shows that the discharge was from + electricity of the ground to − electricity of the clouds.

Other observations on similar autoregistrations of lightning strokes and of their direction have shown that the discharge from the clouds to the earth is much less frequent than that from the earth to the clouds.

My brother and I will be glad to send our published notes to anyone who cares to have further details on the subject. GIOVANNI PLATANIA.

University of Catania, October 6.

The Pollination of Toadflax.

CAN any reader kindly state—from observation—which insect pollinates the round-leaved toadflax—*Linaria spuria*? S. P.

Linaria spuria, Miller, is a not uncommon weed of cornfields on calcareous soils in the Midlands and south of England, in western, central, and southern

Europe, in northern Africa, and in western Asia, and it occurs adventitiously in North America. I have never observed insects pollinating the flower. The corolla is closed, and probably small insects are unable to effect an entry; there are no "nectar-guides"; the four anthers are adherent, mature simultaneously with the stigma, and dehisce internally. It would seem, therefore, as Kunth ("Handbook of Flower Pollination," English translation by Ainsworth Davis, vol. iii., p. 177) states, that "automatic self-pollination is inevitable." I fear "S. P." will regard this answer to his question as analogous with the dictum: "There are no snakes in Iceland!" C. E. Moss.

Botany School, Cambridge, November 9.

SCIENTIFIC GLASSWARE.

AN interesting account of the efforts which have been made in France to replace glassware for scientific and technical purposes which had formerly been imported from Germany and Austria by home productions is given in an article in the July–August number of the *Bulletin de la Société d'Encouragement pour l'Industrie Nationale*. The article consists of a detailed account of an exhibition of French products of this kind, and affords interesting comparisons with the similar but much smaller exhibition recently held in the rooms of the Institute of Chemistry in Russell Square. The French exhibition included optical glass, and utensils for the heavy chemical trades.

In regard to optical glass, of course, it is not surprising to find that the French are in a far better position than that yet reached in this country. The firm of optical glass manufacturers which was founded in Paris by one of the Guinand family has been steadily developed, and has for years past—under the names of Mantois and latterly of Parra-Mantois—issued lists of optical glasses of a range and quality quite as wide as, and in many respects more satisfactory than, those of Schott, of Jena. It is, in fact, worth while remembering that on many occasions during the twelve or fifteen years preceding the war the British manufacturer of optical glass was confronted with a more serious competition from Mantois than from Schott.

This state of affairs must be held highly to the credit of the French glass-makers, and we see indications of similar skill and enterprise in other directions connected with the glass industry. French plate-glass, associated with the name of the great firm of St. Gobain, has long held a high reputation, while the name of Appert is a household word wherever glass is studied. Accordingly we see in the present record of the French exhibition a most comprehensive list of products of all kinds, including not only laboratory-ware, such as beakers, flasks, etc., but many specialities such as glass for X-ray tubes and glass for serum tubes. The list of exhibitors is so large, the range of products exhibited so wide, and the claims made for the quality of the products so sweeping, that one might well suppose that the French efforts in this direction had been crowned with complete success, and that their industries had been rendered entirely independent of imported goods. It is sincerely to be hoped, in the interests of our Allies, that this impression is correct, and that the ordinary users of this ware are really able to obtain it in the regularity—as regards both quality and quantity—which is essential for practical purposes.

So far as can be judged from the printed descriptions and the photographs with which it is illustrated, the French exhibition was on an altogether larger scale than the one recently held by the Institute of Chemistry. The latter was, in fact, somewhat disappointing as regards both number of exhibitors and range of exhibits. Some very creditable achievements were, of course, represented, particularly in regard to laboratory-ware, such as flasks, beakers, and similar articles. Those exhibited were excellent examples of their kind so far as workmanship and the obvious qualities of the glass are concerned. It was disappointing to find, however, that there was no evidence as to the real qualities of the various articles shown. Public testing laboratories are available in this country perfectly competent to give certificates of quality in regard to all articles of this kind; this being the case, why were not these exhibits accompanied by such certificates showing the behaviour of the glass to chemical reagents and to sudden changes of temperature? In the absence of such evidence we can only hope that the glasses labelled "resistant" are really fairly satisfactory for their purpose, and that the flasks and beakers will stand the usage to which they are of necessity exposed in the laboratory.

Another marked feature of the Institute of Chemistry exhibition was the circumstance that it was confined very largely to the lighter kinds of laboratory-ware. While manufacturers are to be congratulated upon the measure of success which they have achieved in this very important direction, it seems desirable to direct attention to the fact that laboratories cannot exist on light glassware alone. There is a whole range of glass articles of a heavier type which are also necessary—such as desiccators, separating funnels, jars and cylinders, etc.—which were formerly obtained from abroad. So far as the writer is aware, English-made articles of this class are not yet available, although the difficulties of manufacture are probably much less than those connected with ware which has to resist severe physical and chemical conditions.

In conclusion, it may perhaps be suggested that, while a good exhibition is of considerable value in bringing before those interested the best samples of the home products now available, the future of this glass industry and of the technical and scientific operations related to it depends upon a factor which can never be brought out by any exhibition—*i.e.* the steady and regular trustworthiness of the articles produced. In the chemical laboratory, for instance, it becomes a serious matter if at intervals a beaker or a flask should crack at a critical point in a long and delicate

operation. It is only fair to point out that such untoward accidents did occur from time to time when Jena glassware was used, but, broadly speaking, they were rare. It is, of course, too early in their career to pronounce upon the British manufacturers of these goods in this respect, and the matter is only mentioned here in the desire to impress upon them the extreme importance of this factor of uniformity and trustworthiness. Beautiful samples sent for exhibition and specimens sent for trial or test which behave extremely well may serve to initiate trade and to introduce the products, but only complete regularity and dependence will ever succeed in building up a permanent industry and trade in these goods.

PROF. H. H. W. PEARSON, F.R.S.

BY the death of Prof. H. H. W. Pearson, which occurred on November 3 at the Mount Royal Hospital, Wynberg, Cape Colony, South Africa is deprived of one of the ablest and most popular of her scientific men, and botanists have lost a colleague richly endowed with the qualities which go to make an ideal student of Nature.

Harold Henry Welch Pearson was born at Long Sutton, Lincolnshire, in 1870; he was privately educated; after holding a teaching post in an Eastbourne school he entered the University of Cambridge as a non-collegiate student, and later became a member of Christ's College, where he remained until his election to the Frank Smart studentship, which necessitated migration to Gonville and Caius College. His Cambridge career was a series of successes: in 1899 he was awarded the Walsingham medal for work in Ceylon on the vegetation of the Patanas. In 1898 he was appointed curator of the Cambridge Herbarium, and in 1899 he joined the staff of the Kew Herbarium. In 1902 he was appointed professor of botany at the South African College, Cape Town, where he laboured with conspicuous success up to the time of his death. He was elected into the Royal Society in the present year. Though the double responsibilities of the professorship and the Botanic Garden were no light burden, Pearson enlisted as a trooper in a Local Defence corps.

Full advantage was taken of the splendid opportunities of exploration afforded by South Africa, and Pearson proved himself to be an explorer of the best type; he visited Damaraland four times, and in January of this year he wrote home from Windhoek after a particularly arduous journey undertaken with the fullest approval and support of General Botha. He also explored Namaqualand, Bushmanland, Angola, and other regions, always returning with valuable booty, of which he made the best use both by his own researches and by generous gifts to institutions and other botanists. Pearson's expeditions were readily assisted by scientific bodies, and especially by the Percy Sladen Trustees, whose liberal contributions were well earned and thoroughly appreciated. His first paper (1898) dealt with the anatomy of the seedling of the Cycad Bowenia, and in 1899 the Linnean Society published the results of his field-work in Ceylon. In 1902 he wrote on the double pitchers of a Dischidia.

Pearson's most important work is on Welwitschia and Gnetum; he not only greatly extended our knowledge of these Gymnosperms, but with conspicuous ability demonstrated the nature of the "endosperm," for which he proposed the term trophophyte. Pearson's more recent contributions have strengthened his position on the vexed question of the degree of affinity of the Gnetales to the Angiosperms. In one of his most recent letters Pearson referred to the MS. of a promised volume on the Gnetales as almost complete. Observations on South African Cycads, investigations on the common maize disease caused by the root-parasite *Striga lutea*, an account of the Thymeleaceæ in the Flora of Tropical Africa, a paper on the internal temperature of Euphorbia and Aloe, and well-written descriptions of travels illustrate the wide range of his activities.

The greatest service rendered by Pearson to South Africa was the part he played in the foundation of the National Botanic Garden, and it was his tactful and untiring efforts which led the Government to set apart about 400 acres on the Kirstenbosch estate, on the east side of Table Mountain, for a National Garden, of which he was appointed honorary director in 1913.

Pearson was a botanist of many parts, and a man who inspired affection in an unusual degree by his geniality, honesty of purpose, and boyish enthusiasm. He recognised the almost unlimited possibilities of botanical and economic developments through the Kirstenbosch Garden, and it is for his successors to do their part in carrying out the broadly conceived scheme of the first director. In a letter dated July, 1913, he wrote: "It will be a great burden, but it is worth carrying, even if it never falls to me to exploit its contents."

A. C. SEWARD.

PROF. HENRIK MOHN.

THE death of Henrik Mohn, on September 12 at Christiania, removes from the meteorological world a very well known and popular figure. Born at Bergen on May 15, 1835, he had completed his eighty-first year. He took part in all international assemblies of meteorologists from the commencement of the series of 1873 until the meeting of the International Meteorological Committee at Rome in 1913, when he excused himself on account of the long journey. Shortly afterwards he retired from his appointment as director of the Norwegian Meteorological Service and professor in the University of Christiania, which he had held since 1866. He maintained his scientific activity to the end of his life. His most recent work was the discussion of the meteorological observations of Amundsen's expedition to the South Pole, which was published in 1915. It displays remarkable ingenuity in giving a con-

nected meteorological account of the conditions near the Pole based upon a very limited number of data, but with true insight.

Mohn's best-known work is a text-book of the principles of meteorology, which passed through many editions and was translated into almost all European languages except English. By the series of papers on the movement of the atmosphere,[1] written in collaboration with C. M. Guldberg, and published in Christiania in 1876 (revised 1883), he became one of the most successful exponents of dynamical meteorology. His institute was prominent among its fellows for the excellence of its regular publications and the promptitude with which they were issued. He was a strenuous advocate of the use of the hypsometer for absolute determinations of pressure; and on the occasion of a visit to England he took the opportunity of making a comparison between barometric standards by that method, which agreed with direct comparisons within a thousandth of an inch.

Mohn's published papers are very numerous and cover all sections of meteorological science. He was the author of the article on the geography of Norway in the ninth edition of the "Encyclopædia Britannica" and a number of articles on the climate of Norway. He had a remarkably close grip of the conditions and limitations of meteorological observations and observers, and on that account was a most valued member of the International Meteorological Committee and of the various conferences and congresses at which the principles and the programmes of international co-operation were discussed. His personal qualities secured for him universal esteem as the *doyen* of international meteorologists. He was generally chosen by the Norwegian Academy as one of its representatives at international celebrations. The regret called forth by his retirement on account of his advancing years was revived and heightened by the news of his death. NAPIER SHAW.

NOTES.

WE learn with much regret of the death, on November 12, at sixty-one years of age, of Prof. Percival Lowell, director of the Lowell Observatory, Flagstaff, Arizona, where his notable work on Mars and other planets has been carried on since 1894.

HIS MAJESTY THE KING has been pleased to approve of the following awards this year by the president and council of the Royal Society:—A Royal medal to Dr. J. S. Haldane, for his services to chemical physiology, more especially in reference to the chemical changes of respiration; a Royal medal to Prof. H. M. Macdonald, for his contributions to mathematical physics. The following awards have also been made by the president and council:—Copley medal to Sir James Dewar, for his investigations in physical chemistry, and more especially his researches on the liquefaction of gases; Rumford medal to Prof. W. H. Bragg, for his researches in X-ray radiation; Davy medal to M. le Prof. H. L. le Chatelier, for his researches in chemistry; Darwin medal to Prof. Yves Delage, for his researches in zoology and botany; Sylvester medal to M. J. Gaston Darboux, for his contributions to mathematical science; Hughes medal to Prof. Elihu Thomson, for his researches in experimental electricity.

THE following is a list of those who have been recommended by the president and council of the Royal Society for election into the council at the anniversary meeting on November 30:—*President,* Sir J. J. Thomson; *Treasurer,* Sir A. B. Kempe; *Secretaries,* Prof. A. Schuster and Mr. W. B. Hardy; *Foreign Secretary,* Prof. W. A. Herdman; *Other Members of the Council,* Prof. J. G. Adami, Dr. H. T. Brown, Dr. Dugald Clerk, Prof. A. R. Cushny, Prof. A. Dendy, Prof. P. F. Frankland, Prof. J. W. Gregory, Dr. H. Head, Mr. J. H. Jeans, Major H. G. Lyons, Major P. A. McMahon, Prof. F. W. Oliver, Prof. C. S. Sherrington, Prof. A. Smithells, Hon. R. J. Strutt, and Mr. Richard Threlfall.

ELEVEN members of Sir Ernest Shackleton's Antarctic expedition arrived in London last week, including Mr. Frank Wild (second in command), Messrs. J. Wordie, R. S. Clark, R. James, L. Hussey, and G. Marston (of the scientific staff), Major Orde Lees (motor engineer), and Messrs. A. Macklin and J. McIlroy (surgeons). The remaining members of the Weddell Sea party will arrive shortly, with the exception of Sir Ernest Shackleton, who is on his way to New Zealand to join the *Aurora*. In an interview in the *Daily Chronicle* Mr. Wild gives some account of the experiences. The *Endurance* was nipped in the ice four months before she eventually sank, and the explorers fortunately had ample time even at the end to remove stores and equipment to the ice. With these stores, and meat provided by shooting the dogs, as well as a few seals and penguins, they managed to survive. On Elephant Island, with its scanty resources, the food problem caused grave anxiety, for the stores were running low. We have not heard any details as yet about the scientific results, but they must be considerable, at least in oceanography and meteorology. A number of kinematograph films have been brought back, including views of the crushing of the *Endurance*, the abandoning of the ship and her foundering, as well as of the explorers' life on the drifting ice-floe and on Elephant Island.

THE Women's National Land Service Corps has just issued an interim report on the work of the last eight months. This organisation is recognised by the Board of Agriculture and has received a Government grant. It has endeavoured to create a favourable opinion as to the value of women's work in agriculture by supplying a body of workers capable of making a good impression, and so break down the prejudice of those farmers who are opposed to the employment of women. From the start the selection committee has spared no pains to prevent unsuitable women from going on the land, with the result that, considering the difficulties involved, the number of failures has been extraordinarily small. The corps has several training centres in different parts of the country, where women are given short courses of instruction in farm work. Besides supplying labour units to farmers, another, and perhaps more important, branch of the work has been directed against the view, widely held in the rural districts, that work on the land is derogatory. The interesting letters appended to the report give a very clear idea of this difficulty. The corps is urgently in need of more recruits to meet the demand from farmers which cannot now be met, and is certain to become greater after January 1, 1917, when exemptions of agricultural labourers are to be reconsidered. The secretary of the corps is Miss A. C. Franklin, and the headquarters are at 50 Upper Baker Street, London, N.W.

[1] An English translation is given in Abbé's "Mechanics of the Earth's Atmosphere." Third Collection. (Smithsonian Institution, 1910.)

AN inter-departmental committee, presided over by Mr. Harcourt, has now arranged the respective spheres of work and co-operation, in dealing with commercial inquiries, of the new Commercial Intelligence Department of the Board of Trade and the Imperial Institute, which in recent years has become a central department for information and investigation respecting the sources and uses of the raw materials of the Empire. In future the Technical Information Bureau of the Imperial Institute will answer all commercial inquiries respecting the sources of supply, technical uses, and value of raw materials within the Empire, and will be responsible for supplying all information required in order to bring the producer overseas in touch with the manufacturer at home. Inquiries as to immediate supplies may be addressed either to the Board or to the Institute, as may be most convenient, but the Commercial Intelligence Department of the Board of Trade will as a rule be prepared to deal with inquiries for immediate supplies of well-known raw materials which can be obtained at once through ordinary trade channels. In answering those inquiries in which special statistical or trade information is required, in addition to technical information, the Board and the Institute have arranged to co-operate. Investigations of the possible industrial uses of raw materials will, as heretofore, be dealt with by the Imperial Institute. The arrangement proposed by the committee has now been accepted by the Secretary of State for the Colonies, the President of the Board of Trade, and the Executive Council of the Imperial Institute.

DR. HENRY HEAD, F.R.S., has been appointed a member of the committee to inquire into the position occupied by natural science in the educational system of Great Britain.

WE regret to announce the death on November 13 of Mr. Charles Smith, master of Sidney Sussex College, Cambridge, and author of many well-known works on mathematics, at seventy-two years of age.

THE Stockholm correspondent of the *Morning Post* states that the Nobel prize for physiology for 1916 will probably be awarded to Prof. H. J. Hamburger, of Groningen University. It is stated that the Swedish Academy of Sciences has decided not to award this year the Nobel prizes for physics and chemistry.

MR. R. N. DOWLING, organiser of agricultural education to the Lindsey County Council, Lincs., has been appointed director of the first Government farm colony for ex-service men in the East Riding of Yorkshire. An account of the Government scheme for the establishment of this land-settlement colony was given in NATURE of October 26, p. 152.

AT a recent meeting of the Optical Society the election to honorary membership took place of Sir Frank Dyson, Astronomer Royal, Prof. R. A. Sampson, Astronomer Royal for Scotland and professor of astronomy in the University of Edinburgh, and Prof. H. C. Plummer, Royal Astronomer of Ireland and Andrews professor in the University of Dublin.

THE Maria Mitchell Memorial Astronomical Fellowship at Harvard Observatory, value 100*l*., is offered to a woman for the year beginning September 15, 1917. The fellowship at all times must be used for purposes of serious study, and the fellow should be as free as possible from other responsibilities. Application must be in the hands of the secretary of the committee, Mrs. Charles S. Hinchman, 3635 Chestnut Street, Philadelphia, Pennsylvania, on or before April 1, 1917.

THE next award of the quinquennial Cartwright prize of the Royal College of Surgeons of England will be for the five years ending December 31, 1920. The prize consists of a medal in bronze and an honorarium of 85*l*. The subject for the competing essays is "The Treatment of Injuries of the Jaws, and the Restoration by Mechanical Means of Parts of the Jaws Lost as the Result of Injury or Removed on Account of Disease." Further particulars of the competition are obtainable from the secretary of the college.

IT had been proposed to establish a whaling station with its accompanying works near Fiskebäckskil, on the Gullmar fjord, north of Gothemburg, but the Swedish Government has now placed its ban on any such handling within Swedish terrritory of right whale, sperm whale, or beaked whale. This decision will be welcomed by the workers at the neighbouring biological station of Kristineberg, as well as by all naturalists who wish for some limit to be set to the chase of these interesting and threatened animals.

THE introductory lecture of a course of twelve lectures (the Swiney Lectures on Geology) on "The Mineral Resources of Europe" was delivered by Dr. J. S. Flett, at the Royal Society of Arts, on Tuesday, November 14. The remaining lectures will be given on Tuesdays, Thursdays, and Fridays, at 5 p.m., until Friday, December 8. The subjects to be dealt with are coal resources, petroleum, iron ores, copper, tin, manganese, lead, the precious metals, and the salt deposits of Germany, France, and Britain. The lectures will be illustrated by lantern-slides, and admission to them is free.

AT the anniversary meeting of the Mineralogical Society held on November 7 the following were elected officers and members of council:—*President*, Mr. W. Barlow; *Vice-Presidents*, Prof. H. L. Bowman and Mr. A. Hutchinson; *Treasurer*, Sir William P. Beale, Bart.; *General Secretary*, Dr. G. T. Prior; *Foreign Secretary*, Prof. W. W. Watts; *Editor of the Journal*, Mr. L. J. Spencer; *Ordinary Members of Council*, Capt. W. Campbell Smith, Dr. J. W. Evans, Dr. F. H. Hatch, Mr. J. A. Howe, Mr. T. V. Barker, Mr. G. Barrow, Prof. C. G. Cullis, Mr. F. P. Mennell, Mr. H. Collingridge, Mr. T. Crook, Dr. G. F. Herbert Smith, and Dr. H. H. Thomas.

CAPT. R. W. NICHOLS, who was killed in action on October 23, at thirty-one years of age, entered the service of Messrs. Arthur Guinness, Son, and Co., Ltd., at the age of fifteen. On the formation of the Guinness Research Laboratory in 1901 Capt. Nichols was employed as assistant to Mr. F. Escombe. In all work in connection with this he showed conspicuous ability. He left the service of Messrs. Guinness about five years ago, and, after a short service with an English firm, emigrated to Canada, and soon obtained a position at the Agricultural Station at Ottawa, where he was employed up to the time of joining the Army. Capt. Nichols was an extremely keen worker, and his cheerful temperament gained him a great number of friends. His loss will be deeply regretted by all his associates.

IN the Scottish lighthouse service there have been for many years a number of lightkeepers interested in natural history, especially in bird-life, who have contributed valuable records on the migratory movements of birds to the annual reports on Scottish ornithology. One of these has just passed away in the person of Mr. J. M. Campbell, who was, besides, keenly interested in the study of marine life, for which his nine years' residence on the Bell Rock afforded him ample opportunities. In 1904 he published a well-written volume on the "Natural History of the Bell Rock," in which he described, month by month, the

seasonal fluctuations of the invertebrate life exposed at low tides on the rocks around the lighthouse, and of the birds visiting it and the lantern. On his transference to the Bass Rock he turned his attention to the hosts of sea-fowl resorting to that famous nesting haunt, more particularly to the gannet, on which he contributed many valuable notes to Mr. Gurney's monograph of that bird. Mr. Campbell also made some useful contributions to Mr. Evans's papers on the moths occurring at the lanterns of the northern lighthouses, which recently appeared in the *Scottish Naturalist*.

By the death on November 5, after a long illness, of Prof. H. M. Waynforth—until recently professor of engineering in King's College, London—engineering teaching has suffered a great loss. Born in 1867, Prof. Waynforth was educated at the Haberdashers' School and at the Finsbury Technical College, his apprenticeship being served at Messrs. Bennett and Sons, engineers. He was assistant to Prof. Perry at Finsbury for some time, after which he went to Mason College, Birmingham, as demonstrator in engineering, leaving Mason College to join the engineering staff of King's College, London, in 1896. He was appointed assistant-professor of engineering in 1902, and University professor in 1912. His work for engineering teaching in the University of London was most valuable and important. The present syllabus for the B.Sc. degree in engineering, especially in theory of structures, strength of materials, and theory of machines, owes much to his energy and professional ability. An eminently practical man, he laboured assiduously to keep the syllabus as practical as possible, and at the same time to maintain a high standard of academic attainment. He did a good deal of original work on the testing of materials, but it will be as a great teacher that he will be best remembered. His lectures at King's College were marked by great freshness and vigour, and his breadth of mind and cordial sympathy endeared him to all his students. His loss will be felt by his old colleagues at King's College and in the University of London, but he will be especially mourned by the large number of King's College men who now, on many battle-fronts and in the Grand Fleet, are applying the principles he taught so well to the engineering problems of the war.

The Kelvin lecture delivered before the Institution of Electrical Engineers on November 9 by Dr. Alexander Russell dealt with some aspects of Lord Kelvin's life and work. After giving a short account of his early life, Dr. Russell showed how, in many fields of fundamental importance to the electrical engineer, Lord Kelvin's work had provided the basis on which his successors had built. His solution of the problem of the transmission of signals along a submarine cable given in 1851 only requires a slight extension to make it suitable for the electric transmission of power in a three-phase system, while his proof that the temperature of a heated body may be less when it is surrounded by a bad conducting covering than when it is left bare has been reproduced by others as a new discovery. Many of the theoretical extensions of Lord Kelvin's work we owe to Dr. Russell himself, as, for example, the calculation of the force between electrified spheres. As, in addition, he is a former pupil of Kelvin, it would have been difficult to find one more fitted than Dr. Russell to treat of Lord Kelvin's work with understanding and with sympathy. As a teacher of the natural philosophy class at Glasgow University, with pupils whose principal ambition was to pass the M.A. examinations, Lord Kelvin was to a great extent wasted. If he could have spent his time in inspiring with his own spirit and enthusiasm for research a selected body of students more capable of appreciating his genius, how much richer science would have been. May we hope that by the time another Kelvin appears we shall have learnt how to utilise his powers to greater advantage than in preparing undergraduates for their degree examinations.

At the annual meeting of the Society for Extending the Rothamsted Experiments, held on November 6, Mr. J. F. Mason, M.P., being in the chair, an address was given by the Rt. Hon. the Earl of Crawford and Balcarres, President of the Board of Agriculture, who sketched briefly the history of the Rothamsted Experiment Station and the part it has played in the development of British agriculture. During the war the work of the station has necessarily been modified. Two-thirds of the total staff are either fighting or engaged on direct war work, the special experience gained at Rothamsted having proved unexpectedly useful in certain highly important directions. Some of the staff hold commissions in the Sanitary Corps; some are engaged under the Ministry of Munitions in the large-scale manufacture of a certain indispensable constituent of high explosives; while some are fighting in infantry regiments. Those left at the laboratory are kept occupied with special inquiry work sent in by the Board of Agriculture and other departments. Nevertheless, the ordinary work is still being continued. Women workers have come in to take the place of some of the men who have gone, and they are keeping nearly all the lines of experiment alive, so that not only is nothing being lost, but steady progress in the experiments is being made. The whole of the organisation is thus being kept in working order, and in readiness for full development to deal with the problems of the new situation which will undoubtedly arise after the war. The director of the station, Dr. E. J. Russell, was able to announce some handsome gifts during the year, including 1000*l.* from the widow and daughter of the late treasurer, Dr. Hugo Müller; 300*l.* from the Carnegie Trustees for the purchase of books for the library; 232*l.* from the Rt. Hon. Sir John T. Brunner, P.C., for furnishing the library; as well as other gifts for the laboratories and the library. The sum of 500*l.*, needed to clear off the Building and Equipment Fund, was raised at the meeting on November 6.

In the third issue of *Folk-lore* for the current year Mr. S. A. H. Burne discusses some examples of survivals of folk memory in Staffordshire. Thus he points out that local tradition describes with some correctness Cromwell's action in regard to the rights of freeholders in Needwood Forest, and a local rhyme, still current, expresses the popular joy at the Restoration, the despotism of the Executive under Cromwell being much disliked. The idea, still prevalent, that the corpse of a person dying through violence should not be touched before the arrival of the police is traced back to medieval criminal procedure, which imposed a certain presumption of guilt upon the first finder of a dead body. Hence it was manifestly wise to let someone else discover it, and the current idea is a survival from coroners' law in the Middle Ages.

The tests used for determining colour vision and tactile discrimination by the Cambridge Anthropological Expedition to the Torres Straits fifteen years ago are criticised in great detail by Prof. E. B. Titchener in the Proceedings of the American Philosophical Society (vol. lv., No. 3). The findings of this expedition have been so often quoted, and so many generalisations from these tests made about the native mind, that the writer of the paper thinks that more attention should be paid to the technique and suitability

of the tests. He criticises Dr. McDougall's use of the æsthesiometer from the point of view of method, and the apparatus chosen by Dr. Rivers to test colour vision. If the tests themselves are faulty, then the generalisations based on them are invalid, and the writer thinks that the Murray Islanders ought not to be judged by these experiments. Anthropologists and ethnologists will find the whole article of interest.

ALTHOUGH the lack of a definition of disease does not prevent the practice of medicine, the amount of litigation which has recently arisen about medical matters, such litigation turning upon the meaning of terms like injury, accident, disease, etc., necessitates the accurate definition of such terms. It is the object of an article by Dr. Charles Mercier in the October number of *Science Progress* to define "a disease." Every part of the human body has a duty towards the whole, which Dr. Mercier calls its extrinsic function, and a duty towards itself (which consists in making good the waste consequent on the performance of its extrinsic function), its intrinsic function. When the intrinsic or extrinsic function of a part of the body is disordered or defective, there is usually some sign of such disorder or defect. The sign may be perceptible to the patient alone, to bystanders alone, to a skilled physician alone, or to all three. Such a sign is termed a symptom. Disease is a term covering not only all disorders of function and all symptoms, but also all results of disorder of function. Indigestion, a disorder purely of extrinsic function; atrophy, a disorder purely of intrinsic function; albuminuria, a result of disorder of extrinsic function; cancerous breast, a result of disorder of intrinsic function; and pain, are all disease. But none of these is "a disease." Diseases may become symptoms, but the only way they can do so is in the way we contemplate them. Certain things sometimes called diseases are not diseases. Structural disease is not "a disease"; thus a cancerous liver may be removed from a dead body and preserved in spirit, and it would obviously be absurd to call the preserved organ a disease. It is a diseased organ, but not a disease. A valve of the heart of a patient suffering from rheumatic fever may undergo structural damage, which, with its consequences and symptoms, constitutes "heart disease." But the latter is only part of "the disease" from which the patient suffers, which is acute rheumatism. When, however, the rheumatism disappears, leaving the heart damaged, this structural damage, together with its symptoms and consequences, becomes "the disease."

DR. A. RASMUSSEN, in the *American Naturalist* for October, gives a very valuable summary of all the theories which have been advanced in explanation of the hibernation of animals since Gesner wrote in 1551. Conrad Gesner was apparently the first to conduct experimental work by way of an attempt to solve the mystery which enshrouds this peculiar state of torpor, though speculation on the subject goes back to the time of Aristotle. Although the author refers occasionally to the hibernation of "man and other animals," yet in his essay he confines his remarks entirely to mammals. He insists that until certain causal relations are definitely established between the factors concerned many of these theories are of little value except as a stimulus to further research. If the hibernation of mammals is only an extreme form of ordinary diurnal sleep, as some maintain, it is especially to be hoped that this subject will continue to be investigated by more modern and adequate means, for no entirely satisfactory theory has yet been advanced to explain the physiological cause of ordinary sleep.

IN a recent report to the governors of the Huddersfield Technical College, Dr. A. E. Everest, the newly appointed head of the Department of Coal-Tar Colour Chemistry, refers to the objects which the governing body had in view in grafting this extension on to the courses already existing in the college. The aim is to establish in Huddersfield "a laboratory for research and post-graduate work that shall be the national centre to which all firms connected with the coal-tar colour industry shall naturally come for assistance, and around which all matters connected with coal-tar colour chemistry shall centre." It is recognised that the first essential to the success of this scheme is to keep the new laboratory open to the participation of all industrialists interested in this branch of applied chemistry, and to this end the governors have selected as the head of the department one not in any way tied by appointment to any particular firm. British Dyes, Limited, the directors of which have helped the new venture with a substantial endowment, are now in possession of the Tunbridge works of the old firm of Messrs. Read Halliday and Sons, Limited. Moreover, this company has made great progress with its new factory in the auspiciously named suburb of Dalton. At Deighton, within a stone's-throw of the Dalton site, are the rapidly extending works of Messrs. L. B. Holliday and Co., at present engaged on an improved process for an urgent necessity. At Milnsbridge, also in the same valley, is the old-established firm of Messrs. Leitch and Co., who have accomplished work of national importance. These and other firms outside Huddersfield have interested themselves in the new department, and have rendered valuable assistance. At present teaching and research work are in progress, temporary accommodation having been found in the chemical department. These facilities are, however, quite inadequate, and a suitable site has been acquired for the colour department, on which well-equipped laboratories, offices, and reference library will be built so soon as the necessary funds are available.

THE "Galvanoset," a patented piece of apparatus utilising the ordinary electricity supply for medical purposes, has been submitted to us for examination by the Medical Supply Association, Gray's Inn Road, W.C. It may be described as a potential divider using tap-water as the medium conveying the main current. The water is contained in a cylindrical glass vessel about 9 in. in diameter and 4 in. deep. Into the water dip two vertical rods of electric light carbon placed as far apart as possible, and supported from the flat ebonite cover of the glass vessel. From these electrodes current is taken to the patient. Just below the cover is a horizontal arm which rotates about a vertical central axle and carries at its ends two vertical carbon electrodes which are connected to the mains. When the movable electrodes have their joining line perpendicular to the line joining the fixed electrodes, there is no potential difference between them, but when their joining line coincides with that between the fixed electrodes there is the maximum potential difference. The pairs of electrodes never touch, so there is no danger of passing a large current through the patient. By the aid of a graduated circle on the cover and an outer index attached to the arm carrying the movable electrodes, an approximate notion of the voltage in the derived circuit is obtained, but for greater precision a milliammeter is provided on the cover. A trial shows that when a pressure of 100 volts is applied between the fixed electrodes a maximum current of about 200 milliamperes flows in the derived circuit. Quite apart from the medical purposes for which it is designed, an apparatus such as this would have manifold applications in all laboratories where small variable currents are required.

OUR ASTRONOMICAL COLUMN.

THE ECLIPSING BINARY RX HERCULIS.—An extended series of observations of photographic magnitudes of this variable has lately been made and discussed by R. H. Baker and Edith E. Cummings (Laws Obs. Bull., No. 25). The observations were made by the extra-focal method and, in combination with the spectroscopic evidence, lead to the following conclusions:—The two stars are slightly ellipsoidal, and each has a radius about one and a half times that of the sun. The mass of each star is a little less than that of the sun, and the density is about one-fourth of the sun's density. The star eclipsed at principal conjunction is of magnitude 7·96, and is brighter by 0·12 magnitude than its companion; its surface brightness, mass, and density are greater than those of the fainter star by 12, 6, and 9 per cent. respectively, and it is of slightly earlier spectral class (A). The distance between the centres of the two stars is about five times the radius of either star, or about 5,280,000 km. At conjunction 70 per cent. of the disc of one star is eclipsed by the other. The period is 1·7785740 days (Shapley), and the semi-duration of eclipse 2h. 53m. The photographic magnitude of the system is 7·264, and the magnitudes at primary and secondary minima 7·84 and 7·71 respectively. Outside eclipse the intensities generally increase towards secondary minimum, showing that the light of the star eclipsed at this time is augmented by radiation of its brighter companion.

SPECTROSCOPIC RESOLVING POWER.—The resolving power of a spectroscope is limited by the diffractional broadening of the geometrical images of the slit, and, following Lord Rayleigh, the limit of resolution usually adopted is determined by the condition that the maximum of the central band corresponding to one of the lines should fall on the minimum of that of the second line. Under these conditions, for two lines of equal intensity, the intensity at the centre of the combined bands is 0·81 of that of the maxima. An experimental investigation made by C. M. Sparrow at the University of Virginia (*Astrophysical Journal*, vol. xliv., p. 76) has led to the result that the limit of resolution is given by the "undulation condition"—that is, by the condition that the central minimum shall just disappear. The theoretical resolving power thus derived is about 26 per cent. greater than that given by the Rayleigh criterion. Among other matters of interest, a simple approximate formula is given for the resolving power of the Fabry and Perot interferometer.

THE MINIMUM RADIATION VISUALLY PERCEPTIBLE.—Adopting the light from a 6th magnitude star as the smallest amount perceptible, Dr. H. E. Ives has made an interesting calculation of the corresponding least quantity of radiant energy capable of exciting the sensation of light (*Astrophysical Journal*, vol. xliv., p. 124). Taking Russell's estimate that a candle at one metre distance is of stellar magnitude $-14{\cdot}18$, it is easily deduced that the brightness of a 6th magnitude star is $0{\cdot}849 \times 10^{-8}$ of this. Since a metre-candle is equivalent to 1·59 ergs per sec. per sq. cm., it follows that the least power corresponding to illumination from a light-source of the above brightness is $1{\cdot}35 \times 10^{-8}$ ergs per sec. per sq. cm. Assuming 6 mm. as the diameter of the pupil, the radiation entering the eye from a light-source of maximum efficiency of the brightness of a 6th magnitude star would be $0{\cdot}38 \times 10^{-8}$ ergs per sec. On the assumptions made, this is the smallest amount of radiation perceivable by the eye, but it is important to note that the figures given only apply to radiation from a distant point-source, such as a star. At this rate of energy-reception the eye would receive through the pupil the elementary energy-quantum in one-thousandth of a second.

METEOROLOGY IN WAR.

LONG before the outbreak of the world conflagration of the past two years war and the weather was a subject which captivated many minds, mainly of non-scientific or semi-scientific people who were prepared to accept as proof the most superficial circumstances which seemed to substantiate any popular belief. Even during the progress of the present war there have been many discussions in the Press and before societies in this and in other countries which have had for their object the perpetuation of the old belief that gun-firing causes rain, though round Shoeburyness, our great gun-firing station, less rain falls than in any other part of the British Isles! These quasi-learned discussions have been of no assistance to the fighting forces on sea or land.

Scientific investigators, however, have not been idle, though little or nothing of their activities is known outside official circles. The meteorological establishments of the various countries involved in the great war have been doing their utmost to utilise the now very greatly increased knowledge of the physics of the atmosphere for the immediate benefit of the armies. Perhaps, at first sight, it would be natural to infer that meteorologists can go no further than prepare, on the lines familiar to us during the past half-century, predictions of the weather changes likely to take place within the coming twenty-four hours. But the matter has got far beyond this. As is stated in the eleventh annual report of the Meteorological Committee for the year ended March 31 last, just issued (Cd. 8381, price 1*d.*):—"The variety of ways in which the weather affects warlike operations in all parts of the world has become very apparent from the diversity of the information which the Office is called upon to supply at short notice. The results of meteorological inquiries initiated in what appeared to be the remote interest of the theory of the circulation of the atmosphere have turned out to have important practical bearings."

Both for naval and military operations accurate forecasts have been greatly enhanced in value, yet probably they are not more important than other tasks now undertaken by the meteorologists—for example, the behaviour of the upper atmosphere for the information of the flying services, and the condition of the surface atmosphere and its relation to gun-sighting and range-finding. According to the official report referred to above a separate unit of the Royal Engineers was created for a meteorological field service, that with the Expeditionary Force in France being under the command of Major Gold, one of the Meteorological Office superintendents, and that in the eastern Mediterranean under Capt. Wedderburn, honorary secretary of the Scottish Meteorological Society, assisted by Lieut. Kidson, of Canterbury College, New Zealand, and magnetician in the service of the Carnegie Institution of Washington. In view of the importance of an adequate knowledge of the weather to the proper conduct of naval and military operations in the Mediterranean generally, Major Lyons, R.E., formerly Director-General of the Egyptian Survey Department, was appointed to take charge of this section. Further, the importance of co-ordinating the experience of flying officers with the work of the Office and observatories in order to obtain more effective knowledge of the structure of the atmosphere has led to the appointment of Major G. I. Taylor, Schuster reader in meteorology, to the professorship of meteorology to the Royal Flying Corps.

That the responsible authorities appreciate the work performed by the meteorological services is evidenced by the Distinguished Service Order conferred on Major Gold, and the inclusion of some of his assistants in the Commander-in-Chief's despatches; while the

Meteorological Office has received the special thanks of the Admiralty for its services in the Mediterranean. The world at large has been unaware of these manifold activities, imagining that the Meteorological Office practically ceased to exist when the daily forecasts in the newspapers came to an end. Yet during its silence the department has been worked far harder than ever before, and it was in recognition of the success of the service that the director received the honour of knighthood.

EDUCATION AT THE BRITISH ASSOCIATION.

AFTER the presidential address, the section took up the discussion of the reform of the primary school. Mr. J. C. Legge dealt with handwork, but unfortunately he spent the greater part of his half-hour upon historical and psychological preliminaries. Of the constructive suggestions outlined in the abstract the most interesting was the idea of finding in the soldiers returned from the war a great reservoir of admirable men who might be trained as teachers of handwork. He concluded with a plea for greater freedom to local authorities, a freedom such as would allow them to develop along their own lines, under the gentlest supervision from a very human central authority. Prof. T. P. Nunn pointed out the dangers of formality in handwork—a danger from which Mr. Legge's paper was not wholly free, in so far as it seemed to separate the activity of muscle and nerve from purposefulness. Manual activity must not be regarded as an end in itself, a danger which it shared with all other school subjects, as shown especially by mathematics and geography. Some body of central interest, life itself perhaps, is essential in order to give meaning to the several parts of the curriculum. In school, handwork should be an aid to the so-called intellectual subjects, and it should be the means of developing the feeling for craftsmanship and art. Prof. J. A. Green pleaded for a larger place and a new use for books. The bookiness of the primary school was not due to a superfluity of books, but to the unrealities for which books stood. Rightly understood, it is more books, not fewer, that are wanted there. A disappointing discussion followed, in which side-issues rather than fundamentals were raised—a result perhaps inevitable when the wide range of the subject is remembered.

A better result was achieved next day, when the place of science in secondary and higher education was considered. Mr. J. S. Talbot, referring to a committee of the Incorporated Association of Headmasters which had met recently at Wellington, said there was general agreement as to the necessity of finding a place for science amongst the subjects essential to a good school education. From two and a half to four hours a week should be provided for it in the school time-table of all boys up to sixteen. At the same time, they were not agreed that the school science of to-day was wholly satisfactory. A well-educated boy should surely know something of men like Newton, Darwin, and Pasteur, though he might now do much science at school without hearing of them. Dr. Gray's precise scheme of reform followed broadly the same line. The division between classical and modern sides should, he thought, be dropped for all boys in public schools before sixteen, though the division might take place at fourteen in municipal secondary schools, where it would follow technical and commercial lines of demarcation. After sixteen all boys should be taught the principles of biology. Dr. Hadow dealt with the subject from the point of view of the universities. The present first-year work might be better done in the schools, and the three years' university course begin at the end of what is now the intermediate course. As to research, the pure science student might start immediately he had graduated, but applied science men should go to the works first and return to the university after a year or two there. Dr. E. F. Armstrong deprecated the booky man of science. Present methods produced few men of any use in business where scientific methods of attacking problems were the first essential. But the prizes in industry depended in the last resort upon capacity for organisation and command. In the discussion, all the speakers agreed in condemning early specialisation and demanding a fuller recognition of science in the schools, and some further emphasis was laid upon the doubt as to whether just the right kind of science was being provided for boys amongst whom a large proportion had literary or linguistic tastes. Similar problems in relation to girls' education were discussed in the afternoon, though the issues were narrowed down to the school science more suited to girls preparing for the medical profession on one hand, and for domestic life on the other.

The last meeting of the section was devoted to a consideration of the report of the Mental and Physical Factors Committee, which had conducted an inquiry into the development of facility in the first four rules of arithmetic as shown by elementary-school children between eight and fourteen years of age.

THE BRITISH ASSOCIATION AT NEWCASTLE.

SECTION K.

BOTANY.

OPENING ADDRESS (ABRIDGED) BY A. B. RENDLE, M.A., D.Sc., F.R.S., PRESIDENT OF THE SECTION.

SINCE our last meeting the Great War has continued to hold chief place in our lives and thoughts, and in various ways, and to a greater or less degree, has influenced our work. In the case of many botany has had for the time being to be set aside, while others have been able to devote only a part of their time to scientific work. On the other hand, it is gratifying to note that some have been able to render helpful service on lines more or less directly connected with their own science. The trained botanist has shown that he may be an eminently adaptable person, capable, after short preparation on special lines, of taking up positions involving scientific investigation of the highest importance from the points of view of medicine and hygiene.

Some months ago the various sectional committees received a request to consider what could be done in their respective sections to meet problems which would arise after the war. Your committee met and discussed the matter, with the result that a set of queries was sent round to representative botanists asking that suggestions might be presented for consideration by the committee. A number of suggestions were received of a very varied kind, indicating that, in the opinion of many botanists at any rate, much might be done to utilise our science and its trained workers in the interests of the State and Empire. Your committee decided to arrange for reports to be prepared on several of the more important aspects by members who were specially fitted to discuss these aspects, and these will be presented in the course of the meeting. These reports will, I am convinced, be of great value, and may lead to helpful discussion; they may also open up the way to useful work.

For many of us this means the breaking of new ground. We have taken up the science because we loved it, and if we have been able to shed any light on its numerous problems the work has brought its own reward. But some of us have on occasion been brought into touch with economic problems, and such must have felt how inadequate was our national equipment for dealing with some of these. In recent years we have made several beginnings, but these beginnings must expand mightily if present and future needs are adequately to be met, and if we are determined to make the best use of the material to our hand.

Without trenching on the domain of economics, we may assume that increased production of foodstuffs, timber, and other economic products will be desirable. The question has been raised as to the possibility of increasing at the same time industrial and agricultural development. But as in industry perfection of machinery allows a greater output with a diminished number of hands, so in agriculture and horticulture perfection of the machinery of organisation and equipment will have the same result.

The improvement of the plant from an economic point of view implies the co-operation of the botanist and the plant-breeder. The student of experimental genetics, by directing his work to plants of economic value, is able, with the help of the resources of agriculture and horticulture, to produce forms of greater economic value, kinds best suited to different localities and ranges of climate, those most immune to disease and of the highest food-value. Let the practical man formulate the ideal, and then let the man of science be invited to supply it. Much valuable work has been done on these lines, but there is still plenty of scope for the organised Mendelian study of plants of economic importance.

The introduction of new plants of economic value is within the range of possibility; our répertoire has increased in recent years, but an exhaustive study of food plants and possible food plants for man and stock would doubtless yield good results.

We have heard much lately as to the growing of medicinal plants, and experience would indicate that here is opportunity for investigation, and, unless due care is taken, also danger of waste of time, money, and effort. A careful systematic study of species, varieties, and races is in some cases desirable in order to ensure the growth of the most productive or valuable plant, as in the case of the Aconites; and such a study might also reveal useful substitutes or additions. Here the co-operation between the scientific worker and the commercial man is imperative.

The advantages arising from a closer co-operation between the practical man and the botanist is illustrated by the research laboratories recently organised by the Royal Horticultural Society at Wisley. Such an institution forms a common meeting-ground for the grower of plants and the botanist. The former sets the problems, and the latter takes them in hand under conditions approaching the ideal and with the advantages of mutual discussion and criticism. Institutions such as these will give ample opportunity to the enthusiastic young botanist who is anxious to embark on work of investigation. The student of plant physiology will find here work of great interest. The grower has perforce gained a great deal of information as to the behaviour of his plants under more or less artificial conditions, but he is unable to analyse these conditions, and the co-operation of the physiologist is an invaluable help. Experiments in the growth of plants under the influence of high-tension electricity are at the present time being carried out at Wisley. Such experiments may be conducted anywhere where land and power are available, but it is obviously advantageous that they should be conducted by an expert plant physiologist versed in scientific method and not directly interested in the result. Dr. Keeble's recent series of lectures on "Modern Horticulture" at the Royal Institution deal with matter which is full of interest to the botanist. For instance, he shows how the work of Continental botanists on the forcing of plants has indicated methods, in some cases simple and inexpensive, which have proved of considerable commercial value, and that there is evidently scope for work in this direction, which, while of interest to the plant physiologist, may be also of general utility.

The subject of the soil offers problems to the botanist as well as to the chemist and proto-zoologist. In the plant we are dealing with a living organism, not a machine; and an adequate knowledge of the organism is essential to a proper study of its nutrition and growth.

The study of manures and their effect on the plant should attract the botanist as well as the chemist. In this connection I may refer to Mr. Martin Sutton's recent work at Reading on the effects of radic-active ores and residues on plant-life. A series of experiments was carried out in two successive years with various subjects selected for the different character of their produce, and including roots, tubers, bulbs, foliage, and fruit. From the immediate point of view of agriculture and horticulture the results were negative; the experiments gave no hope of the successful employment of radium as an aid to either the farmer or gardener. But, though the immediate result was unsatisfactory to the grower, there were several points of interest which would have appealed to the botanist who was watching the course of the experiments, and, if followed up, might throw light on the effect of radium on plant-life and lead in the end to some useful result. As Mr. Sutton points out, many of the results were "contradictory," while a close examination of the trial notes, together with the records of weights, will furnish highly interesting problems. For instance, there was evidence in some cases that germination was accelerated by the presence of radium, though subsequent growth was retarded; and the fact that in several of the experiments plants dressed with a complete fertiliser in addition to radium have not done so well as those dressed with the fertiliser only may be regarded as corroborating M. Truffaut's suggestion that radium might possess the power of releasing additional nitrogen in the soil for the use of plants, and that the plants in question were suffering from an excess of nitrogen. Certain remarkable variations between the duplicate unmanured control plots in several of the experiments led to the suggestion that radium emanations may have some effect, apparently a beneficial one. I have quoted these experiments as an example of a case where the co-operation of the botanist and the practical man might lead to useful results, and at the same time afford work of much interest to the botanist.

The utilisation of waste lands is a big subject and trenches on the domain of economics. But important botanical problems are involved, and careful ecological study will prepare the way for serious experimental work. The study of the growth of plants in alien situations is fraught with so many surprises and apparent contradictions that successful results may be looked for in most unlikely situations.

The study of the diseases to which plants are liable, and their prevention and cure, offers a wide and increasing field for inquiry, and demands a larger supply of trained workers and a more definite and special system of training. For the study of those which are due to fungi it is obviously essential that a thorough general knowledge of fungi and laboratory

methods should be acquired, preferably at some pathological institution which would also be in touch with the cultivator and naturally approached by those requiring advice and help in connection with disease, on the same principle that a medical school is attached to a hospital. An important part of the training should be the study of the disease in the field and the conditions under which it arises and flourishes. From the point of view of mycology much useful scientific work remains to be done on the life-history of the fungi which are, or may be, the causes of disease. Other plant diseases afford problems for the physiologist, who is a necessary part of the equipment of the Pathological Institute.

The anatomical and chemical study of timbers might with advantage occupy a greater number of workers. The matter is of great economic importance. Questions of identity are continually arising, and in the present vague state of our knowledge it is often difficult or impossible to give a satisfactory answer. Samples of timber are put on the market shipped, say, from West Africa under some general name such as mahogany; the importer does not supply leaves and flowers for purposes of identification, and in the present incomplete state of our knowledge it is often impossible to make more than a vague attempt at determination. Or a merchant brings a sample which has been sent from X as Y, which it obviously is not; but what is it, whence does it probably come, and what supply of it is likely to be forthcoming? These are questions which it would be useful to be able to answer with some greater approach to accuracy than at present. And it should be the work of definitely trained persons.

The various illustrative suggestions which I have made would imply a close co-operation between the schools of botany and colleges and institutions of agriculture, horticulture, and forestry; to pass from the former to one or other of the latter for special work or training should be a natural thing. While on one hand a university course is not an essential preliminary to the study of one or other of the applied branches, the advantages of a broad, general training in the principles of the science cannot be gainsaid. The establishment of professorships, readerships, or lectureships in economic botany at the university would supply a useful link between the pure and applied science, while research fellowships or scholarships would be an incentive to investigation.

There is the wider question of a *rapprochement* between the man of science and the commercial man. Its desirability is obvious, and the advantages would be mutual; on one hand it would secure the spread and application of the results of research, and on the other the man of science would be directed to economic problems of which otherwise he might not become cognisant. The closer association between the academic institution and those devoted to the application of the science would be a step in this direction.

Our British possessions, especially within the tropics, contain a wealth of material of economic value which has been only partially explored. One of the first needs is a tabulation of the material. In the important series of Colonial floras incepted by Sir Joseph Hooker, and published under the auspices of Kew, lies the foundation for further work. Consider, for instance, the "Flora of Tropical Africa," now rapidly nearing completion. This is a careful and, so far as possible with the material at hand, critical descriptive catalogue of the plants from tropical Africa which are preserved in the great British and European herbaria. The work has been done by men with considerable training in systematic work, but who know nothing at first hand of the country the vegetation of which they are cataloguing. Such a "Flora" must be regarded as a basis for further work. Its study will indicate botanical areas and their characteristics, and suggest what areas are likely to prove of greater or less economic value, and on what special lines. It will also indicate the lines on which areas may be mapped out for more detailed botanical exploration. That this is necessary is obvious to any botanist who has used such a work. A large proportion of the species, some of which may, on further investigation, prove to be of economic value, are known only from a single incomplete fragment. Others, for instance, which may be of known economic value, doubtless exist over much larger areas and in much greater quantity than would appear from the "Flora." The reason of these shortcomings is equally obvious. The collections on which the work is based are largely the result of voluntary effort employed more or less spasmodically. The explorer working out some new route, who brings what he can conveniently carry to illustrate the plant products of the new country; the Government official or his wife, working during their brief leisure or collecting on the track between their different stations; the missionary or soldier, with a penchant for natural history; to these and similar persons we are largely indebted for additions to our knowledge of the plant-life. Advantage has sometimes been taken of a Government expedition to which a medical man with a knowledge of, or taste for, natural history, or, in rare cases, a trained botanist, has been attached.

It is time that pioneer work gave place to systematic botanical exploration of our tropical possessions and the preparation of handy working floras and economic handbooks. Work of botanical exploration should be full of interest to the young botanist. But if he is to make the best use of time and opportunity he must have had a proper course of training. After completing his general botanical course, which should naturally include an introduction to the principles of classification, he should work for a time in a large herbarium and thus acquire a knowledge of the details of systematic work and also of the general outlines of the flora of the area which he is to visit later. He should then be given a definite piece of work in the botanical survey of the area. From the collated results of such work convenient handbooks on the botanical resources of regions open to British enterprise could be compiled. There will be plenty of work for the systematist who cannot leave home. The ultimate elaboration of the floristic work must be done in the herbarium with its associated library. There is also need of a careful monographic study of genera of economic value which would be best done by the experienced systematist at home, given a plentiful supply of carefully collected and annotated material. Closely allied species or varieties of one and the same species may differ greatly in economic value, and the work of the monographer is to discover and diagnose these different forms and elucidate them for the benefit of the worker in the field.

If we are to make the best use of our resources botanical research stations in different parts of the Empire, adequately equipped and under the charge of a capable trained botanist, are a prime necessity. We seem to have been singularly unfortunate in the management of some of our tropical stations and botanical establishments.

A botanical station for research to be effective must be under the supervision of a well-trained botanist with administrative capacity, who must have at his disposal a well-equipped laboratory and ground for experimental work. The director will be ready to give help and advice on questions of a botanical nature arising locally, and he will be on the look-out for local problems which may afford items of botanical research

to visiting students. Means must be adopted to attract the research student, aided, if necessary, by research scholarships from home. The station should have sufficient Imperial support to avoid the hampering of its utility by local prejudice or ignorance. The permanent staff should include a mycologist and a skilled gardener.

Finally, I should like to suggest the holding of an Imperial Botanical Congress at which matters of general and special interest might be discussed. The visit of the British Association to Australia was, I think, helpful to the Australian botanists; it was certainly very helpful and of the greatest interest to those coming from home. Many of the addresses and papers were of considerable interest and value, but of greater value was the opportunity of meeting with one's fellow-workers in different fields, of conversation, discussion, and interchange of ideas, the better realisation of one's limited outlook, and the stimulus of new associations. A meeting which brought together home botanists and botanical representatives from oversea portions of our Empire to discuss methods of better utilising our vast resources would be of great interest and supremely helpful. Let us transfer to peace purposes some of the magnificent enthusiasm which has flowed homewards for the defence of the Empire in war.

In this brief address I have tried, however imperfectly, to indicate some lines on which botanists may render useful service to the community. To a large extent it means the further development and extension of existing facilities added to an organised co-operation between botanists themselves and between botanists and the practical and commercial man; this will include an efficient, systematic cataloguing of work done and in progress. We do not propose to hand over all our best botanists to the applied branches and to starve pure research, but our aim should be to find a useful career for an increasing number of well-trained botanists and to ensure that our country and Empire shall make the best use of the results of our research. Incidentally there will be an increased demand for the teaching botanist, for he will be responsible for laying the foundations.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

BY invitation of the college authorities, the next annual meeting of the Association of Public School Science Masters will be held at Eton on Wednesday and Thursday, January 3 and 4, 1917, under the presidency of Prof. H. H. Turner. After the president's address the main subjects of discussion and their openers will be as follows:—Science for the rank and file, Prof. R. A. Gregory; Technical bias in science teaching in schools, Mr. E. R. Thomas; The place of the text-book in science teaching, Mr. G. N. Pingriff. There will be the usual exhibition of apparatus, but it will consist chiefly of exhibits by members of the association.

THE current issue of the *Fortnightly Review* contains an article by Dr. R. Brudenell Carter on "Science and Education." The subject is made interesting to the general reader from the variety of aspects under which it is viewed, and the interest is enhanced by literary style and historical illustration. The importance of early sense-training is emphasised, and attention is directed to the value of a pocket magnifying-glass as a child's possession. The author's views on the development of intelligence, individual and racial, appear at times to challenge orthodox genetic psychology, but this may be due to the difficulty of popular exposition in a short article. However this may be, general assent will be given to the proposition that instruction in science should "change the view taken by the pupils of the events around them, and produce a conviction of ignorance of many forces and conditions by which the lives of nations, as well as of individuals, are liable to be powerfully or overwhelmingly influenced." Dr. Carter's proposals for science instruction in schools will scarcely be accepted as adequate, even as part of the all-round instruction of those who do not intend to pursue a scientific career, since they depend upon lectures alone, a course which teaching experience has proved to be ineffective unless a period of practical and more intensive study is added. But science teachers will welcome the general trend of the article, and all readers will gain by the freshness and vigour of the essay. Even now our legislators need to be reminded that "wisdom is hardly to be expected from men who regard its highest manifestations with the unseeing eyes of the scientifically ignorant."

THE Mathematical Association has now expressed its agreement with the Classical, English, Geographical, Historical, and Modern Language Associations in the view that any reorganisation of our educational system should make adequate provision for both humanistic and scientific studies; that premature specialisation should be avoided; and that technical preparation for a particular profession should be conceived in such a spirit that it misses none of the essentials of a liberal education (see NATURE, September 7, p. 23). The Mathematical Association submits that from a school course of mathematics the pupil should acquire (1) an elementary knowledge of the properties of number and space; (2) a certain command of the methods by which such knowledge is reached and established, together with facility in applying mathematical knowledge to the problems of the laboratory and the workshop; (3) valuable habits of precise thought and expression; (4) some understanding of the part played by mathematics in industry and the practical arts, as an instrument of discovery in the sciences and as a means of social organisation and progress; and (5) some appreciation of organised abstract thought as one of the highest and most fruitful forms of intellectual activity. This statement is signed by Prof. A. N. Whitehead, president of the Mathematical Association, and by Mr. A. W. Siddons, chairman of the Teaching Committee. It will be remembered that the Association of Public School Science Masters has also expressed agreement with the resolutions adopted by the associations representing humanistic studies, and has emphasised the needs which natural science meets in the direction of the search for truth and of a comprehension of the part played by science in modern civilisation (see NATURE, October 26, p. 162).

TO *Science Progress* for October Sir Ronald Ross contributes an essay dealing with the question whether our public-school education is in need of reform, and, if so, how much, from the point of view of parents. The discussions which have taken place in the House of Lords and elsewhere would seem to lead one to believe that there is general agreement as to some reform being necessary, but not as to its amount. Unfortunately there is a tendency for the modern educationist to believe that he alone should decide the nature of the curriculum, and many people besides the parents of public-school boys think that boys are taught what the schoolmaster is able to teach rather than what they should be taught. Lord Desborough's Committee for Public-School Reform sent to the parents of boys at Eton and other public schools a memorandum (published in NATURE of June 8) urging reform, and requesting replies for or against it. The response indicated that the parents are overwhelmingly in

favour of reform. Sir Ronald Ross urges that early education should be wide rather than deep, and suggests a long list of outdoor qualifications, arts, languages, and knowledges which should be the possession of an ideally trained young man of twenty. He refers to many amazing arguments which have been urged in favour of grammatical education (*e.g.* that to it is due the success of voluntary recruiting in Britain), and from the discussion draws the conclusions:—(1) That the first elements of Greek and Latin are necessary for every intellectual employment; (2) that a complete classical education is necessary for very few intellectual occupations; (3) that an exclusive classical education is insufficient for any such occupation; (4) that a knowledge of one or more modern languages is more useful than, and just as educative as, similar knowledge of a dead language; and (5) that a man who is entirely ignorant of science can scarcely be considered educated.

COMPULSORY Greek in university entrance examinations received little support at the meeting of the Hellenic Society on Tuesday, when the subject of "The Future of Hellenic Studies" was under discussion. Dr. Walter Leaf, who was in the chair, declared himself against this condition of entrance at Oxford and Cambridge, which are the only two Universities where Greek is made compulsory for all students; and this was also the view of most of the speakers who followed him. The discussion was intended to exhibit the claims of classical studies to continued attention as against the demands made by the advocates of the natural sciences at a meeting held last May, but the impression received from most of the speakers was that which Balak expressed after he had asked Balaam to assist him in stopping the advance of the Israelites: "I called thee to curse mine enemies, and behold thou hast altogether blessed them these three times." Prof. Conway stated that Greek need not be essential in preparatory schools or in the public schools, and could be studied very successfully by interested students after entering the university. He rightly pointed out that boys working for scholarships are not given time for science in preparatory schools or opportunity in public schools. Other speakers agreed that the knowledge of classical languages acquired by most pupils was insufficient to enable authors to be read with intelligence, and that from the point of view of influence upon life and character it would be better to devote time to the reading of translations. There was, indeed, little said at the meeting with which reasonable advocates of scientific studies would be disposed to differ, and nothing upon which a conflict between classics and science could be based. What is wanted most of all is joint action to change the attitude of the public in general towards all knowledge of which no direct commercial advantage can be seen. When this has been accomplished, and obscurantists of all kinds have been removed, it will be possible to contemplate courses of study apart from traditional or other interests, and to construct them with the sole aim of promoting the development of all that is best in the body and mind of the pupil.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, November 2.—Sir J. J. Thomson, president, in the chair.—Sir William **Crookes**: The photographic spectra of meteorites. Thirty rare earthy meteorites, mostly acquired through the courtesy of the British Museum Trustees, have been examined. The examination has revealed the presence of unexpectedly large traces of chromium in all the specimens, a condition quite different from that found in the siderites or meteoritic irons, where chromium is practically absent. The proportion between chromium and nickel remains constant in twenty-six out of the thirty aerolites, and is clearly shown in the photographs. In three only nickel is almost absent. From the experience gained it has been possible to make a mixture containing known quantities of nickel and chromium, which, with the addition of iron, produces a spectrum in the neighbourhood of the chromium group that is practically identical with that produced by the aerolite Aubres.—Prof. H. **Lamb**: Waves in an elastic plate. The theory of waves in an infinitely long cylindrical rod was discussed by Pochhammer in 1876. The somewhat simpler problem of two-dimensional waves in a solid bounded by parallel planes was considered by Lord Rayleigh and by the author in 1889. The main object in these investigations was to verify, or to ascertain corrections to, the ordinary theory of the vibrations of *thin* rods or plates, and the wave-length was accordingly assumed to be great in comparison with the thickness. It occurred to the author some time ago that a further examination of the two-dimensional problem was desirable for more than one reason. The period-equation is, however, at first sight rather intractable, and it is only recently that a method of dealing with it has suggested itself. The result is to give a fairly complete view of the more important modes of vibration, together with indications as to the character of the higher modes which are of less interest.—Prof. W. H. **Young**: Multiple integrals. This note gives certain results and formulæ fundamental in the theory of multiple integration with respect to a function $g(x, y, \ldots)$ of bounded variation (integrator). For simplicity the discussion is confined to two variables. The integrator may, without loss of generality, be taken to be a positive monotonely monotone ascending function—that is, one the monotone increase of which with respect to either of the variables has an increasing rate as the other variable increases.—Prof. W. H. **Young**: The order of magnitude of the coefficients of a Fourier series.—T. C. **Sutton**: A determination of the heat of vaporisation of water at 100° C. and one atmosphere pressure in terms of the mean calorie.—G. H. **Livens**: The mechanical relations of the energy of magnetisation. The usual mathematical formulation of the relations of the magnetic field leads to the same expression, viz. $\mu H^2/8\pi$, for the density of the energy associated with the field, whether this arises from rigid magnets or from steady currents; but as in the first case the energy is treated as potential energy, and in the second as kinetic energy, the apparently consistent result in the two cases really involves a discrepancy. In the present paper a new formulation of the relations is given which overcomes the difficulty of interpretation in the two cases. The fundamental change made in the work consists in the choice of the magnetic induction vector B, instead of the more usual magnetic force H, to denote the conditions in the æther.

Zoological Society, October 24.—Dr. A. Smith Woodward, vice-president, in the chair.—S. **Maulik**: Cryptostome beetles in the collection of the Cambridge University Museum. The collection is a representative one, containing species from all parts of the world. Three new genera, one new subgenus, and two new species are described.—H. G. **Newth**: Investigations into the early development of the Echinoderm Cucumaria. The larval life is very short as compared with that of the Auricularia. It takes place at the expense of the yolk, and is complete in about five days. Formation of the cœlomic vesicles occurs by the bending and constriction of the archenteron. No separate anterior cœlom appears. The hydrocœle ring closes in the left dorsal interradius, and the radial canals and five

primary oral tentacles arise directly from it, alternating with one another. The internal madreporite arises as a secondary differentiation of the walls of the stone-canal.—R. E. **Turner**: Wasps of the genus Pison. One hundred and nine species are dealt with, of which fifteen are described as new. Reasons, drawn from the numerical distribution of the species in different areas, are given for supposing the genus to be in a declining state—fifty of the total number of species being from the continent of Australia. In addition to Pison, the small allied genera, Aulacophilus and Pisonopsis, are dealt with, one new species of the former being described.

Physical Society, October 27.—Mr. F. E. Smith, vice-president, in the chair.—Dr. S. G. **Barker**: The application of the Kerr effect to the determination of the saturation values for magnetism of ferro-magnetic metals, compounds, and alloys. The paper describes work carried out in the laboratory of Prof. Du Bois on the relation between the intensity of magnetisation of various ferro-magnetic materials and the rotation of the plane of polarisation of plane polarised light reflected from a polished surface of the material. The specimens, in the form of circular discs 5 mm. in diameter and 0·5 mm. thick, were soldered to one of the pole pieces of a large electromagnet. Through an aperture in the other pole monochromatic light, polarised in two nearly coincident planes by means of a Lippich polariser, was incident almost normally on the polished surface of the specimen. The reflected beam passed through an analyser, the rotation of which could be measured, by means of an auxiliary optical system, to a high degree of accuracy. In the first part of the paper results are given for a number of materials of known magnetic properties in order to establish the validity of the method, due to Du Bois, of obtaining the value of the saturation intensity from the curve connecting field strength with rotation. The method is then applied to materials of unknown properties. The variation of the Kerr constant with the wave-length of the light was also determined for a number of substances.—D. **Owen**: The influence of the time element on the resistance of a solid rectifying contact. The resistance at a solid rectifying contact, and consequently the exact shape of the resistance characteristic, depend upon the time for which the testing current is allowed to flow. A series of characteristics is given corresponding to durations of contact extending over the range one forty-thousandth of a second to thirty seconds. The following conclusions are drawn:—(1) That the variation of resistance with voltage may be attributed entirely to thermal effects. (2) That the characteristic obtained by applying the testing voltage for one hundredth of a second is, at moderate voltages, materially the same as that which would be found at the expiry of a period of the order of a millionth of a second. (3) That the sensibility of a wireless receiving circuit (in which the rectifying contact is used) does not differ very appreciably from that deduced from a slow period characteristic. (4) That an important fraction of the contact-resistance resides in a stratum of molecular thickness at the interface of the two elements of the contact; and that it is in this region alone that rectifying action at very high frequencies is effected.

Linnean Society, November 2.—Sir David Prain, president, in the chair.—Prof. G. S. **Boulger**: Early chapters in plant distribution. The author sketched the first glimpses in the works of Cardinal Bembo, M. de l'Obel, Sir Hans Sloane, Dr. Christian Mentzel, and J. Pitton de Tournefort. The second chapter was devoted to Carl von Linné, whose "Flora lapponica" and several theses in the "Amœnitates academicæ" were brought forward in support. Next followed Haller, J. G. Gmelin, Buffon and Forskl , C. L. Wildenow, with a brief allusion to P. A. Broussonet.—L. A. **Borradaile**: The Pontoniinæ and Carides from the western Indian Ocean.

Aristotelian Society, November 6.—Dr. H. Wildon Carr, president, in the chair.—Dr. H. Wildon **Carr**: Presidential address: The problem of recognition. In the experience of recognition there is an element which may be named "againness." The problem of recognition is the nature and genesis of this element. There are two forms of recognition, in each of which we meet with this element of "againness"—an intelligent form and an instinctive form. These appear to be quite separate, but the cognitive fact is the same in each. In intelligent recognition we seem able to account for the "againness" by repetition, memory, and the judgment or perception of identity or similarity—the mental process being an external act of comparison between a present sense-datum and a past. This, however, is an illusion, because in reality the essential factor, repetition, is absent. Recognition implies prior cognition, but does not depend on the presence of a memory-image of the prior cognition. Recognition is the conditionate, and not the condition, of learning by experience; learning by experience is a primary, not a dependent, fact. In instinctive recognition there can be no memory-image of the prior cognition, because this prior cognition lies beyond the individual in the racial experience. Yet in instinctive recognition we have sentience, familiarity, and pre-awareness—all of which are mental characteristics. We have, therefore, to conceive the mental process, or the mind, as a continuous organisation of experience. Past experience has not only contributed its quota to this organisation, but is incorporated within it, giving to it, and receiving from it, its character and individuality. New sentient experience in entering this organisation receives the impression of its stamp or mould, and this is the mark of the past on the present cognition which constitutes it recognition.

Mineralogical Society, November 7.—Anniversary meeting.—Mr. W. Barlow, president, in the chair.—Dr. J. W. **Evans**: The combination of twin operations. The question of complex twin-crystals in which two distinct laws of twinning are represented was dealt with. A distinction was made between cases in which the twin-axes are parallel or at right angles, and those in which they are inclined to one another obliquely. In the former the result of the combination is itself a twin operation, while in the latter it is a rotation, the direction of which depends on the order in which the operations are applied; it is in some cases combined with an inversion.—Dr. J. W. **Evans**: A modification of the Kohlrausch method of determining refractive indices. The observing instrument is a microscope placed vertically and fitted with a Bertrand lens. An immersion theodolite stage of the Klein type is used so that the substance under investigation may be rotated beneath a liquid of higher refractive index about two axes, the first at right angles to the optical axis of the instrument, and the second at right angles to the first and to the plane surface of the object. This is observed through the natural surface of the liquid, and rotated in either direction until the position of total reflection is reached. By rotation of the object about the second axis the refractive indices in all directions parallel to its plane surface may be determined, and the values of the principal refractive indices thus obtained.—A. **Holmes** and Dr. H. F. **Harwood**: The basalts of the Brito-Arctic Province. The basalts from Hare Island, which were collected by Thomas Reid in 1855, include six varieties, of which four are free from olivine and carry silica among the amygdale minerals, and the remaining two contain olivine and are with-

out free silica. All the rocks are rich in titaniferous magnetite, and analyses indicate that their most noteworthy feature is the unusual abundance of titania. The analyses cannot be closely matched except by those of basalts from Scoresby Sound, Iceland, the Faröe Islands, and the west of Scotland. This paper is the first of a series in which the authors hope to describe rocks from all the important localities within the province.—Miss N. **Hosali** exhibited models of crystals constructed by herself.

Optical Society, November 9.—Mr. F. J. Cheshire, president, in the chair.—J. W. **French**: The grinding and polishing of optical surfaces. The polished surface of metals consists of a layer which covers over small scratches and pits in the underlying material. When the surface layer is removed by etching, the scratches and pits are exposed. When the polished surface of glass is etched, numerous fine scratches reappear, and it has been wrongly assumed that glass behaves like metals. For purposes of description, the original material is referred to as α glass and the modified material constituting the surface layer as β glass. Clean scratches comparable with those on metal cannot be formed on the α glass. The material splinters in the characteristic conchoidal fashion. Perfectly clean scratches can be formed in the β layer; they can be filled in by further polishing, and it is these scratches that reappear after etching. The cohesion of the silicates constituting the surface layer is too small to permit of the bridging over of pits, such as minute airbells, that are just exposed, and no evidence of any inclusion of foreign matter in the β layer scratches has been obtained. An optical glass surface is produced as follows:—The action of the pitch polisher loosens or liquefies, as it were, the surface layer of molecules, which rearrange themselves uniformly under surface tension. The polishing medium subdivides, breaks up, and removes the surface layer, thus exposing the underlying material. This process then repeats itself, and a perfect surface is obtained only by the removal of material beyond the bottom of the hollows produced in the glass during the earlier abrasion process.

PARIS.

Academy of Sciences, October 23.—M. Camille Jordan in the chair.—The President announced the death of M. E. F. Maupas, correspondant in the section of anatomy and zoology.—A. **Lacroix**: The volcanic glasses of the Cantal massif.—G. **Humbert**: Some remarkable numerical functions.—C. de la Vallée **Poussin**: The zeros of $\zeta(s)$ of Riemann.—A. **Verschaffel**: Advantages of circles both mobile and with multiple origin.—W. H. **Young**: Trigonometrical series and the means of Cesàro.—D. **Pompeiu**: Series with positive terms and the derived functions.—D. **Menchoff**: The unicity of the trigonometrical development.—J. **Guillaume**: Observations of the sun made at the Observatory of Lyons during the third quarter of 1916. Details of observations made on seventy-nine days during the quarter.—C. **Camichel**: The determination of the velocity of propagation a in high-pressure water mains.—C. **Zenghelis** and S. **Horsch**: The chemical action of sodium peroxide upon hydrogen sulphide. The main product of the reaction is sulphide; polysulphides, sulphate, and thiosulphate are formed in smaller quantities.—Ph. **Flajolet**: Perturbations of the magnetic declination at Lyons (Saint-Genis-Laval) during the second quarter of 1916.—L. **Vegard** and O. **Krogness**: The results of observations of the aurora borealis carried out at the Observatory of Haldde. The discussion of determinations of heights measured by photographs taken simultaneously from two points. The lower limit of height always exceeds 85 kilometres, the upper limit from 100 to 330 kilometres.—G. **Bourguignon** and J. **Lucas**: Classification of the muscles of the superior member in man following their radicular systematisation, by the velocity index of excitability.—M. **Weinberg** and P. **Séguin**: Contribution to the etiology of gaseous gangrene. A description of a new bacillus (*B. histolyticus*) which, while incapable of itself producing a gaseous infection, appears to play an important part in the etiology of certain cases of gaseous gangrene.

October 30.—M. Camille Jordan in the chair.—G. **Bigourdan**: Astronomical observations at Paris from 1632 to the foundation of the Observatory. From 1632 to 1637 work was done by Gassendi, Beaugrand, Boulliau, and Descartes. About this period there commenced scientific gatherings which later resulted in the formation of the Academy of Sciences. The solar eclipse of June 1, 1639, was observed by three different groups. The paper concludes with a tabular statement showing the more important observations made between 1653 and 1667.—H. **Le Chatelier** and F. **Bogitch**: The determination of the density of solid bodies. A discussion of the chief causes of error in density measurements of solids. The method suggested is based on the direct measurement in a narrow graduated tube of a liquid by the powdered solid. It is shown that either benzene, carbon tetrachloride, or petroleum spirit may serve as the displaced liquid, but that water is quite unsuitable.—M. **Hamy**: A reduction formula for prismatic spectra.—MM. **Costantin** and **Bois**: The varieties of vanilla.—C. de la Vallée **Poussin**: The Riemann zeros of $\zeta(s)$.—W. **Kilian**: The exact age of the "Plaine des Rocailles," near the Roche-sur-Foron (Haute-Savoie), and fluvioglacial stages of Genevois-Faucigny.—L. **Bouchet**: The variations of thickness of a caoutchouc sheet under the influence of an electrostatic field. It is proved experimentally that under the action of an electrostatic field vulcanised india-rubber contracts in the direction of the lines of force.—J. **Bougault**: The semicarbazones of the α-ketonic acids. α-Di-iodo- and α-dibromo-phenylbutyric acids. α-Iodo- and α-bromo-phenylcrotonic acids.—L. **Daniel**: Experimental cultures at the seashore. In the course of fifteen years plants of various kinds, transferred from Rennes to Erquy, near the sea, have acquired none of the characteristics of halophytic plants.—P. **Lesage**: Trials of the seeds of *Lepidium sativum* under varying conditions. The effects of germination in dilute potash solutions, in alcoholic solutions, in solutions of chlorides, nitrates and sulphates of potassium, sodium, and ammonium were studied. The effects of time of immersion, soaking in petrol or ether, of moist air, and of solutions of hydrogen peroxide are also given.—F. **Vincens**: A Verticilliaceæ of doubtful affinities.—M. **Baudouin**: Results of the examination of the mandible of a young infant of the polished Stone age.—W. T. **Porter**: Low arterial pressures and their treatment. Experiments on animals have proved that when the diastolic pressure is as low as 45 mm. to 50 mm., unless appropriate treatment is applied the animal dies. Observations on wounded at the front show that there is no essential difference between the effects of a low pressure in man and in animals, and the same mode of treatment can be applied with success in both cases. The means adopted are:—(1) Mechanical; (2) adrenaline; (3) injection of isotonic serum.—Ch. **Richet**: Remarks on the preceding paper.—J. **Beauverie**: Researches on the influence of the osmotic pressure on bacteria. The case of the cholera vibrion.—L. C. **Bailleul** and P. **Girard**: The polarisation of the cicatricial tissue and the electrical treatment of deep cicatricial adherences.

NEW SOUTH WALES.

Linnean Society, July 26.—Mr. A. G. Hamilton, president, in the chair.—R. J. **Tillyard**: Studies in Australian Neuroptera. No. 4. Descriptions of new genera and species of the families Ithonidæ, Hemerobiidæ, Sisyridæ, Berothidæ, and the new family Trichomatidæ. An attempt is made, by a critical study of the venation, to clear up the difficult question of the relationships of a mass of forms usually relegated to the Hemerobiidæ. Reasons are given for restricting this family to forms combining a number of characters, among which the principal are the number and structure of the radial sectors.—Dr. A. J. **Turner**: Studies in Australian Microlepidoptera. Five genera and sixty-five species of Meyrick's two groups, Œcophorides and Eulechriades, are described as new, and a number of known species are recorded from additional localities.—Rev. W. W. **Watts**: Some cryptogamic notes from the Botanic Gardens, Sydney.

BOOKS RECEIVED.

Elementary Practical Chemistry. By Profs. F. Clowes and J. B. Coleman. Part ii. Eighth edition. Pp. xvi+255. (London: J. and A. Churchill.) 3*s.* 6*d.* net.

A Text-Book of Physics. Edited by A. W. Duff. Fourth edition. Pp. xiv+692. (London: J. and A. Churchill.) 10*s.* 6*d.* net.

Om Ole Rømers Opdagelse of Lysets Tøven. By K. Meyer. (København: Høst und Søn.) 2 kronen.

Chemistry for Rural Schools. By E. Jones and J. J. Griffith. Pp. 184. (London: Blackie and Son, Ltd.) 2*s.* 6*d.* net.

Typographical Printing Surfaces. By L. A. Legros and J. C. Grant. Pp. xxiv+732. (London: Longmans and Co.) 2*l.* 2*s.* net.

Oil-Field Development and Petroleum Mining. By A. B. Thomson. Pp. xix+626+maps viii. (London: Crosby Lockwood and Son.) 25*s.* net.

A Concordance to the Works of Horace. Compiled and edited by L. Cooper. Pp. ix+593. (Washington: Carnegie Institution.)

The Coal Measures Amphibia of North America. By R. L. Moodie. Pp. x+222+plates 26. (Washingtone: Carnegie Institution.)

Gonadectomy in relation to the Secondary Sexual Characters of some Domestic Birds. By H. D. Goodale. Pp. 52+plates vii. (Washington: Carnegie Institution.)

A Sylow Factor Table of the First Twelve Thousand Numbers. By H. W. Stager. Pp. xii+120. (Washington: Carnegie Institution.)

The Elements of Reconstruction. Pp. 120. (London: Nisbet and Co., Ltd.) 1*s.* net.

Australasian Antarctic Expedition, 1911—1914. Scientific Reports. Series C. Zoology and Botany. Vol. iii., part i. Fishes. By E. R. Waite. Pp. 92+plates 5, etc. (Adelaide: R. E. E. Rogers.) 8*s.* 6*d.*

DIARY OF SOCIETIES.

THURSDAY, NOVEMBER 16.

INSTITUTION OF MINING AND METALLURGY, at 5.30.—*Informal Discussion*: Standardisation, so far as it affects the Mining and Metallurgical Industries: including the Question of the Adoption of the Metric System.

CHILD STUDY SOCIETY, at 6.—Experiments in Hand-writing in Schools: Speed Tests in Manuscript Writing: Dr. C. W Kimmins.—The Artistic Aspect of Manuscript Writing: W. Scutt.—Manuscript Writing in a Central School: J. W. Samuel.—Manuscript Writing in a Boys' Elementary School: A. Sinclair.

LINNEAN SOCIETY, at 5.—(1) Pedanios Dioscorides of Anazarba: his Writings and his Commentators; (2) The New Cabinets for the Linnean Herbarium: The General Secretary.—A New Australian Genus of Hydrocharidaceæ: Dr. A. B. Rendle.—Some Collections of the Littoral Marine Fauna of the Cape Verde Islands, made by Cyril Crossland in the Summer of 1904: A. W. Waters.

CHEMICAL SOCIETY, at 8.—A Simple Method of Estimating Arsenic in Organic Derivatives: A. J. Ewins.—A New Method for the Preparation of Nitrosyl Tribromide: R. L. Datta and N. R. Chatterjee.—Neutral Potassium Persulphate as a Reagent in Organic Chemistry: R. L. Datta and J. N. Sen.—The Hydrolysis of Iron Ammonium Alum: W. N. Rae.

FRIDAY, NOVEMBER 17.

INSTITUTION OF MECHANICAL ENGINEERS, at 6.—Report of the Hardness Tests Research Committee.

MONDAY, NOVEMBER 20.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—Easter Island: Mr. and Mrs. W. Scoresby Routledge.

TUESDAY, NOVEMBER 21.

ZOOLOGICAL SOCIETY, at 5.30.—The Pectoral and Pelvic Arches of the London Specimen of Archæopteryx: Prof. B. Petronievics and Dr. A. Smith Woodward.—Studies on the Anoplura and Mallophaga, being a Report upon a Collection from the Mammals and Birds in the Society's Gardens. II.: B. F. Cummings.—Notes on a Collection of Heterocera made by Mr. W. Feather in British East Africa, 1911–13: Lieut.-Col. J. M. Fawcett.

INSTITUTION OF CIVIL ENGINEERS, at 5.30.—Keadby Bridge: J. B. Ball.

INSTITUTION OF PETROLEUM TECHNOLOGISTS, at 8.—The Pyrogenesis of Hydrocarbons: E. L. Lomax, Dr. A. E. Dunstan, and Dr. F. B. Thole.

ROYAL STATISTICAL SOCIETY, at 5.15.—Presidential Address: The Organisation of Registsation in its Bearing on Vital Statistics: Sir Bernard Mallet.

WEDNESDAY, NOVEMBER 22.

ROYAL SOCIETY OF ARTS, at 4.30.—The Economic Development of Russia and Britain's Share Therein: L. Urquhart.

GEOLOGICAL SOCIETY, at 5.30.

THURSDAY, NOVEMBER 23.

ROYAL SOCIETY, at 4.—Annual Report of Council.—At 4.30. *Probable Papers*: The Scattering of Plane Electric Waves by Spheres: Dr. T. J. I'a Bromwich.—Numerical Results of the Theory of the Diffraction of a Plane Electromagnetic Wave by a Perfectly Conducting Sphere: J. Proudman, A. T. Doodson, and G. Kennedy.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—The Parallel Operation of Electric Power Stations: J. S. Peck.

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