

Romney Marsh, Chesil Beach, Plymouth Sound. The lectures are addressed to advanced students of geology of the University of London and to others interested in the subject. Admission is free, without ticket.

We learn from *Science* that a Bill has been signed by which the Massachusetts Institute of Technology will receive 20,000*l.* annually from the State for ten years. By the terms of the measure, the institute will maintain eighty free scholarships to be apportioned among the forty senatorial districts of the State. The California legislature has passed a Bill, which has been recently signed, appropriating 5000*l.* for a soils laboratory building, equipment, and other improvements at the Citrus Experiment Station. The work of the laboratory is to be confined to the study of citrus soils. The legislature of Hawaii has voted 15,000*l.* for a new building for the College of Hawaii and 4000*l.* for maintenance expenses.

THE report has been issued (Cd. 5662) of the Departmental Committee appointed to inquire into the administration of (a) endowments the income of which is applicable, or is applied to or in connection with, elementary education, and (b) small educational endowments other than the above, in rural areas, the application of which to their proper purposes presents special difficulties; and to consider how far under the existing law it is possible to utilise them to the best advantage; and whether any, and, if so, what, changes in the law are desirable in the direction of conferring upon county and other local authorities some powers in respect of such educational endowments or otherwise. The committee makes a number of recommendations, which are summarised in the report under twenty-two headings. Especially important is the proposal that, subject to certain exceptions and modifications, county councils in their capacity as local education authorities under the Education Act, 1902, should perform the functions at present performed by the Board of Education with regard to the administration of the endowments within the terms of reference, that there should be an appeal to the Board of Education from any scheme made by a local education authority, and that the range of educational objects to which trustees may apply their funds should be widely extended. It is also recommended that the local education authority should have the same powers of demanding accounts and investigating the administration of charities as are at present exercised by the Board of Education, but that the Board of Education should have a concurrent power of demanding accounts, though trustees will no longer be under any obligation to render accounts to the Board. Certain of the suggestions are not made unanimously, and memoranda at the end of the report provide particulars of the points on which some few members of committee do not agree with the main recommendations.

ATTENTION has recently been directed to a somewhat anomalous situation which had come into existence during the last few years in connection with medical education. The General Medical Council exercises a supervising control over the standard of the tests required by the various qualifying authorities in this country. In the regulations published by the Council, students are required to study the preliminary sciences at an institution recognised by the council, and *after* passing an examination in general education when above sixteen years of age. The council requires no elementary science at all in the general education. These regulations, which are obviously designed to make sure that students shall not scamp their literary, for the sake of their scientific, education, and that they shall study elementary science under generous conditions, probably achieve their purpose satisfactorily for a certain class of student. But, since public schools are not recognised by the council as places where elementary science can be studied, they evidently do not meet the case of the very large number of boys who enter the medical profession from the public schools. The difficulty has been met in the past by the fact that those qualifying authorities most used by public-school boys have not conformed to the regulations of the council. For though termed "regulations," they are not legal requirements, but more in the nature of recommendations. Thus the Conjoint Board of London and the Universities of Oxford, Cam-

bridge, and London, the professional tests of which are beyond suspicion, allow students to pursue the study of the preliminary sciences at the public schools. Hence a boy following the usual school curriculum, and working at elementary science as part of his general education, has been able to offer himself for examination in these subjects on leaving school at eighteen or nineteen years of age. Recently, however, an increasing number of boys have gone from public schools to the newer universities and other authorities where they have to conform to the requirements of the Council. To observe the regulations, these boys have had to study again the elementary science which they have already, in many cases, satisfactorily done at school. Representations have been made to the council by the public schools directing attention to the difficulty thus raised; and on May 29 last at the meeting of the General Medical Council a resolution was proposed by Sir Henry Morris to remove the disabilities from which public-school boys suffer by "recognising" the schools under certain conditions. This resolution was adopted by 24 votes to 5.

THE fifth annual Conference of the Association of Teachers in Technical Institutions was held at Southport on June 5. Mr. Barker North, of the Bradford Technical College, in his presidential address, said that during the year the membership of the association increased by more than 20 per cent., and branches were formed in Ireland and Wales. More than 50 per cent. of the full-time technical teachers of England and a large percentage of the part-time teachers are now in the association, which is the only organisation representing all grades of the profession. Many technical institutions, he said later, suffer from the unsatisfactory nature of the constitution of education committees, and he urged the co-option of experts to remedy the present lack of special knowledge. Mr. North gave a tabular statement from the recently published census of production which shows that the net output in the nine leading industries of the country rose with an increase in the percentage of salaried persons. This suggests that, within certain limits, the employment of a large number of skilled technologists would develop the industry into higher forms and increase productivity. The state of the chemical industries shows how fatal is the system of limiting the employment of research chemists. Referring to the reforms necessary in education, he argued for the closer affiliation of continuation schools with the higher institutions; the work of the former should be a real continuation of that of the primary schools, and in technical institutes and universities provision must be made alike for the rank and file of the industrial army and for their officers—the second type being evolved from the first by means of natural selection. The defects of the present system would be remedied by drafting the best of the evening students systematically into day courses and by concentrating them for the highest class of work in specialised institutions. Such institutions should be affiliated to form technical universities. On these lines, he thought, the development of the Imperial College should be carried out. The time is ripe, said the president, for the appointment of another Royal Commission, with broader terms of reference than those assigned to the present, so that the whole question of the organisation of higher technical education in this country may be subjected to an exhaustive inquiry. Papers were read by Prof. W. W. Haldane Gee and Mr. T. J. Burnett, and resolutions were adopted urging the formation of an Advisory Council on Technical Education, consultative committees of teachers, the representation of teachers on education committees, and advisory committees for juvenile employment.

SOCIETIES AND ACADEMIES.

LONDON.

Faraday Society, May 2.—Mr. James Swinburne, F.R.S., president, in the chair.—A. **Scott-Hansen**: Hydro-electric plants in Norway and their application to electrochemical industry (see p. 501).—Edgar **Stansfield**: Two simple forms of gas-pressure regulators. The two regulators described give a steady pressure, easily adjusted, not influenced by the rate of flow of the gas. They consist merely of an outer containing vessel into which water is

poured, and an inner cylinder open top and bottom containing a floating beaker to which a valve is connected. When gas is passed into the inner cylinder through the valve, the position of the floating beaker adjusts itself so that the pressure of gas rises until the valve just closes.—Dr. W. C. McC. **Lewis**: Internal, molecular, or intrinsic pressure—a survey of the various expressions proposed for its determination. If we consider an imaginary plane of unit area placed in any direction well inside a liquid mass, equilibrium across this plane is maintained by the balanced attractive and repulsive molecular forces, which we have reason to believe are of very great magnitude, amounting to hundreds, or even thousands, of atmospheres. The attractive force per unit area is defined as the molecular, internal, or intrinsic pressure of the liquid, and is usually denoted by the symbol K . The present paper is a survey of the various attempts which have been made to estimate the value of K for various liquids.

May 23.—Dr. R. T. Glazebrook, C.B., F.R.S., vice-president, in the chair.—Dr. Arthur L. **Day**: Recent advances in high-temperature gas thermometry. The paper reviews the work done in recent years to increase the range and accuracy of the temperature scale upon which the various methods of measuring high temperatures depend for their calibration.—Dr. J. A. **Harker**: The high-temperature equipment of the National Physical Laboratory. The paper dealt with the methods of construction and the use of the various forms of apparatus for the attainment of temperatures above 100° C. which have been designed at the laboratory during the past ten years.—H. C. **Greenwood**: The boiling points of metals. In view of the scanty and uncertain nature of our knowledge of these important constants, a general investigation of the question was greatly needed. The present experiments may be divided into three sections:—(1) A study at atmospheric pressure of the boiling points of a number of metals which are unaffected by carbon at high temperatures (antimony, 1440° C.; bismuth, 1420° C.; copper, 2310° C.; lead, 1525° C.; magnesium, 1120° C.; silver, 1955° C.; tin, 2275° C.). (2) A study at atmospheric pressure of the boiling points of some metals which readily combine with carbon (aluminium, 1800° C.; chromium, 2200° C.; iron, 2450° C.; manganese, 1900° C.). (3) The influence of pressures varying from 10 cm. of mercury to 50 atmospheres on the boiling points of bismuth, copper, lead, silver, tin, and zinc.—A. **Blackie**: The behaviour of silica at high temperatures. This communication gives an account of some experiments made to determine the effect of heat on the strength and devitrification of the opaque and transparent varieties of fused silica. A determination was also made of their relative coefficients of expansion at high temperatures.—Prof. Max **Bodenstein**: Methods of maintaining constant high temperatures. Three general methods are in use:—(1) By means of a vapour in equilibrium with its liquid. Suitable substances are only available for a moderate range of temperature, but a uniform temperature over a large volume is easily maintained. On the other hand, constancy of temperature over a long period cannot be relied upon. (2) A liquid heating bath controlled by a thermostat. For high temperatures the method is restricted by the difficulty in obtaining a suitable substance, although for moderate temperatures oil or paraffin in a suitably constructed bath are fairly satisfactory, and temperatures up to 350° can be maintained within 0.05° for several months if a sensitive gas regulator be employed. (3) For high temperatures air baths only can be employed. Tube furnaces heated electrically, either directly or by means of coils, are now exclusively used, but although a constant temperature is easily maintained, uniformity of temperature is more difficult of attainment.—M. Charles **Féry**: Stellar pyrometry. The temperatures of incandescent terrestrial bodies can be measured by reference to the laws of radiation, either the law of Stefan or the law of monochromatic radiations, but these cannot be applied in the case of stars, owing to the small amount of radiation. The author has therefore devised an instrument, based on Weiss's displacement law, according to which temperature is measured by an appreciation of the colour tint of the star. In the instrument described, the colour of an image of the star is compared with that of a standard lamp the tint of which can be varied. The pyrometer is

standardised by reference to an electric furnace, an arc (3500° C.), and the sun (6500° C.).

Royal Microscopical Society, May 17.—Mr. H. G. Plimmer, F.R.S., president, in the chair.—J. E. **Barnard**: A method of disintegrating bacteria and other organic cells. The author first mentioned that bacterial toxins were of two kinds, extracellular and intracellular. The former were excreted into the medium, e.g. beef broth, on which the organism was cultivated, so that by a process of filtration the organisms could be removed and the toxin was obtained in the filtrate, but the majority of pathogenic micro-organisms did not excrete their toxins, at least to any extent, and the toxins were retained within and formed integral parts of the cells of the organisms. One method of obtaining these toxins was mechanically to disintegrate the bacterial cell, so that the cell contents were expressed, and the apparatus described accomplished this. It consisted essentially of a containing vessel in which, by a suitable rotation of steel balls, the organisms were crushed. The principal conditions to be filled in such an appliance were:—(1) approximately every cell should be brought under the grinding action; (2) little or no rise of temperature should take place; (3) the disintegration should be carried out in a vessel which was sealed so that, when dealing with pathogenic organisms, none could escape at any stage of the process. These conditions were, in the main, complied with in the apparatus described. Experiments indicated that by this method the cell-juices were obtained unaltered, and so were suitable for investigations on the chemical composition and properties of the bacterial proteins and other cell constituents. Also that, after the grinding process had been carried on for a sufficient time, practically no cells remained which could be stained properly by any recognised bacteriological method, and which, therefore, could be regarded as whole cells containing a normal quantity of cell-juice.—James **Murray**: Third portion of a Report on the rotifera observed by the Shackleton Polar Expedition of 1909. This portion of the report dealt with the new species, &c., from the Pacific Islands, in which the author said that in Fiji fifteen bdelloid rotifera were collected, in Hawaii twenty-four. Ten species were common to the two groups. In Fiji two new species were distinguished, *Callidina pacifica* and *Habrotrocha nodosa*, the latter previously known as a variety in India and elsewhere. In Hawaii there were no peculiar species, but some very distinct varieties. In the various Pacific islands there have been recorded thirty-one species of bdelloids.

Zoological Society, May 23.—Dr. A. Smith Woodward, F.R.S., vice-president, in the chair.—Dr. J. Stuart **Thomson**: Alcyonaria of the Cape of Good Hope and Natal. The author dealt exclusively with the order Gorgonacea, and recorded nineteen species, of which six were described as new.—Dr. A. Hopewell **Smith** and Dr. H. W. Marett **Tims**: Tooth-germs in the wallaby (*Macropus billardieri*). The material upon which their observations were based had been kindly sent to the authors by Mr. Brooke Nicholls, of Melbourne. It consisted of three embryos of *M. billardieri*. The smallest specimen (allowing for the difference in size of the adults of different species) was considerably younger than that of any other Diprotodont previously examined. In the upper jaw they had identified six incisors, thus confirming M. F. Woodward's original statement. The functional incisors of the adult appeared to be the second, fourth, and sixth of the series. There were four premolars, of which the first, third, and fourth persisted. There was also one molar tooth. In the lower jaw, owing to the difficulty of interpreting the conditions, it was not certain whether there were representatives of five or six teeth in front of the premolars. Presuming there were five, the large functional incisor of the adult was the fourth of the series. As in the upper jaw, there were four premolars and one molar, the second premolar not fully developing. There were evidences of vestigial predecessors to the large lower incisor and to pm^4 . The following points of histological interest were noted:—(1) The heaping up of the epithelium along the alveolar margins, a character often supposed to be peculiar to the ungulates. (2) The precocious development of the enamel. (3) The compactness of the stellate

reticulum of the enamel-organ. (4) The abundant evidence of blood-vessels within the enamel-organ, thus confirming the observations of Poulton and Howes in the rodents. The opposite opinion is usually held. (5) Some slight evidence in support of the fusion of enamel-organs. Such fusion has been recorded in the fishes and reptiles, but not hitherto in mammals.—Rev. A. Miles **Moss**: The Spthingidæ of Peru, based on studies of Lepidoptera, with special reference to the larvæ, made during a three years' residence at Lima.—Dr. R. **Broom**: The structure of the skull of cynodont reptiles. The author, after a study of all the available material contained in the British and South African museums, gave a detailed comparative account, illustrated by a series of figures, of the morphology of the skull in the chief genera of the Cynodontia, including Bauria, Nythosaurus, Cynognathus, Trirachodon, Gomphognathus, Diademodon, Sesamodon, and Melinodon. He also discussed in some detail certain peculiarities of the mammalian skull, apparently derived from a cynodont ancestor.—Dr. C. W. **Andrews**: A new species of Dinosaurium from British East Africa (see p. 457).

Geological Society, May 24.—Prof. W. W. **Watts, F.R.S.**, president, in the chair.—R. J. **Lechmere Guppy**: The geology of Antigua and other West Indian islands, with reference to the physical history of the Caribbean region. After noticing the work of former observers on the geology of Antigua, the author gives a brief description of the formations of that island, showing that it is divided into three principal regions:—(1) the volcanic (or igneous) region; (2) the central plain; and (3) the calcareous formation, the first-named being, according to previous authors, the oldest, as it is pre-Tertiary, and the others following in succession. The calcareous formation, hitherto considered the newest, contains fossils, of which the most remarkable is a species of Orbitoides. After a discussion of these formations, and especially of the evidence for the so-called "Oligocene" age of the calcareous formation, the conclusion is reached that this formation is the oldest, not the youngest, and is probably Eocene or older. The island was raised above sea-level by the development of the great Antillian dislocation, which is described, and divides each of the islands of Guadeloupe and Antigua into two parts, of which the eastern is calcareous and the western volcanic. In Antigua the central plain intervenes between the two parts, while in Guadeloupe they are only separated by a narrow channel. In support of this proposition, the physical features of Antigua are discussed, and it is shown that the island has not been submerged since the volcanic period.

Institution of Mining and Metallurgy, May 31.—Mr. H. **Livingstone Sulman**, president, in the chair.—C. O. **Schmitt**: Future economies in Rand reduction plants. The main idea permeating this paper is a defence of the stamp tube-mill combination, against which arguments have been adduced by other authorities, with the further argument that, if either component of this combination is abandoned in the future, it will be the gravity stamp rather than the tube-mill that will be replaced by a machine capable of producing a finer product at a reduced cost. Naturally, a chief point of this paper is to promote discussion on a matter concerning which there are two distinct schools of thought. The author points out in introduction that, if working costs remain at their present figure, the limit of profitable mining will be reached approximately at a vertical depth of 5000 feet in a period of time that can be readily estimated. To increase the depth at which profits may be obtained, and consequently the period of life of a mine, it will be necessary to reduce working costs and capital charges, the former being the factor as regards which most improvement can be effected. What is known as the "big mill" policy was introduced on the Rand with the view of reducing working costs, and gave satisfactory results within proper limits. The author proceeds to analyse the work accomplished respectively by the sorting and breaking plant, and the milling or crushing plant, and he urges that, in view of recent developments and exhaustive experiments made on a sufficiently large scale, the efficiency of the tube-mill when dealing with material of a fineness suitable to produce the best results will be an important factor in the lowering of reduction

costs to meet increased expenditure necessitated by seeking ore at depth. A considerable amount of data has been collected for this purpose, much of it in the form of tabular matter and diagrams of typical flow sheets in modern practice, with the view of showing that double-stage crushing is a certain means of effecting marked economies in operating costs and securing better extraction.—A. C. **Hoare**: The roasting of complex ores in gold assaying. Opinion is divided as to the advisability of roasting before fusion when assaying complex gold ores, and though in consequence of experiments it is now established that there is no loss of gold by volatilisation when telluride gold ores are roasted, the volatilisation losses, if any, met with in roasting other complex ores have not been definitely established. The author therefore undertook this investigation with respect to sulphide ores containing iron pyrites, which after careful assay had a base sulphide, such as zinc blende, stibnite, cinnabar, or mispickel, added to them, so that the influence of the sulphide on the roasting could be determined by subsequent assay. The results of these experiments showed that there was no loss of gold in roasting low-grade ores containing zinc blende or antimony, but that there is a loss when the ores contain arsenic, cinnabar, or mispickel.—G. M. **Austin**: A prospector's method of gold assay. In this paper the author details the outfit necessary for carrying out assays in a remote district without the need of taking an elaborate equipment, and he furthermore gives the results of a number of tests made with the view of determining the degree of accuracy attainable by means of a comparatively simple outfit, using one of two methods of assay of which he gives full particulars.

MANCHESTER.

Literary and Philosophical Society, May 9.—Prof. F. E. **Weiss**, president, in the chair.—Ernest F. **Lange**: Some remarkable steel crystals, coupled with some notes on the crystallisation of the iron-carbon alloys. The crystals were discovered by Colonel T. E. **Vickers, C.B.**, in the cavity of the rising head of a large steel casting, and were preserved by him in view of the known rarity of the occurrence of such a mass of perfectly developed steel "pine-tree" crystals, as the crystalline structures of steel are usually allotrimorphic instead of idiomorphic, that is to say, their geometrical forms do not, except in very unusual circumstances, correspond with their internal crystalline symmetry. A photograph of the cavity was exhibited which showed the walls covered with pyramidal apices of the crystals formed in the liquid metal, and masses of crystals up to 14 or 15 inches in length pendant from the upper portion of the cavity, where they had slowly formed and elongated with the sinking metal with remarkably little interference and in exceptional circumstances of size of casting and casting head and slowness of cooling. Reference was made to the columnar structure of steel castings and ingots as cast, and to the fact that although steel ingots show such a strongly defined columnar structure, the experiments of Müller in Germany had shown that the interior of "bled" ingots was invariably smooth, and that ordinarily solidification proceeded in smooth parallel layers without intrusion of any crystal growths towards the interior. These steel "pine-tree" crystals had never been reproducible in a laboratory experiment, and the problems of the crystallisation of steel had been worked out by experiments upon the allotropic forms of the iron and iron-carbon alloys, the work of Stead and Osmond and Cartaud being specially mentioned for its laboriousness and ingenuity. The author illustrated the internal symmetry of the crystalline structures of various steels by lantern-slides showing the structures that had been obtained in some of his own experiments in the heat treatment of steel, some of which had led to the scientific control of certain metallurgical operations formerly guided by rule-of-thumb practice only.—Prof. S. J. **Hickson, F.R.S.**: *Osteocella septentrionalis*. Some pieces of a very fine pennatulid well preserved in spirit were sent to Prof. Bell by the Rev. J. H. Keen from 30 fathoms off Lucy Island, British Columbia. They were sent by Prof. Bell to the author for examination and report. The specimen was, when caught, about 2 metres in length, and possessed a long, hard calcareous axis reaching a diameter of 7 mm. in its thickest region. On comparing the axis with that

of the type-specimen of *Osteocella septentrionalis* from Burrard's Inlet, British Columbia, preserved in the British Museum, no doubt could be entertained that the specimen from Lucy Island belongs to the same species. Large pennatulids from the same waters similar to this in structure have been described by different authors under the names *Verillia*, *Halipteris*, *Pavonaria*, and *Ballicina*. There can be no doubt that most of these specimens belong to the same species, and the proper name for it by the rules of nomenclature is *Osteocella septentrionalis*. The paper contains some general account of the structure of *Osteocella*, but, apart from the characters of the axis, the most important character is the great development of fleshy substance on the ventral side of the rachis and the presence of ventral radial canals.

DUBLIN.

Royal Irish Academy, May 8.—Rev. Dr. J. P. Mahaffy, president, in the chair.—K. T. Wang: The differentiation of quaternion functions. Quaternion functions are considered which involve only one quaternion, the constants being scalars. The formula

$$dfq = f'q dq + (f'q \cdot Vq - Vfq)V(Vdq : Vg)$$

is obtained, where $f'(q)$ is the differential coefficient of $f(q)$ formed as if q was a scalar. Several examples are given, and also application to the operator α (defined by $d = -Sdq \alpha$).—I. Arwidsson: Some Irish Maldanidæ. The paper dealt with a small collection of polychæet worms belonging to the family Maldanidæ, collected in Irish waters. One new genus, *Cæsicirrus*, and two new species, *C. neglectus* and *Nichomache maculata*, were described. Both species had been found previously by various naturalists, but were erroneously identified.—G. A. J. Cole: Glacial features in Spitsbergen in relation to Irish geology. The paper arises out of the excursion made in connection with the International Geological Congress of 1910. The comparison of Spitsbergen with Ireland towards the close of the Ice age is rendered an apt one, both on account of the scale of the surface features and the proximity of the open oceanic waters through a large part of the year. The effect of frost action, and especially of "nivation-hollows," is pointed out as originating the recesses, which are ultimately converted into cirques. It is urged that in plateau areas, like those of the eastern part of the Ice Fjord and around Killary Harbour in Ireland, cirques arise by the notching of the plateau edges below the snow-line. The Irish cirques, it is argued, belong to a late stay in the glaciation of the country. The possibility is discussed of the retention of lowland ice in the central areas of Ireland after regions to the east had become free. Interglacial phenomena may thus be traceable only on the margin of the Irish "ice-island," though pronounced in other areas.

May 22.—Rev. Dr. Mahaffy, president, in the chair.—James Murray: *Rotatoria bdelloida* (Clare Island Survey). No fewer than sixty-five species of bdelloid rotifers have been collected on Clare Island and the neighbouring mainland by Mr. Murray and his helpers, among them one species (*Habrotrocha hibernica*) new to science. The Irish bdelloids correspond closely with those of Scotland, only two species being, so far, unknown from that country.

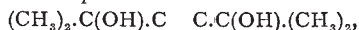
Royal Dublin Society, May 23.—Prof. T. Johnson in the chair.—Prof. James Wilson: The inheritance of milk-yield in cattle. This investigation involved considerable preliminary inquiry, especially on the following points:—(a) the corrections to be made in short and prolonged lactations in order to bring them to the normal; (b) the allowances to be made for age; (c) in determining how far a cow's total normal yield might be estimated from her yield early in a lactation. These points having been determined, it was found that in full-sized breeds there are three grades of cows, a low grade giving from 450 to 600 gallons, a high grade giving from 1000 to 1200 gallons, and an intermediate grade giving from 750 to 950 gallons, and it was found, also, that the high and low grades are approximately "pure" strains, while the intermediate grade is a "Mendelian" hybrid between them.—Prof. T. Carroll: Experiments carried out at the Albert Agricultural Institution, Glasnevin, Dublin: an inquiry into the potato disease *Phytophthora infestans*. The experiments consisted

of (a) placing in a field of potatoes a case protected by cotton-wool from the entrance of disease spores. The potatoes planted in the case belonged to a variety liable to disease; but the haulms and tubers of these protected potatoes were not attacked, whilst the surrounding unprotected crop was badly affected. (b) A portion of ground in which potatoes were growing was completely covered with cotton-wool immediately after the plants had made their appearance, when it was found that the tubers of the crop were completely free from disease, although the surrounding crop was much diseased, as were the haulms of the protected potatoes. (c) Between the drills (*anglice* ridges) holes were made 12 inches, 6 inches, and 3 inches deep, into which immature potato tubers were put, the haulms of the potatoes being placed over them. The potatoes from the 12-inch hole were free from disease; those from the 6-inch and 3-inch holes were one-third and two-thirds diseased respectively. Experiments with diseased tubers were also undertaken. (a) These were planted in a cool conservatory; disease did not appear in the plants nor in their tubers, although crops in the neighbourhood were badly diseased. (b) One of the tubers of this experiment planted in the conservatory showed no sign of disease up to September of the following year. The haulms of this plant were removed, and the soil having been carefully removed from the tuber, diseased haulms from a plant grown outside were shaken over the exposed tubers after they had been sprayed with pure spring water. Almost all the tubers contracted the disease on their exposed surfaces. These and other experiments were undertaken in order to test whether the disease *Phytophthora infestans* is carried to the tubers of potato plants from the leaves through the stems, and with the object of proving the value of preventive spraying and suggesting its *raison d'être*.

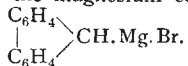
PARIS.

Academy of Sciences, May 29.—M. Armand Gautier in the chair.—H. Deslandres: A simple explanation of the solar protuberances and other phenomena by very weak magnetic fields. By assuming the existence of a solar magnetic field analogous to that of the earth and also the ionisation of the gas of the black filaments and protuberances with the predominance of ions of the same sign. The consequences of this assumption are developed and compared with various experimental data.—Ch. Lallemand: A project for an international map and aeronautical fixed points. Proposals for a map for the use of aeronauts, enabling the position to be readily determined. The necessity for an international agreement is pointed out.—A. Halier and Ed. Bauer: The oximes and phenylalkylisoxazolones obtained with ethyl, methyl, and dimethylbenzoylacetic esters. The oxime of benzoyl-ethyl-acetic acid described by MM. Hantzsch and Miolati does not exist, and is, in fact, phenylethylisoxazolone. The esters of monomethyl, monoethyl, and dimethylbenzoylacetic acids, whatever their mode of preparation, give rise to substituted phenylisoxazolones when treated with hydroxylamine hydrochloride and alcoholic potash. The oximes, however, can be obtained by treating these esters in alcoholic solution with the chlorzincate of hydroxylamine (Crismer's salt).—Ch. Ed. Guillaume: The coefficient of the quadratic term in the formula of the expansion of nickel steels. The value of the coefficient of the quadratic term in the expansion is plotted against the percentage of nickel, the data from eighty-four alloys being utilised. The disturbing effects of chromium and manganese are discussed.—S. Arloing, M. Fern, and J. Chattot: The influence of the anæmia of the organs on the incidence of tuberculous lesions. Tubercle bacilli, varying in virulence, do not produce lesions in an organ deprived of circulation by aseptic means.—M. Godlewski was elected a correspondent for the section of rural economy in the place of the late M. Fliche.—J. Guillaume: Observations of the sun made at the Observatory of Lyons during the first quarter of 1911. The results of observations on fifty-nine days are given in three tables showing the number of spots, their distribution in latitude, and the distribution of the faculæ in latitude.—Jules Drach: The determination of the asymptotic lines to the general surfaces of the third degree.—Lucien Godeaux: Linear congruences of

conics.—G. **Koenigs**: The law of the curvatures of conjugated superficial profiles.—M. **Lemeray**: The principle of relativity and the forces exerted between bodies in motion.—H. **Larose**: The propagation of a discontinuity along a telegraph line with uniform loss.—G. A. **Hemsalech**: The air spectrum given by the initial discharge of the self-induction spark. It has been shown in a previous note that the spectrum of the initial discharge of a self-induction spark differs from that emitted by the oscillations, the spectrum having a large proportion of lines. A further study of these spectra of the initial discharge shows that the intensity varies inversely as the capacity of the condenser and directly as the self-induction of the discharge circuit. An increase in the capacity of the electrodes produces a strengthening in the line spectrum and a weakening of the bands.—André **Léauté**: The irregularities of the disruptive potential.—H. **Lioret**, F. **Ducretet**, and E. **Roger**: A self-recording telephone. A combination of a loud-speaking telephone and phonograph is described.—Pierre **Sève**: The measurement of magnetic fields in absolute value. The simultaneous use of the Cotton balance and the induction method described allows fields up to 15,000 Gauss to be measured with an accuracy of 1 in 1000.—E. **Baud**: The molecular heat of fusion.—A. **Tian**: The radiations causing the decomposition of water and the extreme ultra-violet spectrum of the mercury arc. The radiations decomposing water, forming hydrogen and hydrogen peroxide, are localised in the extreme ultra-violet at about 1900 Angström's. The light from a quartz mercury arc lamp determines this decomposition, owing to the presence of rays 1846, 1848, and 1851.—Georges **Dupont**: The catalytic isomerisation of acetylene pinacone. The synthesis of tetramethylketo-hydrofurane. The pinacone



treated with an aqueous solution of mercuric sulphate gave, not the expected dioxyketone, but its internal anhydride, tetramethylketo-hydrofurane. The latter gives both ketonic and enolic reactions.—Emile **André**: A new method of preparing β -diketones. Ketones of the type $\text{C}_6\text{H}_5\cdot\text{C} \quad \text{C}\cdot\text{CO}\cdot\text{R}$. combine with amines forming compounds $\text{C}_6\text{H}_5\cdot\text{C}(\text{NR}'\text{R}')\cdot\text{CH}\cdot\text{CO}\cdot\text{R}$. The latter, under the influence of acids, readily hydrolyse, forming the salt of the amine and the β -diketone $\text{C}_6\text{H}_5\cdot\text{CO}\cdot\text{CH}_2\cdot\text{CO}\cdot\text{R}$. Examples are given proving the generality of the method.—P. L. **Viguiet**: Tetrolic aldehyde.—V. **Grignard** and Ch. **Courtot**: The magnesium derivative of fluorene. In xylene solution at 135° C. fluorene reacts with ethylmagnesium-bromide,



being formed, several reactions of which are described.—M. **Battandier**: Experiments on the germination of an aquatic plant, *Damasonium Bourgaei*.—P. **Vuillemin**: Remarks on a disease of the Weymouth pine (*Pinus Strobus*). Reasons are given for supposing that this disease is not really a new one in France.—Pierre **Bonnier**: The monostatic capacity in aviators.—A. **Marie** and Léon **MacAuliffe**: The influence of the social medium on the development of height in women. The average female height increases with the social position.—L. **Le Nouëne**: The addition of a microphone apparatus to the ear trumpet for the relief of deafness.—Charles **Nicolle**, A. **Cuénod**, and L. **Blaisot**: Some experiments on trachoma (granular conjunctivitis). An account of attempts to transmit trachoma from human subjects to monkeys.—A. **Magnan**: The influence of the nature of the food upon the large intestine and cæcum of birds.—N. **Lehmann** and C. **Vaney**: The relations between the climatic conditions and frequency of the larvæ in the Hypoderma of the ox.—M. **Maisonneuve**: The fecundity of Cochylys.—Adrien **Lucet**: The influence of agitation upon the development of *Bacillus anthracis* cultivated in liquid media. If the liquid cultures of anthrax are kept agitated, the bacilli tend to assume the same form as in blood, and the yield in a given time is increased.—A. **Marie**: The development of a neutralising substance in the brain of mammals.—Eloy de **Stœcklin**: The oxydase properties of oxyhæmoglobin.—Gabriel **Bertrand** and Arthur **Compton**: The action of heat upon emulsin.

—Stanislas **Meunier**: The rôle of biological force in the evolution of the terrestrial surface.—G. **Vaseeur**: Western France during the Stampian epoch.—M. **Deprat**: The importance of recent epirogenic movements in south-eastern Asia.—L. **Cayeux**: Dislocations in the islands of Delos, Rhenee, and Mykonos (Cyclades).—Francis **Rey**: The presence of the Gothlandian in the plain of Tamlet, on the Algeria-Morocco border.—Charles **Moureu** and Adolphe **Lepape**: The ratio of argon to nitrogen in natural gaseous mixtures and its signification. This ratio has been determined for fifty-two natural gases from springs, and varies between 0.76 and 3.37, with an average of 1.15.—M. **Boudry**: A new method of utilising thermal waters at a distance from the spring.

CALCUTTA.

Asiatic Society of Bengal, May 3.—I. H. **Burkill**: *Swertia chinenses* quatuor novæ ex herbario G. Bonati. Four new *Swertias* from Yunnan are described, viz. *S. Bonatiana*, *S. Duclouxii*, *S. rosea*, *S. patens*; *S. patens* is a very marked species.—W. W. **Smith**: Note on *Sterculia alata*, Roxb., var. *irregularis*, a remarkable instance of leaf variation. The author directs attention to the wide range of variation in the leaf of this peculiar variety as represented on a tree in cultivation at the Royal Botanic Garden, Calcutta. Seedlings from the tree may vary like the parent.—W. W. **Smith**: A new *Gentian* and two new *Swertias* from the E. Himalaya. Descriptions of a small *Gentian* and two *Swertias* from Sikkim, *Gentiana pluviarum*, *Swertia ramosa*, and *S. Burkilliana*.—W. W. **Smith**: *Plantarum novarum* in Herbario Horti Botanici Calcuttensis cognitarum Decas. Descriptions of *Oritrephes septentrionalis*, *Senecio biligulatus*, *S. Lagotis*, *S. Kingianus*, *S. Chola*, *Saussurea fibrosa*, *S. Pantlingiana*, *S. Nimborum*, *S. Laneana*, and *Veratum shanense*. The first and last are from Burma; the others are from the Sikkim Himalaya.—Lieut. F. H. **Malyon**: Some current Pushtu folk-stories.—D. **Hooper**: The composition of Indian yams. Proximate analyses are given of forty samples of the tubers of identified species and varieties of *Dioscorea*, grown wild or cultivated in India. The food value of the best kinds is shown to agree with that of the potato. The poisonous principle, dioscorine, is described, and its presence or absence is recorded in the samples examined. The chemical changes that take place when the poisonous roots are treated with water to render them edible is shown by comparative analysis of the raw and prepared tubers.—D. **Hooper**: Some Asiatic milk-products. Peculiar forms of dried cheese, called *Karut* in Baluchistan and Afghanistan, and *Chema* in Tibet and Mongolia, are described, and the analysis of samples from Nepal and Quetta are recorded. They consist largely of casein, with more or less free lactic acid. Examinations are also made of Bengal curds, called *chhana* and *dahi*, the first being a rich cream containing more casein than ordinary cream, and the second being buttermilk undergoing lactic fermentation. *Karut* is prepared from fermented skimmed milk by pressing and drying the coagulated proteids.—Kashi P. **Jayaswal**: Elucidation of certain passages in I'tsing.—Biman Behari **Dey** and Hemendra Kumar **Sen**: Interaction of hydrazine sulphate with nitrites, and a new method for the determination of "nitritic" nitrogen. On attempting to prepare hydrazine nitrite by the double decomposition of barium nitrite and hydrazine sulphate, barium sulphate is precipitated, and the new salt appears to be formed at low temperatures, but readily decomposes. A systematic examination was made of the gases evolved, and it was found that by collecting the gases in an endiometer, nitrous oxide and nitrogen existed in the proportion of two to one. By calculating the weight of the gases evolved, the formation of monacid hydrazine nitrite is demonstrated according to theoretical equations. Nitrites of the alkalis, the alkaline earths, the heavy metals, and, in fact, nitrites in general, were decomposed in a similar manner, and the estimation of the volumes of residual gases indicated the amount of nitritic nitrogen formed in the reactions.—Prof. W. **West**, with notes by Dr. N. **Annandale**: Descriptions of three new species of *Alga* associated with Indian fresh-water polyzoa. The *algæ* described are from the Western Ghats and Orissa, and represent the genera *Tolyptorhix*, *Dactylococcopsis*, and *Microcystis*.