invention, and assists students by providing a common meeting-place and centre of action. Every scientific discoverer desires immediate publication of his work, both for his own reputation and to secure the assistance of his colleagues. Every industrial inventor requires publication in order that he may secure the natural profits of his invention. A society systematises and arranges the science or study which is its subject-matter.

The present condition of science is certainly due to the organised efforts of such societies as the Royal Society and its subordinate societies in this and other countries. They secure public recognition for science and those who pursue it; they prevent overlapping; serve to deter different men from working on the same lines; and they bring influence to bear on the public and on the Government. Any individual is less powerful by himself than when he is associated with others seeking the same object. An active society is a corporation with a perpetual succession, and it never dies. The work carried on by an isolated student ceases at his death, but the work done by a number of students associated together goes on and on. As one man drops out, another takes his place.

An excellent example of the reciprocal influence of scientific workers and of a scientific institution upon each other is afforded by the Royal Institution. Without Davy, Faraday, or Tyndall, the Royal Institution would never have become the important body it now is. But without the Royal Institution neither Davy nor Faraday would have had any opportunity for carrying out their scientific work and of obtaining their scientific reputation, and perhaps the same may be said to a certain extent of Dr. Tyndall.

The history that I have been tracing comprises within it a record of the advance in many directions of our acquaintance with the secrets of nature, of our turning that acquaintance to practical account, and of the consequent progress of the nation in material prosperity. It bears witness likewise to that specialisation in science, which, though by no means an unmixed blessing, seems to be of necessity associated with all advancement in natural knowledge. The days are long since past when any single individual could attempt to cope with the whole encyclopædia of science, but the question not unfrequently arises at the present day whether the position of the specialist would not be more secure were the foundations on which he builds extended over a larger area, and were his scientific sympathies somewhat wider in their character.

Another question that may be asked is whether there is any need for this multiplicity of societies. The answer from any one who in whatever manner believes in evolution will be, that at the time of founding each society a necessity for it must at all events have been thought to exist, and that the analogous societies at that time in being must have been either unable or unwilling to adjust or expand themselves so as to include the subject for the study of which the new society was instituted. Many of the subjects, for instance, that originally came within the domain of the Royal Society, and indeed are still included within it, have by degrees been not absolutely banished from it, but relegated in the main to other societies, founded more especially for the study and illustration of such subjects. The Linnean, the Astronomical, the Chemical, and the Geological Societies afford instances in point, and any attempt to suppress such societies, and to bring their members all within the fold of the Royal Society, would have a disastrous effect on the advance of science, and would absolutely overweight the powers of the Royal Society itself. At the same time it must be remembered that accounts of important discoveries in any of these branches of knowledge are cordially welcomed by the Royal Society, and that it is usually the case that the leading Fellows of these special societies are also Fellows of the Royal Society. The same in a lesser degree holds good with the Society of Antiquaries, as archæological discoveries, especially when bearing on the early history of man, are welcomed alike on both sides of the quadrangle at Burlington House.

Turning to the more purely philosophical societies that have been established in London, it would seem as if for some reason or other the soil was not congenial for their growth or longevity. The Dialectical Society, founded in 1865, was dissolved in 1888; the Psychological, founded in 1875, ceased to exist in 1879, but was resuscitated under the name of the Society for Psychical Research in 1882. The Zetetical Society, established in 1878, and the Aristotelian in 1880, do not appear in Whitaker's List of Societies and Institutions, though the latter, notwithstanding that its members are few, is still in active operation. Altogether the number of those interested in abstract philosophy seems to bear no proportion to that of the votaries of the study of nature in all its phases and of those who devote themselves to the application of science to the good of mankind.

In the Institut de France, one of the Académies is that of Sciences Morales et Politiques, which, however, is divided into five sections. Of the eight places devoted to philosophy, only six were filled at the beginning of the present year, but this may have been purely accidental. The mention of the Institut suggests the question how far a similar association of academies would meet the requirements of this country. Such a question is beyond the limits of the present address, but in passing I may say that the necessary limitations of the Institut, the payment for attendance, the method of election of its members, and its close connection with the Government of the day, all present features which are hardly in accordance with our insular traditions. In Paris itself the Institut has had to be supplemented by various important scientific societies, such, for instance, as the Geological Society and the Society of Antiquaries of France.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—Dr. S. H. Hodgson has been appointed an elector to the White's professorship of moral philosophy in succession to the late Prof. Henry Sidgwick.

It will shortly be proposed in Convocation to confer the degree of D.Sc., *honoris causa*, upon Dr. Oliver J. Lodge, principal of the University of Birmingham.

Science scholarships are announced for competition on December 4 at Balliol College, Trinity College and Christchurch; on December 11 at Magdalen College; on January 15 at Jesus College.

CAMBRIDGE.—The complete degree of M.A., *honoris causa*, is to be conferred on Mr. G. H. F. Nuttall, M.D. California, Ph.D. Göttingen, University lecturer in bacteriology and preventive medicine, and on Mr. T. Strangeways Pigg, Advanced Student of St. John's College, University demonstrator of pathology.

The Special Board for Medicine propose a new scheme for the degrees of M.B. and B.C., whereby candidates shall be required to pass a suitable examination in pharmacology (*i.e.* the physiological actions of remedies), and in general pathology and the elements of hygiene, before admission to the final or qualifying examination in medicine, surgery and midwifery.

THE new Ravenscroft metallurgical laboratory of the Birkbeck Institution will be opened on Saturday next, December 1.

DR. BRILLOUIN has been nominated to succeed the late Prof. Bertrand as professor of general and mathematical physics at the Collège de France.

DR. THOMAS BUZZARD, a Fellow and member of the Council of King's College, London, has been appointed one of the representatives of the college upon the Senate of the University of London, in succession to Lord Lister, who has resigned.

AT a meeting of the associates of the Owens College, Manchester, held on November 21, Prof. J. J. Thomson, F.R.S., who is himself an associate, was elected a representative of the associates on the Court of Governors of the college for a period of five years.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, August 21.—"Note on the Occurrence of a Seed-like Fructification in certain Palæozoic Lycopods." By D. H. Scott, M.A., Ph.D., F.R.S.

The specimens described in the present note show that seed-like bodies, identical with those figured by Williamson under the name of *Cardiocarpon anomalum*, were borne on Lepidodendroid cones, otherwise indistinguishable from *Lepidostrobus*. They thus prove that under the genus *Cardiocarpon*, and even under the "species" *C. anomalum*, totally different objects have been confounded, namely, the seeds of Cordaiteæ or Cycads on the one hand, and the integumented megasporangia of certain Palæozoic Lycopods on the other. The latter organs present close analogies with true seeds, but are wholly distinct in detailed structure from the Gymnospermous seeds above mentioned. The discovery of the specimens of the new cone is due to Messrs. J. Lomax and G. Wild, who recognised it as a *Cardiocarpon*-bearing strobilus, resembling a *Lepidostrobus*. The original specimens, which are calcified and generally well preserved, were derived from the Ganister beds of the Lower Coal-measures of Lancashire. A closely similar fructification occurs, at a much lower horizon, in the Burntisland beds of the Calciferous Sandstone Series.

The strobilus is of the ordinary *Lepidostrobus* type. The cylindrical axis bears numerous spirally disposed sporophylls, each of which consists of a long horizontal pedicel, expanding at the distal end into a rather thick lamina, which turns vertically upwards. Anatomically, the structure is also that of a *Lepidostrobus*. The ligule is sometimes well preserved; it is seated in a depression of the upper surface of the sporophyll, at the distal end of the sporangium, and is thus in the normal position.

With one exception, the specimens of the strobilus are immature, and their tissues not quite fully differentiated. These younger specimens bear sporangia which are essentially those of a *Lepidostrobus*. A single large sporangium is seated on the upper surface of the horizontal pedicel of each sporophyll, to the median line of which it is attached along almost its whole length. The sporangial wall has the structure characteristic of *Lepidostrobus*. Within the sporangial cavity, the membranes of the megaspores are usually preserved; a single large megaspore almost fills the sporangium, but smaller, abortive spores, with thicker walls, are also present. It appears that a single tetrad was developed in each megasporangium, and that of the four sister-cells one only came to perfection, constituting the functional megaspore.

In one specimen, discovered by Mr. Wild, the strobilus is in a more advanced condition. In its upper part the sporophylls simply bear sporangia, as above described, but lower down in the cone these are replaced by integumented, seed-like structures, identical with the detached bodies called *Cardiocarpon anomalum* by Williamson. Mr. Wild's specimen, then, demonstrates that the *Cardiocarpon anomalum* of Williamson was borne on a cone with all the characters of a *Lepidostrobus*, and that it represents the matured condition of the megasporangium and sporophyll.

The detailed comparison of specimens in the young and the mature condition has shown the nature of the change, which converts the megasporangium, together with its sporophyll, into a seed-like organ. A thick integument has grown up from the sporophyll, completely overarching the megasporangium, except for a narrow crevice left open at the top. When seen in a section tangential to the strobilus as a whole, this crevice is cut across, and presents exactly the appearance of a micropyle; in reality it differs from a micropyle in being a narrow slit, extending almost the whole length of the sporangium, in the radial direction, whereas the micropyle of an ordinary seed is a more or less tubular passage.

In a strobilus associated with the seed-like specimens, and probably of the same species, but bearing microsporangia, it was found that the latter, like the megasporangia of the female cone, are provided with integuments.

The Burntisland specimens, which from their horizon are presumably of a distinct species, are of interest for two reasons: in one specimen the ligule is clearly shown, enclosed by the integument, the only example of this organ so far observed in the mature, seed-like stage of the fructification. Another of the Burntisland specimens was the first observed in which the prothallus was present. It fills a great part of the functional megaspore, which is almost co-extensive with the sporangial cavity, and consists of a large-celled tissue, resembling the prothallus of *Isoetes* or *Selaginella*. The peripheral prothallial cells are smaller than the rest, but no archegonia could be detected. [In a section, since examined, cut by Mr. Lomax from one of the Coal-measure specimens, the prothallus is even better preserved. October 9, 1900.]

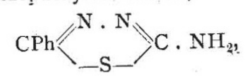
The bodies described in this note resemble true seeds in the possession of a testa or integument, and in the fact that one megaspore or embryo-sac alone came to perfection; the seed-like organ was likewise shed entire, and appears to have been indehiscent. In many points of detail, however, the reproductive bodies in question differ from the seeds of any known Gymnosperms; they afford no proof of the origin of the latter class from the Lycopods. The newly-discovered fructification nevertheless shows that certain Palæozoic Lycopods crossed the boundary line which we are accustomed to draw between Sporophyta and Spermophyta. As these fossils appear worthy of generic rank, it is proposed to found the genus *Lepidocarpon* for their reception.

Physical Society, November 23.—Prof. Everett, F.R.S., Vice-President, in the chair.—A paper on a self-adjusting Wheatstone's Bridge, by E. H. Griffiths and W. C. D. Whetham, was read by Mr. Whetham. The object of this paper is to describe a cheap and easy method of getting a self-adjusting bridge to show on a scale the actual resistance of any wire. Contact with the bridge wire is made by means of a light horozontal bar, which is suspended by a phosphor-bronze strip from the coil of the d'Arsonval galvonometer used with the instrument. A second bar, parallel to and above the first, is rigidly connected with the coil. A wooden beam, worked by clockwork, moves up and down between the bars and clamps them alternately. When the beam is down contact is made with the bridge wire. If this contact is not at the zero point a current will flow through the coil, and if the cell is connected up the proper way, it will turn the coil so as to bring the upper bar nearer to the null point. This puts a twist into the phosphor-bronze strip, and when the beam rises and clamps the upper bar the torsion comes into play, and brings the lower bar under the upper one. The beam then descends and makes contact at this point, and if any current flows through the galvanometer there is further movement until the null point is reached. Any alteration in the resistance of the wire under experiment causes a movement of the zero point on the bridge wire, and this is followed by the lower arm. The position of the lower arm can be directly indicated by means of a scale. Prof. S. P. Thompson asked how the scale was calibrated. Mr. Whetham said the scale was arbitrary, but it could be calibrated by the known resistance of the bridge wire per unit length. Extension of the range can be obtained by shunting the bridge wire with various resistances. Mr. Glazebrook asked how sensitive the bridge was. Mr. Whetham said that working with a dry cell it could easily indicate one degree on a platinum thermometer. Mr. Blakesley pointed out that if the cell was connected up the wrong way the zero point would be an unstable one.—A paper on the liquefaction of hydrogen was read by Dr. M. W. Travers. These experiments were undertaken in order to provide liquid hydrogen in sufficient quantity for the separation of neon from the helium with which it is usually mixed. The separation is effected by cooling the gases to the temperature of hydrogen boiling at atmospheric pressure. The principles and conclusions do not differ from those of Dewar, but as the production of liquid hydrogen is neither difficult nor costly, an account of the experiments is given. In 1884 Wroblewski showed that strongly cooled and compressed hydrogen, on being allowed to expand, formed mist or spray in the tube; and later Olszewski repeated these experiments on a larger scale and determined the temperature of the liquid. Other methods of liquefying hydrogen have been suggested by Lord Rayleigh and Kammerlingh Onnes. In the case of many gases a fall of temperature takes place on free expansion, but under ordinary circumstances the temperature rises in the case of hydrogen and helium. The principle of free expansion was first applied by Hampson and Linde to the liquefaction of air. Within the last two years Dewar has shown that, at a temperature close to $-200°$ C., hydrogen behaves as an imperfect gas and becomes cooled when allowed to expand. This principle has been applied by Dewar to the liquefaction of hydrogen in quantity. In the author's experiments, hydrogen under a pressure of 200 atmospheres passes through a coil which is cooled to $-80°$ C. by a mixture of solid carbonic acid and alcohol. It then enters another coil contained in a chamber which is continually replenished with liquid air. The lower portion of this coil passes into another chamber, which is closed and communicates through a pipe with an exhaust pump. Liquid air flows continuously from the first chamber into the second through a pin valve controlled by a lever. The liquid air, boiling under a pressure of 100 mm. of mercury, lowers the temperature to $-200°$ C. The gas then passes into a regenerator coil, which is enclosed in a vacuum vessel, and expanding at a valve, passes upwards, through the interstices of the coil and the annular space surrounding the chambers through which the gas first passes, to an outlet whence it can return to the main supply pipe. The liquid which separates from the gas is ultimately collected in a vacuum vessel. The apparatus, with the exception of the compressor, motor and Hampson air liquefier, is comparatively inexpensive. About 50*l*. is required for the additional apparatus, and each time liquid hydrogen is made involves a further expenditure of about a sovereign. Dr. Hampson said he would like to offer a correction. Dr. Travers had said that he (Dr. Hampson) was the first to liquefy air by the application of the counter current process to the Joule-Thomson effect. Although he was the first to make the proposal he was not the first to apply it. He made the proposal to Prof. Dewar's assistant in 1894, and air was liquefied by Prof. Dewar by this method. Dr. Travers had referred at length to a valve which he (Dr. Hampson) had devised, but as it was straightforward common sense he did not wish to accept any credit for the use it had been to the author in his experiments. He would like to call attention to the remarkable features of the work in two respects—the economy of means and the magnitude of results. By means of liquid hydrogen Prof. Ramsay and Dr. Travers had succeeded in obtaining the physical and other properties of some of the rarer gases. Prof. S. P. Thompson said the author had asserted that the Joule-Thomson effect for hydrogen changes in sign at some temperature, and expressed his interest in the fact that it was possible to get a cooling effect by allowing hydrogen to expand. Mr. Boys asked if it was necessary or desirable to allow the hydrogen to expand to atmospheric pressure. Dr. Travers said the mechanical advantages of this were great. Dr. Lehfeldt asked if there had been any attempt to determine the temperature of the liquid, and, secondly, if the apparatus could be employed to determine the magnitude of the Joule-Thomson effect. Dr. Harker asked if the temperature at which the Joule-Thomson effect changes sign was known. Dr. Donnan said that the effect changed sign at the temperature at which "PV" was a minimum. Dr. Travers, in reply to Dr. Lehfeldt, said he had not determined the temperature of the liquid, and the apparatus was not suitable for measuring the Joule-Thomson effect. He should say that the change of sign occurred about $-150°$ C. It was Daniel Berthelot who first pointed out that the change of sign corresponded with the minimum value of "PV," but the experiments of Amagat on the relation between pressure and volume were not sufficiently accurate to fix the temperature.—A paper on the anomalous dispersion of carbon, by Prof. R. W. Wood, was taken as read. Experiments were made with smoke films and with films deposited on plate glass in a vacuum by an incandescent lamp. The dispersion was first measured with a Michelson interferometer, illuminated with monochromatic light of various colours, obtained by prismatic analysis. The fringes were photographed and measured, readings being obtained between wave-lengths ·000040 cm. and ·000066 cm. The results show a steady increase of refractive index from blue to red. The refractive index for sodium light was measured by estimating the thickness of the film and the fringe displacement, and was found to be 2·2. A prismatic deposit of smoke was then made by allowing a piece of plate glass to move uniformly backwards and forwards over the top of a small flame. The deviation produced by this prism was measured by means of a direct vision spectroscope with the prisms removed. Experiments were performed with red and blue light. The mean deviation of red and blue was taken for sodium light, and this result was in good agreement with the deviation obtained by the interferometer method.—A paper on the refraction of sound by wind, by Dr. E. H. Barton, was taken as read. Assuming that the wind is everywhere horizontal, and does not vary in any one horizontal plane, but is different at different levels, then the following results are obtained for rays in the same vertical plane as the wind: (1) The direction of propagation is not usually at right angles to the wave front where there is a wind, consequently the cosecant law for the wave front needs supplementing by another expression giving the direction of the ray. (2) Total reflection cannot occur if the wave front is initially horizontal. (3) In a region where the horizontal wind increases uniformly as we ascend, the rays, instead of forming a catenary, describe a more complicated curve, which, however, reduces to a parabola in the special case of rays whose wave fronts are horizontal. In the paper the relation between direction of propagation and wave front is first worked out and then the refraction of waves and rays on crossing into a new wind zone is considered. This principle is then applied to the diffraction through any number of parallel wind zones, and it is shown that the final inclinations of wave fronts and rays are independent of the characteristic constants of the intermediate zones. It is shown that since a cosecant cannot have a value between $+1$ and -1, total reflexion becomes possible. If, however, the wave front is initially horizontal there is no refraction of the wave front and no total reflexion, but the ray deviates without limit from the vertical, and tends to correspond with the wave front. When reflexion occurs it follows the ordinary optical law. The society then adjourned until December 14, when the meeting will be held at the Royal College of Science, South Kensington.

Chemical Society, November 15.—Prof. Thorpe, President, in the chair.—The following papers were read:—Trichlorobenzoic acid, by F. E. Matthews. Benzonitrile hexachloride is acted upon by alcoholic soda with production of a mixture of trichlorobenzoic acids from which a new trichlorobenzoic acid was isolated; the new acid gives an ester with hydrogen chloride and alcohol and is, therefore, the 1:2:4-trichloro-3-benzoic acid.—Oxidation of benzalthiosemicarbazone, by G. Young and W. Eyre. Benzalthiosemicarbazone,

$$CHPh:N.N:C(SH).NH_2,$$

is oxidised to amidophenylthiodiazole,



by ferric chloride. Similar oxidation products are obtained from the 4-substituted methyl and phenyl benzalthiosemicarbazones.—The nitration of benzeneazosalicylic acid, by J. T. Hewitt and J. J. Fox. With dilute nitric acid, benzeneazosalicylic acid yields benzeneazoorthonitrosalicylic acid, whilst with strong nitric acid, paranitrobenzeneazosalicylic acid is obtained.—Upon the collection and examination of the gases produced by bacteria from certain media, by W. C. C. Pakes and W. H. Jollyman. The strictly ærobic organism *Bacillus pyocyaneus* grows in media containing 1 per cent. of potassium or ammonium nitrate under anærobic conditions; the authors conclude that the terms ærobic and anærobic must be extended so as to include the presence of oxygen in the form of nitrates. The gases produced by this organism from nitrated media contain nitrogen and small quantities of oxygen.—The bases contained in Scottish shale oil, by F. C. Garrett and J. A. Smythe. The basic mixture separated from Broxburn shale oil seems to contain no pyridine; α-picoline, $\alpha\gamma\alpha'$-trimethylpyridine, and $\alpha\beta$- and $\alpha\beta'$-dimethylpyridine were isolated from it.—On a simplified method for the spectrographic analysis of minerals, by W. N. Hartley and H. Ramage.

PARIS.

Academy of Sciences, November 19.—M. Maurice Lévy in the chair.—Note on the telescopic planets, by M. de Freycinet. The asteroids studied, 428 in number, appear to belong to eight independent rings, each of which, before breaking up into fragments, turned as one piece round the sun. This hypothesis as to their formation requires three conditions, all of which are shown to be fulfilled.—On the aërostatic observation of the Leonids, by M. J. Janssen. The observations from the balloons ascending from Paris were obscured by clouds, although an altitude of over 13,000 feet was attained. Observations at other stations were also spoiled by the state of the weather.—Sir Joseph Hooker was elected a Foreign Associate in the place of the late Prof. R. Bunsen.—Observations of the Leonid swarm at Meudon, by M. H. Deslandres. Only nine Leonids were seen on the two nights.—On some applications of non-euclidian geometry, by M. Servant.—On the summation of series, by M. Émile Borel.—On a new shadow analyser, by M. J. Macé de Lépinay. The new analyser may be used for any simple rays, and preserves its sensibility in convergent light. By applying a modification of Mouton's method, it is possible to measure easily thicknesses up to several centimetres with an accuracy of $0·14\,\mu$.—On the electrocapillary properties of mixtures and electrocapillary viscosity, by M. Gouy.—The direct combination of nitrogen with the metals of the rare earths, by M. Camille Matignon. A mixture of the oxide of the rare earth with aluminium and magnesium is heated in a tube containing air and connected with a manometer. Under these conditions, with lanthanum, praseodidymium, neodidymium and samarium, the absorption of the oxygen and nitrogen is very rapid; with cerium and thorium the absorption, although complete, is slower.—Relation between the chemical constitution of the colouring materials derived from triphenylmethane and their absorption spectra in aqueous solution, by M. P. Lemoult. All the dyes examined gave in aqueous solution an absorption spectrum possessing a red luminous band, the centre of which was fixed in position ($\lambda = 6860$).—On blue chlorophylline, by M. M. Tsvett. By a particular mode of treatment, which is described in detail, the author has succeeded in obtaining crystals of a chlorophylline of a pure blue colour, apparently different from the phyllocyanine of Frémy and the chlorophyllines of Sorby and Gautier.—Cryoscopy of human sweat, by M. P. Ardin-Delteil. Normal sweat from a healthy man has an average freezing point of $-0°{\cdot}24$ C. It may vary in individual cases between $-0°{\cdot}08$ and $0°{\cdot}46$ C., the oscillations being in great part due to the variations in the quantity of common salt contained in the perspiration.—On the development of *Sclerostomum equinum*, by M. A. Conté.—On the exosmosis of diastases by plantules, by M. Jules Laurent. Seeds during germination may give out a portion of the diastases necessary to the digestion of their food reserves, and thus utilise certain insoluble organic materials, such as starch, but the phenomenon stops when germination ceases.—Origin of an ochreous clay, characteristic of the red diluvium, by M. Stanislas Meunier.—The uses of transparencies for combining the effects of the synodic revolution with those of terrestrial rotation, by M. A. Poincaré.—Observations on the Leonids at Algiers, by M. H. Tarry.

CAPE TOWN.

South African Philosophical Society, October 3.—T. Stewart, Vice-President, in the chair.—The Secretary communicated a paper by Dr. R. Broom, on *Ictidosuchus primaevus, nov. spec.* The paper contained a description of the remains of a small Theriodont reptile from the Karroo Beds of Pearston. The form is specially interesting as illustrating a new Theriodont type, and one which has many affinities with the Dicynodonts.—Prof. J. T. Morrison read a paper on some periodical changes in the rainfall at the Royal Observatory, Cape of Good Hope, since 1841. Prof. Morrison dealt with the records of rainfall that have been kept at the Royal Observatory since the year 1841. These showed certain regularities attended by many apparent irregularities. The author subjected the records to the process of mathematical analysis discovered by Fourier, and so showed evidences of two sets of fluctuations running simultaneously through the monthly amounts of rainfall. These fluctuations completed themselves in approximately nine and ten years respectively. The question of the reality of these fluctuations was considered, and tested by comparing their effects in producing apparent fluctuations of slightly different times, such as the well-known sun-spot period of about eleven years. The agreement was such as to make it probable that the two first-mentioned fluctuations are the two prevailing periodicities. The approximate values of some of their part-periods had been computed, and the totals gave a fair approximation to all the more striking changes that have occurred in the rainfall at the Observatory from year to year for the last sixty years. The author concluded that the coincidences were sufficient to warrant a careful investigation of the exact times of the chief fluctuations, and a computation of the magnitude of their sub-periods. He intends to prosecute the research.

DIARY OF SOCIETIES.

THURSDAY, NOVEMBER 29.

GOLDSMITHS' INSTITUTE CHEMICAL SOCIETY, at 8.30.—The Profession of an Industrial Chemist: Dr. J. Lewkowitsch.

MONDAY, DECEMBER 3.

VICTORIA INSTITUTE, at 4.30.—The Proceedings of the Congress for the History of Religion, Paris: Theophilus G. Pinches.

TUESDAY, DECEMBER 4.

SOCIETY OF ARTS, at 8.—Electric Oscillations and Electric Waves: Prof. J. A. Fleming, F.R.S.

INSTITUTION OF CIVIL ENGINEERS, at 8.—*Paper to be discussed*: Machinery for the Manufacture of Smokeless Powder: Oscar Guttmann.—*Papers to be read, time permitting*: The Signalling on the Waterloo and City Railway; and Note on the Signalling of Outlying Siding Connections: A. W. Szlumper.—Signalling on the Liverpool Overhead Railway: S. B. Cottrell.

ROYAL PHOTOGRAPHIC SOCIETY, at 8.—Lantern Slides, Pastoral and Sundry: Colonel J. Gale.

ZOOLOGICAL SOCIETY, at 8.30.—On the Breeding Habits of *Protopterus Symnarchus*, and some other West African Fishes: J. S. Budgett.—On the Mammals collected during the "Skeat Expedition" to the Malay Peninsula 1899-1900: J. Lewis Bonhote.—On the Habits and Natural Surroundings of Insects and other Animals observed during the "Skeat Expedition" to the Malay Peninsula, 1899-1900: Nelson Annandale.

WEDNESDAY, DECEMBER 5.

SOCIETY OF ARTS, at 8.—Road Traction: Prof. H. S. Hele-Shaw, F.R.S.

GEOLOGICAL SOCIETY, at 8.—Bajocian and Contiguous Deposits in the Northern Cotteswolds: the Main Hill-Mass: S. S. Buckman.—On the Corallian Rocks of St. Ives (Hunts.) and Elsworth: C. B. Wedd.—The Unconformity of the Upper Coal Measures to the Middle Coal Measures of the Shropshire Coalfield, and its Bearing upon the Extension of the Latter under the Triassic Rocks: W. J. Clarke.

SOCIETY OF PUBLIC ANALYSTS, at 8.—The Examination of Extract o Malt: Dr W. J. Sykes and C. A. Mitchell.—(1) Note on the Estimation of Glycerine; (2) The Examination of Gum Resins: Dr. J. Lewkowitsch.—Note on the Occurrence of Barium in the Spring Water of Boston Spa: Percy A. E. Richards.—On the Analysis of Samarskite: Arthur G. Levy.

ENTOMOLOGICAL SOCIETY, at 8

THURSDAY, DECEMBER 6.

ROYAL SOCIETY, at 4.30.—*Probable* papers: The Histology of the Cell Wall, with Special Reference to the Mode of Connection of Cells. Part I. The Distribution and Character of "Connecting Threads" in the Tissues of *Pinus sylvestris* and other Allied Species: W. Gardiner, F.R.S., and A. W. Hill.—On the "Blaze Currents" of the Frog's Eyeball; Dr. A. D. Waller, F.R.S.—On a Bacterial Disease of the Turnip (*Brassica napus*): Prof. M. G. Potter—The Micro-organism of Distemper in the Dog, and the Production of a Distemper Vaccine: Dr. S. M. Copeman.—On the Tempering of Iron Hardened by Overstrain: J. Muir.

CHEMICAL SOCIETY, at 8.—Ballot for the Election of Fellows.—Santalenic Acid: A. C. Chapman.—Ammonium Bromide and the Atomic Weight of Nitrogen: A. Scott, F.R.S.—Interaction between Urethanes and Primary Benzenoid Amines: Dr. A. E. Dixon. The Decomposition of Chlorates. Part III. Calcium Chlorate and Silver Chlorate: W. H. Sodeau.—Nitride of Iron: Gilbert J. Fowler.—The Heat of Formation and Constitution of Iron Nitride: Gilbert J. Fowler and Philip J. Hartog.—Relationships of Oxalacetic Acid: H. J. H. Fenton, F.R.S., and H. O. Jones.

RÖNTGEN SOCIETY, at 8.—Exhibition and Description of a Stereoscopic Fluoroscope and a New Rotary Mercury Break: J. Mackenzie Davidson.

LINNEAN SOCIETY, at 8.—On some New Foraminifera from Funafuti: C. Chapman.—On British Thrifts: G. Claridge Druce.

FRIDAY, DECEMBER 7.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Dock Gates: F. K. Peach.

GEOLOGISTS' ASSOCIATION, at 8.—The Zones of the White Chalk of th English Coast. II. Dorsetshire: Dr. A. W. Rowe.

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