we learn that the number of earthquakes was 169 as against 190 noted in 1899 and 209 noted in 1898. To obtain these records the empire has been divided into sixteen districts, each district having its referee. Dalmatia, for example, has 423 observers, who send their observations—unfortunately for the editor—in at least three different languages, to Prof. A. Belar in Laibach.

There are five horizontal pendulum stations, four of which receive from the Government a yearly subvention of 1000 to 1100 K. A sixth station is to be installed at Pribram, one instrument to be on the surface and another at a depth of 1100 m. in the Adalbert-Schacht.

In part i. Dr. W. Láska gives a catalogue of records obtained between June 1899 and December 1900 from a three-component seismograph installed at Lemberg. From the introduction to this work it is clear that Dr. Láska has met with troubles, some of which might certainly have been avoided had he been acquainted with the experiences of his predecessors. On the second page we learn that the clock employed to drive the record-receiving photographic film has also been employed to give time marks on the same. To expect a time-piece to unroll a heavy band of paper or to turn a drum and at the same time to keep a chronometer-like rate is a false economy in which those who construct seismographs for the first time frequently indulge. Whatever inaccuracies may, in consequence of this apparent simplicity of arrangement, have crept into Dr. Láska's time determinations it was evidently his intention that what could be measured should be measured with unimpeachable exactitude. The writer has in his possession a globe which, as it could not be made in England, was purchased from abroad. Its scale is stated to be 1/25,823,716·814. Although Dr. Láska does not aim at such exactitude, he tells us that the mirror of his N.W. pendulum is 3·757 m. distant from the recording drum, whilst the period of the pendulum when hung vertically is $0^{s}\cdot31515$, to which, however, he adds that there is no certainty about the accuracy of the fourth decimal. Tables which inform us that 0·1 minute = 6 seconds, 0·2 minute = 12 seconds, &c., also convey an idea of unnecessary redundancy.

In the working of the instrument, which is installed in a cellar, a well-known bogie has been encountered. There is hardly a seismologist who has not met it, and volumes sufficiently numerous to form a moderate library have been published describing its behaviour. It is a something which causes pendulums to move fitfully, and many observers cling to the belief that it is an actual motion of the ground and either trace the same to the beating of waves on a distant shore or to some other cause. The photograms showing these movements which Dr. Láska reproduces are strikingly like those obtained from observatories all over the world. Forasmuch as a copious ventilation or the burning of a gas jet in the room thus haunted frequently results in expelling the intruders, my own opinion is that the majority of them have their origin in the movements of the atmosphere in the room rather than the movement of the ground.

To show that there may be a relationship between seismic disturbances and the movements of magnetic needles which is not mechanical, our attention is once more drawn to the ancient story of the magnet at Parc St. Maur which at the time of an earthquake was caused to move whilst a similarly formed and similarly suspended copper bar remained at rest. Our attention, however, is not drawn to the possibility that these two systems had very different natural periods of vibration.

In a supplement, suggestions are made respecting the determination of the distance of an earthquake origin from a given station from the interval which elapses at that station between the arrival of the preliminary tremors and the large waves. In recent reports issued by the British Association, especially that for 1900, it will be seen that not only have these suggestions already assumed a practical form, but also that other subjects referred to by Dr. Láska have received greater or less consideration.

Part iii. is a detailed account of earthquakes noted in German Bohemia by Dr. V. Uhlig.

In part iv. Prof. P. Franz Schwab gives the records obtained from an "Ehlert" pendulum installed at Kremsmünster. From an analysis of the records it appears that the frequency of earthquakes was much less between Apogee and Perigee than between Perigee and Apogee. In the cooler months, especially from the middle of September to the beginning of March, the pendulums were frequently unsteady. The greatest disturbances, however, accompanied marked barometric depressions. These movements probably eclipsed movements due to earthquakes.

The next number, by Dr. E. Mazelle, is a register of 146 records obtained from a Reubeur-Ehlert pendulum at Trieste.

One excellent suggestion made by Dr. Mazelle is that seismologists should have a uniform system in chronicling their observations.

The periods of his pendulums are taken monthly and are recorded to within 1/100 of a second of time, whilst a table is given to compute possible tiltings of the pendulum to within 1/1000 of a second of arc.

At the end of this paper we find certain analyses of the registers, relating, for example, to the monthly frequency and the frequency of disturbances of different amplitudes, those with amplitudes between 1 and 2 mm. forming 35 per cent. of the total observations.

The sixth part of these publications, by J. N. Woldrich, refers to the earthquake which on January 10, 1901, shook north-east Bohemia. Here and there we find reference to unusual phenomena like the swaying of forests as if moved by a strong wind, the increase or decrease of water in springs, and the effect of the movements upon men and the lower animals. The latter, excepting the story of a man who by the shaking was caused to walk in his sleep, are of the usual type.

Most of these papers are accompanied by maps or diagrams.

J. M.

SCIENTIFIC SERIAL.

THE February number of the *Journal of Botany* contains three articles dealing with mosses. The first and most interesting paper records the finding of an Arctic species, *Tetraplodon Wormskioldii*—practically a Splachnum—on Widdy Bank Fell, by Messrs. E. C. Horrell and D. A. Jones. Its usual habitat is about 70° N., and further north.—Mr. Duncan discusses the occurrence of *Octodiceras Julianum* along with Fontinalis in the River Severn.—There is the first part of a joint paper by Messrs. D. Prain and E. Baker on Indigofera species, in which it is proposed to deal with the numerous synonyms.—Mr. C. B. Clarke writes an appreciative article on Colonel Sir Henry Collett, who combined botany with various important administrative posts in India.

IN the number for March, Messrs. S. Schönland and E. G. Baker conclude a series of articles on South African species of Cotyledon.—Two sets of "Notes" deal with the distribution of plants. The first, by C. E. Salmon, enumerates floral localities in Norfolk, thereby furnishing an appendix to Trimmer's "Norfolk Flora" and the supplement thereto.—The second article, written by William Whitwell, relates to East Sussex. He alludes to the "Notes" given by Salmon in the last December number of this journal, which were more copious and referred to the whole county. These two papers, with Arnold's well-known book, should bring the Sussex flora up to date, more especially since Mr. Salmon benefited by help from Mr. Botting Hemsley and by records due to Mr. Roper.—In the supplement, Mr. Batters once again essays a catalogue of British marine Algæ, which will be very cordially welcomed. The "revised list" was published in the *Annals of Botany*, 1890, by the same writer in conjunction with Mr. Holmes. As regards localities a change will be noticed; instead of the arbitrary sections of the coast given in the revised list, specific towns, &c., are now mentioned. Practically the whole of this part deals with the Myxophyceæ, or, as they are generally termed, the Cyanophyceæ.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, March 14.—Mr. S. Lupton, vice-president, in the chair.—A paper on the thermal expansion of porcelain was read by Mr. A. E. Tutton. The paper gives an account of experiments made to determine the expansion of Bayeux porcelain between 0° and 120° C. The material employed was a portion of the tube used by Bedford in his experiments on the expansion of porcelain between 0° and 830° C. Another piece of the same tube has also been used by Chappuis in a series of determinations by the Fizeau method between 0° and 83° C. The author has worked with an interference dilatometer, which possesses advantages over the Abbe

form of the original Fizeau apparatus. The observing part of the instrument is separated from the expansion chamber, and the temperature of the interference tripod and the substance under investigation, which it carries, is measured by means of a thermometer bent just above the cylindrical bulb and so arranged that the latter lies on the tripod table. The chief advantages over the Fizeau apparatus are briefly, (1) the employment of a micrometric method of measuring the position and width of the interference bands; (2) the use of autocollimation; (3) the employment of C hydrogen light; (4) an arrangement of the thermal chamber which readily permits an extension of the range to 120° C. The author has also introduced an aluminium compensator, a relatively thick disc of aluminium laid on the top of the porcelain tube. This overcomes the difficulty of polishing the porcelain and affords a large field of bands instead of an annular ring showing parts of bands. The mean of three determinations with three specimens of material gives the following result for the linear expansion, $L_t = L_o[1 + 10^{-9}(2522t + 7{\cdot}43t^2)]$. The results presented by the author agree tolerably well with those of Chappuis, but the constant a is slightly smaller. The constant b is seven times larger than according to Bedford. The discrepancies between the results of Chappuis and Bedford appear to be due to a fundamental real difference, dependent on the interval of temperature for which the determinations were made. The increment per degree of the coefficient of expansion of porcelain is not a constant quantity, but one which is much larger between 0° and 100° than at higher temperatures. The supposition of Prof. Callendar, as to the anomalous expansion between 0° and 100°, appears to be well founded.—The secretary then read a paper by Mr. W. Williams on the temperature variation of the electrical resistances of pure metals and allied matters. In the first part of the paper an attempt is made to correlate the periodic variations which pure metals exhibit as regards their atomic weights, chemical valencies, melting points and electric resistances. If m is the chemical valency, V the atomic volume, θ the absolute temperature, T the absolute melting point and c, or $V^{\frac{1}{3}}\alpha T$, the constant of Pictet's law, then $\sigma \propto \frac{mV\theta}{cT}$, where σ is the specific resistance at 0° C. This relation holds for most of the metals, but fails for gold, indium, tin and aluminium, and also for metals of the iron group. The temperature resistance-coefficients of pure metals are not equal to 1/273, and an expression for the change of resistance with temperature has been deduced which holds approximately for many metals. The author also obtains simple expressions for the average increment per degree of the specific heat of metals and for the ratio between the specific resistances of the solid and liquid states of a metal at the temperature of fusion.—A paper entitled "A suspected case of electrical resonance of minute metal particles for light waves; a new type of absorption," by Prof. R. W. Wood, was read by the secretary. Experiments on which the author has been engaged have led him to believe that he has found a new type of light absorption, which it may be possible to refer to the electrical resonance of small metallic particles for waves of light. Metallic deposits on glass have been produced which are shown by the microscope to consist of particles less than the wave-length of light, and which by transmitted light exhibit colours as brilliant as those produced by aniline dyes. The author has sought to explain these colours by interference and diffraction, and has been forced to accept the hypothesis suggested in the title of the paper. The metallic deposits can be obtained by heating small fragments of the alkali metals in exhausted glass bulbs, when the vapour condenses on the cold parts of the bulbs and forms the films. It can be shown that the colours are due to the presence of metallic sodium (in the case in which sodium has been used) by allowing air to enter the bulb; oxidation takes place and the film vanishes. In some experiments the air has been allowed to enter very slowly, and the changes which the film undergoes before it vanishes have been examined. The particles which form the deposits can be classed under three heads: (1) coarse particles which diffract or scatter light and give the bulb a silky lustre; (2) minute particles very close together which regularly reflect those wave-lengths absent in the transmitted light, but give no scattered light; and (3) minute particles far apart which diffuse light of the same wave-lengths as those which are to some extent absent from the transmitted light. By observing the spectrum of the transmitted light, the author has examined the changes in colour which accompany changes in temperature of the films. The paper gives an account of the relation between the colour of the film and the size and distribution of the particles, and also of the behaviour of the films with polarised light. Experiments upon the electric resistance of the films have proved that they are non-conducting. The author concludes by stating that at the present stage it is impossible to decide either in favour of, or against, the theory of resonance. The idea of resonance has proved a useful working hypothesis for explaining some of the phenomena described in the paper. The secretary read a letter from Prof. R. Threlfall directing the attention of the author to some experiments upon the same subject published by him in 1894.

Chemical Society, March 6.—Dr. E. Divers, F.R.S., vice-president, in the chair.—The slow oxidation of methane at low temperatures, by Dr. Bone and Mr. R. V. Wheeler. Much controversial matter has been published on this subject, the point in dispute being which of the two constituents of marsh gas, viz. carbon and hydrogen, undergoes oxidation first when the gas is burned in an insufficient supply of oxygen. The authors find that methane between 300° and 400° C. burns simultaneously to carbon monoxide and water, small quantities of carbon dioxide being also formed, probably as the result of a secondary reaction.—Isomeric additive compounds of dibenzyl ketone and deoxybenzoin with benzal-*p*-toluidine, *m*-nitrobenzal-aniline and benzal-*m*-nitraniline, iii., by Dr. F. E. Francis.—These additive compounds exist in three modifications, differing in melting point and other physical properties, and are thus easily separable one from another.—Mesoxalic semi-aldehyde, by Messrs. Fenton, F.R.S., and Ryffel. When tartaric acid is treated with gaseous chlorine in presence of ferrous salts it undergoes oxidation, forming the semi-aldehyde of mesoxalic acid, which can be isolated in the form of its osazone and dioxime.—The action of hydrogen peroxide on carbohydrates in presence of ferrous salts, by Messrs. Morell and Crofts. In this reaction, glucose, mannose, lævulose and arabinose are oxidised to their corresponding osones.—*m*-Nitrobenzoyl camphor, by Dr. M. O. Forster and Miss F. M. G. Micklethwait. This substance has been prepared by the action of nitric acid on benzoyl camphor. The most interesting feature exhibited by it is that it only exists in the enolic form, whilst benzoyl camphor occurs in both ketonic and enolic modifications, camphor itself being only known in the ketonic form.—The Cloëz reaction, by Dr. Chattaway and Mr. J. M. Wadmore. When cyanogen chloride or bromide reacts with sodium ethoxide, urethane and triethylcyanurate are formed. This reaction is, at first sight, inexplicable if the formula C:N.Cl be assigned to cyanogen chloride, but the authors suggest that the latter reacts first with the alcohol, forming an ethyl iminochlorocarbonate, which in secondary changes gives rise to the products mentioned above.—The picrimido-thiocarbonic esters, by Mr. J. C. Crocker. The author describes the products obtained when picryl chloride reacts with ammonium thiocyanate.—Robinin, violoquercitrin, myrticolorin and osyritrin, by Mr. A. G. Perkin. The author finds that myrticolorin, a quercetin glucoside, is identical with osyritrin.—The nitration of *sym.*trihalogen anilines, by Dr. Orton. When the aniline operated upon contains a bromine atom in the para-positions relative to the amino-group, it is replaced by a nitro-group. The similar chlorine substituted anilines do not undergo this replacement.—Some *sym.*nitrochlorobromanilines and their derivatives, by Dr. Orton. A description of the products obtained in the course of the foregoing investigations.—The resolution of pheno-α-aminoheptamethylene into its optical merides, by Prof. F. S. Kipping, F.R.S., and Mr. A. E. Hunter. This base undergoes de-racemisation when it is converted into the racemic *d*-tartrate and the latter is fractionally crystallised from water containing tartaric acid.

Linnean Society, February 20.—The Rev. T. R. R. Stebbing, F.R.S., in the chair.—On behalf of Mr. G. M. Thomson, of Dunedin, N.Z., the secretary exhibited a series of photographs of New Zealand flowers. In connection with the plants, some observations were made on the birds which visit them, *e.g.* the bell-bird or "korimako," *Anthornis melanura*, the grey warbler, *Gerygone flavirostris*, the pied fantail, *Rhipidura flabellifera*, and the yellow-breasted tit, *Petroeca macrocephala*. Of these, the first-named was observed to assist in the fertilisation of the native fuchsias, on quitting which the feathers of the head were seen to be stained with the bright

blue pollen of the flowers. A favourite nesting-site of the tit, *Petroeca macrocephala*, was said to be immediately under the head of the ti-tree, *Cordyline australis*, a good photograph of which was likewise exhibited.—A paper was read by Dr. J. E. Duerden on the internal structure and histology of *Bunodeopsis globulifera*, Verrill, a West-Indian sea anemone, which he had previously described as new (in a paper on the Jamaica Actiniaria published in 1898) although without bestowing any specific name. Prof. Verrill had since described it under the name *Bunodeopsis globulifera*, but his description was limited to an account of the external characters. Dr. Duerden now described in detail the peculiarities of its anatomy and minute structure.—Mr. B. Daydon Jackson, in a report on the botanical publications of the United Kingdom as a part of the "International Catalogue of Scientific Literature," gave the history of botanic bibliography from the time of Linnæus, mentioning the admirable catalogue by Dryander of Sir Joseph Banks's library and passing on to the Royal Society's "Catalogue of Scientific Papers," at present consisting of eleven volumes, ranging from 1800–1883, the last seventeen years being in course of compilation. The genesis of the "International Catalogue of Scientific Literature" was then briefly described and the means adopted for the collection and classification of titles given. The Linnean Society had contributed the titles of papers and books issued within the United Kingdom, amounting to about 2300, and the first part of the volume devoted to botany for 1901 was now in the hands of the printers for early publication.—A paper by Miss Lettice Digby was read on her behalf by Mr. J. E. S. Moore, on the structure and affinities of some Gastropoda from Lake Tanganyika belonging to the genera Chytra and Limnotrochus, the paper being based on material which formed part of Mr. Moore's African collections. The external features, nervous system and viscera were described in detail and the affinities of the species considered.

Zoological Society, March 4.—Mr. William Bateson, F.R.S., vice-president, in the chair.—Mr. E. N. Buxton gave an account, illustrated by lantern slides, of his recent sporting-expedition to the Egyptian Soudan, in the course of which he traversed the route along the White Nile between Khartoum and Fashoda. Mr. Buxton exhibited a series of photographs of mammals and birds taken from living specimens. Among these were views of the white-eared kob (*Cobus leucotis*) and the tiang (*Damaliscus tiang*).—Dr. H. Lyster Jameson read a paper on the origin of pearls. The author's observations referred especially to *Mytilus edulis*, the common mussel. The pearls were found to be due to the presence of parasitic Distomid larvæ, which entered the subcutaneous tissues of the mussel and became surrounded with an epidermal sack similar in its characters to the outer shell-secreting epithelium of the mantle. If the Distoma died in the sack it became calcified, and formed the nucleus of a pearl, the pearl arising, like the shell itself, from the calcification of the cuticle of the epithelial cells. The parasite sometimes migrated out of the sack, in which case the nucleus of the pearl was inconspicuous. Dr. Jameson had investigated the life-history of this parasite, and found that it arose as a tailless Cercarian larva, in sporocysts, in *Tapes decussatus* and *Cardium edule*. He had succeeded in infecting mussels from Tapes in an aquarium. The adult stage of this parasite was apparently *Distoma somatinae*, Levinsen, which occurs in the intestine of the eider duck, and which the author had found in the scoter or black duck (*Œdemia nigra*). The complicated life-history of the parasite, and the absence of organs of locomotion in the Cercaria-stage, sufficed to account for the anomalous and hitherto inexplicable distribution of pearl-bearing mussels. Dr. Jameson had found that pearls were caused by similar parasites in several other species of Mollusca, including some of the pearl-oysters; and he believed that the artificial infection of the pearl-oysters could be effected in a similar manner to that which he had found successful in the case of the common mussel. When this was achieved the problem of artificially producing pearls would be solved.—Dr. P. L. Sclater enumerated the species of parrots of which specimens were contained at the present time in the Society's collection —109 in all—and made remarks on some of the rarer species.—Mr. G. T. Bethune-Baker read a paper entitled "A Revision of the Amblypodian Group of Butterflies of the Family Lycænidæ." The author was of opinion that the whole of the species of this group could be conveniently relegated to six genera—viz., Amblypodia, Iraota, Surendra, Thaduka, Mahathala and Arhopala—and that it was useless to split up the genera further, as had been attempted by some entomologists.—A communication from Mr. Martin Jacoby contained the descriptions of sixty-three new species of Coleoptera of the family Halticidæ from Central and South America.

Geological Society, February 26.—Prof. Charles Lapworth, F.R.S., president, in the chair.—On some gaps in the Lias, by Mr. Edwin A. Walford. The author's endeavour is to prove gaps in the stratigraphical succession of the Lias, involving the removal of zones or parts of zones, and also to prove palæontological gaps by the abrupt appearance of many new genera of Mollusca.—On the origin of the river-system of South Wales, and its connection with that of the Severn and Thames, by Mr. Aubrey Strahan. The southerly courses of some rivers from the Usk to the Ogmore are described, and shown to be independent of both the east-and-west folding and the north-north-westerly faulting of the rocks on which they lie. Farther west the drainage-system takes a different direction, the rivers coinciding so closely with a set of west-south-westerly disturbances as obviously to have been determined in direction by them. Of the three systems of disturbance alluded to, the east-and-west (Armorican) folding was pre-Triassic; it marks a period of compression with impulse from the south, and though it reached great intensity in Devon, Somerset and South Wales, it died away in Central Wales. The north-north-westerly (Charnian) faulting, though partly of pre-Triassic age, was renewed in post-Eocene times, and is manifested over much of the British Isles. It marked periods of relief from pressure, and of subsidence. The west-south-westerly (Caledonian) folding was the latest; it marked a period of compression, with impulse from the north, and displayed greater energy in Central than in South Wales. It gave rise to a series of subsidiary disturbances in the latter region, and initiated and controlled the river-system. The ignoring by the rivers of the structures due to the earlier disturbances is attributed to the Palæozoic areas having been overspread by Upper Cretaceous rocks at the time of the initiation of the river-system. The eastward course of the Upper Severn is attributed to the upheaval of a main axis (now the main water-parting) in Central Wales. Its deflection to the south and south-west was due to the formation of an anticline in the Chalk, which must have been parallel to, but a little west of, the present Chalk-escarpment, and which was parallel to, and contemporaneous with, the Caledonian disturbances in Wales. This anticline, acting in combination with the Armorican folding displayed in the London and Hampshire basins, initiated the systems of the Thames and Frome. Those systems were initiated in post-Oligocene and pre-Pliocene times, and the same age is inferred for the systems of South Wales and of the Severn.

MANCHESTER.

Literary and Philosophical Society, February 18.—Mr. Charles Bailey, president, in the chair.—Mr. R. L. Taylor read a paper on a modification of Rose's method of separating cobalt and nickel. In the original process described by Mr. Rose and improved by Mr. T. H. Henry, barium carbonate and chlorine (or bromine) were added to rather strongly acid dilute solutions of the two metals and allowed to stand, with frequent shaking, for from twelve to eighteen hours. The cobalt was precipitated as sesquioxide, while the nickel remained in solution. Mr. Taylor finds that if a neutral solution is used, the precipitation of the cobalt is complete in a few minutes, and that excellent quantitative results can be obtained. The retardation of the reaction which occurs when the solution is (as Rose and Henry used it) strongly acid at the outset, the author shows, is due to the free carbonic acid which is produced in the solution when the carbonate is added to the acid liquid. A similar retardation occurs in a neutral solution if carbon dioxide is first bubbled through it or if soda-water is added to it. Mr. Taylor recommends the process for the separation and detection of cobalt and nickel in the ordinary process of qualitative analysis. Either barium or calcium carbonate may be used (dry, precipitated, as usually sold, will do) with bromine water, and if no free acid is present at the outset, the cobalt is all precipitated in five minutes. On filtering, nickel can be readily detected in the filtrate by adding a little ammonia and ammonium sulphide. If there is any free acid present at the outset, it must either be boiled away or neutralised before adding the carbonate. Sodium carbonate may be used for neutralising, but then the free carbonic acid must all be boiled away, and the liquid cooled, before adding the carbonate and bromine water.—Mr.

D. L. Chapman described some experiments which have been carried out, in conjunction with Mr. F. A. Lidbury, principally for the purpose of discovering whether Faraday's law may be considered as applying to gases. The electric discharge was passed through water vapour, and the separation of oxygen and hydrogen which took place was found to be from two to three times as great as that which occurred in a voltameter placed in the same circuit. The results are, therefore, inconsistent with the view that the phenomenon is essentially electrolytic.

February 25.—Mr. C. Bailey, president, in the chair.—Dr. Henry Wilde, F.R.S., delivered the Wilde lecture, his subject being "The Evolution of the Mental Faculties in Relation to some Fundamental Principles of Motion."

DUBLIN.

Royal Irish Academy, February 24.—Prof. R. Atkinson, president, in the chair.—Prof. F. T. Trouton read for Prof. W. Ramsay, F.R.S., a paper on the molecular surface energy of some mixtures of liquids. The liquids with which the determinations were made were mixtures of carbon bisulphide and chloroform, ethylene dibromide and chlorobenzene, toluene and acetic acid, ethylene dibromide and acetic acid, ethyl alcohol and benzene, ethyl alcohol and chloroform. Mixtures in proportions varying by about 10 per cent. each step were prepared and the surface tension determined in each case at several temperatures. From these it was sought to adduce information as to the state of molecular aggregation in the mixtures by calculating the mean molecular weight in each case given by assuming that the relation $\gamma(Mv)^{\frac{2}{3}}=k\tau$ holds good for mixtures. These determinations are given in the paper in the form of tables.—Prof. John Joly, F.R.S., read a paper on solvent denudation in fresh water and sea water." The experiments are comparative: on basalt, orthoclase, obsidian and hornblende. It is found that the rate of solvent denudation unaccompanied by attrition in sea water is very much faster than in fresh water, contrary to what is generally inferred from the experiments of Daubrée.

EDINBURGH.

Royal Society, February 3.—Lord M'Laren in the chair.—Mr. James Russell read a paper on magnetic shielding in hollow iron cylinders, the magnetising force being transverse to the axis of the cylinder. The field within the cylinder was measured inductively by means of a rotating coil in connection with a ballistic galvanometer. Two different iron cylinders were experimented with, and the cylinder could, if desired, be magnetised circularly by means of a coil wound round it parallel to the generating lines. The general conclusions are as follows:—(1) When no other magnetising force is acting than that due to the transverse field increasing by increments from zero, the shielding ratio diminished by unity is proportional to the ratio permeability (B/H) and not to the differential permeability (dB/dH). In descending fields the theoretic conditions are not fulfilled, (2) When a circular magnetising force is acting upon the iron cylinder in addition to that due to the transverse field, the order and manner in which the one field is superposed upon the other affects the shielding ratio to an enormous extent, and the conclusions arrived at are not in harmony with the investigations of Stefan and Du Bois (see *Electrician*, vol. xl. p. 654, 1898). When the circular magnetisation is superposed upon a pre-existing magnetisation due to the transverse field, the shielding ratio diminished by unity is proportional to the differential permeability as impressed upon the iron by the circular field. It attains a maximum for comparatively low values of this field and then falls off towards an asymptotic minimum. When the circular field is applied first, the shielding ratio becomes distinctly reduced in value, and becomes still further reduced if the transverse field is subjected to repeated reversal. On the other hand, repeated reversal of the superposed circular field increases the shielding ratio so long as the values of dB/dH are high. The paper contained many other results of interest. Prof. Schäfer, in a note on the existence within the liver cells of channels which can be directly injected from the blood-vessels, referred to the recent work of the Drs. Fraser and Dr. Browicz, and then drew attention to the fact that in one of the slides in the possession of the physiology department of the Edinburgh University the existence of these channels was clearly indicated. The slide was prepared in 1886 for Prof. Rutherford by Dr. (now Prof.) Carlier, but though Dr. Carlier drew Prof. Rutherford's attention to it at the time, no further notice was taken of it.—Dr. D. F. Harris, in a paper on functional inertia a property of protoplasm, contended that functional or metabolic inertia is that property of living matter in virtue of which it tends to remain in the functional *status quo ante*. It is of two kinds, katabolic and anabolic, according as it is katabolism or metabolism that persists in spite of stimuli tending to alter the metabolic phase. It was shown to express itself under very different categories — biochemical as "latent period," "refractory period" (physiological insusceptibility), as rhythm, or as accompanied by consciousness. Thus functional inertia is the physiological counterpart or antithesis of irritability or affectability. Its recognition as a property of protoplasm enables us to correlate a very large number of different phenomena of both animal and vegetable life having apparently nothing else in common.—In a paper on functional inertia of plant protoplasm, Mr. R. A. Robertson gave further illustrations of Dr. Harris's views. The phenomena of latent periods in stimulation by gravity, heat, contact, injury, are expressions of the anabolic phase of the inertia; those of the periods of activity after inhibitory stimulation—as when protoplasmic movement is inhibited by high temperature, sunlight, or absence of oxygen, assimilation by cold, desiccation or darkness, growth in length by light, &c.—indicate the katabolic phase of inertia. Functional inertia finds expression in the existence of stimulatory limits, periodicity of growth and movement, and in the phenomena of polarity, and so on. It appears as a physiological insusceptibility in photochemical induction and elsewhere. In virtue of it protoplasm can be educated and new characters acquired. Its time value varies from a few seconds to hours and may be artificially extended to days; its amount may be infinite in respect of a single stimulus of any degree of intensity, but relatively small (as in the case of a dry seed) for a combination of simultaneously acting stimuli.

PARIS.

Academy of Sciences, March 10.—M. Bouquet de la Grye in the chair.—Preparation and properties of a new hydride of silicon, by MM. H. Moissan and S. Smiles. Magnesium silicide having approximately the composition $SiMg_2$ was treated with dilute hydrochloric acid, and the escaping gas, which was spontaneously inflammable and consisted largely of hydrogen, passed through a U-tube cooled down to the temperature of liquid air. A solid substance separated out in the cooled tube, which partially boiled off on allowing the temperature to rise. The volatile portion was found to be ordinary hydrogen silicide, SiH_4, the remaining liquid, which boiled at 52° C., proving to be a new compound of the composition Si_2H_6, analogous to ethane. The most remarkable property of this new compound is that of catching fire spontaneously in the presence of air at the ordinary temperature, and if a small quantity of the liquid is introduced into a large volume of hydrogen, the latter also acquires the property of becoming spontaneously inflammable in air.—The conditions of vegetation of vineyards giving high yields, by M. A. Müntz. By systematic analyses of the soil, manure added, and the amount of sugar produced in the grape, the author has been able to correlate the amounts of nitrogen, phosphoric acid and potash used in the production of one kilogram of alcohol from the fermented grapes. It is found that vines giving high yields require larger amounts of fertilising materials, but that the latter do not increase in proportion to the amounts of sugar elaborated.—On the extension of the theorem of Lagrange to viscous fluids, by M. P. Duhem.—On glycosuria due to asphyxia, by MM. R. Lépine and Boulud.—M. Winogradsky was nominated a correspondant in the section of rural economy in the place of the late M. Demontzey.—Observations of the sun made at the Observatory of Lyons with the Brunner 16 cm. equatorial during the third quarter of 1901, by M. J. Guillaume. The results are expressed in three tables, showing the number of spots, the distribution of the spots in latitude and the distribution of faculæ in latitude respectively.—A theorem on trigonometrical series, by M. H. Lebesgue.—On factorial series, by M. J. C. Kluyver.—On the cohesion of liquids, by MM. Leduc and Sacerdote. A new interpretation is given of an old experiment in which the weight required to pull away a plane glass surface from a liquid is regarded as a measure of the cohesion of the liquid. In reality the cohesion of the liquid has nothing to do with the effect.—The electromagnetic theory of the aurora borealis and the variation and perturbations of terrestrial magnetism, by M. Charles Nordmann. It has been shown that there is a close relation between the spectrum of the aurora and

that of the light round the kathode of a tube containing oxygen or nitrogen. The author concludes that the aurora borealis is a kathode phenomenon produced in the rarefied layers of the upper atmosphere by Hertzian waves emanating from the sun. The theory of Arrhenius is adversely criticised.—On a new application of optical observations to the study of diffusion, by M. J. Thovert. The optical method described in a previous paper is applied to the determination of the diffusion constants of solutions of the acids, alkalis and some salts. The numbers obtained for the salts accord well with those calculated from electrolytic data by Nernst's diffusion theory; for the acids the observed numbers are smaller than the calculated.—Remarks on a recent note of MM. Nagoaka and Honda relating to the magnetostriction of nickel steels, by M. F. Osmond.—Study of the transformations of steels by the dilatometric method, by MM. Georges Charpy and Louis Grenet. Two transformations can be observed in the iron-carbon alloys by the dilatometric method: the one brusque, produced at 700° C., with contraction of volume, corresponding to the absorption of heat observed at the critical point a_1 in the pyrometric method; the second a more gradual one, taking place at a temperature near that of the critical point a_3 as determined by the pyrometric method.—The action of hydrogen peroxide on oxide of zinc, by M. de Forcrand. The experimental results of the author lead to the conclusion that zinc can exist in three states of peroxidation, Zn_3O_5, Zn_4O_7 and ZnO_2.—On a new phosphate of soda, by M. H. Joulie. Ordinary sodium phosphate is mixed with phosphoric acid until it is neutral to litmus. On concentration, crystals of the new salt separate out; they possess the composition $Na_3H_3(PO_4)_2$. It is pointed out that this salt presents certain advantages from the therapeutic point of view.—Reduction of orthonitroazoic colouring matters: production of substituted derivatives of phenyl-pseudo-azimidobenzene, by MM. A. Rosenstiehl and E. Suais.—On the variation of rotatory power in the esters of stable lævorotatory borneol, by MM. J. Minguin and E. Grégoire de Bollemont.—On the separation of galactose and glucose by the *Saccharomyces Ludwigii*, by M. Pierre Thomas. Glucose is readily fermented by this yeast, but galactose is not attacked. Details are given of the best mode of carrying out this separation, which affords very good yields.—The study of the lactic fermentation by the observation of the electrical resistance, by MM. Lesage and Dongier.—The evolution of branchial formations in the adder, by MM. A. Prenant and G. Saint-Remy.—Study of a liver-wort with thallus inhabited by a fungus, by M. J. Beauverie.—On a fossil Parkeria, by M. B. Renault.—Researches on the modifications of the blood and serum preserved aseptically by heating. The lipolytic function of the blood, by MM. Maurice Doyon and Albert Morel.—Volume in urology. The volume type and the dynamical coefficient, by M. J. Winter.—Experimental researches on the biological life of a xiphopage, by MM. N. Vaschide and Cl. Vurpas.

GÖTTINGEN.

Royal Society of Sciences.—The *Nachrichten* (physico-mathematical section), part iii. for 1901, contains the following memoirs communicated to the Society:—

November 8, 1901:—W. Voigt: The electron-hypothesis and the theory of magnetism. A. Auwers: Right ascensions of 792 stars, observed with the meridian instruments of the Göttingen Observatory in the years 1858 and 1859.

December 21, 1901:—V. Rothmund: On the formation of calcium carbide.

The accompanying "business number" contains an interesting account by the presiding secretary of the proceedings in connection with the 150th anniversary of the Society, celebrated in November last.

DIARY OF SOCIETIES.

THURSDAY, MARCH 20.

ROYAL SOCIETY, at 4.30.—Development of the Layers of the Retina in the Chick after the Formation of the Optic Cup: J. Cameron.—On a Peculiarity of the Cerebral Commissures in certain Marsupialia, not hitherto recognised as a Distinctive Feature of the Diprotodontia: Prof. G. Elliot Smith.—The Classification of the Elements: Prof. H. E. Armstrong, V.P.R.S.—Persulphuric Acids: Prof. H. E. Armstrong, V.P.R.S., and Dr. T. Martin Lowry.—On a Throw-Testing Machine for Reversals of Mean Stress: Prof. Osborne Reynolds, F.R.S., and J. H. Smith.—On the Equilibrium of Rotating Liquid Cylinders: J. H. Jeans.—A Portable Telemeter, or Range-finder: Prof. G. Forbes, F.R.S.

LINNEAN SOCIETY, at 8.—Electric Response in Ordinary Plants under Mechanical Stimulus: Prof. J. C. Bose.—On the Fruit of *Melocarina bambusoides*, Trin., an Exalbuminous Grass: Dr. O. Stapf.—On Malacostraca from the Red Sea Collected by Dr. H. O. Forbes: Messrs. Alfred O. Walker and Andrew Scott.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Problems of Electric Railways: J. Swinburne and W. R. Cooper.

FRIDAY, MARCH 21.

ROYAL INSTITUTION, at 9.—Recent Developments in Colouring Matters. (In English): Prof. Otto N. Witt.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.—Fencing of Steam and Gas-Engines: H. D. Marshall.—Fencing or Guarding Machinery used in Textile Factories: S. R. Platt.—Protection of Lift-shafts, and Safety Devices in connection with Lift-Doors and Controlling Gear: H. C. Walker.—Guarding Machine Tools: W. H. Johnson.

EPIDEMIOLOGICAL SOCIETY, at 8.30.—Infantile Mortality in the Tropics: Dr. Daniels.

SATURDAY, MARCH 22.

ROYAL INSTITUTION, at 3.—Some Electrical Developments: Lord Rayleigh, F.R.S.

ESSEX FIELD CLUB (Essex Museum of Natural History, Stratford), at 6.30.—Annual Meeting. The Presidential Address will be delivered by Prof. Meldola, F.R.S., on The Coming of Age of the Essex Field Club, a Record of Local Scientific Work, 1880–1901.

MONDAY, MARCH 24.

INSTITUTE OF ACTUARIES, at 5.30.—The British Offices Life Tables, 1893; an Investigation of the Rates of Mortality in different Classes of the Assurance Experience, and of the resulting Net Premiums and Policy Reserves: T. G. Ackland.

TUESDAY, MARCH 25.

MINERALOGICAL SOCIETY, at 8.—The Petrology of British East Africa: Notes on the Rock-specimens collected by Prof. J. W. Gregory and Sir Harry Johnston respectively: G. T. Prior.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Greenwich Footway-Tunnel: W. C. Copperthwaite.—Subaqueous Tunnelling through the Thames Gravel, Baker Street and Waterloo Railway: A. H. Haigh.

SOCIETY OF ARTS (Colonial Section), at 4.30.—The Sphere of State Activity in Australia: The Hon. Sir John Alexander Cockburn, K.C.M.G.

WEDNESDAY, MARCH 26.

GEOLOGICAL SOCIETY, at 8.—On a Remarkable Inlier among the Jurassic Rocks of Sutherland, and its bearing on the Origin of the Breccia-Beds: Rev. J. F. Blake.—On a Deep Boring at Lyme Regis: A. J. Jukes-Browne.

CHEMICAL SOCIETY (Royal Institution Lecture Theatre), at 9.—Raoult Memorial Lecture: Prof. van 't Hoff.

CONTENTS.