meability for the electric flux.—On the diffraction of light at the straight sharp edge of a screen, by Eugen Maey. This work was undertaken to test whether a certain diffraction phenomenon was explainable by the accepted theory of diffraction. The phenomenon in question, as described by W. Wien, consists in the fact that a finely-ground metallic edge, when illuminated by an intense white light, appears as a bright line from points deep in the geometrical shadow. A careful theoretical and experimental study of the phenomenon shows that the theory is competent to explain the fact within certain limits, but that the phenomenon is greatly influenced by small differences of excellence in the edges, a circumstance which has an important bearing upon the behaviour of gratings.—Absolute measurements on the discharge of electricity from points, by Julius Precht. In general, points may be charged highly before discharge begins. Lightning conductors require about 15,000 volts, and the finest points 2500. Ultra-violet illumination favours discharge, whereas dust and flame gases diminish it. A bundle of equal points requires a higher potential than a single one. A point discharging positive electricity wears away, whilst a point negatively electrified does not.—Also papers by O. Wiener, J. von Geitler, M. Levy, A. Kossel, and A. Raps.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 4.—"Further Experimental Note on the Correlation of Action of Antagonistic Muscles." By C. S. Sherrington, M.A., M.D.

In a previous communication (Proceedings of Royal Society, February 1, 1893) it was stated that physiological contraction, and even mere mechanical tension, of the *flexor muscles* of the knee exerts considerable physiological influence upon the activity of the antagonistic group of muscles, the *extensors*. For instance, the elicitation of the "jerk" from the extensors can be rendered difficult for a time by appropriate excitation of the flexors, and can on the other hand be much facilitated by flaccidity or paralysis of the latter.

In order to judge whether under these circumstances the briskness of the "knee-jerk" varies directly with the degree of tonus of the extensor muscles, the rapidity of onset of rigor mortis, has been chosen as a guide to the degree of tonus existing in them before death. The experiments of Brown-Séquard and Hermann have proved that section of the nerve supplying a muscle delays the time of onset of rigor mortis in the muscle, even if the section is performed only shortly before death. There was therefore examined the influence of section of the motor spinal roots on the time of onset of rigor mortis, and a delay of onset of rigor mortis was thus produced. The delay seemed as considerable as after section of the entire muscular nerve. The effect of section of the sensory roots was next examined, and found to be marked retardation of onset of rigor; the retardation was less if the spinal cord were previously severed in the region of the first lumbar segment. The effect of placing and keeping one hind limb in the pose most favourable for the elicitation of the "jerk" (knee flexed) and the other limb in the position in which the jerk is restrained (knee extended) was then investigated (always after previous severance of the spinal cord at the first lumbar segment). On the side on which the knee had been kept flexed the onset of rigor mortis was delayed in the extensor muscles, whereas on the opposite side, with the knee extended rigor was delayed in the flexors. It was inferred that the tonus of extensors is heightened by excitation of the antagonistic set, and conversely.

In regard to the mutual association of action of antagonistic muscles about other joints than the knee, it had been noticed in an earlier series of observations that during excitation of the cortical areas of the hemisphere, when isolated movements of the pollex and hallux are being initiated, the movement of response obtained is often reversed by section of the peripheral nerve or nerves supplying those muscles which predominate in the movement obtained. For example, flexion can by section of the flexor nerve be at once converted into extension. Sometimes, however, movement in the same sense, although diminished in force and extent persists even after cutting the nerve to the predominant group of the antagonistic muscles. This indicates that in some cases there occurs, together with contraction of one group of muscles, concomitant relaxation of the antagonist. This evidence of inhibition of one set of the synergetic muscular couple during co-ordinate action induced by cortical excitation is in the case of the digits of comparatively infrequent occurrence. In the case of the eye muscles it is, on the contrary, quite usual.

When, the external rectus muscle of one eye (*e.g.*, of the left eye) having been put out of action, the frontal cortex of the right hemisphere is excited, the eyeballs if previously directed to the right revert both of them to the left—*i.e.*, the excitation which evokes contraction of the right internal rectus evokes also relaxation of the left internal rectus. Again, when the internal rectus has been put out of action—*e.g.*, in the left eye—excitation of the left frontal cortex produces, if the eyes have been previously directed to the left, an immediate movement of both eyeballs to the right, the left eye frequently rotating beyond the median primary position. Here the same excitation of the cortex which induces contraction of right external rectus muscles induces synchronously a relaxation of the left internal rectus muscle. These interruptions of the tonus or of the contraction of one antagonist concurrently with augmentation of the contraction of its opponent are obtainable not only from the so-called "motor" region of the cortex, but even more strikingly by excitation of the "visual area" of occipital region of the cortex.

During voluntary movements similar phenomena occur, but appear less obvious than under experimental excitation of the cortex. Although inhibition of contraction or tonus is apparently so common a factor in the co-ordination of the antagonistic lateral straight muscles of the eyes, these muscles occasionally yield good indication of synergetic contraction as well as co-ordinate relaxation. The mutual association of the two oblique muscles seems usually of the nature of concomitant contraction, not of contraction coupled with relaxation. On the other hand, the muscles which close and open the palpebral fissure appear to work altogether independently one of the other. In their case section of the particular peripheral nerve concerned in either movement is at once followed by total disappearance of the movement, and that without reversal.

Although the cerebral cortex exercises inhibition so readily in the field of innervation of the third nerve, the dilatation of the pupil evoked by excitation of that portion of the cortex appeared whenever tested to be due to impulses discharged *viâ* the cervical sympathetic, and not to inhibition of the constriction exercised *viâ* the third nerve.

May 18.—"An Experimental Investigation of the Nerve Roots which enter into the Formation of the Lumbo-Sacral Plexus of *Macacus rhesus*." By J. S. Risien Russell, M.B., M.R.C.P., Assistant Physician to the Metropolitan Hospital.

(From the Pathological Laboratory of University College, London.)

This formed the subject of a paper recently read before the Royal Society, in which the author described one chief type of plexus met with in *Macacus rhesus*, the main distinguishing features of which, as contrasted with the chief variation encountered, consisted in the fifth lumbar nerve root sending a branch to the sciatic nerve trunk, and the obturator nerve taking its origin from the fourth and fifth lumbar nerve roots alone, whereas of the variations met with that which occurred most frequently was one in which the fifth lumbar root did not send a branch to the sciatic nerve, and the obturator nerve received a branch from the sixth lumbar nerve root in addition to those received from the fourth and fifth lumbar roots. Between these two extremes all forms of variation were met with; but the upper limit of supply to the limb was always found to be the third lumbar root, and the lower limit the first sacral root.

Excitation Experiments.

The movement which results on excitation of any given nerve root with the Faradic current is a compound one made up of several simple movements; while excitation of any single small bundle of nerve fibres, many of which combine to form a nerve root, results in a single simple movement, and not all the movements of the compound root in lessened degree. These single simple movements bear an almost constant relation to the nerve roots, the same movements being as a rule found in any given root, and such movements always bear the same relation to the spinal level. Further, each bundle of nerve

fibres representing a single simple movement in a nerve root remains distinct in its course to the muscle or muscles, producing such a movement without inosculating with other motor nerve fibres.

Muscles diametrically opposed in their action are represented in the same nerve root, but in different degrees, and when a certain group of muscles predominate in their action in one root they as a rule predominate in that root. In those instances in which the opposed movements are represented in three consecutive nerve roots the middle root of the series is that in which both movements are represented, while the root above contains the one movement, and that below contains the other.

The movements of flexion and extension are found to alternate in their representation from above down, flexion being at a higher level than extension in the highest segment of the limb, while extension is above flexion in the next, and so on.

A muscle is usually represented in two nerve roots, and to an unequal extent in these; and when variations occur, it is, as a rule, that one of the nerve roots in which the muscle is represented is different, rather than that it is represented in more nerve roots. When the same muscle is represented in two nerve roots the muscle fibres innervated by one root are not innervated by the other, so that only part of the muscle contracts when a single root is excited.

Ablation Experiments.

Division of any given nerve root produces paresis of the group of muscles supplied by it, which paresis is temporary, nearly all of it being recovered from. The amount of paresis or paralysis produced is proportional to the number of nerve roots divided; and this again varies according to whether the roots divided are consecutive or alternate ones, the effect being much greater in the former than in the latter case. Such division of one or more nerve roots does not result in incoordination of the remaining muscular combinations represented in other nerve roots; the remaining movements are merely more feeble.

Exclusion of a certain Root or Roots during an Epileptic Convulsion in the Limb.

Division of one or more nerve roots produces alteration of the position of a limb during an epileptic convulsion, which altered position depends on the muscular combinations that have been thus thrown out of action. And the effect is identical when the root or roots are divided at the time when the convulsions are evoked, and when they have been divided some weeks previously. No incoordination is produced in the remaining muscular combinations; and there is no evidence of overflow of the impulses which ought to travel down the divided root into other channels through the spinal centres, so as to reach the muscles by new paths.

"A Further Minute Analysis by Electric Stimulation of the so-called Motor Region (Facial Area) of the Cortex Cerebri in the Monkey (*Macacus sinicus*)." By Charles E. Beevor, M.D., F.R.C.P., and Victor Horsley, M.B., F.R.C.S., F.R.S. [1]

(From the Laboratory of the Brown Institution, and from the Pathological Department of University College, London.)

In the paper of which this is an abstract the authors have completed the minute analysis of the movements elicited by excitation of the excitable (so-called motor) region of the cortex cerebri in the Bonnet Monkey (*Macacus sinicus*). The portions hitherto examined having been those in which the movements of the limbs were represented, the facial area was chosen for the present research. After an historical introduction and a description of the anatomy of the region investigated, the method of notation and record of results is discussed.

Considering that in this part of the cortex cerebri there is well-defined representation of movements of both sides of the body, the question of bilaterality of representation is raised, and attention directed to its importance. The analysis of the results obtained show that there existed precise localisation for the movements of the individual portions of the face, even to that of half the lower lip.

The specialisation of the movements of the tongue was rendered easy of examination by employing the operative device of dividing the tongue in the middle line. This shed unexpected light on the representation of the movements of this organ.

Movements of the pharynx were made the subject of observation, and some degree of unilaterality was discovered in the movements of the soft palate.

Finally, attention is drawn to the fact that the marches of movements in succession are in this region very inconstant and difficult to arrange.

[1] The expenses of this research were defrayed principally by a grant from the Government Grant Fund of the Royal Society, and in part by a grant from the Scientific Grants Committee of the British Medical Association.

"On the presence of Urea in the Blood of Birds, and its bearing upon the Formation of Uric Acid in the Animal Body." By Sir Alfred Garrod, M.D., F.R.S.

The author gives in his paper a *résumé* of the opinions held with regard to the formation of uric acid in the animal economy during the last half century, and then announces his discovery of the presence of urea in the blood of birds in quantities practically the same as that which is present in the mammalian blood; by which discovery the views hitherto held as to the formation of uric acid are necessarily modified. Having afterwards shown that the kidneys have no power of removing uric acid from blood, and referred to other physiological points in connection with uric acid and urea, he sums up most of his views in the following propositions:—

First. That in mammalia and other urea-excreting animals the metabolism of the nitrogenised tissues results in the formation of urea as an ultimate product; that an appreciable and measurable amount of this substance is always found in their blood, and is constantly being excreted by the kidneys; and, further, that any cause leading to the decrease of this excretion produces an augmentation of the urea in the blood.

Second. That in birds, and other uric-acid-excreting animals, the metabolism of the nitrogenised tissues is exactly the same as in mammals, and that urea is the ultimate product of this metabolism; that urea is always present in their blood, in quantities not less than in mammalian blood, and that the urate of ammonium is a subsequent product of the union of urea with some other principle or principles, glycine probably being one of them. Consequently, it is not necessary that uric acid should be present in the blood of uric-acid-excreting animals: in health, in fact, it is not detectible. When it is present, its presence is a result of its having been absorbed after formation in the kidneys or elsewhere.

Geological Society, May 24.—W. H. Hudleston, F.R.S., President, in the chair.—The following communications were read:—Notes on Dartmoor, by Lieut.-General C. A. McMahon. The author alluded to a memoir on the British Culm Measures recently published by Mr. Ussher, in which the view is advanced that the granite of Dartmoor resulted from the metamorphism of pre-existing rocks which had in a rigid state offered obstruction to a long sustained N. and S. squeeze, and that their fusion and consequent consolidation were effected *in situ*. The author gave some of the results of a visit to the western borders of Dartmoor. He detailed some examples of eruptive granite-veins intruding into Culm beds in the immediate vicinity of the main mass of granite. The latter, in the locality described, is porphyritic down to its boundary, and the veins are also porphyritic. All the circumstances lead to the belief that these veins are real apophyses from the main mass, and that the view adopted by De la Beche regarding the origin of the Dartmoor granite is the true one. After alluding to some features in the Meldon granite-dyke not before noted, some detailed observations in the bed of the River Tavey were given, and an explanation offered of the way in which the fine-grained marginal variety of the granite, seen in that locality, has been produced. The improbability that a tremendous squeeze sufficient to fuse 225 square miles of a pre-Devonian rock into granite while the Culm Measures outside the zone of marginal contact-metamorphism are left almost untouched was commented upon, and finally, the author alluded to the often-observed pseudo-stratification of the Dartmoor granite, and urged that the cause of this is not the one suggested by De la Beche, but that it is due to sub-aerial agencies. The reading of the paper was followed by a discussion in which the President, Mr. Watts, Mr. Teall, Mr. Rutley, Prof. Bonney, and Prof. Hull took part. General McMahon briefly replied.—On some recent borings through the lower Cretaceous strata in East Lincolnshire, by A. J. Jukes-Browne. The borings described in this paper are at Alford, Willoughby and Skegness, and disclose the existence of an unsuspected anticlinal axis, bringing up Lower Cretaceous rocks beneath the

Drift. In the Willoughby boring, beneath the Drift, a brown sand was obtained, apparently the "Roach" division of the Lower Cretaceous, and below it the Tealby Clays (108 feet), oolitic ferruginous beds (18 feet), and sandstone and sand regarded as the Spilsby Sandstone. In the Alford boring the highest solid rock appears to belong to the basal beds of the Red Chalk, and below it is Carstone, and then clay. The axis of the anticlinal appears to pass between Alford and the border of the wolds, and is probably continued in a north-westerly direction beyond the village of Claythorpe. The result of the information now obtained makes it probable that the Chalk tract which lies to the south-east of the Calceby valley is completely isolated from the rest of the Chalk area. The President said that the lesson of the paper was that it was never safe to take anything for granted when one had to deal with Boulder Clay, and Mr. Strahan remarked that he agreed with Mr. Jukes-Browne's interpretation of the structure of the district.

Linnean Society, May 24.—Anniversary meeting.—Prof. Stewart, President, in the chair.—The treasurer presented the accounts duly audited, and the secretary having announced the elections and deaths during the past twelve months, the usual ballot took place for new members of Council, when the following were elected:—Messrs. J. G. Baker, A.C.L. Günther, G. R. Murray, R. C. A. Prior, and Howard Saunders. The President and officers were re-elected. The librarian's report having been read and certain formal business disposed of, the President delivered his annual address, taking for his subject "The various modes in which animal sounds are produced." On the motion of Dr. Braithwaite, seconded by Sir James Gibson Maitland, Bart., a unanimous vote of thanks was accorded to the President for his address, with a request that he would allow it to be printed. The Society's gold medal was then formally presented to Prof. Daniel Oliver, in recognition of the services rendered by him to botanical science, and having been acknowledged by Prof. Oliver, the proceedings terminated.

CAMBRIDGE.

Philosophical Society, May 15.—Prof. T. McK. Hughes, president, in the chair.—The following communications were made to the Society:—Exhibition of abnormal forms of *Spirifera lineata* (Martin) from the Carboniferous Limestone, by F. R. Cowper Reed. This species, as defined by Davidson, is normally subject to great variation of form and ornamentation, as it includes *Sp. imbricata* and *Sp. elliptica*. Specimens with intermediate characters are however common. The series of abnormal forms exhibited showed the gradual development of a sharp median groove both in the dorsal and ventral valves so as ultimately to produce a bilobed shell. From the nature of these grooves interruption of the shell-secreting action of the mantle seems to have occurred along a definite line: and the cause may have been disease, the presence of a parasite or foreign body, or pressure during life. Similar malformation is seen in some Terebratulas, &c. The normal and regular bilobation of some species of *Orthis*, *Terebratula*, &c., is comparable.—Exhibition of Post-Glacial Mammalian bones from Barrington recently acquired by the Museum of Zoology, by Mr. S. F. Harmer.—Exhibition of a specimen showing Karyokinetic division of the nuclei in a plasmodium of one of the *Mycetozoa*, by Mr. J. J. Lister.—Observations on the Flora of the Pollard Willows near Cambridge, by Mr. J. C. Willis and I. H. Burkill.—The plants occurring in the tops of willows near Cambridge have been recorded during the last few years, and amount to 80 species, occurring 3951 times altogether in about 4500 trees. Of these 80, only 18 form more than 1 per cent. of the total number of records. The rest have only a small number of records. As Loew has pointed out in a recent paper, these plants are of interest from the points of view of distribution of seeds and of epiphytism. Classifying them according to means of distribution, we find that 19 species have fleshy fruits; 1763 records (44·6 per cent.) of these occur. Three species with burrs have 651 records (16·4 per cent.); 34 species with winged or feathered fruit or seed have 996 records (25·1 per cent.); 7 with very light seeds have 421 (10·6 per cent.); and finally of plants whose means of distribution is poor or somewhat doubtful, we have 17 species with 120 records (2·9 per cent.). It is thus shown very strikingly how the various distribution mechanisms succeed, only the better ones showing in the list any numbers. The bird-distributed plants figure much higher here than in such cases as *e.g.* the flora of the churches of Poitiers (Richard), because birds visit the trees to such an extent The observations show clearly the fact that a seed is only carried a short distance by its distribution mechanism. Plants were always found upon the soil, within 250 yards at most, of those found in the trees. An analysis was taken as far as possible of the birds' nests found in the trees, and pieces, often with ripe fruits, of many plants in the list were discovered in them, so that probably this means of distribution is of some importance. With regard to epiphytism, Loew considers these plants as exhibiting a commencement of this mode of life, and this seems probable enough. Like the regular epiphytes, they possess good methods of seed distribution. Their position does not call for any special means of supporting themselves, and the supply of humus is plentiful. *Mycorhiza*, which Loew found on many, was not observed in the few examined. The size of many of the shrubs, *e.g.* Elder, *Ribes*, Roses, &c., was very remarkable; some elders were three inches thick or more, and as much as 12 feet high. Experiments are in progress upon the growth of plants in willow humus.—Note on the plants distributed by the Cambridge dust-carts, by I. H. Burkill.—The street-sweepings of Cambridge have of late been spread on Coe Fen for the purpose of raising the level. From this material spring the plants whose seeds have been scattered in the dust of the roads. Of these, 99 species and one variety have been collected. No less than 39 per cent. are species whose dissemination has been effected directly or indirectly by Man, being either used for food or maintained in the gardens. The other species are almost all such as seed freely on roadsides, and have for the most part very light seeds.

DUBLIN.

Royal Dublin Society, May 17.—Prof. G. F. Fitzgerald, F.R.S., in the chair.—Dr. G. Johnstone Stoney, F.R.S., read a paper on the cause of sun-spots. In this communication the author recalled attention to the explanation of sun-spots which he had offered in 1867, in a paper on the physical constitution of the sun and stars, published in the Proceedings of the Royal Society, No. 105, 1868. He pointed out that the discoveries since made through the spectroscope, and the details of the photosphere revealed to us in the photographs taken by Prof. Janssen at Meudon, have brought to light striking confirmations of this explanation. The photosphere, according to the author's view, consists of incandescent sooty clouds, and the cloudy regions constitute the bright patches seen in Prof. Janssen's photographs, each of which is in general some hundreds of miles broad and several hundreds of miles long. Inasmuch as the greater part of the radiation emanates from them, they must form a stratum of minimum temperature. In the interstices between the patches and in those larger openings which are known as sun-spots, a less luminous background is brought into view. This is either a second layer of cloud which is of transparent material like terrestrial clouds, or it is a position in which both the density suddenly becomes greater and at which there is a sudden transition from transparent atmosphere above to opacity beneath. This would present the appearance of the reflecting surface of a molten ocean. Now, by the "Law of Exchanges," such an ocean as is supposed by the second hypothesis, being capable of reflecting incident light abundantly, or such a cloud of transparent material as is supposed by the first hypothesis, being capable of scattering incident light abundantly, would either of them radiate much less abundantly than the sooty clouds which constitute the photosphere, and would therefore appear black in comparison, whether at the same temperature, or at higher temperatures up to a certain limit. One or other of these, then, appears to be that dark background seen in sun-spots and in the intervals between the patches of photosphere. The appearance of penumbra seen in most sun-spots and in many of the intervals between the patches of photosphere would be presented wherever the sooty clouds are thin, and not sending down the abundant showers which seem elsewhere to prevail, and which in faculæ are continuous over immense spaces.—Mr. Thomas Preston attracted the attention of the Society to a simple, direct, and perfectly general method of expressing the efficiency of a reversible engine in terms of the temperatures of the source and refrigerator. He also mentioned that the cycle originally described by Carnot requires no correction, and depends on no theory of heat. Carnot begins with an adiabatic transformation, and his cycle consequently possesses all the advantages of the "corrected" cycle proposed by Maxwell.

The commonly accepted version of Carnot's method is therefore an injustice to the celebrated author of "The Motive Power of Heat."

PARIS.

Academy of Sciences, May 29.—M. de Lacaze-Duthiers in the chair.—Studies on diffraction gratings; focal anomalies, by M. A. Cornu. Gratings, although trustworthy enough to be used for determining wave-lengths of light, yet present various anomalies which might cast some doubt upon the rigour of the optical principles upon which their construction is based. In order to study these perturbations in detail and to eliminate the attendant errors, M. Cornu constructed a machine for the automatic ruling of lines spaced according to fixed laws, so as to produce and exaggerate at will the anomalies whose origin was to be verified. Thus the systematic error in the position of the focus of spectrum images was reduced to two distinct and purely geometrical causes: In plane gratings, to the existence of a feeble curvature of the ruled surface; in a plain or curved grating, to the existence of a regular variation in the distance apart of the lines. In most cases these two causes coexist, which makes the laws of the optical phenomenon highly complex.—On the volatilisation of silica and zirconia, and the reduction of these compounds by carbon, by M. Henri Moissan (see Notes).—Preparation in the electric furnace of some refractory metals: tungsten, molybdenum, vanadium, by M. Henri Moissan (see Notes).—On the preparation of zirconium and thorium, by M. L. Troost. An intimate mixture of zirconia and finely comminuted sugar charcoal, the former being in excess, is strongly compressed into small discs and placed in a carbon retort. It is then subjected to the action of the voltaic arc supplied by a current of 35 ampères and 70 volts, the retort being placed in a closed chamber traversed by a slow current of carbonic acid, so as to prevent the air from burning and retransforming the metal into zirconia. The reduction is immediate, and gives rise to small metallic masses which are not pure zirconium, but a true carburet of zirconium, corresponding to the formula ZrC_2. If the carbon retort is lined with zirconia the ingot is gradually freed from carbon, and leaves the pure metal behind. This has a steel-grey colour and is extremely hard. It scratches glass deeply, and is untouched by the best files. In air it is unaltered at ordinary temperatures. At a red heat it oxidises at the surface if containing little carbon, but burns brightly if containing much. It is not attacked by acids except by hydrofluoric acid, which acts even if greatly diluted. Thorium is prepared in an exactly similar way from the chloride. The reduction takes place more readily, giving rise to a carburet, ThC_2. The metal is very brittle, and less hard than zirconium. It decomposes water in the cold, evolving hydrogen and a hydrocarbon of pungent odour. In contact with air it gradually swells up and forms a powder which burns with greater rapidity and brightness than zirconium.—Observations on the volatilisation of silica, *à propos* of M. Moissan's communication.—On the phenacite of Saint-Christophe en Oisans, by MM. A. Des Cloizeaux and A. Lacroix.—On ordinary differential equations which possess fundamental systems of integrals, by M. Sophus Lie.—The total solar eclipse observed at Fundium (Senegal) on April 16, 1893, by M. N. Coculesco.—On geometrical properties which only depend upon spherical representation, by M. C. Guichard.—On surfaces with lines of curvature plane in both systems and isothermals, by M. Th. Caronnet.—Theorems relating to analytical functions of n dimensions, by M. G. Scheffers.—On a general property of fields admitting of a potential, by M. Vaschy.—On the densities of some gases and the composition of water, by M. A. Leduc.—On the rigidity of liquids, by M. J. Colin.—Action of acetic anhydride upon linalol; transformation into geraniol, by M. G. Bouchardat.—A general method for the analysis of butters, by M. Raoul Brullé.—On the physiology of the crayfish, by M. L. Cuénot.—Mechanism of the hyperplasic process in epithelial tumours; applications, by M. Fabre-Domergue.—Researches on the modifications of the excretion of urea in the course of certain surgical maladies, and especially after great operations; consequences from the point of view of therapeutics and treatment after operations, by M. Just Championnière.

BERLIN.

Physical Society, May 12.—Presidents, at first Prof. Kundt, and later Prof. du Bois Reymond.—Dr. E. Pringsheim gave an account of his further researches on the cause of the emission of light by heated gases. By the method already employed for sodium (see NATURE, vol. xlv., p. 312) he had recently tested the vapours of lithium, thallium, and potassium. At the highest temperature, at which nickel was fused, the vapours of these metals similarly gave an emission-spectrum following on the absorption spectrum as long as reduction processes were excluded. They at once showed their characteristic spectral lines as soon as the salt used, or the silicate formed from the metal in contact with the surface of the porcelain tube, was reduced either by hydrogen, by the metal itself, or by iron. The experiment of Dewar and Liveing, in which, by heating lithium with potassium and sodium in an atmosphere of hydrogen in an iron tube, they obtained the lithium-line, was explained by the speaker as due to the above-named cause, viz., a compound is formed of iron and lithium, which is then reduced and exhibits both emission and absorption. Dr. Pringsheim concluded from his experiments in support of his views that the four elements—lithium, sodium, thallium, and potassium—are not luminous when simply heated above the temperature of the flame in which they ordinarily exhibit their characteristic spectra. He believed rather that they only show emission and absorption spectra when they are in the nascent state resulting from processes of chemical reduction.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

BOOKS.—A Treatise on Elementary Dynamics, 2nd edition: S. L. Loney (Cambridge University Press).—An Introduction to Practical Bacteriology: Dr. W. Migula, translated by M. Campbell (Sonnenschein).—Some Hints on Learning to Draw: G. W. C. Hutchinson (Macmillan).—The Hawks and Owls of the United States in their Relation to Agriculture (Washington).—The Geological and Natural History Survey of Minnesota, 20th Annual Report (Minn.).—Missouri Botanical Garden, Fourth Annual Report (St. Louis, Mo.).—Modern Microscopy: M. I. Cross and M. J. Cole (Baillière).—Geological and Solar Climates: M. Manson (Dulau).—British Forest Trees: J. Nisbet (Macmillan).—Darwin and Hegel: D. G. Ritchie (Sonnenschein).—Lectures on Sanitary Law: A. W. Blyth (Macmillan).—Fragments of Earth Lore: Prof. J. Geikie (Edinburgh, Bartholomew).—The Lepidoptera of the British Islands, vol. 1, Rhopalocera: C. J. Barrett (L. Reeve).—Hypnotism, Mesmerism, and the New Witchcraft: E. Hart (Smith, Elder).

PAMPHLETS.—Die Klimate der Geologischen Vergangenheit: E. Dubois (Nijmegen, Thieme).—Notes on the Gasteropoda of the Trenton Limestone of Manitoba, with a Description of One New Species: J. F. Whiteaves.—Sulla Dissipazione di Energia in un Campo Elletrico Rotante e Sulla Isteresi Elettrostatica: R. Arnò (Roma).

SERIALS.—Brain, Parts 61 and 62 (Macmillan).—Engineering Magazine, June (New York).

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