the front surfaces, are fixed against a block of wood, so that the angle between the two surfaces is slightly less than 90°. This simple apparatus will give the interference phenomena produced by means of Fresnel's mirror or bi-prism.—An improved wave apparatus, by John T. Stoddard. This is a method of demonstrating to a class the formation of the compound curves representing the combination of two simple sound waves.—On a recent rock-flexure, by Frank Cramer.—On the origin of the rock-pressure of the natural gas of the Trenton limestone of Ohio and Indiana, by Edward Orton. By the rock-pressure of gas is meant the pressure in a well which is locked in so that no gas can escape; and the author concludes that the rock-pressure of the gas of the Trenton limestone is due to the pressure of a water column under which it is held in the arches of the rocks. This explanation seems applicable to all gas fields.

THE *American Meteorological Journal* for January contains a continuation of Faye's theory of storms, and of Ferrel's convectional theory of tornadoes, both of which have been already referred to; the latter paper is concluded in the number for February. Of the other articles in these two months the principal are:—The mathematical elements in the estimation of the Signal Service Reports, by W. S. Nichols. He points out that attempts to measure the accuracy of the daily weather forecasts are liable to give rise to a confusion of ideas, and, confining his attention to rainfall, he lays down certain rules for testing the value of the predictions to the community when judged from the stand-points of quantity and quality, as well as the accuracy of the information.—On the use of the "sling" thermometer in the prediction of frosts, by Prof. H. A. Hazen. With the view of protecting delicate plants from destruction by frost, the author advocates the determination of the dew-point in the evening, and if it is found to be as low as 25°, and the air-temperature at 45° or lower, with a clear sky, frost may be expected, and the plants should be protected by smoke from burning straw, before the early morning.—On globular lightning, by Dr. T. C. Mendenhall. The author quotes many interesting instances of this rare phenomenon, the earliest case recorded being at Stralsund in June 1670; and he describes several instances in which it has been observed at sea. Photographs of the phenomenon are much wanted.—Diminution of temperature with height, by Prof. H. A. Hazen. He has recently spent several weeks on the summit of Mount Washington (6300 feet above sea-level), and finds that the diurnal range of temperature, which is very small, is not due to the heating of the air by the sun, but only to the convection currents caused by the warm rocks. The object of the paper is to endeavour to throw light on the true explanation of storm phenomena.—An interesting summary, by A. L. Rotch, of the Meteorological Conference held at Paris in September last, in connection with the International Exhibition. This is the first general account which has appeared in English.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 6.—"On the Development of the Ciliary or Motor Oculi Ganglion." By J. C. Ewart, M.D. Communicated by Prof. M. Foster, Sec. R.S.

The most conflicting views have for some time been held as to the origin, relations, and homology of the ciliary (motor oculi, ophthalmic, or lenticular) ganglion. By Remak, Schwalbe, Marshall, and others, the ganglion of the ophthalmicus profundus has been described as the ciliary ganglion, and this ganglion has frequently been regarded as the ganglion of the motor oculi nerve, and hence as homologous with the Gasserian and other cranial ganglia. The ciliary ganglion having been shown by van Wijhe to be quite distinct from the ganglion of the ophthalmicus profundus, the old view of Arnold has been recently revived, and already van Wijhe, Hoffmann, Onodi, Dohrn, and Beard have indicated that they regard the ciliary as a sympathetic ganglion. Hoffmann bases his belief on certain observations on the development of the ciliary ganglion in reptiles, while Onodi has adopted this view chiefly because in the higher vertebrates the ciliary ganglion receives a communicating branch from the sympathetic. But Beard, while considering the ciliary a sympathetic ganglion, states that in sharks he has seen nothing in support of "the mode of origin for the ciliary ganglion described by Hoffmann," in reptiles.

In studying the ciliary ganglion in Elasmobranchs I have been specially struck with its tendency to vary not only in the same genus or species, but in the same individual. Of the numerous specimens examined, I have only once found the ganglion entirely absent (in an adult *Raia radiata*), while I have occasionally (in *Acanthias*) found two well-developed ganglia on each side. Usually in sharks I found the ganglion lying in connection with the inferior branch of the motor oculi, while in skates it was generally in contact with the ophthalmicus profundus, or lying midway between the motor oculi and the ganglion of the profundus. In form the ganglion varies extremely, rounded or conical in some cases, in others it was represented by two or three groups of cells lying parallel to or in contact with the motor oculi.

In some cases ganglionic cells had wandered from the ganglion a considerable distance along the ciliary nerves towards the eyeball.

Although in sharks the ciliary ganglion often lay in close contact with the motor oculi nerve, no ganglionic cells were ever found either in the trunk of that nerve or on any of its branches. In skates the ganglion was usually more intimately related with the ophthalmicus profundus than the oculo-motor. In all cases the ciliary ganglion had at least two roots, one from the motor oculi, and one or two from the ophthalmicus profundus. In skates the profundus root always proceeded directly from the profundus ganglion, and the profundus ganglion was frequently found to be connected by a communicating branch with the Gasserian ganglion.

Both in sharks and skates, in addition to the ciliary nerves from the ciliary ganglion there were ciliary nerves proceeding from the ganglion and from the trunk of the profundus, and in some cases large ganglionic cells had wandered from the profundus ganglion along the ciliary nerves; occasionally a few large cells had migrated some distance along the main trunk of the profundus. In all cases the majority of the cells of the ciliary ganglion were only about half the size of the cells of the profundus ganglion.

In skate embryos under two inches in length no indication of the ciliary ganglion was discovered, and in shark embryos about ten inches in length the ganglion was frequently represented by small groups of cells in the vicinity of the inferior branch of the oculo-motor nerve. In sharks the first steps in the development of the ganglion were not observed, but in skates it was possible to make out all the stages. The first indication of the ganglion was in the form of a slender outgrowth from the inferior border of the large ophthalmicus profundus ganglion, which met and blended with fibres from the descending branch of the motor oculi. The *outgrowth from the profundus ganglion* was crowded with cells; the *fibres from the motor oculi*, like its root and trunk, were absolutely destitute of cells. At a somewhat later stage the cells had accumulated at the junction of the outgrowth from the profundus ganglion with the fibres from the motor oculi. It looked as if the blending of the two sets of fibres had formed a network which resisted the further migration of the ganglionic cells. In typical cases, at a still later stage, all the ganglionic cells had left the outgrowth from the profundus ganglion to form a rounded mass from which the ciliary nerves took their origin. In some cases some of the fibres which connected the profundus ganglion with the Gasserian seemed to reach and end in the ciliary ganglion. It thus appears that the ciliary ganglion stands in the same relation to one of the cranial nerves (the ophthalmicus profundus) as the sympathetic ganglia of the trunk stand to the spinal nerves, and that the ciliary ganglion may henceforth be considered a sympathetic ganglion. Further investigations may show that the ganglia in connection with the branches of the trigeminus (fifth) nerve may also be considered as belonging to the sympathetic system. In conclusion, I may say that I have found the vestiges of the ophthalmicus profundus ganglion in a five-months human embryo lying under cover of the inner portion of the Gasserian ganglion, and satisfied myself that the ophthalmicus profundus of the Elasmobranch is represented in man, as suggested by several writers, by the so-called nasal branch of the ophthalmic division of the fifth. To as far as possible clear up the confusion that has arisen from mistaking the ophthalmicus profundus nerve for a branch of the oculo-motor or of the trigeminus nerve, and the ganglion of the ophthalmicus profundus for the ciliary ganglion, it might be well in future to speak of the profundus as the *oculo-nasal* nerve and its ganglion as the *oculo-nasal* ganglion.

Chemical Society, February 20.—Dr. W. J. Russell, F.R.S., in the chair.—The following papers were read:—The behaviour of the more stable oxides at high temperatures, by Dr. G. H. Bailey and Mr. W. B. Hopkins. Previous experimenters have found that cuprous oxide is obtained when cupric oxide is heated to redness. The authors find that at higher temperatures a further quantity of oxygen is given off, and an oxide having the composition Cu_3O is formed. This is insoluble in mineral acids and even in aqua-regia, but can be converted into a soluble form on fusion with caustic potash, from which it separates on treatment with water. The oxides of lead and tin seem to behave similarly at high temperatures.—The influence of different oxides on the decomposition of potassium chlorate, by Messrs. G. J. Fowler and J. Grant. The authors have systematically examined the influence of the chief metallic oxides and certain unstable salts on the decomposition of potassium chlorate by heat, and the chief results obtained may be summarized as follows:—(1) Acid oxides, such as V_2O_5, WO_3, and V_3O_8, cause the evolution of oxygen at a much reduced temperature with the formation of a metavanadate, tungstate, or uranate. Chlorine is evolved in large quantity in these cases, but the whole of the oxygen of the chlorate is not liberated, since the compound of K_2O with the oxide is not decomposed by heat or by chlorine—

$$4KClO_3 + 2V_2O_5 = 2K_2O, V_2O_5 + 2Cl_2 + 5O_2.$$

(2) Alumina acts similarly but less energetically. (3) Chromium sesquioxide causes the evolution of oxygen at a lower temperature, chlorine also being liberated—

$$8KClO_3 + 2Cr_2O_3 = 4KCrO_4 + 4Cl_2 + 7O_2.$$

(4) The sesquioxides of iron, cobalt and nickel, cupric oxide, and manganese dioxide cause the evolution of oxygen at a comparatively low temperature accompanied by only a small percentage of chlorine; the oxide is left but little altered at the end of the experiment. The authors find that their results are in harmony with the theory of the action of manganese dioxide advanced by McLeod (Chem. Soc. Trans., 1889, 184). (5) The monoxides of barium, calcium, and lead cause no evolution of oxygen when heated with potassium chlorate, but the latter breaks up below its normal temperature with the formation of potassium chloride and a peroxide. (6) In the presence of such oxides as silver oxide and the peroxides of barium and lead, potassium chlorate acts as a reducing agent. No oxygen is liberated, but a perchlorate is formed. (7) Oxides such as those of zinc and magnesium are completely inactive. The authors find that the physical condition of the oxide is of importance, thus copper oxide prepared in the dry way is almost inactive; and further, that certain substances, as powdered glass, sand, and kaolin, assist the decomposition, although apparently they undergo no chemical change.—The interaction of hypochlorites and ammonium salts; ammonium hypochlorite, by Messrs. C. F. Cross and E. J. Bevan. The authors bring forward evidence of the formation and existence of ammonium hypochlorite in solution, but have failed to isolate the compound when produced by the action of an ammonium salt on a dilute solution of bleaching powder, or by the electrolysis of ammonium chloride solutions. It exhibits curious anomalies in oxidizing properties in comparison with other hypochlorites. It is without action on many colouring matters—for example, those of the vegetable fibre; it does not decolorize a solution of indigo in sulphuric acid, although it at once liberates iodine from potassium iodide, and it does not peroxidize hydrated lead oxide. On the other hand, it oxidizes sulphites and arsenites, and its effect on aniline salts is identical with that of ordinary hypochlorites. In the discussion which followed the reading of the paper, Prof. Armstrong suggested that probably the authors were dealing with a chlorinated derivative of ammonia, *e.g.* NH_2Cl; such compounds, according to Gattermann's experiments, being more stable than is usually supposed.—The action of phosphoric anhydride on stearic acid, by Dr. F. S. Kipping. One of the products of the reaction is stearone, $(C_{17}H_{35})_2CO$, and the yield appears to be as good or better than that obtained when salts of stearic acid are submitted to dry distillation.—Semithiocarbazides, by Prof. A. E. Dixon.—Note on the production of ozone by flames, by Mr. J. T. Cundall. Ilosva (*Ber. der deut. chem. Gesellsch.*, Referate 1889, 791) states that when all the products of combustion of various kinds of flames are collected, they do not exhibit the smell or taste of ozone. This is confirmed by the results of some unpublished experiments made by the author in 1886, but recently he has found that the air aspirated through a tube, 3 mm. in bore, whose mouth is fixed about 5 mm. above the tube, and 5 mm. away from the flame of a Bunsen burner, both tastes and smells strongly of ozone. Similar results were obtained both with luminous and hydrogen flames. It was not found possible to confirm this fact by any other test for ozone, owing to the impossibility of finding any sufficiently sensitive reaction which was not common to dilute nitrogen oxides. The author agrees with Ilosva that the smell and taste of ozone are the only trustworthy tests for it when it is present in small quantities, and that Houzeau's papers (impregnated with red litmus and potassium iodide), which at first sight should give the necessary distinction, since an acid gas would not be expected to give an alkaline product, are useless, inasmuch as nitrogen oxides also turn them blue.

Geological Society, February 26.—Mr. J. W. Hulke, F.R.S., Vice-President, in the chair.—The following communication was read:—On the relation of the Westleton Beds or "Pebbly Sands" of Suffolk to those of Norfolk, and on their extension inland, with some observations on the period of the final elevation and denudation of the Weald and of the Thames Valley; Part 3, on a Southern Drift in the valley of the Thames, with observations on the final elevation and initial sub-aërial denudation of the Weald, and on the genesis of the Thames, by Prof. Joseph Prestwich, F.R.S. In this third part of his paper the author gave a description of the characters of the Southern Drift, showing how it differs from the Westleton Beds in the nature of its included pebbles, which consist of flints from the Chalk with a large proportion of *chert* and *ragstone* from the Lower Greensand, while there is a total absence of the Triassic pebbles and Jurassic *débris* characterizing the Northern Drift. He traced the drift through Kent, Surrey, Berkshire, and Hampshire, and described its mode of occurrence. Another pre-glacial gravel was then discussed under the title of the Brentwood group, and its age was admitted to be doubtful. The author then entered into an inquiry as to the early physiographical conditions of the Wealden area, and gave reasons for supposing that a hill-range of some importance was formed in the Pliocene period after the deposition of the Diestian beds. From the denudation of this ridge, he supposes that the material was furnished for the formation of the Southern Drift, which may have been deposited partly as detrital fans at the northern base of the range. The relation of the Southern Drift to the Westleton Shingle and other pre-glacial gravels was considered, and the Westleton Beds were referred to a period subsequent to that of the formation of the Southern Drift. The influence of the meeting of the earlier Wealden axis with that of the folding which produced the escarpments of central England was discussed, and it was suggested that the result would be the genesis of the Thames valley and river. The following summary gives the results of the author's inquiry as developed in the other parts of the paper. He holds:—(1) That the Westleton Shingle ranges from Suffolk to Oxfordshire and Berkshire, rising gradually from sea-level to 600 feet. (2) That the lower Tertiary strata were co-extensive with this shingle. (3) That the upraising of the Westleton sea-floor, with its shingle, preceded the advance of the Glacial deposits, and that the latter become discordant to the former when traced westward, occupying valleys formed after the rise of the Westleton Beds. (4) That the Tertiary strata and Westleton Beds on the north border of the Chalk basin were continuous until the insetting of the Glacial period, when they were broken through by denuding agencies. (5) That none of the present valleys on the north of the Thames Tertiary basin date back beyond the Pre-glacial period. (6) That the same date may be assigned to the Chalk and probably to the Oolite escarpments. (7) That in the Thames basin, besides the Northern Drift, there is a Southern Drift derived from the Lower Greensand of the Wealden area, and from the Chalk and Tertiary strata formerly extending partly over it. (8) That during the Diestian period the Weald was probably partly or wholly submerged, and that between this and the insetting of the Glacial period, the Wealden area and the Boulonnais underwent upheaval resulting in the formation of an anticlinal range from 2000 to 3000 feet high. (9) That from the slopes of this range the materials of the Southern Drift were derived, and spread over what is now the south side of the Thames basin. (10) That this denudation commenced at the time of the Red Crag, and went on uninterruptedly through successive geological stages. (11) That consequently, though the Southern Drift preceded the Westleton Shingle, the two must at one time have proceeded synchronously. (12) That the valley-system of the Wealden area dates from Pliocene times—

the initial direction of the transverse valleys from pre-Glacial times—and of the longitudinal valleys from Glacial times. (13) That the Thames basin results from the elevation of the Weald and the flexures of the Chalk and Oolites of the Midland counties, and dates from a period subsequent to the Westleton Beds. (14) That the genesis of the Lower Thames similarly dates from early Pleistocene times, whilst its connection with its upper tributaries and the Isis, which possibly flowed previously north-eastward, took place at a rather later period. After the reading of the paper there was a discussion, in which the Chairman, Mr. Whitaker, Dr. Irving, Mr. Topley, Dr. Evans, and the author, took part. Dr. Evans congratulated the Society and Prof. Prestwich on his having been able to sum up the results of the observations of so many years in the series of papers which he had lately read.

Entomological Society, March 5.—Captain Henry J. Elwes, Vice-President, in the chair.—Mr. C. G. Barrett exhibited a number of specimens of *Dianthecia carpophaga*, Bork., bred by Mr. W. F. H. Blandford from larvæ collected near Tenby on flowers of *Silene maritima*. He remarked that the series included a number of forms intermediate between *D. carpophaga* and *D. capsophila*, and establish the fact that the latter is only a local variety of the former. Mr. W. H. B. Fletcher, Mr. Blandford, and Mr. McLachlan took part in a discussion as to the identity of the supposed species.—Mr. Barrett further exhibited a specimen of *Dianthecia luteago*, var. *Barrettii*, Db., also bred by Mr. Blandford from a larva found at Tenby, and he remarked that the species had not previously been taken in England; also a long series of forms intermediate between *Catoptria scopoliana*, Hw., and its small variety *parvulana*, Wilk., collected by Mr. E. Bankes, Mr. Fletcher and Mr. Vine, in Sussex, the Isle of Wight, and Pembrokeshire; also a specimen of *Botys mutualis*, Zell.,—a species widely distributed in Asia and Africa,—taken by Mr. C. S. Gregson near Bolton, Lancashire.—Mr. H. Goss exhibited several abnormal specimens of *Arctia caja*, bred last December. The object of the exhibition was to show the effect produced by forcing the larvæ, and subjecting them to unusual conditions. It was stated that the peculiarity of the colour of the hind wings of the female parent had not been transmitted to any of the offspring.—Mr. Blandford referred to two specimens of a species of *Cardiophorus*, from Tenby, which he had exhibited at the August meeting of the Society as *Cardiophorus cinereus*, and stated that subsequent investigation had led him to hand them to Mr. Champion for determination. Mr. Champion was of opinion that they did not belong to the same species; that one of them was *C. asellus*, Er., and the other, probably, *C. equiseti*, Hbst., a species new to this country.—Mr. C. J. Gahan read a paper entitled "New Longicornia from Africa and Madagascar."—Captain Elwes read a paper entitled "On a new species of *Thymara* and other species allied to *Himantopterus fuscinervis*, Wesmael."—Dr. Sharp read a paper entitled "On some Water Beetles from Ceylon."—Mr. J. J. Walker communicated a paper entitled "Notes on Lepidoptera from the Region of the Straits of Gibraltar." Mr. F. Merrifield, Mr. B. G. Nevinson, Captain Elwes, and Mr. G. Lewis took part in the discussion which ensued.—It was announced that papers had also been received from Mr. E. Meyrick, Prof. Westwood, and Mynheer P. C. T. Snellen.

Royal Meteorological Society, March 19.—Mr. H. F. Blanford, F.R.S., Vice-President, in the chair.—The following papers were read:—A brief notice respecting photography in relation to meteorological work, by Mr. G. M. Whipple. The first person to use photography for obtaining meteorological records was Mr. T. B. Jordan, of Falmouth, in 1838. Some years later, Sir F. Ronalds and Mr. C. Brooke devised more complete and elaborate apparatus; the arrangement of the former being now in use at the Observatories of the Meteorological Office, and that of the latter at the Royal Observatory, Greenwich. Reference was also made to Mr. J. B. Jordan's form of sunshine recorder, and to Captain Abney's photo-nephograph. The various photographic processes which have been employed in connection with these instruments were fully described.—Application of photography to meteorological phenomena, by Mr. W. Marriott. The author showed how photography could be most usefully employed for the advancement of meteorological knowledge. Much valuable information had been recently obtained from photographs of lightning and clouds An interesting collection of such photographs was shown on the screen, together with others illustrating floods, whirlwinds, tornadoes, hailstorms, frost, snow, &c.—After the reading of these papers, the meeting was adjourned to allow the Fellows to inspect the Exhibition of Instruments, &c., an account of which we print elsewhere.

Mathematical Society, March 13.—J. J. Walker, F.R.S. President, in the chair.—The following communications were made:—Perfect numbers, by Major P. A. MacMahon, R.A.—The relation of distortion in prismatic images to dispersion, by Dr. J. Larmor.—On the satellite of a line relatively to a cubic, by the President (Prof. Greenhill, F.R.S., V.P., in the chair).—An approximate relation connecting successive terms of the expansion for tan x, by G. Heppel.

PARIS.

Academy of Sciences, March 17.—M. Hermite in the chair.—M. Maurice Lévy communicated a paper on the application of electro-dynamical laws to planetary motions. In a communication of February 17, M. Tisserand applied Gauss's formula of electro-dynamical attraction to the movement of celestial bodies without at all asserting it to be true. M. Lévy concludes that the formula is contrary to the doctrine of energy and to the facts, and shows that Riemann gave a law which, like that of Weber, is in accord with both.—On the photographic halo, and a method of making it disappear, by M. A. Cornu. The author has investigated the appearance and cause of the halos which surround intense points of light on a photographic plate, and the conditions necessary to remove them.—Under agricultural chemistry, M. Berthelot discusses the facts relating to observations on the reactions between the soil and atmospheric ammonia.—M. P. Schutzenberger, in researches on some phenomena produced during the condensation of gases containing carbon under the influence of the silent discharge, has investigated the composition of the brown solid formed together with carbonic acid from the condensation of carbonic oxide. The experimental results give a formula intermediate between $C_{12}H_2O_{10}$ and $C_{12}H_2O_{11}$.—Method of determining the pole of an ellipsoid of three unequal axes by the observation of its catoptric images, by M. D. E. Sulzer.—On a new system of electrical accumulators and some accessory apparatus, note by M. Charles Pollak.—On the double thiosulphates of lead and sodium, by M. J. Fogh.—The action of sulphuric acid on aluminium, by M. A. Ditte. The author finds aluminium to behave much like amalgamated zinc. With a smooth plate of this metal immersed in dilute cold sulphuric acid for some time but little hydrogen is liberated owing to the formation of a protecting film of the free gas, and that any circumstances tending to facilitate the removal of this film increase the rapidity of action of the acid; for instance, a trace of a chloride of any metal reduced by aluminium causes the plate to be comparatively rapidly attacked owing to the roughening of the surface due to the deposition of a metallic film; again a similar effect is obtained when the reaction is caused to occur in a vacuum, because of the freer disengagement of hydrogen. The product of the reaction is in the first place neutral sulphate of aluminium, but the reaction continues further, a basic sulphate being produced with further evolution of hydrogen. The conclusion is drawn that aluminium acts normally, in accordance with the heat of formation of its salts, when in contact with sulphuric acid or metallic sulphates, and that the slowness of the reaction is due to the mechanical interference of the liberated hydrogen.—On a new crystalline form of ammonium chloride, by MM. G. Geisenheimer and F. Leteur. M. Le Bel has shown the possibility of a second form of ammonium chloride (*Comptes rendus*, January 20, 1890); the authors give data leading them to conclude that they have probably obtained the second form, rendered stable by the presence of a slight impurity.—Note by M. J. Meunier, on the mono- and di-benz-acetals of sorbite.—On the α dextro- and lævo-rotatory borneol camphorates, by M. A. Haller. The author draws the conclusions—(1) that the total etherification of camphoric acid is only effected at a relatively high temperature and with the anhydride; (2) that isomeric bodies are certainly produced under these conditions; (3) that camphoric acid, in the acid ethers studied in this note, is analogous to phenol in its reactions.—On oxytetric acid, by M. Ch. Cloez.—On the value of the heat of hydration of malic acid, by M. Iw. Ossipoff.—Note by M. J. A. Muller, on the dissociation of the hydrochlorides of amines and dissolved salts of fatty acids. Using phenolphthalein as indicator, the author has been enabled to trace the dissociation of

these bodies on diluting or heating their solutions.—A botanical note, by M. Léon Guignard, on the formation and differentiation of the sexual elements which take part in fertilization.—Another botanical paper, by M. A. Prunet, on the comparative structure of the nodes and internodes in the trunk of the Dicotyledones.—Under geology, M. de Folin has a paper on the formation of nummulitic rocks. He concludes that these rocks are formed by the work of an organism of the same order as the Rhisopodes.—Also under geology, M. Stanislas Meunier contributes some chemical researches on the fossil shells of Foraminifera, Mollusks, and Crustacea. He has investigated the composition of the flocculent organic residue formed when these fossil shells are dissolved in acid.—On Pyrenean kersanton, its age and affinities with ophite, by M. J. Caralp.

BERLIN.

Physiological Society, February 28.—Dr. Rosenstein exhibited a patient with distension of the lymphatics in the leg, and fistulous openings which discharged an albuminous fluid sometimes amounting to 1100 c.c. in a day. Dr. J. Munk has made observations on this fluid. It is sometimes transparent, but is always milky after a meal containing fat. It thus resembles chyle rather than lymph, and probably really is chyle. At least two-thirds of the fat given at any one meal reappeared in the fluid from the fistula. On giving olive oil, fat appeared in the fluid in two hours, increased steadily till its maximum after five hours, then diminished, and in ten or twelve hours disappeared. With a harder fat, *e.g.* mutton fat, the phenomena were the same, but were longer in appearing. Erucic acid given to the patient appeared as a neutral fat, and not as free acid, synthesis having been effected in the body. No appreciable absorption of fat occurs from the rectum. Large doses of starch or sugar scarcely increased the percentage of sugar, nor did large meals of albumen increase that of proteids in the fluid. Thus the only food-stuff which leaves the intestine by the lacteals is fat.

Meteorological Society, March 4.—Dr. Vettin, President, in the chair.—Dr. Wagner spoke on fire-damp explosions in mines in their relationship to cosmic and meteorological conditions. He discussed the collection of the gas, the conditions necessary for its explosion, the part played by coal-dust, and the several chance circumstances which may lead to the non-discovery of the gas in the workings. He next discussed the various means available for avoiding and removing accumulations of fire-damp, and gave an account of researches on the relationship of its explosion to varying barometric pressures. His own work had consisted in working up the statistics of the Dortmund mining district in which explosions are more frequent than in any other state of Prussia. The reports cover a period of 21 years and give a record of 7000 explosions. He first compared the numerical relationship of the explosions with the phases of the moon, and concluded that there is no connection between the two. He then made a similar comparison of their frequency with the rotational period of the sun, taking the latter as 25·5 days: the result was again negative. He finally compared their frequency with periods of 27·9 days, this being, according to Buys-Ballot, the cycle of temperature variations resulting from the sun's rotation. In this case the curves he obtained were quite uniform and regular, showing a maximum on the third day and a second maximum on the twentieth. He refrained from drawing any definite conclusions from this last observation in view of the numberless chance circumstances which may lead to explosions.

Physical Society, March 7.—Prof. Kundt, President, in the chair.—Dr. Rubens spoke on the employment of the bolometer for observing the electrical radiations of Hertz as carried out by himself and Dr. Ritter. Up to the present it had not been found possible to measure the intensity of the radiation owing to the extraordinarily minute amplitude of the oscillations; but the speaker had been able to carry out the determination by means of a bolometer whose construction and working he fully described. It consists essentially of an accurately balanced primary Wheatstone bridge, two of whose arms are again converted into secondary Wheatstone bridges. If a current passes through one of them its resistance is altered by the rise of temperature, and the galvanometer gives a proportionate throw. A similar effect is produced by a wave of electrical radiation, and hence its amplitude can be measured by this bolometer when once it has been calibrated. When experimenting with the polarizing wire-grating it was found that there is a constant relationship between the intensity of the rays which pass the grating and the angle of inclination of the wires to the plane of oscillation of the rays. It was further observed that the energy which does not pass the grating is reflected, and to the extent of 98 per cent., when the wires are at right-angles to the plane of oscillation. Experiments in illustration of the above were shown at the end of the communication.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

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