

to start from the secondary deposit which unites the rays at the centre. Much skill and care have been bestowed on the beautiful drawings illustrating these researches, and they are admirably reproduced in an excellent series of plates.—Prof. MacBride, in a paper on the early development of Amphioxus, shows the similarity between the coelomic chambers of Amphioxus and Balanoglossus, and homologises the metapleural lymph canals of the former with portions of the collar pouches of the latter; in consequence of this he revives Bateson's comparison of the atrial folds of Amphioxus with the posterior collar folds of Balanoglossus.—Mr. Shipley gives an account of a new Tape-worm from a bird in the Sandwich Islands.—Dr. Willey gives the diagnosis of a new genus of Enteropneusta.—Prof. Haswell describes a Turbellarian from deep wells in New Zealand.—Prof. Ray Lankester, in a note on the development of the atrial chamber of Amphioxus, corrects Prof. MacBride's statements with regard to the well-known researches by himself and Dr. Willey on the development of the atrial chamber.

Bulletin of the American Mathematical Society, February.—The number opens with an account of the fourth annual meeting of the Society on December 29, 1897. After the election of the new Council—Prof. S. Newcomb being re-elected President—eleven papers were presented; of some of these abstracts are given, and the journals in which they have appeared, or will appear, are named.—Prof. Woodward's paper on the differential equations defining the Laplacian distribution of density, pressure, and acceleration of gravity in the earth presents an improved mathematical method for the treatment of the problem, previous methods being deemed by the author to be lacking in elegance and compactness.—The following are to appear in the *American Journal of Mathematics*—viz. on some points of the theory of functions, by Prof. Chessin; and point-transformation in elliptic coordinates of circles having double contact with a conic, by Dr. Lovett. A second paper by Dr. Lovett, entitled "Certain invariants of a plane quadrangle by projective transformation," will be published in the *Annals of Mathematics*. It is a contribution to the theory of a system of 4-coplanar points, and shows among other things how the group theory may be made to yield the details of elementary geometry.—Prof. Newcomb's presidential address, given *in extenso*, treats of the philosophy of hyperspace. "There is a region of mathematical thought," he remarks, "which might be called the fairyland of geometry. The geometer here disports himself in a way which, to the non-mathematical thinker, suggests the wild flight of an unbridled imagination rather than the sober sequence of mathematical demonstration." He defines his hyperspace as being, in general, space in which the axioms of the Euclidean geometry are not true and complete. Curved space and space of four or more dimensions are completely distinct in their characteristics, and must therefore be treated separately. Prof. Newcomb's views have already been stated in our columns, and the present address is an interesting sequel to them up to date.—Another of the papers, viz. orthogonal group in a Galois field, by Dr. L. E. Dickson, is also given here. The term *orthogonal*, in the present connection, is defined, and a remark of Jordan's shown to be not exact (*Traité des Substitutions*, p. 169, ll. 18–21).—We can merely mention that the second meeting of the Chicago Section was held on December 30 and 31, 1897, at which twenty-one papers were read. Brief abstracts are given. From the *Notes* we learn that in the year 1897 the membership of the Society increased from 280 to 301, and the total number of papers read was 88!

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, January 27.—"On the Zoological Evidence for the Connection of Lake Tanganyika with the Sea." By J. E. S. Moore, A.R.C.S.

The results of the morphological examination of the animals obtained during the author's recent expedition to Lake Tanganyika have made it evident that the fauna of this lake must be regarded as a double series, each half of which is entirely distinct in origin and nature from the other. The remarkable Molluscan shells which were brought home by Burton and Speke, form but a small part of the Molluscan section of the more abnormal of these fresh-water stocks. Besides Molluscs,

the lake was found to contain fishes, Crustacea, Cœlenterata, and Protozoa, all of which, like Speke's shells, present the most curious marine affinities, and for distinctive purposes the individual members of this unique assemblage of quasi-marine fresh-water organisms are described as members of the Halolimnic group.

The distribution of the aquatic faunas occurring in Lakes Shirwa, Nyanza, Kela and Tanganyika, all of which were visited and dredged during the expedition, shows (together with what is already known respecting the Victoria Nyanza and the more northern lakes) that the Halolimnic animals are exclusively restricted to Tanganyika. It is thus rendered inconceivable that the Halolimnic forms can have arisen through the effect of ordinary conditions operating upon the population which the lake originally possessed. For the same reasons, it becomes equally clear that the Halolimnic animals cannot be regarded as the survivors of an old fresh-water stock. Since, if we accept either of these suppositions, we are bound by the facts of distribution to believe, also, that the Halolimnic animals have been destroyed in every African lake but one; a supposition which may be ingenious, but which, when the number of lakes existing in the African interior is fully realised, becomes grotesque.

Apart from the physical difficulties which the present effluent of Tanganyika presents to the ingress of organisms from the sea, it is impossible to regard the Halolimnic forms as having recently transmigrated thither from the ocean, since none of these animals are exactly similar to any marine organisms at present known. They must, therefore, have been in Tanganyika long enough to modify into their present condition from the living oceanic species which we know, or they retain the characters of a sea-fauna that has elsewhere become extinct.

The delicate nature of the lake Medusæ, and the fact that most of the Halolimnic Molluscs are exclusively deep-water forms, renders it impossible that these organisms can have made their way into Tanganyika at any time under the physical conditions which now exist.

The facts of distribution and the general characters of these forms, as well as the geographical conditions of the lake in which they are now found, lead then to the conclusion that the Tanganyika region of Central Africa must have approximated to a deep arm of the sea in ancient times.

This view is finally confirmed by the details of the anatomy of the Halolimnic animals themselves. For some of the individual Molluscs of this group combine the characters of several of the most modern marine genera. The Halolimnic fauna of Tanganyika, therefore, cannot represent an extinct fresh-water stock, since the characteristic fresh-water organisms of the present day (which would in such a case have to be regarded as their linear descendants) possess the anatomy of vastly older types.

To the Halolimnic animals there thus attaches the unique interest that they themselves constitute the few surviving indications of an old sea which once extended far into the African interior, and which, judging from the characters of the animals it left behind, must have retained its connection with the ocean at least as late as Tertiary times.

These conclusions, it will be observed, are directly in opposition to the views which were originated by Murchison, and which depict the African interior as never having been below the sea at least since the New Red Sandstone age.

February 17.—"On the Magnetic Deformation of Nickel." By E. Taylor Jones, D.Sc.

The experiments were made with a view to further testing a result arrived at on a former occasion by the author, viz. that the magnetic contraction of a long nickel wire was approximately proportional, when allowance was made for the effects of Kirchhoff's system of stresses, to the fourth power of the magnetisation.

In order to vary, if possible, the conditions of the experiments some preliminary measurements were made to find out whether temperature had any marked influence on the magnetic contraction. The temperature of the specimen was raised by allowing warm water to flow through the water-jacket of the magnetising coil. It was found that at low field-strengths (up to about 90 C.G.S.) the magnetic contraction was greater at 56° C. than at 19° C.; at higher fields the contraction was greater at the lower temperature, the difference being about 6 per cent. at the field 330 C.G.S.

Repeated measurements showed that the contraction at any

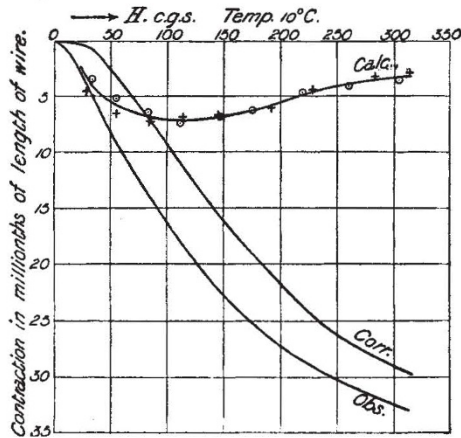
temperature and field was not constant, but diminished as time went on. In order to eliminate this effect as far as possible the subsequent measurements were made in the following order:—

(1) The change of magnetisation accompanying a certain increase of tension, and the magnetisation at the mean tension (at 10° C. and 55° C.).

(2) The magnetic contraction at the mean tension (at 10° C. and 55° C.).

(3) The measurements of (1) repeated.

(4) The magnetic contraction at 10° C. Values of the expression deduced from Kirchhoff's theory were calculated from (1) and (3) for both temperatures, and the mean compared with the observed contraction (2). The results are shown (for 10° C.) in the accompanying diagram. The calculated contraction is much



less than the observed, and the difference is approximately proportional to the sixth power of the magnetisation. A similar result was obtained by comparing the mean observed contraction at 10° C. (2) and (4), with the calculated value deduced from (3). All the quantities measured showed a diminution as time went on, especially the influence of tension on magnetisation at low fields. The calculated values of the contraction deduced from (1) are indicated in the diagram by the points + + + . . . ; those deduced from (3) by the points o o o At the field 275 C.G.S. the magnetic contraction was about 16 per cent. less than it was four months earlier.

Physical Society, March 11.—Mr. Shelford Bidwell, President, in the chair.—Prof. J. D. Everett gave a communication on dynamical illustrations of certain optical phenomena. The first part of the paper deals with the properties of a series of equal particles attached at equal intervals to a uniform stretched elastic weightless string. Their free simple-harmonic modes of wave-motion are first investigated. The highest frequency occurs when the wavelength is double that of the common distance a . As the wavelength increases from $2a$ to infinity, or diminishes from $2a$ to a , the frequency tends to zero. To every wave-length λ_1 between $2a$ and infinity, there corresponds a wave-length λ_2 between $2a$ and a , such that $a/\lambda_1 + a/\lambda_2 = 1$. The frequency is the same for λ_2 as for λ_1 . Further examination shows that the difference of wave-length between these two solutions is only apparent, and that, so far as the movements of the particles are concerned, waves of length λ_1 travelling in one direction, are identical with waves of length λ_2 travelling in the opposite direction. The same is true if $a/\lambda_1 + a/\lambda_2$, instead of being unity, is equal to any integer. On the other hand, if the difference between a/λ_1 and a/λ_2 is an integer, the two sets of waves travel in the same direction. Any simple-harmonic wave-motion of the system of particles may thus be regarded as having any one of an infinite number of wave-lengths. When one particle of the system is constrained to a S.H. motion, of frequency not exceeding that which corresponds to $\lambda = 2a$, the whole system will ultimately vibrate in equal waves. When the frequency of the constrained particle exceeds that due to $\lambda = 2a$, the ultimate state will be S.H. motion with exact opposition of phase between successive particles. The simultaneous displacements of the particles at any instant, as we travel away from the constrained particle in either direction, form a diminishing geometrical progression with signs alternately plus and minus.

Expressions are investigated for the constraining force and for the ratio of the energy of the system (consisting of an unlimited number of particles) to the energy of the constrained particle. The second part of the paper deals with pendulums. (1) Sympathetic pendulums, such as two equal pendulums suspended from the same support. (2) Double pendulums, *i.e.* one simple pendulum suspended from another. In each case the investigation consists in seeking a mode of vibration in which the two bobs have either identical or opposite phases, so that their displacements are in a constant ratio, positive or negative. In every case there are two such modes, one with a positive and the other with a negative ratio. As regards the sympathetic pendulums: when they are equal in mass and length, the periods for the two modes are approximately equal, and the displacement of each pendulum follows the law of a "curve of beats," the excursions are largest for one pendulum when they are smallest for the other. As regards the double pendulum: when the lower mass is much less than the upper, there exist, in like manner, motions following the law of beats, provided that, to start with, one bob is at rest in the zero position, and the other at rest in an extreme position. If the lengths of the two strings are decidedly unequal, one fundamental mode has approximately the period of the upper, and the other the period of the lower pendulum. In the former, the displacements of the two bobs are comparable; in the latter, the displacement of the upper is small compared with the lower. The bearing of these conclusions is pointed out, first, on Lord Kelvin's conclusions respecting a suspended clock; and, secondly, on Lord Rayleigh's assertion (frequently quoted in connection with anomalous dispersion) respecting the influence on a heavy pendulum of a much lighter one suspended from it. To obtain the phenomenon of beats in perfection, the upper string must be slightly longer than the lower, and the ratio of difference to sum of lengths must equal the ratio of lower mass to upper. The beats thus obtained explain the experiment described in the second edition of "Rayleigh on Sound," § 62. Sellmeier's application of the beats of double pendulums to explain fluorescence is briefly described. Stokes explains fluorescence by the analogy of the chain of equal particles discussed in the first part of the paper. Forced vibrations quicker than the critical frequency are produced by the action of the vibrating ether on the fluorescent body; and when the body is left to itself, its subsequent motion is made up of S.H. components, all of which are below the critical frequency.—Prof. R. A. Lehfeldt then read a paper on the properties of liquid mixtures. In a previous communication (*Phil. Mag.* 5, vol. xl. p. 398) the author followed out the consequences of a certain thermodynamic relation between the composition of a liquid mixture and that of the vapour in equilibrium with it, and the saturation-pressure of the system. More stable compounds are now chosen, *viz.* benzene and toluene mixed with carbon tetrachloride, as types of normal organic compounds; and benzene and toluene mixed with ethyl alcohol as types of a so-called "associated" liquid. These experiments have been carried out in the Davy-Faraday laboratory. The measurements come under two distinct groups: (1) vapour-pressure, (2) composition of vapour. They were made separately, on material from the same source, prepared identically. To measure the vapour-pressure of the mixtures, the "dynamic" method was adopted. An experiment consists in weighing out a mixture, taking its refractive-index by a Pulfrich refractometer, placing it in a boiling tube, and after adjusting temperature and pressure, taking observations at different temperatures on a rising scale, and then on a falling scale. The refractive-index of the residue is again measured; this is always used for checking the composition of the mixtures. For determining the composition of the vapour over liquid mixtures, the method used is to distil a little of the mixture and analyse the distillate. The apparatus is arranged so that the distillate can be drawn off by a tap, as required. The author criticises the results of Linebarger (*Jour. Amer. Chem. Soc.*, vol. xvii.), and also those of Margules (*Wien. Ber.*, vol. civ.). Linebarger states that the partial pressure of benzene and toluene in mixtures, is simply proportional to the molecular percentage present. This conclusion, the author considers, is only roughly true; the partial pressure of the hydro-carbon vapour is not necessarily linear in mixtures; hence, the rule proposed by Linebarger for determining the molecular weight is incorrect.—The President proposed votes of thanks to the authors, and the meeting was adjourned until March 25.

Chemical Society, March 3.—Prof. Dewar, President, in the chair.—The following papers were read:—Preparation of anhydrous hydrogen cyanide and carbon monoxide, by J. Wade and L. C. Panting. On dropping a mixture of equal volumes of sulphuric acid and water on to 98 per cent. potassium cyanide, hydrogen cyanide is evolved in nearly theoretical amount; with concentrated sulphuric acid, nearly pure carbon monoxide is evolved in almost theoretical quantity.—Preparation of some nitro- and amido-oxylutidines, by J. N. Collie and T. Tickle. The authors have prepared mononitro- and monamido-derivatives of pseudolutidostyryl and ethylic pseudolutidostyrylcarboxylate by the ordinary methods.—Production of some nitro- and amido-oxylutidines. Part ii., by Miss L. Hall and J. N. Collie. Nitrolutidone is obtained by nitrating lutidone with a mixture of nitric and sulphuric acids; the platinumchloride of amidolutidone, when warmed with hydrochloric acid, seems to yield a salt of propine diamine, $\text{CMe}(\text{NH}_2) : \text{CH}(\text{NH}_2)$.—On benzene hexabromide, by F. E. Matthews. The author was unable to prepare the second benzene hexabromide described by Orndorff and Howells, and could not prepare either the hexachloride or hexabromide of bromobenzene.—Note on the action of bromine on benzene, by J. N. Collie and C. C. Frye. The authors have succeeded in proving the presence of ortho-compounds in the product of the action of bromine on benzene in presence of sunlight.—Note on manganic salts, by C. E. Rice. The author shows that the decomposition of manganic chloride in solution into manganous chloride and chlorine is reversible.—Some chemical properties of concentrated solutions of certain salts. Part i. Potassium carbonate, by W. C. Reynolds. By crystallising a concentrated solution of potassium carbonate containing the chloride, nitrate, or acetate of various metals, the author has obtained crystalline double salts of the following compositions: $\text{CuK}_2(\text{CO}_3)_2$, $\text{CuK}_2(\text{CO}_3)_2 \cdot 4\text{H}_2\text{O}$, $\text{MnK}_2(\text{CO}_3)_2 \cdot 4\text{H}_2\text{O}$, $\text{FeK}_2(\text{CO}_3)_2 \cdot 4\text{H}_2\text{O}$, $\text{CaK}_2(\text{CO}_3)_2$, $\text{Bi}_2\text{OK}_4(\text{CO}_3)_4 \cdot \text{H}_2\text{O}$, $\text{CoK}_2(\text{CO}_3)_2 \cdot 4\text{H}_2\text{O}$, $\text{NiK}_2(\text{CO}_3)_2 \cdot 4\text{H}_2\text{O}$, $\text{MgK}_2(\text{CO}_3)_2 \cdot 4\text{H}_2\text{O}$, and AgKCO_3 .—The colouring matters of the Indian dye-stuff *Delphinium salil*, by A. G. Perkin and J. A. Pilgrim. The dried flowers and stems of *Delphinium salil* are used in India under the name of "asbarg" for producing a yellow colour on alum-mordanted fabrics. Three colouring matters exist as glucosides in the plant, namely isorhamnetin, quercetin, and a third which was not obtained pure.—Some metallic salts of natural yellow colouring matters, by A. G. Perkin and P. J. Wood. Quercetin, morin, fisetin and myricetin decompose potassium acetate in alcoholic solution with formation of sparingly soluble metallic derivatives; luteolin, apigenin, chrysin and gentisin do not do so.—The interaction of magnesium and solution of copper sulphate, by E. Divers.

Royal Microscopical Society, February 16.—Mr. A. D. Michael, Vice-President, in the chair.—Mr. J. E. Barnard said that when he gave his demonstration at the November meeting, on the application of the electric arc to photomicrography, Mr. Nelson suggested that it would be of interest if he would show some lantern slides taken in that way; he had accordingly brought a few examples for exhibition on the screen. These included a series showing ringworm fungi, which he thought would have some interest apart from the method by which the photographs had been produced. A number of slides were then shown, illustrating the appearance of the fungi in various stages and under conditions in which the external portions, or internal structure of the hair of man and animals had been attacked, and their appearance when cultivated artificially. The photographs were from microscopical preparations lent by Dr. T. Colcott Fox. Other slides were shown of the bacilli of anthrax, tuberculosis, typhoid fever, bubonic plague, &c. Dr. Hebb concluded some remarks by saying that he did not know that he had ever seen these subjects so beautifully illustrated as he had that evening. Mr. T. Charters White said he could endorse all that fell from Dr. Hebb. For high amplification he did not know that he had seen anything so sharply defined, especially in the case of the Podura scale magnified 6000 diameters. The Chairman said no one could fail to be struck by the clear manner in which these minute objects had been shown. [Two of the pictures, with a short account of the light used in their production, have already appeared in these columns (p. 448).—Mr. T. Charters White read a paper on microcrystallography, which he illustrated by the exhibition on the screen of a number of slides of the crystals described. He had selected them to show how large a number of beautiful forms might be obtained

from the same salt by causing it to crystallise under different conditions. Mr. White further illustrated the subject by exhibiting the formation of crystals under the microscope. The Chairman thought it quite possible that when they came to examine these crystals very carefully they would find that the ultimate form did, after all, agree with the typical form, but it was remarkable to see how other forces could modify these forms.—The Chairman said they had another paper on the agenda, on Foraminifera taken chiefly from shallow water in the Malay Archipelago, by Mr. Durrand.

Royal Meteorological Society, February 16.—Mr. F. Campbell Bayard, President, in the chair.—Mr. E. Mawley gave a report on the phenological observations for 1897, from which it appeared that there had been a marked absence of very exceptional weather during the past phenological year, the most noteworthy features affecting vegetation being the persistent rains in March and the three dry periods of May, July and October. Until about the middle of May wild plants appeared in blossom in advance of their usual time, but throughout the rest of the flowering season they were all somewhat behind their average dates in coming into bloom. The heavy rainfall in the early spring favoured the hay, which proved the only really abundant farm crop of the year, but greatly impeded the sowing of spring corn. The cereals were, however, much benefited later on by the warm, dry and brilliant weather of the summer. Taking the country as a whole, oats proved a good crop, barley an average one, while the yield of wheat was somewhat under average. There were also fair crops of roots and potatoes. It was owing more to the dry spring and summer and the sunless autumn of the previous year, than to the moderate frosts and cold winds of the spring of 1897, that the fruit crop was such a very light one. Apples, pears and plums, and especially the latter, yielded badly, while the small fruits were in most districts only average crops.—Mr. Hopkinson read a paper on monthly and annual rainfall in the British Empire 1877–96. In this the author gave particulars of the mean monthly and annual rainfall, and the number of rainy days, at the following twelve stations in the British Empire, viz. London, England; Port Louis, Mauritius, Calcutta and Bombay, India; Colombo, Ceylon; Adelaide and Melbourne, Australia; Wellington, New Zealand; Toronto and Winnipeg, Canada; Kingston, Jamaica; and Malta.

Linnean Society, February 17.—Dr. A. C. L. Günther, F.R.S., President, in the chair.—Dr. Kakichi Mitsukuri, Professor of Zoology, Imperial University, Tokyo, was admitted a Foreign Member.—Prof. G. B. Howes, F.R.S., exhibited specimens of Dog-fishes: (1) *Scyllium canicula* from the egg-case, and (2) *Scyllium catulus* prematurely hatched, which he had received from Mr. C. W. L. Holt, of the Marine Biological Laboratory at Plymouth. The specimens showed the dorso-lateral and caudal placoids which led Filippi to propose the species *Scyllium acanthonotum*, shown by Dr. Günther to be based upon a developmental character, and had in recent years been the subject of some interesting speculations by Paul Meyer. For comparison he exhibited also an embryo from the purse of *Callorhynchus antarcticus*, showing a similar set of organs, and gave reasons for surmising that they are not merely transitory vestiges, but of service to the animal while encapsulated within its egg-case. Some additional remarks were made by the President.—Mr. J. E. Harting exhibited a nearly white variety of *Mus rattus* recently obtained in Carnarvonshire, and made some remarks on the difference of haunts and habits in the two species *M. rattus* and *M. decumanus*, and on their usual antagonism. In reply to Mr. H. J. Elwes on the question of occasional hybridism, he stated that no well-established case of the kind had been recorded, although some years ago Mr. Barrett Hamilton had described (*Zool.*, 1888, p. 141) a suspected hybrid which was partly brown in colour, partly black, and exhibited some other intermediate characters. He referred to the so-called Irish rat, *Mus hibernicus* of Thompson, which was now regarded as a permanent black variety of *Mus decumanus* not confined to Ireland.—Mr. F. N. Williams read a paper on *Arenaria*, one of the larger genera of Caryophyllaceæ, which now includes a considerable number of species. *Alsine* and others, usually included as sections of the genus, he thought should be regarded as distinct genera; *Alsine* and *Arenaria* being distinguished by the same cardinal character which separates *Lychnis* from *Silene*.—Mr. G. S. West read a paper on the histology of the salivary, buccal, and Harderian glands of the *Colebridae*, with notes on their tooth-succession and the relationship of the poison-duct.

Geological Society, February 23.—W. Whitaker, F.R.S., President, in the chair.—On some submerged rock-valleys in South Wales, Devon, and Cornwall, by T. Codrington. The author described various valleys in which the solid rock was reached at a considerable depth below sea-level, on the sides of Milford Haven and in the Haven itself; beneath the Tivy, Tawe, and Neath, the Wye, the Severn, the Bristol Avon, the Dart, the Laira, the Tavy, the Tamar, and other rivers. In the case of the Dart the rock-bottom had been found at one place at a depth of 110 feet below low-water level, and in the case of other rivers at varying depths less than this. The deposits showed that some of the infilling took place after the period of submerged forests, and much before this, for frequent cases of glacial deposits filling the bottoms of these submerged valleys were recorded. The fact that in the Solent and Thames the glacial deposits bordered the sides of the valleys, and did not occur at the bottom as in the case of the valleys described in the paper, indicated that the latter were older than the former, though they presented features similar to those of some of the valleys of the North-east and North-west of England.—Some new carboniferous plants, and how they contributed to the formation of coal-seams, by W. S. Gresley. The author, in a paper published in abstract in the Society's *Quarterly Journal* for May 1897 (vol. liii. p. 245), argued that certain brilliant black laminae in coal, and similar materials found among some mechanical sediments of the coal measures, pointed to the former existence of an aquatic plant. In the present communication he described structures in the pitch-coal laminae of bituminous coal and in the glossy black layers of anthracite which he believed to be indications of two other kinds of plants, and stated that he had examined structures which might be due to some other kinds of vegetation.

Zoological Society, March 1.—Dr. W. T. Blanford, F.R.S., in the chair.—Mr. G. A. Boulenger, F.R.S., exhibited, and made remarks upon, a living hybrid newt, the result of a cross between specimens of a hybrid *Molge cristata* × *M. marmorata* and the former species, which had been reared at Argenton-sur-Creux by M. R. Rollinat.—Mr. F. E. Beddard, F.R.S., read a paper on certain points in the anatomy of the cunning Bassarisc (*Bassariscus astutus*), as observed while dissecting a specimen which had died in the Society's menagerie, and called special attention to certain points in the viscera and in the form of the brain in which *Bassariscus* agreed with the arctoid carnivora.—Mr. G. A. Boulenger, F.R.S., read a paper entitled "a revision of the African and Syrian fishes of the family Cichlidae, part I." The author had come to the conclusion that the African and Syrian fishes of this family were, so far as was known; represented by nine genera.—A communication was read from Prof. B. C. A. Windle and Mr. F. G. Parsons containing the second part of a memoir on the myology of the terrestrial carnivora. The present portion dealt with the muscles of the hind limb and the trunk in various species, which, in many cases, seemed to give good indications of their affinities.—A communication from Dr. A. G. Butler on the Lepidoptera collected by Mr. G. A. K. Marshall in Natal and Mashonaland in 1895 and 1897 was read.

PARIS.

Academy of Sciences, March 7.—M. Wolf in the chair.—Chemical actions exerted by the silent discharge. Aldehydes and nitrogen, by M. Berthelot. Mixtures of nitrogen with various substances of aldehyde function, including acetaldehyde, propionic aldehyde, acetone, methylal, aldol, paraldehyde, trioxymethylene, formaldehyde, camphor, benzaldehyde, salicylic aldehyde, and furfural were submitted to the action of the silent discharge for periods varying from eight to twenty-four hours. The nitrogen absorbed was measured, and the gases produced analysed. The solid and liquid products were not obtained in quantities sufficient for analysis.—Chemical action of the silent discharge. Organic acids and nitrogen, by M. Berthelot. The acids studied were formic, acetic, propionic, crotonic, benzoic, succinic, maleic, fumaric, phthalic, camphoric, glycollic, lactic, malic, tartaric, oxybenzoic, pyruvic, levulic, and dehydracetic acids.—Observations relating to the chemical action of the silent discharge on dielectric liquids, by M. Berthelot. The liquids examined were alcohol, olive oil, and essence of turpentine. Alcohol gave a mixture of hydrogen and ethane.—Action of calcium sulphate upon some haloid salts of the alkalies, by M. A. Ditte. A study of the equilibrium produced in aqueous solutions containing calcium

sulphate, and varying proportions of alkaline chlorides, bromides, and iodides.—On the number and symmetry of the fibrovascular bundles of the petiole as a measure of the perfection of vegetable species, by M. A. Chatin.—On the results given by a seismograph installed at Grenoble, by M. M. Lévy. The slight earthquake shock noticed in the valley of the Po on March 4, was clearly shown on the seismographs (Kilian and Paulin, Angot) at Grenoble.—On the absorptive power of lampblack for radiant heat, by MM. Crova and Compan. It is usually assumed that for a given flux of radiant energy the absorptive power of a layer of lampblack is equal to unity. This, however, is not necessarily the case, the coefficient of absorption varying between narrow limits according to the nature of the deposit and its mode of application. A layer of black, applied in the ordinary way, may have an absorptive power as low as 0.9. The application of several layers, each washed with alcohol and then dried, gives a more complete absorption, the coefficient after some six deposits, rising to .98. Fewer deposits of platinum black are required to reach the same limit.—Report on a memoir of M. Gonessiat, entitled "Researches on the law of variations of latitude," by M. Radau.—On the "Histoire céleste du 17^e siècle" of Pingré, by M. G. Bigourdan.—Note on the ellipsoid of Jacobi, by M. P. Krüger.—On the determination of the group of rationality of linear differential equations of the fourth order, by M. F. Marotte.—On conjugated congruences of pencils C, by M. C. Guichard.—On the invariants of linear partial differential equations of two independent variables, by M. J. Le Roux.—On a problem of Riemann, by M. Ludwig Schlesinger.—On certain first integrals of some dynamical equations in two variables; application to a particular case of the problem of three bodies, by MM. J. Perchot and W. Ebert.—Researches of precision on the infra-red dispersion of quartz, by M. E. Carvallo. The dispersion was measured by means of a bolometer; the results differ appreciably from those of Mouton, but show a remarkably close agreement with figures calculated by means of an extrapolation formula of Mace de Lépinay, derived from observations in the visible spectrum and ultra-violet.—Influence of soft iron on the mean square of the difference of potential at the extremities of a bobbin traversed by a high-frequency current, by M. H. Pellat.—On the temperature of incandescent lamps, by M. P. Janet. The variation of the resistance of the lamp as a function of the difference of potential at the ends of the filament is measured, and also the variation in the resistance of a cooled lamp as a function of the time. From these, with the weight of the filament, the temperature can be deduced, assuming that the filament is composed of pure carbon. Four lamps gave concordant figures, namely 1610°, 1630°, 1620°, and 1720° C.—Some properties of kathodes placed in a powerful magnetic field, by M. André Broca. The experiments lead to the conclusion that there are two kinds of kathode rays, one of which rotates round the line of force of the magnetic field, and the other which follows this line of force.—Researches on nickel-steel. Variations of volume of irreversible alloys, by M. C. E. Guillaume.—Researches on the magnetic properties of nickel-steel, by M. Eugène Dumont. A determination, in absolute values, of the magnetic permeability of twelve samples of nickel steel containing from 26 to 44 per cent. of nickel, in fields varying from 14 to 50 C.G.S. units, and at temperatures between -78° and 250° C. The results are expressed graphically in three sets of curves.—Preparation of beryllium by electrolysis, by M. P. Lebeau. The pure metal is most conveniently obtained by the electrolysis of the fused double fluoride of sodium and beryllium by a current of six amperes, and potential difference of 35 to 40 volts.—Chemical estimation of carbon monoxide in the air, even in the smallest traces, by M. Maurice Nicloux. The method is based upon the fact that carbon monoxide is oxidised by iodic anhydride at 150°, giving carbonic acid and iodine, the latter, representing the carbonic oxide present, being measured by a colorimetric method.—On the dissociation of the carbides of barium and manganese, by MM. Gin and Leleux. These two carbides, at the highest temperatures of the electric furnace, behave similarly to calcium carbide; not being volatile, but dissociated into the metal and carbon.—Researches on the explosion of mixtures containing marsh gas by electric currents, by MM. H. Couriot and J. Meunier. There is no danger of explosion of mixtures of air and methane, by wires raised to incandescence by an electric current. It is only when the wire melts, and a spark passes, that an explosion is determined.—On the preparation and etherification of asymmetrical dimethylsuccinic acid, by M. E. E.

Blaise.—On the synthetical isoborneols, their identity with fenoilic alcohols, by MM. G. Bouchardat and J. Lafont.—On the partial decomposition of chloroform in the organism, by MM. A. Desgrez and M. Nicloux. A reply to the criticism of M. de Saint-Martin. Normal blood gives on analysis a small proportion of carbon monoxide. This amount is notably increased in the blood of animals under chloroform.—A true mucin produced by a fluorescent pathogenic bacillus, by M. Ch. Lepierre.—Action of the bacterium of sorbose upon polyhydric alcohols, by M. Gabriel Bertrand. Alcohols show very different behaviour when treated with the sorbose bacillus; some, such as glycol, xylite and dulcitol, resisting the oxidising action completely; others, glycerine, sorbite, mannite, being readily oxidised to ketones.—Influence of the medium upon variations in the Protozoa, by M. J. Kunstler.—The larva of the sponges and homologation of the leaflets, by M. Yves Delage.—On a new type of Copepod, by M. Jules Bonnier. The new type, to which the name *Pionodesmotes phormosomæ* is given, was found by the Prince of Monaco in one of the scientific voyages of the *Princess Alice*.—On a cereal of the Soudan, by M. Dybowski.—A prehistoric station at Mount Huberville, near Valognes, by M. Le Nordez.

DIARY OF SOCIETIES.

THURSDAY, MARCH 17.

ROYAL SOCIETY, at 4.30.—The Croonian Lecture will be delivered by Prof. Wilhelm Pfeffer, For. Mem. R.S. On the Nature and Significance of Functional Metabolism (Betriebs-stoffwechsels) in the Plant.

ROYAL INSTITUTION, at 3.—Magnetism and Diamagnetism: Prof. J. A. Fleming, F.R.S.

LINNEAN SOCIETY, at 8.—Natural Selection the Cause of Mimetic Resemblance and Common Warning Colours: Prof. E. B. Poulton, F.R.S.—On the Brain of the Edentata, including Chlamyphorus: Dr. Elliott Smith.—On *Linnocarpus*, a New Genus of Fossil Plants from the Tertiary Deposits of Hampshire: Clement Reid.

CHEMICAL SOCIETY, at 8.—The Reduction of Bromic Acid and the Law of Mass Action: Winifred Judson and Dr. J. Wallace Walker.—The Action of Ferric Chloride on the Ethereal Salts of Ketone Acids:—Dr. R. S. Morell and Dr. J. M. Crofts.—Note on the Volatility of Sulphur: T. C. Porter.—Action of Ammonia and Substituted Ammonias on Acetylurethane: Dr. George Young and Ernest Clark.—Cannabinol: T. B. Wood, W. T. N. Spivey, and Dr. T. H. Easterfield.—Formation of Oxytriazoles from Semicarbazides: Dr. G. Young, and B. M. Stockwell.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Sixth "James Forrest" Lecture, Geology in Relation to Engineering: Prof. W. Boyd Dawkins, F.R.S.

CAMERA CLUB, at 8.15.—Some Recent Animal Photographs: Gambier Bolton.

FRIDAY, MARCH 18.

ROYAL INSTITUTION, at 9.—The Bringing of Water to Birmingham from the Welsh Mountains: J. Mansergh.

MONDAY, MARCH 21.

SOCIETY OF ARTS, at 8.—The Thermo-Chemistry of the Bessemer Process. Prof. W. N. Hartley, F.R.S.

VICTORIA INSTITUTE.—A New Babylonian Story of the Flood: Theo. G. Pinches.

CAMERA CLUB, at 5.30.—Annual General Meeting—At 8.30.—Travels in Kashmir and Little Tibet: Dr. Arthur Neve.

TUESDAY, MARCH 22.

ROYAL INSTITUTION, at 3.—The Simplest Living Things: Prof. E. Ray Lankester, F.R.S.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Calcium Carbide and Acetylene: Henry Fowler.—Extraordinary Floods in Southern India: their Causes, and Destructive Effects on Railway Works: E. W. Stoney.

ROYAL HORTICULTURAL SOCIETY.—Horticultural Soils.

ROYAL PHOTOGRAPHIC SOCIETY, at 8.—The Gum Bichromate Process: Robert Demachy.

WEDNESDAY, MARCH 23.

SOCIETY OF ARTS, at 8.—The Preparation of Meat Extracts: C. R. Valentine.

GEOLOGICAL SOCIETY, at 8.—The Eocene Deposits of Devon: Clement Reid.—On an Outlier of Cenomanian and Turonian near Honiton, with a Note on *Holaster altus*, Ag.: A. J. Jukes-Browne.—Cone-in-Cone: Additional Facts from various Countries: W. S. Gresley.

THURSDAY, MARCH 24.

ROYAL SOCIETY, at 4.30.—The Bakerian Lecture will be delivered by Dr. W. J. Russell, F.R.S. Subject: Further Experiments on the Action exerted by certain Metals and other Bodies on a Photographic Plate.

ROYAL INSTITUTION, at 3.—Recent Researches in Electricity and Magnetism: Prof. J. A. Fleming, F.R.S.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Cost of Generation and Distribution of Electrical Energy: R. Hammond.

CAMERA CLUB, at 8.15.—Photographic Engraving in Intaglio: Colonel Waterhouse.

FRIDAY, MARCH 25.

PHYSICAL SOCIETY, at 5.—On the Circulation of the Residual Gaseous Matter in a Crookes' Tube: A. A. Campbell Swinton.—On some Improvements in the Roberts-Austen Recording Pyrometer, and Notes on Thermo-electric Pyrometers: A. Stansfield.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Internal Governor Friction: H. O. Eurich.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

BOOKS.—Évolution Individuelle et Hérité: F. Le Dantec (Paris, Alcan).—Ethnological Studies among the North-West Central Queensland Aborigines: W. E. Roth (Brisbane, Gregory).—Exploration of the Air by means of Kites (Cambridge, Mass., Wilson).—Queen's College, Galway, Calendar for 1897-98 (Dublin, Ponsobny).—Prospecting for Minerals: S. H. Cox (Griffin).—Lehrbuch der Algebra: Prof. H. Weber, Zweite Auflage, Erster Band (Braunschweig, Vieweg).—The Collected Mathematical Papers of Arthur Cayley. Supplementary Volume containing Titles of Papers and Index (Cambridge University Press).—Araneae Hungariae: C. Chyzer and L. Kulczynski, Tome 1 and 2 (2 parts) (Budapestini).—Audubon and his Journals: M. R. Audubon, 2 Vols. (Nimmo).—The Smithsonian Institution, 1846-1896. The History of its First Half-Century: edited by G. Browne Goode (Washington).—Smithsonian Institution. Revision of the Orthopteran Group Melanopli (Acridiidae): S. H. Scudder (Washington).

PAMPHLETS.—Field Columbian Museum. Annual Report of the Director to the Board of Trustees for the Year 1896-97 (Chicago).—Ditto. List of Fishes and Reptiles obtained by Field Columbian Museum East African Expedition to Somali-Land in 1896: S. E. Meek and D. G. Elliot (Chicago).

SERIALS.—Knowledge, March (Heftorn).—Botanische Jahrbücher, Fünfundzwanzigster Band, 1 and 2 (Leipzig).—Strand Magazine, March (Newnes).—Engineering Magazine, March (222 Strand).—Rendiconto delle Sessioni della R. Accademia delle Scienze dell' Istituto di Bologna, 1895-96: Ditto, Nuova Serie, Vol. 1, Fasc. 1 to 4 (Bologna).—Katalog der Bibliothek der K. Leopoldinische-Carolinischen Deutschen Akademie der Naturforscher, Achte Liefg., Band ii 5 (Halle).—Journal of the Institution of Electrical Engineers, March (Spon).—Science Abstracts, January (Taylor).—Bulletin of the Liverpool Museums, February (Liverpool).

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