

regard to the theory.—On the motion of the satellites of the planets with respect to the sun, by P. Stroobant. The author points out that the moon alone, among all the satellites, always turns the concavity of its orbit towards the sun. This concavity is less at new than at full moon, but the attraction of the sun always outweighs that exerted by the earth. The author investigates theoretically the motions of the satellites round the sun, and introduces the attractions of their planets as perturbations. In order that the trajectory may be looped, the linear velocity of the satellite must be superior to that of the planet. The satellites I., II. and the new one of Jupiter, and Mimas, Enceladus, Tethys, and Dione of Saturn are the only satellites with looped orbits. The rest of the satellites follow a sinuous curve with points of inflexion. Those of Uranus are not taken into consideration. The author expects that if the moon is considered as revolving round the sun, subject to perturbations due to the earth, the lunar theory will be simplified, and successive approximations will be more convergent.

Bulletin de la Société d'Anthropologie de Paris, tome v. (4^e série), No. 3, March 1894; No. 4, April 1894.—Meeting of February 1, 1894.—Dr. P. Maclaure and M. Bois contributed a note on Ectrodactyly and Syndactyly, in which they describe a very remarkable case, where the right foot and both hands have the appearance of a two-pronged fork. The authors had the opportunity of dissecting this subject, and give a most interesting account of the anatomy.—M. Paul Denjoy described a religious ceremony in Annam, celebrated at the commencement of the new year in honour of ancestors.—M. Ch. Letourneau read a paper on synthetic literature of the first ages, and M. F. Gaillard contributed a note on the sculptures of Gavr Inis.—On February 15, M. E. d'Acy made a communication on flint implements from the plateaus of Picardy and Normandy.—At the meeting of March 1, M. L. Lapique exhibited some photographs of the inhabitants of the Mergui Islands (the Selungs), and made some anthropological and ethnographical observations on those people. The Mergui archipelago is situated off the coast of Tennasserim (long. 96° 20' E.; lat. 13° to 9° N.). It is composed of lofty islands covered with ancient forests. The islands themselves may be said to be uninhabited, but in the straits and roadsteads of the Archipelago are to be found several tribes of nomadic fishermen who live entirely on their boats, except during the wet season, from May to September, when they come ashore and build temporary habitations for themselves on the coast. They are very wild, and hold little communication with the people on the mainland. The people seem to be of Malay origin, but there is evidently a considerable admixture of foreign blood of various kinds.—On March 15, M. G. Lagneau read a paper on the mortality from tuberculosis as affected by occupation and by residence.—M. O. Lambert offered some observations with regard to a recently observed case of the presternal muscle, in which he contended that the names *rectus thoracis* and *sternalis brutorum* as applied to this muscle are misleading, and that it ought to be regarded as a survival of a connection that once existed between the panniculi of the abdomen and of the neck.—Dr. Michaut contributed an account of the prehensile foot among the Japanese and Annamites.—M. A. Ponchon gave an account of the caves of Herleville, Canton of Chaules (Somme); and M. Octave Vauvillé read a paper on the enclosures, dwellings, and common pottery of the Gallic epoch. The conclusions at which M. Vauvillé arrives are (1) that the same forms of pottery were in use at the same time in different parts of the country; (2) that the pottery, at the close of the Gallic epoch, was generally made with a wheel; and (3) that it is evident that true art: existed amongst the potters of that period.

L'Anthropologie, tome v. No. 3, May-June 1894.—In an article on the inauguration of anthropology and human anatomy at the Jardin des Plantes, M. E.-T. Hamy gives a most interesting account of the work of Marin Coreau de la Chambre and Pierre Dionis, who lectured there during the years 1635-1680. Dr. R. Collignon contributes an anthropological study of the Basque race, in the form of a summary of a work published *in extenso* in the "Memoirs of the Anthropological Society of Paris." M. Salomon Reinach continues his exposition of sculpture in Europe anterior to Greco-Roman influences.

Tome v. No. 4, July-August, 1894.—This number opens with an interesting article, by Antony Jully, on funeral rites, graves, and honours paid to the dead in Madagascar. The worship of the dead is greatly developed in the different tribes that people

the isle of Madagascar, and the ceremonies connected with it and the monuments that result from it are distinctive characters of that race, composed though it is in all probability of heterogeneous elements. The dead is honoured, not because his memory is dear to his relations, but because they fear to rouse his anger by neglect, and so to suffer from his vengeance. Careful attention is paid to the orientation of the graves, which are placed to the north-east of the house and in close proximity to it.—In a short paper on the remains of Elk and Lion, found in a prehistoric station at Saint Martory (Haute-Garonne), the author explains the reasons that have induced him to include these animals, together with the reindeer, in his list.—In an article on Mycenaean Crete, M. Salomon Reinach gives an account of the important discoveries lately made in that island by Mr. Arthur Evans.—M. Eugene Toulouze describes the discovery of an interment of the neolithic period at the village of Saint Mammès (Seine et Marne). The sepulchral chamber measures 1.75m. in length by 0.90m. in width, and it is bounded by walls constructed of comparatively small stones. A vase, a polished axe, an arrow-head, and three other worked flints were found associated with the human remains, which were much damaged.—Prehistoric crania of Patagonia form the subject of a valuable article by Dr. R. Verneau. According to M. Moreno, it is possible to distinguish five or six distinct types amongst the known skulls of the ancient inhabitants of Patagonia. Dr. Verneau shows that all the crania have certain characters in common, such as great capacity, prominent glabella and superciliary ridges, sub-nasal prognathism, extroversion of the mandibular angles, large chin, and much-worn teeth.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 21.—"On Some Phenomena in Vacuum-tubes." By Sir David Salomons, Bart.

This paper deals with the phenomenon known as striæ, or bands, in vacuum tubes.

As far as the author could learn from the sources of information available to him, no one had previously discovered how to produce a predetermined number of bright and dark bands in a tube having an open or free path.

After a prolonged investigation he has succeeded in producing this result, and in the present paper he describes, first, the methods by which a definite number of bright and dark bands can be produced in a vacuum-tube; and, secondly, a number of interesting phenomena which have a bearing on the production of the bands in general.

Some of the conclusions drawn from the experiments are:—

That bands may be produced with greater facility in small tubes than in large, and that they become more accentuated probably on account of the inequality of the diameter of such tubes.

That for the production of bands, the glass of the tube itself appears to play a part, since the bands are difficult to produce unless they reach to the glass of the tube.

That an exceedingly minute current produces bands which to the eye, in most instances, disappear when the current is somewhat increased, and on further increasing the current they become visible again. The author believes that in all previous investigations it has been stated that the bands cannot be produced until a considerable current is passed. He refers to investigations by Messrs. Warren de la Rue, Gassiot, and others. His experiments, however, prove the contrary. The probable reason why these statements were made is due to the fact that with the apparatus employed at that time such small currents could not be easily produced. When the minute current is increased, and the bands seem to disappear, the author thinks this is due to an optical illusion; the bands are there, but too faint to be seen, perhaps in consequence of the dark bands being so narrow that they escape observation.

That, when an electric discharge takes place in a large tube in which is placed a partition pierced with a hole, "a forcing effect" frequently appears to be produced. Any bright bands being produced at the hole in the partition may give the appearance of being pushed through to the side of the tube which has the greater length. This phenomenon is mentioned because it is apt to mask many effects, unless the current is suitably adjusted.

That it is not impossible, after the first trace of light becomes visible in a tube when passing a very minute current, that the

dark bands subsequent to this stage are illusory, and that they are really the bright bands; and what appear to be the bright bands consist of overlaps which produce double the brightness of the so-called dark bands. In reality, therefore, the bright bands indicate the position of the dark bands.

That by devices bands can be produced in a large tube occupying only a small portion of the cross sectional area, at any rate so far as the eye can discern.

That, when employing Prof. Crookes' tubes for illustrating experiments on radiant matter, if suitable conditions are observed, striæ are formed in these tubes.

That in tubes having exceedingly small electrodes, and apparently not capable of producing striæ, these can be shown to exist if very minute currents are employed.

That the tube, when made to act as a condenser, permits more current to pass.

That from the above considerations it is not unlikely that a view, which has been held, in regard to the probable origin of the bands, that they consist of a series of discharges through the tube, is true; that the nature of such discharge can be varied by suitable devices placed within the tubes, and that the examination of the nature of the discharge can be best made with very minute currents, that is to say, currents so small that, if made any less, the tube would no longer show any sign of light.

"The Asymmetrical Probability-Cure." By Dr. F. V. Edgeworth.

"On the Absorption Spectra of Dilute Solutions." By Thos. Ewan.

In order to measure the extinction coefficients of very dilute solutions, a new spectro-photometer was devised, in which a Lummer and Brodhun photometric prism was used, and the photometric measurements made by means of Abney's rotating sector.

The absorption spectra of dilute solutions of cupric sulphate, chloride, bromide, and nitrate were found to be identical. Solutions of cupric acetate absorb, for the same amount of copper, more light than those of the other salts used. The difference tends to disappear as the solutions become more dilute, and it is increased by the addition of acetic acid.

Measurements of the absorption spectra of a series of solutions of dinitrophenol in pure water were made, from which the amounts of the substance dissociated into ions were calculated, and found to be in very satisfactory agreement with those calculated from the electrical conductivity of the solutions.

The ferric hydroxide formed by the hydrolysis of ferric chloride in aqueous solutions containing less than 0.005 gramme molecules of FeCl_3 per litre, was found to contain no chlorine. The hydrolysis may therefore be represented most simply by the equation $\text{FeCl}_3 + 3\text{H}_2\text{O} \rightleftharpoons \text{Fe}(\text{OH})_3 + 3\text{HCl}$. The determinations of the quantity of colloid ferric hydroxide contained in these solutions (made partly by the spectro-photometer, partly by filtration through porous earthenware) showed that the equilibrium does not take place in accordance with the law of Guldberg and Waage, but agrees much better with the modified form of the law due to Arrhenius, in which account is taken of the electrolytic dissociation of the different substances.

PARIS.

Academy of Sciences, September 3.—M. Lœwy in the chair.—The marine laboratory of the museum at Tatihou I., near Saint-Vaast-la-Hougue (Manche), by M. Edmond Perrier. A description is given of the laboratory fittings and arrangements, and the work enabled to be done by its means.—On two methods for the study of currents in open circuits and of displacement currents in dielectrics and electrolytes. An abstract of a memoir given by the author, M. de Nicolăieff. Discs or rings of dielectrics are, in the first method, supported by bifilar suspension between the two poles of an electromagnet so that the plane of the ring is at 45° to the axis of the electromagnet, and centrally situated between the poles. The difference in the displacements caused in constant and alternating fields of the same strength is due to a secondary field set up by displacement currents caused in alternating fields. Paraffin shows an augmentation of 12 per cent. for a period of 930 per minute, and 9 per cent. for 770 per minute. In the second method, displacement currents in the rings are caused by the iron in the magnet cores. The ring is suspended perpendicular to the axis of the cores; the polar faces are able to be brought nearer to or removed farther from the parallel faces of the ring. By this method, augmentations have been obtained of 15 per cent. for

yellow wax, and 8.3 per cent. for paraffin. Electrolytes in annular glass tubes behave just like perfect dielectrics, sulphuric acid giving an augmentation of deviation of 15 per cent.—Assimilability of potash by the action of nitrates in poor siliceous soils, by M. P. Pichard. It is shown that, in presence of nitrates, a part of the potash combined with silica is capable of being assimilated by various plants, and hence that it is necessary to determine the total potash present in soils as well as that portion eliminated by acids or aqua regia when estimating the agricultural value of soils.—On the construction of the circle derived from seven right lines or defined by the equation $O = \Sigma_1^7 l_1 T_1^3 = X^2 + Y^2 - R^2$, by M. Paul Serret.—On a new gravimetric method for the estimation of glucose, by M. Fernand Gaud. Cuprous oxide is obtained in much the usual manner by reduction, but care is used to carry out the reduction below 100° by using a water-bath as source of heat. The reduced suboxide is then weighed by transferring the carefully-washed precipitate to a specific gravity bottle, and filling up with boiled water and weighing. The weight p of the precipitate is given by the formula

$$p = \frac{P - V_t d}{1 - \frac{d}{\Delta}}$$

where P is the weight of the water and precipitate, V_t is the volume of the flask at the temperature of experiment t , d is the specific gravity of water at the same temperature, and Δ is the specific gravity of dry cuprous oxide 5.881. The quantities of glucose corresponding to given amounts of cuprous oxide are as follows:—10 mg. of $\text{Cu}_2\text{O} = 5.413$ mg. of glucose; 20 = 9.761; 30 = 14.197; 50 = 23.036; 100 = 46.221; 200 = 91.047; 300 = 138.842; 400 = 188.928.—Phenomena following from the dialysis of the cells of the beer ferment, by M. E. Onimus. Yeast secretes a dialysable substance which inverts the sugar present before new cells are produced. The medium is modified by the zymase, and then only becomes able to support the production of new cells.—On the Constantinople earthquake of July 10, 1894, by M. D. Eginitis. The method of Dutton and Hayden gives the focus at a depth of 34 km. The speed with which the shock travelled to various places is as follows:—Paris, 3 km.; Pavlovsk, 3.5 km.; and Bucharest, 3.6 km. per second.

BERLIN.

Physiological Society, July 6.—Prof. Munk, President, in the chair.—Dr. J. Munk had tested the results of his experiments on fasting man by further new experiments on dogs, with the special object of investigating the excretion of chlorine, phosphorus, lime and magnesia, which he had found to be increased in man during hunger. During ten days of fasting he found all four of the above substances, but especially phosphorus and lime, in largely increased quantities in the urine, as compared with days of normal dieting. The fæces also during hunger, which closely resembled meconium both in appearance and composition, contained an increased amount of phosphorus, lime, and magnesia. By calculating, from the amount of nitrogen excreted, the amount of body-proteid metabolised during hunger, he found that only a portion of the excreted phosphorus could have come from the proteid; the remainder must have resulted from the metabolism of some constituent of the body rich in phosphorus and lime. The ratio of these to each other corresponded to a metabolism of bone-substance amounting to about 39 grms. in ten days of hunger. Dr. Munk further reported on experiments on dogs, in which he at one time administered a given amount of meat all at once, and at another time the same amount of meat distributed over three meals. In the latter case the excretion of nitrogen in the urine was greater than in the former, indicating a less perfect utilising of the proteid. This result on dogs is, however, not applicable to man, in whose case the conditions are different, and in whom, as shown by Ranke's older experiments, a given amount of food is more completely utilised if taken in separate portions than if eaten all at once.—Dr. Engel gave an account of his observations on the blood-corpuscles of incubated hens'-eggs, leading to results essentially the same as those obtained from mammalian embryos. In birds the red and white corpuscles and platelets take their origin from nucleated red cells. These views were supported by photographs and microscopic preparations, which were, however, regarded by Dr. Benda as not excluding the possibility that the appearances they presented were purely artificial.

July 20.—Prof. du Bois Reymond, President, in the chair.—Mr. W. T. Porter, of Boston, spoke on spinal respiratory tracts, and gave an account of the following interesting experiments:—On unilateral section of the cord at the level of the nucleus of the phrenic, the movement of the diaphragm on the same side ceases or becomes very weak, whereas it continues unaltered on the other side. If now the phrenic nerve on the uninjured side be cut through, the diaphragm on this side becomes relaxed, while at the same time, on the other side with the unilateral section, the movements of the diaphragm begin again and are continued quite normally. Prof. Koenig had been able, in conjunction with Miss Koettgen, to investigate the absorption of light by visual-purple from a freshly extirpated human eye. A portion of the solution was examined in an unaltered condition, and the remainder after it had been converted into visual-yellow by the action of green light. The curves of the transmission of light for a solution of visual-purple were found to be identical with the luminosity curves of the totally colour-blind, and of bi- and tri-chromatic eyes where the intensity of light is so small that colours cannot be perceived. The curve for a solution of visual-yellow was the same as the luminosity curve of a red-green colour-blind eye. From the above, Prof. Koenig deduced the probability that visual-purple serves for the perception of undefined colourless grey, while visual-yellow serves for the perception of blue. Since both visual-purple and, hence also, visual-yellow are absent from the fovea centralis, this part of the retina should be colour-blind for blue. The speaker brought forward a series of facts in support of this view, and a discussion followed.

July 27.—Prof. du Bois Reymond, President, in the chair.—Prof. Koenig first spoke about an "experimentum crucis" as to his theory of the significance of visual-purple which had been suggested during the discussion at the end of the last meeting, and declared it to be irrelevant. Dr. Greef described the neuroglia cells of the retina and chiasma of the optic nerve as prepared by Golgi's method, and which were called spider-cells, owing to their small elongated bodies and long slender processes. A comparison of these cells in different classes of vertebrate animals had shown that they are most numerous in man, and possess the longest and slenderest processes, while they are less numerous and have shorter and thicker processes the lower one goes in the vertebrate scale. The function of the cells appears to be to isolate the individual nerve-fibres. Prof. Kossel had further investigated the products of the decomposition of nucleic acid, and obtained a much simpler chemical composition for thymine, based on its elementary analysis, than in his previous researches. He had also discovered a new base, which he called "cytosin," and whose reactions he described in detail. Prof. Kossel further described a new and simpler method for determining urea in urine, consisting in a modification of Bunsen's well-known method, and which had proved itself trustworthy as applied to solutions of urea of known composition. Dr. Krüger had isolated a new base of the xanthin group from human urine, which, while it differed materially in its reactions from the xanthin bodies, but showed much resemblance to guanin, he had named epiguanin. Dr. Lilienfeld gave an account of his further researches on diglycocollamide esters. By combining diglycocollamide with leucic acid, as also with tyrosinic and asparaginic acids, he obtained various substances which all gave proteid reactions. One of the compounds so closely resembled ordinary peptone, both in appearance and in all its reactions, that he had provisionally given it the name of synthesised peptone. He reserves for himself the further investigation of this interesting group of synthetic products.

NEW SOUTH WALES.

Linnean Society, July 25.—Prof. David, President, in the chair.—The following papers were read:—(1) Observations on the femoral gland of *Ornithorhynchus* and its secretions, together with an experimental inquiry concerning its toxic action, by C. J. Martin and F. Tidswell. The gland is a compound racemous variety with large alveoli possessing a wide lumen, and somewhat recalling the appearance of a mammary gland. The alveoli communicate with ducts which eventually join at the hilus of the gland to form the duct leading to the spur. The gland is surrounded by a capsule of fibrous tissue, exterior to which is a thin layer of smooth muscle fibres. A marked difference in the minute structure of the gland was noted in animals killed in June and those in April respectively, the former showing the appearance characteristic

of an actively secreting gland, whereas the latter suggested that of a mammary gland when it had undergone retrogressive morphosis. Examination of the poison showed it to consist principally of albuminous bodies, and the introduction of these into rabbits produced very marked poisonous results. When injected under the skin, local swelling, and great general depression and rise of temperature followed, but in three days the animal was well again. When the poison was introduced directly into the vascular system, small quantities ($\frac{1}{3}$ grain) caused death in under half an hour. Larger doses so introduced produced almost immediate death, by producing nearly universal clotting of the blood whilst travelling in the blood-vessels. Such clotting naturally soon put an end to all circulation. In summing up, the authors compared the action of *Platytypus* poison with that of the venom of Australian snakes, supposing the latter to be diluted 5000 times.—Notes on Australian "ship-worms," by C. Hedley. A large species of "shipworm" or "cobra" from South Australia, perhaps the largest yet discovered, was described and figured under the title of *Terebrato edax*. The type of *T. antarctica*, Hutton, from New Zealand was also figured to demonstrate that the supposed recognition of this species from the coast of Queensland was erroneous.—On five interesting shields from Northern Queensland, by R. Etheridge, jun.—Additional notes on the Palæontology of Queensland. Part i. Palæozoic, by the same.

BOOKS and SERIALS RECEIVED.

Books.—The Works of Hertz and some of his Successors: Prof. O. Lodge (*Electrician Co., Ltd.*).—Glasgow and West of Scotland Technical College Calendar, 1894-95 (Glasgow, Anderson).—Catalogue of the Michigan Mining School, 1891-94: Announcements, 1895-96 (Houghton, Michigan).—Trattato di Materia Medica: Prof. P. Giacosa (Torino, Bocca).—Fonds and Rock Pools: H. Scherren (Religious Tract Society).—Heat treated Experimentally: L. Cumming (Longmans).—Theoretical Mechanics; Solids: A. Thornton (Longmans).
SERIALS.—Geological Magazine, September (K. Pau!).—Publications of the Astronomical Society of the Pacific, Vol. 6, No. 35 (San Francisco).—American Meteorological Journal, September (Ginn).—Engineering Magazine, September (Tucker).—Tufts College Studies, No. 2 (Tufts College, Massachusetts).—Brain, Part 67 (Macmillan).—Medical Magazine, September (Southwood).—Science Progress, September (Scientific Press).—American Journal of Science, September (New Haven).—Bulletin de l'Académie Impériale des Sciences de St. Petersburg, nouvelle série iv., Nos. 1 and 2 (St. Petersburg).

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