

ou d'un centimètre cube pour que l'animal supporte sa maladie même sans grande élévation de température et presque sans aucune réaction à l'endroit de l'infection." So writes Dr. Smirnow; and, indeed, the experiments which he cites with this antitoxin fully justify this favourable verdict. Still more recently it has been employed on dogs, which of all animals are perhaps the most susceptible to diphtheria poison; this being proved by the difficulty which is experienced in immunising them for the production of curative serum. Dr. Smirnow states that a dog weighing from eighteen to twenty pounds, inoculated subcutaneously with 0.5 c.c. of virulent diphtheria broth cultures, usually dies in two or two and a half days after it has been infected. The protective treatment of a purposely infected dog was commenced one day after inoculation, and from 3 to 5 c.c. of the electrolytic antitoxin sufficed to save the animal's life. This quantity Dr. Smirnow thinks might probably be lessened, and yet not interfere with its remedial action. For the technical details of the methods recommended by Dr. Smirnow for the production of this artificial antitoxin, we must refer the reader to the original memoir, to be found in vol. iv. No. 5, 1896, of the Petersburg *Archives* already mentioned. It would appear that in itself the antitoxin is quite harmless, for ordinary guinea-pigs can stand with impunity a dose ten times and more as strong as that required for remedial purposes. As regards the effective quantity for injection, it appears that in the initial stages of the disease there is no difference in the amount required of the serum and Smirnow-antitoxin respectively; but as the disease progresses, whilst yielding to reduced doses of the artificial antitoxin, it will not to similarly reduced doses of antitoxic serum. Its preparation is incomparably simpler, and with a good supply of toxic diphtheria broth in hand, the antitoxin can be produced in a day, whilst, involving far less expense, it can be supplied at a much more reasonable rate. Dr. Smirnow has at least shown that the preparation of a specific remedy against diphtheria is not the exclusive monopoly of the animal organism, but can be elaborated artificially without the assistance of living mechanism. The author is to be congratulated upon the highly successful results which he has so far achieved; and if the therapeutic value of this electrolytic antitoxin is shown to be as great for man as it has undoubtedly proved itself to be for animals, then indeed Dr. Smirnow has made a distinct and important step forward in the domain of preventive medicine.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE following are among recent appointments:—Dr. Vélain to occupy the chair of physical geography recently founded in the Paris University; Mr. H. M. Paul and Mr. G. A. Hill to be professors of mathematics in the U.S. Navy.

THE Spanish Universities and other educational institutions under State control have just been thrown open to foreigners by Royal decree. By the new ordinance foreigners are admitted to the right of matriculation, study, and examination in all educational establishments under the Spanish Government, and are entitled to take degrees in the Universities.

IT is reported (says *Science*) that the subsidy given by the state to the University of California will be doubled, being hereafter 240,000 dols. annually. Mr. Levi Strauss, of San Francisco, has endowed twenty-eight undergraduate scholarships in the University, and seven graduate scholarships, of the value of 250 dols., have been endowed by other donors. The number of students in the University has increased from 918 in 1891-2 to 2250 in the present year. It is again stated that the University will receive gifts amounting to 5,000,000 dols. for buildings, of which sum 1,200,000 dols. is promised by Mrs. Hearst, of San Francisco. Chicago University has received a gift of 225,000 dols. from Mrs. Mary Esther Reynolds, in fulfilment of a pledge made nearly five years ago.

SCIENTIFIC SERIALS.

Symons's Monthly Meteorological Magazine, April.—The first daily weather map. In September 1895, Mr. Symons issued a photographic reproduction of the first daily weather map ever published, and promised to give its history, after making further inquiries. In 1849 the proprietors of the *Daily News* decided

upon publishing reports of wind and weather. The organisation was entrusted to Mr. Glaisher, who travelled over the country, and, with the co-operation of the railway and electric telegraph companies, erected instruments and instructed the clerks in their use. The issue of the above journal for June 14, 1849, contained the earliest known telegraphic weather report. During the Exhibition of 1851, the Secretary of the Society of Arts decided upon issuing the information collected by the Electric Telegraph Company in the form of a daily weather map, the first of which appeared on August 8, 1851.—Scientific kite work in the Arctic regions. In a foot-note to Dr. Harvey's article on meteorology, in the *Encyclopedia Metropolitana*, there is a description of an experiment made by the Rev. G. Fisher and Captain Sir E. Parry, at the island of Igloodik, in lat. 69° 21' N. and long. 81° 42' W. during the winter 1822-23. The height observed was 379 feet, and the temperature recorded was -24°, there being no variation in the temperature between that altitude and the surface of the earth, although the thermometer was capable of indicating the smallest change.

SOCIETIES AND ACADEMIES.

LONDON.

Linnean Society, April 1.—Dr. A. Günther, F.R.S., President, in the chair.—Mr. Miller Christy exhibited three royal state cloaks formerly worn by the kings of the Hawaiian Islands, and made of the feathers of four species of birds, of which the exhibitor gave an account, referring to the coloured figures of them given in Mr. Scott Wilson's "Birds of Hawaii," namely, *Vestiaria coccinea* (red), *Psittacirostra psittacea* (green), *Acroloccercus nobilis*, and *Drepanis pacifica* (black and yellow). The last-named, of which no specimen is to be found in the National Collection, was believed to be now extinct.—Mr. W. T. Thiselton-Dyer exhibited: (1) A series of drawings (on the screen) to illustrate the "Cultural Evolution of *Cyclamen latifolium*, Sibth." The species is a native of Greece and the Levant, and is believed to have been first introduced into European cultivation in 1731. In 1768 Miller described a form modified by cultivation, under the name of *Cyclamen persicum*. This was erroneous, as, according to Boissier, neither the wild nor the garden form occur in Persia. The latter persisted in cultivation for about 150 years, and about 1860 became the starting-point of the modern races which were illustrated. *Cyclamen latifolium* has never been hybridised, and it was shown that the striking forms now in cultivation were the result of the patient accumulation of gradual variations. Drawings of the remarkable forms, "Papilio," obtained by de Langhe-Vervaeke, and of the "Bush-Hill Pioneer," by Messrs. Hugh Low and Co., were shown. It was pointed out that the tendency of the species under cultivation was to lose its distinctive generic characters, and to approximate to a more generalised type. The reflexion of the corolla-segments was often lost, as in *Lysimachia*; the segments were sometimes multiplied, as in *Trientalis*; and the margins were fringed, as in *Soldanella* and cultivated forms of *Primula sinensis*. The "Bush-Hill Pioneer" possessed, in the creasing of the petals, a remarkable character, without parallel in any primulaceous plant occurring in a wild state. (2) A series of plants was exhibited to illustrate the origin of the garden "Cineraria." It was generally agreed that this had sprung from one or more species native of the Canaries. An extreme cultivated form was shown, and compared with *Senecio cruentus*, which all internal evidence indicated as the sole original stock. *S. Heritieri*, another reputed parent, was exhibited. But it was pointed out that this has a shrubby habit and stems markedly zigzag between the internodes, while the leaves are clothed beneath with a dense white tomentum. These characters it transmits, more or less, to its hybrid offspring. In illustration of this point, Mr. Poe's hybrid (*S. super-Heritieri* × *cruentus*) was exhibited (a similar one has occurred at Edinburgh); also the Cambridge hybrid (*S. super-cruentus* × *Heritieri*). *S. cruentus* crosses very freely with the garden Cineraria, and as the latter never exhibits any trace of the characters of *S. Heritieri*, it was concluded that that species had no part in its origin, and that, as in the case of the Cyclamen, the striking development of *S. cruentus* in cultivation was due to the continued accumulation of gradual variations.—Mr. A. W. Bennett exhibited a series of drawings, by Mr. E. B. Green, of root-hairs of plants with various parasitic growths, and showed

preparations of several under the microscope.—Mr. G. R. Murray exhibited several lantern-slides of coccophores and rhabdospheres, prepared from specimens collected by Captain Milner, of the ss. *Para*, while on a voyage to Barbados, including all the forms figured in the *Challenger* Report (see p. 510).—Mr. H. Groves exhibited a large number of *Characeae*, collected by Mr. T. B. Blow in various parts of Australasia and Asia, views of the localities referred to being shown on the screen by the collector.—Mr. George Masee, on behalf of Miss Helen B. Potter, communicated the substance of a paper on the germination of spores of *Agaricineae*.—A paper by Dr. A. J. Ewart, on the evolution of oxygen from coloured bacteria, was deferred for reading until May 6 next.

Entomological Society, April 7.—Mr. Roland Trimen, F.R.S., President, in the chair.—A memorandum of an association for the protection of insects in danger of extermination, which had been drawn up by a Committee appointed for the purpose and approved by the Council, was laid before the Society and signed generally by those present (see p. 588).—The draft of alterations and additions to the Society's bye-laws, recommended for adoption by the Council, was read for the first time.—Mr. McLachlan showed, on behalf of Mr. Gerald Strickland, a magnified photograph of *Brachycerus apterus*, obtained by direct enlargement in the camera, and extremely clear in definition and detail.—Mr. Tutt exhibited some of the silk used by *Tephrosia historta* to cover its ova, and discovered by Dr. Riding. It was contained in a pouch at the extremity of the abdomen in the form of dense bundles about 2 mm. long, and resembling in miniature locks of wavy flaxen hair. Hitherto all such coverings were supposed to consist of scales from the anal segment.—Papers were communicated by Prof. Miall, F.R.S., on the structure and life-history of *Linnobia replicata*, and by Messrs. Godman, F.R.S., and Salvin, F.R.S., on new species of Central and South American Rhopalocera.

Mathematical Society, April 8.—Prof. Elliott, F.R.S., President, in the chair.—The President made some appreciative remarks upon the late Prof. Sylvester, dwelling more especially upon the loss to the Society and to the mathematical world generally sustained by his death. He mentioned that he had been authorised by the Council to write a message of sympathy to the deceased Professor's nearest relative.—The Rev. F. H. Jackson read a paper on the extension of a certain theorem (connected with Gauss's hypergeometric series).—Mr. Macaulay gave a sketch of a note on the deformation of a closed polygon, so that a certain function remains constant.—Mr. Love communicated an abstract of a paper, by Prof. Sampson, entitled "A Continuation of Gauss's Dioptrische Untersuchungen."—The President communicated from the chair a paper, by Herr Sommerfeld, "Ueber verzweigte Potentiale im Raum." (The method of the paper is a generalisation of Lord Kelvin's theory of images, and there are in it some interesting applications to diffraction problems. The paper was presented at the instance of Prof. Klein, who would like to bring about a somewhat livelier connection between English and German mathematicians.)—Mr. S. Roberts, a past President of the Society, having taken the chair, Prof. Elliott communicated papers, by Mr. A. L. Dixon, on the potentials of rings, and by Mr. J. W. Russell, on certain concomitant determinants.—Mr. R. Hargreaves and Lieut.-Colonel Cunningham, R. E., made impromptu communications, the latter writing on the board the following high primes:—305, 175, 781; 466, 344, 409; 550, 554, 229; 632, 133, 361.

EDINBURGH.

Royal Society, April 5.—Prof. McKendrick, in the chair.—A paper by Lord Kelvin and Dr. Maclean, on the electric properties of fumes proceeding from flames and burning charcoal (p. 592).—The automorphic linear transformation of a quadric, by Dr. Muir.—On ethene prepared from ethyl-iodide, and on the properties of some mixtures of ethene and butene, by Prof. Kuenen.—Continuation of experiments on electric properties of uranium, by Lord Kelvin and others.—Prof. Tait, in a short communication on the relations among the quantities ρ , v , t , in a substance, discussed certain of Amagat's recent results in their bearing upon Van der Waal's theory. What at first sight seemed to be a remarkable concordance between this theory and the facts of experiment, proved on closer inquiry to be quite the reverse.—Dr. D. Fraser Harris gave a demonstration of the reducing power of the living animal tissues (cat and rabbit), made by injecting into left external jugular the gelatine

and Berlin-blue mixture used for blood-vascular injections. Injection commenced as soon as the animal ceased to breathe, and it was found that the liver most vigorously, and kidney next, reduced the ferric ferrocyanide in the blood-vessels to the pale-green or almost colourless ferrous ferrocyanide, which, on the organs being cut up and exposed to air, was reoxidised to the deep blue ferric salt. This reduction is the expression of the inspiratory phase of the internal respiration, and is a measure of the metabolic power of the living tissues.—In a second paper on hæmatoporphyria and its relations to the source of urobilin, Dr. Harris showed that urobilin—for which urochrome would be a better term, as connoting no particular source of the urinary pigment—cannot now be held to be derived from absorption of altered bile pigment in the intestines. It has a hepatic, but not a biliary origin, and in health is formed in the liver probably thus: Hæmatin is there decomposed with deposit of iron and a precursor of urobilin produced, probably the chromogen, which, on traversing the lungs, is oxidised to urobilin, and in the kidneys again partly reduced to chromogen, so that we find both urobilin and its chromogen in the urine. In hæmatoporphyria the urine is orange-coloured, and contains a less deoxidised pigment than urobilin, probably from depraved metabolism in muscular, cutaneous, and connective-tissue systems.—Dr. Albert A. Gray, Glasgow, in a paper on the perception of the direction and distance of sound, dealt, first, with some experiments on the degree of accuracy with which the direction of sound may be estimated. The question of how far the difference of phase with which a sound affects the two ears simultaneously may aid in judging its direction was considered, and Prof. Sylvanus Thompson's discoveries in this connection commented upon. The author described some experiments of his own upon the tympanic membrane, which showed that pressure of the chain of ossicles of one ear inwards caused the opposite ear to hear a sound more loudly. This peculiar fact was shown to be due, in all probability, to a reflex starting from the labyrinth of the first ear, and passing to the *tensor tympani* or *stapedius*, or (more probably) both these muscles of the opposite ear near which the sound was produced. Thus the muscular system of one ear is in connection with the opposite ear, and *vice versa*. As the positive phase of a sound-wave will relax the *tensor tympani*, and render the *stapedius* tense, and the negative phase will produce the reverse effect, it is evident that by means of the muscular sense we may be able to estimate the phase of a sound-wave in each ear, and by comparing both, be able to localise roughly the direction of the source of a sound.—Mr. A. Rankin read a note on the number of gales observed at Ben Nevis Observatory.

PARIS.

Academy of Sciences, April 12.—M. A. Chatin in the chair.—The election of M. Radau as a member in the Section of Astronomy, in the place of the late M. Tisserand, was approved by the President of the Republic.—On the observatory of Mount Etna, after observations of M. Riccò, by M. H. Faye. The observatory is situated about a kilometre from the central crater, at a height of 9650 feet. The chief difficulties have not been due to the eruptions of the volcano, but to the heavy snowfalls, which frequently attain a depth of from seven to sixteen feet at the observatory. The mean temperature for the year is $0^{\circ}.4$ C.—On the law of the discharge in air of electrified uranium, by M. Henri Becquerel. The loss of electricity by uranium appears to be solely effected by the gas in contact with the metal, since the losses sustained by a uranium ball in a vacuum are extremely small, and are of the order of the amounts which would leak through the supports. Reserving the effects of varying the gas for a future communication, the present paper contains the relations experimentally found to exist between the loss of potential and the time.—Further remarks on the classification of the Insemineæ, by M. Ph. van Tieghem.—Morphology of the sternum and clavicles, by M. Armand Sabatier. By a study of the sternum of the crocodile, new light is thrown upon the vexed question of the morphological signification of the sternal apparatus of vertebrates.—Interpretation of the parts of the anther, with special reference to the ovule in the genus *Lepidoceras*, by M. D. Clos.—Some remarks on two recent papers of M. van Tieghem.—Committees were nominated to act as judges for the prizes bearing the names of Philipeaux (experimental physiology), Montyon (unhealthy trades), Cuvier, Trémont, Gegner, Petit-d'Ormoy (mathematical sciences and natural sciences), Tchihatchef, Gaston Planté

Cahours, and Saintour.—Discussion of the barometric heights in the zone 10°—30° N, during 1883, by M. A. Poincaré.—An internal governor for an aerial boat, by M. F. Lacerer.—Photography of Koenig's flames, by M. Marage.—Experiments made on a new kathodic apparatus, by MM. Foveau de Courmelles and G. Seguy. The apparatus consists of two vacuum tubes joined to a spherical reservoir. The observations with this form show that the interior pressure in a vacuum tube is not equal at all points, this unequal distribution of the gas being produced during the passage of the current.—On the local attractions observed in Fergana, by M. Venukoff.—Heat of formation of formaldehyde, gaseous and dissolved, by M. Marcel Delépine.—On the formation of ammonium cyanide and its manufacture, by M. Denis Lance. Ammonia gas passed over carbon at a temperature of about 1000° C. always gives ammonium cyanide, the yield being greatest when the ammonia is mixed with a considerable proportion of nitrogen and hydrogen, and when the temperature is 1100° C.—Classification of the Orthoptera according to the characters drawn from their digestive apparatus, by M. L. Bordas.—Researches on the histology of the nerve cell, with some physiological considerations, by M. G. Marinisco.—On the physiological and pathological action of the X-rays, by M. Sorel. An account of the serious results following the application of the X-rays to the stomach. It is regarded as inadvisable, at least in certain subjects, to apply the X-rays in the neighbourhood of important organs, such as the stomach, heart, or lungs. It has been remarked that the body of an animal which has been dead for some time is always more opaque to the Röntgen rays than one just dead and still warm.—Remarks on the preceding note, by M. Lanne-longue.—On the toxicity of the alcohols, by M. Picaud. A study of the action of the alcohols upon fishes (*Carassius auratus*), batrachians (*Triton vulgaris*), and birds (*Carduelis elegans*). The toxic effect, as with the mammalia, was found to increase with the molecular weight.—Animal evolution, a function of the cooling of the globe, by M. R. Quinton.—Method of vaccination against poisoning by ricin, by M. Ch. Cornevin.—The destination of the megalithic monuments, by M. Ch. Godey.—A hydro-pneumatic motor, by M. G. Housset.—A horizontal barometer with rarefied air without the use of ice, by M. Victor Ducla.

DIARY OF SOCIETIES.

THURSDAY, APRIL 22.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Recent Developments in Electric Traction Appliances: A. K. Baylor. (Continuation of Discussion)

CAMERA CLUB, at 8.15.—Peeps into Nature's Secrets: R. Kearton.

SATURDAY, APRIL 24.

ROYAL BOTANIC SOCIETY, at 4.

TUESDAY, APRIL 27.

ROYAL INSTITUTION, at 3.—Volcanoes: Dr. Tempest Anderson.

SOCIETY OF ARTS, at 8.—Delft Ware: Dr. J. W. L. Glaisher, F.R.S.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Annual General Meeting.

ROYAL STATISTICAL SOCIETY, at 5.30.

ROYAL HORTICULTURAL SOCIETY, at 1.—Winter and Spring Bedding.

ROYAL PHOTOGRAPHIC SOCIETY.—Technical Meeting, at 8.—A Practical Demonstration of Glass-blowing at the Lamp: T. Bolas.

ROYAL VICTORIA HALL, at 8.30.—The Life of an Egg: Dr. W. B. Benham.

WEDNESDAY, APRIL 28.

SOCIETY OF ARTS, at 8.—Asbestos and Asbestic: with some Account of the Recent Discovery of the latter at Danville, in Lower Canada: Robert H. Jones.

GEOLOGICAL SOCIETY, at 8.—On the Origin of some of the Gneisses of Anglesey: Dr. Charles Callaway.—Note on a Portion of the Nubian Desert South-east of Korosko: Captain H. G. Lyons, R.E., Miss C. A. Raisin, and Miss E. Aston

BRITISH ASTRONOMICAL ASSOCIATION, at 5.

THURSDAY, APRIL 29.

ZOOLOGICAL SOCIETY, at 4.—Annual Meeting.

CHEMICAL SOCIETY, at 8.—Monochlorodiparacetic Acid and some Condensations: Dr. H. C. Myers.—On the Decomposition of Iron Pyrites: W. A. Caldecott.

CAMERA CLUB, at 8.15.—The Automatic Telephone: S. B. Apostoloff.

FRIDAY, APRIL 30.

ROYAL INSTITUTION, at 9.—Kathode Rays: Prof. J. J. Thomson, F.R.S.

EPIDEMIOLOGICAL SOCIETY, at 8.—Some Observations on the Infectivity of Diphtheria, and its Relation to School Closure: Dr. Louis Parkes.

SATURDAY, MAY 1.

ROYAL INSTITUTION, at 5.—Annual Meeting.

GEOLOGISTS' ASSOCIATION.—Excursion to Cookham. Leave Paddington 1.40 p.m.; arrive Cookham 2.30 p.m. Director: Ll. Treacher.

LONDON GEOLOGICAL FIELD CLASS.—Excursion to Leith Hill. Lower Greensand. Leave London Bridge, 2; arrive Holmwood, 3.17.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

BOOKS.—Le Four Électrique: H. Moissan (Paris, Steinheil).—Meteorology in Mysore, 1895: J. Cook (Bangalore).—A System of Medicine: edited by Dr. T. C. Ailbutt, Vol. 2 (Macmillan).—Farm and Garden Insects: Dr. W. Somerville (Macmillan).—Collected Contributions on Digestion and Diet: Sir W. Roberts, 2nd edition (Smith).—Das Studium der Technischen Chemie: Dr. P. Fischer (Braunschweig, Vieweg).—L'Optica delle Oscillazioni Elettriche: Prof. A. Righti (Bologna, N. Zanichelli).—Some Unrecognised Laws of Nature: I. Singer and L. H. Berens (Murray).—The Ancient Volcanoes of Great Britain: Sir. A. Geikie (Macmillan).—Aids to the Study of Bacteriology: T. H. Pearmain and C. G. Moor (Baillière).—Geology of North-East Durham: D. Woolacott (Sunderland, Hills).—Proceedings of the London Mathematical Society, Vol. xxvii. (Hodgson).—Contributions to the Science of Mythology: Prof. F. Max Müller, 2 Vols. (Longmans).—A Guide to the Fossil Invertebrates and Plants in the Department of Geology and Palaeontology in the British Museum (Natural History), S.W. (London).—The Law and Practice of Letters Patent for Inventors: Dr. L. Edmunds and Dr. T. M. Stevens, 2nd edition (Stevens).—With the Dutch in the East: Captain W. Cool, translated by E. J. Taylor (Luzac).—The Forcing Book: L. H. Bailey (Macmillan).—The Story of the Mine: C. H. Shinn (Gay).—Problems and Questions in Physics: C. P. Matthews and J. Shearer (Macmillan).—Experimental Morphology: Dr. C. B. Davenport, Part 1 (Macmillan).—Cytologische studien aus dem Bonner Botanischen Institut: E. Strasburger and others (Berlin, Borntraeger).—Recherches sur les Origines de l'Égypte: J. De Morgan (Paris, Leroux).

PAMPHLETS.—Comité International des Poids et Mesures, Procès-Verbaux des Séances de 1895 (Paris, Gauthier-Villars).—Comptes rendus des Séances de la Deuxième Conférence Générale des Poids et Mesures, 1895 (Paris, Gauthier-Villars).—A Protest against the Modern Development of Unmusical Tone: T. C. Lewis (Chiswick Press).—Criticism on Darwin's, Wallace's, and Hæckel's Evolution Theories (Hodgson).—First Annual Report of the New York Zoological Society (New York).

SERIALS.—Bulletin of the American Mathematical Society, March (New York).—Physical Review, Vol. iv. No. 5 (Macmillan).—Geographical Journal, April (Stanford).—Mind, April (Williams).—American Journal of Science, April (New Haven).—Notes from the Leyden Museum, October 1896 (Leiden, Brill).—Journal of the Royal Statistical Society, March (Stanford).—Engineering Magazine, April (Tucker).—Proceedings of the American Philosophical Society, November 1896 (Philadelphia).—Annals of the Astronomical Observatory of Harvard College, Vol. xl. Part 5; ditto, Vol. xxx. Part 4 (Cambridge, Mass.).—Journal of the Royal Horticultural Society, March (117 Victoria Street).

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