the more evident the needs of the Physical Department, which has been obliged to occupy temporarily parts of four different buildings. The Trustees, recognising this need, are now erecting a building for a physical laboratory. The new laboratory is to be a handsome building of red brick, trimmed with brown sandstone, and will occupy a fine site about a block from the other University buildings, on the corner of a quiet little street midway between the more important streets, which carry the bulk of the traffic of that region. It will therefore be as free from disturbance from the earth-vibrations as could be expected in a city.

The building will be 115 feet long by 70 feet broad, and will have four stories besides the basement. In the centre of the building, and below the basement, are several vaults for instruments requiring to be used at constant temperature, also a fire-proof vault for storage. In these vaults will be placed Prof. Rowland's dividing-engine, by which the diffraction-gratings are ruled, and the Rogers-Bond comparator, which has recently become the property of the University. In the basement will be rooms for the mechanical workshop, for furnaces, and for piers for instruments requiring great stability. The first floor will include the main lecture-room, which will accommodate 150 persons, and rooms for investigations by advanced students in heat and electricity. The second floor will contain mathematical lecture-rooms, studies for instructors, and a room for the mathematical and physical library of the University.

The elementary laboratory will be on the third floor, which will also have rooms for more advanced work. The fourth floor will contain rooms for special work in light.

There will be a tower on the south-east corner of the building, which will have two rooms above the fourth floor. The upper of these will be provided with telescope and dome, and will be a convenient observatory when great steadiness in the instruments is not required. There will be power in the building for driving the machinery in the workshop and for running the dynamo-machines. A large section of the building is to be made entirely free from iron. The sash-weights will be of lead, and the gas-pipes of brass. Brackets will be attached to the walls, on which galvanometers and cathetometers may be placed. In order to avoid the inconvenience of having piers go up through the lower rooms, and yet to secure steadiness, beams have been introduced into the floors, which reach from one wall to the other between the regular floor-beams, and do not touch the floor at any point. If, now, a table is made to rest on two of these beams, by making holes in the floor over them to admit the legs of the table, it is entirely undisturbed by any one walking over the floor, except by such motion as is transmitted to the walls. There will also be a small vertical shaft in the wall of the tower, running from top to bottom, in which a mercurial manometer may be set up.

The vaults for constant temperature have been built with double walls, so that a current of air may be drawn between them whenever desirable to prevent dampness. It is expected that the laboratory will be ready by October next.

The photographic map of the spectrum upon which Prof. Rowland has expended so much hard work during the past three years, is nearly ready for publication. The map is issued in a series of seven plates, covering the region from wave-length 3100 to 5790. Each plate is 3 feet long and 1 foot wide, and contains two strips of the spectrum, except Plate No. 2, which contains three. Most of the plates are on a scale three times that of Angström's map, and in definition are more than equal to any map yet published, at least to wave-length 5325. The 1474 line is widely double, as also are b_3 and b_4, while E may be recognised as double by the expert. In the region of the H line these photographs show even more than Lockyer's map of that region. Negatives have also been prepared down to and including the B group, and they may be made ready for publication, one of which shows eleven lines between the D lines. A scale of wave-lengths is printed on each plate, and in no case does the error due to displacement of the scale amount to one part in 50,000. The wave lengths of over 200 lines have been determined to within one part in 500,000, and these serve as reference lines to correct any small error in the adjustment of the scale. The great value of such a map lies not only in the fact that it gives greater detail and is more exact than any other map in existence, but that it actually represents the real appearance of the spectrum in giving the relative intensities and shading of groups of lines, so that they are readily recognisable. The photographs were taken with a concave grating 6 inches in diameter, and having a radius of curvature of 21½ feet, and the photographs were taken when the plate was placed directly opposite the grating; both the sensitive plate and grating being perpendicular to a line joining their centres, and placed at a distance apart equal to the radius of curvature of the grating, the slit being on the circumference of the circle, whose diameter is the distance between the grating and plate. With this arrangement, the spectrum is photographed normal for wave-lengths without the intervention of any telescopes or lens systems; and a suitable scale of equal parts applied to such a photograph at once gives relative wave-lengths.

Few persons have any idea of the perseverance and patience required to bring such a task to a successful issue. More than a year was devoted to preliminary experiments designed to discover the best mode of preparing the plates for the particular regions to be photographed. Hundreds of preparations were tested to find their influence on the sensitised plate, and the whole literature of photography was ransacked, and every method tested to the utmost, before the work of taking the negatives could begin.

The Rogers-Bond comparator, which has been already referred to as having been purchased by the University lately, is one of two instruments that were constructed in 1881 by Pratt and Whitney of Hartford, Conn. The general plan and requirements were made out by Prof. W. A. Rogers of Cambridge, and the drawings and details were worked out by Mr. George M. Bond, then a student at Stevens Institute. The comparator was designed for making exact comparisons of standards of length. The other similar comparator is owned by the Pratt and Whitney Manufacturing Company, and is used by them in testing and constructing their standard gauges.

The instrument consists essentially of two microscope-carriages, which slide on two parallel cylindrical steel ways between stops, which may be clamped at any point. A carriage entirely independent of the ways on which the microscopes slide supports the two bars to be compared, and is provided with means of accurate and rapid adjustment, by which the bars may be successively brought into position under the microscopes, and the lengths compared by the micrometers attached to the microscopes; or one microscope only need be used, and slid first against the stop at one end, and then against that at the other end. The instrument also affords great facility in determining fractions of a given length with any desired degree of precision. The instrument is one requiring the utmost skill in its construction, and it cost several thousand dollars to make it. A full account of this remarkable instrument is given in the *Proceedings* of the American Academy of Arts and Sciences for 1882-83.

K.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

THE Chancellor of St. Andrew's University (His Grace the Duke of Argyll) has given his sanction to a recent enactment of the University Court empowering the Senatus to admit to the Science Degrees of the University, students who may have received their education at University College, Dundee.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, December 17, 1885.—"A Preliminary Account of a Research into the Nature of the Venom of the Indian Cobra (*Naja tripudians*)." By R. Norris Wolfenden, M.D., Cantab. (from the Physiological Laboratory, University Coll., London). Communicated by E. A. Schäfer, F.R.S.

In this account the author refers only to cobra venom, the venom of *Naja tripudians*. The dried venom dissolved in water and filtered from accidental particles yields a solution, clear, and usually slightly acid. This solution contains a large amount of proteïd. Boiling produces a copious coagulum, and after removal of all coagulum by frequent filtration there is still much proteïd in the solution. A fresh solution of the venom is at once precipitated by neutral salts such as $MgSo_4$, NaCl, &c., and also by absolute alcohol.

The previous valuable labours of Sir Joseph Fayrer (*Proc. Roy. Soc.*, 1873, 1874, 1875, 1878), and Dr. Lauder Brunton and others, have dealt chiefly with the physiological side of the question, but have left the chemical nature of these snake venoms still undetermined.

Weir Mitchell and Reichert (*Med. News*, April 28, 1883; *Lancet*, July 21, 1883), working with the venoms of American snakes, have indicated in these venoms certain poisonous proteïds, the nature of which, however, is not fully elucidated. Wall's ("Indian Snake Poisons," Allen and Co., 1883) experiments and conclusions lead to the same view. Blyth (*The Analyst*, vol. i.) attributed the venom to an acid ("cobric acid") of deadly power. Gautier asserted that he had separated two ptomaïnes from Trigonocephalus and Naja venom. The author undertook this research with the object of determining whether the active venomous properties reside in the proteïd constituents or some other non-proteïd body or bodies. His work falls under the following heads:—

(1) The possibility of cobra-poisoning being due to "germs" or living organisms in the secretion.
(2) Its possible dependence upon an alkaloidal body.
(3) Its dependence upon some acid (cobric acid).
(4) Its dependence upon the proteïds contained in it.
(5) The mode of action of these proteïds.

With regard to the first proposition, the author finds nothing in cobra poison which will grow under cultivation methods favourable for such organisms. The symptoms of the poisoning are entirely unlike bacillary infection, and resemble more the effect of some rapidly-acting chemical poison. With regard to the presence of "alkaloids" in cobra venom, the author made three examinations of the dried venom by the Stass Otto method, but failed to find any trace of an alkaloid. He thus confirms the results of Prof. Wolcott Gibbs, who examined cobra poison for Dr. Weir Mitchell, in search of "ptomaïnes," but stated that he could find no trace of such bodies. In reference to the "cobric acid" said to have been obtained by Blyth from cobra venom, the author remarks that as it is said to be crystalline, it will presumably readily dialyse. Searching the dialysates for such a body, the author has failed to meet with it. Dialysates that retain any toxic power do so by virtue of the proteïd which they contain, since cobra venom, or the dialysate of cobra venom, loses its poisonous properties with the removal of its proteïds.

The fourth proposition—viz. that the toxic power of the venom is resident in the proteïds, is the author's chief point, and on this subject he remarks as follows:—

The coagulum obtained by boiling the venom is harmless when injected into rats. The filtrate from the coagulum is toxic, though in less degree than the original solution. The author thinks this toxic power to be due to syntonin remaining in the solution. That it is due to proteïd is shown by the fact that, with the removal of this proteïd by acetate of lead, it is rendered harmless.

The dialysates of cobra venom which are toxic contain proteïd, but lose their poisonous properties when this proteïd is removed by boiling with ferric acetate.

The variable degree of toxic power of the dialysates is dependent on the length of time the dialysis has lasted, and thus upon the amount of proteïd that has passed through the dialyser.

From what has been said as to the non-existence of any poisonous acid or alkaloid in cobra venom, and also the diminution of toxicity on boiling solutions of the venom, and complete removal of poisonous properties on completely freeing the boiled venom from such proteïd as has escaped coagulation by heat, and, further, as to the dependence of the toxicity of the dialysates upon the proteïd therein, there can be no further doubt that the toxic power of the venom is entirely due to its proteïds, and that it completely loses all poisonous power on the removal of these bodies.

The formerly reputed power of permanganate of potash as an antidote is explained by the action of this body upon albumens, which it converts into oxyprotosulphonic and other allied acids (according to Brücke and Maly) and it fails as an antidote within the body because it oxidises all albumens indifferently, without any selective power for the cobra proteïds.

The proteïds contained in cobra venom are—

(1) Globulin, which is obtained by saturation and shaking with $MgSo_4$, and which is coagulated in its solutions at 75° C. It is extremely toxic, and kills by involving the respiratory system, producing speedy asphyxia.

(2) Serum albumen, present in the filtrate from the $MgSo_4$ precipitate, and which is brought down on further saturation and shaking with Na_2So_4. It coagulates between 70° and 80° C. There is very little of it present, and it probably acts in a poisonous manner by producing a general and ascending paralysis.

(3) Syntonin, which is left in the filtrate after boiling the venom, and is also partially precipitated by $MgSo_4$, along with the globulin, and also appears in the dialysates, from which it is entirely removed by boiling with ferric acetate, or lead acetate. It possesses poisonous properties, chiefly like the globulin.

It is possible that some specimens of cobra venom contain a little peptone, though it can only be in faint traces. The bodies which Weir Mitchell and Reichert have described as peptone in Crotalus and Mocassin venoms are probably albumoses. That they are precipitated by dilute acetic acid, NaCl, and liquor potassa indicates this character. The "globulin," which they have described as dissolved by heating instead of coagulating, is also possibly a body of this nature. The complete removal of all proteïds from cobra poison by boiling with ferric acetate, except in some specimens the very faintest trace (as indicated by metatungstic acid), shows that when peptone is present it is only in the smallest traces, and it is not constantly found in cobra venom.

In conclusion, the author desires to express his thanks to the Indian executive for readily acceding to the request of Mr. Vincent Richards, a member of the last Snake Commission, to supply him with the dried venom. The amounts received have, however, been small, making the research not only slow, but very difficult.

Victoria (Philosophical) Institute, January 4.—A paper by Mr. Boscawen, on the Abramic Migration, and the light thrown thereon by recently discovered Assyrian Inscriptions was read.

PARIS

Academy of Sciences, December 28, 1885.—M. Jurien de la Gravière, Vice-President, in the chair.—Obituary notice of the late M. L. R. Tulasne and his botanical work, by M. P. Duchartre.—Note on the new star in Orion recently discovered at Lord Crawford's Observatory, Dun Echt, by M. C. Wolf. From a study of its spectrum, which belongs to Class III., section *a* of Vogel, this would appear to be, not a temporary star like τ Coronæ discovered in 1866, but a true star hitherto undetected.—On the movement of the molecules of the "solitary wave," by M. de Saint-Venant.—Researches on the functions of Wrisberg's nerve—complementary note, by M. Vulpian.—Researches on the real origin of the secreting nerves of Nuck's salivary gland, and of the labial salivary glands of the dog, by M. Vulpian.—Observations on the structure of the vascular system in the genus Davallia, and particularly in *Davallia repens*, by M. A. Trécul.—On the respiration of plants outside the living organisms, in connection with M. Regnard's recent communication, by M. Ad. Chatin.—On a new theory of algebraic forms (continued), by Prof. Sylvester.—Report on M. Mestre's claim of priority of discovery in connection with MM. Napoli and Abdank-Abakanowicz's integraph, by the Commissioners, MM. Bertrand and Jordan. To a certain extent M. Mestre's claim is allowed; he appears entitled to the credit of the general idea of the apparatus, all the details of which must, however, be accredited to M. Napoli.—Letter on the proposed appointment of a special Commission to study the subsidence of the land along the coasts of the English Channel, by the Minister of Public Instruction.—On the relative frequency of the spots on the two hemispheres of the sun, by M. Spörer. Between the years 1880-82 the spots occurred most frequently in the northern hemisphere (56 per cent.), but from 1882-85 they were most frequent in the southern, being last year in the proportion of 69 to 30 per cent.—On a unique method of determining the constants of the altazimuth, and of M. Lœwy's recently-invented meridian lunette "à grand champ," by M. Gruey.—Observations of Barnard's comet made at the Observatory of Bordeaux, by MM. G. Rayet, Doublet, and Flamme.—Observations of Fabry's comet made at the Observatory of Bordeaux, by MM. G. Rayet and Flamme.—Elements of Fabry's comet, by M. Gonnessiat.—Note on the secular diminution of the obliquity of the ecliptic, by M. F. Folie.—On the potential energy of two ellipsoids mutually attracting each other, by M. O. Callandreau.—On the doubly periodical functions of the third species, by M. Appell.—Note on the effects of the rheostatic machine of quantity (two illustrations), by M. Gaston Planté.—A new application of the principle determining the transmission of power to a distance by means of electricity, by M. Manceron.—Application of the numerical laws of the chemical equilibria to the dissociation of the hydrate of chloride, by M. H. Le Chatelier. The principles here developed are directly applicable to all the hydrates of gaseous bodies, and to a large number of other compounds, such as the alkaline bi-carbonates, with which the author is at present occupied.—Action of some deoxidising agents on vanadic acids, by M. A. Ditté. It is shown that, when subjected at a high temperature to the action of hydrogen, sulphur, arsenic, phosphorus, and some other reducing agents, vanadic acid may, according to the circumstances, lose a greater or less quantity of oxygen.—Note on the preparation and physical properties of the pentafluoride of phosphorus, by M. H. Moissan. —Note on the combinations of the trichloride of gold with the tetrachlorides of sulphur and selenium, by M. L. Lindet.—Thermic researches on glyoxylic acid ($C_4H_4O_8$), by M. de Forcrand.—On the oxidation of sebacic acid, by M. H. Carette. —On a new means of testing the purity of volatile substances, by M. E. Duclaux.—On the normal character of the morbid process developed by tuberculous inoculations, by M. G. Colin. —Remarks on the character of the glycogen observed in the ciliated Infusoria, showing that it is in every respect analogous to that developed in the liver of higher organisms, by M. E. Maupas.—A physiological study of acetiphenone, by MM. A. Mairet and Combemale.—On the dialytic properties of the membrane of the cyst in *Vorticella nebulifera* and other Infusoria, by M. F. Fabre.—Note on the polychete Annelidæ found on the French coast, district of Dinard, by M. de Saint-Joseph.—On the traces left by the Quaternary glaciers in the cave of Lombrives, Ariège Valley, by M. E. Trutat.—Remarks on the first sheets of the new geological map of France, prepared to a scale of 1 : 500,000, by MM. G. Vasseur and L. Carez. This work, which is to be completed during the course of the year 1886, will comprise altogether forty-eight sheets, of which fifteen have already been issued. These include the south coast of England, the greater part of Belgium, Luxemburg, the Rhine to Bonn and Frankfort, Alsace-Lorraine, the eastern and central parts of the Paris Basin, and the neighbourhood of Bordeaux.—Chief results of the systematic researches made in Sweden since the year 1873 on the upper atmospheric currents, by M. H. Hildebrandsson.—Note on the northern limit of the south-west monsoon in the Indian Ocean, by M. Venukoff. It appears from M. Prjevalsky's recent voyage to Northern Thibet that the limit of the south-western monsoon coincides approximately with the 37th parallel of latitude, and stretches west and east from about the head-waters of the Oxus and Tarim Rivers to the meridian of Langchew, capital of the province of Kan-su, in West China.—A reply to M. Bourquelot's recent note on interverted sugar, by M. E. Maumené.—Note on the guano of Alcatras, by MM. A. Herbelin and A. Andouard.—Reply to M. Cartailhac's objections on the human remains and pottery recently found in the cave of Nabrigas, by MM. Martel and de Launay. The authors deny the possibility of a post-Quaternary disturbance of the cave, and consequently maintain the conclusions already formulated on the significance of these discoveries.—The death was announced of M. Tulasne, Member of the Botanical Section, who died at Hyères on December 22, 1885.

VIENNA

Imperial Academy of Sciences, October 8, 1885.—On the establishment of a homogeneous magnetic field on the tangent galvanometer for measuring stronger currents, by G. A. Schilling.—On the blood-circulation of the ganglion-cell, by A. Adamkiewicz.—Determination of the orbit of the planet Ida (243), by N. Herz.—On the energy of the yeast-cell, by G. Czeczetka.—On a new method for the determination of phosphorus in pig-iron and steel, by W. Kalmann. —On Brooks's comet of September 2, 1885, by E. Weiss.—Astronomical researches on the eclipses noted by Hebrew writers: i. the Biblical eclipses, by E. Mahler.

October 15.—Contributions to our knowledge of sulpho-hydantoïns, by R. Andreasch.—On the disposition of karyokinetic figures in the central nervous system and in the retina of adder-embryos, by L. Merk.—Researches on strychnine, by F. Loebisch and P. Schoop.

October 22.—On some applications of the principle of apolarity, by B. Igel.—Studies on quercetin and its derivatives, ii., by J. Herzig.—On some derivatives of phloroglucin, by the same.—On rhamnin and rhamnetin, by the same—Results of an embracing computation of the elements of all central and partial eclipses of the sun—8000—which have occurred in the period −1207 November 10 (Jul.) till +2161 November 17 (Greg.), and of all total eclipses of the moon—5200—in the period from −1206 April 21 (Jul.) till +2163 April 12 (Greg.), by Th. von Oppolzer.—On prophetic eclipses, by E. Mahler.

November 5.—On the fat of cochineal, by E. Raimann.—On *Tosoraphinia texta*, Rœm. sp., and on *Scytalia pertusa*, Reuss. sp., from the environs of Raudnitz (Bohemia), by J. Fahalka.—On Crocodilida from the Miocene of Styria, by A. Hofmann.—On the application of the gravity of a rolling body as a motive power, by J. Burgaritzki.—On a new mechanical principle of the force hitherto called gravitation, by W. Bosse.—A preliminary note on the zodiacal light, by T. Unterweger.—Sketch of a theory of the moon, by Th. von Oppolzer.

STOCKHOLM

Academy of Sciences, December 9.—Remarques concernant un cas special du problème des trois corps, éclaircies par une première approximation pour les mouvements de la planète Hécube (108) sous l'influence du soleil et de Jupiter, by Dr. Paul Harzer.—On Schefferite from Långbau and Pajsberg, by Dr. G. Flink.—Observations on the meteoric showers, November 27, 1885, by Prof. H. Hildebrand.—Sur la théorie des ensembles, by Prof. G. Cantor.—Remarks on this paper, by Dr. G. Enström. —New and imperfectly-known Isopoda, by Dr. C. Bovallius.—Systematic list of the family Asellida, by the same.—The laws of the atomic weights, by Dr. Y. R. Rydberg.—On double oxalates of platinum, by Herr H. G. Söderbaum.—On rocks composed of pyroxene and amphibole in Central and Eastern Småland: (1) classification and description of the rocks, by Dr. F. Eichstädt; (2) Myrmecological studies, by Herr G. Adlerz. —On pyramidal stones (Dreikanter) from the Cambrian formation of Sweden, by Prof. A. G. Nathorst.

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