Candidates for the Professorship of Botany are requested to send in their applications to the Registrar of the University on or before January 26. The stipend is 700*l.* a year, and a house rent free in the Botanic Garden.

New College offers an Exhibition in Natural Science (Chemistry or Biology). The examination commences May 6.

CAMBRIDGE.—The following are the principal courses in Natural Science during the present term :—

Mathematics.—Prof. Adams, Lunar Theory, commencing January 31; Mr. Turner (Under Plumian Professor), Instruction in the Use of Astronomical Instruments, January 30; Mr. Mollison, Vibrations and Sound, January 24; Mr. Stearn, Hydrodynamics, January 25; Mr. Hobson, Fourier's Series and Conduction of Heat, January 28; Mr. Thompson, Electromagnetism, January 25; Mr. Glazebrook, Wave Theory of Light, January 24; Mr. Ball, Algebra and Determinants, January 25; Dr. Besant, Analysis, January 23; Mr. Pendlebury, Analytical Optics, January 23.

Chemistry.—Prof. Liveing, General Course, January 24; Prof. Dewar, Organic Chemistry, January 28; Mr. Main, General Course, January 28; Mr. Pattison-Muir, Carbon Compounds, January 25; Non-Metals, January 26; Mr. Scott, Elementary Organic Chemistry, January 25; Mr. Lewis, Catechetical Lectures, January 25; Mr. Heycock, Chemical Philosophy.

Practical Chemistry.—Mr. Sell and Mr. Fenton, Demonstrations in Quantitative Analysis, January 25.

Physics.—Lord Rayleigh, Acoustics, January 26; Mr. Trotter, Electricity and Magnetism, January 24; Physical Optics, January 24; Mr. Atkinson, Heat, January 25; Mr. Glazebrook, Elementary Physics, January 25; Mr. Shaw, Elementary and Advanced Physics, Hydrostatics and Heat, January 25.

Mechanism.—Prof. Stuart, Theory of Structures, January 29; Mr. Lyon, Statics and Hydrostatics, January 29; Rigid Dynamics, January 30; Mr. Ames, Elementary Mathematics for Students of Mechanism, January 30.

Geology.—Principles of Geology and Stratigraphy (advanced), Prof. Hughes, January 24; Dynamical Geology, Mr. Roberts, January 24; Palæontology and Petrology, by Demonstrators, January 26.

Botany.—General Elementary Course, Mr. Vines, January 24; Anatomy of Plants, Mr. Gardiner, January 25; General Biology of Plants (advanced), Mr. F. Darwin, January 26; Morphological Botany, Mr. Hicks, January 26.

Zoology and Comparative Anatomy.—Geographical Distribution of the Vertebrata, by Prof. Newton, January 30; Elementary Biology, Mr. Vines and Mr. Sedgwick, January 25; Practical Morphology, Mr. Sedgwick, January 24; Morphology of Sauropsida, Mr. Gadow, January 23.

Biology.—Elementary, Mr. Vines and Mr. Sedgwick, January 25.

Anatomy and Physiology.—Osteology, Prof. Macalister, January 25; Physiology, Prof. Foster, January 24; Anatomy of the Digestive and Circulatory Organs, Prof. Macalister, January 24; Chemical Physiology, Mr. Lea, January 25; Physiology of the Circulation, Dr. Gaskell, January 24; Practical Work, Dissection, under the supervision of the Professor and Demonstrator, in the Dissecting Room.

SCIENTIFIC SERIALS

Bulletin de la Société des Naturalistes de Moscou, année 1883, No. 2.—Researches into the compounds of the acetylenes, by A P. Sabanéeff. The author has studied these imperfectly known compounds, namely, di-brom-acetylene, and the double compounds of acetylene with bromine and chlorine, and with chlorine and iodine. He has discovered a new method of preparing larger quantities of the former by acting with zinc on an alcoholic solution of the four-brom-acetylene, and describes its various reactions.—On the periodical changes of level of the ocean, by H. Trautschold (in German). The author, who already in 1869 supported the idea that the geological changes are due, not to the rise of the continents, but to the falling of the level of the ocean, finds in the disposition of the series of deposits of all ages up from the Silurian, on the plains of Russia, new and very interesting arguments for his idea. He maintains that the level of the ocean was falling from the Silurian epoch to the end of the Trias, when the seas had, around the now Russian plains, nearly the same shape as now. The level of the ocean rose, however, during the Jurassic period, retiring again about the end of the Chalk period.—On the bastard of the *Anas crecca* with *Anas boschas*, by Dr. N. Sewertsoff, with a coloured plate (in German). The most interesting bastard of the nearly two extremes of the ducks (relatively to their size) has been shot in the province of Ryazan. The Russian ornithologist describes its features at length, and adds some remarks on the bastards of the ducks generally.—Monopetal plants of Radde, by Ferd. von Herden (continued).—Description (in German) of the Veronicas, Castillejas, *Siphonostegia*, *Phtheirospermum*, and Omphalotrix.—A Mastodon tooth, note by H. Trautschold.—On the photographic photometry of fixed stars, by Ed. Lindemann (in German).—Materials for the fauna of Hemiptera of Russia, by W. Yakovleff, being a description, in Russian, of several new species.

Rivista Scientifico-Industriale, October 31.—A detailed account of the electric exhibition held in September at Lodi, by Prof. Alessandro Volta.—Programme of the anthropological section of the Italian exhibition to be held next year in Turin. Amongst other attractions there will be a large collection of typical Italian skulls of all dates and from every part of the peninsula. Materials will also be brought together for studying the history, ethnography, language, and present condition of all the foreign communities (Albanian, Greek, Catalonian, Slav, German, Rumansch, French) settled in various parts of the country.

Rendiconti del R. Istituto Lombardo di Scienze e Lettere, November 29, 1883.—On Lagrange's general expression of the force necessary to produce a tautocronous motion regarded as a function of space and velocity, by Prof. C. Formenti.—Geological notes on the Alps of the provinces of Reggio and Modena, by D. Pantanelli.—On the first traces of a national debt in the Byzantine Empire, by Z. von Lingenthal.—Unimetalism and bimetalism, by Dr. A. Villa Pernice.—Meteorological observations in the Brera Observatory, Milan, during the month of September, 1883.

Nachrichten of the Royal Society of Sciences and of the University of Göttingen, August 22, 1883.—Contributions to the study of spermatozoa and their evolution (preliminary paper), by Dr. A. von Brunn.—Researches on the action of glycol on orthophenylendiamin, orthodinitrobenzine, and sulphuric acid.

November 7.—On the meteorological relations of Göttingen, by Hugo Meyer.—Optical researches on the substance (calcareous spath) into which crystals of aragonite become decomposed under the action of heat, by C. Klein.—On the age of the iron ores at Hohenkirchen, by A. von Koenen.—On the theory of modular equations, by A. Hurwitz.—On the relations between solar and atmospheric electricity, showing how the latter is referable to the former and allied causes.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, November 22, 1883.—"Some Relations of Heat to Voltaic and Thermo-Electric Action of Metals in Electrolytes," by G. Gore, F.R.S., LL.D.

The experiments described in this paper throw considerable light upon the real cause of the voltaic current. The results of them are contained in twenty tables; and by comparing them with each other, and also by means of additional experiments, the following general conclusions and chief facts were obtained.

When metals in liquids are heated, they are more frequently rendered positive than negative in the proportion of about 2·8 to 1·0; and whilst the proportion in weak solutions was about 2·29 to 1·0, in strong ones it was about 3·27 to 1·0, and this accords with their thermo-electric behaviour as metals alone. The thermo-electric order of metals in liquids was, with nearly every solution, whether strong or weak, widely different from the thermo-electric order of the same metals alone. A conclusion previously arrived at was also confirmed, viz. that the liquids in which the hot metal was thermo-electro-positive in the largest proportion of cases were those containing highly electro-positive bases, such as the alkali metals. The thermo-electric effect of *gradually* heating a metal in a liquid was sometimes different from that of *suddenly* heating it, and was occasionally attended by a reversal of the current.

Degree of strength of liquid greatly affected the thermo-electric order of metals. Increase of strength usually and con-

siderably increased the potential of metals thermo-electro-negative in liquids, and somewhat increased that of those positive in liquids.

The electric potential of metals, thermo-electro-positive in weak liquids, was usually about 3·87 times, and in strong ones 1·87 times, as great as of those which were negative. The potential of the strongest thermo-electric couple, viz. that of aluminium in weak solution of sodic phosphate, was ·66 volt for 100° F. difference of temperature, or about 100 times that of a bismuth and antimony couple.

Heating one of the metals, either the positive or negative, of a voltaic couple, usually increased their electric difference, making most metals more positive, and some more negative; whilst heating the second one also, usually neutralised to a large extent the effect of heating the first one. The electrical effect of heating a voltaic couple is nearly wholly composed of the united effects of heating each of the two metals separately, but is not however exactly the same, because whilst in the former case the metals are dissimilar, and are heated to the same temperature, in the latter they are similar, but heated to different temperatures. Also, when heating a voltaic pair, the heat applied to two metals, both of which are previously electro-polar by contact with each other as well as by contact with the liquid; but when heating one junction of a metal and liquid couple, the metal has not been previously rendered electro-polar by contact with a different one, and is therefore in a somewhat different state. When a voltaic combination, in which the positive metal is thermo-negative, and the negative one is thermo-positive, is heated, the electric potential of the couple diminishes, notwithstanding that the internal resistance is decreased.

Magnesium in particular, also zinc and cadmium, were greatly depressed in electromotive force in electrolytes by elevation of temperature. Reversals of position of two metals of a voltaic couple in the tension series by rise of temperature were chiefly due to one of the two metals increasing in electromotive force faster than the other, and in many cases to one metal increasing and the other decreasing in electromotive force, but only in a few cases was it a result of simultaneous but unequal diminution of potential of the two metals. With eighteen different voltaic couples, by rise of temperature from 60° to 160° F., the electromotive force in twelve cases was increased, and in six decreased, and the average proportions of increase for the eighteen instances was ·10 volt for the 100° F. of elevation.

A great difference in chemical composition of the liquid was attended by a considerable change in the order of the volta-tension series, and the differences of such order in two similar liquids, such as solutions of hydric chloride and potassic chloride, were much greater than those produced in either of those liquids by a difference of 100° F. of temperature. Difference of strength of solution, like difference of composition or of temperature, altered the order of such series with nearly every liquid; and the amount of such alteration by an increase of four or five times in the strength of the liquid was rather less than that caused by a difference of 100° F. of temperature. Whilst also a variation of strength of liquid caused only a moderate amount of change of order in the volta tension series, it produced more than three times that amount of change in the thermo-electric tension series. The usual effect of increasing the strength of the liquid upon the volta-electromotive force was to considerably increase it, but its effect upon the thermo-electromotive force was to largely decrease it. The degree of potential of a metal and liquid thermo-couple was not always exactly the same at the same temperature during a rise as during a fall of temperature; this is analogous to the variations of melting and solidifying points of bodies under such conditions, and also to that of supersaturation of a liquid by a salt, and is probably due to some hindrance to change of molecular movement.

The rate of ordinary chemical corrosion of each metal varied in every different liquid; in each solution also it differed with every different metal. The most chemically positive metals were usually the most quickly corroded, and the corrosion of each metal was usually the fastest with the most acid solutions. The rate of corrosion at any given temperature was dependent both upon the nature of the metal and upon that of the liquid, and was limited by the most feebly active of the two, usually the electrolyte. The order of rate of corrosion of metals also differed in every different liquid. The more dissimilar the chemical characters of two liquids the more diverse usually was the order of rapidity of corrosion of a series of metals in them. The order of rate of simple corrosion in any of the liquids examined differed from that of chemico-electric and still more from that of thermo electric tension. Corrosion is not the cause of thermo-electric action of metals in liquids.

Out of fifty-eight cases of rise of temperature the rate of ordinary corrosion was increased in every instance except one, and that was only a feeble exception—the increase of corrosion from 60° to 160° F. with different metals was extremely variable, and was from 1·5 to 321·6 times. Whether a metal increased or decreased in thermo-electromotive force by being heated, it increased in rapidity of corrosion. The proportions in which the most corroded metal was also the most thermo-electro-positive one was 65·57 per cent. in liquids at 60° F. and 69·12 in the same liquids at 160° F.; and the proportion in which it was the most chemico-electro-positive at 60° F. was 84·44 per cent., and at 160° F. 80·77 per cent. The proportion of cases therefore in which the most chemico-electro-negative metal was the most corroded one increased from 15·56 to 19·23 per cent. by a rise of temperature of 100° F. Comparison of these proportions shows that corrosion usually influenced in a greater degree chemico-electric rather than thermo-electric actions of metals in liquids. Not only was the relative number of cases in which the volta-negative metal was the most corroded increased by rise of temperature, but also the average relative loss by corrosion of the negative to that of the positive one was increased from 3·11 to 6·32.

The explanation most consistent with all the various results and conclusions is a kinetic one:—That metals and electrolytes are throughout their masses in a state of molecular vibration. That the molecules of those substances, being frictionless bodies in a frictionless medium, and their motion not being dissipated by conduction or radiation, continue incessantly in motion until some cause arises to prevent them. That each metal (or electrolyte), when unequally heated, has to a certain extent an unlike class of motions in its differently heated parts, and behaves in those parts somewhat like two metals (or electrolytes), and those unlike motions are enabled, through the intermediate conducting portion of the substance, to render those parts electro-polar. That every different metal and electrolyte has a different class of motions, and in consequence of this they also, by contact alone with each other at the same temperature, become electro-polar. The molecular motion of each different substance also increases at a different rate by rise of temperature.

This theory is equally in agreement with the chemico-electric results. In accordance with it, when in the case of a metal and an electrolyte, the two classes of motions are sufficiently unlike, chemical corrosion of the metal by the liquid takes place, and the voltaic current, originated by inherent molecular motion under the condition of contact, is maintained by the portions of motion lost by the metal and liquid during the act of uniting together. Corrosion therefore is an effect of molecular motion, and is one of the modes by which that motion is converted into and produces electric current.

In accordance with this theory, if we take a thermo-electric pair consisting of a non-corrodible metal and an electrolyte (the two being already electro-polar by mutual contact), and heat one of their points of contact, the molecular motions of the heated end of each substance at the junction are altered; and as thermo-electric energy in such combinations usually increases by rise of temperature, the metal and liquid, each singly, usually becomes more electro-polar. In such a case the unequally heated metal behaves to some extent like two metals, and the unequally heated liquid like two liquids, and so the thermo-electric pair is like a feeble chemico-electric one of two metals in two liquids, but without corrosion of either metal. If the metal and liquid are each, when alone, thermo-electro-positive, and if, when in contact, the metal increases in positive condition faster than the liquid by being heated, the latter appears thermo-electro-negative, but if less rapidly than the liquid, the metal appears thermo-electro-negative.

As also the proportion of cases is small in which metals that are positive in the ordinary thermo-electric series of metals only become negative in the metal and liquid ones (viz. only 73 out of 286 in weak solutions, and 48 out of the same number in strong ones), we may conclude that the metals, more frequently than the liquids, have the greatest thermo-electric influence, and also that the relative largeness of the number of instances of thermo-electro-positive metals in the series of metals and liquids, as in the series of metals only, is partly a consequence of the circumstance that rise of temperature usually makes substance—metals in particular—electro-positive. These statements are

also consistent with the view that the elementary substances lose a portion of their molecular activity when they unite to form acids or salts, and that electrolytes therefore have usually a less degree of molecular motion than the metals of which they are partly composed.

The current from a thermo-couple of metal and liquid, therefore, may be viewed as the united result of difference of molecular motion, first, of the two junctions, and second, of the two heated (or cooled) substances; and in all cases, both of thermo- and chemico-electric action, the immediate true cause of the current is the original molecular vibrations of the substances, whilst contact is only a static permitting condition. Also that whilst in the case of thermo-electric action the sustaining cause is molecular motion, supplied by an external source of heat, in the case of chemico-electric action it is the motion lost by the metal and liquid when chemically uniting together. The direction of the current in thermo-electric cases appears to depend upon which of the two substances composing a junction increases in molecular activity the fastest by rise of temperature, or decreases the most rapidly by cooling.

Zoological Society, January 15.—E. W. H. Holdsworth, F.Z.S., in the chair.—The Secretary exhibited, on the part of Mr. H. Whitely, an immature specimen of the Night-Heron (*Nycticorax griseus*), which had been shot in Plumstead Marshes, Kent, in December last.—A communication was read from Mr. J. C. O'Halloran, Chief Commissioner and Police Magistrate for Rodriguez, accompanying a specimen of a large lizard found only in that island, and very rare there. The specimen had been identified by Mr. Boulenger as *Phelsuma newtoni*, belonging to the family Geckotidæ.—Sir Joseph Fayrer exhibited some additional specimens of the horns of deer gnawed by other deer, in confirmation of previous remarks on the subject.—Canon Tristram, F.R.S., exhibited and made remarks upon some specimens of species of the genus *Pachycephala*, which appeared to have been ignored or wrongly united to other species in a recently published volume of the Catalogue of Birds of the British Museum.—Mr. W. F. R. Weldon read a paper in which he gave a description of the placenta in *Tetraceros quadricornis*. The author showed that this placenta is intermediate between that of *Moschus* and that of the typical Bovidæ, having few cotyledons with diffuse vascular ridges between them. Associated with this primitive character is a uniserial psalterium.—A second paper by Mr. Weldon contained some notes on the anatomy of a rare American monkey, *Callithrix gigot*, which had recently died in the Society's Gardens. The author gave a description of the external characters, and the principal viscera were compared with those of *C. moloch* and of *Mycetes*.—A communication was read from Mr. E. J. Miers, F.Z.S., giving an account of a collection of Crustacea from the Mauritius, which had been forwarded to the British Museum by M. V. de Robillard. In the collection was an example of a new species of *Callianassa*, proposed to be called *C. martensi*.—Mr. Francis Day read a paper on races and hybrids among the Salmonidæ, and exhibited a series of specimens of young salmon and hybrid Salmonidæ reared at Sir J. Gibson Maitland's Howie-town Fish Establishment.—Prof. F. Jeffrey Bell read a paper on the generic position and relations of *Echinanthus tumidus* of Tenison-Woods, from the Australian seas, which he showed to belong to a different genus, proposed to be called *Anomalanthus*.

Chemical Society, January 17.—Dr. W. H. Perkin, president, in the chair.—The following gentlemen were elected Fellows:—B. H. Brough, G. Daubeney, C. C. Hutchinson, W. S. Kilpatrick, E. Matthey, H. Peile, J. Pallister, R. Romanis, S. G. Rawson, F. M. Rogers, W. Robinson, T. Stenhouse, W. O. Senier, J. A Voelcker.—The following papers were read:—On camphoric peroxide and barium camphorate, by C. T. Kingzett. In 1863 Brodie described the formation of camphoric peroxide by triturating camphoric anhydride with barium peroxide in the presence of ice-cold water. The author has repeated the above experiments, and concludes that no camphoric peroxide is formed, but that the anhydride is first converted into camphoric acid, which decomposes the barium peroxide, yielding camphorate of barium and peroxide of hydrogen.—On the decomposition of silver fulminate by hydrochloric acid, by E. Divers and Michitada Kawakita. Formic acid and hydroxyammonium chloride are formed, as is the case with mercury fulminate, but the authors have only been able to obtain two-thirds of the calculated quantity of these bodies. Some ammonia and hydrocyanic acid are also formed.—Supplementary note on Liebig's production of fulminating silver without the use of nitric acid, by E. Divers and Michitada Kawakita. The authors have succeeded in preparing the fulminate, but only when the reaction was allowed to proceed for some time. The solution was then warm, and always contained nitric acid.—On hyponitrites, by E. Divers and Tamemasa Haga. The authors criticise the recent paper of Berthelot and Ogier, and give an account of fresh investigations, which confirm the formula originally proposed by Divers, AgNO. They have not been able to obtain hyponitrite, either by the method proposed by Mencke, *i.e.* heating potassium nitrate with iron filings, or the method proposed by Zorn, in which ferrous hydrate is used as the reducing agent.

Royal Meteorological Society, January 16.—Mr. J. K. Laughton, F.R.A.S., president, in the chair.—The Secretary read the Report of the Council, which showed that the past few months mark a very important epoch in the history of the Society. In October the Council received the intimation that Her Majesty had been graciously pleased to grant the Society permission to assume the prefix "Royal." In consequence the Society has become, and will henceforth be called, the Royal Meteorological Society. In December the Fellows made certain alterations in the by-laws by which the annual subscription has been increased. The Report also showed that the Society is doing a great deal of practical work, not only by holding meetings and publishing the papers read at the same, but also by the establishment of a large number of observing-stations, which are regularly inspected, so that the results obtained from them may be strictly uniform and comparable. The number of Fellows is 549 and of honorary members 19, thus making a total of 568.—The President then delivered his address, in which he referred to the experiments made by Mr. Saxon Snell, Mr. Bertram, and Mr. Hele Shaw, with the object of determining the coefficients of Biram's anemometers; as yet these can scarcely be considered quite satisfactory, for, though made with the utmost care, they give results differing from each other by nearly 25 per cent. and from the known truth in opposite directions. The reduction of barometric readings to sea-level is another problem of great interest and importance, the solution of which is far from perfect, and, as applied to the converse determination of altitudes, has been pronounced by Mr. Gilbert, of the U.S. Geological Survey, to be beset with difficulties "so numerous and so baffling that there is no reason to hope that they will ever be fully overcome." In many cases, too, the reduction, even if correct, implies an accumulation of air in places where no air exists; and isobars so drawn, traversing mighty mountain ranges such as the Rocky Mountains or the Himalayas, or elevated plateaus such as those of Central or Eastern Asia, convey an impression which may easily lead to serious mistakes. The great achievement of the year is unquestionably the gathering in of the observations taken, by international agreement, at nine Arctic stations, in which, amidst circumstances of more or less discomfort, parties continued through a full period of twelve months. With one station established by the United States on the shores of Lady Franklin Bay, it has been found impossible to communicate; this was established in the summer of 1881, and no trustworthy news has since been received. Preliminary reports have been published from the English station at Fort Rae on the northern shores of the Great Slave Lake; from the German station in Cumberland Sound; from the Austrian at Jan Mayen, and from some of the others; but the principal interest attaches not to the observations taken separately but to the collation and comparison of the whole, which may be expected to lead the way towards problems of the greatest importance to meteorology. In the present day one science is so mixed up with a number of others, and so involved in them, that it is impossible to separate them, or to define the exact limits of each. Many of the problems of meteorology belong as much to geography, or at times even to experimental physics, and an address which speaks of the progress of meteorology is perhaps apt to appear in some degree discursive. It is that the true student of nature, whilst limiting his detailed work to one particular direction, must consider her kingdom as a grand and comprehensive whole, one and indivisible.—The following gentlemen were elected the officers and Council for the ensuing year:—President: Robert Henry Scott, F.R.S.; Vice-Presidents: Hon. Ralph Abercromby, Edmund Douglas Archibald, M.A., John Knox Laughton, F.R.A.S., William Marcet, M.D., F.R.S.; Treasurer: Henry Perigral, F.R.A.S.; Trustees: Hon. Francis Albert Rollo Russell, M.A., Stephen William Silver, F.R.G.S.;

Secretaries: George James Symons, F.R.S., John William Tripe, M.D.; Foreign Secretary: George Mathews Whipple, F.R.A.S.; Council: William Morris Beaufort, F.R.A.S.; George Chatterton, John Sanford Dyason, F.R.G.S., William Ellis, F.R.A.S., Charles Harding, Richard Inwards, F.R.A.S., Baldwin Latham, F.G.S., Robert John Lecky, F.R.A.S., Edward Mawley, F.R.H.S., Cuthbert E. Peek, F.R.G.S., Capt. Henry Toynbee, F.R.A.S., Charles Theodore Williams, M.D.

Anthropological Institute, January 8.—Prof. Flower, F.R.S., president, in the chair.—The election of the following new members was announced:—Rev. E. S. Dewick, M.A., F.G.S., Prof. A. Macalister, M.D., F.R.S., and Mr. Oldfield Thomas as ordinary members, Dr. E. T. Hamy and Dr. Hermann Welcker as honorary members, and Mr. Lucien Carr and Dr. A. B. Meyer as corresponding members.—The President stated that Mr. Francis Galton had offered 500*l.* in prizes to those who should before May 1, 1884, furnish him with the best extracts from their family records according to the form prescribed in his "Record of Family Faculties," published by Macmillan and Co., and he urged all members of the Anthropological Institute to give Mr. Galton every assistance in their power.—Mr. H. H. Johnston read a paper on the races of the Congo and the Portuguese colonies in Western Africa. The author stated that Western Tropical Africa, between Senegambia to the north and the River Cunéné, offered a vast studying ground to the anthropologist, wherein types of nearly every well-marked African race might be observed. After detailing many of the various races, he proceeded to describe the Bushmen north of Cunéné, which he characterised as about the lowest type of men, but, of the five or six specimens which came more particularly under his notice, he remarked that their mental ability was strangely at variance with their low physical characteristics. The Hottentots were much finer men than the Bushmen as regarded height and build, but they exceeded the latter in baboon-like licentiousness. The western slopes of the Shella Mountains were peopled by a tribe called the A-ndombe, a sturdy race of carriers, which extended as far north as Benguela. Referring to the races of the lower Congo, Mr. Johnston observed that they depended almost entirely upon vegetable diet, whilst they were remarkable for their initiation ceremonies. Traces of phallic worship were noticed, especially in the interior, and more particularly in the neighbourhood of Stanley Pool. A Congo market was exceedingly interesting, and was held for about four or eight days. The natives would often go 100 miles to attend one of these markets, the women generally being the keenest traders. Between Stanley Pool and the coast there is only one great leading tongue spoken, though this has several dialects. This is the Congo language, one known to and studied by Europeans probably before any other Bantu tongue. It bears many signs of Portuguese influence.

Geological Society, January 9.—J. W. Hulke, F.R.S., president, in the chair.—Patrick Doyle, Alfred Harker, Rev. Frederick Hastings, Rev. John Milne-Curran, and William Ford Stanley, were elected Fellows; Prof. G. Capellini, of Bologna, a Foreign Member, and M. Alphonse Briart, of Mons, a Foreign Correspondent of the Society.—The following communications were read:—On the volcanic group of St. David's, by the Rev. Prof. J. F. Blake, F.G.S. The result of the author's examination of the rocks in the district of St. David's which have been designated *Dimetian*, *Arvonian*, and *Pebidian*, is that they belong to one volcanic series, whose members are those usually recognised in eruptive areas, and whose age is anterior to and independent of the true Cambrian epoch. The independence of this series and the Cambrian is shown by the nature of the junction at all points of the circuit that have been seen. The supposed isocline west of the granitic mass cannot be verified on an examination of the coast-section, there being great irregularity and gentle synclinals not far from where the apex of the isocline should be. With regard to the nature of the rocks which thus antedate the Cambrian, the author was unable to recognise any true alternations in the materials of the granitic axis, though the rock is a peculiar one in the arrangement of its constituents. The felsitic rocks are not independent of the granite, as they surround it on all sides, the line along the north and south being specially traced. They are also often intrusive into the ashes, and hence can have no definite strike. Attention was drawn to the highly acid character of the whole series, and to the small size of the centres of eruption, and it was suggested that such centres have continually decreased in number and increased in magnitude during geological time.—On further discoveries of vertebrate remains in the Triassic strata of the south coast of Devonshire, between Budleigh Salterton and Sidmouth, by A. T. Metcalfe, F.G.S. The author gave a brief stratigraphical account of the Triassic rocks of the coast. He then described some vertebrate remains, consisting chiefly of portions of jaw-bones with teeth in line, probably of Labyrinthodonts, found in the upper sandstones (Ussher's classification) at High Peake Hill, near Sidmouth, by H. J. Carter, F.R.S. At numerous places between Budleigh Salterton and Sidmouth, Mr. Carter and the author had found a large number of isolated bone fragments. Such fragments had been submitted to a microscopical examination by Mr. Carter. In some specimens the bone structure was visible throughout; in some the bony portion had been partially removed and replaced by an infiltration of mineral matter; in others the removal of the bony portion was complete. From these facts the author drew the conclusion that a comparative abundance of vertebrate life was maintained during the Triassic period; and that the rareness of Triassic fossils was due not so much to the paucity of animal life during that period as to the fact that Triassic strata afforded no suitable conditions for the *preservation* of organic remains.

EDINBURGH

Royal Physical Society, January 16.—J. A. Harvie-Brown, F.R.S.E., president, in the chair.—The following communications were read:—On intra-epithelial capillaries in Oligochæta, by F. E. Beddard, F.R.S.E.—On the geognosy of the Harz Mountains, part 1, by H. M. Cadell, B.Sc., of the Scottish Geological Survey. The writer stated that there was still some room for original investigation in that quarter, notwithstanding the great attention the German geologists had bestowed on the region. The Germans had not yet learned the art of detailed structural geological mapping and section-drawing as carried out in the British geological surveys, and many of their so-called geological maps were nothing more than mere petrographical pictures. The writer then went over the various formations of the Harz, and noticed the fact that graptolites were found at the top only of the lowest or Hercynian rocks, which he suggested might be cited as an example of one of Banaudes' "colonies." The older or "core rocks" of the Harz terminating in the Kulm were overlaid in violent unconformability by the border rocks, beginning at the coal measures and extending upwards to the Trias and Cretaceous systems. He agreed with those who consider the loess an "æolian" deposit swept as dust into sheltered valleys and nooks by the wind, and thought that water had had nothing directly to do with its origin. The paper was illustrated by the exhibition of rocks and metallic minerals from the region described.—Prof. Cossar Ewart, F.R.S.E., exhibited, with remarks, a large torpedo recently caught in a trawl off Wick, and believed to be the only specimen of the kind ever found north of the English Channel. The specimen exhibited was 28 inches in length and 19½ inches across the pectoral fins, and belonged to the species *hebetans*.

SYDNEY

Linnean Society of New South Wales, November 28, 1883.—C. S. Wilkinson, F.G.S., F.L.S., president, in the chair.—The following papers were read:—Some fishes of New Britain and the adjoining islands, by Charles W. De Vis, B.A. The names of the new specimens described are—*Serranus perguttatus* and *cruentus*, *Mesoprion flavirosea*, *Tetraroge vestita*, *Acanthurus zebra*, *Rynchichthys novæ-britanniæ*, *Harpage rosea* (a new genus of the Berycidæ), *Salarias æquipinnis*, *Amphiprion arion*, *Pomacentrus onyx* and *notatus*, *Nesiotes purpurascens* (a new genus of the Labridæ), *Exocœtus longibarba*, *Arius armiger*, *Herpetichthys cobra*, (a new genus of the Murænidæ), *Tetrodon insularium* and *lævis*.—Some results of trawl fishing outside Port Jackson, by William Macleay, F.L.S. In this paper are given—(1) An account of two trials of a large beam trawl in forty to fifty fathoms water, by the order of the Commissioner of Fisheries; (2) a list of the fishes captured; and (3) descriptions of two new species—a skate, *Raia australis*, and a gurnard, *Lepidotrigla mulhalli*. Mr. Macleay considers the result promising on the whole.—Baron Maclay read a note on the "Barometro Araucano" from the Chiloe Islands. He stated that this remarkable instrument had been shown to him among a number of other curiosities by Capt. C. de Amezaga, of the

Italian corvette *Caraciolo*, who informed him that it was used by the natives of the Chiloe Islands as a kind of barometer to foretell the approach of either dry or wet weather. This "Barometro Araucano," which consisted merely of the shell of a crab, pronounced by Mr. Haswell to be one of the *Anomura*, probably of the genus *Lithodes*, is most peculiarly sensitive to atmospheric changes. In dry weather it remains nearly white, but, with the approach of moisture, small red spots appear on the shell, increasing in number and size with the increase of humidity, until during the wet season it becomes completely red.

PARIS

Academy of Sciences, January 14.—M. Rolland in the chair.—On the researches of M. Guntz in the thermo-chemistry of the fluorides, in reply to the strictures of M. Tommasi, by M. Berthelot.—On a process of anæsthesis by the method of titrate mixtures of vapours and air; its application to the human subject in the form of vapours of chloroform, by M. Paul Bert. The chief advantages of this process are stated to be: delirium always slight, sometimes altogether absent, even in adults; absolute and regular insensibility obtained in six to eight minutes; quiet sleep; normal breathing, circulation, and temperature; no symptoms of nausea; normal and perfectly reassuring appearance of the patient while asleep; constant and always very protracted consecutive anæsthesis; great economy in the outlay for chloroform.—Generalisation and strictly mechanical demonstration of Joule's electrical formula, $w = ie\,T$, by M. A. Ledieu.—On the preparation in large quantities of artificial virus attenuated by rapid heating, by M. A. Chauveau. By this process sufficient virus for the prophylactic inoculation of from 4000 to 8000 sheep may be rapidly prepared in the same reservoir.—Observations of the Pons-Brooks comet made at the bent equatorial of the Paris Observatory, by M. Périgaud.—On the genus of some entire functions in mathematical analysis, by M. Laguerre.—On the geometrical curve known as Pascal's "limaçon," by M. A. Genocchi.—On linear differential equations with doubly periodical coefficients, by M. G. Floquet.—On the adiabatic expansion of the vapour of water, by M. P. Charpentier.—On the agreement of experience with the general theoretic law regulating capillary surfaces, especially in its application to water confined between two moistened plaques, vertical and parallel, by M. Quet.—On a new method of determining the magnetic inclination by means of the induction compass, by M. Wild.—On the observation of earth currents whose intensity is shown to be subject to secondary fluctuations depending on the degree of moisture and temperature of the zone comprised within the circuit, by M. Larroque.—Determination of the intensity of combustion in some acetones and in the two ethers of carbonic acid, by M. W. Louguinine.—On the phenomena of chemical dissociation, by M. Isambert. Here the author endeavours to resume the results of his experimental researches on dissociation in a simple theory based on the thermic data, by means of which alone it is possible to appreciate chemical phenomena.—On the preparation of the sulphate of the sesquioxide of pure chromium, by M. H. Baubigny.—Explanation of a method for determining the density of liquid oxygen, by M. Menges. The author obtains the equation $d = \frac{V_1 d_1}{v - v_1}$, where d = the density of the liquid gas, v = its volume, V = the volume of the gaseous portion, all known quantities.—On colloidal ferric ethylate and ferric hydrate, by M. Ed. Grimaux.—On a chloruretted silicate of manganese, by M. Al. Gorgeu.—On the influence of plastering on the composition and the chemical properties of wine, by M. L. Magnier de la Source. The plastering process with chemically pure sulphate of lime has the effect of decomposing not only the cream of tartar, but also the neutral organic combinations of potassium which are present in a very considerable proportion in the perfectly ripe grape.—On the presence of the diamond in some graphic stone occurring near Bellary, Madras Presidency, by M. Chaper.—On the fossil Echinidæ of the Eocene formations at Saint-Palais (Charente Inférieure), by M. G. Cotteau.

BERLIN

Physical Society, January 4.—Prof. Neesen briefly communicated the contents of a paper sent in by Herr Friedrich C. S. Müller, describing three apparatus used in connection with the delivery of lectures: a tangent compass, a galvanometer, and a rheostat. These instruments were intended to take rapid measurements, and to render them visible to a large audience. Following up this subject, Prof. Neesen gave a short account of the contrivance by which in his lectures he measured the mutual attraction of two magnets by means of scales. In conclusion, he reported experiments instituted by him with a view to determining the influence of magnetisation on electrical conducting power. In these experiments he had made use of a magnetic substance of high specific resistance, a solution of chloride of iron. Two equal tubes were filled with the same solution, and inserted as the two branches of a Wheatstone bridge into the circuit of a galvanic battery; the two other branches being so arranged that the galvanometer stood at zero. The electrodes in the two tubes consisted of iron plates, and were exactly alike. The tubes, that is, the fluid conductors, had in the different experiments different shapes and different diameters. The contents of the one tube were then magnetised either by a magnetising spiral or by a powerful electromagnet, and the galvanometer was observed during this process of magnetisation. The result of the experiments was in every case a negative one. Very slight deflexions were indeed observed in the galvanometer needle in the case of the experiments with the magnetising spiral, but these proceeded from the slight heating of the fluid, an effect which, notwithstanding the solution of chloride of iron was surrounded by a casing of circulating water, had not been wholly avoided. In those experiments, on the other hand, in which the magnetisation was made by means of the electromagnet, the needle remained invariably at rest.—Prof. Rœber discussed and explained the principle of experiments made on the Rhone and reported in the *Comptes Rendus*. These experiments had for their object the towing of ships by means of ropes wound round the whole vessel.—Dr. Kœnig gave a short preliminary communication on the experiments, which, in cooperation with Dr. Dietrici, he had made, with a view to determining the precise position of different spectral colours and the sensitiveness of the eye for distinguishing colours. At the next meeting of the Society he would speak at greater length on the subject, illustrating it by numerical data.

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