at the Newcastle School, Staffordshire; J. Brill, B.A., Fourth Wranger in 1882, Assistant Professor of Mathematics in University College, Aberystwith; W. F. R. Weldon, B.A., First Class in the Natural Sciences Tripos of 1881, author of a number of papers in Zoology and Comparative Anatomy, formerly Demonstrator to the Professor of Zoology and in the Morphological Laboratory; A. R. Johnson, B.A., Sixth Wrangler and First Division in the Mathematical Tripos of 1882–83 (new regulations), author of papers in the *Messenger of Mathematics*, &c.; G. F. Stout, B.A., First Class in the Chemical Tripos of 1881–82 (new regulations), and First Class (with distinction in Metaphysics) in the Moral Sciences Tripos of 1883; G. B. Mathews, B.A., Senior Wrangler in 1884, Professor of Mathematics in the University College of North Wales, Bangor. It is worth noting that Pure and Applied Mathematics, Chemistry, and Biology have been markedly recognised by this election.

Dr. Donald MacAlister has been appointed University Lecturer in Medicine, and Dr. Bushell Annington University Lecturer in Medical Jurisprudence.

Mr. Walter Heape has been approved by the Board for Biology and Geology as Demonstrator in Animal Morphology, on the nomination of the Lecturer in that subject, Mr. Sedgwick.

Prof. Sidgwick, Prof. Adamson (Owens College), and Messrs. James Ward and J. S. Nicholson are appointed Examiners for the Moral Sciences Tripos.

Mr. A. R. Forsyth of Trinity College is appointed Examiner in the Mathematical Tripos (Third Part) in January next, in the place of the late Mr. R. C. Rowe.

In reference to our note a fortnight ago (vol. xxx. p. 649), we should state that, at Trinity College, Major Scholarships of the value of 80*l.* a year, which may be raised to 100*l.* subsequently, are open for competition in Natural Sciences as well as in Classics and Mathematics to persons not yet in residence, with the usual restriction as to age.

SHEFFIELD.—Another step has been taken in the formation of the new Engineering School at Firth College, Sheffield, in the appointment of Mr. W. H. Greenwood to be Professor of Metallurgy and Mechanical Engineering, and Mr. Ripper to be Assistant Professor of Engineering. It may be in the memory of our readers that the City and Guilds of London Institute made a grant about eighteen months ago of 300*l.* a year to the Firth College in aid of the establishment of a Chair of Engineering. Since then additional subscriptions have been promised for five years to the amount of 550*l.*, together with a capital sum of over 10,000*l.* A site for laboratories and shops has been obtained, and these will be proceeded with as soon as possible. It is hoped that the special advantages of Sheffield will make it the central school of metallurgy, especially for iron and steel, in the kingdom, and the Committee intend to spare no efforts in rendering it a complete and effective one.

SCIENTIFIC SERIALS

The American Journal of Science, September.—On the amount of the atmospheric absorption, by S. P. Langley. From numerous observations taken at sea-level or at an altitude of nearly 15,000 feet, the author is led to infer that the mean absorption of light as well as of heat by our atmosphere is probably at least double the usual estimate of about 20 per cent. He also believes that fine dust particles, both near the surface and at a great altitude, play a more important part in this absorption, both general and selective, than has been hitherto supposed.—A study of tornadoes, by Henry A. Hazen. In this paper the author examines some of the ordinary theories that are advanced for explaining the origin and development of these destructive phenomena. After showing some of the seeming difficulties involved in these theories, he proceeds to point out a few of the characteristics of the outbursts, with a view to opening up fresh lines of investigation, upon which a further advance may be made towards a true knowledge of the forces underlying them. He is inclined to think that J. Allan Broun's theory, attributing tornadoes to the direct influence of the sun's electricity upon the moisture of the air, or possibly to the indirect effect from the sun's heat, is more satisfactory than the numerous theories of friction, evaporation, condensation, sudden changes of temperature, and the like.—On the absorption of radiant heat by carbon dioxide, by J. E. Keeler. The author considers it probable that to the action of CO_2 in the atmosphere is due one or more of the great gaps in the invisible part of the solar spectrum which the discoveries of Prof. Langley show to be much more extensive than had hitherto been supposed. He further regards it as certain that some other agent than this gas contributes essentially to the total absorptive power of the atmosphere, so that a method of analysis based on this power, in which the effect of the second agent is neglected, cannot lead to correct results.—Note on the Triassic insects from Fairplay, Colorado, by Samuel N. Scudder. These fossil remains present an assemblage of forms altogether different from anything hitherto found in the Palæozoic series on the one hand, or in the Jurassic beds on the other. They seem to show a commingling of strict Jurassic forms with a larger proportion of types which may be called Upper Carboniferous or Permian, with a distinct Jurassic leaning. Hence the probability that the beds in which they occur belong to the Triassic or intermediate formation.—On the flexibility of Itacolumite, by Orville A. Derby. From observations made on this extensive series of quartzose rocks occurring in the gold and diamond regions of Minas Geraes, Brazil, the author infers that the peculiar property of flexibility attributed to them is not an original characteristic, but only a surface character, a phase of weathering or decay brought about by percolating waters.—On the age of the glazed and contorted slaty rocks in the vicinity of Schodack Landing, Rensselaer County, New York, by S. W. Ford.—On the relations of the mineral belts of the Pacific slope to the great upheavals, by Geo. F. Becker. The views of H. P. Blake and Clarence King regarding the parallelism of the series of mineral belts on the Pacific slope to the great mountain ranges, and attributing the deposits themselves to the solfateric action accompanying the ejection of igneous rocks, have since been mainly confirmed. But, independently of any theory, a conclusion of economical importance evidently follows from the fresh facts recently brought to light. A great majority of all the rich ores west of the Wahsatch Range occur in belts following the western edges of distinct geological areas—the Cretaceous in Utah, the Palæozoic and Carboniferous in Nevada and Arizona, the Jura-Trias in East California, &c. Hence analogy points to the neighbourhood of the still unexplored portions of these contacts as the most promising for future discoveries of the precious metals.—Notice of the remarkable marine fauna occupying the outer banks off the southern coast of New England, No. 9, by A. E. Verrill.—Brief contributions to zoology from the Museum of Yale College, No. lv.—Work of the steamer *Albatross* in 1883.—Geology of the Blue Ridge, near Balcony Falls, Virginia, by John L. Campbell.

October.—On the duration of colour-impressions upon the retina, by Edward L. Nichols. Taking up the subject where it was left fifty years ago by Plateau's researches, the author concludes, from a protracted series of experiments: (1) that the study of the duration of colour-impressions produced by different portions of the spectrum tends to confirm Plateau's results; (2) that the persistence of the image is a function of the wave-length producing it, being greatest at the ends of the spectrum, and least in the yellow; (3) that it decreases with the intensity of the ray producing it; (4) that it is not the same for all eyes; (5) that the duration is in inverse order to the luminosity of the colours producing it; (6) that each wave-length of the visible spectrum produces three primary impressions, red, green, and violet, of which the green is the most evanescent, violet the most persistent; (7) that the duration of the retinal image depends upon the length of time during which the eye has been exposed, decreasing as the exposure increases.—Description of a fulgurite from Mount Thielson, Oregon (one illustration), by J. S. Diller.—On the paramorphosis of pyroxene to hornblende in rocks (two illustrations), by Geo. H. Williams.—On the southward ending of a great synclinal in the Taconic Range (with a map and several illustrations), by James D. Dana. The section of the Taconic Range here dealt with extends about 150 miles along the western border of New England, mainly between Middlebury, in Central Vermont, and Salisbury, in North-Western Connecticut. The conclusions arrived at regarding the synclinal character of the system and the Lower Silurian age of the rocks agree with those of Sir William Logan, except that he made the limestone to precede instead of to include the Trenton group.—On supposed glaciation in Pennsylvania, south of the terminal moraine (with a map), by Prof. H. Carville Lewis. The author considers that all the existing surface phenomena may be explained by the action of running waters and other causes independent of glaciation.—History and chemical analysis of a mass of meteoric iron

found in a head-stream of the Red River, Wichita County, Texas, by J. W. Mallet. The analysis yielded iron over 90 per cent., nickel over 8, a little cobalt, tin, phosphorus, copper, sulphur, graphitic carbon, silica, and a trace of manganese.—The life and work of Jean-Baptiste-André Dumas, by J. P. Cooke.—Account of a new meteorite discovered in Grand Rapids, Michigan, on May 15, 1883, by J. R. Eastman. The analysis of the fragment now in the Smithsonian Institute yielded: iron 94·543, nickel 3·815, cobalt 0·369, insoluble residue 0·118.

Rivista Scientifico-Industriale, September 15-30.—Origin of atmospheric electricity, of thunder-clouds and volcanic eruptions, by Giovanni Luvini.—Description of an automatic and continuous registrator of electric energy transmitted at a given part of a circuit, by Prof. Rinaldo Ferrini.—On the electric conductivity of greatly diluted saline solutions, by Dr. Giuseppe Vicentini.—On a system of electro-chronometric bells adapted to private residences, by Giuseppe Bianchedi.—Note on the Walker railway-carriage break, by Angiolo Villa.—On a new system of simultaneous telegraphy and telephony, by M. Van Rysselberghe.—Descriptive notes on the fauna of Sardinia, by Prof. A. Costa.

SOCIETIES AND ACADEMIES

LONDON

Chemical Society, November 6.—Dr. Perkin, F.R.S., President, in the chair.—It was announced that a ballot for the election of Fellows would take place at the next meeting of the Society (November 20).—The following papers were read:—On the action of aldehydes and ammonia upon benzil (continued), by F. R. Japp and S. C. Hooker. In previous papers two general reactions have been studied relating to the joint action of aldehydes and ammonia upon similar bodies; in addition, a third totally distinct reaction occurs, which is investigated in the present paper. The authors have studied the action of salicylaldehyde and ammonia upon benzil. A condensation-product, $C_{28}H_{24}N_2O_4$, was obtained, which proved to be dibenzoyldihydroxystilbenediamine. By the action of dilute hydrochloric acid, the hydrochloride of a new base, $C_{14}H_{16}N_2O_2$, was formed; its platinum salt, picrate, sulphate, diacetyl derivative, &c., were prepared and examined. The authors have also studied the action of furfuraldehyde and ammonia upon benzil.—Isomeric modifications of sodium sulphate, by S. U. Pickering. The author has determined the heat of dissolution of efflorescd sodium sulphate heated to various temperatures. He concludes that there are two modifications: one formed by not heating above 150°, the other being produced at temperatures from 150° to the fusing-point of the salt.—On some vanadates of the amines, by G. H. Bailey. The author has prepared and studied a considerable number of these bodies, and has compared them with the corresponding vanadates of the alkalies.—Contributions to our knowledge of acetoacetic ether, part 1, by J. W. James.—On magnesium hydrosulphide solution and its use in chemico-legal cases as a source of hydrogen sulphide, by E. Divers and T. Shimidzu. The authors prepare this solution by passing ordinary hydrogen sulphide into a flask containing magnesia suspended in water. By heating the solution to 60°, a steady stream of hydrogen sulphide free from hydrogen and from hydrogen arsenide is obtained.—On the origin of calcium thiosulphate: an emendatory note to a paper on calcium hydrosulphide, by E. Divers. The author concludes that there is essentially only one method of forming the thiosulphate, *i.e.* by the union of sulphur with calcium sulphite.

Physical Society, November 8.—Prof. Ayrton in the chair.—Mr. Kavargee was elected a member of the Society.—Prof. F. Guthrie read a paper on certain phenomena attending mixture. In a previous paper Dr. Guthrie had noticed the increase of volume attending the separation of triethylamine and water effected by heat. The present paper is an account of a more thorough examination of this and allied phenomena. Experiments conducted with a number of different liquids showed that mixtures can be arranged in two distinct classes. Of the first a mixture of water and ether is an example: when shaken up together they mix, heat is *evolved*, and a *diminution* of bulk takes place. If any excess of ether present is poured off, and the lower clear liquid *heated* in a sealed tube, it becomes turbid owing to the separation of the ether. This is accompanied by an *increase* of bulk and *absorption* of heat. Triethylamine and water and diethylamine and water are mixtures belonging to this class; the temperature of separation is a function of the ratio in which the two liquids are present. A typical case of the second class is a mixture of alcohol and bisulphide of carbon. These mix with one another in all proportions above 0° C. with *increase* of bulk and *absorption* of heat. Upon being *cooled* to about − 17° C. they separate. The separation of a mixture of ether and water and of a mixture of alcohol and the bisulphide was shown. In these cases the action is regarded as a chemical one, and generally an excess of one liquid or the other is present. To determine the combining proportions two methods were used. In the first a number of mixtures of the same two liquids in different proprtions were taken, and the rise or fall of temperature produced by their mixture measured. When this was a maximum, there might be assumed to be no "dead matter" present. In the second method, which is more delicate, but more laborious, and which was used when the approximate combining proportion had been found by the first, the change of volume produced by mixture was noted; when this increment is a maximum, the liquids are present in their combining proportion. These experiments gave very concordant and definite results: for example, the molecular compound of ether and carbonic sulphide is represented by the formula $C_4H_{10}O,2CS_2$, and that of chloroform and carbonic sulphide by $CHCl_3,CS_2$. A striking confirmation of this view is afforded by the behaviour of the vapour-tension of a mixture. The temperature being constant, if the vapour-tension is plotted with the percentages of the more volatile liquid as abscissæ, the curve is, for a mixture of two liquids which have no chemical action upon one another, as the iodide and bromide of ethyl, a straight line. For ordinary mixtures, however, this is not the case. A curve is obtained in which there is observable at a certain point an irregularity. The corresponding abscissa indicates the molecular combination found by the previous experiments.—Dr. C. R. Alder Wright read a paper by himself and Mr. C. Thompson, on voltaic and thermo-voltaic constants. In a former paper the authors had stated that in a cell set up with two metals immersed in pure solutions of their corresponding salts, a given increment in the strength of the solution surrounding the metal acquiring the higher potential causes an increment (a) in the E.M.F. set up (e), while an increment in the strength of the other solution causes a decrement (b) in the E.M.F. This law is now substantiated; it is, however, found that for dilute acids, instead of metallic salts, (b) may be negative. The authors also find that it is possible to represent the E.M.F. of a cell by the difference of two quantities which they term the voltaic constants. These are quantities, one relating to each plate and its surrounding liquid. The voltaic constant of a metal and a liquid is a function of the nature of the metal surface, the strength of the solution, and the temperature, but is independent of the opposed plate and its liquid; it is practically defined as the E.M.F. set up when opposed to a zinc plate in a solution of the corresponding salt of the same molecular strength. The authors further conclude that the E.M.F. of a given combination usually *stands in no simple relationship to the chemical action taking place in the cell*, but that it may be expressed by the sum of the mechanical equivalent of the chemical action per electro-chemical equivalent, and the difference of two quantities, one being related to each metal and its surrounding liquid, and being constant for that metal and liquid termed *thermo-voltaic constants*. This thermo-voltaic action may act with or against the chemical action in producing E.M.F. In some cases, as in that of a cell composed of iron in ferrous sulphate and cadmium in cadmic sulphate solutions, the E.M.F. is against and greater than that produced by chemical action; consequently the cell works backwards with absorption of heat. At the close of the paper Prof. Ayrton and Dr. Guthrie remarked upon the apparent exception here shown to the second law of thermodynamics.

PARIS

Academy of Sciences, November 3.—M. Rolland, President, in the chair.—Observations of the new planet 244 made on October 22 to 24 with the equatorial *coudé*, with remarks on the efficiency of this instrument, by M. Lœwy. The author gives a full account of the performance of this equatorial, which has now been installed in the Paris Observatory for the last two years. His opinion of its excellent qualities is supported by the testimony of Dr. Gill and Mr. Norman Lockyer, the latter of whom pronounces it one of the instruments of the future.—A first study on the parallax of the sun, by M. Bouquet de la