George F. Becker. From his researches the author infers that porphyries may form at any depth and no matter how slowly the temperature of the magma may sink, while granular rocks can scarcely ever have been thoroughly fluid or homogeneous, but have often consolidated at pressures extremely moderate compared with those at which it is certain that porphyries would form.—A fifth mass of meteoric iron from Augusta County, Virginia, by George F. Kunz. This specimen, which comes from the same place where was found the largest of the three masses first described by Prof. Mallet, yielded, on analysis: iron 90·293; nickel, 8·848; cobalt, 0·486; phosphorus, 0·243; carbon, 0·177; with traces of copper, tin, sulphur, silica, manganese, chromium, and chlorine. —Note on the origin of comets, by Daniel Kirkwood. It is argued that, although most comets are of interstellar origin, some of short period may have had their rise within the solar system. — The bichromate of soda cell, by Selwyn Lewis Harding. The experiments here described tend to show that this is a most efficient cell, whose effectiveness, as far as its constancy is concerned, might be materially increased by interchanging the positions of the electrodes with their surrounding liquids, after the fashion of the Fuller cell.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, January 13.—"Supplementary Note on the Values of the Napierian Logarithms of 2, 3, 5, 7, and 10, and of the Modulus of Common Logarithms." By Prof. J. C. Adams, F.R.S.

In vol. xxvii. of the Proceedings of the Royal Society, pp. 88-94, the author has given the values of the logarithms referred to, and the value of the modulus, all carried to 260 places of decimals.

The calculations in that paper were carried to several more decimal places, but the application of an equation of condition which supplied the means of testing the accuracy of the whole work, showed that errors had crept into the work which vitiated the results beyond 263 places of decimals.

Through inadvertence, however, the results were printed in the above paper exactly as they were given by the calculations, although several of the later decimals, especially in the value found for the modulus, were known to be wrong.

The author has now succeeded in tracing and correcting the errors which occurred in the former calculations, and the equation of condition which tests the accuracy of the work is now satisfied to 274 places of decimals.

The present paper gives the parts of the several logarithms concerned which immediately follow the first 260 decimal places as already given in the former paper, and likewise the corrected value of the modulus, which is found to be—

M=·43429 44819 03251 82765 11289 18916 60508 22943 97005 80366
65661 14453 78316 58646 49208 87077 47292 24949 33843 17483
18706 10674 47663 03733 64167 92871 58963 90656 92210 64662
81226 58521 27086 56867 03295 93370 86965 88266 88331 16360
77384 90514 28443 48666 76864 65860 85135 56148 21234 87653
43543 43573 17253 83562 21868 25

which is true to 272 or 273 places of decimals.

February 10.—"Contributions to the Metallurgy of Bismuth." By Edward Matthey.

"An Inquiry into the Cause and Extent of a Special Colour-Relation between certain Exposed Lepidopterous Pupæ and the Surfaces which immediately surround them." By Edward B. Poulton.

Linnean Society, February 3.—W. Carruthers, F.R.S., President, in the chair.—Dr. M. C. Grabham and Capt. G. Wingate were elected Fellows of the Society.—Mr. G. Maw exhibited a *Narcissus cyclamineus* grown by him from bulbs sent by Mr. A. W. Tait, of Oporto. The plant in question was known to Parkinson (1640), afterwards was lost of, and rediscovered by Mr. Johnston, near Oporto, in 1885.—Mr. Maw showed a drawing of *Crocus Karducharum*, and another, for comparison, of *C. zonatus*, from the Taurus, to which it is allied. —Brigade-Surgeon J. E. T. Aitchison read a paper on the fauna and flora of the Afghan boundary. The zoological collection obtained comprised, in round numbers, 20 species of mammals, 130 species of birds, 35 species of reptiles, 7 species of fish, and over 100 species of insects. Among these, many were new to science. Of special interest is the mole-like rat, *Ellobius fuscicapillus*, hitherto only known from the type obtained forty years ago at Quetta. In certain places the ground is riddled with the burrows of this and other rodents. The geographical range of the tiger goes east and north to Bala Murghab; that of the cheetah to the valley of the Heri-rud. A pheasant (*Phasianus principalis*) and woodpecker (*Gecinus gorii*) are new. With some exceptions, the birds are chiefly migratory, their arrival in spring following each other in quick succession. The Brahmini duck (*Casarca rutila*), unlike its congeners, nests and remains throughout the year. The most abundant species of birds are, among the genera *Saxicola*, *Lanius*, *Sylvia*, *Motacilla*, and *Emberiza*. An adult fine example of *Naia oxiana* is a museum acquisition, as the species heretofore has only been recognised from young undeveloped specimens. Regarding the insects, 20 are new, though, taken as a whole, the insect fauna resembles that of Arabia and North Africa, rather than that of India proper. The botanical collections amount to 800 species, and probably 10,000 specimens of plants. Over 100 are new to science. The author gave some account of the physical features of the districts traversed, and of the climate. Taking these into consideration, he states that the plants do not represent what is generally recognised as an Oriental flora, being chiefly composed of northern Persian and Arabian forms, augmented by Central Asian and Siberian types, with a few West Himalayan or Tibetan, and still fewer representing the Punjab or Scind. Beside these are a fairly representative local flora; say, one-sixth of the collection. *Juniperus excelsa* is the only indigenous conifer; neither oaks nor species of *Æsculus*, *Olea*, or *Myrtus* were met with. *Populus Euphratica* forms forests in the river-beds, but as long as the tree is situated near water it is indifferent to altitude. Out of 75 natural orders, Compositæ and Leguminosæ greatly preponderate over the others, containing 81 and 80 species respectively. In Compositæ, *Cousinia* heads the genera with 18 species; *Centaurea* has 10 species. Of 80 species of Leguminosæ, 39 belong to the genus *Astragalus*, 14 of these being new. Of 61 species of Gramineæ, all are well known. The Cruciferæ collected number 56 species; several are new. Chenopodiaceæ follow with 39 species, Labiatæ with 35, Boraginaceæ 32, Umbelliferæ 30, Caryophyllaceæ 30, Rosaceæ 27, Lilliaceæ 26, Euphorbiaceæ 16, Polygonaceæ 15, Ranunculaceæ 14, Rubiaceæ and Cyperaceæ each 13, Scrophularineæ and Plantagineæ 10 and 11 respectively. The orchards at some of the villages are surrounded with high walls, inside which is a row of mulberry-trees grown for the breeding of silkworms. In the Afghan gardens, beetroot, carrots, turnips, cabbages, radishes, and tomatoes are raised, and these are of excellent quality. In the fields, besides wheat, rye, and barley, opium, tobacco, melons, and certain oil-seeds are cultivated. Cotton is grown, but the quality of the fibre is poor. Several plants of pharmaceutical value flourish—Galbanum, Ammoniacum, &c., and of these the author gave a full account.

Zoological Society, February 1.—Dr. St. George Mivart, F.R.S., Vice-President, in the chair. — Mr. F. Day exhibited and made remarks on a hybrid fish supposed to be between the pilchard and the herring, and a specimen of *Salmo purpuratus* reared in this country.—Mr. W. L. Sclater exhibited and made remarks upon some specimens of a species of *Peripatus* which he had obtained in British Guiana during a recent visit to that country, and added some general observations on the distribution and affinities of this singular form of arthropods.—Mr. A. Thomson read a report on the insects bred in the Society's Insect House during the past season, and exhibited the insects referred to.—A communication was read from Dr. B. C. A. Windle, containing an account of the anatomy of *Hydromys chrysogaster*.—Mr. Martin Jacoby read a paper containing an account of the Phytophagous Coleoptera obtained by Mr. G. Lewis in Ceylon during the years 1881, 1882. About 150 new species were described and many new generic forms.—Mr. F. E. Beddard read some notes on a specimen of a rare American monkey, *Brachyurus calvus*, which had died in the Society's Gardens.—Mr. Oldfield Thomas read a note on the mammals obtained by Mr. H. H. Johnston on the Camaroons Mountain. —A paper was read by Capt. Shelley, containing an account of the birds collected by Mr. H. H. Johnston on the Camaroons Mountain. The collection contained thirty-six specimens referable to eighteen species, and of these four were new to science. —Mr. G. A. Boulenger read a list of the reptiles collected by Mr. H. H. Johnston during his recent visit to the Camaroons Mountain.—Mr. Edgar A. Smith read a paper on the Mollusca collected at the Camaroons Mountain by Mr. H. H. Johnston,

and gave the description of a new species of *Gibbus*, proposed to be called *Gibbus johnstoni*, of which specimens were in the collection.—A communication was read from Mr. Charles O. Waterhouse, containing a list of some coleopterous insects collected by Mr. H. H. Johnston on the Camaroons Mountain.

Geological Society, January 12.—Prof. J. W. Judd, F.R.S., President, in the chair.—The President announced the sad loss which the Society had sustained since the last meeting by the death of Mr. John Arthur Phillips, F.R.S., who had been for several years a valuable member of the Council, and one of the Vice-Presidents of the Society.—The following communications were read:—The Ardtun leaf-beds, by J. Starkie Gardner, with notes by Grenville A. J. Cole. The description of these beds by the Duke of Argyll thirty-five years ago indicated that enormous tracts of trap in the Inner Hebrides were of Tertiary age. Prof. Edward Forbes, who described the leaves, inclined to the idea that they might be Miocene; but in estimating the value of this conjecture, we must remember that at the time the existence of Dicotyledonous leaves of similar aspect, but of undoubtedly Cretaceous age, was quite unsuspected, and that no typical Eocene flora had then been properly investigated or described. Prof. Heer adopted the opinion that the age of this formation was Miocene, and unfortunately extended its application to formations containing similar floras in Greenland and elsewhere. The writer of the present communication tried to show that instead of belonging to the Miocene, these floras are of Eocene age, and in fact older than the Thanet beds. He also re-described the plant-beds, and maintained that they are part of a rather extensive series of sedimentary rocks intercalated among the traps.—On the Echinoidea of the Cretaceous strata of the Lower Narbadá region, by Prof. P. Martin Duncan, F.R.S.—On some Dinosaurian vertebræ from the Cretaceous of India and the Isle of Wight, by R. Lydekker.—Further notes on the results of some deep borings in Kent, by W. Whitaker.

January 26.—Prof. J. W. Judd, F.R.S., President, in the chair.—The following communications were read:—On the correlation of the Upper Jurassic rocks of the Jura with those of England, by Thomas Roberts.—The physical history of the Bagshot Beds of the London basin, by the Rev. A. Irving. The author, in reviewing the position taken up by him, attempted to estimate the value of such palæontological evidence as exists, and insisted on the importance of the *physical* evidence in the first place. He gave reasons for considering the evidence of pebbles, pipe-clay, derived materials, irony concretions, percentages of elementary carbon (ranging in the more carbonaceous strata up to nearly 2½ per cent.) taken together with the evidence of carbon in combination, as adduced in former papers, *fresh-water Diatoms* (now, perhaps, recorded for the first time in the Middle and Lower Bagshot), and the microscopic structure of the sands and clays, as furnishing such a cumulative proof of the fluviatile and delta origin of the majority of the Middle and Lower Bagshot Beds, as can hardly be gainsaid; while he regarded the wide distribution of the Sarsens as indicating, along with the fauna, a much greater areal range formerly of the Upper Bagshot than of the strata below them.

Mineralogical Society, January 11.—Mr. L. Fletcher, President, in the chair.—Messrs. A. Pringle, G. T. Prior, and J. M. Thomson, were elected Members.—The following papers were read:—On a specimen of meteoric iron found at Yundagin, West Australia, in 1884, by Mr. L. Fletcher, President.—Additional notes on the feldspar from Kilima-njaro, by Mr. L. Fletcher, and Mr. H. A. Miers.—On the occurrence of greenockite in a new locality, by Prof. M. F. Heddle.—Note on a form of calcite from Heilim, Sutherlandshire, by Prof. M. F. Heddle.—Note on the occurrence of bismutite in the Transvaal, by Mr. H. Louis.—Notes on celestine from Gloucestershire and on apatite from East Cornwall, by Mr. R. H. Solly.—Note on the presence of lead in calcite from Leadhills, by Mr. J. Stuart Thomson.—On the use of gnomonic projection, by Mr. H. A. Miers.—Prof. Judd exhibited a specimen of a new terrestrial alloy of iron and nickel (Ni_2Fe) discovered in New Zealand by Prof. Ulrichs.—Colonel MacMahon exhibited a crystal of sapphire from a vein which had been revealed by a landslip in the south-east of Cashmere, about the year 1880.

PARIS

Academy of Sciences, February 7.—M. Gosselin, President, in the chair.—Movements of a bird's wing represented according to the three dimensions of space, by M. Marey. In continuation of his first communication on the flight of birds, the author here shows, by a series of chrono-photographic images, how the movement of the wing is made according to the three dimensions of space. One of the illustrations gives a synoptic view of the projections of the wing on three different planes at ten successive instants of a single revolution, thus containing all the elements necessary to determine the continuous action of the wing. Further chrono-photographic experiments are promised, which will convey a complete representation of all the alar movements, and in general of all notions relating to the kinematics of flight.—On the red fluorescence of alumina, by M. Lecoq de Boisbaudran.—On the composition of the ashes of cider, by M. G. Lechartier. The study of the composition of the ashes which ciders yield by incineration is here undertaken, both for its scientific interest and on account of the indications it may give of their purity. The author inquires whether this composition presents uniform distinctive characters whatever its local origin, and finds that the ashes of the cider apple are in no way modified by the nature of the soil. He also shows the differences existing between the ashes of the fruit, the leaf, and the wood of the apple-tree.—Experiments relative to the anti-phylloxeric disinfection of the grape-vine, by MM. Georges Couanon and Etienne Salomon. The varying results of M. Balbiani's already-described process are here reported from various districts throughout France for the year 1886. Although generally satisfactory, the remedy was found in some cases to be as bad as the evil, the failure being attributed either to the unhealthy state of the plant or to climatic or other local conditions.—Fresh researches on the action exercised by cuprous preparations on the development of the Peronospora of the vine, by MM. Millardet and Gayon. These experiments, carried out last September, fully confirm the conclusion already anticipated by the authors, that in these mixtures the essential prophylactic agent is the copper dissolved by rain-water and dew.—Memoir on the developments of naval geometry, with application to the calculations of stability, by MM. Guyou and Simart. The authors consider their method as a distinct improvement on those of their predecessors, Charles Dupin, Bravais, Rankine, Reech, Leclert, and Daymard. Thanks to their new formulas, the still laborious calculations which are required even by Daymard's method (recently crowned by the Academy) are much shortened.—Geographical co-ordinates of Punta-Arenas, by M. Cruls. For this important station the following values have been recently determined: Latitude 53° 9′ 38″·6 S.; Longitude 4h. 43m. 36·09s. west of Greenwich.—Equatorial observations of the new comets, Brooks and Barnard, made at the Observatory of Algiers with the 0·50m. telescope, by MM. Trépied and Rambaud.—On entire algebraic series, by M. L. Lecornu.—Some experiments on aërial eddies, by M. Ch. Weyher. The experiments here described deal with waterspouts in the open air, with whirlwinds in an inclosed space, with the attraction produced by vortices, and with the variation of temperature in an eddy.—On the electrolysis of alkaline solutions, by M. Duter. In the electrolysis of aqueous solutions of potassa, soda, baryta, or lime, the volume of oxygen liberated on the positive electrode is considerably less than half that of the hydrogen liberated on the negative electrode. But with a wide platina plate for positive and a fine platina wire for negative electrode, the author obtains one volume only of oxygen for four of hydrogen. In the electrolysis of alkaline solutions there appear to be formed small quantities of a superoxygenated compound combined with an alkali in such a way that it cannot be liberated by ebullition but only by an acid. This appears to be a peroxide of hydrogen, by the existence of which M. Berthelot explains various reactions, such as that of the permanganate of potassa on oxygenated water.—The principle of maximum labour and the laws of chemical equilibria, by M. H. Le Chatelier. It is shown that under a single law may be reduced all the phenomena without exception of vaporisation, allotropic transformation, and dissociation from − 200° C., boiling-point of oxygen, to + 1000° C., point of dissociation of the oxide of iridium.—Action of the oxide of lead on some dissolved chlorides, by M. G. André. Some true oxychlorides are here described, which the author has obtained by studying the action of certain oxides on the solutions of the alkaline earthy chlorides.—Combinations of the glycerinate of potassa with the monatomic alcohols, by M. de Forcrand. The glycerinates here studied are those of methylic, ethylic, propylic, amylic,

and isobutylic potassa.—On phosphoplatinous chloride, $PhCl_3PtCl_2$, by M. E. Pomey.—On a combination of orthotoluidine and the bichloride of copper, by M. E. Pomey. The formula of the combination here determined is shown to be $CuCl_2 . 5(C_7H_9N . 4Cl)$.—On the hydrochlorate and platinochlorate of di-isobutylamine, and the platinochlorate of tri isobutylamine, by M. H. Malbot. These substances, apparently not hitherto produced, have for formulas: $HCl . N(C_4H_9)_2H$; $PtCl_4 . 2HClN(C_4H_9)_2H$; and $PtCl_4 . 2HClN(C_4H_9)_3$.—On gluconic acid, by M. L. Boutroux. The author has succeeded in preparing sufficient quantities of this acid by means of the process indicated by MM. Kiliani and Kleemann.—On the characteristic properties of olive oils, by M. Albert Levallois It is shown that the most constant character of olive oils prepared in the laboratory from various berries from the south of France is density. A simple method is described for distinguishing these from the oils of sesame, cotton, colza, linseed, and cameline.—On sardine-fishing, by M. Launette. The abundance and scarcity of this fish on the west coast of France is shown to be intimately associated with the animal refuse drifting across the Atlantic from the Newfoundland cod-fisheries.—On the formation of the so-called "red wood" (*bois rouge*) in the fir and Epicea, by M. Emile Mer. The occasional development of these hard and yellow-coloured layers in the relatively soft and white wood of the fir and Epicea is here attributed to the superabundance of nutritive elements at certain points under various conditions of growth.—On the Miocene vertebrate fauna of Grive-Saint-Alban, Isère, by M. Charles Depéret. Amongst the most interesting remains of this fauna is an anthropoid ape, Sansan's *Pliopithecus antiquus*, whose molars point to a relationship with the present gibbons.—Synthetic experiments on the abrasion of rocks, by M. J. Thoulet. These experiments have been carried out to determine the laws regulating the weathering of rocks under the action of drift sand.—On the age of the bauxite deposits in the south-east of France, by M. Louis Roule. This formation seems to have been deposited on the bed of the lake formerly stretching between Provence and Languedoc, and belongs to the lacustrine series closing the Chalk epoch in this region.—On the distribution of mean cloudiness on the surface of the globe, by M. L. Teisserenc de Bort.

BERLIN

Physiological Society, December 10, 1886.—Prof. du Bois-Reymond in the chair.—Dr. Hermes showed the luminous Bacillus brought some time ago with marine fish from the West Indian Ocean and bred in pure cultures. In nutrient gelatine the Bacillus formed funnel-shaped cultures at the surface. Inoculated into sterilised fish it rendered them luminous to a very high degree. The Bacillus developed also in fresh-water fish, but only when these were placed in salt water. In fresh water the Bacillus disappeared. At temperatures below 15° Celsius, the luminosity ceased. It was easy with this fish-Bacillus to render a large quantity of sea water luminous. If, however, the water were allowed to stand for twenty-four hours, only the surface was luminous; but by stirring it up the whole mass again became luminous in consequence of the interpenetration of the air.—Prof. Zuntz reported on experiments which, in conjunction with Dr. Berder, he had instituted with a view to ascertaining the effect of alcohol on metastasis in man. The respiration was especially examined. An essential preparatory condition for such experiments was the complete cessation of all muscular activity, which increased the absorption of oxygen and the formation of carbonic acid, as was also protection against the too rapid cooling, promoted by the flow of blood in the skin, consequent on the operation of the alcohol. With the moderate use of alcohol (20 ccm.), so as to produce no perceptible sign of intoxication, the absorption of oxygen was somewhat increased without corresponding increase in the formation of carbonic acid, a relation corresponding with the combustion of the alcohol, in which two molecules of carbonic acid are formed for every three molecules of oxygen consumed.—Dr. Wurster described a new reagent for the demonstration of active oxygen in the living organism. Tetramethylparaphenylenediamine and dimethylparaphenylenediamine were colourless substances not liable to be changed in the air; but with active oxygen, in form of ozone, peroxide of hydrogen, or nitrous acid, they formed colouring matters, the tetramethyl-compound giving a blue colouring matter, which with an excess of active oxygen again lost its colour; whilst the dimethyl-compound with a little oxygen yielded a red colouring matter, and with excess of oxygen a violet colouring matter. The speaker had saturated paper with these substances. Reagent papers of this description were admirably adapted in all cases for the detection of active oxygen. In cutaneous evaporations, and, in particular, in perspiration, copious quantities of active oxygen were in this way capable of being demonstrated. The presence of such active oxygen might further be demonstrated in the saliva of healthy persons, and in the sap of plants, especially in the milky juices of plants. Seeing that in all these cases ozone was absent, otherwise it would have been recognised by its odour, only peroxide of hydrogen or nitrous acid could be present. By means of other reactions it was shown that in these cases there was no question of anything but peroxide of hydrogen.

January 14.—Prof. Munk in the chair.—Dr. Gad communicated the results of some experiments, which had been carried out by him in conjunction with Dr. Wurster, respecting the active oxygen in the animal organism. By means of the two reagents in active oxygen discovered by Dr. Wurster—dimethylparaphenylenediamine and tetramethylparaphenylenediamine, the properties of which were demonstrated by Dr. Wurster at the last meeting of the Society—animal fluids and tissues were tested in respect of the presence in them of active oxygen. On the skin the reagent papers either remain colourless, or they become coloured symptomatic of slight oxidation, or they become rapidly coloured and rapidly discoloured, which was an invariable phenomenon in the case of stronger oxidation of the diamines. Blood produced no change on either the dimethyl or the tetramethyl, whereas fresh muscles, and even flesh bought at the butcher's, yielded a very strong reaction, an energetic oxidation. If moderate quantities of a solution of the two diamines were injected subcutaneously into frogs or rabbits, or into their venous system, then they got completely oxidised in the body and were no longer capable of being demonstrated. They were altered into colourless combinations; and only in the heart, in the liver, and at the places of application were strong colorations discernible. The stomach was coloured at all places to which the oxygen of the air had entrance; the places, on the other hand, which were protected from the air were colourless, and became coloured only when they were exposed to the air. The brain presented a colouring of olive-green—a phenomenon which would have to be more particularly investigated, seeing that the colourings of oxidation under dimethyl were red or blue, under tetramethyl, blue. In consideration of the fact that the living protoplasm of the cells did not readily take up foreign substances, and taking account of the fact above demonstrated, that the blood did not oxidise either of the two substances in question, the speaker assumed that the complete consumption occurring after the introduction of the two bodies into the living organism was accomplished by the juices of the tissues, or by the fluids which secreted the protoplasm of the cells. The objection made against the experiments, that the diamins were not found because they were not absorbed, was refuted by the fact that the animals operated on always showed the phenomena of intoxication proceeding from the central nervous system. Experiments would be further continued by Dr. Gad and Dr. Wurster. The experiments had hitherto yielded the important fact that in the living organism the protoplasm worked in an especially oxidising manner.

Physical Society, December 17, 1886.—Prof. von Bezold in the chair.—Prof. Neesen exhibited a tuning-fork of variable pitch of tone. It had a hollow stem and hollow prongs, so that it could be filled with quicksilver to any desired height. With the increasing mass of the vibrating-fork the pitch of its tone changed. The excitation was effected by electro-magnetic methods.—Dr. Aron developed the theory of the inductionless coils constructed by him. In this task he pursued the practical object of putting an end to, or at least very much reducing, the spark arising from the extra-current on the interruption of the electric current, and very soon rendering the contacts unavailable. The induction exercised by the iron-nucleus on the windings might, as was well known, be obviated by a copper case, and the induction of the different windings of the spirals on one another was overcome by the speaker by intercalating a tin-foil layer between each layer of windings and embedding the isolated wires in a good conductor. The speaker showed theoretically that by this encasement the heat, and consequently the opening spark, became considerably reduced, especially in the

case of weak currents. The efficacy of this method of procedure was confirmed by the experience that a contact which had been in constant operation for two years remained unchanged.—Dr. Richarz spoke of the formation of peroxide of hydrogen by electrolysis. If a current were conducted through diluted sulphuric acid, then there was formed at the positive electrode a strongly oxidising substance, formerly taken for peroxide of hydrogen, but demonstrated by M. Berthelot to be per-sulphuric acid, S_2O_7. In experiments on the electrolysis of concentrated solutions of sulphuric acid with wire-shaped platinum electrodes, the speaker had obtained in the solution, beside per-sulphuric acid, ozone and peroxide of hydrogen, and assumed that all three bodies made their appearance at the positive electrode. This assumption had been disputed by Traube, and, on the ground of experiments with diluted acids, he had maintained that the peroxide of hydrogen arose only at the negative electrode by reduction of the atmospheric oxygen. Dr. Richarz repeated his experiments, and found that in concentrated sulphuric acid, on electrolysis, peroxide of hydrogen occurred always at the positive electrode when per-sulphuric acid was formed; but that it occurred temporarily later on, and was not a direct product of the electrolysis, but arose through secondary chemical reactions, by oxidation of water through the per-sulphuric acid. The following experiment served as a proof thereof:—A 40 per cent. sulphuric acid solution was subjected to electrolysis, and thereby, on account of too great attenuation, no peroxide of hydrogen, but only per-sulphuric acid, came to view. If, now, into the 40 per cent. sulphuric acid 60 per cent. acid were poured, after the electrolysis was finished, then did peroxide of hydrogen show itself in the fluid.—Dr. Dieterici communicated how he rendered galvanometers insensible to the disturbances of the earth's magnetism by surrounding with an iron cylinder, and setting in an iron box provided with suitable apertures for observation, the windings of the galvanometer up to the height of the mirror set above the needle. Residual magnetism, which was readily recognised, was easily removed by heating and by adjusting the mutual position of the two parts of the iron case.

Meteorological Society, January 4.—Prof. von Bezold in the chair.—The yearly report having been read by the Secretary, and officials elected, Dr. Zenker explained the arrangement and contents of the meteorological calendar edited by him.—Dr. Sprung then read a paper on Hadley's principle. Starting from the phenomenon, now and again observed, of an air-current proceeding in the direction of the meridian, while the gradients of atmospheric pressure operated in a direction perpendicular thereto, the author referred to the circumstance that Hadley had last century resolved the direction of the trade-winds into the simultaneous action of the difference of temperature and of the earth's rotation resulting in a mean course, an explanation which first obtained general acceptance through Dove. The derivation of the curve described by a mass-particle on the earth when it had received an impulse to the north and was rotating in a parallel with the earth had been attempted in two different ways—one way by Mousson and another by Schmidt. The speaker discussed such derivations for the simplest case—that of a rotating disk and of a mass-point thereupon impelled with a certain energy and free from friction towards the centre. Through analytical development of the results, he adopted the method of taking as approximately accurate Schmidt's derivation, which presupposed the force in the direction of the meridians to be a constant value, but the force in the direction of the circle of parallel to augment with the time. After further consideration of the centrifugal force, a basis for the mechanics of atmospheric currents on the earth might be determined by Hadley's principle.

Chemical Society, January 10.—Prof. A. W. Hofmann, President, in the chair.—Prof. Rud. Weber communicated the results of his experiments on some compounds of sulphuric anhydride with phosphoric and iodic anhydrides; he has isolated compounds of the composition $P_2O_5 + 3SO_3$ and $I_2O_5 + 3SO_3$, and he describes their preparation and analysis.—O. N. Witt described a new method of producing the azines; they can be obtained from the decomposition of the azo-compounds produced from diazobenzenesulphonic acid and phenyl-, paratolyl-, and xylyl-β-napthylamine.—C. Friedheim criticised the method recommended by Weil for the volumetric determination of hydrogen sulphide; the method is not only troublesome and complicated, but the reaction does not take place in the manner assumed by Weil. The author gives analytical results showing that the method cannot be depended on.—Prof. Pinner read abstracts of papers by Liweh, and Ramsay and Young.

BOOKS AND PAMPHLETS RECEIVED

Westindische Skizzen, Reise-Erinnerungen: K. Martin (Brill, Leyden). — Sitz. der Kaiserlichen Akademie der Wissenschaften (Mathematische-Naturwissenschaftliche Classe), Zweite Abth., 1, 2, 4, 5, 6, 7, 8. 9. 10; Dritte Abth., 3 to 10; Erste Abth., 1, 2, 3, 5, 6, 7, 8. 9, 10 (Gerold's Sohns, Wien).—Journal of the Chemical Society, February (Gurney and Jackson).—Bulletin du Musée Royal d'Histoire Naturelle de Belgique, tome iv., No. 4.—A Text-book of Euclid's Elements, part 1: H. S. Hall and F. H. Stevens (Macmillan and Co.).—Observatory Temperature-room and Competitive Trials of Chronometers in 1884-86 (Washington).—On the Flora of Shetland: W. H. Beeby (Cowan, Perth).—The Coleoptera of the British Isles: W. W. Fowler (Reeve and Co.).—Loch Creran: W. Anderson Smith (A. Gardner).—The Survival of the Fittest: A. S. Wilson (A. Gardner).—Sitzungsbericht der Physikalisch-Medizinischen Societät zu Erlangen, 18 Heft (Erlangen).—Bulletin of the American Museum of Natural History, vol. i. No. 8.—Bolletino della Società Geografica Italiana, Anno xxi. fasc. 1 (Roma).—Bulletin de la Société de Géographie 4e. trimestre, 1886 (Paris).—Meteorologische Beobachtungen in Deutschland, 1884, Jahrg. vii. (Hamburg).—Le Climate de la Belgique en 1886: A. Lancaster (Hayez, Bruxelles).—Liste Générale des Observatoires et des Astronomes: A. Lancaster (Hayez, Bruxelles).—Mineral Physiology and Physiography: T. S. Hunt (Cassino, Boston).—Notes on South African Hunting; A. J. Bethell (Whittaker).—American Journal of Mathematics, vol. ix. No. 2 (Baltimore).—Imperial University of Japan; Calendar for the Year 1886-87 (Marruya, Tokio).—Anuario de la Oficina Central Meteorolojica de Chile, tomo 18, Correspondiente a 1886 (Santiago).—Journal of the Royal Microscopical Society, February (Williams and Norgate).—Studies in Life and Sense: A. Wilson Chatto and Windus).—Proceedings of the American Association for the Advancement of Science, Twenty-fifth Meeting (Salem).—Annalen der Physik und Chemie, 1887, No. 2 (Barth, Leipzig).—Lehrbuch der Allgemeinen Chemie, Erste und Zweite Haft, Zweiter Band: Dr. W. Ostwald (Engelmann, Leipzig).—Quarterly Journal of the Geological Society, February (Longmans).—Beiblätter Annalen der Physik und Chemie, 1887, No. 1 (Barth, Leipzig).—Verhandlungen der Gesellschaft für Erdkunde zu Berlin, Band xiv. No. 1 (Remier, Berlin).—Zeitschrift der Gesellschaft für Erdkunde zu Berlin, Nos. 126 und 127 (Remier, Berlin).—City of York; Report on the Prevalence of Typhoid Fever in York, 1886 (Johnson, York).

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