to the importance of nature-study as a factor in the new education, the author insists on its value as a means of cultivating the powers of observation and at the same time warns his readers that it is not to be considered as in any way identical with elementary science. Various definitions and limitations of the subject are then given, after which attention is directed to its aims and objects. Among these, stress is laid on its power of interesting pupils—especially those to whom the ordinary school-curriculum is peculiarly distasteful—and thus rendering education a pleasure rather than a toil. It is also urged that nature-study promises to be the form of education best adapted to develop the pupils into good citizens capable of making their way in the world and, above all, of relying on their own judgment. Healthful it certainly is, and the love of nature it engenders may, it is suggested, tend to check the exodus of the population from the country to the towns. The difficulty of securing the right class of teachers claims a considerable share of attention, and some amount of discussion is devoted to the question as to the extent to which books should be used. Collecting, again, is a phase of the subject which requires very careful treatment in order to prevent the pupils from degenerating into mere curiosity-hunters. The author is, however, of opinion that both books and collections have their place in the scheme. The relative values of outdoor and indoor work are then discussed, in the course of which much importance is attached to the "seasonal method" of study. Before the final summary, the article winds up with observations on teachers of all grades and classes, and the best method of training them, followed by a reference to the objections against, and the difficulties connected with, "nature-study."

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, November 27.—"The Inter-relationship of Variola and Vaccinia." By S. Monckton Copeman, M.A., M.D. Cantab., F.R.C.P. Communicated by Lord Lister, F.R.S.

The term "variolæ vaccinæ" employed by Jenner, as a synonym for cow-pox, has been generally accepted as affording evidence that, in so naming this disease "small-pox of the cow," he was desirous of placing on record his belief that cow-pox or vaccinia was intimately related to human small-pox, if indeed it were not directly derived from it.

But the difficulty experienced by the writer and numerous other investigators in attempts to transmit small-pox to bovines, whether cows or calves, has not infrequently been cited as a reason for regarding Jenner's theory with distrust.

It is well known, however, that a great deal, at any rate, of the small-pox which was prevalent at the time that Jenner lived and wrote was of that comparatively mild variety which, under the name of inoculated small-pox, was intentionally produced in healthy subjects, with the object of thereby conferring protection against subsequent attack by the disease in virulent form.

So mild indeed, at times, were the results of inoculations in the hands of such operators as Adams and the brothers Sutton, that, as we learn from contemporary records, in many instances but little obvious effect was observed, with the exception of the local vesicle arising at the site of insertion of the small-pox virus. The majority of persons thus inoculated are not likely, therefore, to have been incapacitated, as the result of the operation, to a much greater extent than are those who undergo efficient vaccination at the present day, and, doubtless, they would be, for the most part, capable of following their ordinary avocations during the progress of the induced disorder.

Not only were the effects following on inoculation comparatively mild, but the disease in this form was intentionally carried into many country districts which otherwise might not have become invaded by small-pox.

In the light of these facts, it would appear not improbable that it was from the *inoculated* form of small-pox rather than from the ordinary variety of the malady that much, at any rate, of the cow-pox in the pre-vaccination era was derived. Supposing this to have been the case, it is not difficult to understand how that the cracks, so often found on the udders of cows, might become infected by a milker with fingers contaminated by contact with the inoculation sore upon his arm.

In default of inoculated small-pox in the human subject, use was made of the monkey, which, as the writer had shown in a previous communication to the Royal Society, is readily susceptible to the disease. The necessary small-pox material has been obtained during the course of recent outbreaks of small-pox at Middlesbrough, Glasgow and London.

The results of the experiments may be briefly summarised as follows:—In each of the separate series, the human small-pox lymph or pulp was first inoculated directly on calves, and in every instance, so far as could be observed, with altogether negative results. But with monkeys, success was as invariably obtained, and when, after one or more passages through this animal, the contents of the local inoculation vesicles were employed for insertion on the calf, an effect was now produced which, after two or three removes in that animal, was indistinguishable from typical vaccinia. Moreover, from the contents of vesicles raised in this manner on the calf, a number of children have been vaccinated, some of whom were afterwards kept under observation for a considerable period. Every such vaccination "took" normally, and in no case was any bad result subsequently observed.

The experimental results obtained all tend, then, to confirm the view that the vaccinia of Jenner's time was derived, in all probability, from a comparatively mild form of small-pox. Of even more importance is the fact that the work has afforded conclusive evidence of the essential identity of the virus of small-pox and cow-pox or vaccinia.

December 4.—"On the Vibrations and Stability of a Gravitating Planet" By J. H. Jeans, B.A., Isaac Newton Student and Fellow of Trinity College, Cambridge. Communicated by Prof. G. H. Darwin, F.R.S.

The first part of the paper deals with the vibrations and stability of a gravitating elastic sphere. The matter is not necessarily homogeneous, but is arranged in spherical layers. It is pointed out that, in the classical investigation of the displacements produced in a gravitating sphere by given surface-forces, the most important of the gravitational terms is omitted. The effect of this omission is to necessitate a correction, and this may entirely invalidate the solution when we are dealing with spheres of the size of the earth or other planets. In fact, it appears that for a gravitating solid of the kind we are discussing the spherical configuration may be one of *unstable equilibrium*, the instability being brought about by these gravitational terms. The vibration through which instability first enters is one in which the displacement at every point is proportional to a harmonic of the *first* order.

In a former paper, "The Stability of a Spherical Nebula" (*Phil. Trans.*, A, vol. cxcix., p. 1), the suggestion was put forward that the instability of a nebula, sun or planet, which, upon the nebular hypothesis, is supposed ultimately to result in the ejection of a satellite, may be largely brought about by a gravitational tendency to instability of the kind described. We take, for the moment, an extreme hypothesis, and imagine that this agency is the preponderating agency and that the rotational tendency to instability may be disregarded in comparison.

Except for the changes which have occurred since the consolidation of the planets, the solar system supplies material for testing the consequences of this hypothesis. When a number of planets of varying masses have thrown off satellites, we find (upon our present extreme hypothesis) that the masses ought to be proportional to the *squares* of the radii. It is found that this law is approximately obeyed in the solar system. It is further found that the absolute values of the masses and radii are approximately such as would be expected.

It is interesting to compare two extreme hypotheses, the first referring the phenomena of planetary evolution solely to rotational, the second solely to gravitational, instability. Given the approximate values of the density and elasticity of a planet, and the fact that this planet has thrown off a satellite, then the former hypothesis leads to a certain inference as to the angular momentum of the system, the latter to an inference as to the radius of the primary. The former leads to no inference at all as to the size of planets which are to be expected—they are as likely to be of the size of billiard balls as of the size of the planets of our system—while the latter leads to no inference as to the angular momentum of the system, but presupposes it to be small. The contention of the present paper is that the inferences which are drawn from the former hypothesis are not borne out by observation on the planets of our system, while those which are drawn from the latter are borne out as closely as could be expected. The true hypothesis must of necessity lie somewhere between the two extremes which are being

compared, but the evidence seems to show that it is much nearer to the latter (gravitational) than to the former (rotational).

We next consider a number of questions connected with the figure of the earth. It seems to be almost certain that the present elastic constants of the earth are such that a state of spherical symmetry would be one of stable equilibrium. On the other hand, if we look backwards through the history of our planet, we probably come to a time when the rigidity was so small that the stable configuration of equilibrium would be unsymmetrical. At this time the earth would be pear-shaped, and the transition to the present approximately spherical form would take place through a series of ruptures. It is suggested that the earth, in spite of this series of ruptures, still retains traces of a pear-shaped configuration. Such a configuration would possess a single axis of symmetry, and this, it is suggested, is an axis which meets the earth's surface somewhere in the neighbourhood of England (or possibly some hundreds of miles to the south-west of England). Starting from England, we find that England is at the centre of a hemisphere which is practically all land; this would be the blunt end of our pear. Bounding the hemisphere we have a great circle, of which England is the pole, and it is over this circle that earthquakes and volcanoes are of most frequent occurrence. Now, if we suppose our pear contracting to a spherical shape, we notice that it would probably be in the neighbourhood of its equator that the changes in curvature and the relative displacements would be greatest, and hence we should expect to find earthquakes and volcanoes in greatest numbers near to this circle. Passing still further from England, we come to a great region of deep seas—the Pacific, South Atlantic and Indian oceans; these may mark the place where the "waist" of the pear occurred. Lastly, we come, almost at the antipodes of England, to the Australian continent. This may mark the remains of the stalk-end of the pear.

Physical Society, December 12.—Mr. S. Lupton, vice-president, in the chair.—Mr. S. W. J. Smith exhibited and described a portable capillary electrometer. This instrument is a modification of the form of capillary electrometer which consists of two wide tubes joined by a cylindrical capillary tube which may be horizontal or inclined. The apparatus contains mercury and sulphuric acid of about maximum conductivity suitably distributed in the tubes. A spring key is commonly used with the instrument, but the author has devised a key consisting of a U-tube closed at one end, communicating at the other with a pneumatic pressure ball and containing mercury in the bend. By squeezing the ball, the same change of contacts can be produced as by pressing the lever of an ordinary spring key. Using this key and a microscope magnifying 50 diameters, a potential difference of 1/10,000th volt can be detected without difficulty. The instrument, used as a surface-tension galvanometer, is more convenient than an ordinary galvanometer with a magnetic system because there is no suspension, no lamp and scale, and practically no levelling.—A paper on astigmatic aberration was read by Mr. R. J. Sowter. This paper affords a simple explanation of some of the shadow phenomena observed by Prof. S. P. Thompson in his experimental researches on the aberration of lenses, namely, in those experiments in which the aberration is wholly or in part astigmatic.—Prof. L. R. Wilberforce exhibited apparatus for a lecture experiment on gaseous diffusion. In Graham's experiments on diffusion through porous septa, the gas experimented upon was contained in a vessel inverted over water, and the pressure was kept approximately atmospheric by applying a counterpoise to the vessel. This adjustment, however, is imperfect owing to the weight of the water displaced by the material of the vessel. Prof. Wilberforce showed that, by suspending the vessel from one arm of a balance rendered suitably unstable by a weight above the central knife-edge, a compensating effect could be introduced and the pressure kept sensibly constant for a considerable range of motion of the vessel. He pointed out that this device could also be utilised for the measurement of pressure.—A paper on vapour-density determinations, by Sir W. Ramsay and Dr. Steele, was read by Sir W. Ramsay. This paper gives a detailed account of some accurate experiments on the densities of vapours over a large range of pressure carried out by a modification of Gay-Lussac's method. This method has the advantage that while densities are being determined, compressibilities can, within certain limits, be simultaneously estimated with the same sample of material. From results of experiments, it appears that the densities of certain compounds calculated for zero pressure are not proportional to their molecular weights deduced from the atomic weights of the elements which they contain. This conclusion involves one, or it may be several, of a series of assumptions enumerated in the paper. These assumptions are fully investigated and discussed, and the authors suggest that it may be possible that the atomic weights of the elements depend on the proportion in which they are present in the compounds which contain them.

Royal Astronomical Society, December 12.—Dr. J. W. L. Glaisher, F.R.S., president, in the chair.—Mr. Innes presented a paper on some developments in terms of the mean anomaly and also the results of measures of double stars made at the Royal Observatory, Cape of Good Hope, in 1902. He made some remarks on the excellence of the McClean telescope, with which the measures were made, and the great convenience of the rising floor of the observatory.—Mr. Hardcastle read a note on binding together reseaux and plates. In measuring some photographs of the moon, on which no réseau had been impressed, the réseau plate and photograph were bound together film to film, but in the course of measurement a slight shifting occurred, which it was difficult to prevent.—Mr. Bellamy read a note on preserving negatives. Some developed star negatives which had been placed in envelopes and stacked on shelves were found after a time to have received on the film a faint image of the inscription that had been written on the envelopes. Mr. Knobel remarked that this was certainly not due to the effect described by Prof. Russell, as the writing was only visible on the film by reflected light.—The Astronomer Royal exhibited and described a new measuring machine which had been made by Troughton and Simms for the Royal Observatory, Greenwich, and was intended for the measurement of photographs of Eros.—A paper by Mr. Robinson, of the Radcliffe Observatory, Oxford, was read, on the photographic and visual magnitude of α Orionis. Between March 9, 1901, and October 22, 1902, the photographic magnitude of this star had slightly increased, and since the latter date there appeared a gradual decline in brightness; both the increase and decrease were confirmed by the visual estimations.—Photographs of the spectra of Jupiter, Saturn and other planets, taken by Mr. Percival Lowell at Flagstaff, Arizona, were shown on the screen.—Mr. Hinks exhibited photographs of Mr. Ritchey's series of drawings from the negatives of the nebula surrounding Nova Persei taken at the Yerkes Observatory. Mr. Hinks showed by the aid of diagrams how the apparent motion of the nebula might be explained upon the hypothesis of Prof. Kapteyn, that successive portions of the nebula were illuminated by the star and that there was no real motion of the nebula itself.

Mathematical Society, December 11.—Prof. Lamb, president, in the chair.—The following papers were communicated:—Prof. L. E. Dickson, (1) The abstract group simply isomorphic with the group of linear fractional transformations in a Galois field; (2) Generational relations of an abstract simple group of order 4080. The first paper deals with the abstract group of order $\frac{1}{2}p^n(p^{2n}-1)$, which is simply isomorphic with the group of all linear fractional transformations on one variable, with coefficients belonging to the Galois field $[p^n]$, and with determinants equal to unity. It is shown that when $n = 1$, the group may be generated by two operations which are subject to generational relations, and these relations are determined. When n has other values, the generating operations are more numerous, but the generational relations are again determined. The validity of the theorems depends in general on the solution of a problem in the theory of numbers, which can be treated readily in any particular case. In the first paper, p is supposed to be greater than 2; the second paper deals with the case $p = 2$.—Dr. H. F. Baker, (1) On the calculation of the finite equations of a continuous group; (2) On the integration of linear differential equations; (3) On some cases of matrices with linear invariant factors. In the second paper, use is made of the matrix notation for the systematic study of linear differential equations. This study leads to two independent problems. One problem consists in the determination of all irreducible types of multiplication tables of sets of matrices of the same order, a problem akin to that of the enumeration of types of discontinuous groups. The other problem consists in the investigation of the properties of a class of functions which arise by repeated integrations from simpler functions. The serial solutions which are obtained converge for all finite values of the

independent variable in a suitably chosen "star-region," and their character near the corners of the region is determined. The work is applied to elucidate the connection between the form of the system of linear equations and the form of the linear substitutions, by which the monodromy group of the system is generated. The results are exemplified by the study of particular equations of the hypergeometric type.—Prof. M. J. M. Hill, The continuation of the power series for arc sin x.—Mr. E. T. Whittaker, The functions associated with the parabolic cylinder in harmonic analysis.—Mr. H. M. Macdonald, Some applications of Fourier's theorem. The expression of an arbitrary function by means of Fourier's theorem is thrown into the form of a double integral, the path of integration with respect to one variable being part of the axis of real numbers, and the path with respect to the other variable going to ∞ in the two senses of the axis of imaginary numbers. The theorem is generalised by altering the latter path of integration, and the generalised form is applied to the evaluation of certain integrals involving Bessel functions. Numerous properties of these functions are deduced.—Rev. F. H. Jackson, Series connected with the enumeration of partitions.—Mr. W. H. Young, Sets of intervals, part ii., overlapping intervals. In the present paper, some of the methods and results of a previous paper by the same author are applied to the case of overlapping intervals on the straight line. In this way, direct proofs are obtained of a theorem in the theory of aggregates due to Heine and Borel, and of its so-called counterpart. Certain restrictions in the usual enunciation of these theorems are shown to be unnecessary.—Mr. G. H. Hardy, On the expression of the double Zeta and Gamma functions in terms of elliptic functions. The logarithms of the functions studied by Barnes (*Phil. Trans.* Roy. Soc., Ser. A, vol. cxcvi., 1901) are expressed by means of definite integrals involving the Weierstrassian elliptic and Zeta functions.—Mr. J. H. Grace, Perpetuants (second paper).

Royal Microscopical Society, November 19.—Dr. Hy. Woodward, F.R.S., president, in the chair.—Dr. D. H. Scott, F.R.S., gave a demonstration on the microscope in fossil botany. After giving a brief history of the subject from 1833 to the present time, he proceeded to describe its principal features, aided by lantern slides projected on the screen. There were also under microscopes in the room nearly 30 slides of sections of Calamites, Calamostachys, Sphenophyllum, Lepidodendron, Bothrodendron, Lepidostrobus, Spencerites, Lepidocarpon, Lyginodendron, &c., many of these having been photographed for the series of lantern slides.—Dr. Edmund J. Spitta then described a new apparatus for obtaining monochromatic light with an ordinary mixed jet. A diagram of the apparatus was shown on the screen and also three photographs of *Amphipleura pellucida*; the first, taken with white light, gave faint indications of markings, the second, taken with a Gifford's fluid screen, showed the appearance of striæ, and the third, with blue monochromatic light, obtained by means of Dr. Spitta's new apparatus, showed the diatom clearly resolved into dots. The principal feature in the apparatus was the mounting of a Thorp diffraction film upon a corrective prism which Mr. Thorp had contrived. The diffraction film thus mounted can be used with the ordinary optical bench, giving light in a direct line from the burner to the microscope. The apparatus was exhibited in operation in an adjoining room.—Dr. P. E. Shaw sent a paper on an electrical method of taking microscope measurements.

Royal Meteorological Society, December 17.—Mr. W. H. Dines, president, in the chair.—A paper by Mr. C. V. Bellamy, on the climate of Cyprus, was read by the secretary. The mean temperature for the year at the capital city, Nicosia, is 67°·2, the extreme highest temperature being 108° and the extreme lowest 28°. The annual rainfall is about 14 inches, which falls mostly in the winter months. The author also gave particulars as to the meteorological conditions at Troödos, the sanitarium and summer resort of Cyprus, which is situated in the mountains at an altitude of more than 5000 feet above sea-level.—A paper by Mr. H. H. Clayton, of the Blue Hill Observatory, U.S., on the eclipse cyclone of 1900, was also read by the secretary. The author in a former paper discussed the meteorological observations made along the path of the total solar eclipse in the United States on May 28, 1900, and stated that he found that a cyclone followed in the wake of the eclipse—though the changes were very minute and feeble—the fall of temperature developing a cold-air cyclone in an astonishingly short time with all the peculiar circulation of wind and distribution of pressure which constitute such a cyclone. This theory was not readily accepted by meteorologists, and Prof. Bigelow, who has discussed all the observations received by the U.S. Weather Bureau, thinks that they scarcely confirm Mr. Clayton's conclusions. The author now examines Prof. Bigelow's discussion and points out that the observations really confirm his own statements.

Zoological Society, December 2.—Dr. Henry Woodward, F.R.S., vice-president, in the chair.—Dr. Hans Gadow, F.R.S., gave an account (illustrated by lantern slides) of his recent expedition to southern Mexico. He described the Valley of Mexico, and discussed the question of the axolotls and their metamorphosis. He also gave an account of his ascent of the Volcano of Orizaba, and of the two types of *tierra caliente* met with on the Atlantic and Pacific slopes, and pointed out the various phases of animal life met with in these different localities.—Dr. Einar Lönnberg contributed a series of notes, illustrated by photographs, of the variations observed in the elk in Sweden, more especially as regards the form of the antlers. These the author classed in three groups—"palmate," "intermediate" and "cervine." The last were comparable to the type lately described as *Alces bedfordiae*. These differences, in the author's opinion, were not attributable either to age or to degeneration, neither did they seem to indicate racial distinction.—A communication was read from Mr. R. Lydekker, F.R.S., calling attention to a photograph of a skull and antlers of a reindeer obtained by Mr. H. J. Pearson in Novaia Zemlia. On account of the palmation of the antlers differing markedly from that of the known races of the reindeer, Mr. Lydekker was of opinion that the specimens belonged to a new race, which he accordingly named *Rangifer tarandus pearsoni*.—Mr. H. R. Hogg read a paper on the Australian spiders of the subfamily Sparassinæ. It contained descriptions of twenty-five new species and a list of those previously known.—A communication from Mr. W. F. Lanchester contained an account of the crustaceans of the groups Anomura, Cirripedia and Isopoda (marine forms) collected during the "Skeat Expedition" to the Malay Peninsula in 1899–1900.—A communication from Mr. F. F. Laidlaw contained an account of the dragon-flies of the subfamily Cænagrioninæ collected during the "Skeat Expedition" to the Malay Peninsula.—Mr. R. I. Pocock described a new species of marine spider, discovered by Mr. Cyril Crossland in Zanzibar, under the name *Desis crosslandi*.—Mr. Pocock also read a paper containing descriptions of twenty new species of harvest-spiders of the order Opiliones from the southern continents. Two of these formed the types of the new genera Sorensenella and Lomanella.

Linnean Society, December 4.—Mr. Wm. Carruthers, F.R.S., vice-president, in the chair.—Rev. John Gerard exhibited specimens of a Polygala from Grassington, in the West Riding of Yorkshire; the plant has been named *P. amarella*, Crantz. He also showed a monstrous form of *Geum rivale*, Linn., from between Long Preston and Settle; the terminal flower was apparently normal, but about one inch and a half below the calyx there appeared a whorl of about twenty petaloid members, on extremely long "claws," and surrounded by a series of leaf-like bracts.—Mr. R. Morton Middleton showed an extremely well-developed fasciated stem of asparagus.—Dr. George Henderson called attention to a passage in the Georgics of Vergil (i. 73 *seqq.*), in which the poet, after recommending a system of fallowing, proposes as an alternative means of restoring the fertility of the soil that before taking a second grain crop the soil should be refertilised by planting it with a leguminous crop. The Romans believed that these plants actually enriched the soil, especially if the roots were plentiful. It is remarkable that recent discoveries regarding the nitrification of the soil by the roots of Leguminosæ should have been foreshadowed so long ago.—The first paper was one by Dr. Gilbert C. Bourne, on some new and rare corals from Funafuti, based on material dredged off Tutanga at a depth of 200 fathoms. The only oculinid coral was *Lophohelia tenuis*, Moseley, previously only obtained at a depth of 375 fathoms; the present specimen is figured to correct the figure given in the *Challenger* report. Seven turbinolid corals were obtained, two being new to science, and figured from photographs; one, a species of Trochocyathus, having several fossil congeners.—Mr. E. A. Newell Arber gave a digest of his paper on the morphology of the flowers and fruits of the

Xylosteum section of Lonicera.—Mr. C. B. Clarke read a paper, Note on *Carex Tolmiei*, Boott. The species was founded upon a specimen from the Columbia River, to which the author had subsequently added three other plants. The author has redescribed the original specimen, and has described two of the supposed component forms as new species.—A paper by Herr C. With, of Copenhagen, was briefly characterised by Prof. G. B. Howes, F.R.S., on the Indian Phalangidæ contained in the Indian Museum, at Calcutta. The collection was put into Herr With's hands to compare with the types of Thorell's species. With regard to the distribution of forms, the author remarks that the Indian peninsula and adjacent islands seem characterised by the presence of the subfamily Gagrellinæ.

PARIS.

Academy of Sciences, December 15.—M. Bouquet de la Grye in the chair.—On the presence of argon, oxide of carbon and hydrocarbons in the gas from the fumaroles of Mont Pelée at Martinique, by M. Henri Moissan. The gas, which was collected by M. Lacroix, emerged at a temperature of about 400° C. Besides those gases which have been already mentioned as present in other volcanic eruptions, a considerable quantity of combustible gas was found, together with about 0·7 per cent. of argon. The percentage of carbon monoxide (1·6 per cent.) would render the gas very toxic, and it is possible that many of the deaths during the eruptions may have been due to this cause.—On the stability of equilibrium and the variables without inertia, by M. P. Duhem.—Experiments on the duration of the germinating power of seeds preserved in a vacuum, by M. Émile Laurent. Samples of seeds of various species of plants were kept in the dark in a vacuum, side by side with duplicate samples in air, and these were tested after intervals of two-and a-half years, five years and seven-and-a-half years. Fatty seeds appear to keep better in a vacuum than in air, but no general rule could be deduced from the other seeds, the results being variable.—Remarks by M. le Général Bassot on the *Annuaire* of the Bureau des Longitudes for 1902.—Perturbations independent of the eccentricity, by M. Jean Mascart.—Observations of the Giacobini comet (1902 *d*) made at the Observatory of Besancon, by M. P. Chofardet. The comet appears as a small nebula of the twelfth magnitude, and has an apparent diameter of about 45″.—On the integration of a partial differential equation of the second order of the hyperbolic type, with more than two independent variables, by M. R. d'Adhémar.—A method for the electrical separation of the metallic part of a mineral from its gangue, by M. D. Negreano.—On aluminium fluoride, by M. E. Baud. The preparation of pure aluminium fluoride, $Al_2Fl_6.7H_2O$, is described, and its thermochemical data determined.—The action of boron chloride upon gaseous ammonia, by M. Joannis.—As previous researches on the reaction between ammonia and boron chloride have given contradictory results, the reaction has been reinvestigated, especial attention being given to the temperature of the reaction, which was kept at about −70° C. Ammonium chloride and boron amide appear to be the only products; at 440° C., the latter compound is partly decomposed, the compound $Bo_2(NH)_3$ being produced.—On a violet ammonio-manganese phosphate, by M. Ph. Barbier.—The separation of the alkalis from peroxide of manganese, by M. H. Baubigny. The alkali salts carried down by precipitated peroxide of manganese, which cannot be completely removed by washing with boiling water, can be eliminated by a preliminary washing with a concentrated solution of ammonium nitrate.—The diffusion of arsenic in nature, by M. F. Garrigou. The arsenic is obtained in the state of sulphide, which is then submitted to Bunsen's flame reaction, in which a film is produced on porcelain. It is claimed that quantities of arsenic of the order of 0·00001 milligram can be detected and approximately estimated. Remarks by M. Armand Gautier on the preceding paper. In working with such minute quantities of arsenic as those mentioned by M. Garrigou, the extreme difficulty of allowing for the arsenic derived from the glass and reagents is pointed out.—On *p*-benzene-azobenzoic acid and its derivatives, by MM. P. Freundler and de Laborderie.—On oxybenzylphosphinic acid, by M. C. Marie.—On a new method of chlorination of aromatic hydrocarbons, by MM. Seyewetz and Biot. The reagent used in the chlorination is the double compound of ammonium chloride and lead tetrachloride. By its aid, chlorine derivatives of benzene, toluene, xylene, naphthalene and anthracene were readily obtained.—A cœlomic gregarian in Coleoptera, by M. L. F. Blanchard.—On the evolution of the acrosome in the spermatid of Notanecta, by MM. J. Pantel and R. de Sinéty.—Teleomitosis in *Amœba Gleichenii*, by M. P. A. Dangeard.—On photosynthesis outside the organism, by M. Luigi Macchiati. Some facts in confirmation of the statement by M. Jean Friedel on the production of chlorophyll assimilation outside the plant. These researches prove that the principal agent in chlorophyll assimilation in the green plant, and also in the photosynthesis outside the living organism, is an enzyme and that the chlorophyll pigment appears to act as a chemical sensitiser.—The ripening of seeds and the appearance of the germinating power, by M. P. Mazé.—On the *rôle* of vortices in wind erosion, by M. Jean Brunhes.—On the ocean current near the Landes coast, by M. L. A. Fabre.—On the origin of the transversal break of the Kosva (North Ural), by M. Louis Duparc.—The rapids in the river Kosva are due to an old synclinal more or less orthogonal to the direction of the folds.—On the deposits of phosphate of lime in the Belemnites chalk, by M. N. de Mercey.—The influence of catalytic agents upon the working of the organism: spermine, cerebrine and chloradrenal, by M. Alexandre de Poehl.—The diseases of organic demineralisation: plasmatic anæmia, by M. Albert Robin.

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