and islands upon it in a neighbourhood which is becoming nearer and more intimate every year. We often speak complacently of the advantage this is to our own country in particular—of what it has done in enormously increasing the wealth and prosperity of the rich, and ameliorating and brightening the lives of the poor—in promoting the growth of our manufacturing trades—in enabling food to be imported from abroad in large and regular supplies at much cheaper rates than we could produce it ourselves in these islands, and in the great increase of population that the growing prosperity of the country and the easier conditions of life have thus brought about. All this is true, and it represents an extent of change and of progress during a short space of time that we can only look and marvel at, as being due to so large an extent to the results of one man's inventions. But there are other feelings with which we do well to regard the matter besides those of wonder and admiration, and of self-satisfaction with the great prosperity and the numerous advantages the country has reaped. We have been favoured above most other peoples by all these great changes, and have been blessed in very bountiful measure. We must not forget, however, that among the privileges we thus enjoy, that of immunity from danger and harm is not included. There are few pleasures or privileges to be had without alloy; and we now find, as a set-off against the benefits obtained through the improvements in ocean navigation, that we have much greater responsibilities and difficulties in protecting ourselves against danger, and in preserving unimpaired for the future the heritage of power and prosperity that has been handed down to us. The same causes that make ocean navigation easy, swift, and certain for us, make it easier also for any possible enemies to attack us. The great increase of population, due to the recent growth of wealth and prosperity, requires for its existence constant supplies of raw material to be kept up from abroad, in order that our surplus hands may be profitably employed in manufactures, and it requires also large and continuous food supplies from outside in order that it may be fed. Hence the great problem of the time for this country—how to protect ourselves against the dangers and drawbacks of the new state of things, while enjoying for the time its advantages and reaping its rewards; and how to effectually shield the vulnerable points in our armour that have arisen out of changes and improvements which brought so much good in other ways. It is upon the sea that any real danger to England would arise; and upon the sea it would have to be met. Let us hope that the nation which has covered all the seas of the world with its ships will not now fail in energy and enterprise, or be slow in providing and maintaining adequate defence of what it has produced with such success, and out of which it has reaped such rich reward. If we were to fail thus in our duties, and so shirk our responsibilities, the improvements and benefits we owe so largely to the genius of James Watt might, after all, prove a curse instead of a blessing; and we should be unworthy of the country and the race which produced the great engineer who taught his contemporaries, more than one hundred years ago, how to manufacture Power.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—Mr. Francis Gotch, F.R.S., Holt Professor of Physiology in University College, Liverpool, has been elected to the Waynflete Professorship of Physiology, vacated by the appointment of Dr. Burdon Sanderson to be Regius Professor of Medicine. Prof. Gotch is no stranger to Oxford, having been for some years assistant to his predecessor in the Waynflete Chair.

CAMBRIDGE.—Dr. W. S. Lazarus-Barlow, of Downing College, has been appointed Demonstrator of Pathology in the room of Dr. J. Lorrain Smith, who has been elected Lecturer in Pathology at Queen's College, Belfast.

The Examination in Sanitary Science for the University Diploma in Public Health will begin on April 2.

Hitherto one of the conditions which had to be fulfilled before the Science and Art Department made payments to the Committees of schools or classes, for the instruction of students, has been that the parents of a student should not have an income exceeding £400 a year from all sources. A Blue-paper now informs us that the Lords of the Committee of Council of Education have decided to enlarge this limit to £500 per annum. In future, therefore, the student on account of whom a claim is made must belong to the category of "persons in the receipt of not more than £500 a year from all sources, that is, who are allowed an abatement of the income-tax; and their children if not gaining their own livelihood." This example could be followed with advantage by the Technical Education Committees of those County Councils that restrict their Scholarships to competitors whose parents are in receipt of less than £120 a year.

SCIENTIFIC SERIALS.

Bulletin de l'Académie Royale de Belgique, No. 1.—Is the declination indicated by a compass independent of its magnetic moment? by Ch. Lagrange. According to Gauss's theory it may be assumed that the magnetic axis of a magnet lies in the direction of the lines of force of the field, whatever its magnetic moment may be. But in practice it is found that the orientation of a magnet depends upon the strength of its magnetisation. Since these systematic differences are not due to magnetic force, they must be due to some other force, probably a force hitherto unknown. Hence the magnetic chart of the earth calculated by Gauss's theory cannot be considered rigidly correct. A new constant must be introduced, depending upon the declinometer. The author foreshadows an explanation of these facts, based upon the "circulation of the ether," and intimately associated with the physics of the globe.—Double decompositions of vapours, by Henryk Arctowsky. It is not necessary that two substances should be dissolved in water to bring about their mutual decomposition; or their "ionisation," in terms of the electrolytic theory, is not altogether dependent upon water. Freshly sublimated mercuric chloride and flowers of sulphur were placed in small vessels inside a Bohemian glass tube over an organic combustion furnace. A current of pure dry hydrogen was introduced, which on heating formed sulphuretted hydrogen with the sulphur. This gas and the vapour of $HgCl_2$ gave a precipitate of mercuric sulphide on the walls of the tube. This reaction, which is contrary to Berthelot's principle of maximum work, does not take more time than the corresponding reaction in water. To prove that it was a true double decomposition, CO_2 was substituted for the hydrogen, when it was found that the sulphur vapour alone was unable to attack the mercuric chloride.

Bulletin de l'Académie des Sciences de St. Pétersbourg, fifth series, vol. 1, No. 4, 1894.—Minutes of proceedings for October last.—On derived functions of superior orders, by N. Sonin (in Russian).—Crustacea Caspia: contributions to the knowledge of the Carcinological fauna of the Caspian Sea, by G. O. Sars (in English, with eight plates). The Gammarideæ are continued, and the following species, mostly new, are described and figured: *Gammarus Warpachowskyi*, *minutus*, *macrurus*, *compressus*, *similis*, *robustoides*, *crassus*, *abbreviatus*, and *obesus*, and *Niphargoides caspius*, Grimm.—On the transformation of Periodical Aggregates, mathematical paper by H. Gyldén (in German).—On Free Energy, by B. Galitzine (in Russian).

SOCIETIES AND ACADEMIES.

LONDON

Royal Society, January 24.—"Notes of an Inquiry into the Nature and Physiological Action of Black-damp, as met with in Podmore Colliery, Staffordshire, and Lilleshall Colliery, Shropshire." By Dr. John Haldane.

Black-damp, sometimes also called choke-damp, or "stythe," is one of the gases frequently found in the workings of coal mines. It is distinguished from fire-damp by the fact that it is not explosive when mixed with air, but extinguishes flame; and from after-damp by the fact that it is not the product of an explosion, but collects in the workings under ordinary conditions. Like after-damp and fire-damp, it produces fatal effects when inhaled in sufficient concentration. A further distinction has been drawn between black-damp and white-damp, which latter is described as capable of supporting combustion, while at the same time acting as a poison when inhaled.

The author has made a number of observations on concentrated black-damp from two pits, the first being in a fiery

and the second in a non-fiery district. The conclusions arrived at are as follows:

(1) The specimens of black-damp consisted when undiluted of nitrogen containing an admixture of a seventh to an eighth of its volume of carbonic acid.

(2) Air containing just sufficient black-damp to extinguish a candle or oil lamp produced no immediately sensible action on a man. A mixture of about 16 per cent. of the black-damp and 84 per cent. of air extinguished candles and lamps, whereas a mixture of about 60 per cent. of the black-damp and 40 per cent. of air would be required to produce immediate danger to life.

(3) The dangerous physiological action of black-damp is due to deficiency of oxygen, not to excess of carbonic acid. The effect first appreciable when increasing proportions of black-damp are breathed is, however, due to carbonic acid alone.

February 21.—"The Composition of the Extinctive Atmospheres produced by Flames." By Prof. Frank Clowes.

In a former paper (*Roy. Soc. Proc.*, vol. lvi.), the author communicated the results obtained by mingling gases, which were extinctive of flame, with air, until a flame burning in the air was just extinguished. The gases used in the experiments were carbon dioxide and nitrogen. Each of these gases was separately introduced into the air, and the composition of the atmosphere thus produced, which just extinguished flame, was determined by chemical analysis.

The general results arrived at were:—

(1) That wick-fed flames require atmospheres of very similar composition to extinguish them: while gas-fed flames require atmospheres of widely differing composition.

(2) That nitrogen must be added in larger proportion than carbon dioxide, in order to extinguish the same flame.

(3) That the minimum proportion of extinctive gas which must be mingled with air in order to extinguish a flame is independent of the size of the flame.

A supplementary series of experiments has now been undertaken in order to determine the composition of the atmosphere extinctive of each flame, which is produced by the flame itself when burning in an enclosed volume of air at atmospheric pressure. The apparatus used and the method of experimenting are fully described.

As in the previous series of experiments (*loc. cit.*) the combustible substances used were chiefly those which are burnt for ordinary heating and lighting purposes—namely, alcohol (absolute), alcohol (methylated), paraffin (lamp oil), colza and paraffin, candle, hydrogen, carbon monoxide, methane, and coal-gas.

Determinations were made of the percentage composition of the residual atmospheres left by the flames, and these were compared with the composition of the artificial atmosphere in which flame is just extinguished, and with the composition of atmospheres which are respirable according to the recent experiments of Dr. Haldane (*Proc. Roy. Soc.*).

The conclusions drawn from the tabulated results of the experiments published in the paper are that:—

(1) The flames of the combustible gases and liquids, which were experimented upon, produce, at the point of extinction in an enclosed atmosphere, a change in the proportion of oxygen in the air generally corresponding to that produced by preparing extinctive atmospheres by artificial mixture.

(2) The flames of candles and lamps, when they are extinguished by burning in a confined space of air, produce an atmosphere of almost identical composition with that of air expired from the lungs.

(3) The extinctive atmospheres produced by the combustion of the flames of candles and of lamps, and the air expired from the lungs after inspiring fresh air, are respirable with safety.

(4) The extinction of an ordinary candle or lamp flame is not necessarily indicative of the unsuitability of an atmosphere to maintain life when it is breathed.

Geological Society, February 6.—Dr. Henry Woodward, F.R.S., President, in the chair.—On bones of a Sauropodous Dinosaur from Madagascar, by R. Lydekker, F.R.S. The bones described in the paper were collected by Mr. Last to the east of the town of Narunda, on the north-eastern coast of Madagascar. They include vertebræ, limb-bones, and portions of pectoral and pelvic girdles. These bones were described in detail, and the animal which possessed them was referred to the genus *Bothriospondylus*, Owen; a dorsal vertebra, described in the paper, being taken as the type of the new species. The identification of the Malagasy reptile with a type occurring in the Jurassic rocks of England harmonises with the reference of some of the strata of the island to the Jurassic period.—On the physical conditions of the Mediterranean basin which have resulted in a community of some species of freshwater fishes in the Nile and the Jordan waters, by Prof. E. Hull, F.R.S. The author summarised the evidence in favour of the existence of barriers in post-Miocene times, separating the Mediterranean area into a chain of basins. He brought forward arguments in support of his contention that the waters of the eastern (Levantine) basin became fresh during a period when the area of evaporation was smaller, and the supply of river-water greater, than at present. Into this freshwater lake the waters of the Nile would flow directly. He had elsewhere given reasons for believing that the Jordan Valley from Lake Huleh to Arabah was the bed of a lake over 200 miles long, and at least 1300 feet above the present level of the Dead Sea. He suggested that the waters of this lake escaped into the Levantine basin through the plain of Esdraelon. With such physical conditions existing, the fauna of the Levantine basin would have had a means of spreading throughout the whole system of waterways connected with it. In conclusion the author added some observations on the changes which occurred in the Mediterranean area subsequent to the post-Miocene epoch of earth-movement.—On the loess and other superficial deposits of Shantung (Northern China), by S. B. J. Skertchly and T. W. Kingsmill. The following deposits were described in the order of their antiquity:—(1) Recent fluviatile deposits. (2) Marine sands with *Cardium*, *Ostræa*, and *Bulla*, extending to a height of 200 feet above sea level, and indicating former submergence to that amount. (3) Old river gravels, often resting on loess, and possibly contemporaneous with the marine gravels. They furnish part of the evidence relied on by the authors for supposing the existence at that time of a climate moisture than the present one. (4) Loess. (5) Basement-gravels having the same relation to the loess that the Upper Greensand bears to the Chalk. The loess east of the Pamirs is extensively developed over an area of over one million square miles. It is sometimes over 2000 feet thick, and occurs up to several thousand feet above sea-level. Evidence was brought forward by the authors with the intention of establishing the absolute want of connection between the Chinese loess and the present river-systems, its original stratified condition (as shown by variation of tint and horizontality of layers of concretions), and its subsequent rearrangement to a great extent. The absence of marine shells was discussed, and the suggestion thrown out that the shells had been destroyed by percolating water. The authors gave their reasons for supposing that the loess is a marine formation, and stated that the sea need not have reached to a higher level than 600 feet above the present sea-level, for the Pamir region where it occurs, 7000 feet above the sea, is an area of special uplift. They maintained that there are no proofs of the glaciation of Northern and Eastern Asia, so that Chinese loess could have no connection with an area of glaciation. They stated that the zoological, ethnological, historical, and traditionary evidence alike pointed to the former depresssion of Asia beneath the sea, and the subsequent desiccation of the land, consequent upon re-elevation.

Mathematical Society, February 14.—Mr. A. B. Kempe, F.R.S., Vice-President, in the chair.—The chairman announced the decease, since the January meeting, of Prof. Cayley, F.R.S., and Sir J. Cockle, F.R.S., and stated that the Society had been represented at the funeral of the former by the President, himself, and Profs. Elliott, F.R.S., and Henrici, F.R.S. Messrs. Walker, F.R.S., Glaisher, F.R.S., and Elliott, F.R.S., paid tributes to the memory of the deceased gentlemen, and a resolution was passed unanimously that the President (Major Macmahon, F.R.S., who was absent owing to a domestic affliction) be requested to convey, in such form as he should think fit, votes of condolence from the Society to Mrs. Cayley and Lady Cockle.—Dr. Hobson, F.R.S., gave a brief sketch of a paper, by Mr. H. M. Macdonald, on the electrification of a circular disc in any field of force symmetrical with respect to its plane.—Prof. Elliott read a paper on certain differential operators, and their use to form a complete system of seminvariants of any degree, or any weight.—Prof. W. Burnside, F.R.S., sent notes on the theory of groups of finite order, iii. and iv. Herr Hölder, in a paper in the *Math. Ann.* vol xl., and Dr. Cole, in a paper in the *American Journal of Mathematics*, vol. xv., have

determined all the simple groups whose orders do not exceed 660. The only other known results in connection with the question as to whether there is a simple group corresponding to a given order are as follows. There is no simple group whose order is the power of a prime, or whose order contains two or three prime factors; and the only simple group whose order contains four prime factors is a group of order 60. The latter result was established in a paper published in vol. xxv. of the *Proceedings* of the Mathematical Society. The present paper aims at an extension of these results. If $p_1, p_2, \ldots p_n$ are distinct primes in ascending order, it is shown that in a group of order

$$p_1 p_2 \ldots p_{n-1} p_n^m$$

the number of operations whose orders are divisible by p_s and by no lower prime is

$$(p_s - 1) p_{s+1} \ldots p_{n-1} p_n^m,$$

from which it follows at once that a group whose order is of this form can neither be simple nor contain a simple sub-group.[1] It is also shown that a group whose order is of the form

$$p_1^2 p_2 \ldots p_{n-1} p_n^m$$

cannot be simple, and cannot contain a simple sub-group, with the exception of the case in which it contains a tetrahedral sub-group; in which case $p_1 = 2$, $p_2 = 3$. Thirdly, it is shown, with certain limitations, that if no prime entering in the order of a group, except the greatest, appears to a higher power than the second, the group cannot be simple. Fourthly, it is proved that no groups whose orders are of the forms.

$$p_1^m p_2 \text{ or } p_1^m p_2^2$$

can be simple. A deduction from these results of general form, aided by the consideration of certain more particular cases, is that the only simple groups whose order is the product of five primes are the known simple groups of orders 168, 660, and 1092. Finally, it is shown that if in a group of order

$$p_1^{m_1} p_2^{m_2} \ldots p_{n-1}^{m_{n-1}} p_n^{m_n}$$

the sub-groups of order

$$p_1^{m_1}, p_2^{m_2}, \ldots p_{n-1}^{m_{n-1}}$$

are all cyclical, the group cannot be simple, and cannot contain a simple sub-group.

Entomological Society, February 20.—Prof. Raphael Meldola, F.R.S., President, in the chair.—Mr. W. M. Christy exhibited specimens of *Lycæna agestis*, caught in Sussex, last summer, which had a white edging round the black discoidal spot. He said the specimens might, perhaps, be identical with the northern form of the species known as the variety *salmacis*.—Mr. H. Goss exhibited a small collection of Lepidoptera from the South of France, made by Mr. Frank Bromilow.—Prof. Meldola invited discussion upon the address delivered by Mr. Elwes, as retiring president, on the "Geographical Distribution of Butterflies," at the last annual meeting. He remarked that he had not himself had time to consider the paper in an adequate manner, but he thought that the discussion might lead to a useful expression of opinion if the speakers would deal with the question as to how far the scheme of distribution advocated by Mr. Elwes was borne out by a comparison with other orders of insects. He was of opinion that in considering schemes of geographical distribution, the results arrived at were likely to be of greater value the wider the basis on which they rested, and he therefore suggested that the question might also be taken into consideration as to how far it was justifiable to draw conclusions from the consideration of one division or one order only. Dr. Sharp, F.R.S., remarked that geographical distribution consisted of two divisions; firstly, the facts; secondly, the generalisations and deductions that may be drawn from them. He thought that as regards insects generally our knowledge of the facts was not yet sufficient to warrant many generalisations. Still the impressions of those who have paid attention to particular groups of insects are even now of some importance, though at present based on incomplete knowledge. He thought the Rhopalocera would prove to be a somewhat exceptional group in their distribution. Notwithstanding that Australia and New Zealand are so poor in them, this was by no means the case with their Coleoptera, Australia being very rich, and its fauna of Coleoptera being very distinct. He thought that if Lepidoptera generally were well collected in Australia and New Zealand, it would be found that this order was not so poor in species as was supposed. He instanced the case of the Sandwich Islands, where it was supposed that there were very few species of Lepidoptera, and yet some 500 species, or perhaps more, had been recently found there by Mr. R. C. L. Perkins, who had been sent to investigate the islands by a committee appointed by the Royal Society and British Association.—Mr. McLachlan, F.R.S., said he was of opinion that no definite demarcation of regions existed, but that all the regions over-lapped; in any case the retention of Palæarctic and Næarctic as separate provinces was not warranted on Entomological data. He believed that at the close of the Glacial period some insects instead of going north were dispersed southwards, and that the present geographical distribution of some forms might thus be accounted for. The discussion was continued by Mr. Osbert Salvin, F.R.S., Mr. J. J. Walker, Herr Jacoby, Mr. Champion, Mr. Elwes, and Prof. Meldola.—The Rev. T. A. Marshall contributed a paper entitled "A Monograph of British Braconidæ, Part vi."—Mr. J. W. Tutt read a paper entitled "An attempt to correlate the various systems of Classification of the Lepidoptera recently proposed by various authors." In this paper he criticised the opinions recently expressed by Mr. G. F. Hampson, and Dr. T. A. Chapman, in certain papers published by them. A discussion ensued, in which Mr. Elwes, Prof. Meldola, and Mr. Tutt took part.

Zoological Society, February 19.—Sir W. H. Flower, K.C.B., F.R.S., President in the chair.—Mr. F. E Beddard, F.R.S., read a paper in which he gave a description of the brain of the Glutton (*Gulo luscus*).—A second paper by Mr. Beddard contained a description of the brain of different species of Lemurs that have died in the Society's Gardens, pointing out the range of variation to be observed in the cerebral convolutions of this order.—A communication was read from Mr. C. Davies Sherborn and Dr. F. A. Jentink, in which was given the dates of the publication of the parts of Siebold's "Fauna Japonica" and Giebel's "Allgemeine Zoologie" (first edition).—A communication was read from Dr. J. de Bedriaga, "On the Pyrenean Newt, *Molge aspera*, Dugès," dealing with the external, osteological, and larval characters of this imperfectly-known Batrachian, and giving an account of its habits.

Linnean Society, February 21.—Mr. C. B. Clarke, F.R.S., President, in the chair.—Mr. J. H. Vanstone exhibited specimens of some nearly allied Hydrozoa, namely, *Bougainvellea ramosa* and *B. musca*, and after demonstrating their structure, gave reasons for concluding that although the latter had been described as distinct by Prof. Allman, the characters relied upon were not of specific value but simply varietal.—Mr. George Brebner exhibited some lantern slides of *Glæosiphonia capillaris* and other Algæ, with accompanying descriptions, and gave an interesting account of his method of preparing slides in colours.—On behalf of Mr. J. Boerlage, the President demonstrated the chief points in a paper communicated by him on the identification of *Chionanthus Ghæri*, an obscure species figured by Gaertner at the end of the last century in his famous work "De fructibus et seminibus Plantarum," but hitherto undetermined. From the researches of Mr. Boerlage it now appeared that it was evidently referable to *Seirpodendron costatum*, Kurz. This was made clear by the excellent drawings which accompanied the paper, as well as by the specimens which were exhibited.—A paper was then read by Mr. E. M. Holmes, on new marine Algæ from Japan. The author pointed out that up to the present time the known species of Algæ from that country did not exceed 300, or about half the number found in Great Britain; but that the districts around three centres only had been explored, namely Hakodadi, Tokio, and Nagasaki, notwithstanding the fact that seaweeds are largely used as food by the Japanese, and form an important article of commerce. The paper included descriptions of twenty-three new species (the structure of which was shown by means of the oxyhydrogen lantern) belonging to the genera *Cladophora*, *Codium*, *Dictyota*, *Dictyopteris*, *Polyzonias*, *Chondrus*, *Gracilaria*, *Grateloupia*, *Gymnogongrus*, *Halymeria*, *Lethershedtia*, and *Padina*.

[1] It has been pointed out to the author since the paper was communicated to the Society, that this first result is contained in a paper by Herr G. Frobenius, *Berliner Sitzungsberichte*, 1893.

CAMBRIDGE.

Philosophical Society, February 25.—Mr. R. T. Glazebrook, Treasurer, in the chair.—On binocular colour mixtures, by Dr. W. H. R. Rivers. Two methods of producing binocular colour mixture were shown—by Wheatstone's stereoscope and by a modification of Hering's method devised by Mr. E. T. Dixon. Colour mixture and rivalry were described as occurring in the after-image following binocular combination of coloured patches.—On a new parasite probably allied to Echinorhynchus, by Mr. A. E. Shipley. The specimens described came from the skin of a bird *Hemignathus procerus*, taken by Mr. Perkins in the Island of Kauai, one of the Sandwich Islands.—Notes on Pachytheca (with exhibition of specimens), by Mr. A. C. Seward. The genus *Pachytheca* from Silurian and Devonian rocks of Britain and Canada has been a subject of discussion among palæontologists ever since its discovery in 1853. Several writers have placed the fossil among Algæ, and this position has been assigned to it on the grounds of a supposed resemblance of its histological structures to that of certain recent genera. An examination of a series of microscopic sections prepared by Mr. Storrie, of Cardiff, has led the author to doubt the sufficiency of the evidence on which the comparison with any existing alga has been based, and to regard *Pachytheca* as an organism of uncertain position which might well receive attention at the hands of zoologists.

PARIS.

Academy of Sciences, March 4.—M. Marey in the chair.—The life and works of Admiral Pâris, member of the Geography and Navigation Section, by M. E. Guyou.—Axoïds of two plane lines, by M. H. Resal.—Prophylactic remedy for marsh-fevers, by M. d'Abbadie. The use of a daily fumigation of the body with sulphur is urged as a preservative against intermittent fevers in malarial districts.—On the interior pressure and the virial of the interior forces in fluids, by M. E. H. Amagat. A mathematical paper in which the variations of certain theoretical constants, deduced from the results of the experimental determinations of the properties of gases under high pressures, are discussed.—Observation of Wolf's planet BP, made at Toulouse Observatory, by M. F. Rossard.—Rectification of some arithmetical theorems, by P. Pepin.—The month of February, 1895, at Parc de Saint-Maur Observatory, by M. E. Renou. A discussion of the meteorological conditions obtaining in the neighbourhood of Paris. It is shown that a continued low temperature is very rare in February. The mean temperature of the month is given at $-4^{\circ}\cdot45$. The minimum temperature was reached on the 7th at Parc de Saint-Maur $-15^{\circ}\cdot4$, and at Châteaudun $-14^{\circ}\cdot6$, and on the 9th at Vendôme $-19^{\circ}\cdot4$. At the first-named station the earth was frozen beneath turf to a depth of 0·53 metres, and in the kitchen-garden to a depth of 0·65 metres.—Panoramic views obtained with the repeating twin-camera, by M. J. Carpentier.—Basic and acid oxides and sulphides. Zinc sulphide, by M. A. Villiers.—Calorimetric researches on dilute solutions. Sodium acetate, by M. E. Monnet. The heat of solution of sodium acetate augments with the concentration of the solution.—On hexamethylene-amine; ammonium salts; action of acids; production of primary amines, by M. Delépine. The reaction of acids on the ammonium iodides of hexamethylene-amine. $C_6H_{12}N_4.RI+6H_2O=6CH_2O+3NH_3+NRH_3I$, is given as a new method of forming primary amines. The use of bismuth potassium iodide for the isolation of these primary amines is noted.—On the composition of French and foreign oats of the 1893 crop, by M. Balland.—New considerations on the comparative anatomy of the limbs, by M. J. P. Durand (de Gros). M. Edmond Perrier followed up this paper with a discussion of the theory of the compound nature of the higher animal organisms.—On a disease of the spiny lobster, by MM. E. L. Bouvier and Georges Roché.—On the formation of the shell of molluscs, by M. Moynier de Villepoix.—On the diffusion of perfumes, by M. Jacques Passy.—Researches on the fertilising materials required by the vine, by M. A. Müntz. The following conclusions have been arrived at: (1) In all vineries the absorption of nitrogen and potash is much more considerable than that of phosphoric acid. (2) Nitrogen is absorbed in large quantity by the vine, and, contrary to widely received opinions, nitrogenous manures ought to be used; these are in other respects the most effective. (3) In the southern vineyards, nitrogen is absorbed in greater proportion than potash; in more northern regions potash is most absorbed. (4) Notwithstanding the enormous difference in yield, the southern vine requires no greater amount of nutritive materials than the vines of more temperate climates. (5) The quantity of fertilising elements used by the vine per hectolitre of wine produced is three or four times more considerable in the more northern districts than in the south.—On the abnormal partitions of the fronds of ferns, by M. Adrien Guébhard.

BOOKS, PAMPHLETS, and SERIALS RECEIVED

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