stand together to stop aggression and to guarantee to the world the peaceful development for which it is waiting.

THE Board of Education announces, in Circular 1034, that the following examinations have been recognised for the calendar years 1918 and 1919 as approved examinations, under the Board's scheme for the better organisation of examinations in secondary schools:—*As First Examinations:* (1) The School Certificate Examination of the Oxford and Cambridge Schools Examination Board; (2) the Senior Local Examination of the Oxford Delegacy for Local Examinations; (3) the Senior Local Examination of the Cambridge Local Examinations and Lectures Syndicate; (4) the School Certificate Examination of the University of Bristol; (5) the First School Certificate Examination of the University of Durham; (6) the General School Examination of the University of London; (7) the School Certificate Examination of the Northern Universities Joint Matriculation Board. *As Second Examinations:* (8) The Higher Certificate Examination of the Oxford and Cambridge Schools Examination Board; (9) the Higher School Certificate Examination of the Oxford Delegacy for Local Examinations; (10) the Higher School Certificate Examination of the Cambridge Local Examinations and Lectures Certificate; (11) the Higher School Certificate Examination of the University of Bristol (*a*); (12) the Higher Certificate Examination of the University of Durham; (13) the Higher School Certificate Examination of the University of London (*a*); (14) the Higher Certificate Examination of the Northern Universities Joint Matriculation Board. The examinations marked (*a*) will be held for the first time in 1919. The Board will pay to each school on the grant list an additional grant not exceeding 2*l.* on each pupil entered for any of the above-named examinations held during the years 1918 and 1919.

THE *Times Educational Supplement* (February 21) publishes an article entitled "The Universities and the War," which discusses the position of well-educated boys on attaining the age for military service, and suggests that the universities should be more fully used for the education and military training of young officers for the Army. It is pointed out that public-school boys who are members of the Officers Training Corps remain at school until attaining the age of eighteen and a half, when they are sent to officer cadet units for further training for commissions, whereas well-educated boys from all other secondary schools must enlist at about the age of eighteen, unless they go to a university and join an O.T.C. there. Those who enlist receive no special training for commissions for six months. The writer of the article therefore suggests that boys suitable for commissions should be encouraged by the War Office to join the universities and to receive military training in the O.T.C. Mr. Macpherson, in dealing with the question of the supply of officers in his statement in the House of Commons on February 20, admitted that invaluable work was done at the beginning of the war by the Officers Training Corps, but the War Office now expected a man to have served abroad before obtaining a commission, save in a few exceptional cases, and to have attained the rank of corporal, thereby having shown signs of leadership. For the Regular Army the period of training at Sandhurst and Woolwich had been extended. "It was not always the case that a boy who was able to pass with flying colours examinations in languages and mathematics made the best officer." The chances were that a boy who was captain of his school Rugby fifteen, who found it difficult to pass such an examination, had all the qualities of leadership, and should be given scope for the display of these qualities in the Regular Army. "The authorities at Woolwich considered the nominated candidates [those not entering by competitive examination] far and away the best, most capable, and hard-working, and they often produced the best officers." It appears extraordinary that, at this stage of the war, Mr. Macpherson should offer official encouragement to boys training for commissions not to apply themselves to their studies.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 7.—Sir J. J. Thomson, president, in the chair.—Prof. E. T. **Whittaker**: The numerical solution of integral equations. The present communication is concerned with integral equations of Abel's type

$$\int_0^x \phi(s)\mathrm{K}(x-s)ds = f(x),$$

and of Poisson's type,

$$\phi(x) + \int_0^x \phi(s)\mathrm{K}(x-s)ds = f(x),$$

where $\mathrm{K}(x)$ and $f(x)$ are given functions, and $\phi(x)$ is the unknown function which is to be determined. The object of the work is to obtain solutions of these equations in forms which can be made the basis of numerical calculation.—Prof. W. H. **Young**: (1) The Cesaro convergence of restricted Fourier series. (2) Non-harmonic trigonometrical series.—Prof. G. A. **Schott**: The electromagnetic inertia of the Lorentz electron. For a perfectly conducting oblate spheroid with speed $k\mathrm{C}$, eccentricity k, and axis in the direction of motion, G. W. Walker (Roy. Soc. Proc., A 93, p. 448) finds

Longitudinal electromagnetic mass $= \frac{2}{3}e^2a^{-1}\mathrm{C}^{-2}(1-\frac{1}{5}k^2)(1-k^2)^{-3/2}$,
Transverse electromagnetic mass $= \frac{2}{3}e^2a^{-1}\mathrm{C}^{-2}(1+\frac{1}{10}k^2)(1-k^2)^{-1/2}$.

Walker appears to regard this spheroid as a model of the Lorentz electron. If this be so, there is an obvious contradiction with the theory of relativity which demands investigation. The author has recalculated Walker's results on the basis of the general mass formulæ given in "Electromagnetic Radiation," Appendix D. The agreement between Walker's results and those of the paper, so far as it goes, indicates that his spheroid is not to be regarded as a model of the Lorentz electron.—Sir J. C. **Bose**: Researches on growth and movement in plants by means of the high magnification crescograph.

Linnean Society, February 21.—Sir David Prain, president, in the chair.—J. B. **Gatenby**: Notes on the bionomics, embryology, and anatomy of certain Hymenoptera Parasitica, with special reference to *Microgaster connexus,* Nees. The author remarked that *Microgaster connexus,* a parasite of *Porthesia similis,* was hyperparasitised by *Mesochorus pallidus.* The anatomy of Microgaster had been investigated; the larva has the posterior end of the body enlarged into the form of a spherical vesicle; the latter was thought by previous workers to be the ninth abdominal segment, but from anatomical and other evidence it is now considered to be the evaginated proctodæum. The embryonic membranes in Microgaster were also described, and notes were given on the various Hymenoptera parasitic on Aphidæ, and the embryonic membrane of an Aphidius was described. It was stated that internal entomophagous hymenopterous larvæ do not feed during practically the first third of their growth, but live by means of highly developed embryonic membranes; in their middle and later life they do not defecate; later larval and pupal stages were found to be generally normal.—W. B. **Brierley**: Experimental studies in the specific value of morphological characters in the fungi. In all systematic treatment of the fungi there is implied

constancy of morphological characters, and particularly of the size and shape of the mature reproductive bodies or spores. An experimental study of the specificity of these criteria is in process, the work being carried out primarily upon the fungus *Botrytis cinerea*. This species is contained in the "Polyactis" group of the genus, and the species in this group are separated partly by reason of their different hosts, but more critically by minute differences in the branching and septation of the conidiophore and by the size and shape of the spore.

March 7.—Sir David Prain, president, in the chair.—Prof. E. B. **Poulton**: The mimetic and Mendelian relationships of the "White Admirals" of North America. The "White Admiral" butterflies of the Nymphaline genus Limenitis or Basilarchia (the North American subgenus) form an interesting group with peculiar larvæ and pupæ. Their conspicuous patterns are displayed in a floating flight, and the under surface of the wings is not procryptically coloured like that of the Vanessas—characteristics which are found in the specially protected models for mimicry, and the Müllerian mimics of other still more distasteful species; and so it is with Limenitis. The English *L. sibylla* is resembled by the female of the "Purple Emperor" (*Apatura iris*), which flies in the same woods, while the tropical American representatives of Limenitis—the powerful genus Adelpha—are beautifully mimicked by the females of the representatives of Apatura—the genus Chlorippe. The African representatives of Limenitis—the genus Pseudacræa—are almost all of them wonderful mimics of the Acræas, and in one instance of a Danaine

Zoological Society, March 5.—Dr. A. Smith Woodward, vice-president, in the chair.—R. I. **Pocock**: The external characters of the lemurs and Tarsius. The observations recorded were based, except in the case of Tarsius, upon specimens that had lived in the society's gardens. The author stated his opinion that Tarsius should be removed from the lemuroid primates and classified with the monkeys. He proposed to divide the primates into two primary groups, the Strepsirhini for the lemurs and the Haplorhini for Tarsius and the rest, the Haplorhini being further divided into the Tarsioidea for Tarsius and the Pithecoidea for monkeys, apes, and man.—Sir G. F. **Hampson**: Classification of the Hypsotropinæ. The author described the Hypsotropinæ as a rather obscure group of the Pyralidæ, of very uniform appearance and differing chiefly in structure.

Mathematical Society, March 14.—Prof. E. W. Hobson, vice-president, in the chair.—G. H. **Hardy**: The representation of a number as the sum of any number of squares.—G. N. **Watson**: A problem in the theory of numbers.—Prof. W. H. **Young**: Non-harmonic Fourier series.

PARIS.

Academy of Sciences, February 11.—M. Léon Guignard in the chair.—M. **Hamy**: A particular case of diffraction of circular stars and its application to the sun.—A. **Carnot**: New methods of estimation of copper, zinc, cadmium, nickel, and cobalt. The method is based on precipitation with sodium carbonate, solution of the precipitate in ammonia, and reprecipitation of the metallic hydroxide or carbonate by boiling.—M. Cuénot was elected a correspondant for the section of anatomy and zoology in succession to the late M. Maupas.—**T. Lalesco**: The classes of nuclei capable of symmetry.—E. **Léger**: The mechanism of the formation of certain isomers of cinchonine and their hydrohalides.—P. **Nicolardot** and J. **Boudet**: The examination of mercury fulminate and the analysis of mixtures for detonators. The methods suggested are based on treatment with yellow ammonium sulphide to form mercury sulphide, and precipitation of antimony sulphide from the solution by ammonium sulphite.—J. **Clarens**: The precipitation of phosphoric acid as ammonium phosphomolybdate. Practical estimation of phosphoric acid by a simple nitrometer measurement. A method is described for obtaining a phosphomolybdate precipitate in which the ratio of ammonia to phosphorus is fixed, so that the phosphorus is ultimately determined by a gasometric measurement.—L. **Dubreuil-Chambardel**: An anatomical variation of the second metacarpal.—E. **Roubaud**: Disappearance of the infective power in *Anopheles maculipennis* in the course of hibernation.—M. **Folley**: The cross of the aorta in exophthalmic goitre.

February 18.—M. Léon Guignard in the chair.—G. **Bigourdan**: Various French astronomical observatories of the seventeenth century.—M. Vayssière was elected a correspondant for the section of anatomy and zoology in succession to the late M. Renaut.—P. E. **Gau**: The integration of partial differential equations of the second order.—M. T. **Beritch**: The extension of Rolle's theorem to the case of several variables.—B. de **Fontviolant**: A new theory relating to the effects of the wind on bridges supported on arches.—M. **Maggini**: A new stellar photometer. A description of a modified wedge photometer.—A. **Véronnet**: The contraction of a gaseous mass and the evolution of the sun.—A. **Travers**: The estimation of vanadium in presence of molybdenum by titanous chloride.—L. **Gentil**, M. **Lugeon**, and L. **Joleaud**: Geology of the Sebou basin (Morocco).—L. **Dunoyer**: The diurnal variation of the wind in altitude and the influence of the distribution of the cloud masses.—M. **Reboul**: The diurnal variations of the wind in altitude.—L. **Daniel**: Extension of the limits of culture of the vine by means of certain hybrids.—L. **Lapicque** and J. **Chaussin**: The food value of whole wheat and of flour of 85 per cent. extraction compared with white flour. Medium wheat leaves 12 per cent. of indigestible residue; its nutritive value is equal to 90 per cent. of its weight of white flour.—P. **Brodin** and Fr. **Saint-Girons**: Contribution to the study of digestive leucocytosis.—H. **Colin**: Transformations of inulin in the tuber of the Jerusalem artichoke during the period of repose.—F. **Diénert** and A. **Guillerd**: The concentration of the micro-organisms of water. After trying and discarding various types of filters, and removal by formation of precipitates, a workable concentrating agent was found in alumina cream. Prepared and used in the manner laid down, from 80 per cent. to 100 per cent. of added *B. coli* were recovered.—A. **Bouquet** and L. **Nègre**: Culture of the parasite of epizootic lymphangitis and the experimental reproduction of the disease in the horse.—M. **Folley**: The aortic cross in exophthalmic goitre. Dilation of the aorta is a constant symptom of Basedow's disease, and may be used as a means of diagnosis in doubtful cases.—E. Le **Moignic** and J. **Gautrelet**: Intravenous injections of oil. Contribution to the physiological study of the T.A.B. lipo-vaccine. From 1 c.c. to 1·5 c.c. of oil can be safely injected into the circulation of a dog, and vaccines with an oil basis are proved to be less toxic than aqueous vaccines.

February 25.—M. Paul Painlevé in the chair.—G. **Bigourdan**: The old astronomical stations of Nantes and Pau. Historical notices of the work of Anastase, Fontenay, and Lévêque at Nantes, and of Richaud, Tawzin, Pallu, Graindorge, and Jean de Bonnécamp at Pau.—A. **Blondel**: The graphical determination of total inductances, direct and transversal, of alternators by means of the partial characteristics calculated or observed.—A. **Carnot**: Some new separations of the five metals of the group soluble in ammonia. Examples of

the application of the method outlined in an earlier communication to the analysis of brass, German silver, and other alloys.—E. **Ariès**: The critical constants of mercury. The formula given in a previous paper, and worked out for the cases of argon, xenon, and crypton, is now applied to mercury, the vapour of which is also monatomic. The formula leads to 1077° C. for the critical temperature, and 420 atmospheres for the critical pressure of mercury.—W. **Kilian**: Contributions to the knowledge of the Delphino-Provençal and Rhodanian lower Cretaceous.—M. Flahault was elected a non-resident member in the place of the late M. Gosselet.—B. **Jekhowsky**: The generalisation of a theorem of Cauchy relating to developments in series.—R. de Montessus de **Ballore**: Skew quartics of the first species.—J. **Guillaume**: Observations of the sun made at the Observatory of Lyons during the fourth quarter of 1917. Details of observations made on fifty-seven days.—E. **Vessiot**: Propagation by waves and the theory of general relativity.—P. **Weiss** and A. **Piccard**: A new magneto-thermal phenomenon. In the course of a magnetic study of nickel in the neighbourhood of the Curie point, the establishment of the field (15,000 g.) caused a marked rise of temperature (0·7°). The suppression of the field produced a cooling of the same order. The reversibility and order of magnitude distinguish this effect from heating due to hysteresis. Above the Curie point (629·6° Absolute) the rise of temperature is proportional to the square of the magnetisation, a result which can be deduced from the theory of the molecular field.—Ph. **Flajolet**: Perturbations of the magnetic declination at Lyons (Saint-Genis-Laval) during the fourth quarter of 1917.—J. **Dufrénoy**: Tumours on the maritime pine.—C. **Cépède**: New method of staining the tubercle bacillus.—H. **Vincent**: The prophylaxy of Maltese fever by the active immunisation of the germ-carrying animals.

BOOKS RECEIVED.

Précis de Radiodiagnostic Technique et Chirurgie. By Dr. Jaugeas. Second edition. Pp. xxviii+563. (Paris: Masson et Cie.) 20 francs.

Localisation et Extraction des Projectiles. By L. Ombrédanne and R. Ledoux-Lebard. Second edition. Pp. iv+305. (Paris: Masson et Cie.) 4 francs.

Theory of Functions of a Complex Variable. By Prof. A. R. Forsyth. Third edition. Pp. xxiv+855. (Cambridge: At the University Press.) 30*s.* net.

The War and the Bagdad Railway. By Prof. M. Jastrow, jun. Pp. 160. (Philadelphia and London: J. B. Lippincott Co.) 6*s.* net.

Department of Commerce. U.S. Coast and Geodetic Survey. Terrestrial Magnetism. U.S. Magnetic Tables and Magnetic Charts for 1915. By D. L. Hazard. Pp. 256+illustrations in pocket. (Washington: Government Printing Office.)

The Advanced Montessori Method. By M. Montessori. ii., The Montessori Elementary Material. Translated by A. Livingston. Pp. xviii+455. (London: W. Heinemann.) 12*s.* 6*d.* net.

What Industry Owes to Chemical Science. By R. B. Pilcher. Pp. xiv+150. (London: Constable and Co., Ltd.) 3*s.* net.

The Systematic Treatment of Gonorrhœa. By N. P. L. Lumb. Pp. viii+116. (London: H. K. Lewis and Co., Ltd.) 4*s.* 6*d.* net.

Anti-Malaria Work in Macedonia among British Troops. By Dr. W. G. Willoughby and L. Cassidy. Pp. x+68. (London: H. K. Lewis and Co., Ltd.) 3*s.* 6*d.* net.

Tumours: Their Nature and Causation. By Dr. W. d'Este Emery. Pp. xx+146. (London: H. K. Lewis and Co., Ltd.) 5*s.* net.

Aids to Rational Therapeutics, with U.S.A. Pharmacopœia Equivalents. By Dr. R. W. Leftwich. Pp. x+233. (London: Baillière and Co.) 3*s.* 6*d.* net.

Aviation Engines: Design, Construction, Operation, and Repair. By First Lieut. V. W. Pagé. Pp. 589. (London: Crosby Lockwood and Son.) 15*s.* net.

DIARY OF SOCIETIES.

THURSDAY, MARCH 21.

INSTITUTION OF ELECTRICAL ENGINEERS, at 6.—The Mechanical Design and Specification of the Turbo-alternator Rotor: Dr. S. F. Barclay.

INSTITUTION OF MINING AND METALLURGY, at 5.30.—Annual General Meeting.

INSTITUTION OF NAVAL ARCHITECTS, at 11 a.m.—Problems of the Future in the Design and Construction of Merchant Ships: W. S. Abell.—Research in Marine Engineering: A. E. Seaton.—The Effect of the Longitudinal Motion of a Ship on its Statical Transverse Stability: G. S. Baker and Miss E. M. Keary.—At 3 p.m.—The Iron Carbon Equilibrium Diagram and its Practical Usefulness: Prof. H. C. H. Carpenter.—Stress Distribution in Bolts and Nuts: C. E. Stromeyer.

LINNEAN SOCIETY, at 5.—The Shoulder-girdle of a Dicynodont Reptile from South Africa: E. S. Goodrich.—Fossil Charas from Oligocene Beds: J. Groves.—Malayan Form of *Chlorococcum humicola* (Nacq.), Rabenh.: Miss B. Muriel Bristol.

FRIDAY, MARCH 22.

ROYAL INSTITUTION, at 5.30.—Radiation from System of Electrons: Sir J. J. Thomson.

INSTITUTION OF NAVAL ARCHITECTS, at 11 a.m.—A Preliminary Survey of the Possibilities of Reinforced Concrete as a Material for Ship Construction: Major M. Denny.—Reinforced Concrete Vessels: W. Pollock.—Design and Construction of a Self-propelled Reinforced Concrete Seagoing Cargo Steamer building in Great Britain: T. G. O. Thurston.—An Investigation of the Shearing Force and Bending Moment acting on the Structure of a Ship including Dynamic Effects: A. M. Robb.—At 3 p.m.—Air Supply to Boiler Rooms: R. W. Allen.

PHYSICAL SOCIETY, at 5.—The Fourth Guthrie Lecture: The Origin of Spectra: Prof. J. C. McLennan.

SATURDAY, MARCH 23.

ROYAL INSTITUTION, at 3.—Problems in Atomic Structure: Sir J. J. Thomson.

MONDAY, MARCH 25.

SOCIETY OF CHEMICAL INDUSTRY, at 8.—Some Cottonseed Products in Relation to Present-day Needs: E. C. de Segundo.

CONTENTS.

Editorial and Publishing Offices:
MACMILLAN AND CO., LTD.,
ST. MARTIN'S STREET, LONDON, W.C.2.

Advertisements and business letters to be addressed to the Publishers.

Editorial Communications to the Editor.
Telegraphic Address: PHUSIS, LONDON.
Telephone Number: GERRARD 8830.