Societies and Academies.

CAMBRIDGE.

Philosophical Society, July 26.—P. A. M. **Dirac**: On quantum algebra. In this algebra the commutative law of multiplication no longer holds, but the other axioms of ordinary algebra are still valid. A general definition of a function is proposed, and the differential coefficient is defined without introducing the idea of a limit.—Miss B. **Swirles**: The polarisabilities of atomic cores. The polarisabilities of the cores of several atoms are calculated from the terms of their spectra by means of a formula due to Born and Heisenberg. The values so obtained agree with those given by a modification of the dispersion formula of Kramers and Heisenberg.—J. R. **Oppenheimer**: On the quantum theory of the problem of the two bodies. (Preliminary communication.) In addition to the Balmer terms derived by Pauli, Schrödinger and Dirac, the line intensities are computed; for example, the first Balmer emission line is 12·2 times as intense as the second Lyman line, and the first Balmer absorption line is 5·37 times as intense as the second. The probabilities of transition and capture are derived, and a method of obtaining the deflexion spectrum is sketched. The argument is based throughout on Schrödinger's theory.—G. P. **Thomson**: An optical illusion due to contrast. A blackened strip on a photographic negative sometimes has the appearance of being blacker at the edges than the centre, though the reverse is found to be the case when measurements are made by a photometer. The edges are narrower and clearer the more rapid the transition from light to darkness, but become too narrow to be seen when the transition is made as abrupt as possible. The eye appears to see rapid change of blackness as enhanced blackness. A converse effect appears for a light strip on a blackened ground.—M. H. A. **Newman**: Integral invariants of the affine field.—A. **Young** and H. W. **Turnbull**: The linear invariants of ten quaternary quadrics.—G. S. **Mahajani**: A contribution to the theory of ferromagnetism.—E. B. **Moullin**: On some resistance properties of a certain net-work containing inductances and capacities, and their analogies in a mechanical system. If the net-work is in acceptor resonance at a certain frequency when excited from a particular member, then it will also be in resonance when excited from any other member, but then the resonance may be either acceptor or rejector.—J. C. **Burkill**: On Mellin's inversion formula.—Major P. A. **MacMahon**: The elliptic products of Jacobi and the theory of linear congruences.—R. **Hargreaves**: Geodetic and dynamical principles, a comparison and connexion.—J. R. **Oppenheimer**: On the quantum theory of vibration-rotation bands. The dynamical problem of the diatomic molecule is solved on the new mechanics. The quantum numbers, chosen to give a normal state, are $n = \frac{1}{2}, \frac{3}{2} \ldots$; $m = -\frac{1}{2}, -\frac{3}{2}, -\frac{5}{2} \ldots, \frac{1}{2}, \frac{3}{2}, \frac{5}{2} \ldots$; $r = -m + \frac{1}{2} \ldots, +m - \frac{1}{2}$. The frequencies differ from the classical frequencies for half integral vibrational and rotational quantum numbers in having $m^2 - \frac{1}{4}$ for m^2 in the coupling term. The weights of the m states are $2m$. The intensity of the central line of the band vanishes. The intensities of the lines are worked out to the second order in $\nu_{rot.}/\nu_{vib.}$.—P. A. **Taylor**: An approximation to the motion of two rotating electrical doublets in a plane.—D. R. **Hartree**: Some relations between the optical spectra of different atoms of the same electronic structure. (ii.) Aluminium-like and copper-like atoms. For penetrating orbits of the series electron, the quantum defect can be expressed as the sum of contributions from the groups of core orbits of different principal quantum number. Based on this, relations are obtained between the values of the quantum defect for corresponding terms of the spectra of an atom of a given element in different states of ionisation, and of different atoms in such states of ionisation that they have the same electronic structure.—J. P. **Gabbatt**: Note on the extension to higher space of a theorem of Wallace.—J. B. S. **Haldane**: A mathematical theory of natural and artificial selection (Pt. iii.).

ROME.

Pontifical Academy of Sciences (Nuovi Lincei), June.—**Gemelli**: Perception of the position of the body in relation to the sensation of equilibrium of an aeroplane pilot. The importance of muscular, cartilaginous, and tactile sensations, in opposition to those of the semi-circular channels of the ear, is emphasised. Anile, however, reaffirms the importance of such channels with reference to the equilibrium, and states that these studies necessitate consideration of the vast and complex relationships between the vestibular nerve and the nervous centres.—**Luigioni**: A case of trifid antenna in *Demetrias atricapillus*, a small coleopterous insect of the scarab family.—**Teofilato**: Motion of a weight in a medium with viscous resistance.—**Pagnini**: Hypotheses serving as foundation for the undulatory theory.—**Gianfranceschi**: De momento theoriae physicae circa quanta. The bases and the results of the quantum theory are examined and those of real value indicated.—**Scatizzi**: The demonstration of formal generality by means of differential equations of a typical case of the ideal problem.—**Colonnetti**: Experimental investigations on elastic co-actions. Results are given of the study of a rectilinear beam and of a ring subjected to the action of a source of heat which induces in them a state of co-action.—**Giorgi**: Unsolved questions in the fundamental theories of electromagnetism.—Isabella **Biasi**: The extension of Birichbet's theorem to the general typical case of impulsive function.

SYDNEY.

Linnean Society of New South Wales, June 30.—R. J. **Tillyard**: Upper Permian insects of New South Wales (Pt. ii.). The orders Mecoptera, Parameco-ptera and Neuroptera. These fossils are from Belmont and Warner's Bay and belong to three closely allied holometabolous orders. The Mecoptera are represented by no less than two families, five genera and eighteen species, this being the largest fossil Mecopterous fauna yet discovered, though the Lower Permian of Kansas comes fairly close to it with six genera and fourteen species. This order is also the oldest of the three, as it can be traced back into the Upper Carboniferous. The most abundant genus is Permochorista Till., of which eleven species are described. Fragments of the wings of this genus are the commonest fossils in these beds. The order Paramecoptera is not known outside these beds, and there are only two species; they are interesting as being the early ancestral types from which the orders Diptera, Trichoptera and Lepidoptera have evolved. The Neuroptera are represented by one family, four genera and eight species of the suborder Planipennia.—A. P. **Dodd**: New species of Australian Proctotrypoidea, with revisional notes. One new genus in the family Scelionidæ and ten new species in the families Scelionidæ, Belytidæ and Diapriidæ are described.—G. H. **Hardy**: A new classification of Australian robberflies belonging to the subfamily Dasypogoninæ (Diptera, Asilidæ) Eighteen genera of the Dasypogoninæ are recognised and are divided into three tribes, Brachyrrhopalini (4 genera), Saropogonini (10) and Phellini (4).—May M. **Williams**: Contributions to the cytology and

phylogeny of the siphonaceous Algæ. (2) Oogenesis and spermatogenesis in *Vaucheria geminata*. The young oogonia and antheridia are multinucleate, the ultimate uninucleate condition of the oogonium resulting from the degeneration of the supernumerary nuclei. These latter are regarded as being potential gameto-nuclei, and potential and functional gameto-nuclei are homologous. There is no mitosis occurring in the oogonium or antheridium in connexion with the development of these organs. The Vaucheriaceæ are regarded as being derived from a Cladophora-type with gametangia liberating free gametes. They probably represent an end line of development.

Royal Society of New South Wales, July 7.—**A. R. Penfold**: The essential oils of *Leptospermum lanigerum*, Smith (Pt. 1). This Myrtaceous shrub is widely distributed, and is especially plentiful in the southern districts of New South Wales, where it follows the water courses. The chemical results obtained by an examination of material collected at Monga, near Braidwood, New South Wales, points to the separation of two extreme forms of this shrub. The type has silvery leaves, and yields 60-75 per cent. of aromadendrene and eudesmene, 16-20 per cent. d-a-pinene, with smaller quantities of citral, geraniol, geranyl-formate and cinnanamate, etc. The leaves of form A are bright green, and it yields 40-60 per cent. d-a-pinene, 40-45 per cent. darwinol and its acetate, with smaller quantities of sesquiterpene and its alcohol.

Official Publications Received.

Proceedings of the Cambridge Philosophical Society. Vol. 23, Part 3, July. Pp. 191-335. (Cambridge: At the University Press.) *7s. 6d.* net.

Museo Nacional de Historia Natural "Bernardino Rivadavia," Buenos Aires. Memoria Anual de 1924. For M. Doello-Jurado. Pp. 118+44 plates. (Buenos Aires.)

The Rockefeller Foundation: a Review for 1925. By George E. Vincent. Pp. 59. (New York City.)

The Memoirs of the Imperial Marine Observatory, Kobe, Japan. Vol. 2, No 2: A Note on the Characteristic Movement of Spots, Faculæ and Flocculi of the Sun. By Rikiti Sekiguti. Pp. 83-110. (Kobe.)

Memoirs of the College of Science, Kyoto Imperial University. Series B. Vol. 1, No. 2: Notes on the Volcanic and Seismic Phenomena in the Volcanic District of Shimabara, with a Report on the Earthquake of December 8th, 1922, by Prof. Takuji Ogawa; Notes on a Fossil Elephant from Sahamma, Tôtômi, by Prof. Jirô Makiyama. Pp. 201-264+plates 6-16. Vol. 1, No. 4: Studies on the Surface Characters of Minerals. i: Electro-chemical Behavior of the Crystal Surface of Pyrite. By Atsushi Matsubara. Pp. 285-332+plate 19. Vol. 2, No. 1: On the Structure of the Anaphasic Chromosomes in the Somatic Mitosis in *Vicia Faba*, with special reference to the so-called Longitudinal Split of Chromosomes in the Telophase, by Yoshinari Kuwada; A Study of the Mycorrhiza of *Abies firma*, S. et Z., with special reference to its Mycorrhizal Fungus, *Cantharellus floccosus*, Schw., by Koki Masui; On the renewed Growth of the Mycorrhizal Root, by Koki Masui. Pp. 92+6 plates. Vol. 2, No. 2: Contributions to the Knowledge of the Intestinal Secretion of Insects. i: Mid-Intestinal Secretion of Lepidoptera, with an Appendix: Behavior of Mitochondria in the Mid-Intestinal Epithelium of the Silk-worm *Bombyx mori*, L., by Osamu Shinoda; Einige Beobachtungen über die Ernährungsbiologie der wilden Seidenraupe, *Dictyoploca japonica*, Moore, von Osamu Shinoda. Pp. 93-128+plates 7-10. Vol. 2, No. 3: Studies on the Surface Characters of Minerals. ii: The Distribution of Tarnish Colours on the Crystal Surface of Pyrite, by Atsushi Matsubara; Studies on the Surface Characters of Minerals. iii: a simple Method for the Determination of the Surface Stability of some Minerals, by Atsushi Matsubara; Tertiary Fossils from North Kankyô-dô, Korea, by Prof. Jirô Makiyama. Pp. 129-160+plates 11-13. (Kyoto.)

U.S. Department of Agriculture. Farmers' Bulletin No. 1489: The Green June Beetle Larva in Tobacco Plant Beds. By K. B. McKinney and Joe Milam. Pp. ii+6. (Washington, D.C.: Government Printing Office.) 5 cents

Proceedings of the Society for Psychical Research. Part 99, Vol. 36, July. Pp. 171-343. (London: Francis Edwards.) *7s. 6d.* net.

Conseil Permanent International pour l'Exploration de la Mer. Bulletin Statistique des Pêches maritimes des Pays du Nord et de l'Ouest de l'Europe. Rédigé par D'Arcy Wentworth Thompson. Vol. 13, pour l'année 1923. Pp. 113. (Copenhague: Andr. Fred Host et fils.)

Carnegie Institution of Washington: Eugenics Record Office. Bulletin No. 25: The Families whence High Intelligence Springs. By Grace Allen. Pp. 39. (Cold Spring Harbor, Long Island, N.Y.)

Royal Botanic Gardens, Kew. Picture Postcards. Set 12: Stove and Greenhouse Plants. 6 cards in colour. Set 14: Roses (Rosaceæ.) 6 cards in colour. Set 15: Orchids (Orchidaceæ.) 6 cards in colour. Set 16: Decorative Plants. 6 cards in colour. (Kew: Royal Botanic Gardens.) 1*s.* per set.

Mitteilungen der Naturforschenden Gesellschaft in Bern aus dem Jahre 1925. Pp. xxx+82. (Bern: K. J. Wyss Erben.)

Diary of Societies.

SATURDAY, AUGUST 28.

NORTH OF ENGLAND INSTITUTE OF MINING AND MECHANICAL ENGINEERS (Associates and Students' Section) (at Newcastle-upon-Tyne), at 3.—Capt. W. Ridley: The Mineral Wealth of the British Empire.

CONGRESSES.

AUGUST 27 AND 28.

IRON AND STEEL INSTITUTE (Autumn Meeting) (at Stockholm).—F. Adcock: The Effect of Nitrogen on Chromium and some Iron Chromium Alloys (Alloys of Iron Research, Part IV.).—J. H. Andrew and H. A. Dickie: A Physical Investigation into the Cause of Temper Brittleness.—Prof. C. Benedicks, H. Bäckström, and P. Sederholm: Anomalies in Heat Conduction, with some Determinations of Thermal Conductivity in Iron and Carbon Steels.—Prof. C. Benedicks and R. Sundberg: Electrochemical Potentials of Carbon and Chromium Steels.—G. F. Comstock: The Treatment of Steel with Ferro Carbon-Titanium.—G. A. Hankins, D. Hanson, and Miss G. W. Ford: The Mechanical Properties of Four Heat-Treated Spring Steels.—Prof. K. Honda: Is the Direct Change from Austenite to Troostite Possible?—A. Johansson and R. Von Seth: The Carburisation and Decarburisation of Iron and Some Investigations on the Surface Decarburisation of Steel.—A. Johansson and A. Wahlberg: The Development of the Swedish Iron and Steel Industry during the last thirty years.—E. Kinander: Notes on Jernkontoret.—A. Lundgren: The Testing of Hardened Steel.—W. Petersson: Notes on the Development of the Swedish Mining Industry during the last twenty-five years.—G. Phragmen: The Constitution of the Iron-Silicon Alloys.

AUGUST 29 TO SEPTEMBER 1.

SOCIÉTÉ HELVÉTIQUE DES SCIENCES NATURELLES (at Fribourg).—In Sections devoted to Mathematics, Physics, Geophysics, Meteorology and Astronomy, Chemistry, Geology, Mineralogy and Petrography, General Botany, Special Botany and Geographical Botany, Zoology, Entomology, Anthropology and Ethnology, Palæontology, Medical Biology, History of Medicine and Natural Science.

AUGUST 31 TO SEPTEMBER 8.

WORLD POWER CONFERENCE (at Basle), Technical Programme of Sectional Meeting:

Utilisation of Water Power, and Inland Navigation.
Exchange of Electrical Energy between Countries.
The Economic Relation between Electrical Energy Produced Hydraulically and Electrical Energy Produced Thermally: Conditions under which the two systems can work together with advantage.
Electricity in Agriculture.
Railway Electrification.

SEPTEMBER 1 TO 4.

INSTITUTE OF METALS (Autumn Meeting) (at Liége).

Wednesday, September 1, at 8.—Dr. W. Rosenhain: Ancient Industries and Modern Metallurgy (Autumn Lecture).

Thursday, September 2.—L. Boscheron: An Account of the Non-Ferrous Metals Industry in the Liége District.—Dr. A. G. C. Gwyer and H. W. L. Phillips: The Constitution and Structure of the Commercial Aluminium-Silicon Alloys. With an Appendix upon The Properties of the Modified Aluminium-Silicon Alloys, by Dr. D. Stockdale and I. Wilkinson.—J. D. Grogan: Some Mechanical Properties of Silicon-Aluminium Alloys.—B. Ôtani: Silumin and its Structure.—H. J. Gough, S. J. Wright, and Dr. D. Hanson: Some Further Experiments on the Behaviour of Single Crystals of Aluminium under Reversed Torsional Stresses.—P. Chevenard: Thermal Anomalies of Certain Solid Solutions.—W. T. Cook and W. R. D. Jones: Preliminary Experiments on the Copper-Magnesium Alloys.—Dr. K. Honda: A Comparison of Static and Dynamic Tensile and Notched-Bar Tests.

Friday, September 3.—Dr. C. J. Smithells, H. P. Rooksby, and W. R. Pitkin: The Deformation of Tungsten Crystals.—A. Pinkerton and W. H. Tait: Season-Cracking in Arsenical Tubes.—Dr. C. S. Smith and Prof. C. R. Hayward: The Action of Hydrogen on Hot Solid Copper.—F. W. Rowe: Bronze Worm-Gear Blanks produced by Centrifugal Casting.—Kathleen E. Bingham: The Constitution and Age-Hardening of Some Ternary and Quaternary Alloys of Aluminium containing Nickel.—Capt. F. R. Barton: Development of the Use of Nickel in Coinage.—C. H. M. Jenkins: The Constitution and the Physical Properties of the Alloys of Cadmium and Zinc.—G. B. Phillips: The Primitive Copper Industry of America. Part II.

SEPTEMBER 6 TO 11.

AMERICAN CHEMICAL SOCIETY (at Philadelphia).—In eighteen Divisional Gatherings, dealing with various branches of Pure and Applied Chemistry.

SEPTEMBER 12 TO 18.

INTERNATIONAL CONGRESS FOR APPLIED MECHANICS (at Federal Technical University, Zurich).—Lectures by Prof. P. W. Bridgman, Prof. P. Debye, Prof. T. Levi-Civita, Prof. L. Prandtl, and Prof. G. I. Taylor.

SEPTEMBER 13 TO 17.

INTERNATIONAL CONGRESS OF PHILOSOPHY (at Harvard University, Cambridge, Mass.).

SEPTEMBER 19 TO 26.

GERMAN SCIENTIFIC AND MEDICAL ASSOCIATION (at Düsseldorf).

SEPTEMBER 22 TO 24.

GERMAN RÖNTGEN SOCIETY (at Düsseldorf).—Discussions on X-ray Treatment of Inflammation, the Compton Effect, and Irradiation of the Ovary and Offspring.