

adequate training of efficiently educated youths as leaders in our chief industries and what number avail themselves of such training. Certainly it would be found far below that of Germany or the United States, our chief industrial competitors. Inquiry should also be made as to the disposition of our chief technical institutions, especially those equipped for the efficient training of day students, and as to the desirability of the official recognition of such institutions as specialise in the science and technology of certain industries, e.g. iron and steel at Sheffield; cotton textiles and chemical products, particularly dyes, at Manchester; the leather industry at Leeds; shipbuilding at Glasgow, Newcastle, and Belfast; mining at Wigan, Newcastle, and Cardiff; textiles other than cotton at Leeds, Huddersfield, and Bradford; mechanical and electrical engineering at various chief centres, etc. There is reason to believe that public opinion is ripe for much larger support both from local and State funds. The new Education Act will certainly add largely to the number of capable students who will need the help of maintenance scholarships, which should, in consequence, be very largely increased, so as to enable them to proceed to higher institutions for whole-time study. It is to be hoped that this important memorandum will be circulated to every Member of Parliament and to all the education authorities and chief industrial associations throughout the kingdom.

### SOCIETIES AND ACADEMIES.

#### LONDON.

**Optical Society**, April 10.—**J. W. French**: The unaided eye. After a brief historical introduction, the principal dioptric features of the eye were considered, particularly those relating to the pupil reflexes. By means of a simple pupilometer the diameter of the pupil when applied to optical instruments was measured. The variations of the pupil with varying illumination of the whole retina, of the macula lutea, and of several zones of constant area were also measured and the results discussed. It would appear that for the macula lutea the pupil area varies as the fifth root of the illumination. The zone around the macula lutea is more sensitive, and the sensitiveness diminishes thereafter towards the margin of the retina. So far as the pupil reflexes are concerned, the two eyes are quite independent of each other; while the pupil area of the one eye under constant illumination remains constant, the other eye under simultaneous variation of the illumination varies in accordance with the above law. The variation of the pupil area with accommodation is quite independent of the illumination, and is determined by the refractive power of the crystalline lens.—**T. Smith**: The spacing of glass-working tools. In constructing optical systems the exact curvatures for the surfaces determined by calculation need not be employed, but the departures must lie between limits which will be functions of the nominal curvatures. It follows that a system of properly spaced tools should suffice to meet all normal requirements. The basis on which a system should be constructed is discussed, and a proposed standard list of tools is derived from an aberrational condition, together with assumed extreme relations between aperture and focal length and between aperture and radius of curvature. The total number of tools, which is finite, occurs as an independent variable in the formula on which the system is constructed, and in the absence of experimental investigations this must be determined by comparing the results obtained from an arbitrarily assumed value with the lists that manufacturers have found from experience to be reasonably spaced. A comparison between the

list derived by assuming the total number of different curvatures in the complete set to be one thousand and the lists of two makers shows satisfactory agreement.

#### PARIS.

**Academy of Sciences**, March 31.—**M. Léon Guignard** in the chair.—**A. Lacroix**: The leucitic lavas of Trebizond and their transformations. From the data furnished by chemical analyses it is impossible to get an exact idea of the magmatic relations of these rocks, since the essential ratios are disturbed by chemical and mineralogical transformations of secondary origin.—**G. Bigourdan**: The observatory of Le Monnier in the rue Saint-Honoré. Historical account of Le Monnier's astronomical work and publications, and of his instruments.—**Ch. Barrois** and **P. Pruvost**: The stratigraphical divisions of the Coal Measures of the North of France.—**H. Douvillé**: Evolution and classification of Nummulites.—**C. Richet** and **H. Cardot**: Sudden mutations in the formation of a new race of micro-organisms. A study of the modification produced by an arsenical medium upon the production of lactic acid by a pure lactic organism. This organism does not gradually become accustomed to the poison, but the tolerance shows a series of sudden variations, each of which is marked by intense multiplication.—**M. de Sparre**: Conditions to be fulfilled for increasing the flow, and hence the work, in an hydraulic installation without modifying the pipe.—**G. A. Boulenger**: An interesting case of sexual dimorphism in an African snake, *Bothrolycus ater*.—**M. Eugène Casserat** was elected a non-resident member in succession to the late **M. H. Bazin**.—**P. Sabatier** and **G. Gaudion**: Catalytic dehydrogenation by nickel in presence of hydrogen. Pinene, limonene, camphene, menthene, and cyclohexene carried by hydrogen over nickel at 350°–360° C. undergo simultaneously hydrogenation and dehydrogenation. The reaction has been applied to compounds containing oxygen. Cyclohexanol gives phenol; pulegone, a mixture of cresol and thymol.—**S. Lefschetz**: The analysis of algebraic varieties.—**L. E. J. Brouwer**: The enumeration of regular Riemann surfaces of Genus I.—**A. Véronnet**: The temperature of equilibrium of a gaseous star for any ray.—**A. Colson**: The theory of solubility.—**C. Chéneveau** and **R. Audubert**: Absorption in turbid media. Dispersion by internal diffusion.—**P. Vaillant**: The production of a continuous current by the application of an alternating electromotive force to a voltameter with platinum electrodes.—**J. Martinet**: The mobility of the hydrogen atoms in organic molecules. The action of phenylhydrazine on dioxindols. Although neither aldehydes nor ketones, dioxindols give phenylhydrazones with great ease. The preparation and properties of several of these phenylhydrazones are described.—**G. Guilbert**: Some examples of "cyclone compression." Cyclonic centres sometimes present the phenomenon of disappearing very rapidly, in twenty-four hours or even less. This the author terms "cyclone compression," and directs attention to several examples which have occurred recently.—**A. Jauffret**: The determination of the woods of two species of *Dalbergia* from Madagascar, according to the characters of their colouring matters. The colouring matters extracted from these two species by solvents give different chemical reactions and absorption spectra. These characters are constant for each species.—**L. Daniel**: Researches on the comparative development of the lettuce in sunlight and in the shade.—**H. Colin**: The utilisation of glucose and lævulose by the higher plants. Analyses are given of total dextrose and lævulose and the ratio of these two hexoses in various parts of the plant in the case of beetroot, Jerusalem artichoke, and chicory.—**E. Esclangon**: The physiological sensations of

detonation.—E. Bourquelot and M. Bridel: Application of the biochemical method to the study of several species of indigenous orchids. Discovery of a new glucoside, loroglossine. This new glucoside was isolated from *Loroglossum hircinum* in crystalline form. It is hydrolysed by hot dilute sulphuric acid or by emulsin.—A. Bayet and A. Slosse: Arsenical poisoning in industries involving coal and its derivatives. The study of numerous cases of pitch-cancer in a briquette works showed that many of the symptoms strikingly resembled those of chronic arsenical poisoning. Arsenic was proved to be present in the pitch, in the dust floating in the air at the works, in the hair of all the workmen, and in notable quantities in the urine and blood of the greater number of the workmen. Analyses of the blood, urine, and hair of other workmen, living in the same district, but not employed in briquette-making, gave negative results for arsenic. Thus from both the chemical and the clinical examination the conclusion is drawn that the symptoms observed in workmen handling pitch are those of chronic arsenical poisoning.

BOOKS RECEIVED.

Joseph Priestley. By D. H. Peacock. Pp. 63. (London: S.P.C.K.) 2s. net.

The Geology of South Australia. By W. Howchin. In two divisions. Division i., An Introduction to Geology, Physiographical and Structural, from the Australian Standpoint; Division ii., The Geology of South Australia, with Notes on the Chief Geological Systems and Occurrences in the other Australian States. Pp. xvi+543. (Adelaide: The Education Department.)

Inorganic Chemistry. By Prof. J. Walker. Eleventh edition, revised and enlarged. Pp. viii+326. (London: G. Bell and Sons, Ltd.) 5s. net.

Elementary Chemistry of Agriculture. By S. A. Woodhead. Pp. vii+188. (London: Macmillan and Co., Ltd.) 3s. 6d.

Displacement Interferometry by the Aid of the Achromatic Fringes. By Prof. C. Barus. Pt. iii. Pp. 100. (Washington: The Carnegie Institution of Washington.)

Naval Officers: Their Heredity and Development. By C. B. Davenport, assisted by M. T. Scudder. Pp. iv+236. (Washington: The Carnegie Institution of Washington.)

Duration of the Several Mitotic Stages in the Dividing Root-tip Cells of the Common Onion. By Dr. H. H. Lauehlin. Pp. 48+plates. (Washington: The Carnegie Institution of Washington.)

DIARY OF SOCIETIES.

THURSDAY, APRIL 24.

MATHEMATICAL SOCIETY, at 5.—K. Ananda Rau: (1) Lambert's Series; (2) The Relations between the Convergence of a Series and its Summability by Cesàro's Means.—G. H. Hardy and J. E. Littlewood: A Fauberian Theorem for Lambert's Series.

INSTITUTION OF ELECTRICAL ENGINEERS, at 6.—Major A. C. Fuller: The Fullerphone, and its Application to Military and Civil Telegraphy.

MONDAY, APRIL 28.

INSTITUTE OF ACTUARIES, at 5.—P. H. McCormack: Group Insurance.

TUESDAY, APRIL 29.

ROYAL INSTITUTION, at 3.—Prof. Keith: British Ethnology—The People of Wales and Ireland.

FARADAY SOCIETY AND RÖNTGEN SOCIETY (Joint Meeting), at 5.—General Discussion: The Examination of Materials by X-Rays. Sir Robert Hadfield: Introduction of Discussion.—Prof. W. H. Bragg: Radio-metallography.—Prof. A. W. Porter: Abstracts of (a) Investigation of Metals by means of X-Rays, by F. Janus (Munich) and M. Reppchen (Cologne). (b) The Principles Governing the Penetration of Metals by X-Rays, by Dr. G. Respondek (Helensee).—M. H. Pilon and G. Pearce: Apparatus used for Radio-metallography.—Capt. R. Knox and

Major G. W. C. Kaye: The Examination of Timber by X-Rays.—Sir Robert Hadfield, S. A. Main, and J. Brooksbank: (1) Testing the Absorption Power of Different Steels under the X-Rays. (2) X-Ray Examination as Applied to the Metallurgy of Steel. (3) Radiographic Examination of Carbon Electrodes used in Electric Steel-making Furnaces. (4) A Method of Testing an X-Ray Tube for Definition.—Lt.-Col. C. F. Jenkin: The Detection of Hair Cracks in Steel by means of X-Rays.—F. F. Renwick: The Behaviour of Photographic Plates to X-Rays considered in Relation to the Radiography of Metals.—Dr. R. E. Slade: Contrasts in X-Ray Photographs.—M. E. Schneider (Le Creusot): Radio-metallography.

ZOOLOGICAL SOCIETY, at 5.30.—Dr. W. T. Calman: Marine Boring Animals.—Noel Taylor: A Unique Case of Asymmetrical Duplicity in the Chick.—Geo. Jemison: A Chimpanzee in the Open Air in England.

INSTITUTION OF CIVIL ENGINEERS, at 5.30.—Annual General Meeting.

WEDNESDAY, APRIL 30.

ROYAL AERONAUTICAL SOCIETY, at 8.—Major H. E. Wimperis: Aerial Navigation.

THURSDAY, MAY 1.

ROYAL INSTITUTION, at 3.—Dr. H. S. Hele Shaw: Clutches.

LINNEAN SOCIETY, at 5.—J. Small: The Pappus in the Composite.—Montagu Drummond: Notes on the Botany of the Palestine Campaign: I. The Flora of a Small Area in Palestine.—H. N. Dixon: Mosses from Deception Island.

INSTITUTION OF ELECTRICAL ENGINEERS, at 6.—Dr. C. Chree: Magnetic Storms.

CHEMICAL SOCIETY, at 8.—Prof. J. H. Jeans: The Quantum Theory and New Theories of Atomic Structure.

FRIDAY, MAY 2.

ROYAL INSTITUTION, at 5.30.—Prof. J. W. Nicholson: Energy Distribution in Spectra.

INSTITUTION OF MECHANICAL ENGINEERS, at 6.—Dr. W. H. Hatfield: The Mechanical Properties of Steel, with Some Consideration of the Question of Brittleness.

SATURDAY, MAY 3.

ROYAL INSTITUTION, at 3.—Prof. H. S. Foxwell: Chapters in the Psychology of Industry.

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