

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, November 2.—Sir Archibald Geikie, K.C.B., president, in the chair.—Sir W. de W. Abney: Colour-blindness and the trichromatic theory of colour-vision. Part iii.—Incomplete colour-blindness. The first part of the paper shows how, if an equation be formed by rays in known position in the spectrum to match a white, by normal vision and by the colour-blind, the two can be compared together without special reference to the luminosity of the matched white. The luminosities of all the rays are known in the one case, and only two in the second, and from the two matches the unknown deficiency of colour sensation can be calculated. Owing to the fact that large quantities of their white can be mixed with the colours without being detected by those incompletely colour-blind who have a small factor for one of their sensations, a very false interpretation of their colour-blindness might be arrived at by the method described above. If, however, the luminosity of the composite white and the matched white be carefully equalised, a full determination of the colour deficiency can be arrived at by treating the equation somewhat in the manner described in part ii. of this same subject, when a true result is obtained. The latter part of the paper dealt with colour equations made from the rotation of discs; and it is shown that trustworthy results can be obtained from their use so long as the sensations stimulated by the pigments in the light in which they are viewed are known in amount. The method of ascertaining the sensation composition of the pigments, and of the light used for their illumination, is described. When once these are known, no further appeal to the spectrum is required. The author recommends the use of a white light passing through a yellow substance, such as chromate of potash solution, as a viewing light, in which only the red and green pigments are required in the inner disc, the blue not being wanted. The "grey" match becomes thus much brighter and is easier to read.—H. R. A. Mallock: Note on the iridescent colours of birds and insects. In this note reasons are given for the view that certain forms of brilliant coloration which occur in the feathers of birds and in the scales and integuments of insects are due to interference, and are of the nature of the colours of thin plates. Walter, in 1895, in Germany, and quite recently Michelson in America, have written on this subject, and, basing their opinions on the behaviour of polarised light when reflected from the colour-producing surfaces, conclude that the colours are due to selective absorption and reflection, and are akin to those reflected from certain anilin dyes and from metals. The reasons against this view and in favour of interference are (1) that when any of these natural colour-producing structures are penetrated by a fluid having the same refractive index as that of the material of which the structure is composed, the colour disappears; (2) when the refractive index of the fluid is less, the colour does not disappear altogether, but changes towards the red; (3) (which is perhaps the most important) under mechanical pressure the colours first change towards the red and then (as the pressure increases) disappear. These results are what might be expected from a structure which produces interference, and it is difficult to reconcile them with any other hypothesis. The note is founded on observations, extending over many years, on examples of this class of colour production taken from a considerable number of orders and genera, both of birds and insects, and the methods of examination employed are shortly described.—K. R. Lewin: The behaviour of the infusorian micronucleus in regeneration. When *Stylonychia mytilus* is cut in two, so that each merozoon receives one member of the meganucleus and one micronucleus, both fragments exhibit in favourable circumstances complete regeneration. This involves segmentation of the meganuclear member and division of the micronucleus. If a portion of the cytoplasm be removed from the hind end of the animal without disturbing the nuclei, there may occur during regeneration a division of one, usually the posterior, micronucleus. The result is to furnish the regenerated infusorian with three micronuclei instead of two, i.e. the division does not restore, but actually disturbs, the nuclear relations characteristic of the race. When the regenerated

individual proceeds to fission, all three micronuclei divide. That an extra division can be introduced into the normal cycle of mitoses shows that the organella is in a fit state to divide before the whole animal is ready for spontaneous fission; that the supernumerary mitosis occurs during regeneration suggests that the stimulus causing the micronucleus to divide may be the condition of the surrounding cytoplasm which obtains during the constructive activities of regeneration. The cases in which regeneration occurs without either of the micronuclei dividing can be supposed to be those in which either the micronuclei were not ripe for mitosis or the stimulus was not sufficiently intense to evoke a division—by reason, e.g., of regeneration occurring slowly, with no great intensity of constructive processes at any time. At the normal fission of the animal, when all the micronuclei present divide, there is a general formation of new parts quite comparable with the localised activity in regeneration, and accomplished, it is natural to suppose, with much the same condition of the cytoplasm. The normally occurring mitoses, and those taking place during regeneration, can thus be brought under one point of view.—A. F. Hayden and W. P. Morgan: An inquiry into the influence of the constituents of a bacterial emulsion on the opsonic index. These experiments, so far as they have gone, show that in the technique of the estimation of the tubercle opsonic index the quantity and character of the contents of the bacterial emulsion must be taken into account, and that the chief factor influencing the estimation is the finely ground bacterial detritus resulting from the process of triturating the dried culture of the bacillus.—Colonel Sir David Bruce: The morphology of *Trypanosoma gambiense* (Dutton).—A. H. Caulfeild: (1) Factors in the interpretation of the inhibitive and fixation serum reactions in pulmonary tuberculosis; (2) preliminary report upon the injection of rabbits with protein-free (tuberculo-) antigen and antigen-serum mixtures.

Physical Society, October 27.—Prof. H. L. Callendar, F.R.S., president, in the chair.—Hon. R. J. Strutt: Further observations on the afterglow of electric discharge and kindred phenomena. It is shown that ozone prepared by means of the Siemens ozone tube used at atmospheric pressure is able, when mixed with nitric oxide, to give the greenish-yellow afterglow flame. This result is only attained, however, when the ozone has been concentrated by fractional distillation. A blue glow is obtained under the same conditions with sulphuretted hydrogen and ozone. The effect of sulphur compounds in improving the air-glow noticed by the older experimenters is shown to be due, not to any direct intervention of these bodies in the reaction, but to their power of destroying organic matter prejudicial to ozone. When once this is got rid of, the sulphur compounds are of no further advantage. It is found that pure oxygen does not give an afterglow. The afterglow seen in electrodeless bulbs containing oxygen is due to some interaction with water vapour. The luminosity given out when ordinary spring water is shaken with ozone is shown to be due to oxidation of peaty matter contained in it. Brown peat water gives greatly enhanced luminosity.—Prof. C. G. Barkla and J. Nicol: Homogeneous fluorescent X-radiation of a second series. It was shown by one of the writers that the fluorescent X-radiations emitted by elements exposed to primary Röntgen radiation can be arranged in series, one radiation in a particular series being emitted by each element, and the radiation belonging to that series becoming more penetrating with an increase in the atomic weight of the radiating element (Proc. Camb. Phil. Soc., May, 1909). The homogeneity of radiations of only one series (the K series) was shown by Barkla and Sadler. This paper describes experiments showing the homogeneity of fluorescent X-radiations in the second series (the L series), and exhibiting the homogeneity of radiations of the two series from a number of elements. Details are given of the observations on the radiations from barium. Similar results are recorded in the case of the radiations from iodine, antimony, and silver. The homogeneous fluorescent radiations of different series are emitted simultaneously by an element exposed to Röntgen radiation of more penetrating type than either. The fluorescent X-radiations can

thus be analysed into well-defined radiations widely different in penetrating power, and may be said to give a line spectrum in X-rays. The absorbability of the fluorescent radiations is given by the following values of λ/ρ , where λ is the coefficient of absorption of these radiations in aluminium of density ρ :—

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| Ag radiator: (Series K) [2.5]; (Series L) 700 | |
| Sb " " " 1.21 " 435 | |
| I " " " 0.92 " 300 | |
| Ba " " " 0.8 " 224 | |

PARIS.

Academy of Sciences, October 30.—M. Armand Gautier in the chair.—B. **Baillaud**: Presentation of two volumes of the "Annales de l'Observatoire de Paris."—Ch. **André**: The formation of suns. Referring to recent adverse criticisms of Laplace's theory, the author maintains that recent physical researches confirm this theory.—A. **Demoulin**: The R surfaces.—Eugenio Elia **Levi**: Periodic differential equations.—Paul **Dienes**: The summation of Taylor's series.—Henry **Hubert**: The parabolic form of the exposed acid crystalline rocks in western Africa. The water erosion takes place only at the expense of granitic rocks, and is characteristic of certain regions. The effect of the motion of the cutting particles is shown to result in a curved outline.—G. **Millocchau**: Contribution to the study of the spectral effects of electric discharges in gases and vapours. The image from a vacuum tube containing the gas under examination at a known pressure is projected on to a circular photographic film rotating at a high known velocity. Seven kinds of simple discharge are described, and three types of mixed discharge. All the results are in accord with hypotheses which connect the production of the spectrum with the temperature of the molecule and the dissociation effects corresponding with that temperature.—Albert **Colson**: The theory of solutions and heats of solution. The author regards the identification of the dissolved particle with the chemical molecule as inadmissible, and considers that the dissolved particle is generally polymolecular. He suggests *dissolecule* as a distinctive name for the dissolved particle. The difference between the heat of solution of a gas and its heat of condensation, which should be zero according to the van 't Hoff hypothesis, represents the heat disengaged by the molecular contraction giving rise to the *dissolecule*.—MM. **Broniewski** and **Hackepill**: The electrical properties of the alkali metals, of rhodium, and of iridium. Measurements are given of the thermoelectric power of caesium, rubidium, potassium and sodium, and of rhodium and iridium. The purification of the alkali metals was effected by distillation in a vacuum.—G. D. **Hinrichs**: The atomic weights of the dominant elements.—E. **Chablay**: The use of liquid ammonia in chemical reactions. Researches on the alcoholates. An alcohol dissolved in liquid ammonia immediately decolorises a blue solution of potassammonium or sodammonium, hydrogen, ammonia, and the anhydrous alcoholate RONa being formed. A blue solution of calcium-ammonium reacts similarly, the calcium alcoholate being formed. Barium and strontium ammoniums act similarly.—Maurice **Lanfray**: The oxy- β -methylthiophenes.—MM. **Taffanel** and **Dautriche**: The mode of firing explosives. In blasting in mines one cartridge containing fulminate is usually arranged to explode several cartridges containing safety explosive only. Experiments are described showing the most advantageous arrangement of the fulminating cartridge with respect to the others.—Jean **Friedel**: The effect on vegetation of a more complete darkness than that currently employed in laboratories. A box for growing plants in the dark is described in which the exclusion of light is so perfect that a delicate photographic paper is unaffected after prolonged exposure. The results on the plants are compared with those obtaining under ordinary conditions, in which the exclusion of light is not so perfect.—Pierre **Berthault**: The variations of tuberiferous *Solanum*.—P. **Desroche**: The action of various light radiations on the motion of the zoospores of *Chlamydomonas*.—A. **Marie** and A. **Donnadieu**: Leucogenesis and intestinal epithelium.—A. **Magnan**: Human monsters.—Pierre **Georgevitch**: The formation and germination of the spores of *Bacillus thermophilus vragensis*.—Louis **Gentil**: The country of

Zaër, western Morocco.—Maurice **Lugeon**: The existence of two phases of Palæozoic foldings in the western Alps.—Carl **Renz**: The extension of the Palæozoic formations in the islands off the coast of Argos.—Fernand **Meunier**: The Blatidæ of the Commeny Coal-measures. The lake of Commeny would appear to have been inhabited by a fauna of Blatidæ, less rich than in the American deposits, and represented by a very small number of genera, some of which possessed extremely prolific species.—Ch. **Moureu** and A. **Lepape**: The rare gases in fire-damp. Analyses of five specimens of fire-damp collected under conditions excluding air. One striking fact brought out by these analyses is the much higher proportion of helium to nitrogen than that existing in air. The nitrogen from the Mons specimen contained no less than 13 per cent. of helium.

BOOKS RECEIVED.

Die Palaeobotanische Literatur. Bibliographische Übersicht über die Arbeiten aus dem Gebiete der Palaeobotanik. Herausgegeben von W. J. Jongmans. Zweiter Band. Pp. iv+417. (Jena: Fischer.) 18 marks.

Die Bearbeitung des Glases auf dem Blasetische. By D. Djakonow and W. Lermantoff. Zweite Auflage. Pp. xv+196. (Berlin: R. Friedländer & Sohn.) 6 marks.

A Naturalist on Desert Islands. By P. R. Lowe. Pp. xii+300. (Witherby and Co.) 7s. 6d. net.

Psychology and Pedagogy of Writing: a Résumé of the Researches and Experiments bearing on the History and Pedagogy of Writing. By Dr. M. E. Thompson. Pp. 128. (Baltimore: Warwick and York Inc.)

Mental Fatigue: a Comprehensive Exposition of the Nature of Mental Fatigue, of the Methods of its Measurement and of their Results, with Special Reference to the Problems of Instruction. By Prof. Max Offner. Translated by Prof. G. M. Whipple. Pp. viii+133. (Baltimore: Warwick and York Inc.)

Der Panamakanal. Die Bedeutung des Kanalbaues seine Technik und Wirtschaft. By M. D. Fiegel. Pp. vii+183. (Berlin: D. Reimer.) 4 marks.

Islands of Enchantment: Many-sided Melanesia Seen through many Eyes, and Recorded by F. Coombe. Pp. xxvii+382. (London: Macmillan and Co., Ltd.) 12s. net.

Manual of Farm Animals: a Practical Guide to the Choosing, Breeding, and Keep of Horses, Cattle, Sheep, and Swine. By Prof. M. W. Harper. Pp. xxv+545. (London: Macmillan and Co., Ltd.) 8s. 6d. net.

Laughter: an Essay on the Meaning of the Comic. By Prof. H. Bergson. Authorised translation by Cloudeley Brereton and F. Rothwell. Pp. vii+200. (London: Macmillan and Co., Ltd.) 3s. 6d. net.

Sir John Burdon Sanderson: a Memoir by the late Lady Burdon Sanderson, completed and edited by his Nephew and Niece, with a selection from his papers and addresses. Pp. 315. (Oxford: Clarendon Press.) 10s. 6d. net.

Die Silicate in Chemischer und Technischer Beziehung. By Drs. W. and D. Asch. Pp. xv+409. (Berlin: Springer.) 16 marks.

Cours de la Faculté des Sciences de Paris. Leçons sur les Hypothèses Cosmogoniques Professées à la Sorbonne. By H. Poincaré. Rédigées par H. Vergne. Pp. xxv+294. (Paris: Hermann.) 12 francs.

Astronomy. By A. R. Hinks. Pp. 256. (London: Williams and Norgate.) 1s. net.

Introduction to Science. By Prof. J. A. Thomson. Pp. 256. (London: Williams and Norgate.) 1s. net.

Confessions of a Robin. By Lieut.-Col. A. F. Mockler-Ferryman. Pp. 192. (London: S.P.C.K.) 2s.

Geometry for Schools. By W. G. Borchardt and the Rev. A. D. Perrott. Vol. i. Pp. viii+52 and Answers. Vol. ii. Pp. viii+53 to 162 and Answers. (London: G. Bell and Sons, Ltd.) 1s. and 1s. 6d.

The Enzyme Treatment of Cancer and its Scientific Basis. By Dr. J. Beard. Pp. xix+290. (London: Chatto and Windus.) 7s. 6d. net.

Chemistry and Chemical Magic. By V. E. Johnson. Pp. 150. (London: H. Frowde and Hodder and Stoughton.) 1s. 6d.