technical colleges. Among the awards we notice the following:—Mabel Gardner, who has gained the first science scholarship at Girton College, senior county scholarship of 90*l.* a year for three years. H. H. Mittell, a full senior county scholarship of 90*l.* a year for three years to enable him to proceed to Magdalene College, Cambridge, where he has gained an open scholarship, and to take the mathematical tripos. C. H. Pitt, a senior county scholarship of 90*l.* a year to enable him to proceed to Corpus Christi College, Cambridge, where he has won an open science scholarship. A. E. Baker, an exhibition of 75*l.* a year for two years in the first instance, in order to enable him to proceed to Trinity College, Cambridge, where he has obtained an exhibition and subsizarship, and to take the natural sciences tripos. W. H. Norris, an exhibition of 70*l.* a year for three years to enable him to proceed to Corpus Christi College, where he has gained an open science scholarship. J. W. Kuhrt, a free place at the London School of Economics and Political Science, together with an exhibition of 50*l.* a year for two years, in order to enable him to take the B.Sc. examination of the London University in economics. B. P. Williams, an exhibition of 50*l.* a year for two years, together with a free place at the college to enable him to take the B.Sc. degree in engineering. P. A. Houseman, an exhibition of 40*l.* a year for three years to assist him to proceed to Würzburg University for the study of chemistry. H. H. Hodge, an exhibition of 30*l.* for one year in order to enable him to travel on the Continent and study the French language and the French system of education.

THE Board of Education has recently published two sets of regulations, for the session 1903–4, for schools of various grades. One volume deals with secondary day schools, and does not appear to differ in any important respect from that of last year. The other contains regulations for all schools and classes in connection with the Board of Education which have not received attention in previous regulations already published for next year's work, such as evening schools, technical institutions, and schools of art and art classes. A circular letter respecting the latter volume has been issued by the Board, and describes for the benefit of managers of schools the important respects in which the regulations for next session differ from those of previous years. The volume may be said to concern all those institutions in which instruction of a specialised or technical character is given, whether in the day-time or in the evening, as well as evening schools and classes the scope of which may vary almost indefinitely with the attainments and aim of the students. The rule under which the rate of grant payable for science instruction given in the day-time was half the rate payable for such instruction if given in the evening is abolished, and grants for advanced instruction given during the day in technical institutions will now be assessed in accordance with regulations appropriate to the special circumstances of such instruction. The letter also urges the desirability of fixed salaries for teachers of classes of all kinds, and rightly insists that the amount of stipend should be in relation to the qualifications and experience of the teacher and the time given by him to the work of the class, and that cognisance should be taken of the time absorbed in preparing experimental lectures, in travelling, and in the correction of home-work. It is very satisfactory, too, to find that the new regulations definitely require a sufficient preliminary training for students in classes in scientific and technical subjects, and that every encouragement is given to managers to inaugurate a system of "courses of study" rather than one of isolated subjects in no way correlated.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 18.—"On the Synthesis or Fats Accompanying Absorption from the Intestine." By Benjamin **Moore,** M.A., D.Sc., Johnston Professor of Biochemistry at University College, Liverpool. Communicated by Prof. C. S. Sherrington, F.R.S.

The fats of the food are changed in the intestine into fatty acids and glycerine, and the fatty acids are then in part combined with alkali to form soaps.

Both soaps and free fatty acids have a very small solubility in water, and it is by the agency of the bile, in which both are much more soluble, that these constituents of the digested fats are made capable of being taken up in soluble form by the absorbing cells of the intestine.

The absorbed fatty constituents are not taken up by the blood stream, but pass by a separate system, namely, the absorbent lacteals of the intestinal area, to be finally carried to the circulating blood by the main lymphatic vessel, the thoracic duct.

Now, somewhere along the path of absorption, the absorbed soaps and fatty acids are recombined with glycerine to form fats, for in the thoracic duct after a meal containing fat only fats are found.

The seat of this transformation has not hitherto been known with accuracy, but in this paper experiments are quoted to show that the change occurs in the intestinal cells which first take up the consituents of the digested fat in soluble form, and not in the cells of the lymphatic glands of the intestine through which the absorbed fatty matter subsequently passes on its way to the thoracic duct.

This is shown by analyses of the fatty matter in the small lymphatic vessels leading from the intestine, which show that, even here before the absorbed fatty matter has reached the abdominal lymphatic glands, it has all been changed back into fat. A change in the same direction is shown by analyses for fatty constituents of the intestinal cells, but here the process is found in progress, and not yet complete.

It is further shown that the cell must be *in situ* and supplied with nutrient matter in order that this change can be brought about, for no synthesis of fat occurs when the isolated intestinal cell or extracts of it are allowed to act upon the fatty constituents *in vitro*. The only change then occurring is the formation from soap of free fatty acid, which is probably the initial stage in the change occurring in the living intact cell, and is further a protective action, which would prevent the entrance of the poisonous soaps into the circulation.

This demonstrates that the living cell supplied with energy by the nutrient matter which bathes it is capable of acting as an energy transformer for chemical energy, and of carrying out syntheses impossible for enzymes which cannot add energy to the ingredients upon which they act, and hence cannot carry out complex syntheses requiring the addition of chemical energy to those ingredients, as can the living cell.

"The Theory of Symmetrical Optical Objectives." By S. D. **Chalmers,** B.A. (Cantab.), M.A. (Sydney), St. John's College, Cambridge. Communicated by Prof. Larmor, Sec. R.S.

This paper deals with the relations between the aberrations of a lens system, used with a front stop, and those of the compound system formed by two such systems disposed symmetrically with respect to the stop. The results justify the practice of correcting a single component —the back one—for astigmatism and spherical aberration, *provided* due attention is paid to the securing of the condition for no distortion.

PARIS.

Academy of Sciences, July 20.—M. Albert Gaudry in the chair.—The manner of flow of a spreading sheet of water on a plane surface, applied to the case where the surface is curved, by M. J. **Boussinesq.**—On a new method for the detection and estimation of small traces of arsenic, by M. Armand **Gautier.** It is based on the principle that ferric oxide precipitated in the presence of arsenic carries down with it the whole of the latter, even in the presence of chlorides and other salts. The arsenic in the precipitate can then be directly estimated in a Marsh apparatus. In this way the thousand millionth of its weight of arsenic can be detected in a substance, and its presence was shown in the purest distilled water and many common reagents.—On the torsion movements of the eye when looking in certain directions, the socket remaining in the primary position, by M. Yves **Delage.**—On a new action produced by the rays *n*, and on several facts with regard to these radiations, by M. R. **Blondlot.** The rays *n* falling on platinum foil heated to dull redness cause it to glow more brightly. This effect is not due to increase of temperature. The increased brilliancy is observed on both sides of the

foil owing to the fact that cold platinum, which is opaque to these rays, becomes transparent on heating.—Study of the molecular deformations of a steel bar submitted to thrust, by M. L. **Fraichet.**—Photographs of the Borelly comet (1903 *c*), by M. **Quénisset.** These photographs were taken at the author's observatory at Nanterre, and in pairs, so as to give a stereoscopic representation.—On the theory of the acoustic field, by M. **Charbonnier.** The theory serves to explain certain photographs of projectiles obtained by Dr. Mach, of Vienna, and is the basis of Gossot's method of measuring the velocity of projectiles.—Contribution to the study of superheating, by M. A. **Petot.**—Sublimation curves, by M. A. **Bouzat.** A comparison of the sublimation curves of carbon dioxide, ammonium sulphide, and ammonium carbonate with the dissociation curve of the compound of silver chloride and ammonia.—On the law of recombination of ions, by M. P. **Langevin.** An expression is developed which gives the ratio of recombinations to the number of collisions between two ions of opposite sign, and is verified by comparison with the experimental values for air and carbon dioxide.—On commutation in continuous current dynamos, by M. **Iliovici.**—The influence of temperature on the dichroism of mixed liquids, and a proof of the law of indices, by M. Georges **Meslin.** Substances are chosen for which the value of the index of the liquid but very slightly exceeds the mean value for the solid. The change in sign of the dichroism with rise of temperature was experimentally verified in a number of cases.—On photographic spectrophotometry, by M. C. **Camichel.** Various catalytic reactions brought about by metals and the accelerating and retarding influences, by M. A. **Trillat.** Reactions between copper or platinum and the vapour of alcohols of oxidising, reducing, condensing, or saponifying effects. The reactions are considerably affected by traces of impurities, and the copper must first be tarnished by heating in air.—On ferrisulphuric acid and ethyl ferrisulphate, by M. A. **Recoura.** The ethyl ester is obtained by boiling the acid with alcohol as a yellow solid. On heating the acid, it loses simultaneously one molecule of sulphuric acid and two of water, leading the author to assign to it the formula $Fe_2O_3.3SO_3.H_2SO_4.2H_2O+6H_2O$.—Prussian and Turnbull's blues. A new class of complex cyanides, by M. P. **Chrétien.** A soluble acid blue or hydrodiferrocyanic acid, $Fe_2Cy_6H,3H_2O$, is obtained by the spontaneous decomposition of hydroferrocyanic acid at about 20°. It reacts with alkalis as follows:—$Fe_2Cy_6H + 4KOH = FeCy_6K_4 + Fe(OH)_3 + H_2O$. This and other reactions are studied thermochemically.—On spartein. General characteristics; action of some reducing agents, by MM. Ch. **Moureu** and A. **Valeur.** This communication contains a repetition of previous work on spartein, and an account of unsuccessful attempts to obtain reduction products.—On the isonitrosomalonic ethers and their conversion into mesoxalic ethers, by MM. L. **Bouveault** and A. **Wahl.** The methyl and ethyl ethers were obtained pure, and converted into the corresponding mesoxalic ether by means of nitrogen peroxide.—Action of ammonia on the compound of oxide of ethylene and β-*o*-cyclohexanediol, by M. Léon **Brunel.** With an excess of ammonia *o*-aminocyclohexanol is obtained; with less ammonia, more complicated substances.—Researches on the nutrition of etiolated plants, by M. G. **André.**—On the phospho-organic reserve material of plants, by M. S. **Posternak.** The method is given for the separation of this substance as the salt of an acid, CH_5PO_5, from seeds and other parts of plants. In this way 70 per cent. to 90 per cent. of the phosphorus in the seeds can be accounted for, lecithine representing only 1 per cent. to 7 per cent. of the phosphorus.—On roots trained by experiment to grow upwards, by M. H. **Ricome.** The plants (beans) were attached to the end of a long thread kept oscillating. The development of the root and longitudinal growth were perfectly normal.—A resinous Granadilla, by M. Henri **Jumelle.** The exudation from the base of the stem of this plant, the *Ophiocaulon Firingalavense*, is a resin rather than a wax, and contains 83 per cent. of true resin, which is deposited as an amorphous mass from solvents.—Contribution to the study of the Aepyornis of Madagascar, by M. Guillaume **Grandidier.** Particulars of the lower portions of a skeleton of the *Aepyornis ingens*.—On basic inclusions from the volcanoes of Martinique and St. Vincent, by M. A. **Lacroix.**—Contribution to the study of congenital changes in the nervous system, by MM. Claude **Vurpas** and André **Léri.**—On the organic respiratory gases in diabetes, by M. J. **Le Goff.** These gases contain acetone, which was separated as iodoform and estimated. In one case it amounted to nearly 3 grammes in twenty-four hours.—On the retention of irritability of certain organs separated from the body and immersed in an artificial nutritive medium, by MM. E. **Hédon** and C. **Fleig.**—The formation of callus, by MM. V. **Cornil** and P. **Coudray.**—Observations on the sea-level since historic and prehistoric times, by M. Ph. **Négris.** From the fact that two ancient piers at the south entrance of the Straits of Leucade are now nearly three metres under water, and from the encroachments of the sea in various parts of the Mediterranean during the last 2500 years, conclusions are drawn as to the change of level of the latter during a long period.—On the use of fluorescein in subterranean hydrology, by M. E. A. **Martel.**

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