

it is still more difficult to fix a variety; this is abundantly proved by the difficulty of improving wheat. A single ear is selected because it possesses some desirable property; the seed from it is sown; an ear is selected showing the same property, and the process is continued for several generations. "Pedigree" seed is thus obtained, but it rarely remains true; the farmer has to renew his stock periodically from the raiser, who keeps on the selection process. The work done on the selection of seed wheats at the Roseworthy Agricultural College is described in the *Journal of Agriculture for South Australia*; it is hoped in this way to obtain strains which will keep their character for two or three seasons, and prove much more profitable than the seed wheat now in use. There is no question that a good deal can be done by selection, especially in South Australia, where, we are told, little or no attention has been given to the matter, and the best grain is sometimes sold and the worst kept for seed. But it is now clear that the only safe method for the improvement of crops grown from seed is to breed on Mendelian lines, as Biffen is doing at Cambridge, and South Australia would do well to breed, as well as to select, seed wheat.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Mr. Robert Forsyth Scott, fellow and senior bursar, has been elected master of St. John's College in place of the late Rev. Dr. Charles Taylor.

PROF. D. J. HAMILTON, F.R.S., has, in consequence of ill-health, resigned the chair of pathology in the University of Aberdeen to which he was appointed in 1882.

MR. W. GALLOWAY DUNCAN, of Dundee, has been appointed head of the Government Engineering School, Dacca, Bengal.

THE Senate of the University of Bombay has, according to the *Allahabad Pioneer Mail*, decided to include a test in science for all candidates for a degree.

THE jubilee of the University Museum at Oxford will be celebrated on October 8. Honorary degrees will be conferred upon Prof. Arrhenius and Dr. Vernon Harcourt, F.R.S., and a bust will be unveiled of Prof. W. F. R. Weldon, who died in April, 1906.

THE Year-book of the Michigan College of Mines, 1907-8, shows that the college is better equipped and more prosperous than at any previous period since its foundation in 1885. There are now 253 students, their average age being 22½ years. The concentration of effort on training men for the field of mining, the situation of the college in the heart of the copper-mining region of Lake Superior, together with its special methods of instruction, have brought to the institution a large measure of success. Considerable range is allowed in selecting the courses or subjects which shall compose a particular student's curriculum, and the *Record of Graduates*, published as a separate pamphlet, giving their occupations, affords interesting evidence of the success attained.

It is now recognised that the teaching of hygiene and physical exercises to pupils in both primary and secondary schools is of equal importance to their education in other branches of knowledge. In primary schools it is of special importance, as the opportunity for games is often absent in large towns. For this reason the Board of Education makes a knowledge of the methods of teaching and the aims of physical education one of the necessary parts of the equipment of a primary-school teacher. With this qualification is associated the requirement of a knowledge of hygiene, particularly in relation to schools and school children. For the last ten years a systematic course for women has been carried on at the South-Western Polytechnic, Chelsea. This training has been so successful that the course, originally designed for two years, has developed now into one of three years. The governors of the Chelsea Polytechnic are now instituting a similar

course for men, and for this purpose they have engaged a teacher of gymnastics on Ling's Swedish system. In the first instance a course of one year for men will be provided, and it is hoped to obtain students who have passed already two years in training colleges, as well as university graduates with an initial equipment of general and elementary scientific knowledge. Such students, after a year devoted mainly to the study of hygiene, physiology, gymnastic exercises, and the part of anatomy bearing on physical training with study of the theory of movements, should be in a position to take charge of physical education in schools and to take their proper positions as teachers of usual subjects.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 5.—"On the Nature of the Streamers in the Electric Spark." By Dr. S. R. Milner. Communicated by Prof. W. M. Hicks, F.R.S.

(1) The streamers in the inductive spark consist of metallic vapour, the atoms of which are charged, and the motion of the vapour towards the centre of the spark gap is mainly due to the action of the electric force of the spark on the charged atoms. The chief evidence in support of this consists in a number of photographs in which the streamers move back again towards the poles as the oscillating electric field of the spark reverses its direction.

(2) Very great differences were found in the appearances of the streamers which correspond to the different lines of the same metal. The streamers may be divided in this respect into three classes, between which there is in most sparks a sharp distinction.

(a) Blurred streamers, which are often partly masked by the whole spark gap being filled with their light. These invariably correspond to lines prominent in the arc.

(b) Sharply defined streamers, which appear throughout the whole time during which the electrical discharge lasts. These correspond to pure spark lines, i.e. lines which are not present in the arc under ordinary conditions. (c) A third class of streamers show very brightly at the first oscillation, but fade away so rapidly that they appear for only one or two oscillations, even when the other lines, initially no brighter, show ten or twelve. These lines are very sensitive to the influence of self-induction in the circuit; they are very bright in the condensed spark without inductance, but disappear from the spectrum altogether when a moderate inductance is inserted.

By studying the duration of the lines in the inductionless spark, the difference between the three classes of streamers is found to be solely a question of the duration of the luminosities of the metallic lines to which they correspond, the arc lines having a long, the spark lines a short, and the "condensed spark" lines a very short, duration.

(3) No other difference than this one of the durations of the lines has been discovered in the character of the streamers. The photographs obtained show clearly that the velocities of the streamers corresponding to the different lines in the same spark are the same, in spite of the different character of the streamers.

April 30.—"The Supersaturation and Nuclear Condensation of certain Organic Vapours." By T. H. Laby. Communicated by Prof. J. J. Thomson, F.R.S.

(1) The least expansion, which causes condensation in air initially saturated with an organic vapour and ionised by Röntgen rays, has been determined for five esters, six acids (formic to iso-valeric), and iso-amyl alcohol.

(2) In the case of acetic acid the expansion required was greater for feeble Röntgen rays than for more intense ones.

(3) The supersaturation, *S*, existing at the end of each of the expansions mentioned in (1) has been calculated, and also for four alcohols and chloroform from Przbiram's experiments.

(4) The acids are found to have the largest values of *S* and the alcohols the least. The isomers examined have the same value for *S* with one exception. In the case of the alcohols, ethyl to iso-amyl, a fairly regular decrease in *S* accompanies the addition of a CH_2 group.

(5) The existing theory of condensation on ionic nuclei has been given, values of S have been calculated from it, and compared with S deduced from the observed expansions. The agreement in the case of acetic, propionic, *n*-butyric, and iso-butyric acids, and methyl alcohol¹ is very close.

(6) The expansion and supersaturation necessary for condensation on the natural nuclei have been determined for the same (dust-free) vapours. In the case of formic, acetic, and butyric acids a distinctly greater expansion is required to catch the natural nuclei than that required for the ionic nuclei produced by Röntgen rays.

(7) As the expansion was increased the number of drops usually increased continuously with it, so that the fog point was ill-defined, except in the case of tertiary amyl alcohol.

(8) Ethyl acetate, methyl butyrate, propyl acetate, acetic acid, and iso-amyl alcohol were found to condense for a smaller expansion on the positive nucleus than on the negative. Water is the only known substance for which the negative ionic nucleus is more efficient than the positive.

(9) On bubbling air through methyl, ethyl, and iso-amyl alcohols, ethyl acetate, propyl acetate, methyl butyrate, chloroform, and ethyl iodide they became negatively electrified. This was the sign of the electrification to be expected from Prof. Thomson's double layer theory of the relative efficiency of ionic nuclei. Acetic acid was not in agreement with the theory, for it became positively charged on bubbling.

PARIS.

Academy of Sciences, August 24.—M. Bouquet de la Grye in the chair.—A problem relating to the theory of orthogonal systems and to the method of the mobile trihedron: Gaston **Darboux**.—Methylation in the ethylene series from the point of view of volatility: Louis **Henry**. The replacement of the hydrogen atoms attached to carbon in ethylene glycol by the methyl group causes a lowering of the boiling point, although the replacement of the hydrogen atoms in ethylene has the contrary effect. This is probably due to the association of the molecules in the alcohols, the coefficient of association becoming less as the number of hydrogen atoms substituted is increased. The boiling point is raised when methyl groups are introduced into ethylene chloride, and the ethylene oxides behave in a similar manner.—Twilight illuminations: Ernest **Esclangon**. A discussion of the colour effects observed at Bordeaux during twilight, the causes of which still remain unexplained.—Observations of the sun made at the Observatory of Lyons during the second quarter of 1908: J. **Guillaume**. Observations were made on sixty-five days, and tables are given showing the number of spots, their distribution in latitude, and the distribution of the faculae in latitude.—The theory of asymptotic lines: A. **Demoulin**.—The zeros of the integrals of a class of differential equations: Georges **Rémoundos**.—The variation of two ruled surfaces: M. **Haag**.—Liquid helium: H. Kammerlingh **Onnes**. Details are given of the methods adopted for the liquefaction of 200 litres of helium on July 10. This experiment required the use of 75 litres of liquid air and 20 litres of liquid hydrogen. Owing to the extremely small capillarity of liquid helium, the surface of the liquid meets the side of the containing vessel like a knife blade, and the formation of the first quantity of liquid escaped observation. The helium remained in the liquid state for two hours; its density was 0.154, and its boiling point, determined with a helium thermometer, 4°3. The critical temperature is probably about 5°, and the critical pressure not much above 2.3 atmospheres. The helium was not solidified when the pressure was reduced to less than 10 mm. of mercury.—The action of chloride of arsenic on cobalt: F. **Ducelliez**. This reaction gives rise to cobalt chloride, together with an arsenide of cobalt. At a temperature of 1000° C. Co₂As₂ is formed, at 600° C. to 800° C. CoAs, at about 450° C. the product is Co₂As₃; below 400° C. CoAs₂ is slowly formed.—The action of arsenic trichloride upon nickel and arseno-nickels: Em. **Vigouroux**. The arsenides Ni₂As₂, NiAs, and NiAs₂ were obtained by varying the conditions of the experiment.—

The two methods of preparation of monomethylamine: Maurice **François**. In a previous paper the author has described a method of separating methylamine from small proportions of ammonia by means of yellow mercuric oxide. To prepare the pure amine by this process it is requisite that ammonia should be the sole impurity, and the present paper gives a comparative study of the methods of Hoffmann (bromine and acetamide) and Brochet and Cambier (ammonium chloride and formaldehyde) from this point of view. The methylamine hydrochloride prepared by the latter method proved to be very impure; but the product of Hoffmann's reaction was quite suitable for further purification by mercuric oxide.—The mode of growth of the Morille (*Morchella semilibera*): Louis **Matruhot**.—The influences of the external conditions on the development and sexuality of the prothallus of Polypodiaceæ: G. **Perrin**.—Physiological study on the development of fruits and seeds: W. **Lubimenko**. Perforation of the pericarp causes an atmosphere with a lower percentage of carbon dioxide to surround the ovule, resulting in arrested development.—A disease of the oak: MM. **Griffon** and **Maublanc**. This disease, which since the spring has attacked the oaks in a great part of France, is due to a white mould of the genus *Oidium*. It spreads rapidly, and has caused great damage.—The minute structure of the sporozoites of *Plasmodium relictum*: Edmond **Sergent** and Etienne **Sergent**.

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