At the Headmasters' Conference, held on December 23 and 24, at Reading School, Sir Alfred Ewing, director of naval education, gave an address on the scheme of special entry for public schoolboys into the Navy. This scheme of special entry was introduced last year at very short notice, and the number of candidates who came forward was probably not at all so great as may be expected in the future. The candidates numbered ninety-two, and forty-one were taken for the training. Sir Alfred Ewing said hitherto the naval tradition has been unbroken which has required that officers shall join the service at so early an age that they can owe little or nothing to public school training and influence. Now, for the first time in British history, the Navy has said to the public schools, "Send us of your finished product." He asked the cooperation of the headmasters because anything which affects the supply of officers for the Navy, whether the volume of the supply or its efficiency, is a matter of profound national concern. By the scheme of special entry public schoolboys may enter the service at the age of eighteen, and undergo a brief period of professional training for eighteen months, after which they become midshipmen. The qualification desired in naval cadets entered in this way is substantially a good general education not specifically classical, but an education in which, apart from the more humane elements, there is a considerable bias towards mathematics, physical science, and mechanics. The reason of the bias is that these subjects form so much of the professional knowledge which a naval officer has to possess, and so what is substantially the Woolwich entrance examination, without one or two features of the present examination, has been adopted. In taking the public school boy and giving him a brief professional training, it would be very hard to give all the practical mechanical knowledge which the naval officer ought to possess in so short a time, unless there was initially some foundation for such knowledge or at least some aptitude for practical mechanics on the part of the candidate. Therefore the Woolwich list of examination papers is supplemented by introducing a paper on very elementary engineering—a paper intended rather to test the aptitude than the training of the candidate. This is an attempt to attract those who have a special bent towards engineering. Other subjects discussed at the conference were the Teachers' Register and several points in connection with classical education.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Meteorological Society, December 17.—Mr. C. J. P. Cave, president, in the chair.—R. C. **Mossman** and Mr. C. **Salter**: The great rain storm at Doncaster, September 17, 1913. On that day during a period of disturbed weather, a very heavy and local fall of rain took place in the vicinity of Doncaster. The storm lasted fourteen hours, and in that time more than 4 in. of rain fell at six stations, of which four had more than 5 in. The small area embraced by the heavy rain is shown by the circumstance that more than 4 in. fell over only sixty-one square miles, while more than 0·50 in. fell over 2336 square miles. Over the latter area 47,330 million gallons of water were precipitated. No adequate explanation of the storm can be offered, and the phenomenon affords an opportunity for special investigation.—Dr. J. E. **Church**, Jun.: Recent studies of snow in the United States. The author first gave a description of the snow sampler and weigher, which is an instrument he has designed for quickly measuring the depth and the water content of snow upon mountains. He then referred to some of the phases of the snow problem which were susceptible of solution by the aid of this instrument, and showed that the evolution of the snow leads directly to the practical problem of the relation of mountains and forests to the conservation of snow. This is of vital interest wherever irrigation is essential to agriculture, as in the western portion of the United States and in Australia. It is also closely related to the problem of stream control.—C. E. P. **Brooks**: The meteorological conditions of an ice sheet and their bearing on the desiccation of the globe. As the regions occupied by extensive ice-sheets at the present day, viz. Antarctica and Greenland, are the centres of permanent high-pressure areas, with slight precipitation, the author infers that the regions occupied by similar ice-sheets in the glacial period were likewise occupied by permanent anticyclones. The maximum extent of glaciation occurred at about the same time in different regions of the globe, and also coincided with the maximum of the pluvial period, or period of greater rainfall than the present, in the unglaciated regions. But a general decrease in temperature should lead to a decrease, not an increase, in the amount of evaporation, and hence of precipitation. The explanation of the paradox lies in the different distribution of the precipitation.

EDINBURGH.

Royal Society, December 4, 1913.—Prof. Hudson Beare, vice-president, in the chair.—Dr. W. N. **Shaw**: Principia atmospherica—a study of the circulation of the atmosphere. Section I. consisted of five axioms or laws of atmospheric motion, viz. the relation of motion to pressure, the computation of pressure and of the application of the gaseous laws, the law of convection, the law of the limit of convection, and the law of saturation. Section II. contained two lemmas or postulates regarding the relation between temperature and pressure in the stratosphere and in the troposphere, and the average horizontal circulation in the northern hemisphere. In Section III., which formed the bulk of the address, Dr. Shaw laid down for discussion six propositions, three of which had been already dealt with in a communication recently made to the Scottish Meteorological Society and published in the journal of the society for 1913. The remaining three were then considered in some detail, viz.: (1) the conditions necessary to maintain a steady atmospheric current; (5) the calculation of the distribution of pressure and temperature in the upper air from the observations of structure represented by soundings with a pilot balloon; (6) to account for the general circulation of the atmosphere in the northern hemisphere.—Sir William **Turner**: Observations on the auditory organ in the Cetacea. The paper was in two parts, in which were treated respectively the external auditory meatus and ear-wax, and the tympano-petrous bones. One of the specimens of ear-wax exhibited was about 20 in. long, and had been obtained from a blue whale near the South Shetland Islands. Sir William Turner also read a note upon a siliceous sponge of the order Hexactinellida, consisting of white delicate thread-like spicules collected into two tufts or bundles.

December 15.—Prof. James Geikie, F.R.S., president, in the chair.—Prof. C. R. **Marshall**: The pharmacological action of tetra-alkyl ammonium compounds—part ii., the action of tetra-ethyl-ammonium chloride; part iii., the action of methyl-ethyl-ammonium chlorides. Tetra-ethyl-ammonium chloride resembles tetra-methyl-ammonium chloride in inducing paralysis by an action on the myo-neural junctions. It needs, however, much larger doses. Unlike tetra-methyl-ammonium chloride, it has no action on vagal terminations, and it is difficult to produce with it temporary cessation of the respiration. Trimethyl-

ethyl-, dimethyl-diethyl, and methyl-triethyl-ammonium chlorides produce actions, speaking broadly, intermediate to those of tetra-methyl- and tetra-ethyl-ammonium chlorides. None of these compounds stimulate the vagus endings.—Miss Dorothy **Court**: Enzymatic peptolysis in germinating seeds. Parts i. and ii.—Prof. A. H. **Gibson**: The kinetic energy of viscous flow through a circular tube. In the experiments, which were arranged to test the theory, the upper end of the tube projected into the reservoir, and the head loss at entrance to the tube was represented by the expression $cv^2/2g$, where the factor c is unity for very thin-walled tubes, and 0·5 for thick-walled tubes. The experiments gave, for three cases, values of c varying from 0·54 to 0·71, and these could be represented with fair accuracy by the formula

$$c = 1/(2-n^2),$$

where n is the ratio of the inner to the outer diameter.—L. N. G. **Ramsay**: Polychæta of the family Nereidæ collected by the Scottish National Antarctic Expedition. These worms are poorly represented in Antarctic and sub-Antarctic regions. One new species was found near the Falkland Islands.

PARIS.

Academy of Sciences, December 22, 1913.—M. P. Appell in the chair.—Remarks by the President on the proceedings of the fifth general meeting of Weights and Measures, held at Paris and at Sèvres, October 9-17.—G. **Humbert**: Indefinite binary quadratic forms.—Ch. **Lallemand**: Remarks on the second conference concerning the international map of the world on the scale of 1 : 1,000,000, held at Paris, December 10-17.—Arnaud de **Gramont**: The band spectrum of aluminium and its presence in the flame spectrum of certain minerals. The mineral was heated in an oxy-acetylene flame, giving a temperature well above the melting point of iridium. Metallic aluminium or its haloid salts give a mixed line and band spectrum, details being given. The spectrum is not given by the oxygen compounds of aluminium in the oxy-acetylene flame; but this generalisation does not seem to hold with all minerals, some giving the spectrum and others not.—M. Edmond **Perrier** was elected vice-president for the year 1914.—Ernest **Esclangon**: Observation of the Delavan comet made with the large equatorial of Bordeaux Observatory. Positions given for December 19, on which date the comet was of the 11th magnitude.—J. **Guillaume**: Observations of the Delavan comet (1913*f*) made with the *coudé* equatorial at the Observatory of Lyons. Position for December 19. Comet as a whole 11th magnitude, stellar nucleus 13th magnitude.—M. **Giacobini**: Observations of the same comet made at the Paris Observatory. Three positions determined, December 19 and 20.—P. **Chofardet**: On the same. Observations at Besançon on December 19 and 20.—Emile **Belot**: The extension of a theorem of Faye with application to the mode of formation of the planetary system.—St. **Chevalier**: The effect of atmospheric dispersion on the diameter of photographed stars.—Georges **Darmois**: Algebraic curves of constant torsion.—M. **Tzitzéica**: Networks with equal invariants.—B. **Hostinsky**: Closed curves of constant torsion.—A. **Chatelet**: Complex multiplication.—Ernest **Esclangon**: Mean quasi-periodic functions, deduced from a quasi-periodic function.—Kampé de **Fériet**: The development of a function in a series of ultra-spherical polynomials.—Kyrille **Popoff**: Fredholm's equations of the first species.—G. **Bouligand**: Correction to a note on the problem of Dirichlet presented to the meeting of December 8.—Jean **Chazy**: The singular points of the general integral of the problem on n bodies.—Th. de **Donder**: The movement of heat in a body opaque to heat.—J. M. **Crafts**: General comparison of vapour pressures. If T and T′ are the boiling points of any substance under pressures P and P′, T″ and T‴ are the boiling points under the same pressures of a standard substance (naphthalene), and C is a constant, it is shown that the relation $T-T'=(T''-T''')C$ holds for numerous substances of very varied nature.—Pierre **Weiss**: The molecular field and a law of action inversely as the sixth power of the distance.—Paul **Sélényi**: The existence and observation of non-homogeneous spherical light waves.—G. **Sagnac**: The proof of the reality of the luminous æther by the experiment of the rotating interferograph.—M. de **Broglie**: The continuous photographic registration of the spectra of Röntgen rays. The spectrum of tungsten. The influence of thermal agitation.—F. **Bourrières**: The observation of the Brownian movement with linear magnification above 20,000. In this work the ordinary eyepiece of a microscope was replaced by another complete microscope. Under these conditions the Brownian movement proved to consist of a double motion; the first with an amplitude of the order of a micron, the other about 1/50 of this.—V. **Schaffers**: The law of currents producing glow discharge in cylindrical fields.—R. **Marcelin**: The expression of velocities of transformation of physico-chemical systems as a function of the affinity.—M. **Gompel** and Victor **Henri**: The absorption of ultra-violet light by alkaloids of the morphine group and by phenanthrene.—Maurice **Nicloux**: The laws of absorption of carbon monoxide by the blood. The hæmoglobin of the blood corpuscles, put in contact with mixtures of carbon monoxide and oxygen, combines with both gases in proportions defined by their partial pressures in the mixture and in accordance with the law of mass action.—F. **Bodroux**: Catalytic esterification in the wet way. The production of esters in presence of dilute mineral acids. The ordinary theories of esterification by mineral acids fail to explain the catalytic action of these acids in very dilute solutions at 100° C. The author suggests the possible formation of an addition compound of the organic and mineral acids as an explanation of the action.—Charles **Staehling**: A supposed separation of radium D from lead in active lead by means of Grignard's reaction. The author has repeated the work of Hofmann and Wolff, and has been unable to obtain the positive separation indicated by these authors. The results are absolutely negative, and it is concluded that it is impossible to separate radium D from lead in active lead by the tetraphenyl-lead method.—J. **Riban**: Concerning the action of carbonyl chloride upon phosphates and oxides. Remarks on a recent paper by Barlot and Chauvenet.—Gabriel **Bertrand** and H. **Agulhon**: A method for estimating extremely small quantities of boron in organic materials.—Amé **Pictet** and Maurice **Bouvier**: Vacuum tar. A chemical study of the tar obtained by the distillation of coal at 450° C. under reduced pressure (15 mm. to 18 mm.). After separating alcohols and unsaturated hydrocarbons, two naphthenes, $C_{10}H_{20}$ and $C_{11}H_{22}$, were isolated, identical with two hydrocarbons obtained by Mabery from Canadian petroleum.—M. **Lespieau**: True acetylene derivatives obtained from dipropargyl compounds.—E. E. **Blaise**: Syntheses by means of the organometallic zinc compounds. The preparation of the α-ketonic acids.—Marcel **Sommelet**: A method of synthesis of benzyl chloride and its homologues. A new general method is described based on the following reaction,

$$RH + ClCH_2.O.R' = R.CH_2.OR' + HCl,$$

which takes place at −10° C. in carbon bisulphide or carbon tetrachloride solution in presence of $SnCl_4$.—

Paul **Gaubert**: Mixed liquid crystals.—Albert Michel **Levy**: The effects of the granitic metamorphism in the carboniferous eruptive tufas in the neighbourhood of Mâcon.—Pereira de **Sousa**: Contribution to the petrographical study of the north of Angola.—Marcel **Delassus**: The influence of the size of seeds on the general development and anatomy of plants.—Raoul **Combes**: The conversion of an anthocyanic pigment extracted from red autumnal leaves to the yellow pigment contained in the green leaves of the same plant. The yellow pigment is obtained by oxidising the red pigment with hydrogen peroxide. The change in the colour of leaves in the autumn is due to a process of reduction.—L. **Blaringhem** and E. **Miège**: Studies on the straw of wheat.—Armand **Viré**: Experiments on the divining rod. A detailed account of the successful use of the divining rod.—R. **Robinson**: The physiological localisations of the encephalus contrasted with extensive destruction of this organ.—J. G. **Garfounkel** and J. **Gautrelet**: Contribution to the study of the action of colouring matters on the heart and blood pressure.—Emile **Yung**: The vertical distribution of plankton in the lake of Geneva.—A. **Gruvel**: The anchovy (*Engraulis encrassicholus*) on the western coast of Africa.—Ch. **Gravier**: The incubation of Mopsea and Rhopalonella from the Antarctic.—Adrien **Lucet**: The influence of agitation of the broth cultures on the development of *Bacillus anthracis* and some other micro-organisms.—Henri **Coupin**: Zinc and *Sterigmatocystis nigra*.—J. **Wolff**: The catalytic action of iron in the development of barley.—A. **Fernbach** and M. **Schoen**: Pyruvic acid a life product of yeast.—Emile **Haug**: The geology of the southern slopes of Sainte-Baune.—J. **Blayac**: Relations between the sands of the Landes and the terraces of the Garonne.—A. **Bigot**: The structure of the Bocain zone.—P. **Idrac**: The inequalities of the distribution of terrestrial magnetism.

BOOKS RECEIVED.

Letzte Gedanken. By H. Poincaré. Translated by Dr. K. Lichtenecker. Pp. vi+261. (Leipzig: Akademische Verlagsgesellschaft m.b.H.) 4.50 marks.

The Madras Presidency, with Mysore, Coorg, and the Associated States. By E. Thurston. Pp. xii+293. (Cambridge: University Press.) 3*s*. net.

Plant Life. By T. H. Russell. Pp. 71. (Birmingham: Cornish Bros., Ltd.) 2*s*. 6*d*. net.

Royal Horticultural Society. Four Essays, written by Students at Wisley, 1913. Pp. 72. (London: Royal Horticultural Society.)

The Story of Plant Life in the British Isles. By A. R. Horwood. Pp. xiv+254. (London: J. and A. Churchill.) 6*s*. 6*d*. net.

Water: Its Purification and Use in the Industries. By W. W. Christie. Pp. xi+219. (London: Constable and Co., Ltd.) 8*s*. 6*d*. net.

Transmission Line Formulas for Electrical Engineers and Engineering Students. By H. B. Dwight. Pp. vi+137. (London: Constable and Co., Ltd.) 8*s*. 6*d*. net.

DIARY OF SOCIETIES.

FRIDAY, JANUARY 2.

GEOLOGISTS' ASSOCIATION, at 8.—The North Sea Drift and Certain Brick-Earths in Suffolk: P. G. H Boswell.

MONDAY, JANUARY 5.

ARISTOTELIAN SOCIETY, at 8.—Philosophy as Co-ordination of Science: H. S. Shelton.

SOCIETY OF CHEMICAL INDUSTRY, at 8.—The Viscosity of Oils: J. L. Strevens.—The Oxygen Content of Gases from Roasting Pyrites: L. T. Wright.—The Electrical Conductivity of Milk During its Concentration, with Suggestions for a Practical Method of Determining the End Point in the Manufacture of Sweetened Condensed Milk: L. C. Jackson, L. McNab, and A. C. H. Rothera.—Monazite from Some New Localities: S. J. Johnstone.

RÖNTGEN SOCIETY, at 8.15.—Histological Changes Produced by X-rays on Animal Tissues; Destructive and Hyperplastic Action of X-rays; Practical Consequences in Regard to Radio-Therapy and Protection of the Radiologist: Dr. J. Clunet.

WEDNESDAY, JANUARY 7.

GEOLOGICAL SOCIETY, at 8.—The Ordovician and Silurian Rocks of the Lough Nafooey Area (County Galway): C. I. Gardner and Prof. S. H. Reynolds.—The Geology of the St. Tudwal's Peninsula (Carnarvonshire): T. C. Nicholas.

AËRONAUTICAL SOCIETY, at 8.30.—Wind Gusts and the Structure of Aërial Disturbances: Dr. W. N. Shaw.

THURSDAY, JANUARY 8.

CONCRETE INSTITUTE, at 7.30.—Factory Construction: P. M. Fraser.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—The Development of Electric Power for Industrial Purposes in India: H. R. Speyer.

FRIDAY, JANUARY 9.

ROYAL ASTRONOMICAL SOCIETY, at 5.

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