

compensate for annual variation in the water-supply. The power-current will be sent along the line by two independent cables, each capable of carrying the full power at twice 30,000 volts, with earthed neutral. The current will be transformed down to 7500 volts at first, and 15,000 volts later on, if the experience gained with the lower pressure should warrant the increase to double pressure. This will not involve any additional plant, since the secondary winding of transformers both along the line and on the locomotives can from the first be arranged with this alteration in view. It is also contemplated to establish sub-stations in Biasca, Goeschenen, Lavorgo, and Bellinzona. The trolley wires will be suspended from gantries, each wire independently insulated. The section varies according to the gradient from 100 to 160 square millimetres. The feeders are separate for the up and down line, and are 100 square millimetres in section. At all railway stations there are change-over switches for trolley wire and feeders. In the tunnels the wires are carried by brackets fastened to the crown of the tunnel. The rails will be bonded, and, in addition, there will be a bare return conductor either laid in the ground or placed between the trolley wires. A variation in the supply of voltage of from plus 10 to minus 15 per cent. is allowed for. There will be no motor coaches used, only electromotives. It is intended to haul express trains weighing 420 tons with a speed of 50 kilometres per hour on grades of 26 per mille, for which service the electromotive will have to develop 3000 horsepower on the rails. Goods trains weighing up to 670 tons will run with a speed of from 27 to 28 kilometres per hour, and have two electromotives, one in front and one in the rear, each rated at 2800 horse-power. Passenger trains will be heated by steam, the boiler being carried in a special heating coach. Except for the stipulation that the traction must be single-phase at 15 frequency and a voltage of 7500, which may eventually be raised to 15,000, no definite type of electromotive has as yet been selected, but there can be no doubt that several of the already existing types of mono-phase electromotive can be adapted to the special requirements of the Gothard line.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

BIRMINGHAM.—Prof. P. F. Frankland, F.R.S., has been elected dean of the faculty of science in succession to Prof. S. M. Dixon.

Dr. F. C. Lee has been nominated to the chair of civil engineering vacated by Prof. S. M. Dixon.

CAMBRIDGE.—The director of the psychological laboratory has appointed Mr. Cyril Burt, psychologist to the London County Council, to be assistant in experimental psychology.

The professor of zoology and comparative anatomy has appointed Mr. T. J. Saunders to be demonstrator of comparative anatomy.

At Emmanuel College, Mr. J. B. Peace, bursar of the college, resigned the tutorship in mathematics at Michaelmas, and Mr. P. Worsley Wood has been appointed his successor. The exhibition of 50*l.* offered to a research student commencing residence this October has been awarded to Mr. J. Conway Davies for research in history. An additional exhibition of 30*l.* has been awarded to Mr. H. Ogden for research in physics.

The next combined examination for fifty-six entrance scholarships and a large number of exhibitions, at Pembroke, Gonville and Caius, Jesus, Christ's, St. John's, and Emmanuel Colleges, will be held on Tuesday, December 2, and following days. Mathematics, classics, natural sciences, and history will be

the subjects of examination at all the above-mentioned colleges. Most of the colleges allow candidates who intend to study mechanical sciences to compete for scholarships and exhibitions by taking the papers set in mathematics or natural sciences. A candidate for a scholarship or exhibition at any of the six colleges must not be more than nineteen years of age on October 1. Forms of application for admission to the examination at the respective colleges may be obtained from the masters of the several colleges, from any of whom further information respecting the scholarships and exhibitions and other matters connected with the colleges may be obtained.

GLASGOW.—Prof. Archibald Barr has resigned the Regius chair of civil engineering and mechanics, which he has held since 1889. The magnificent James Watt engineering laboratories, in which the department is accommodated, were erected and equipped under his direction. The Crown has appointed Prof. J. D. Cormack, dean of the faculty of engineering in University College, London, and a governor of the Imperial College of Science and Technology, to the vacant chair. Prof. Cormack is a graduate of Glasgow, and was formerly a lecturer in the engineering department.

MR. C. R. BURY has been appointed assistant lecturer and demonstrator in chemistry at the University College of Wales, Aberystwyth.

A gift of ten lakhs of rupees for the promotion of scientific technical knowledge has been made by Dr. Rash Bahari Ghosh to the University of Calcutta.

THE McCosh professorship of philosophy at Princeton University has been resigned by Prof. A. T. Ormond, who has accepted the presidency of Grove City College.

WE learn from *Science* that by the will of Miss Katherine Allen, of Worcester, the Worcester Polytechnic Institute has received a bequest amounting to about 20,000*l.*

MR. L. C. PLANT has resigned his position as head of the department of mathematics in the University of Montana on accepting a similar post in the Michigan Agricultural College. He is succeeded by Dr. N. J. Lennes, of Columbia University.

By a trust settlement of Dr. Gavin P. Tennent, of Bath Street, Glasgow, the sum of 25,000*l.* is bequeathed to the governing body of the University of Glasgow, to be applied for such objects or object in connection with the faculty of medicine as the trustees may determine.

THE Gresham lecturer on astronomy, Mr. Arthur R. Hinks, F.R.S., will deliver a course of four lectures on astronomy in daily use on October 14, 15, 16, and 17, at 6 p.m., at the City of London School, Victoria Embankment. The subjects of the four lectures are respectively:—The determination of time; the distribution of time; the determination of position; and measurement of the size and shape of the earth. The lectures are free to the public.

A STRONG committee, mainly consisting of old students of the Royal Agricultural College, Cirencester, is about to issue a special appeal with the view, in the first place, of collecting the balance of 1685*l.* still required to complete the 5000*l.* necessary to secure the advance of a similar sum from the Development Fund for erection of King Edward's wing of the college. When this sum has been subscribed, the appeal will still be continued so as to provide for further much needed extensions. The honorary secre-

tary of the committee is Mr. A. Goddard, Surveyors' Institution, 12 Great George Street, Westminster.

THE London County Council has arranged for three courses of free lectures at the Horniman Museum, Forest Hill, S.E., during the autumn, viz.:—On Saturday afternoons, at 3.30 p.m., beginning October 11, a course of ten lectures as follows: Nature study in a Croydon garden, E. Lovett; folk-lore of the Balkan peoples (II.), A. R. Wright; native arts and crafts in British New Guinea, Dr. H. S. Harrison; weeds and their influence, Dr. E. Marion Delf; the origin and nature of teeth, Dr. W. A. Cunningham; a folk-lore tour in the southern counties of England, E. Lovett; the history of coined money, A. R. Wright; the evolution of man in the light of recent discoveries, Dr. H. S. Harrison; animal life in the great caves, H. N. Milligan; the stone monuments of prehistoric times, A. L. Lewis. On Wednesday evenings, beginning October 29, a course of five lectures by Mr. H. N. Milligan on the animal life of the sea-shore. On Saturday mornings, beginning October 11, a course of ten lectures to teachers by Dr. A. C. Haddon, F.R.S., on the ethnology of India. Tickets are required only for the Saturday morning lectures, and may be obtained from the museum.

SOCIETIES AND ACADEMIES.

PARIS.

Academy of Sciences, September 22.—Général Bassot in the chair.—A. **Chauveau**: Comparison of vigorous and feeble organisms from the point of view of their aptitude for receiving and cultivating virulent organisms. According to the views at present generally held, a strong, healthy man is less readily attacked by tuberculosis or other contagious diseases than cases where the body has been weakened by alcoholism or other causes. This view is strongly controverted by the author, who refers to the experimental infection in 1868 of sixty healthy animals by tubercle; not one escaped the infection. Additional experiments on the transmission of scab to sheep are now given. Neither the healthy nor enfeebled subjects escaped.—T. **Levi-Civita**: Torricelli's theorem and the commencement of flow.—Edouard **Heckel** and Cl. **Verne**: Cultural bud mutations of *Solanum immite*, *S. Jamesii*, and *S. tuberosum*.—R. **Lépine** and **Boulud**: The intra-renal resorption of chlorides in various states of the kidney.—P. **Chofardet**: Observations of the Metcalf comet 1913*b*, made at the observatory of Besançon with the bent equatorial. Data given for September 7 and 11. The comet was of the ninth magnitude, nucleus badly defined, and no tail visible.—P. **Chofardet**: Observations of the Neujmin comet 1914*c*, made at the observatory of Besançon with the *coudé* equatorial. Data given for September 10 and 11. The comet was of the eleventh magnitude, with a small brilliant nucleus and a nebulous tail.—D. **Mirimanoff**: Remarks on a communication of Eugène Fabry. Pointing out an error in a demonstration of Fermat's theorem.—Paul **Lebard**: Remarks on the affinities of the principal genera of the group of ligulate flowers.—P. **Mazé**, M. **Ruot**, and M. **Lemoigne**: Lime chlorosis of green plants. Rôle of the root excretions in the absorption of iron from chalky soils. The presence of excess of chalk in the soil may produce chlorosis by rendering the iron insoluble. The addition of organic acids permitting the solution of small quantities of iron in presence of calcium carbonate removes the chlorosis at once.—Eugène **Pittard**: The comparative analysis of some of the body dimensions in Tartars of both sexes.—Ch. **Dhéré** and L. **Ryncki**: The absorption of visible and ultra-violet rays by carotinoid pigments.

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BOOKS RECEIVED.

University of London: University College. Calendar. Session 1913-14. Pp. 598+clxxxiii. (London: Gower Street.)

University College, Reading. Twenty-first Anniversary, Michaelmas Day, 1913. Pp. 88. (Reading.)

A Critical Revision of the Genus *Eucalyptus*. By J. H. Maiden. Vol. ii., Part 8. (Sydney: Government of the State of New South Wales.) 2s. 6d.

Memoirs of the Asiatic Society of Bengal. Vol. iii., No. 6. Some Current Pushtu Folk Stories. By F. H. Malyon. Pp. 355-405. 2s. 3d. Vol. iii., No. 7. The Chank Bangle Industry. By J. Hornell. Pp. 407-488. 2s. 8d. (Calcutta: Asiatic Society.)

Social Welfare in New Zealand. By H. H. Lusk. Pp. viii+287. (London: W. Heinemann.) 6s. net.

Switchgear and the Control of Electric Light and Power Circuits. By A. G. Collis. Pp. 85. (London: Constable and Co., Ltd.) 1s. net.

Inductive versus Deductive Methods of Teaching: an Experimental Research. By W. H. Winch. Pp. 146. (Baltimore, Md., U.S.A.: Warwick and York, Inc.) 1.25 dollars.

How I Kept my Baby Well. By Anna G. Noyes. Pp. 193. (Baltimore, Md., U.S.A.: Warwick and York, Inc.) 1.25 dollars.

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