

Norway. On the Glommen River, in the east, three falls are utilised. The uppermost, Kykkelsrud, yields about 40,000 horse-power, of which 10,000 kilowatts is transmitted at 60,000 volts (3-phase 50 periods) to Christiania, thirty-one miles away, and the remainder to Sarpsborg. At Sarpsborg occurs the lowest fall of the Glommen, and here there are two power stations—Hafslund, supplying 24,000 horse-power to calcium carbide works and for zinc smelting, and Borregaard, the output of 26,000 horse-power of which is utilised by the Kellner Partington Paper Pulp Company, Ltd., owning the largest works in Norway. The intermediate fall on the Glommen is at Vamma, where a dam is now in course of construction under considerable difficulties. This dam will have a height of 90 feet, and will be one of the largest in Europe. The power station will be in the centre of the river bed below the dam, and will yield some 70,000 to 80,000 horse-power.

A large number of the minor power stations in the south supply the towns with light and power. Among the smaller electrochemical works are the electro-iron and steel works at Arendal, the experimental nitrate works of the Badische Company at Christianssand, and nickel and aluminium factories near the same town. The nickel works refine nickel matte, and turn out about 400 tons of the pure metal per annum. At Gjössingfjord is Mr. Albert Hiorth's small experimental electro-steel works. At Vadheim, on the west coast, is a sodium factory, and at Trondhjem, in the north, carbide, ferro-chrome, and ferro-silicon are manufactured.

Another great power centre is in the Telemarken district in the south-east of Norway. The Svaelfoss power station supplies 40,000 horse-power to the nitrate factory at Notodden at a voltage of 10,000, delivered without transformation. The four 10,000-horse-power machines—capable of developing 13,000 horse-power—are among the largest in the world. A power station now being constructed at Lienfoss will be able to furnish Notodden with a further 20,000 horse-power. The Tinfoss Works, also at Notodden, are intended to generate 15,000 horse-power, to be used mainly for iron and steel smelting.

The third of the great Norwegian falls is the celebrated Rjukanfoss waterfall on the Maaneely River. The Mös-vand dam, above this fall, provides a reservoir of about 840 million cubic metres (tons) of water, and five miles below is another dam, forming the intake for the power station, situated 1000 feet below. A lower fall of about 1000 feet provides the power for a second station. Both of these power stations—the largest in Europe—will yield 140,000 horse-power, there being in each 10 units of 14,000 horse-power. The turbines, on account of the great height of the falls, are Pelton wheels. The construction of the dams, flumes, and power stations at Rjukanfoss was attended with great engineering difficulties, which are described in the paper. The power from these stations is transmitted through sixty copper and aluminium cables to Saaheim, where factories for the manufacture of nitrogenous products to employ from 2000 to 3000 persons are in course of erection.

The paper concludes with a description of the power plant at the Tysse falls, which consists of seven units, each of 4500 horse-power, and from which electric energy is transmitted at 12,000 volts to Odda, where it is used for the manufacture of calcium carbide and of cyanamide. Here again, on account of the steep, mountainous character of the country, great difficulties presented themselves, particularly in the drilling of tunnels 1320 feet above the fjord, and in fixing the flumes, some against a smooth precipice, with an inclination of 60°. The Tysse power station will eventually yield some 100,000 horse-power.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

BIRMINGHAM.—At the last meeting of the council the following resolution was passed:—"The council of the University has heard with great regret of the death of Prof. Whitcombe, who for twenty-three years was professor of mental diseases at Queen's College, Mason College, and the University, and desires to place on record its appreciation of the valuable services he has rendered to the University."

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Dr. Helen M. Wodehouse has resigned her appointment as lecturer in philosophy on being elected to the principalship of the West Riding of Yorkshire Training College.

At the forthcoming degree congregation, official degrees are to be conferred on Prof. C. E. Martineau (M. Com.), professor of accounting, and on Miss S. M. Fry (M.A.), the warden of the Hall of Residence for Women Students.

BRISTOL.—Mr. Herbert Bolton, curator of the Bristol Museum of Natural History, has been appointed reader in palæontology in the University.

The thanks of the council have been accorded to the Local Committee on Agricultural Development for passing the following resolution:—"In view of the valuable research work now being done in the University of Bristol in the interests of the cheese industry, and also in the investigation of plant diseases, this meeting urges that a substantial grant for a given period of time be provided by the Development Commission, to enable the investigations to be proceeded with until practical results are arrived at."

CAMBRIDGE.—An offer to contribute 200*l.* a year for the next five years to the Geographical Education Fund has been made by the council of the Royal Geographical Society, which has further granted an additional 100*l.* for the year ending Michaelmas, 1912. A private benefactor has also offered 100*l.* for the ensuing academic year. It is proposed that these offers be gratefully accepted by the University.

A lecturer in historical and economic geography, a lecturer in regional and physical geography, and a lecturer in surveying and cartography, will be appointed by the General Board for five years from Michaelmas. The two latter will be known as the Royal Geographical Society's lecturers.

It is proposed to confer the degree of Doctor of Letters, *honoris causa*, upon Prof. Wilhelm Dorpfeld, principal secretary of the Imperial German Archæological Institute in Athens; and the degree of Master of Arts, *honoris causa*, upon Mr. John Watson.

OXFORD.—The following is the text of the speech delivered by Prof. Love in introducing Prof. H. L. Bergson for the degree of D.Sc. *honoris causa* on May 27:—"Adest Henricus Ludovicus Bergson, inter huius aetatis philosophos insignis, vir multis nominibus laudandus, doctrinae novae et singularis suavor, eiusdem variis in rebus probator, rationis sibi constantis et late patentis inventor, orationis vi lumine venustate pollens. Qui cum non solum mathematicam et scientiam naturalem, sed etiam litteras et philosophiam penitus hausisset, id consecutus est ut, si quis alius, ipsius scientiae rationes corrigere et quasi terminos statuere posset. Nova profecto eius est sententia, esse quaedam, velut durandi notionem, sine qua vita et libertas esse non possint, quae in scientiam physicam mathematicis fundamentis extructam non cadant: nova etiam eius doctrina, esse quoddam cognitionis genus ipsi scientiae non obnoxium, quo usa mens ipsam veritatem capiat, et durandi, vivendi, mutationis, motuum naturam comprehendat. Hanc ad sententiam, cum multa alia, tum rationem Darwinianam exegit, qua de re magna controversia exorta est, cum multi multis in terris huic suffragentur, ii qui adhuc dissident eius acumen admirentur."

SHEFFIELD.—Mr. Llewellyn Lloyd, assistant curator of the Museum of Zoology, has been appointed entomologist to the Sleeping Sickness Commission of the British South Africa Company, and is leaving England at once for northern Rhodesia.

THE fourth holiday course and second nine months' training course in physical instruction for men and women at Silkeborg, Denmark, sanctioned by the Danish Board of Education, will commence respectively on July 31 and September 2. Particulars can be obtained from the principal, H. G. Junker, Silkeborg, Denmark.

A COURSE of three lectures on "The Evolution of Coasts" will be given by Prof. Albrecht Penck, director of the "Institut für Meereskunde," Berlin, at Burlington House, Piccadilly, London, W., at 5.30 p.m. on June 27, 28, and 29. The following is an outline syllabus:—development of English coastal scenery; formation of

Romney Marsh, Chesil Beach, Plymouth Sound. The lectures are addressed to advanced students of geology of the University of London and to others interested in the subject. Admission is free, without ticket.

We learn from *Science* that a Bill has been signed by which the Massachusetts Institute of Technology will receive 20,000*l.* annually from the State for ten years. By the terms of the measure, the institute will maintain eighty free scholarships to be apportioned among the forty senatorial districts of the State. The California legislature has passed a Bill, which has been recently signed, appropriating 5000*l.* for a soils laboratory building, equipment, and other improvements at the Citrus Experiment Station. The work of the laboratory is to be confined to the study of citrus soils. The legislature of Hawaii has voted 15,000*l.* for a new building for the College of Hawaii and 4000*l.* for maintenance expenses.

THE report has been issued (Cd. 5662) of the Departmental Committee appointed to inquire into the administration of (a) endowments the income of which is applicable, or is applied to or in connection with, elementary education, and (b) small educational endowments other than the above, in rural areas, the application of which to their proper purposes presents special difficulties; and to consider how far under the existing law it is possible to utilise them to the best advantage; and whether any, and, if so, what, changes in the law are desirable in the direction of conferring upon county and other local authorities some powers in respect of such educational endowments or otherwise. The committee makes a number of recommendations, which are summarised in the report under twenty-two headings. Especially important is the proposal that, subject to certain exceptions and modifications, county councils in their capacity as local education authorities under the Education Act, 1902, should perform the functions at present performed by the Board of Education with regard to the administration of the endowments within the terms of reference, that there should be an appeal to the Board of Education from any scheme made by a local education authority, and that the range of educational objects to which trustees may apply their funds should be widely extended. It is also recommended that the local education authority should have the same powers of demanding accounts and investigating the administration of charities as are at present exercised by the Board of Education, but that the Board of Education should have a concurrent power of demanding accounts, though trustees will no longer be under any obligation to render accounts to the Board. Certain of the suggestions are not made unanimously, and memoranda at the end of the report provide particulars of the points on which some few members of committee do not agree with the main recommendations.

ATTENTION has recently been directed to a somewhat anomalous situation which had come into existence during the last few years in connection with medical education. The General Medical Council exercises a supervising control over the standard of the tests required by the various qualifying authorities in this country. In the regulations published by the Council, students are required to study the preliminary sciences at an institution recognised by the council, and *after* passing an examination in general education when above sixteen years of age. The council requires no elementary science at all in the general education. These regulations, which are obviously designed to make sure that students shall not scamp their literary, for the sake of their scientific, education, and that they shall study elementary science under generous conditions, probably achieve their purpose satisfactorily for a certain class of student. But, since public schools are not recognised by the council as places where elementary science can be studied, they evidently do not meet the case of the very large number of boys who enter the medical profession from the public schools. The difficulty has been met in the past by the fact that those qualifying authorities most used by public-school boys have not conformed to the regulations of the council. For though termed "regulations," they are not legal requirements, but more in the nature of recommendations. Thus the Conjoint Board of London and the Universities of Oxford, Cam-

bridge, and London, the professional tests of which are beyond suspicion, allow students to pursue the study of the preliminary sciences at the public schools. Hence a boy following the usual school curriculum, and working at elementary science as part of his general education, has been able to offer himself for examination in these subjects on leaving school at eighteen or nineteen years of age. Recently, however, an increasing number of boys have gone from public schools to the newer universities and other authorities where they have to conform to the requirements of the Council. To observe the regulations, these boys have had to study again the elementary science which they have already, in many cases, satisfactorily done at school. Representations have been made to the council by the public schools directing attention to the difficulty thus raised; and on May 29 last at the meeting of the General Medical Council a resolution was proposed by Sir Henry Morris to remove the disabilities from which public-school boys suffer by "recognising" the schools under certain conditions. This resolution was adopted by 24 votes to 5.

THE fifth annual Conference of the Association of Teachers in Technical Institutions was held at Southport on June 5. Mr. Barker North, of the Bradford Technical College, in his presidential address, said that during the year the membership of the association increased by more than 20 per cent., and branches were formed in Ireland and Wales. More than 50 per cent. of the full-time technical teachers of England and a large percentage of the part-time teachers are now in the association, which is the only organisation representing all grades of the profession. Many technical institutions, he said later, suffer from the unsatisfactory nature of the constitution of education committees, and he urged the co-option of experts to remedy the present lack of special knowledge. Mr. North gave a tabular statement from the recently published census of production which shows that the net output in the nine leading industries of the country rose with an increase in the percentage of salaried persons. This suggests that, within certain limits, the employment of a large number of skilled technologists would develop the industry into higher forms and increase productivity. The state of the chemical industries shows how fatal is the system of limiting the employment of research chemists. Referring to the reforms necessary in education, he argued for the closer affiliation of continuation schools with the higher institutions; the work of the former should be a real continuation of that of the primary schools, and in technical institutes and universities provision must be made alike for the rank and file of the industrial army and for their officers—the second type being evolved from the first by means of natural selection. The defects of the present system would be remedied by drafting the best of the evening students systematically into day courses and by concentrating them for the highest class of work in specialised institutions. Such institutions should be affiliated to form technical universities. On these lines, he thought, the development of the Imperial College should be carried out. The time is ripe, said the president, for the appointment of another Royal Commission, with broader terms of reference than those assigned to the present, so that the whole question of the organisation of higher technical education in this country may be subjected to an exhaustive inquiry. Papers were read by Prof. W. W. Haldane Gee and Mr. T. J. Burnett, and resolutions were adopted urging the formation of an Advisory Council on Technical Education, consultative committees of teachers, the representation of teachers on education committees, and advisory committees for juvenile employment.

SOCIETIES AND ACADEMIES.

LONDON.

Faraday Society, May 2.—Mr. James Swinburne, F.R.S., president, in the chair.—A. **Scott-Hansen**: Hydro-electric plants in Norway and their application to electrochemical industry (see p. 501).—Edgar **Stansfield**: Two simple forms of gas-pressure regulators. The two regulators described give a steady pressure, easily adjusted, not influenced by the rate of flow of the gas. They consist merely of an outer containing vessel into which water is