

of wave generation is employed, the spark frequency must not be less than about 20,000 a second.

When the microphone is spoken to, the result is to vary the amplitude of the waves emitted without altering their wave-length. It produces waves on waves. At the receiving end the arrangements are similar to those used in wireless telegraphy with a telephonic and crystal or valve receiver. In this case, however, the receiver hears the words spoken to the distant microphone and not merely dot and dash Morse signals.

Using a very ingenious liquid microphone, Prof. Vanni, of Rome, has transmitted speech for 1000 kilometres. In the United States, Fessenden has similarly telephoned a few hundred miles, and Poulsen in Denmark, Colin and Jeance in France, Goldschmidt in Germany, and Ditcham in England have covered greater or less distances. Mr. Marconi also has recently devised appliances for wireless telephony with which he has conducted demonstrations for the Italian Navy lately. All are agreed that the quality of the transmitted speech is good. Since electric waves through the æther all travel with the same velocity, no matter what the wave-length, and attenuate at the same rate, there is no distortion of the wave form. The only difficulty that hinders even greater achievement is that of obtaining a microphone which will carry larger high-frequency currents.

These then are a few of the achievements which have been lately made in covering greater distances in telephonic communication.

We are yet a long way from telephony across the Atlantic, whether with cables or by wireless, but progress will continue to be made, and it is possible that one day speech transmission from England to San Francisco with one repetition at New York may be an accomplished fact.

In the thirty-eight years which have elapsed since Bell and Edison and Hughes gave us the means of commercial telephony much has been done, but there is still a wide field open for invention in improving a means of communication now so essential to our modern life.

#### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

SHEFFIELD.—Mr. Wilfred Jevons has been appointed to the post of junior lecturer and demonstrator in physics, and Mr. A. E. Barnes to the post of lecturer in materia medica, pharmacology, and therapeutics.

PROF. BERGSON will begin his Gifford Lectures in Edinburgh on Tuesday, April 21. The subject will be "The Human Personality."

IT is announced that Lord Elgin has consented to be nominated for the Chancellorship of Aberdeen University in succession to the late Lord Strathcona.

WE learn from *Science* that Prof. Frederick Slocum, who for the past four years has been in charge of the solar observations and stellar parallax work at the Yerkes Observatory, has been elected professor of astronomy at Wesleyan University, Middletown, Connecticut, and will assume his new duties next autumn. A new observatory will be erected immediately as a memorial to the late Prof. Van Vleck, for many years in charge of that department at Wesleyan.

MUSEUMS are every day being used more generally in teaching, and a committee to deal with the subject was appointed at the Birmingham meeting of the British Association. The Children's Museum arranged by the secretary of the Selborne Society at the Children's Welfare Exhibition, which opens at Olympia

on Saturday, is therefore of interest. The points to be emphasised are, preparation of exhibits especially for young people, introduction of a living side, the use of microscopes, the need especially of changing the specimens at frequent intervals, and the advisability of not having too many things displayed at one time.

THE work of the schoolmaster is described in a new light by Mr. E. Boyd Barrett in an article in the current issue of the *British Review*. Early in his essay, to which he gives the title, "How to Complete One's Education," Mr. Barrett lays it down that teaching is worthy of the best minds, and is calculated to repay amply the best minds. He goes on to show that in all the practical effects of school education—character training, intellect training, and the acquisition of knowledge—the schoolmaster benefits more from the teaching he receives from the boys than they do from his. He comes to the conclusion that it would be impossible to devise any educational system of such a nature that the pupil alone would be benefited. To complete his education, every man should devote a few years to teaching; university education, however well it prepares for cultured leisure, does not prepare a man to share his possessions with others—it is too egotistic.

THE Yorkshire Summer School of Geography will be held at Whitby on August 3–22. The school was instituted last year by the Universities of Leeds and Sheffield, in cooperation with Armstrong College, Newcastle-on-Tyne, and with the help of the Education Committees of the County Councils of the East, North, and West Ridings, and of certain county boroughs in Yorkshire. Its object is to provide instruction in the methods of geography and to furnish opportunities for the discussion of problems connected with teaching it. The course will consist of lectures and laboratory and field work. There will be excursions in connection with the field work. All the apparatus used will be simple and inexpensive, and methods applicable to school work will be adopted. The special subject this year will be the British Isles, which will be treated as a whole in a general course and in two alternative courses at the choice of each candidate: (i) on the agriculture, rocks and soils, and (ii) on the oceanography, rivers and river development, and the evolution of transport and communication. Prof. Kendall, professor of geology in the University of Leeds, will be the director of the school.

THE annual report of the Department of Agriculture of the Union of South Africa for the period 1912–13 has just been issued by the secretary, Mr. F. B. Smith, and is a very interesting document. Necessary as agricultural education and research have proved in other countries, there is probably no part of the world where they are more needed than in South Africa. Agricultural problems are very complex; probably more numerous and virulent diseases of live stock and crops exist there than anywhere else in the world; and, owing to the recent occupation of the greater part of the country and the methods of farming pursued, it is more difficult for young men to acquire a knowledge of up-to-date practical agriculture. A number of institutions have been started, and the object of the department has been to place them on an equality as regards educational and experimental facilities, and at the same time to allow them to specialise in the branches of farming for which they are particularly adapted by virtue of their situation. For instance, Elsenburg, in the Cape Province, is particularly devoted to horticulture, viticulture, and Turkish tobacco; Grootfontein, near Middelburg, also in the Cape Province, to Karoo farming, ostriches, and

sheep; Potchefstroom, in the Transvaal, to mealie growing, general agriculture, and cattle; Glen, near Bloemfontein, in the Orange Free State, to live stock and dry-land farming; Cedara, in Natal, to general farming and wattle growing. Provision is made at each institution for the regular in-college courses of instruction, for short courses, extension work, and also for experiments and research and the analysis of soils, manures, and other agricultural commodities. Additional buildings are being erected to meet the needs of the institutions, and their equipment generally is being improved, while the staffs are being strengthened.

### SOCIETIES AND ACADEMIES.

**Geological Society**, March 25.—Dr. A. Smith Woodward, president, in the chair.—Prof. J. W. Judd: The geology of Rockall. Rockall is a small isolated rock in mid-Atlantic, lying 184 miles west of St. Kilda, and, except in the calmest weather, is inaccessible. The rock rises from a bank (the "Rockall Bank") upon which there are dangerous reefs. In 1810 Basil Hall, obtained a fragment from this rock, which later found its way into the collection of the Geological Society. More than thirty years afterwards, the specimen was recognised; it was then mislaid for another thirty years, and in 1895 was brought to the author by the late Prof. T. Rupert Jones. He not only studied all the literature connected with Rockall, but was able to trace two other specimens of the rock, the loan of which he obtained and brought to me. They had been procured in 1868 during the survey of the North Atlantic. The microscopic study of these specimens shows that in Rockall there exist rocks of interest, not represented in our islands, but which have analogues in the Christiania district of Norway. These rocks consist essentially of three minerals—quartz, the felspar albite, and the rare soda-pyroxene ægirite, with its dimorphous form acmite. Dredging operations have yielded specimens from the Rockall Bank. The abundance of basalt-fragments among the dredgings suggests the possibility of Rockall belonging to the same petrographical province as St. Kilda, Iceland, the Inner Hebrides, and the north of Ireland. The existence of borolanite and other alkaline rocks in the northern Highlands suggests the possibility of Rockall being the western extension of a much older province. Some months ago Prof. Iddings and Dr. Washington represented to the author the desirability of a detailed analysis of this rock. One of the two fragments available was sent to America, and the following paper gives the result of its study by Dr. Washington.—Dr. Henry S. Washington: The composition of Rockallite. A petrographical account is given, with reference to the influence of the constituent minerals upon the bulk-analysis. Rockallite has a fine-grained granitic structure, and is composed of about equal amounts of colourless quartz, alkaline felspar, and soda-pyroxene. The pyroxene is of two kinds: a bright grass-green ægirite and a pale yellowish-brown acmite. Some zircon is present. A chemical analysis has been made, zirconia and the rare earths being especially looked for. Several new points of interest have presented themselves. The outstanding features appear to be the high percentages of silica, ferric oxide, and soda, and the low percentages of alumina, ferrous oxide, magnesia, lime, and potash. The interest of the new analysis, however, lies in the detection of zirconia and cerium oxide in large amounts: the percentage of cerium oxide being larger than that from any known igneous rock, with the exception of the nepheline-syenite from Almunge in Sweden. The

norm has been calculated from the old and the new analyses, and the author finds that the rock falls into the subrang rockallose with the general symbol III. 3. 1. 5. These analyses are the only representatives of the subrang rockallose among the 8000 analyses of igneous rocks that the author has now collected. It is proved that the zirconia and cerium oxide enter into the composition of the pyroxenes.

### CAMBRIDGE.

**Philosophical Society**, February 23.—Sir J. J. Thomson in the chair.—Dr. Searle: (1) Determination of the effective aperture of the stop of a photographic lens; (2) experiments with a prism of small angle.—A. E. Oxley: (1) The molecular field in diamagnetic substances (preliminary note); (2) the internal molecular field, which has been shown by the author to exist in diamagnetic substances, is applied to account for the abnormally high values of the specific heat of such substances in the neighbourhood of the fusion point.—Major P. A. Macmahon: The superior and inferior indices of permutations.—N. Wiener: A simplification of the logic of relations.—R. Hargreaves: The domains of steady motion for a liquid ellipsoid, and the oscillations of the Jacobian figure.—J. E. Purvis and E. H. Black: The oxygen content of the river Cam before and after receiving the Cambridge sewage effluent.

March 9.—Dr. Shipley, president, in the chair.—Prof. Wood and G. Udny Yule: A statistical study of feeding trials with oxen and sheep. The authors have studied statistically the results of 400 feeding trials with oxen and sheep collected and tabulated by Ingle in the Journal of the Highland and Agricultural Society, 1909-10. They find that as the amount of food is increased above that required for maintenance the successive increases in live weight become smaller until a limiting value is reached.—G. Udny Yule: Fluctuations of sampling in Mendelian ratios. The author compares the fluctuations observed, e.g. in the proportion of recessives in  $F_2$ , in the seeds borne by individual plants, or in individual litters, with the fluctuations to be expected on the theory of random sampling. For the most part the agreement, in the examples taken, is good and in some cases striking.—M. S. Pease: Inheritance in Brassicæ.—G. Udny Yule and F. L. Engledow: The determination of the best value of the coupling ratio from a given set of data.—F. L. Engledow: A case of repulsion in wheat. The characters concerned are "roughness" and "blackness" of the chaff. In a cross between "smooth black" and "rough white" the numbers in the second generation indicate a repulsion on the 1:3:3:1 basis.—T. Rigg: Soil and crop relations in the Biggleswade market garden area. The author has conducted a soil and crop survey of this district. The soils have been classified and the extent of each soil formation has been determined. Maps were shown illustrating the relationship of the soil formations to the geological formations.—H. A. D. Neville: Digestibility of pentosans. Rats were fed on a basal diet, to which was afterwards added a quantity of some pentosan substance, such as (a) gum, (b) a vegetable mucilage, or (c) the pentosan constituent of a cereal straw. The pentosans of (c) almost entirely disappeared in the animal, those of (b) were almost wholly rejected, while those of (a) occupied an intermediate position. The results support the idea that the diverse opinions held on the food value of the pentosans have arisen by reason of the analytical method used yielding furfuraldehyde from differently constituted substances or from substances containing pentose sugar molecules differently united in the parent substance.—W. H. Parker: A case of correlation in wheat. A high cor-