

(4) There is also an electric gramophone recorder for making dialect gramophone records, and a jet-tone apparatus for studying the action of the vocal organs in speech.

The first work of the laboratory, which is under the joint supervision of Mr. H. Orton, of the English Department, and Dr. E. G. Richardson, of the Physics Department, will be to obtain definitive pictures of the standard English speech sounds. This work is, in fact, almost completed. Records of dialect speakers will then be taken for the purpose of the main object of the laboratory, which is the

comparative philology of the region in which the University of Durham lies. In this connexion, room is provided elsewhere in the College for card indexes of local variants in pronunciation.

For the benefit of others who may be intending to take up similar work, it may be mentioned that the cost of the equipment of a laboratory such as this is quite moderate. Excluding the string galvanometer (which is not essential), the whole of the equipment has cost less than fifty pounds, although it is true that this does not include the cost of the labour of assembling the apparatus.

Chemical Society's Mendeléeff Commemoration

THE centenary of the birth of Mendeléeff was commemorated by the Chemical Society on April 19, when Lord Rutherford delivered an address at the Royal Institution on "The Periodic Law and its Interpretation".

About the period 1860-70, accurate atomic weights and chemical data were available for the known elements, and the time was ripe for some connecting generalisation. The conception of a periodicity in properties when the elements are arranged in the order of their atomic weights was advanced tentatively by Newlands in 1864. Mendeléeff was the first, in 1869, to enunciate the law clearly, to perceive its utility in correlating and even correcting the recorded chemical properties of the elements, and to make from it predictions which might be verified by later investigation.

Mendeléeff's first table, published in 1871, bears a remarkable resemblance to that of the present day. He perceived the true place of the transition elements in the scheme, and did not hesitate to reverse the apparently discordant order of iodine and tellurium. Where his table demanded the presence of then unknown elements, he ventured to predict their properties, his prophecies being strikingly fulfilled by the subsequent discovery of scandium, gallium and germanium.

The discovery of argon and its congeners by Ramsay, at the close of the century, led not to an alteration, but to a widening of Mendeléeff's scheme, the inert gases falling naturally into a group of zero valency and forming a transition between the halogens and the alkali metals. During this period, the Periodic Law lacked any theoretical background which might lead to its interpretation. Sir J. J. Thomson's recognition of the electron as a constituent of all atoms of matter, in 1897, first led to the conception of the electrical structure of matter.

Lord Rutherford himself has been intimately con-

nected with much of the subsequent development in this field. From consideration of the scattering of α -particles by heavy atoms, he was led to the nuclear theory of the atom, according to which the mass of the atom is concentrated in a minute, positively charged nucleus, the charge on which is proportional to the atomic weight of the atom. The conception that the nuclear charge and ordinal number of an element might be the same was applied by Bohr in his theory of spectra. It was brilliantly verified by Moseley's work on the X-ray spectra of the elements, which fixed the true order of the elements, and showed that only 92 exist from hydrogen to uranium. Of these, only one—No. 85—still awaits discovery.

The recognition of atomic number rather than atomic weight as defining the properties of the elements cleared away the apparent discrepancies in Mendeléeff's table. It has been found that most of the elements are actually complex, consisting of isotopes having the same nuclear charge but different masses. The chemical properties of isotopes, depending on nuclear charge, are identical: properties depending on mass may differ sufficiently to render separation possible, as is the case with hydrogen and lithium.

The explanation of the Periodic Law must lie in the arrangement of the outer electrons. Bohr's conception of quantised planetary orbits has been developed by the new wave mechanics to give a complete picture of atomic properties. The rare gases have highly symmetrical, tightly bound configurations. Addition of successive electrons leads to the occupation of the next group of orbits, and runs parallel to the observed chemical properties of the elements. A periodic pattern is thereby obtained, repeating after each inert gas, in which the transition elements and rare earths find a natural place. About the structure of atomic nuclei, little is yet known: the recognition of any periodicity with increasing nuclear charge awaits the discovery of the future.

Increase in Temperature due to Solar Radiation

PROFESSIONAL NOTE No. 63 of the Meteorological Office, the title of which is "Maximum Day Temperatures and the Tephigram", by Lieut.-Col. E. Gold, is a discussion of the problem of estimating the probable rise of temperature in the course of a single day during clear weather on account of the solar radiation, with the aid of the 'tephigram' of Sir Napier Shaw.

In the 'tephigram' the rectangular co-ordinates are temperature and entropy, and any closed area, corresponding with a cycle of changes of a portion

of the atmosphere, represents a definite amount of energy. Isothermal lines and dry adiabatics are represented respectively by vertical and horizontal lines, and moist adiabatics, corresponding with saturated air that is rising and expanding, and is in consequence having its entropy increased by the energy released by condensation of water vapour, are represented by sloping lines that become more nearly horizontal at low temperatures owing to the diminished capacity of air for water vapour at such temperatures. This form of diagram is in use in the

Forecasting Department of the Meteorological Office, and the note, apart from the intrinsic interest and importance of the subject, should be helpful to forecasters when interpreting the significance of the physical state of the atmosphere revealed by observations made in aeroplanes equipped with meteorological instruments.

A discussion of the energy equivalent of 1 cm. on this diagram leads up to a consideration of the amounts of radiation received in different months and the heights up to which the dry adiabatic lapse rate can be brought into being in each case, given isothermal conditions initially.

When passing on to consider what proportion of the total incoming radiation may actually be available for warming the atmosphere, allowance having been made for the increased radiation from the earth's surface, the incoming diffuse radiation of short wave-length, the reflected radiation, and for the heat absorbed in evaporating water from the surface, the author is on difficult ground. An estimation of the last item, for example, has apparently been based entirely on figures for the evaporation from water tanks; the relationship between such figures (practically the only data available) and those representing the average evaporation by day at the season in question from unit area of the earth's surface, is very much a matter of speculation. The table on p. 8 giving the various allowances suggests, however, that in summer this may be a very important item. A suitable warning in regard to the uncertainties of *all* these allowances would not have been out of place in order to prevent the uninitiated from thinking that the difficult problems under discussion have reached anything approaching an exact quantitative solution. E. V. N.

University and Educational Intelligence

BIRMINGHAM.—The University has decided to institute a Department of Industrial Hygiene and Medicine, and arrangements are being made with the view of opening it on October 1, 1934. It is believed that this is the first department of this nature to be established in a Medical School in Great Britain. The research work contemplated includes the investigation of the deleterious action on work-people of the materials they work with and methods of prevention; the training of medical men to advise employers as to methods by which the number of certain types of accidents may be reduced, the selection of employees for various kinds of work, and improving the hygiene of factories. It is probable that the University will grant a diploma to those who complete the course successfully.

CAMBRIDGE.—The Sheepshanks Exhibition for 1934 has been awarded to C. G. Pendse, of Downing College.

The Linaere Lecture will be delivered by Sir Henry Dale, director of the National Institute for Medical Research, on Saturday, May 5, at 5 p.m., in the New Museums. The title of the lecture will be "Chemical Transmission of the Effects of Nerve Impulses".

LONDON.—The degree of D.Sc. in chemistry has been conferred on H. E. Cox (private study) for ten independent publications and four conjoint subsidiary contributions relating to the chemical examination of furs in relation to dermatitis, and food analysis.

APPLICATIONS for the Bayliss-Starling Memorial Scholarship, tenable at University College, London, W.C.1, must be sent to the College Secretary not later than May 12. The annual value of the scholarship is £120 with exemption from tuition fees. The scholar will be required to follow a course of study approved by the Jodrell professor of physiology, involving a training in the principles and methods of research in physiology or biochemistry or both.

Science News a Century Ago

King's College, London

On April 30, 1834, the annual court of governors and proprietors of King's College was held for receiving the report of the council for the previous year. The Archbishop of Canterbury presided. The report stated that the council had previously expressed some doubts as to whether it would be possible to complete the river front, owing to the considerable sums promised by subscribers not being forthcoming. A meeting, however, had been held, at which it was agreed to make an appeal to the friends of the institution, and the consequence was, that, in advances of ten per cent on the shares and in subscriptions and donations a sum of £7,297 17s. had been received. During the year there had been 104 regular and 171 occasional students in the senior department, 66 regular and 175 occasional students in the medical class and 404 students in the junior department. A class of associates had been instituted. The College had never before been so prosperous. Two additional schools had been added, so that there were now seven schools in the metropolis acting in union with the College. The receipts for the year were £16,197 11s. 6d. and the expenditure £12,446 14s. 5d., leaving a balance of £3,750 17s. 1d. besides £4,000 in exchequer bills.

Friday Evening Meetings at the Royal Institution

At the annual meeting of the members of the Royal Institution on May 1, 1834, the Visitors commented on the increased membership and improved financial position shown by their Report. This satisfactory state of affairs they attributed largely to the interest excited by the Friday evening meetings, which had been begun about 1825, and had become a regular feature of the Institution's activities. The Visitors reminded members how deeply they were "indebted for these advantages, to the unwearied exertions, important discoveries, and happy illustrations of one, who has contributed the chief attractions to the meetings in question". The reference is to Faraday. Not only had he given a considerable number of the discourses himself, but from the beginning had acted as secretary of the small committee charged with the duty of arranging the Friday evening discourses. That their success depended almost entirely on his activities may be inferred from a letter written to Faraday in 1839, in which W. T. Brande, then the senior professor at the Institution, regretted that he could not help at a time of emergency. He wrote: "You know how sad a figure I cut on those occasions; and as to the tact requisite for their general management and arrangement, I candidly confess I have it not".