

tures were caused by small steam explosions taking place inside these bones. Yet there is no alternative explanation to offer. For I do not think it is imaginable that any known forces of electric attraction or repulsion could exert enough violence to break bones. At any rate, the physicists appear to know nothing of electric forces of the magnitude that would be required here. In a few well-recorded instances which are extraordinary almost to the point of being incredible, strokes of lightning have effected amputations.

Unless sudden death follows, the probability that a person struck by lightning will recover is large; Dechambre collected 365 instances in which the immediate effects of the stroke were survived, and found that only fifteen of these victims died subsequently from late effects of the lightning. It seems to be very generally assumed that immediate treatment would improve the prognosis considerably, and that many of the people killed by lightning are only apparently dead, and still capable of recovery if properly treated during the next few minutes. I do not know of any statistical evidence to prove this point.

At the present day only general advice can be given, as the accumulated records have shown that no place above ground is completely protected against lightning. It is certainly safer to be indoors than out, and a large house is much safer than a shanty. The windows and doors of the room in which one is should be shut, and one should keep away from the walls, and particularly from the fireplace, because, when a chimney-stack is struck, the contents of the chimney and the fireplace are often blown out into the room and cause bodily injuries. A great many people have been struck in sheds and barns, especially when they have been near doors or windows, or in currents of air. Turley recommended the centre of a railway carriage at a distance from the engine as the securest place of all; Schefčík, a feather bed. To take refuge in the cellars merely to avoid a thunderstorm is not necessary as a routine, though in exceptional cases it may be advisable.

The advice given by various authors to persons caught out of doors in a thunderstorm is contradictory. It is probably unwise to take shelter in a shed unless one can get out of the way of doors, windows, and draughts while one is in it. A shed containing domestic animals is certainly more dangerous than the open. If one has to remain in the open, there are certain things that should be avoided at any cost. The first of these is the proximity of wire fences, because when such a fence is struck the electric discharge may be carried along the wires and cause death at a distance from the place actually struck. The second is proximity to such things as hedges, ponds, and streams, isolated trees, crowds of people, and herds of domestic animals. Crowds of people or animals seem to have a mild attraction for lightning, very possibly by virtue of the warmth and dampness they impart to the atmosphere immediately round them. It has often been said that to have had the clothes thoroughly wetted by rain and rendered conducting gives some protection to people who are struck by diverting the path and violence of the lightning from the body to the clothes. I have found seven well-recorded instances in which the effect of the stroke was to blow all, or practically all, the wetted clothes off the body, by the generation of steam as I believe. There can be no doubt that a part of the energy of the lightning was expended on the clothes in these cases, but three of the seven victims were killed notwithstanding. So the protection of wet clothes cannot be considered at all complete.

So far as treatment is concerned, persons struck

and apparently killed by lightning should at once be given plenty of fresh air, their clothes should be loosened, and artificial respiration by Schäfer's or Sylvester's method should be applied and should be continued until either recovery occurs or cooling of the body and *rigor mortis* show conclusively that death has taken place. In the medical writings of from fifty to two hundred years ago one often sees bleeding recommended, and this might well be of service in those cases of lightning-stroke in which the heart goes on beating while the respiration stops. If it were immediately—within a few minutes—available, to give strong electric shocks to the præcordia would be well worth trying in desperate cases. As regards other remedies—such as stimulants in all forms, hot or cold applications, the inhalation of pungent vapours—very many have been recommended, but none seem to have met with any success.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

SHEFFIELD.—Mr. W. G. Fearnside, fellow and lecturer in natural sciences at Sidney Sussex College, and demonstrator in petrology in the University of Cambridge, has been appointed to the Sorby chair of geology.

ACCORDING to an announcement in the "Political Notes" of *The Times*, there is reason to believe that the Government has abandoned the intention of introducing this session the Education Bill which was to have embodied the scheme under consideration by Lord Haldane's Cabinet Committee. Every effort is being made to lighten the Government programme so that Parliament may be prorogued at a reasonable date in August.

It is announced that their Majesties intend to invite to a garden-party at Buckingham Palace on Saturday, July 19, representatives of the teaching profession in London. We understand that invitations will shortly be issued to responsible head-teachers and principals of schools, institutes, and colleges of every type constituting the public system of education in the county of London. A special choir of children selected from public elementary schools will sing before their Majesties.

IN support of the foundation of a Western University in Central China, a meeting of members of Parliament was held in the House of Commons on June 26. Canon Lord William Gascoyne-Cecil said that nothing is being asked for out of the pocket of the British taxpayer. The suggestion is that the British Government should forgo part of the Boxer indemnity. We learn from *The Times* that it was pointed out that the Boxer indemnity claimed by Great Britain amounted to more than 7,000,000*l.*, and of that amount only 199,000*l.* has been paid. A sum of 250,000*l.* spread over a long period would meet the cost of the new University. A motion that a deputation be appointed to urge upon the Prime Minister the desirability of a Government grant, either out of the Boxer indemnity fund or otherwise, towards the establishment of the proposed University was agreed to.

THE Board of Education has issued (Cd. 6866) the regulations, which will come into force on August 1, for university tutorial classes in England and Wales. The Board will be prepared to make special grants in aid of part-time courses in subjects of general as distinct from vocational education, given under the educational supervision either of a university or uni-

versity college, or of an educational body containing representatives of such places of higher education. The university or supervising body must be responsible for the framing of the syllabus, and the selection of a suitable tutor; and the instruction must aim at reaching, within the limits of the subject covered, the standard of university work in honours. The course must extend for each class over a period of not less than three years, and must occupy at least two hours a week for twenty-four weeks in each year, at least one-half of the time being devoted to class work.

In the issue of *Science* for June 13 further large gifts to higher education in the United States are announced. Mr. Andrew Carnegie has undertaken to provide 200,000*l.* for the medical department of Vanderbilt University. Of this sum 40,000*l.* is to be given to the University immediately for the erection and equipment of laboratories. The income from the remaining 160,000*l.* is to be paid annually for the support of the department through the Carnegie Corporation. A condition of the donation provides that the direction of the educational and scientific work of the department shall be committed by the board of trustees to a small board of seven members, three of whom shall be eminent in medical and scientific work. Messrs. J. B. and B. N. Duke have given 160,000*l.* more to Trinity College in North Carolina. The college has thus secured the 30,000*l.* promised by the Rockefeller Foundation, and has added 200,000*l.* to its endowment. Governor Sulzer has signed a Bill granting 50,000*l.* for a building for the State College of Agriculture at Syracuse University.

THE report for 1913 of the council of the City and Guilds of London Institute has now been published. In it is passed in review the work of the City and Guilds (Engineering) College, the City and Guilds Technical College, Finsbury, the South London Technical Art School, the Department of Technology, and the Leather Trades School. The audited accounts and balance-sheet of the institute are given, and the reports of the heads of the various colleges and schools are included. During the past session the Department of Technology registered 4552 classes in the United Kingdom in 331 towns. These classes were attended by 53,999 students; this number represents, however, only a proportion of the total number of students in attendance at courses of technical instruction largely influenced by the work of the department. The examinations of the department were held in seventy-five technological subjects, for which 22,111 candidates were presented in the United Kingdom alone. While the total number of candidates shows a decrease on the number for 1911, the proportion of passes in the examinations has, on the contrary, risen by 4 per cent., which suggests that the fall in the number of candidates is largely due to the exclusion of a number of insufficiently prepared students from the examinations.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 19.—Sir Archibald Geikie, K.C.B., president, in the chair.—Sir James Dewar: Atomic specific heats between boiling points of liquid nitrogen and hydrogen.—I. The mean atomic specific heats at 50° absolute of the elements a periodic function of the atomic weights.—Hon. R. J. Strutt: An active modification of nitrogen produced by the electric discharge. V. (1) An improved practical method of preparing and storing nitrogen for the experiments is described. (2) It is shown, notwithstanding criticisms of certain other experimenters,

that the presence of traces of oxygen in the nitrogen used is not essential, or even favourable, to the phenomena. The nitrogen used, purified by cold phosphorus, does not contain oxygen to the extent of one part in 100,000. Passing it over red-hot copper in addition makes no difference. The intentional addition of oxygen does harm; 2 per cent. obliterates the effects altogether. Hydrogen and carbon dioxide as impurities are much less harmful, but traces even of water vapour have a very bad effect. (3) Nitrides are formed by the admixture of active nitrogen with vapour of mercury, cadmium, zinc, arsenic, sodium, and sulphur. These are decomposable by water or potash solution, yielding ammonia. (4) Carbon disulphide yields a blue polymeric nitrogen sulphide, and polymeric carbon monosulphide. Chloride of sulphur gives ordinary yellow nitrogen sulphide. Stannic chloride and titanium tetrachloride also yield solid products. In the latter case nitrogen was proved to be present. (5) All organic compounds tried, except carbon tetrachloride, yield hydrocyanic acid freely, but not cyanogen, as was proved by chemical tests. When chlorine is present, cyanogen chloride is formed. Benzene yields (almost certainly) cyanobenzene. (6) The intensity of the cyanogen spectrum with organic compounds is no index of the quantity of hydrocyanic acid being formed. Preponderance of the red cyanogen bands is associated with cyanogen chloride or bromide. On a general view of the evidence, there does not appear to be any definite connection between the development of spectra by active nitrogen and the chemical actions in progress.—Dr. J. A. Harker and Dr. G. W. C. Kaye: The electrical emissivity and disintegration of hot metals. Preliminary experiments have been carried out on the volatilisation and electrical emissivity of a number of metals, mostly in nitrogen at reduced pressures. The metals were heated by alternating current and no applied potential was employed. (1) The emission of positive electricity occurs at temperatures from about 1000° to 1400° C. For metals which melt within this range, a sudden and marked increase in the positive current often occurred at the liquefying point—due, probably, to the sudden release of occluded gas. (2) Oxygen appears to augment the positive current. (3) At higher temperatures, negative electricity predominates and increases rapidly with the temperature. The negative current attained with iridium at the melting point was 80 milliamperes, with tantalum at 1670° C. 220 microamperes, with iron at the melting point 90 microamperes. In the case of carbon in air at atmospheric pressure, an ionisation current of 3½ amperes was obtained. (4) The negative current at moderate pressures appears to be largely increased if the conditions are such that considerable sputtering of the metal occurs. (5) The negative currents are probably a consequence of chemical reaction between the metal and the surrounding gas. (6) Carbon becomes plastic in the neighbourhood of 2500° C. At such temperatures it also readily sublimes.—Dr. A. O. Rankine: A method of measuring the viscosity of the vapours of volatile liquids, with an application to bromine. In this method of determining viscosities the rate of transpiration of the vapour through a capillary tube is controlled by the vapour pressures of the liquid itself, a difference of pressure being established in the process of virtually distilling the liquid through the capillary. The pressures can be estimated without the use of mercury gauges—a state of affairs especially desirable in the case of the halogens. The viscosities of unsaturated bromine vapour over the approximate range 10° C. to 250° C. have been measured, and, except at the lowest temperatures, are found to agree well with Sutherland's formula, not-