Dating of Scottish Varved Clays

MEASUREMENTS made by Dr. J. B. Simpson of fifty-nine varves in a deposit near Dunning in the Earn valley south-west of Perth form the basis of an attempt by Baron De Geer to fix their absolute age (*Proc. Roy. Soc. Edin.*, **55**, 23; 1935). After a systematic comparison, De Geer has succeeded in matching the thickness-variation diagram of the varves with that of a series from the neighbourhood of Copenhagen. This indicates that the Dunning varves represent the years 4313–4371 before the zero year of the Ice Age, which itself occurred about 8,700 years before our century. Thus the measured varves were deposited during the earlier part of the Goti-glacial sub-epoch when the Scandinavian land-ice still filled the whole of the Baltic depression. That the varved clays near Perth are often moraine-covered may be explained by oscillations of the ice-border during its recession. Further measurements are necessary to determine whether varve-deposition was going on during the extension or the recession of the ice-border.

Natural Gas Conservation

THE trend of chemical research to-day indicates that, quite apart from its particular and well-known function in the production of oil, there is a wide field of usefulness for natural gas as a basic raw material in the manufacture of dyestuffs, solvents, anæsthetics, etc. Its conservation, therefore, is of paramount importance. Gas found in intimate association with commercial accumulations of oil has for some time past been conserved, so far as economically practicable, and a wealth of literature has emanated on this aspect of the subject. Mr. C. T. Barber, in his work on "The Natural Gas Resources of Burma" (*Mem. Geol. Surv. India*, **66**, part 1, 1935), takes a less familiar point of view, and stresses the importance of conservation of gas not found in association with oil. Of the vast natural gas resources of Burma, he points out, a considerable proportion is not in intimate association with commercial accumulations of oil. Some of this actually occurs in structures not containing, or not known to contain, oil, while some is found either as free gas in the crestal portions of oil-bearing sands or in non-oil-bearing beds in structures yielding oil from other horizons. In addition to problems of gas conservation, Mr. Barber's work includes a brief outline of the Tertiary geology of Burma, and detailed accounts of the principal natural gas fields, their geographical situation, stratigraphy, and approximate production. Useful maps and an up-to-date bibliography complete this latest work on natural gas in Burma.

Magnetic Testing of 'Work-Hardening' Steel Wires

THE testing of the steel wires used in colliery 'winding' and 'haulage' is of great importance. It is well known that the so-called 'work-hardening' of a wire rope is as great a menace to its safety as the actual mechanical fracture of a group of the component wires of a rope. In a paper which appeared in the *Engineer* of September 13, Dr. T. F. Wall, of the University of Sheffield, points out that only to measure the elasticity of the wires is not a sufficient criterion of their condition. Another characteristic quantity of the greatest importance is the viscosity of the metal forming the wires. There appears to be two kinds of viscosity, one associated with simple longitudinal stresses and the other type associated with a travelling surge of stress in the wire. Dr. Wall describes two electromagnetic methods. The first uses the magneto-striction effect for measuring Young's modulus for a wire by means of longitudinal vibrations. The other is to measure directly the speed at which a surge of stress travels along the wire. Experiments show that the former method provides a very sensitive means for detecting small effects of magnetic loading which cannot be detected in any other way. Work-hardening results in a relatively greater magnetic response to small stresses and a relatively smaller magnetic response to large stresses. The second method measures the velocity of a surge stress by passing the wire through several solenoids connected in series and at the centre of each of which is a search coil connected with an oscillograph. Oscillograms are taken with different magnetising forces and the one which shows that the magnitude of the induced E.M.F. in the search coils varies logarithmically gives the rate of decay of the surge itself. Knowing the velocity of the surge, Young's modulus can be found.

Activity Coefficients from Electromotive Forces

THE electromotive force of a cell containing two solutions of a uni-univalent salt at different concentrations is given by the equation $E = -(2tRT/F)\log(a_1/a_2)$, where t is the transport number and a activity. When, as is usually the case, t is a function of concentration, this must be replaced by $E = -(2RT/F)\int t.d\log a$, the integration being over the range of concentrations used. This equation has been used to find transport numbers, but now that accurate values of the latter are known, it can, as A. S. Brown and D. A. MacInnes (*J. Amer. Chem. Soc.*, **57**, 1356; 1935) show, be used in the determination of activities. The potential is known to be very reproducible and independent of the method of formation of the liquid junction, and this has been further confirmed by measurements with sodium chloride solutions. The electrodes were of silver and silver chloride. If the activity is expressed as the product of concentration (c) and activity coefficient (f), the values of the latter can be very well represented by Hückel's equation: $\log f = -\alpha\sqrt{c}/(1+\beta\sqrt{c}) + Dc$, where α, β and D are constants. It was, however, necessary to change the theoretical value of β from 1·463, as obtained by extrapolation at high dilutions, to 1·315. The value 1·463 corresponds with a 'distance of closest approach' of the ions of 4·45 A., which is sufficiently large to make the higher terms in the extended theory of Gronwall, La Mer and Sandved negligible. The equation proposed by Hitchcock, $-\log f = \alpha\sqrt{c} - Bc$, did not give satisfactory results. Harned and Nims have published results for activity coefficients of sodium chloride obtained with amalgam cells not involving liquid junctions, and these fall on the same curve as the present ones if they are adjusted so as to coincide at $0{\cdot}1\,N$ concentration. The values of the Hückel constants found by Harned and Nims for the more concentrated solutions used do not, however, agree with those found with dilute solutions by Brown and MacInnes, whose results extend to $0{\cdot}05\,N$.

ERRATUM. In the paragraph entitled "Structure of Keratin" (NATURE, Oct. 5, p. 557, lines 21 and 22), for "were respectively normal and parallel to the flat surface" read "were respectively parallel and normal to the flat surface".