

## Research Items

**Domestic Fowl in Britain.** A collection of antiquities from York made by the late William Hewitt of York when excavations were being carried on in High Ousegate in 1903 was acquired by the Municipal Museum, Hull, and has recently been placed on exhibition in the Mortimer Museum. Among the objects in the collection, described with illustrations by Mr. T. Sheppard in the *Naturalist* of December, were twenty-one needles, principally of bone and occasionally of ivory, varying from  $5\frac{3}{8}$  in. to  $2\frac{3}{8}$  in. in length. Some of the bone needles are curved and possibly were made from the ulnar bone of a hare. There were also fifteen pins of bone or ivory, varying in length from  $4\frac{1}{2}$  in. to  $1\frac{1}{4}$  in. A hollow tube  $5\frac{1}{2}$  in. long may be a comb case. It has a deep groove cut in the centre, as though it had been used as a holder. This, and a smaller tube, are made from a mammal bone. With these objects were two hone-stones or sharpeners, with perforations for hanging, a tine of red deer antler, sawn off and sharpened to a square point and an amber pendant. Of the spindle whorls, one of slate is elaborately decorated with concentric rings on the convex side. There are two massive jet rings and a terra-cotta mask with a face and head-dress almost Egyptian in style. Among the bones of pig, ox, red-deer and horse, were two specimens which are the tibia and femur of the domestic fowl, *Gallus domesticus*. In a recent discussion in the *Ibis* on the domestic fowl in Britain in pre-Roman times, Dr. P. R. Lowe argues, against the previously accepted view, that it was indigenous. These two bones from York would appear to confirm his observation.

**Bird Sociology.** So many anecdotes have been circulated about the attentiveness of individual birds to others of their kind in difficulties, that a light on the other side of bird relationships should not be out of place. Eric C. Kinsey has studied in California the habits of the long-tailed yellow-breasted chat (*Icteria virens longicauda*). He trapped the female of a pair, and on the following day the male appeared with a new mate and immediately started nesting operations within a few feet of the old nest, notwithstanding the fact that his old mate was anxiously calling to him from a trap placed alongside the old nesting site. He appeared to be indifferent to her presence in the immediate neighbourhood and entirely heedless of her difficulty. Indeed, it was found to be a rule for this species that a captured individual, male or female, of a pair, never succeeded in decoying its mate into the same trap. Mating seemed to be casual: of another pair, the male was first trapped; two days later the female appeared with a new mate, whereupon she was trapped, and on the following day the same male appeared with a new female (*Condor*, 36, 235; 1934). The regardlessness and fickleness of this chat is in marked contrast to the habits of some other passerine birds which are devoted mates.

**Indian Leafhoppers or Jassidæ.** Dr. H. S. Pruthi has published a second contribution to the above subject (*Mem. Indian Mus.*, 11, No. 2, July 1934). In the present work he describes the genotypes of some of the genera erected by the late Mr. W. L. Distant, and also revises the genus *Moonia*, Dist. Dr. Pruthi

remarks that Mr. Distant is the author of more than 60 per cent of the genera and species of the family described from India. Unfortunately, both the descriptions and illustrations of most of the new forms described by this author are very inadequate. The need has consequently arisen for a thorough revision and redescription of most of Distant's material in order that progress may be made in the further study of the Indian forms. The present work is a contribution towards that end, and Dr. Pruthi's careful figures, especially of the male genitalia, together with the insect species portrayed on the accompanying plates, should prove of definite value to students of the family in question. The Indian species of Jassidæ, it might be added, constitute an important component of the Jassid fauna of the world, and these memoirs will interest specialists in this large and rather neglected group of insects.

**Results of Nerve Grafting.** Sir Charles Ballance has recently published a short monograph ("The Conduct and Fate of the Peripheral Segment of a Divided Nerve in the Cervical Region when united by Suture to the Central Segment of another Divided Nerve". London: Macmillan and Co., Ltd., 1934. 7s. 6d. net) dealing with his more recent work on nerve grafting. He finds that when the cervical sympathetic trunk is made to supply a voluntary muscle, the motor end plates have the normal structure and the sympathetic fibres increase in diameter as the end plate is approached. According to Langley and Anderson, it is only the preganglionic fibres of the sympathetic system which can be made to supply voluntary muscle; the post-ganglionic can never take the place of somatic fibres. This distinction agrees with the modern pharmacological grouping of nerve fibres for (in Dale's terminology) the somatic and preganglionic fibres are 'cholinergic' whilst the post-ganglionic fibres are 'adrenergic'. There are, it is true, considerable differences both in the structure and speed of reaction of somatic and preganglionic fibres, but Ballance's work shows that after the substitution has been made, the preganglionic fibres retain their characteristic size in the nerve trunk down which they have grown, but become modified in the muscle as they approach their destination in the motor end plate.

**Elm Disease in Great Britain.** A brief memorandum issued by the Forestry Commission gives a review of the seventh annual survey of the extent of the attack of the insidious and at times highly virulent malady of the elm genus. During last summer, the disease is said to have made definite progress in nearly every area examined, but the severity of the attack is below the peak year of 1931. Infected trees have been recorded in three new counties, Lancashire, Merionethshire and Cornwall. The classification of the counties of England and Wales shows nine where the attack is frequent and often serious, sixteen where it is sporadic, sixteen seldom found and eleven in which the disease has not yet been reported. It is considered that a more widespread survey would almost certainly add to the numbers in the classes 'sporadic' and 'seldom found'. The nine counties where the pest is worst all lie to

the north and east of London, save the Isle of Wight. It is said that there is no indication as yet of the disease extending westwards. The point of interest which is being studied is what proportion of attacked trees recover partially, but still remain in a condition where the infestation may restart; and what proportion recover entirely. In a case in Kent, known to the writer, three young vigorously growing trees, two standing within ten yards of one another, the third a hundred yards away, were attacked some four or five years ago. Of the two standing close together the first attacked appeared to have recovered and then died within a year. The second has entirely recovered. The third tree lost its leader, then died rapidly from the top, and was then felled and burnt. The fungus had penetrated into some of the branches half way down the stem. The elm bark beetle is said to be a chief carrier of the disease. No beetles or their galleries were found in any of the three trees. No definite record of the elm disease has yet been reported from Scotland.

**Specific Heats of Gases at High Temperatures.** G. G. Sherratt and Ezer Griffiths, working at the National Physical Laboratory, have measured the specific heat of carbon monoxide at temperatures of the order  $2,000^{\circ}\text{C}$ ., using the velocity of sound measured in a graphite tube (*Proc. Roy. Soc.*, Nov. 15, 1934). Previous attempts to measure the specific heats of gases at high temperatures have been made by the explosion method, involving great experimental difficulties and large uncertain corrections. The train of sound waves was set up by a quartz piezo-electric crystal, the effective length of the tube was varied by moving a carbon piston, and the condition of resonance was indicated by changes in the plate current of the oscillator maintaining the vibration of the quartz crystal. Temperatures were measured by a disappearing filament pyrometer. Since the velocity of sound in a gas shows a dispersion effect, being different for different frequencies, the velocity was measured at several frequencies and a correction applied, using a theoretical result of Kneser. The specific heat finally deduced was in good agreement with that deduced from band spectroscopic data.

**Molecular Clustering in Fluids.** R. S. Krishnan (*Proc. Indian Acad. Sci.*, Oct. 1934) has made optical experiments to test for the presence of molecular aggregates in liquids and liquid mixtures. A beam of polarised light was passed through the liquid, and the 'depolarisation' (that is, the ratio of the intensity of the horizontal to the vertical components of polarisation) of the light scattered at right angles is observed. If the scattering particles are comparable in size with the wave-length of light, this depolarisation may be observed. Negative results were obtained with a number of organic liquids. Positive results were obtained with a binary liquid mixture (carbon disulphide + methyl alcohol) and this effect persisted at temperatures lying within a considerable range around the critical solution temperature.

**Exploration of the Upper Atmosphere by Self-Recording Balloons.** E. Regener and his co-workers (*Phys. Z.*, Oct. 1, 1934) have obtained further information on cosmic rays and on the absorption of light in the atmosphere by the use of beautiful self-recording instruments carried by sounding balloons. E. Regener and G. Pfozter sent up a Geiger-Müller counter,

which with its high-tension battery and counting mechanism gave a load for the balloon of about 6 kgm. The apparatus attained a height of 28 km. and the impulses counted gave a variation with height practically identical with that formerly observed with ionisation chambers. The readings at the highest altitudes show a transition effect due to the formation of secondary radiations as the radiation enters the atmosphere. Measurements were made by E. Regener and R. Auer with a large, open ionisation chamber connected to a self-recording electrometer, the chamber being in some experiments lined with paraffin or celluloid. The experiments showed that no large part of the cosmic ray intensity was due to neutrons. E. Regener and V. H. Regener sent a quartz spectrograph to a height of 30 km. with a balloon. In order to avoid setting the spectrograph to point at the sun, the slit was directed towards a white disc illuminated by the sunlight. The camera took a number of spectrograms on a rotating plate, the height being indicated on each by the shadow of an aneroid pointer. The plates were measured in a photometer at two different wave-lengths lying in the region where the absorption of ozone sets steeply in, and the results used to obtain the distribution of ozone in the atmosphere. The maximum concentration of ozone appears to lie in the region 24 km. high, and at 30 km. height 70 per cent of the ozone lies below the apparatus. This result agrees with the estimates of Goetz, Meetham and Dobson, rather than with the earlier view that an ozone layer existed at 40-50 km. height.

**Activity Coefficients of Sulphuric Acid.** Most of the measurements of the activity coefficients of sulphuric acid have been made with the  $\text{Hg}/\text{Hg}_2\text{SO}_4$  type of electrode. The solubility of mercurous sulphate, however, prohibits its use in acid concentrations below 0.005 molal. The cell containing two-phase lead amalgam, with lead sulphate as depolariser, is free from this objection and has been used by J. Shrawder and I. A. Cowperthwaite (*J. Amer. Chem. Soc.*, 56, 2340; 1934) in measurements of the activity coefficients of sulphuric acid from  $0^{\circ}$  to  $50^{\circ}$  over the concentration range 0.02 to 0.001 *m*. The calculations are somewhat difficult, since the degree of ionisation of the acid, involving the two ions  $\text{HSO}_4'$  and  $\text{SO}_4''$ , has to be taken into account, and some assumptions are required. The results at  $25^{\circ}$  are compared with the La Mer, Gronwall and Greiff extension of the Debye-Hückel theory on the assumption of an ionic size of 1.75 Å. The results are also applied to the calculation of the heats of dilution of sulphuric acid. The results are widely divergent from those obtained by the calorimetric method, particularly at low concentrations. When plotted against the square root of the molality, the calorimetric heats of dilution provide a curve which becomes linear below 0.001 *m*. The electro-chemical values indicate a curve which exhibits a point of inflexion such as would be required to bring the curve into the limiting Debye-Hückel slope. A large part of the difference is shown to be due to the different methods of extrapolation used, and adequate agreement is obtained above 0.0036 *m*. The calorimetric data are, however, shown to be in disagreement with several independent results of electromotive force measurements, so that there is at present a real discrepancy between the values of the heat of dilution determined by the two methods which is not explained.