

## Research Items

**Agricultural Settlement in Early Britain.** Dr. Cyril Fox has recognised 'areas of primary settlement' in prehistoric Britain on the porous soils derived from chalk, sand and gravel, and 'areas of secondary settlement' on the heavy clays. In *Antiquity* for September, Messrs. S. W. Wooldridge and D. L. Linton argue in amplification of Dr. Fox's contention for a distinction of the soils of south-eastern England into two classes, 'permeable' and 'impermeable', to cover the undoubted fact that there exists an 'intermediate' type of soil, not recognised by Dr. Fox, which gives rise to highly distinctive and clearly bounded regions figuring among the more important settlement areas of the country from the Bronze Age onwards and clearly recognisable in the present-day cultural landscape. They correspond to the *loess* and *limon* soils recognised by the Continental archaeologists and geographers. It was these loam regions which figured most prominently as the nuclei of settlement and penetration during the earlier stages of peopling the country. Thus in the Bronze Age there are the settlements of the loam regions of Guildford and Godalming, the Southend loam plateau, and the Norwich region, a conspicuous tract of high density following the Thames Valley and the lower parts of the valleys of the Brent, Lea, Wandle, Medway and Stour, the chalk of Wessex and in the Breckland. There is evidence of considerable occupation on the Essex boulder clay. The distribution of the Iron Age settlements and of the slightly later phase of the Cattuvellaunian dynasty tells the same tale. These settlements were inherited with but little extension by the Romans and finally consolidated and extended as regional nuclei by the Nordic invaders. The recognition of this 'intermediate' group of soils renders clearer the very partially true connotation of the 'valleyward movement', as a progression to plains and low plateaux of a definite soil constitution.

**Archæological Exploration in Palestine, 1932-33.** In the course of a survey of the work of archæological exploration in Palestine carried out by the American School of Prehistoric Research in recent years (*Proc. Amer. Phil. Soc.*, Philadelphia, 72, No. 3) Dr. G. Grant McCurdy, director of the School, gives a brief account of the results obtained in the excavations carried out under the direction of Miss Garrod in the cave of Mugharet et-Tabun (Cave of the Oven) in 1932-33. A section 5.25 m. thick shows a sequence of levels ranging from mixture of Mousterian and recent at top through five other levels down to an early Mousterian or perhaps Acheulean, with many superb hand-axes, at bottom. The last-named has yielded an abundance of flint implements totally different from anything in the levels above, and resembling the very old Mousterian of High Lodge. The tooth of an elephant was found in the level which is probably contemporary with the interglacial horizon at Ehringsdorf-Taubach, and possibly of the same age as that recently reported from Ouum Qatafa, south of Jerusalem. Human skeletal remains have been found in level 4 (Mousterian with Levallois affinities and points of Still Bay type). These include a femur, a massive lower jaw, and a practically complete skeleton (? female). In the skeleton the bone of the skull is relatively thin and the develop-

ment of the frontal torus is in marked contrast with the comparative delicacy of the rest of the skeleton. The massive lower jaw is comparable to those found by McCown in the Mugharet es-Sukul, but it is to be noted that while the lower jaw of the complete skeleton is chinless, the massive jaw, found 90 cm. deeper, has a fairly well developed chin. Is the difference racial or individual and abnormal?

**Inbreeding in Ayrshire Cattle.** The Ayrshire breed of cattle is of relatively recent origin, the Herd Book Society dating only from 1877, while Shorthorns were a fairly pure breed in 1800 and Jersey cattle have maintained remarkable purity for nearly 150 years. Ayrshires were derived from the indigenous cattle of the south-west of Scotland graded up at intervals by English cattle, notably the Teeswater and Holstein breeds about 1750. West Highland blood was also introduced about 1800, but definite breeding records began three-quarters of a century later. The pure breeding history has been accompanied by two ideals, the production of milkers and non-milkers. A study of the inbreeding since 1877 has been made, using the methods of Sewall Wright. The coefficient of inbreeding for the whole herd showed a progressive increase to the relatively low value of 5.3 in 1927. No difference was found as between the amount of inbreeding of cows and bulls, and a large part of the inbreeding was traced to two particular sires. High milk-yielding cows showed a low amount of inbreeding, due to the belief that inbreeding was detrimental to milk yield. This assumption is, however, shown to be unfounded, since high milk producers (1,000 gallons and above) are as inbred as average milk producers. The coefficient of inbreeding for the whole breed increased about 100 per cent between 1917 and 1922.

**Branchial Derivatives in the Frog.** Y. Ikeda (*J. Fac. Sci., Imp. Univ. Tokyo*, Sect. 4, Zoology, vol. 3, Pt. 2, 1933) has investigated the branchial derivatives of a Japanese frog, *Rhacophorus schlegelii*. The development of the thyroid is already well known and did not form part of the investigation. The thymus arises solely from the first branchial pouch. The carotid gland is a thickening of the first branchial artery and is not derived from the pharyngeal epithelium. Two other bodies homologous with the carotid gland are found on the second and third branchial arches respectively. The first epithelial body (parathyroid) arises from the third branchial pouch, the second body from the fourth pouch; they later become separated from the pharyngeal epithelium and they persist in the adult on the dorsal wall of the external jugular vein. The post-branchial body arises from the posterior visceral wall where the fifth branchial pouch would be expected to occur. The gill remnants undergo seasonal variations; they and their blood-vessels enlarge in autumn and decrease in summer. They are not identical with the ventral 'Kiemenrest' of Maurer; the latter or pseudo-thyroid appears towards the end of metamorphosis and has nothing to do with the gill. The properi-cardial body, which lies in front of the pericardium, and the procoracoideal body, which is formed as a pair of elevations on the floor of the opercular cavity, do not belong to the branchial derivatives.

**A Method of Quantitative Microchemical Analysis.** L. T. Fairhall and Ruth G. Howard (*J. Roy. Micro. Soc.*, 53, Pt. 2, June 1933) describe a microscopical method of determining minute amounts of precipitated substances. The precipitation tube consists of a capillary tube about 6 cm. long and 0.2–0.3 mm. in internal diameter, closed by canada balsam at its lower end and terminating at its upper end in an open bulb of about 0.5 c.c. capacity. The present series of experiments was carried out chiefly with calcium salts, and the tubes calibrated in terms of known amounts of calcium as oxalate, care being taken to obtain crystals of fairly uniform size and form. An electric tapper shakes the precipitated crystals into the lower part of the capillary tube, which is then placed in a wooden holder and centrifuged. The measurement of the precipitate is made by means of a low power microscope with eyepiece micrometer, the tube being mounted on a small carriage on the mechanical stage of the microscope. To facilitate accurate reading the two opposite faces of the capillary tube were ground optically flat and polished. The procedure for calcium in blood serum is described, and the figures given show an average error of about 5 per cent in the determination of the calcium in one tenth of a cubic centimetre of serum. The method is suggested for such body fluids as peripheral lymph or synovial fluid, available only in small quantity, or for the blood of very small animals, which is obtainable in such small quantity that a macro-analysis for calcium is out of the question.

**Possible Drift of Greenland.** In 1932 Dr. H. S. Jelstrup went to Greenland to determine the exact position of Sabine Island with the view of comparing the result with those of Sabine in 1825 and Børgen and Cope-land in 1869 and 1870. He discusses his results in "Détermination Astronomique a Sabine-Oya" (*Skifter om Svalbard og Ishavet*, No. 58, Oslo 1933). The new determination gave a position 615 metres west of the latter. Comparisons with Sabine's position proved unsatisfactory since the exact point of his observations could not be traced. Dr. Jelstrup discusses the bearing of these observations on Wegener's theory of drift. The older figures were based on careful lunar observations at different dates within a year and there is little reason for supposing that their inaccuracy is of a greater order than  $\pm 83$  metres. Dr. Jelstrup's observations, with the help of radio time signals, are naturally less liable to error and he gives his own possible margin of error as  $\pm 22.5$  metres. Thus he argues that the total difference of position being considerably greater than the sum total of the probable errors, the observations lend support to Wegener's theory of a drift of Greenland towards the west, and he estimates the drift to have been at least 250 metres in 62 years and probably more.

**Rainfall in Holland.** Publication No. 102 of the *Koninklijk Nederlandsch Meteorologisch Instituut, Mededeelingen en Verhandelingen*, No. 34a, is in part a continuation of the earlier No. 15 of the same series. In it Dr. C. Braak deals rather thoroughly with Dutch rainfall. Some of the records extend back to 1849, but the period used for the maps of mean monthly and quarterly rainfall is 1891–1930. There are numerous tables dealing with the diurnal range of rainfall, the frequency of rainfall of various intensities, of very heavy showers—referred to as "cloudbursts"—and of these quantities in relation to the direction of the wind. The wind has to be taken

into consideration when an attempt is made to explain the lesser of the two maxima in the diurnal curve of mean hourly rainfall; the secondary maximum, which generally comes at about 6 a.m., and is most marked in the coastal regions, is attributed apparently to convergence between the land breeze and the general eastward drift over the ocean in these latitudes, but in the detailed application of this theory anomalies appear to be found and the whole subject obviously bristles with difficulties. One part of the work is purely statistical, and is designed to help engineers concerned with the disposal of the water that descends during exceptional downpours. Among the numerous rainfall tables one (Table 37), which gives the general rainfall for Holland month by month from December, 1848, until December, 1930, and the corresponding quarterly and annual figures, is of more than usual interest as a compact survey of the rainfall history of that country. For a large part of Holland, it appears that August is the wettest month, although for the south-east, July is the wettest, in common with the Continental area of midsummer maximum rainfall to the east; along the shores of the North Sea it is October that is wettest.

**Excitation of Characteristic X-Rays by Protons.** Gerthsen and Reusse (*Phys. Z.*, June 15) have been able to demonstrate the production of characteristic  $Al_K$ ,  $Mg_K$  and  $Se_L$  radiations by proton impact and to find the excitation functions. The high-speed protons were produced by an energy-multiplying device depending on *Umladung* between neutral and charged particles and the energies ranged up to about 140 kv. The radiation was detected by a point-counter and its nature was verified by absorption measurements in copper and aluminium foils. The  $Al_K$  radiation began to be excited at about 40 kv. and its intensity rose rapidly at higher voltages. As a rough estimate, one quantum was excited for  $10^5$ – $10^6$  incident particles at 140 kv. It may be noted that the energy transferred is greater than that given by the momentum relations for a proton striking a free electron, for in this case only  $1/750$  of the energy can be transferred as a maximum. The excitation potentials of the radiations observed lie between 1.3 and 1.5 kv.

**A Rare Type of Optical Dispersion.** The type of dispersion known as inclined dispersion of the bisectrices is, according to Tutton, seldom very pronounced, rarely exceeding a degree and generally being only a few minutes. It is therefore of interest to find that the compound acetone 2-4-dinitrophenyl-hydrazone in its stable modification exhibits a value of  $2.5^\circ$  at room temperature (Bryant, *J. Amer. Chem. Soc.*, August). The chief features of the crossed axial plane dispersion present in the metastable form are in harmony with Tutton's experimental generalisations, and the substance belongs to Tutton's second group ("Crystallography and Practical Crystal Measurement", Macmillan, 1922, vol. 2, Chap. xlix), in which the optic axial angle is more sensitive to changes of wave-length than of temperature. The wave-length of uniaxiality was 5440 Å. The  $\beta$  and  $\gamma$  refractive indices are relatively close in magnitude, and the extremely high birefringence is somewhat at variance with Tutton's condition, requiring weak double refraction in order to produce wide separation of the optic axes in the two planes for the two ends of the spectrum.