

Research Items

Pollen Analysis from the Norfolk Fens. An attempt to reconstruct the conditions of discovery of a bronze spear-head with loops at the junction of socket and wings of the Middle Bronze Age has recently been described by H. and M. E. Godwin, J. G. D. Clark and M. H. Clifford (*Proc. Prehist. Soc. East Anglia*, 7, pt. 3). The discovery was made some years ago at Queen's Ground, Methwold Fen, by Mr. John Harrod, of Methwold, from whom it was obtained for the University Museum of Archaeology and Ethnology, Cambridge. The site was visited by members of the Fenland Research Committee, to whom Mr. Harrod was able to indicate the horizon of discovery very closely. The spear-head was found at the base of the lowest draw of peat. The level indicated by attendant circumstances was confirmed by recognition of a well-marked horizon of the surface of the undisturbed peat in the disused trench. Uncontaminated samples of peat were taken, the peat in each instance overlying chalky boulder clay. As the result of the pollen analysis, bore *A* appears to have included three major phases: (a) an early phase with high birch and pine pollen values; (b) the middle phase with overwhelming dominance of alder pollen; and (c) the latest, with co-dominance of ash and alder pollen and showing in its last stages small amounts of beech pollen and high values for hazel pollen. The earliest phase certainly represents the end of the Boreal climatic period and the base of (b) the early Atlantic. This is supported not only by the change-over from pine and birch to alder, but also by the presence in small amounts of oak, elm and lime, with the two latter genera at first dominant over the oak. Probably the change from (b) to (c) indicates a change to generally drier soil conditions with an extension of the fen area locally covered by fen carr (scrub) or fen woods. The record of beech pollen below a late Middle Bronze Age horizon is of interest to botanists since precise evidence is lacking of the history of appearance and spread of this tree in Britain.

'Fossil Tradition' in Stone Implements. Under this title, M. A. Vayson de Pradenne contributes to *Antiquity* for March a study of certain anomalies encountered in stone age industries—more particularly in certain industries of North Africa which have frequently been the subject of comment and conjecture. Excavators have long noticed the occurrence in prehistoric deposits of objects with two distinct patinas. Thus in the Mousterian deposits of La Quina, flints shown to belong to the lower deposits by their deep yellow patina have been found in the upper deposits. They had been re-chipped and used again by the later inhabitants of this site, as is shown by the white patina characteristic of the upper deposits. Certain very peculiar specimens are found in North Africa with rough chipping on one side only accompanied by a tang handle of neolithic type. Since 1919, Reygasse has described numerous artefacts at Bir-el-Ater of which the Mousterian character is supplemented by tanged specimens. Further, there is a whole group of various implements which is supplied with handles. This Aterian industry is widely distributed throughout North Africa and is generally found on the surface or at a slight depth in brick-earths the upper portion of which has been

re-arranged. In the Abri Alain culture, recently described by M. Pallary (see *NATURE*, 134, 975; 1934), are found in a group of contrasted association certain tanged objects exactly like those of the neighbouring Champ de Tir of Eckmuhl, and it cannot be doubted that the type was borrowed by the inhabitants of the Abri Alain from the old industry nearby, which was as 'fossil' to them as it is to us. Other caves near the Abri Alain, as recorded by M. F. Doumergue, include in their culture patinated flints of a palaeolithic facies, also from the Champ de Tir. These implements introduced a new type into the industry which took them over, and serve to show that identity of type need not indicate either direct connexion or contemporary influence.

South African Fisheries. In Dr. Cecil Von Bonde's Report, No. 11, of the Fisheries and Marine Biological Survey, Union of South Africa, for the year ending December 1933 (1934), a résumé of operations of the R.S. *Africana*, and a list of the stations and salinity results occupy the first part, the second part containing investigational reports. Of these, the report on savings-trawl investigations in relation to the conservation and regulation of the Agulhas Bank sole-fishery by J. M. Marchand is of much importance. The Agulhas Bank mud-sole or east coast sole, *Austroglossus pectoralis*, becomes sexually mature and spawns for the first time at an average minimum length-size of 12 in. With a size-limit of 12 in. the percentage of undersized and immature soles in the commercial catches procured with the trawl-gear at present in use is too high. Investigations were carried out in order to find trawl-gear of such form, construction and mesh-dimension as would allow the escape of as high a percentage as possible of soles of less than 12 in. in length, at the same time guarding against the escape of too many mature and marketable fish. The main result is to show that the use of a larger-meshed saving-panel in the back or upper side of the cod-end of the trawl demonstrates an enormous saving of small, immature and non-marketable fish, especially soles, but also other species; the percentage escapes of marketable soles is very low. It is recommended that a certain defined breeding area be closed to trawling for five years, and that a general and special mesh and dimensional regulations be enforced with respect to trawl-nets, a savings-panel to be inserted in the cod-end.

Feeding Mechanism in *Diastylis*. Mr. Ralph Dennell, in describing the feeding mechanism of the cumacean crustacean *Diastylis Bradyi* (*Trans. Roy. Soc. Edinburgh*, 58, Part 1, No. 6; 1934), has carried out his researches both on the living animal and on careful preparations of the mouth parts, which show the features of a typical filtratory malacostracan. There is, however, a peculiar median process projecting into the filter chamber which is of great importance in the working of the feeding mechanism and apparently has not been noticed before in the Cumacea. The filter current is due to the pumping action of the maxillæ and maxillipeds, made possible by the maxillary valve and median process, and to the action of the epipodites in sucking a subsidiary

current through the filter chamber. It is helped to a large extent by the respiratory current. The author suggests that the ancestral cumacean probably possessed certain features shown by the primitive *Gnathophausia* and *Lophogaster*. He intends to follow up the present investigation with one on the feeding mechanism of *Apseudes*, in the hope that it will be possible to describe the evolution of the *Cumacea* and *Tanaidacea* as functionally derivable from a group of primitive mysids which took to burrowing in mud, as a change of habitat is shown in other cases to have a profound effect on the crustacean feeding mechanism.

Hemipterous Insects from Ireland. Mr. J. N. Halbert has recently published a lengthy annotated list of the Irish Hemiptera, especially of the Heteroptera and the Cicadina group of the Homoptera (*Proc. Roy. Irish Acad.*, 42, (B), No. 8, 1935). For the first time, information on the insects in question is brought together with the object of providing a comprehensive survey of the distribution of the species occurring in Ireland. As might be expected, the Heteroptera, or plant bugs, have been more extensively collected than the Cicadina. Out of 455 British species of this suborder, 253 are shown to be found in Ireland. This relative paucity of the Irish fauna is regarded as being due more to past geological changes, resulting in isolation, than to such ecological factors as climate and soil. Of the Cicadina, and the allied Psyllina, the Irish species number 153, or less than half of those recorded for the British Isles as a whole. These two groups, however, have been less intensively collected, their identification is often beset with difficulties and much work remains to be done. Their species are merely enumerated without annotations, the list being tentative in character. The paper as a whole extends to more than 100 pages and is provided with a useful bibliography dealing with Irish faunistic records.

Epidemiology of Winter Outbreaks of Parasitic Gastritis in Sheep. In the course of an epidemiological inquiry into the severe outbreaks of parasitic gastritis which occurred during the winter months of 1933-34 in the British Isles, Mr. E. L. Taylor (*J. Comparative Path. and Therapeutics*, 47, pt. 4, Dec. 1934) found that the epidemic was chiefly associated with heavy infections of species of *Trichostrongylus*. *Haemonchus* and *Nematodirus* did not appear to have been involved. Inquiries on the Romney Marsh showed that 43 farmers lost £10,341 during the outbreak. Most of these losses, however, took place while the sheep were away from the Marsh for winter grazing. The outbreak was associated with a prolonged period of drought. A gradual storage of potential infective material probably took place on the ground during the drought, which may or may not have terminated in a mass development of infective larvæ, depending upon the advent of a period of damp weather of sufficient duration for the infective larvæ to develop. Experiments on the effect of diet on the susceptibility of lambs to worms showed that more worms develop in sheep fed on a deficient diet than in those receiving a full ration; and that those on an adequate diet eliminated their worms more readily than those on an inadequate diet. After a period of drought the herbage is short, scarce and of very poor quality, leading to maximum intake of infective larvæ, and actual under-nourishment of the sheep. It is advised

that, where a shortage of pasture is threatened, the sheep should receive an ample allowance of concentrated food and that use might be made of the application of nitrates to some of the pastures towards the end of the summer, to stimulate the growth of grass of a more nutritious quality.

Improved Methods of Vegetative Propagation. An article entitled "Working up Stock" appears in the *Fruit, Flower and Vegetable Trades' Journal* of February 2, 1935. The identity of the author is hidden behind the pseudonym "Crusoe", but the subject-matter reveals a vigorous awakening of the nursery trade to present-day conditions, as relieved by the provision of import duties on foreign produce. It is shown that seed propagation of several plants is slow in comparison with the newer methods of vegetative propagation suggested by the article. Lupins may be raised as cuttings from the abundant shoots at the base of old stems. *Anchusa* may be multiplied by root cuttings, but attention must be paid to polarity—the piece of root must be planted in the same position in which it naturally grows. Gaillardias and *Gypsophila* may be propagated from pieces of the fine root. An interesting improvement relates to the propagation of hyacinth bulbs. The central conical stem is scooped away until the bases of the scales are exposed. Planting in ordinary soil induces the formation of innumerable small bulbils from the scales; these can then be grown to suitable size. It is interesting to note that these methods of vegetative propagation are as prolific as seed propagation, but have the additional advantage that all the vegetative produce from one plant (that is, a clone) is uniform in colour, shape and size—a very important factor in commercial work.

Rust Fungi in Scotland. The study of fungi rests, perhaps more than that of any other group of plants, upon traditions of observation and nomenclature established by highly scientific amateurs. Scotland had her share of such men. Greville really initiated the study in 1823-28 by the publication of the "Scottish Cryptogamic Flora". He was followed by the Rev. M. J. Berkeley, and in 1879, the Rev. John Stevenson published "Mycologia Scotica". Many rust fungi were described by these authors, but Trail's "Revision" of 1890 was the latest authoritative account until 1934. The Edinburgh Botanical Society has recently published a paper on "The Distribution of the Uredineæ in Scotland" by Dr. Malcolm Wilson (*Trans. Edin. Bot. Soc.*, 31, pt. 3, 345-449; 1934). Records are classified into eleven districts, each being a natural division bounded by watersheds. Trail's records have been more than doubled in number in the present publication. The account is not merely a list of new records, but also attempts to trace the influence of several factors on distribution. Some difficult problems are disclosed. *Puccinia vinca*, for example, occurs in only one station, though *Vinca minor* and *V. major*, its hosts, are widely distributed. *P. agrimonice* and *P. perplexans* have similar local distribution, and attack plants common in all parts. *Phragmidium rubi* and *Puccinia sonchi* occur only near the sea, though their hosts are found abundantly inland. Several species occur in Scotland, but not in England, whilst *Puccinia Porteri* and *Uredinopsis filicina* are new British records.

Clay Minerals. In Prof. Paper 185G. of the United States Geological Survey, C. S. Ross and P. F. Kerr continue the record of their investigation of the clay minerals by chemical, optical, X-ray and dehydration methods. In 1931 they described kaolinite, dickite and nacrite, and their present study shows that *halloysite* is a fourth member of the group, related to, but distinct from, kaolinite. Previously described as amorphous, halloysite is now known to have a crystal structure. The X-ray diffraction pattern has a number of lines in common with that of kaolinite, but in each case there are independent sets of lines. Like kaolinite, halloysite appears to be always the result of weathering, whereas dickite and nacrite are characteristically hydrothermal products. *Allophane* is a genuinely amorphous material that is commonly associated with halloysite. It has no crystal structure and no definite chemical composition. The name includes all materials that can be regarded as mutual solutions of silica, alumina and water with only minor amounts of bases.

Recent Developments in Molecular Rays. I. V. Guillemin has discussed recent work—since 1931—on molecular rays (*J. Franklin Inst.*, Jan. 1935). The scattering of molecular beams by gases has been calculated on quantum theory and also measured experimentally, with satisfactory agreement. The diffraction of molecular beams on crystal surfaces has been observed—this phenomenon is often obscured by adsorption and re-evaporation after a finite time. Magnetic and electric dipole moments have been measured for a number of atoms and molecules, including the hydrogen atom measured by Rabi under conditions such that the proton moment may be determined. Experiments have been devised to examine the re-orientation of atoms oriented by magnetic field when passed through a second field at an angle to the first. A number of other applications of the method are described, and a number of references are given.

Crystal Oscillators for Radio Transmitters. At a meeting of the Wireless Section of the Institution of Electrical Engineers on March 6, a paper was read by Messrs. C. F. Booth and E. J. C. Dixon on the application of the piezo-electric crystal oscillator to radio transmitter problems. This paper comprised an account of the work carried out by the Radio Section of the Post Office between 1925 and 1934 in the development of the use of quartz crystal oscillators in a number of different applications, of which the most important was the control of the carrier frequency of short-wave transmitters employed for overseas radio services. A description was given of the results of a comprehensive investigation of the chief characteristics of different types of quartz crystals, and the manner in which they must be used in order to secure the highest constancy of frequency. Particular attention has been paid to the effect of temperature on the frequency of the crystal oscillator, and special constant-temperature ovens have been designed for the oscillators used for the control of transmitters operating commercial radio-telephone services. The concluding section of the paper gave the results of a study of the performance of frequency-controlled transmitters in actual service. The graphical records show that it is possible to keep the frequency of a transmitter under strict control for periods up to two years, during

which it is only on rare occasions that the variations exceed the limits of tolerance set by international agreement.

Chemistry of Fats. Prof. T. P. Hilditch (*Chemistry and Industry*, 54, 139, 163, 184; 1935), in his Jubilee Memorial Lecture to the Society of Chemical Industry, directed attention to recent investigations of the chemical composition of fats. It had been assumed that the normal constituents of fats and oils were tristearin, tripalmitin and triolein, other substances being regarded as abnormal. It is now known that some of the supposed fatty acids are mixtures of two other acids in equimolecular proportions, margaric acid, for example, consisting of palmitic and stearic acids. Again, the assumption that simple triglycerides (containing three identical fatty acid radicals) are predominant is incorrect: in the natural fats the triglycerides are usually mixed. The major component acids of a fat often exceed three and may be as many as ten or twelve in number, and their relative proportions vary widely in different cases. In the case of fruit-coat fats, the major component acids are practically only palmitic, oleic and linoleic acids, but in many other seed fats, other quite specific acids are found. Cruciferous seed-fats, for example, contain large quantities of the unsaturated erucic acid, Umbelliferae contain petroselinic acid (an isomer of oleic acid), etc. What Prof. Hilditch calls an 'even distribution' rule appears to operate in regulating the composition of the glycerides. A number of general questions, such as the conversion of carbohydrates into fat in living organisms, and the catalytic hydrogenation of fats, were also considered.

Effect of Ozone on Rubber Insulated Cables. It has been well known for many years that ozone attacks rubber, producing cracks and so destroying its insulating properties. The father of the present Lord Rayleigh used to show an experiment at the Royal Institution illustrating this effect. A sheet of stretched rubber was put several feet away from the spark gap of an induction coil which was then started working. After a few seconds, a hole appeared in the stretched rubber which rapidly increased in size. It will be seen that it is necessary when working with the coronal and brush discharges which appear at high voltages to shield rubber cables. In the *Electrician* of February 22, the method of testing cables used by the German Aircraft Research Establishment to see the effects of the action of ozone is described. It appears that the ignition cables of aeroplane engines have to be renewed every 400 hours due to deterioration produced by ozone. In 1932 a German cable manufacturer succeeded in producing a rubber compound which was practically unaffected by ozone under normal working conditions. A cable insulated with this new compound was subjected to the action of ozone for 1,000 hours and then passed satisfactory tests. A cable insulated with ordinary rubber broke down after one hour's similar treatment. Typical examples of test pieces after breakdown are shown. It is stated that with ordinary ignition cable, corona discharge begins when the crest value of the voltage is 7,000. Under normal conditions the crest value is double this, and to prevent its formation it would be necessary to increase its diameter from 0.28 in. to 0.44 in., which would require 2.5 times as much material.