

## Research Items

**Prehistoric East Anglia.** Dr. Cyril Fox, in his presidential address to the Prehistoric Society of East Anglia for 1933, which is published in full in the *Proceedings* of the Society, vol. 7, pt. 2, discusses the implications of a series of maps showing cultural distributions from neolithic times to the iron age, that is, from about 2300 B.C. to A.D. 50. He points out initially that in the Lowland area of Great Britain, of which East Anglia is a part, human distribution is determined by the character of the soil. Hence East Anglia is divided into three zones, of which two, a western and an eastern, suitable for the habitation of early man, are separated by an unsuitable area, a plateau, forming the East Anglian watershed, which is extended southward to the Thames valley by the exposure of the London clay. In each successive period, therefore, the distribution maps show that the area of closest settlement was within the inner curve of the clay-covered watershed, with a second area of density in the lower Thames valley and estuary. A shift of the population on the chalk belt in the course of ages was accompanied by a like southward movement on the coastal belt, as the estuarine trade sought the shortest route to its markets in the centres of denser population through the valleys which penetrated the plateau in the direction of the settlement area on its western side. Changes in distribution of population on the chalk belt in the later periods indicate the opening up of fertile, but less easily worked, lands by the Iron Age Celtic tribes, to whom the Belgæ found themselves opposed and against whom they erected their great system of earthworks, when they had occupied the hitherto unexploited land around St. Albans, which they had reached from the Thames valley and not from the east coast. Differences in type of distribution bring out clearly the distinction between the products of a locally developed culture, of objects imported by trade, and of those introduced by invasion. The series of maps strikingly confirms the reliability of the available data as an index—though an incomplete reflection—of the life of the dwellers in the region, showing where it was vigorous, where it was sluggish, and where almost entirely absent.

**Mass Physiology in Animals.** W. C. Allee (*Biol. Rev.*, 9, Pt. 1, 1934), in reviewing recent work on mass physiology, remarks that analysis of the reactions leading to the formation of aggregations in Nature, or in the laboratory, has scarcely proceeded beyond the recognition that much of such behaviour is innate, although recent evidence indicates that a part of the schooling behaviour of the fish *Ameiurus* is acquired rather than inherited. It is easy to demonstrate that overcrowding lessens the rate of growth of organisms; evidence is presented that undercrowding (for example, in mealworms, fishes, mice) frequently has the same effect. The results from aggregation upon the rate of oxygen consumption vary with different animals; thus, for example, goldfishes in small groups use less oxygen than when isolated, but with the more closely schooling *Ameiurus* opposite results are reported. Groups of animals are able to afford protection to their members if exposed to toxic conditions due to the absence of accustomed salts (as the marine flat-worm *Procerodes* does when placed in fresh water) or to the presence of toxic substances

such as colloidal silver. The amount of protection has been measured for some examples and the protective mechanisms are discussed. The transition from parthenogenetic to sexual reproduction in certain Crustacea (Cladocera) has been shown to result from overcrowding. The effect of numbers present upon the rate of learning differs with different animals and even in the same animals with different problems; thus, fishes learn to run a simple maze more rapidly if in groups than if isolated, but they learn less readily to jump for a bit of worm held just above the water level. Cockroaches learn to run a simple maze more slowly if more than one is present in the maze at the same time. Groups of birds show a fairly definite flock organisation which may or may not be related to active leadership of the flock. "The whole range of mass physiology has been presented with the thought that it forms a large part of the background for social life".

**New Snails from Hawaii.** Mr. C. Montague Cooke, jun. in his paper "New Species of Amastridae" (*Bernice P. Bishop Museum, Occasional Papers*, 10, No. 6; 1933) describes many new members of this interesting genus, which is peculiar to the islands of the Hawaii group, usually living on or under trees or under wood and stones. These snails are viviparous and bear embryos of a fair size, the embryonic whorls having distinct sculpture. One specimen of *Amastra* (*Metamastra*) *gulickiana dichroma*, new sub-species, although not quite fully grown, contained an embryo of about two and a half whorls. Many of the shells, however, were found dead and in one locality, East Maui, Kula, near the division between the lands of Keokea and Kamaole, where there are the last remnants of a native forest of a few decades ago, there were numbers of dead shells of several species and genera scattered among the loose surface stones. Under a single stone about two or three quarts of the richest fossiliferous earth was uncovered. From this mass of earth about 1,300 whole or nearly whole shells were picked out with representatives of about 70 species belonging to 23 genera including a new species, *Amastra inopinata*. Undoubtedly this region was inhabited by a rich land snail fauna some time within the last hundred years. A number of these species must be entirely extinct, as no native forest area is located within several miles. The shape of the various forms varies enormously, some of the shells flat and almost like a *Planorbis*, others *Achatina*-shaped, some sinistral.

**Japanese Decapods.** A valuable monograph on the distribution of decapod crustaceans inhabiting the continental shelf around Japan, chiefly based upon materials collected by the S.S. *Sōyō-Maru*, during the years 1923-30, by Yu Yokoya (*J. Coll. Agric., Tokyo Imperial University*, 12, No. 1; 1933) gives a very good idea of what is common and what is rare in this area; all the records are given with sex and egg (if any) included, so that the breeding seasons are also shown. The extensive material from 658 stations was collected during the biological survey of the continental shelf of Japan, surrounding Honsyū, Sikoku and Kyūsyū, by the surveying ship of the Imperial Fishery Experimental Station of Tokyo. 292 species of decapods are recorded, 52



being new to science, and there are 33 new records for Japanese waters, whilst 3 new genera are proposed. Most of the stations were of 100–400 metres depth, therefore few shallow-water forms are included. Some species have a northerly distribution extending from central Japan as far as the Bering Sea, Alaska and the west of America, others a southerly distribution to the Malay Archipelago, Indian Ocean and Australia. The northern species were collected mainly from the west side of Japan, the southern species mainly from the east, but there are some notable exceptions and the subject is a complicated one which is discussed together with the position of the currents. Two main currents are well known, the warm current, the "Kuro-siwo", sweeping the south-east coast from the East Indian region and turning eastward, and the cold current, the "Oya-Siwo", entering the North Pacific by the Bering Strait, principally deflected along the western side.

**Hydroids as Enemies of Fishes.** E. W. Gudger (*Ann. Mag. Nat. Hist.*, 13, No. 74, Feb. 1934) remarks that the lower invertebrates are commonly thought of as food for fishes rather than as enemies—and so they are broadly speaking—but he brings together the recorded observations on *Hydra* and sessile colonial hydroids as fish-eaters, beginning with those of Trembley (1744) who saw young roaches, about one-third of an inch long, caught by the tentacles of *Hydra*, carried to the mouth and swallowed. Beardsley (1904) found the mortality among trout fry in the troughs of a hatchery at Leadville, Colorado, to be due to the presence of great numbers of *Hydra pallida* (130 per square inch in one trough) and a heavy mortality in the ponds of a trout hatchery in Germany was due to the presence of *Hydra fusca*. The author summarises the accounts of the attacks of *Polypodium* on the ovarian and free ova of the sturgeon of the Volga, of the colonial hydroid *Hydrichthys mirus* which has been found on sea fish off Rhode Island and was believed by Fewkes (1887) to be parasitic, of *H. boycei* described by Warren as parasitic on *Mugil* and other fish in South Africa, and lastly of a species of *Clytia* which fed on young angler fish (*Lophius*) in jars in the Plymouth Laboratory.

**Parasites of the Hessian Fly.** Miscellaneous Publication No. 174 of the U.S. Department of Agriculture (Dec. 1933) consists of a paper by Mr. A. B. Gahan on the serphoid and chalcidoid parasites of the Hessian fly in America. Some 41 species are clearly described and figured with very full synonymy and biological data. Since many of the species dealt with also occur in Europe, this work is one which is of importance to British and other extra-American students of the parasitic Hymenoptera. Particular interest is attached to the species *Eupelmella (Eupelmus) vesicularis*, Retz., which appears to be one of the most polyphagous species of all the Chalcids, since its recorded hosts embrace no fewer than 68 species, belonging to six of the major orders of insects. This feature is all the more remarkable from the fact that the insect has greatly abbreviated wings and is incapable of flight. Five generations have been reared in a single season and males are unknown. Geographically it extends from the British Isles to Russia eastwards, and to Italy in the south; in North America it is likewise very widely distributed. Owing to its polyphagous habits, it appears to be of little

economic value as a primary parasite. The most efficient parasite in the biological control of the Hessian fly seems to be *Platygaster hiemalis*, Forbes, and, in North America, it is practically the only species which attacks the autumn generation of that host.

**Plant Tumours and Polyploidy.** Dontcho Kostoff and James Kendall give some details (*Archiv. Mikrobiologie*, 4, 487; 1933) of the cytology of tumorous growths produced in plants by various means—in some cases occurring generally over an interspecific hybrid, in others induced by injection of various chemical substances into the tissues or by injection with *Bacillus tumefaciens*. They regard these tumours as in all cases similar in construction, and in certain cases have been able to show that some of the cells in their neighbourhood have become either binucleate or multinucleate or polyploid. Such nuclear changes they attribute to an increased viscosity of the protoplasm, which makes the separation of the chromosomes more difficult after they have divided. From the neighbourhood of these tumours in some cases roots arise in which all the cells are polyploid or which have a chimæral structure as regards polyploid and normal nuclear apparatus. In other cases it was possible by cutting back shoots in the neighbourhood of tumours to obtain polyploid shoots and thus polyploid individuals could be separated and propagated. The authors are thus led to suggest that some of the various polyploid types that have been found growing naturally may have arisen as the result of cell disturbances produced by bacterial or other infection.

**Earthquake Seawaves in North-East Japan.** The Pacific coast of north-eastern Japan, perhaps more than any other region in the world, is subject to the inrush of destructive *tunamis* or earthquake seawaves, the most recent examples being those of 1896 and 1933. Earlier *tunamis* along the same coast are described by Prof. A. Imamura (*Japan. J. Astr. Geoph.*, 11, 79–93; 1934), who gives two reasons for their occurrence and destructiveness. Off this coast lies the deep Tuscarora trench, in which changes of level occur one after another in its bed, while the coast contains numerous V- or U-shaped bays opening towards the trench. Excluding *tunamis* less than 10 ft. in height, Prof. Imamura enumerates 15 from 869 until 1933, of which those of 869 and 1611 were the greatest. In the latter year, about 4,783 lives were lost, the height of the waves being 66 ft., as compared with 48 ft. in 1896 and 20 ft. in 1933. From 1611 until 1689, there were five *tunamis* along this coast. Then came a pause of one and a half centuries, followed by another epoch of activity culminating in the disaster of 1896. A few hours before the arrival of the *tunami* in 1894, 1896 and 1933, large secondary undulations were observed in the water of the V-shaped inlets, suggesting that minor crustal deformations had occurred before the great movements that gave rise to the main *tunami*.

**Long Period Temperature Changes.** In the *Monthly Weather Review* of September 1933 there is an interesting study of long period temperature trends by J. B. Kincer, that is carried back in certain cases to the latter part of the seventeenth century. A number of temperature records are analysed in a manner that has been found specially suitable for



showing gradual changes. The sum of the annual mean temperatures for the first twenty years of a record is obtained and is plotted as the first point on a curve, additional points being obtained by subtracting the figure for the first year and adding that for the twenty-first, and so on. In this method an occasional exceptional year or two has only a slight effect on the general run of the curve. The analysis was applied to records in middle latitudes both in North America and Europe and to a few other parts of the world, with rather striking results. It appears that in middle latitudes there has been an upward trend since about the second quarter of the nineteenth century, in spring, autumn and winter, the change being generally about  $3^{\circ}$ —a substantial figure when dealing with means for periods so long as twenty years. The longest records are generally made in or very near to large towns and the possibility that the effect may be due to the growth of such towns and the consequent increase of the influence of artificial heating was considered. A number of overlapping records at town and country stations in the same State in America showed such striking similarity that it was concluded that the effect is general and corresponds with a world-wide change of climate.

**Absorption of 1 cm. Waves.** Cleeton and Williams have successfully produced waves down to 1.1 cm. in length by a vacuum tube oscillator, and have made absorption measurements of these waves in ammonia gas (*Phys. Rev.*, Feb. 15). In accordance with a theory of Dennison, the gas shows a strong absorption band in this region with a maximum absorption at  $\lambda$  1.25 cm. The oscillator used employs a special type of thermionic tube with a split anode. The tube is placed in a strong magnetic field, and the frequency of oscillation depends primarily on the time of transit of the electrons between cathode and anode. The frequency may be varied over a small range by changing the magnetic field and the circuit voltages. There is a small Lecher wire system inside the vacuum tube. The spectrometer has an echelette grating of 18 elements and concave mirrors for focusing the waves, which are detected by an untuned crystal detector at the focus of one of the mirrors.

**Electrical Measurement of Small Vibrations.** In the report of the Aeronautical Research Institute, Tokyo Imperial University (No. 103, Feb. 1934) there is an interesting paper by J. Obata, S. Morita and Y. Yoshida describing an electrical method of measuring small vibrations and its application to the measurement of the vibrations of airscrew blades. The electrical arrangement used comprises an electrical circuit containing a triode. An oscillation with a frequency of about 600,000 cycles per second can be started in the circuit. The displacement or vibration to be measured is made to produce a corresponding change in the anode current of the vacuum tube and this change is recorded by an oscillograph. The novelty of the method is its extremely high sensitivity and the fact that there is no need to bring anything into contact with the moving body. It is known that the vibration of the screw blades is one of the factors affecting the sound emitted. The positions of the loops and nodes were determined for model airscrews and also for an actual airscrew. Oscillograms are shown of the vibrations of the blades for given striking and measuring points. Fairly good agree-

ment between the observed and the calculated values is obtained. The most conspicuous feature observed in the records of the vibrations of blades is a remarkable beat which is especially prominent in the case of metallic airscrew models. It was found that a slight change in the manner of clamping the airscrew model gave rise to marked changes in the number of beats produced per second. The beat is undoubtedly produced by the coupled vibration of the two blades. The degree of coupling is altered by changes in clamping. It is interesting to note that when a four-bladed airscrew model is vibrating, then at the instant of the downward stroke of one of the blades, the ends of the three remaining blades spring upwards.

**Multiplet Intensities in Stars.** Mr. A. D. Thackeray has described an investigation of multiplet intensities in thirty stars in the late types *K5* and *M* (*Mon. Not. Roy. Ast. Soc.*, Dec. 1933). His work, which was carried out with the full spectrophotometric method, confirms the results reported by workers at Yerkes Observatory, who had announced that visual estimates of line intensities demonstrated the existence of anomalies in certain multiplets. The relative intensities of the lines in a multiplet, as they appear in a stellar spectrum, do not agree with the theoretical values, which have been confirmed by laboratory experiments. The effect in solar multiplets was first reported by Minnaert and independently by Woolley. A great deal of argument has been directed towards examining the cause of the anomaly, so far without arriving at any conclusive result. Thackeray discusses some of these arguments in the paper under review. The Solar Physics Observatory, Cambridge, at which Thackeray carried out the work, is to be congratulated on being amongst the first observatories to produce finished results of stellar spectrophotometry on narrow absorption lines with a slit spectrograph.

**Plate Efficiency in Fractionating Columns.** A paper was read by Mr. A. J. V. Underwood before a joint meeting of the Institutions of Chemical Engineers and Petroleum Technologists on March 21 dealing with the determination of plate efficiency in fractionating columns with complex mixtures. The essence of the paper was an evaluation of individual plate efficiency, which is generally taken as the ratio of change in composition of the vapour effected by a plate in the column to the change in composition which would result if the vapour, after passing through the plate, were in equilibrium with the liquid on it. It was claimed that this efficiency could be calculated for each component of the mixture knowing the composition of the vapour below and above the plate, the composition of the liquid on the plate and the composition of the vapour that would be in equilibrium with that liquid. From the above, it would seem that to obtain these data for any given fractionating column would involve numerous analyses of liquids and vapours in contact with every plate, but the author showed that it is only necessary to determine liquid compositions, leaving vapour compositions to be calculated by the use of material and thermal balances. The assumption that an efficiency of the order of sixty to seventy-five per cent is to be expected in practice was not supported by much available experimental data; probably this efficiency is seldom attained, and if it is on the low side, then there is considerable scope for progress in modification of plate design.