

Research Items.

PREHISTORIC DISCOVERIES AT PRESTATYN.—Some interesting evidence bearing upon the possibility of the survival of a palæolithic people in Wales into the Neolithic and Bronze and even into the Iron Ages has been obtained from excavations carried out during the last two and a half years in the neighbourhood of Prestatyn. According to a recent lecture by Mr. F. Gilbert Smith, delivered under the auspices of the Dyserth and District Field Club, the 'Byrn Newydd' people began to settle in that area after the last phase of the Ice Age. The original site of occupation is directly on the boulder clay, now from one and a half to five feet below the present surface level. The implement-bearing zone begins at a depth of about one foot. Of three mounds or islands in a basin of boulder clay, one, the smallest, which had been used as a workshop, had been sealed, after its abandonment, by a deposit of two feet of tufa, and had thus remained untouched by the influence of later cultures. The implements found here included a large number of typical Tardenoisian form with battered backs and cores. They are of chert of exceptional quality, and are worked with great skill. Conclusive evidence for the contact between this culture of epipalæolithic type and that of a later phase is furnished by the discovery of a flint spear-head and a polished stone celt in a 'fire-place' on one of the larger islands in association with artefacts, in the main of the type found in the workshop.

MAGIC IN MADEIRA.—Mr. James Hornell has recently made a study of superstitions connected with the evil eye in Madeira, and has published in the *Journal of the Royal Anthropological Institute*, Vol. 55, Pt. 2, an account of those in which the horns of various animals or substitutes therefor are used to avert evil. There is little overt evidence of this use, and indeed it was denied except in the case of protecting pigs against "bad air." Further inquiry showed, however, that the horns were used in several different ways. In fishing-boats they are employed as amulets against envy or the evil eye, but great secrecy about them is preserved, and they are kept in lockers under the decking. They are only mounted on the prow as a general observance when returning home on the popular festival of May 1—a pagan, not a religious festival. Horns are also used, but rarely, to protect crops. Though horns are not placed outside a house or over the door, the owner's possessions are protected by keeping a pair inside. The horns of a black goat or sheep are held to be the most efficacious. The familiar sign of the horns made with the hand is used and the amulet itself and its name are employed as a deadly insult to a married man, imputing infidelity on the part of his wife. It is probable that the use of an amulet in the form of horns is to be traced to a devil cult, the special efficacy of the goats' horns being significant in view of the belief that the devil when presiding over the witches' assemblies normally took the form of a horned goat. Further, it is to be noted that the amulet should be black.

FŒTAL OSSIFICATION.—The economic conditions which existed in Switzerland during the later years of the War gave Messrs. Kupfer and Schinz opportunities of collecting in slaughterhouses a series of specimens which illustrate every stage in the development and growth of foetal calves ("Beiträge zur Kenntnis der Skelettbildung bei domestizierten Säugetieren auf Grund röntgenologischer Untersuchungen." Von M. Kupfer und H. R. Schinz. Denkschriften der Schweizerischen Naturforschenden

Gesellschaft. Band 69.) Every stage has been X-rayed, and complete records made of the sequence in which the centres of ossification make their appearance in the bones of the limbs. The results of this investigation are graphically summed up in 68 text figures, while 26 photographic plates set out very clearly some of the data on which conclusions are based. These conclusions are that in spite of the dissimilar purposes served by the limbs of the ox and of man, yet the number of centres of ossification which appear in the limbs of each is the same, and the order in which these centres appear is also the same. In the limbs of the calf all centres have appeared by the time of birth, whereas in man their appearance is extended until the age of puberty is reached. The authors also discuss the laws of ossification as revealed by their studies; their conclusions are in agreement with those which have been formulated by anatomists for the centres of the human body. Besides observing centres of ossification, the authors of this monograph have reinvestigated the cartilaginous skeleton which is laid down in the limbs of the foetal calf. The shaft of the fibula, after being laid down in cartilage, disappears, all save its extremities, which become ossified and persist. The digits corresponding to man's great toe and thumb have no embryological representation at any stage, but those which correspond to man's second and fifth digits are formed in cartilage and afterwards undergo atrophy. Thus it will be seen that this monograph contains much new and exact information and should be accessible to all who are investigating skeletal problems. Fortunately for the progress of knowledge, the authors were able to publish their results through subventions placed at their disposal by societies in Zürich.

EXPECTATION OF LIFE.—It is well known that the expectation of life at birth, *i.e.* the average duration of life, has considerably increased during the last thirty years; for males in London from 41.2 years to 53.8 years. This has been brought about chiefly by a falling death-rate in infancy and the early years of life. It is not so well appreciated that the expectation of life of the elderly has not correspondingly increased during this period. This fact is discussed by Prof. Raymond Pearl (*Natural History*, vol. 26, 1926, p. 26), who finds that the evidence available does not indicate that any increase is occurring now, or has occurred, in the recorded expectation of life of persons who live to the age of 75 years or more. Still less is there any evidence that the biological upper limit of the human life span has been raised.

MARINE BIOLOGICAL RESEARCH.—The recent issue of the *Journal of the Marine Biological Association* illustrates the general interest at the present day in the basal conditions of the environment in relation to the living organism, conditions which are at the root of economic research. The marine laboratories are naturally concerned with water-living organisms, and there are records of work by Atkins on the silica content of water, by Orr and Harvey on the nitrite and nitrate contents respectively, and by Poole and Atkins on the penetration of light into sea water. For the latter a new apparatus, consisting of photometers and photo-electric cells, is described. The other authors also bring forward improvements in technique, but much further research on this side is necessary, especially for the quick estimation of combined nitrogen. The greater concentration of the latter in deeper water is what is to be expected, as the phytoplankton necessarily uses up the combined nitrogen,

the organic proteins thus formed being afterwards broken down to simple compounds giving determinate cycles analogous to phosphates, etc. Of other matter, Russell's pelagic young of fishes is the second half of a research dealing with the vertical distribution of the macroplankton off Plymouth; it has a tentative list of distribution types, but we prefer to regard this work as preliminary to a deeper and more continued investigation. Miss Lebour completes the life histories of the Euphausiidae of the English Channel, the elucidation of which was of importance, as they are fed on largely by herring, hake, and other fishes. Dr. Amemiya records salinity experiments on the development stages of oysters. Lastly, the work of Fox on lunar periodicity in reproduction is confirmed by Orton in oysters, the normal forms in 1925 showing "three maximal percentages in spawn in the weeks after the July, August and September full moons."

FREQUENCY CURVES IN HERRING INVESTIGATIONS.—In his report of "Norwegian Fishery and Marine Investigations," Vol. III, No. 4, Dr. Einar Lea has given an important reply to Miss Catherine W. M. Sherriff's report on her mathematical analysis of random samples of herrings ("Fisheries, Scotland," Sci. Invest., 1922). Miss Sherriff was able to show that some of the empirical curves of frequency for the length of fish and for the number of rings counted on the scales, could be very well represented by one or other of the theoretical curves of variation, while others which were bimodal could be represented by the addition of two such curves. Prof. d'Arcy W. Thompson wrote an introductory note to Miss Sherriff's report, and it is the import of this note, rather than the results obtained by Miss Sherriff, which has attracted Einar Lea's attention. Lea infers that Prof. d'Arcy Thompson considers the conformity between the empirical curves of frequency and the theoretical curves of variation to be a criterion in deciding whether a sample of herrings contains a single year group or several. Mathematicians will follow with interest the argument by which Lea comes to the conclusion that empirical curves of frequency, of which the similarity to theoretical curves of probability or variation cannot be doubted, may arise from and represent processes which have nothing to do with variation and variability in the sense given to these terms by Prof. d'Arcy Thompson. The curve of frequency for the length of the herrings in a random sample may easily show sufficient degree of similarity to a theoretical curve of variation even though the individuals in the sample belong to several age groups, and the curve of frequency for the number of rings on the scales may also have a form which is so like a theoretical curve of variation that it might be mistaken for one, without this fact arguing against the assumption that the rings are annual rings; and that consequently the curve of frequency represents the distribution of age in the shoal from which the sample comes.

INFLUENCE OF TEMPERATURE ON THE LOCUST.—In the *Bulletin of Entomological Research* for March 1926, Prof. V. P. Pospelov describes some experiments showing that temperature during breeding exercises great influence on the development of the locust (*Locusta migratoria* L.). There is a certain limit of favourable temperature below which development of the genital products in the imagines ceases and the insects easily succumb to bacterial diseases. Young insects kept at a temperature of 35°-38° C. and with humidity near the saturation point developed rapidly, became adults, and commenced oviposition. In a second experiment, insects during their first two

instars were kept under these same conditions. When in the third instar, they were transferred to a temperature of 30° C. by day and 20° C. by night with humidity at about 70 per cent.; they became sluggish, ate very little, and those which ultimately became adult failed to mature sexually and died without laying eggs. Observations were also carried out with reference to the occurrence of *Coccobacillus acridiorum* in the blood, and the results obtained confirmed the opinion of Mereshkovsky that this organism is a normal symbiont of locusts, but becomes a parasite under unfavourable conditions of temperature and humidity.

PLANT COLONISATION OF THE SEA-SHORE.—Prof. F. W. Oliver has an interesting account of the spread of *Spartina Townsendii* in the Seine estuary, between Havre and Tancarville, in the *Gardener's Chronicle* for March 20. Unlike the process of colonisation in Poole Harbour, where *Spartina* follows upon *Zostera*, on the Seine *Spartina* is settling upon virgin ground. As *Spartina* appears to have been unknown in the Havre district ten years ago, the advance made by the plant since is a very striking example of its powers of rapid colonisation. A further striking point is that in various local patches Prof. Oliver seems to find clear evidence that *Spartina*, the coloniser, has in its turn been ousted and replaced by *Glyceria maritima*. The species is unusually luxuriant in its growth and is apparently particularly favoured by some of the local habitat conditions. In *Modern Science* for April 1926 Prof. Mangham of Southampton discusses another sea-shore coloniser, *Sueda fruticosa*, an almost evergreen, tough, woody shrub, which he suggests might be tried out as a practical method of delaying or arresting the inward movement of mobile shingle banks in various seacoast areas.

NATURAL WOUND HEALING IN TREES.—Mr. T. Swarbrick has a paper on this subject in the *Journal of Pomology and Horticultural Science* (vol. 5, No. 2, March 1926). The outstanding result is that in all the species of trees examined (in a Yorkshire area), study of the natural processes involved in healing showed that, if the wounds were made during the months May to August inclusive, they were soon blocked against the entry of disease organisms; on the other hand, wounds made in September and October may block partially, and wounds made during November to April, scarcely at all, as the result of natural changes at the cut surface. Anatomical and micro-chemical details are supplied as to the nature of this process of blocking, which is mainly due to a gradual plugging of vessels and tracheids by 'wound gum' secreted from the starch containing cells in the neighbourhood of the cut. Such blocking is much more rapid than any subsequent healing by the inward growth of callus tissue from the periphery of the cut stump. These data would seem to be of interest in connexion with the practical operations of pruning, etc., by which cut surface of woody branches are exposed to the entry of disease organisms at various seasons.

MYCORRHIZA.—Dr. M. C. Rayner has commenced in the *New Phytologist* (vol. 25, No. 1, 1926) a monographic account of this subject which will be of very great value to botanical workers. The literature of the subject, whilst very extensive, is so very scattered, the problem of association of fungus and flowering plant being capable of attack from so many points of view, that as a result the subject certainly lacks adequate presentation in modern text-books, and there is no doubt that an impetus to the study of a widespread phenomenon should be the result of this publication. Dr. Rayner's first instalment of this

study, with its account of Kamienski's pioneer work upon *Monotropa*, its full analysis of the classic researches of Frank, with its quotation from the original papers and reproductions of some of the figures published by these earlier authors, certainly provides most botanists with a sounder basis upon which to commence its examination than could be readily provided otherwise save by long searching through the literature. It was also a happy idea to quote again de Bary's original definition of symbiosis, in view of the long controversy as to the relative value to flowering plant and fungus of their close relationship. De Bary, as Dr. Rayner points out, clearly intended symbiosis to include all cases of mutual relationship in life of two organisms, including parasitism.

RECORDS OF PLANTS.—The *Kew Bulletin* No. 2 for 1926 contains some very good photographs of the remarkable tree *Clistoyucca arborescens* Trelease, which grows in 'forests' in the Mohave desert, Los Angeles, California; it is separated from the genus *Yucca* mainly on account of the very thick perianth segments and the absence of a style. C. E. Hubbard gives the full taxonomy of a useful fodder grass, *Paspalum Larranagai* Arech., "Vasey grass," a native of South America; it has now been introduced into North America and South Africa. L. A. M. Riley supplies notes on the flora of Rapa Island, visited by the *St. George* during the Pacific Expedition, 1924-5. Rapa is 250 miles to the S.E. of the Australs, and of the seventeen species collected there, four are apparently new to science. Under the heading "Spolia Mentawiensia," Mr. C. Boden Kloss states that it is proposed to give an account of the results, mainly zoological and to be published in various journals, which were obtained by a collecting expedition in 1924 in the Mentawi group of islands to the west of Sumatra. A beginning is made by an account of the flora by Mr. H. W. Ridley. Mr. W. B. Turrill has some notes on the flora of the nearer East in the same number of the journal.

MAGNETIC OBSERVATIONS.—The March issue of the *Journal of the Washington Academy of Sciences*, 16, p. 109, 1926, contains an interesting lecture on "The Magnetic and Electric Survey of the Earth, its Physical and Cosmical Bearings and Development," by J. A. Fleming, of the Department of Terrestrial Magnetism, Washington. The lecture sketches very briefly the historical development of terrestrial magnetic and electric observation up to its present extensive and detailed though still incomplete stage. There are now about fifty active magnetic observatories, of which less than 20 per cent. carry on electric work; 40 per cent. are in Europe, and less than 20 per cent. in the southern hemisphere. The polar regions are naturally very scantily supplied, a most regrettable fact in view of the interest and importance of the auroral and magnetic phenomena which there attain special intensity. As regards the general magnetic field, even in well-surveyed regions magnetic observations must be continually repeated at regular intervals in order to keep the magnetic charts up-to-date, on account of the rapid and incalculable secular variations in the earth's field: these changes are complicated even over the deep sea.

COLORIMETRY.—A considerable portion of part 2 of volume 27 of the *Transactions of the Optical Society* is devoted to the methods of specifying and matching colours, and Mr. J. Guild, of the National Physical Laboratory, adds considerably to our knowledge of the theory and technique of the subject by his three papers. The standard method of specifying a colour

is by the amount of each of three chosen primary colours' which, when mixed together, match the given colour. Mr. Guild points out that so long as the three primary colours produce white when properly mixed, no special significance attaches to the particular colours chosen, but for convenience he uses a red of wave-length 63×10^{-6} cm. obtained by a Wratten No. 71 filter, for the green a wave-length about 54×10^{-6} cm. obtained by a Wratten No. 62, and for the blue a wave-length 45×10^{-6} cm. by a Wratten No. 49 B filter. For colours of high spectral saturation which are not conveniently dealt with by the trichromatic instruments, Mr. Guild has devised a monochromatic plus white colorimeter which retains the advantage of using spectral colours.

COLOUR KINEMATOGRAPH FILMS.—The method of producing colour kinematograph films by the 'Technicolor' process was described by Mr. Leslie Eveleigh at the Royal Photographic Society on March 30 (*British Journal of Photography*, April 9, p. 215). It is a two-colour process, using standard film, and the pictures are projected by the usual standard apparatus. The colour records are taken alternately by means of a camera that has a prism light-divider behind the lens with an orange-red filter for one and blue-green filter for the other, the two images being foot to foot, that is, the images of one colour being erect, while those of the other colour are upside down. A specially exact perforating machine has to be used to ensure a sufficiently perfect registration of the subsequently superimposed pictures. In printing, the negative is shifted two spaces and the positive one, so that only the red sensation pictures are printed, and then, on another film, the blue-sensation pictures are similarly printed. The two positives, before development, are brought back to back, the cementing liquid is sprayed on to them, and by pressure they are firmly cemented together. The compound film is then developed, washed, dried to a tacky condition, and passed over the surfaces of the necessary dye solutions, first one surface being dyed red and then the other surface dyed blue. Excess of the dye solutions is removed by suction, and when dry, both sides are sprayed with varnish, and the protection so afforded is so complete that the final film may be soaked in water for even two hours without damage. The cost is about 3d. a foot, while the ordinary monochrome film costs 1½d. a foot.

'CREEP' IN METALS.—Two communications to the recent meeting of the Institute of Metals deal with the subject of 'creep.' R. W. Bailey, from an examination of data obtained by several different investigators, comes to the conclusion that for most, if not all, metals the relation between the time t taken to produce a specified softening of the cold-worked metal and the temperature θ at which it occurs has the form $t = t_0 e^{-b\theta}$, b being of the order of 0.05 for a variety of metals. It is independent of the condition of the metal, but t_0 varies with the condition. The results suggest that creep should not occur under stresses below the elastic limit. H. J. Tapsell and J. Bradley, experimenting with a 70:30 nickel-copper alloy containing 2.35 per cent. of manganese, find that this alloy, whilst inferior to an alloy of nickel and chromium, gives very satisfactory results of mechanical tests at high temperatures. The limiting stress which will produce creep is in these experiments much above the elastic limit, except at high temperatures, but it is of course very difficult to decide whether creep is actually occurring when its amount is small, and experiments may measure rather the accuracy of the apparatus used than the true limiting stress. The alloy gives good impact tests even at 700° C.