

Research Items

Man or Ape? In view of the difficulty which has been felt in determining the position of the Taungs skull in relation to man and the anthropoids, Dr. Paul Alsberg of Berlin puts forward in *Man* of October a suggested criterion for deciding on biological lines whether in an indeterminate instance, such as the Taungs skull, the specimen is to be assigned to the human or anthropoid branch in the line of descent. Biologically, man and the animal develop on diametrically opposite principles. The animal develops by physical or organismal adaptation, man by extra-physical or non-organismal adaptation, that is, by the liberation of the body from the necessity of adaptation through extra-physical means, for example, tools. The animal possesses a perfect body with manifold structures for offence and defence; while man's body is utterly defenceless and helpless. His technique develops and replaces his adaptation to Nature; and as evolution proceeds, his technique becomes more perfect, while his body becomes more and more deficient. The development of technique is not limited to tools, but is also revealed in the mental province, being responsible for the development of the word, speech and the concept, the basic element of thought. Further, the body, owing to the use of tools and the principle of body liberation, has suffered both regressive and progressive changes, such as the retrogression of the jaws, or the modifications produced by upright walking, the improvement of the hand, the development of the speech organs and the enlargement of the brain. The ape, on the other hand, has taken the line of animal adaptation. Thus the ape's hand, originally better adapted for tool using, developed for climbing. Again, the upright gait is bound up with the fight principle, but while the gorilla developed or retained equipment for fighting, man did not. Judged by these criteria, a border line case such as *Pithecanthropus erectus* is definitely human, while the Taungs skull points in the human direction.

The Later Stone Age in Northern Ireland. The first of a series of projected papers by Mr. C. Blake Whelan, dealing with the place of the stone age of northern Ireland in a provisional synthesis of late mesolithic and later stone age industries, has appeared (*Proc. Roy. Irish Acad.*, 42, Sec. C, No. 7). While a number of closely related mesolithic industries are differentiated as 'pseudo-Campignian', 'pre-Campignian' or 'proto-Campignian', as well as Campignian, the value of the Continental material is affected by the fact that this shadowy sequence has not received clear stratigraphic confirmation. In Northern Ireland, however, such a stratification is to be found in the Northern Irish coastal sites. These sites are now being investigated by the Harvard University Archaeological Mission, which will test the provisional conclusions to be advanced here. It would appear that from the earliest stages of the Littorina transgression, a succession of differentiated, but related, littoral cultures, emanating from some eastern focus over a prolonged period, reached the Irish shores. However marked the separation of these industries in facies and time, there is a technical continuity which is unmistakable. The groups represented comprise analogues of the Orwell Estuary industry called "Magdalenian", the so-called "Azilian" of

Campbelltown raised beach, the pseudo- and pre-Campignian of the French sites, certain Portuguese Asturian forms, the shell-mound industry of Denmark and lastly the classical type station of Campigny. The Campignian site of Ballynagard, Rathlin Island, is now described. Here with characteristic implements of pure Campignian facies the author has discovered locally polished axes associated with pottery of veritably Windmill Hill type. Ballynagard is thus brought within the great western culture group of the neolithic, exemplified in the ceramic groups of Windmill Hill, Chassey (France) and Michelsberg (south-west Germany).

Fish Eggs and Larvæ from the Java Sea. Under this title, Dr. H. C. Delsman continues his studies on the eggs and young of fishes (*Treubia*, 14, No. 2, 1933). Eel eggs are fairly common in the surface catches with the egg net and may be recognised by their large size, segmented yolk and spacious egg membrane. The most numerous are those without an oil globule, which probably for the greater part belong to the many species of *Muraena* inhabiting especially the coral reefs. Those eggs which possess an oil globule are very interesting, hatching out into larvæ developing black spots ventrally, similar to those studied by Raffaele, Einigmann and others and shown to belong to larvæ of different species of ophichthyids. One of these in the present material is probably *Ophichthys macrochir*. If this be correct, there must be a forward movement of the anus over a distance of at least ten vertebræ. A similar conclusion was reached by Schmidt and by Grassi for *Ophichthys (Ophisures) serpens* from the Mediterranean. Other eggs and larvæ possibly belong to *Pisöodonophis*, the commonest ophichthyids along the coast of Java. Here again a forward shifting of the anus over several vertebræ must take place. Amongst the clupeoid eggs is a large one, found in brackish water, probably a species of *Alosa*, two of which (known as *trubuk*) occur in the river mouths of Sumatra and Borneo. These are related to the shads, but unlike them, appear to spawn in brackish instead of fresh water and have several oil globules in the eggs and newly hatched larva, the ovaries of the *trubuk* being rich in oil.

Cyclostomes. A concise systematic survey of the Cyclostomata is given by Dr. M. Holly in "Das Tierreich", 59 Lief., pp. xii + 62 (Leipzig and Berlin: Walter de Gruyter und Co., 1933). The class is defined and the chief anatomical characters are briefly described. The classification follows on recognised lines into two orders, two families, eleven genera and forty-one species, the discrimination of which is aided by the usual tabular keys. Two other species are regarded as doubtful. The work is illustrated by 57 figures in the text.

Chromosome Division in Grasshoppers. There is some divergence of opinion regarding the behaviour of the chromosomes of the grasshopper and its interpretation, and an investigation by T. Ramachandra Rao upon the spermatogonial divisions of *Aularches miliaris*, supports the observations of McClung and others (*Proc. Indian Acad. Sciences*, 1, No. 1, 19; 1934). The rod-shaped chromosomes numbered 19, a standard number for the males of all the members

of the sub-family Pyrgomorphae. Individual chromosomes are built of fine threads—the chromonemata—and these are double in the telophases, become very thin and reach the limit of visibility during the resting stage, and show a spiral structure in the prophase. Each chromosome is confined to a chromosome vesicle, formed in the interphase owing to the limited centrifugal movement of the chromosome matrices, and it is after the gradual thickening and uncoiling of the chromonemata leading to the late prophase chromosomes that the vesicles break down.

Common Weeds of the Chicago Region. A very attractive booklet on "Common Weeds" by Paul C. Standley, associate curator of the Herbarium, has recently been issued by the Field Museum of Natural History, Chicago. Though it is interesting to note that several of the plants described are found as weeds in Great Britain, most readers will be struck with the high pictorial quality and attractiveness of the illustrations, of which there are twenty-seven. The printed descriptions are short, and describe the most-favoured habitat of the species, the country of origin if introduced, and the manner of seed dispersal. No attempt is made to deal with methods for the eradication of weeds; indeed the author is intent on mentioning any possible use the plants may have. Many people will be interested to know, for example, that the leaves of the yellow dock, which is the same species as our English curled dock (*Rumex crispus*), can be gathered in spring, and cooked and eaten as greens.

Fermentation of Mushroom Hotbeds. The use of fermenting manure as a source of heat for the cultivation of mushrooms and other crops has been a standard horticultural practice for a long time. Successful hotbeds require skilled compounding and attention, but little is known about the bacteriology of the process. An article on the "Distribution of Oxygen and Carbon Dioxide in Mushroom Compost Heaps as affecting Microbial Thermogenesis, Acidity and Moisture therein" by Edmund B. Lambert and A. C. Davis (*J. Agric. Research*, 48, No. 7, 587-601, April 1934) reports a preliminary study of the process of fermentation. It was found that in general, fermentation is anaerobic below a foot from the top of the heap and three feet of the sides. The highest temperatures were found 1-3 ft. from the top and 2-4 ft. from the sides of the heap. Compost in the anaerobic part of the heap tends to be acid, whilst aerobic conditions produce alkalinity. The introduction of ventilating tiles at ground-level permits air to enter the central parts of the heap, and raises the temperature there. It is not known if this will improve the yield of mushrooms; but it opens up interesting possibilities for the control of insect pests which flourish in the cooler places at the base of the heap.

Cultivation of Animal Fodder. The Imperial Bureau of Plant Genetics has just issued a new booklet in the Herbage Publication Series, "Grassland and Forage Crops in Thuringia, Czechoslovakia and Hungary" (Bull. No. 15, 3s. 6d.) The area under review is situated in long. 10°-23° E., lat. 46°-51° N., the type of fodder cultivated depending on two chief factors, namely, climate and elevation. The climate may be divided into two main types, the maritime

(Atlantic) and the continental (Russian). Two important continental areas at low elevations and with rich soils are the Alföld and Thuringian Basin, and it is here that the most important lucerne strains are to be found. The chief aim in the breeding work in these districts is the maintenance of high yield combined with the ability to withstand excessive cold and drought. At the other extreme as regards altitude are the mountain pastures of Thuringia and eastern Czechoslovakia (Slovakia and Sub-Carpathian Ruthenia), where the economic problem is the substitution of the *Nardus stricta* and related poor quality swards by better quality grasses capable of persisting under these conditions. The articles on each district have been prepared in collaboration with acknowledged authorities in the region concerned. It is hoped to extend these studies to other European countries in which the cultivation of animal fodder represents an important part of the national economy.

The Development of the Rhone Delta. In 1930, Mr. R. D. Oldham showed that the present deltaic character of the Lower Rhone was a very late development in the evolution of the river. He is now able to give an outline of the whole history of the Lower Rhone (*Quart. J. Geol. Soc.*, pp. 445-461; 1934). In the Pleistocene, the river had already established its course through a gap between the Alpine and Beaucaire hills, but the present channel through the delta was not open, as a barrier blocked the way and forced the stream westwards. About 600-700 B.C., changes of level occurred which resulted in the formation of a lake (Accion) and involved the submergence of the lowlands near the sea. Some time after 500 B.C., the river built up its channel across the Accion, and floods rose higher against the banks until the barrier was overtopped a little upstream of Arles. A new channel to the sea was thus formed and by 218 B.C. it had become well established. In the eighth century of our era, a fresh movement brought about a subsidence of 15-20 ft. along the line of this new eastern channel, with consequent changes in its course as the flooded areas were gradually reclaimed by river silt. Along the older western branch a more direct channel to the sea was opened up past Albaron and the older course became blocked up and was abandoned. The delta of the Rhone may be said to have begun at this time, since when its development has been normal except in so far as it has been recently controlled by embankments.

Plessey Coal Seam, Northumberland. The Department of Scientific and Industrial Research has issued Paper No. 34 of the Physical and Chemical Survey of the National Coal Resources, dealing with the Plessey seam in Northumberland (London: H.M. Stationery Office. 2s. net). This seam, though only of comparatively limited area and low down in the series, is especially valuable because, as the report states, it yields a good quality of clean hard coal, hard enough to stand transport, and it is, therefore, mainly marketed as a steam and bunker coal. As it is a dull coal, it is not much used for household purposes. The report gives a full account of the seam and its properties, shown by fourteen analyses of samples of the coal together with some four special analyses. The report is of course mainly of interest to the few collieries working this seam, but may attract wider notice through the fact that this seam played an important part in the history of the

Northumberland coalfield and really started coal shipments from the port of Blyth, which has now become a very important coal-shipping centre.

Meteorology of Greenland. Geophysical Memoir No. 61 of the Meteorological Office, Air Ministry, is the fullest account that has yet been given of the meteorological results of the British Arctic Air-Route Expedition, 1930-31. The available material has been worked up by Mr. S. T. A. Mirrlees, of the Meteorological Office. The expedition was not, of course, undertaken with the view of finding out more about the part played by the high land mass of Greenland in the formation and behaviour of the depressions of the North Atlantic, and its significance in connexion with the streams of cold air that spread down from the arctic regions and are responsible for so many of the spells of cold weather in Europe that are initiated by strong winds or gales from between west and north. Nevertheless, to meteorologists this is perhaps the most important problem that the observations might help to solve. The expedition maintained a base station near the head of a fjord not far from Angmagssalik, in East Greenland, from August 1930 until July 1931, and for part of that time on the inland ice-cap at lat. $67^{\circ} 3' N.$, long. $41^{\circ} 49' W.$ Mr. A. Courtauld performed a remarkable feat of endurance by maintaining, alone, all the observations at this inland station from December 5 until March 20, and—after being snowed up—took indoor observations until May. It is difficult in a short space to give a proper idea of the knowledge gained; some of this is of a negative character; for example, the failure to correlate the violent northerly hurricanes experienced at the base station with subsequent gales in the Atlantic. These hurricanes were thought to be only partly katabatic, and, as happens with katabatic winds in some other parts of the world, are usually associated with a pressure gradient having the appropriate direction and yet cannot be relied on to appear when such a gradient is present. The cup anemometer at the base was blown away in one of these, after recording a speed of 129 miles an hour. The main object of the expedition led to particular attention being paid to visibility. On the ice-cap, this was often bad near the ground owing to drifting snow, but on one occasion a cape 220 miles away was identified by an observer in a seaplane, and on another visibility aloft was 180 miles, these observations both being made at 10,000 ft. in late summer.

Accurate Wave-Lengths in Stellar Spectra. Dr. S. Albrecht has published the results of a detailed study of Procyon with a three-prism spectrograph at Yerkes Observatory (*Astrophys. J.*, 80, 86). The object is to obtain accurate wave-lengths of as many spectral lines as possible for use in determining radial velocities of stars of similar spectral types ($F5$ dwarf). The wave-lengths in stellar spectra cannot be computed from laboratory values, since, owing to the comparatively small dispersion used, a large number of the observed lines are blends of two or more lines in unknown proportions, and must be measured directly in the stellar spectrograms. Wave-lengths are given to 0.001 Å. for 1,094 lines (about one third of which are due to Fe) in Procyon. The probable errors, intensities, widths and identifications (when possible) are also given, together with all data which would be necessary if a future rediscussion of the wave-lengths and radial velocities should be desirable.

The work is a continuation of a series of similar studies of standard stars covering classes A_0 to M_b , the first of which (on γ Geminorum, class A_0) was published in 1930.

Dissipation Constants of Solids. If a bar of carefully annealed aluminium is held in the middle and one end is struck, the sound emitted can be heard for a minute afterwards. If the same is done to a bar of lead, no musical note is emitted. There is therefore a great difference in their behaviour towards mechanical vibration. In the case of aluminium, the energy is gradually radiated into the air. In lead the vibrations die out so quickly that within one tenth of a second of being struck the displacement at the end of the lead bar is reduced to about one millionth of its original value. Researches on this subject described in the *Bell Laboratories Record* of August by H. Walther show how to distinguish between the way bodies act in this respect by means of a 'dissipation constant'. The results show that typical solid materials have a wide range of values for this constant. In some cases the results are surprising. For example, of two bars of steel identical in size, shape and composition, one of which is hardened by heating and quenching and the other softened by careful annealing, it is found on tapping their ends that it is the soft one that rings the longer. The constants for most solids lie between the two extremes of lead and aluminium. The figures given indicate orders of magnitude rather than specific values, since for a given material appreciable variation is possible under various conditions of internal strain. It is curious to notice that the order in the list given seems to bear no relation to other physical properties of the body. Carbon and tin have much the same values for the dissipation constant, but their melting points are very different. Zinc and glass differ greatly in hardness and electrical resistivity, but their dissipation constants are nearly the same.

Fatigue Properties of Patented Steel Wire. The importance of the surface condition on the fatigue resistance of steel has been shown conclusively in several recent publications. The importance of this in the production and use of steel wire has led E. T. Gill and R. Goodacre (*J. Iron and Steel Inst.*, 130, Advance Copy; 1934) to undertake a comprehensive study of the effect of decarburisation with the aid of the new Haigh-Robertson fatigue testing machine. They have shown that the effect of the decarburised surface, especially for higher percentage reductions by drawing, is sufficiently great to obscure completely the effect of the carbon content. The removal of this skin results in the fatigue limit increasing, as would be expected, as the carbon content of the steel is raised, but not to so great an extent as does the tensile strength. Under certain conditions, the fatigue properties have given an indication of the stage at which overdrawing of the wire occurs, but much more work is required before any generalisation is possible. An interesting feature of the work is the suggestion that the endurance properties of wire under high stresses undergo critical changes at certain reductions of area, an effect to which the authors are inclined to ascribe certain unexpected failures in wire ropes. They also make the interesting suggestion that although the fatigue limit of wire free from decarburisation is higher than that of decarburised wire, the endurance at stresses higher than the fatigue limit, at any rate in some cases, may be less.