Research Items

Yurok Marriage. From an analysis of a large number of genealogies of the Yurok of the lower Klamath River, north-west California, Messrs. T. T. Waterman and A. L. Kroeber have compiled a marriage census, which reveals some interesting facts relating to their marriage system and incidentally affords an example of a mechanism by which a patrilineal culture might become converted to a matrilineal (*Univ. California, Pub. Amer. Archæol. and Ethnol.*, **35**, No. 1). Two types of marriage are recognised, 'full marriage' and 'half-marriage'. In the former the man 'pays' for his wife and takes her to live in his town and his house. In 'half-marriage', the man pays less, normally about half the value of his bride, and goes to live with his bride, either in her father's house or nearby. He is more or less under his father-in-law's direction and the children belong to his wife's family, their bride-price or any blood money going to his father-in-law, or in the event of his decease, to his wife's brothers. In 'full marriage' the children belong to the husband, and he retains them in the event of divorce, if he refuses to accept the refund of the marriage payment. 'Half-marriage' is perfectly legitimate and carries no disapprobation ; but it indicates a lack of wealth and connotes a relatively low social standing in a society which equates wealth and rank. The census count shows about 23 per cent of marriages of the half-type, suggesting that either the plebs was small or that only part of it 'half-married'. In fact, it is clear that 'full marriage' was of greater frequency than the incidence of aristocracy. It is also evident that the influence of social status was sufficiently strong to lead to the avoidance of 'half-marriage' except from necessity. Mere economy was no adequate motive. In certain cases, however, wealthy parents without male children might persuade a son-in-law to live with them on condition that he became the heir, and a declaration making this clear accompanied the acceptance of the half-payment.

Some American Gobies. Mr. Isaac Ginsburg gives a detailed account of certain gobies, very common on the east coast of the United States as well as on the coast of the Gulf of Mexico, which are important members of the littoral marine fauna (*Bull. Bingham Ocean. Coll.*, **4**, Dec. 1933). In the genus *Gobiosoma* there are no scales (except for two scales at the base of the caudal fin in two sub-genera) and hitherto the common species have been separated into two only, according to the geographical range, one from the Atlantic coast of the United States and one from the Gulf Coast. It is here shown that several species are represented, three of which are common on the east coast of the United States, and their ranges overlap freely : *Gobiosoma ginsburgi* from Massachusetts to South Carolina, *G. bosci* (including *molestum*) from Long Island to Mexico, and *G. robustum* from Florida to Brazil. Closely related genera show a complete transition to the scaleless forms. Thus in *Aboma* the body is entirely covered with scales ; in *Garmannia paradoxa*, the genotype, the scales are present only on the posterior half, from a line somewhat behind the origin of the second dorsal ; in *Tigrigobius* (established originally as a sub-genus of *Gobiosoma*) the scales are still further reduced to a small patch on the caudal peduncle, and four scales on the caudal fin at its base (the four scales being also present in

Garmannia) ; in *Gerhardinus* as well as *Dilepidion*, here regarded as sub-genera of *Gobiosoma*, the scales are reduced to two on the caudal fin at its base. A study of sex ratio in the commonest species shows that there is a preponderance of males in the catches, but, as is explained in the text, this may be due to the smaller size of the females.

Variation in American Fresh-water Gastropods. An intensive study of variation in *Goniobasis virginica* and *Ancula carinata* under natural conditions by Joshua L. Bailey, Jr., Raymond Pearl and Charles P. Winsor is published in three parts in *Biologia Generalis* (Band 8, Lief. 2 (Schlusslief.), 1932 ; Band 9, Lief. 2, 1933 and Band 9, 2 Hälfte (Verslugs–Festschrift), 1933). For this elaborate work two North American molluscs, closely related but belonging to distinct species, are chosen, both of which vary greatly under normal conditions in their natural habitats. The problem was to find the extent or degree of variation in both species in different defined localities within a small defined geographical region, and the relation between any local differences which may be discovered in these forms and measurable factors in the narrowly delimited local environment. The authors conclude that erosion is probably primarily physical, being caused by the silt particles carried by suspension in the water, and that the larger the snail the greater the erosion. Also that the size of the shells seems to be influenced by chlorine, but to a larger extent by the food supply, and that the silt in autumn tends to affect the size adversely, being finer at that time of year and lessening the growth of the algal food and also not being so effective a triturating agent in the stomach of the snail as are the larger sand particles deposited in the earlier part of the year.

Recent and Fossil Foraminifera. Both recent and fossil Foraminifera are dealt with in two of the latest parts of the "Discovery" reports (vol. 3, 1933, "Fossil Foraminifera from the Burdwood Bank and their Geological Significance" by W. A. Macfadgen and "Foraminifera, Part 2, South Georgia" by Arthur Earland). Mr. Earland continues the account of the recent forms. The first part having described the bottom deposits from the Falkland Islands and adjacent area, the present part is on those of the islands of South Georgia and the outlying Shag Rocks, situated some 800 miles to the eastward of the Falklands in the Southern Ocean. He finds the two areas very different although there is no great difference in latitude. South Georgia, lying outside the influence of the Pacific warm water and surrounded by the cold antarctic current flowing northwards, is within the region of the pack-ice, and rises more or less abruptly from deep water, the coastal deposits and bottom faunas being quite unlike those of the Falkland Islands. Many of the species in the coastal fauna are of a distinct type and several are new, while in the deeper water they are more or less identical with those at similar depths in all seas. The existence of really siliceous Foraminifera, except fossil forms, has always been a matter of uncertainty but is shown by Mr. Earland to be a fact, the author defining the term 'siliceous' as meaning "capable of resisting the action of strong acids

without structural change". Three of these acid resisting species have been found in the South Georgian material.

Guinea Worm in China. The occurrence of guinea worm, *Dracunculus medinensis*, in China, has apparently been reported only once, namely, in the tarsus of a horse in Tientsin in 1888, but as the horse had been brought from India it was uncertain where the worm had been acquired. In a recent issue of the *Chinese Medical Journal* (**47**, No. 11–12, 1933), dedicated to the memory of the late Prof. Fülleborn, H. F. Hsu and J. Y. C. Watt record observations on two dogs, both born in Peiping, which were found respectively in August and September 1933 to be harbouring guinea worm. In the first dog, which was one year old, four female worms were present, their anterior ends being observed respectively in the lower jaw, between the toes of the left fore foot, between the toes of the right fore foot and in the lower part of the left hind leg. The first of these worms was discharging larvæ. In the second dog, one year and one month old, one female worm, discharging larvæ, was present in the lower part of the left fore-leg. In Peiping the water of ponds and lakes is frozen from December until March and the authors therefore conclude that the development of sexual maturity in the worm requires at a minimum eight months and at a maximum one year. Four species of *Cyclops* were placed in dishes with actively moving larvæ from the female worms; the larvæ entered all four species. The authors had the intention of keeping the infected *Cyclops* alive for more than five weeks to permit the full development of the larvæ and to feed the infected *Cyclops* to dogs and in this way to complete the life-cycle, but the *Cyclops* died in less than five weeks.

Distribution of Zostera. R. W. Butcher has summarised (*J. Con. Internat. l'Explor. Mer.*, 9, 1934) the present condition and distribution of the various forms of *Zostera* on the English coast. Marked diminution of *Zostera* beds has been noticed for many years in certain localities and more particularly since 1918, that is, for many years before the disease was recorded in America. While in some places the plant has disappeared altogether, in others it is the large-leaved type-form of *Zostera marina*, L., which has suffered, and this has been replaced by narrow-leaved forms usually referred to as *Zostera marina*, var. *angustifolia*, Hornem. This form is sometimes considered to be *Zostera marina* × *nana*, but the author states there is no evidence of any of the chief taxonomic characters of *Z. nana* in such plants. In several places, where an epidemic was noticed in 1931 or 1932, the plants now seem to be recovering and healthy. No evidence of the cause of the disappearance of *Zostera* is produced, though the author suggests that a change in the nature of the substratum is one of the chief contributory factors.

Coal from the Lancashire Coalfield. The Fuel Research Board has just published No. 32 of its Survey Papers, containing a detailed report upon nineteen samples from seven distinct coal seams of the Lancashire coalfield. The seams are for the most part thin but variable, and all of them appear to consist of coking coals. It may be noted that considerable attention has been paid by the Research Board to the Lancashire coalfield, no less than seven reports on this field having been already published. The seams dealt with in this report have been in part dealt with in Report No. 19, which discusses the same seams in a different area of the coalfield. The work, as usual, has been done most carefully. The samples taken are in practically every case pillar samples cut from the seam *in situ* and representing it from the floor to the roof, and the report gives, in addition to the approximate and ultimate analyses of the coal, the amount of sulphur present, the calorific value, the melting point of the ash, the caking index and carbonisation assays, generally as obtained by means of the Gray-King apparatus. It may be pointed out that the seams dealt with in this report are all seams in the Lower Coal Measures and one even in the Millstone Grit. It is stated repeatedly in the report that the correlation of the seams offers considerable difficulty, but the method of using spores for correlation, although referred to in Paper No. 17 and recently applied advantageously by Dr. Raistrick in the Northumberland and Durham area, does not appear to have been employed in this report.

Map Projections. The presidential address of Dr. G. S. Adams, retiring president of the Philosophical Society of Washington, appears in the *Journal of the Washington Academy of Sciences* (**24**, No. 5, May 15, 1934). The principal map projections in common use are reviewed in this address and Dr. Adams describes a series of his own solutions to the problem of providing more accurate graticules for geodetic work. They are derived by projecting from the ellipsoid of revolution on to a sphere of equal surface and thence to a plane. The plane conformal projection is developed by means of the properties of the *sm w* elliptic function to give seven conformal graticules in various polygons. Cahill's butterfly map and its gnomonic variant are mentioned. The address ends with a brief account of the various co-ordinate systems devised and computed by the U.S.A. Geodetic Survey for linking cadastral surveys in the various States; these are based either on Lambert's conformal with two standard parallels or the transverse Mercator.

Wind Tunnel Interference Effects. A comprehensive survey of the interference effects of either the rigid walls of a closed tunnel, or the free surface of an open jet, upon models of aircraft wings, bodies, or airscrews has recently been published (Aeronautical Research Committee R. and M. No. 1566; "Wind Tunnel Interference on Wings, Bodies and Airscrews". By H. Glauert. Pp. 75+34 diagrams. London: H.M. Stationery Office, 1933. 4s. 6d. net). The effects are not only discussed but also the basis of the theoretical treatment is examined critically. Experimental results are quoted when necessary to justify formulæ used, or as a derivation of empirical values which sometimes have to serve to complete theoretical analysis. These are finally summed up in tables and figures which should be invaluable to users of wind tunnels for practical application of the correction formulæ. The limited extent of the artificial stream of a wind tunnel of either type inevitably leads to some constraint of the flow and to some interference with the behaviour of a model tested. This interference could be minimised by using very small models, but it is desirable for many reasons that the model should be as large as possible. One of the most important of these is the impossibility of faithful reproduction of detail construction to very small scales. The study of wind tunnel

interference is therefore of great importance. The application of the knowledge collected and collated in this report should extend the field of investigation available to all existing wind tunnels, and it must appeal to everyone concerned with the use of this particular instrument of aeronautical research. An extensive bibliography of relevant literature is included with references to the text as necessary.

Nuclear Transmutations with Heavy Hydrogen. Two papers on nuclear reactions produced by high-speed ions of heavy hydrogen have recently appeared (*Proc. Roy. Soc.*, A, May). In the paper by M. L. E. Oliphant, P. Harteck and Lord Rutherford, diplons (H^2 nuclei) are made to collide with diplogen nuclei (used as ND_4Cl and D_3PO_4), the velocities corresponding to a maximum of 400 kv. Experiment has revealed no action when D is bombarded with α-particles or protons. With the D bombardment, there was a large emission of particles falling equally into groups of ranges 14·3 cm. and 1·6 cm. The reaction assumed for this is

$$_1D^2 + {}_1D^2 \rightarrow {}_2He^4 \rightarrow {}_1H^1 + {}_1H^3,$$

the $_1H^1$ and $_1H^3$ particles forming the two groups. There is furthermore a large emission of neutrons, apparently homogeneous in velocity, and ascribed to the reaction

$$_1D^2 + {}_1D^2 \rightarrow {}_2He^4 \rightarrow {}_2He^3 + {}_0n^1.$$

The *Physical Review* for May 1 contains a letter from G. P. Harnwell, H. D. Smyth, S. N. Van Voorhis and J. B. H. Kuper in which the production of a hydrogen isotope of mass 3 by the first of these reactions has been confirmed by a mass-spectrograph analysis of a heavy hydrogen sample which had been exposed to a heavy discharge in a 50–80 kv. canal ray tube. (See also NATURE, **133**, 413, March 17 ; and **133**, 564, April 14, 1934.) J. D. Cockcroft and E. T. S. Walton (*Proc. Roy. Soc.*, A, May) describe the result of diplon bombardment of lithium, boron and carbon at voltages up to 700 kv. Lithium gives a proton group of 30·5 cm. range, which is ascribed to the reaction

$$_3Li^6 + {}_1D^2 \rightarrow {}_3Li^7 + {}_1H^1$$
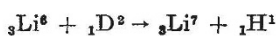
the energy changes being roughly consistent with the known masses of the nuclei. Carbon gives protons with range 14 cm. (and probably γ-rays). Boron gives particles and several proton groups with ranges up to 92 cm., these being probably due to the conversion of B^{16} into B^{11}. Investigations on a number of heavy elements gave proton groups which were probably due to adsorbed layers of impurity.

Aluminosilicate Framework Structures. W. H. Taylor has recently given an account of the aluminosilicate framework structures which include the felspars, zeolites and other crystals (*Proc. Roy. Soc.*, A, June). In these structures the silicon and aluminium atoms lie at the centres of tetrahedra of oxygen atoms, and all the corner oxygen atoms are shared between tetrahedra. All the frameworks contain as a secondary unit a ring of four tetrahedra ; most of the frameworks are three-dimensionally infinite, but in some zeolites it is probable that the framework is two-dimensionally infinite but of finite thickness. The framework constitutes an extended anion, and cations fitting into the framework may undergo isomorphous replacement of two types represented by $KSi \rightleftarrows BaAl$ and $Ba \rightleftarrows K_2$ respectively. The

latter type of replacement is only possible when there are cavities within the structure to accommodate the increased number of potassium ions. The zeolites have peculiar properties of easy dehydration and rehydration—the tetrahedral framework is not dependent on the water molecules, but the latter fit beautifully into the framework if they are assumed to have the tetrahedral arrangement of bonds suggested by Bernal and Fowler.

Electrolytic Conductivity of Alkaline Earth Chlorides. Accurate measurements of the conductivities of some uni-univalent electrolytes have confirmed the Onsager conductance formula as a limiting equation. T. Shedlovsky and A. S. Brown (*J. Amer. Chem. Soc.*, May) describe experiments with the chlorides of magnesium, calcium, strontium and barium at concentrations (C) up to 0·1 normal. The results were considered in relation to the equation $\Lambda_0 = (\Lambda + \beta\sqrt{C})/(1 - \alpha\sqrt{C}) - BC$, where B, α and β are constants and Λ, Λ_0 are the equivalent conductances at concentration C and zero concentration, respectively. This equation reduces to Onsager's equation as a limiting form ($C \rightarrow 0$). The plot of the first term on the right (called Λ'_0) against C did not give perfectly straight lines, although the systematic deviations were not large, and the values of Λ_0 extrapolated agreed with those found by linear extrapolation from plots of Λ against $\sqrt{C}$ for measurements on the very dilute solutions. The data show that the equation for finite concentrations should be $\Lambda'_0 = \Lambda_0 + BC + DC \log C - EC^2$, in which D and E are constants. This result had been predicted theoretically by Onsager as the next approximation to the limiting law. The results thus confirm the Onsager equation as a limiting law for these electrolytes (bi-univalent). A relation with the sizes of the ions is also found.

Analysis of Stellar Variations. A new method of analysing stellar variability has been suggested by Prof. E. A. Milne (*Mon. Not. Roy. Astro. Soc.*, **94**, 418 ; 1934). Although intended originally to apply to pulsating variables of the Cepheid type, it promises to be of great value in the case of variable stars of all types. It is based on the theoretical relationship between radius (r), luminosity (L) and mass (M). In the case of any individual star, M is obviously constant, and if simultaneous observations of r and L are made, a characteristic curve may be plotted showing the relative variations of these quantities. Actually r and L are not observed directly, but r may be deduced from observed radial velocities by integrating with respect to time (after allowing for the velocity of the centre of gravity of the star and for the differing velocities of approach of different regions of the disc) if an approximate mean value of r is assumed. L is derived simply from radiometric observations. It is suggested that $\log r$ be plotted against $\log L$, giving a characteristic curve which (in the case of regular periodic variables) will be a closed curve approaching the elliptical in form. Such curves give considerable insight into phase relations and the period-luminosity law. They also illustrate in a striking way certain features in pulsating variables, such as the coincidence of maximum L with maximum surface velocity. Some preliminary applications are made by the author, sufficient to show it possibilities in increasing our understanding of the nature and origin of stellar variation.