

Research Items.

SKELETAL RECORDS OF MORTALITY.—An investigation in which the method is at least as interesting as the results, recorded by Prof. T. Wingate Todd in the *Scientific Monthly* for June. Since 1912 the anatomical laboratory of Western Reserve University has preserved the skeletons of all subjects, of both white and negro stock, delivered to the medical school, together with a record of the age of each individual. An intensive study of this material, now 1400 specimens, with the view of determining appearances related to age, has made it possible to fix more accurately than hitherto the age at which death took place in any individual case, by an examination of the skeleton. It thus becomes possible, by applying this method to the study of skeletal remains for which a record of the age of death is not available, to determine with approximate accuracy the incidence of mortality. For the present investigation an examination has been made of the material already mentioned in the Medical School, West African skulls in the Royal College of Surgeons, the Tasmanian skulls in the same collection, bronze age skeletons from Furness, medieval remains from Scarborough, and skeletal material ranging in date from A.D. 800 to A.D. 1000 from Pecos in New Mexico. Data for Rome and the Roman colonies in Africa and Spain for comparative purposes are taken from Macdonell's study of expectation of life in Rome, which was based upon the epitaphs of the "Corpus Inscriptionum Latinarum" of the Berlin Academy. In each case interesting results emerge, but the general conclusion is perhaps most significant. The data relating to primitive and early races alike fail to show the peak of death in senility which Pearson found in the mortality curve for England. The peak of mortality occurs at a moderately early age. The peak of old-age death is therefore a comparatively modern achievement resulting from greater safety and improved conditions of living. It differs from the peak of mortality in early and primitive peoples by roughly thirty years.

ANTHROPOMETRY OF NORTH AMERICAN INDIANS.—A continuation of Dr. Aleš Hrdlička's catalogue of human crania in the United States National Museum has been published as vol. 69, art. 5 of the *Proceedings of the Museum*. This part is the second to be issued, the first having appeared in 1924 as art. 12 of vol. 63. It covers: Algonkin and related Iroquois (563 crania), Siouan (285 crania), the Caddoes (15 crania), the Salish and Sahaptin (15 crania), the Shoshonean (69 crania), and the Californians (403 crania). In addition the author's records of crania in other institutions have been added. Of the different strains, the Algonkin shows almost throughout a distinct physical character, coinciding almost exactly with the linguistic family; while the Iroquois, though of different linguistic stock, and including some heterogeneous elements, are radically of the same physical type—dolichocephalic to mesocephalic, with high vault, medium to large face, medium to low orbits, and medium to relatively narrow nose. The Sioux type, one of the best differentiated on the continent, has a mesocephalic skull of moderate to good size, a remarkably low vault—met with only in Athapascans and north-west coast tribes, and distantly among the Mongols—large face and jaws, medium to high orbits, and is mesorhine. The Californian tribes show considerable uniformity, are practically identical with the Shoshonean, and exhibit no traces of extraneous (non-Mexican) influence.

THE THAMES AND THE RHINE.—The belief that the Thames and other English rivers were once tributaries

of the Rhine and that the combined rivers flowed northward to the Arctic Ocean over a plain now occupied by the North Sea, has long been accepted. Jukes Browne put the Arctic outlet north of the Shetlands; Clement Reid put it nearer the Humber; and there have been other modifications in detail. Prof. J. W. Gregory re-examines the problem in an article in the *Geographical Journal* for July, bringing new evidence from the fauna of the rivers and the hydrography of the North Sea. His paper is full of detail and can only be followed with the help of its maps, but the conclusion at which Prof. Gregory arrives is that the Thames did not join the Rhine but turned south through the Dover gate and west along the course of the present English channel, joined by the Hampshire rivers and the Seine. The Rhine flowed through the Zuyder Zee and was separated from the Thames by a land barrier in the North Sea plain now recognisable as a rise on the sea floor, which Prof. Gregory terms the Haisboro-Terschelling rise. The rivers of the Wash and Humber probably joined the Rhine, which flowed westward of the Dogger Bank into the sea and possibly continued to the Norwegian trench. In either case, it would not have been connected with the rivers of Scotland. It is suggested that the land extended northwards only to the 40-fathom and not the 100-fathom line.

AUSTRALIAN AGRICULTURAL RESEARCH.—F. L. McDougall and A. S. Fitzpatrick, in Vol. 10, No. 2, of the *Scottish Journal of Agriculture*, give an account of agricultural research in Australia. The problems of the country are extremely diverse on account of the wide range in the climatic conditions and the variety of industries which are therefore possible. Both agricultural and pastoral industries have increased enormously in the last few years, but as hitherto farming has been on an extensive rather than intensive scale, and as only a small proportion of workable land is actually under cultivation, the scope for future development is large. The chief industry is wool production, and attention to sheep breeding on scientific lines has resulted in a striking increase in the yield of wool; for example, the average weight of fleece per sheep in 1850 was less than 4 lb., whereas in 1925 it averaged 7.69 lb. Wheat growing is the second important industry. Improvements in plant breeding and better methods of dry farming have considerably extended the wheat belt, and the possible wheat-growing area is now estimated at double that at present bearing that crop. Fruit affords many specialised problems. Besides investigations on diseases and insect pests, the suitability of various soils for irrigation and the study of the effect of green manuring on soil fertility are two of the more important lines of work. The biological control of serious weeds, such as the prickly pear, by means of the introduction of certain insects, seems to be proving entirely successful. Dairying, another important industry, can be carried on throughout almost the entire country; similar problems can, therefore, be studied under widely varying climatic conditions. Deficiency in the mineral content of pastures is thought to have a possible correlation with a number of animal diseases, and owing to the importance of the meat export trade the question is being thoroughly investigated. Research is being conducted under two organisations working in close collaboration, namely, the Commonwealth Council for Scientific and Industrial Research, which deals with the scientific aspects of the industries, and the Development and Migration Commission, which is concerned with the economic conditions of the country.

THE LIMBS OF CRUSTACEA AND TRILOBITES.—In their recent paper on the feeding mechanism of a mysid (*Trans. R. Soc. Edin.*, vol. 55, 1927) Prof. H. G. Campbell and Miss S. M. Manton criticise Storch's views of the evolution of the feeding limbs of the Crustacea and Trilobites. While Storch considers the primitive crustacean feeding limb to have been a phyllopodium similar to that of the Anostraca, and to have functioned essentially as a filtering mechanism, they suggest that the primitive limb was a biramous paddle such as occurs in the posterior trunk segments of *Lepidocaris*. From primitive articulates possessing biramous limbs the authors consider that the Branchiopoda and other Crustacea evolved from forms in which the limbs projected ventrally from the body in two parallel series, while Marella and the Trilobites arose from forms in which the limbs projected laterally. Among the Crustacea the endopodite became a foliaceous swimming organ in the Branchiopoda, while in the Malacostraca the exopodite developed as the swimming part of the limb, but it became whiplike. In Marella and the Trilobites the exopodite became the swimming branch of the limb. The authors agree with the usually accepted homologies of the two branches of the limbs of Trilobites; they do not accept the suggestion of Storch for the 'reversal' of the endopodite and exopodite.

A BURROWING CIRRIPEDE.—Major R. B. Seymour Sewell (*Records Indian Mus.*, 28, pp. 269-330, 1926) has made a detailed study of *Lithotrya nicobarica*, a cirripeid which burrows in coral or coral conglomerate usually in such a position that the head, or capitellum, hangs vertically downwards. The author obtained in the Nicobar Islands 65 examples of this species—the largest series hitherto obtained, and was therefore able to study the range of variation. The specimens were found to fall into four groups, which he believes to represent age-groups each corresponding to a year's growth. It would appear that the average length of life of the members of this species is about three years, but that a certain number of individuals may survive for a fourth year. Major Sewell gives a detailed description of the external characters, including the appendages, and of the alimentary tract, the nervous system, and the reproductive apparatus. All the species of *Lithotrya* appear to be hermaphrodite and are probably protandrous; no complementary or parasitic males have been observed in this genus. A consideration of the changes that occur in individuals of *L. nicobarica* as age and size increase suggests that several so-called species, which have hitherto been regarded as distinct, are merely different varieties or life-phases of a single widely distributed species. The author records a distinct tendency towards 'right-handedness' in the capitellum indicated by the fact that the scales or laminae of both scutum and tergum are rubbed off to a greater degree on the right side than on the left. The greater development of the longitudinal peduncular muscles on the right side would seem to be associated with the 'right-handedness' since the more violent movement of this side of the body would cause a more rapid removal of the older laminae.

MARINE SHELLS FROM THE SOUTH-EAST COAST OF THE UNITED STATES.—In 1885 and 1886 the U.S. Fisheries Steamer *Albatross* made a series of dredgings off the south-east coast of the United States. The large specimens of mollusca have been already dealt with, but the examples from the fine siftings were reserved and worked at from time to time, as opportunity served, by the late Dr. W. H. Dall, the Pyramidellidae being determined by Dr. P. Bartsch. The descriptions of these are now published (*Proc.*

U.S. Nat. Mus., vol. 70, art. 18) and account for 337 species, of which 204 are apparently new. Unfortunately, none of these new forms is at present figured.

HEREDITARY OBESITY IN MICE.—It is well known that in mice, yellow is epistatic to other coat colours and that homozygous yellow mice do not occur owing to the lethal effect of the yellow gene in the homozygous condition. Dr. Danforth has recently shown (*Jour. of Heredity*, vol. 18, No. 4) that healthy yellow mice always become abnormally fat on an ordinary diet, this tendency being even more marked in the females than in the males. Thus yellow females are often twice, and sometimes thrice, as heavy as others. The fat is partly subcutaneous and partly attached to the viscera. The evidence indicates that the obesity is produced by the same gene which produces the yellow coat pigmentation and not by a separate factor, since no cross-overs appear. On a restricted diet the yellow mice can gradually use up their store of fat, and it is suggested that the condition is similar to that in hibernating animals which store up fat in their tissues to be used later when no food is taken. The condition is also compared with that in certain human families with a pronounced hereditary tendency to adiposity.

THE ARMENIAN EARTHQUAKE OF OCT. 22, 1926.—This destructive earthquake is described in a brief report by Prof. S. Abdalian of the University of Erya (*La Nature*, July 1). The epicentre was near Papantour in the recently depressed valley of the Chirak. Several important faults traverse this valley; one of them running close to the volcano Alaghöz (about 15,000 feet in height). In the epicentral district the ground was much fissured, and in one fissure, passing through the village of Alexandrooka, a change of level of 15 mm. has occurred, the side next the valley being depressed with reference to the side of Alaghöz. At Dharli and Kazarabad, monuments in the cemeteries were rotated on their pedestals through an angle of 43°.

ICE ON THE COAST OF FINLAND.—The distribution of ice on the Finnish coast of the Gulf of Bothnia, the Gulf of Finland, and Lake Ladoga, year by year, is recorded in a series of papers published by the Havsforskningsinstitutet of Helsingfors, entitled *Översikt av Isåona*. They cover the winters 1914-15, 1915-16, 1917-18, 1919-1920, 1924-25. Reports for the other years have already been published. In a series of maps the nature and distribution of the ice is shown during the winter months. Freezing generally begins in November, and the ice has its widest extent in March; in April conditions improve, but the break up and disappearance of the ice is slow. Some of it may be present so late as June, but as a rule it has gone before the end of May. In some years January and February are little better than March. The data on which the distribution charts are based are collected by some seventy stations along the coast and in the Åland Islands. The reports also give the air and water temperature for representative stations during the winter months.

HYDROGRAPHY OF THE LABRADOR BANKS.—The report for 1926 of the International Ice Observation and Ice Patrol in the North Atlantic (*United States Coast Guard Bulletin*, No. 15) gives an account of some oceanographical researches in addition to the itineraries of the patrol vessels and location of the icebergs. The observations for 1926 corroborate earlier ones to the effect that the density of water on the Grand Bank is usually higher along the zone of contact between

the Labrador Current and the Gulf Stream than on either side of the Gulf Stream. But this high density does not exactly coincide with the abrupt transition from low to high temperature, but lies as a rule 25 miles to 35 miles inshore of it. Since the density wall unquestionably marks the easterly and the westerly sets of the Currents, it follows that the drop in temperature of the surface water does not mark the change in direction of the current. Another section gives a summary of iceberg records off Newfoundland between 1880 and 1926, with particular reference to the past twenty-six years, the records of which are plotted on a chart. It is shown that there are no ice-free months on the steamer tracks via Cape Race and only four on the tracks between the United States and Europe.

MOLECULAR SPECTRA.—The band spectra of the vapours of sulphur, selenium, and tellurium, which were the subject of a recent paper by Prof. McLennan in the *Philosophical Magazine*, have been examined in more detail by B. Rosen in Berlin (*Zeitschrift für Physik*, 43, p. 69). The resonance series and the fluorescence and absorption spectra are similar to those found in iodine by Prof. R. W. Wood, and are likewise ascribed to a simple diatomic molecule. Addition of inert gases to tellurium does not, however, increase the number of lines obtained in resonance, as it does with iodine, but merely reduces the intensity of those already present. The analysis of these spectra gives considerable information about the forces between the two nuclei and the heat of dissociation into atoms, as well as the conditions under which Stokes's rule, that the excited light is of greater wave-length than the incident light, breaks down.

THE LIGHT FROM POSITIVE RAYS.—Prof. W. Wien has recently succeeded in photographing the first five members of the fundamental Lyman series of hydrogen in the ultra-violet light from positive rays which had passed through a perforated cathode (*Annalen der Physik*, vol. 83, p. 1). His usual technique had to be considerably modified, the pencil of positive rays being shot excentrically into the barrel of a vacuum spectrograph, where its image was thrown directly by the grating on to a Schumann plate. The calibration of the plate for quantitative measurements of intensity was effected by intercepting part of the positive rays, and measuring the current carried by the remainder to a small metal disc, the corresponding spectra being examined afterwards by ordinary photometric methods. Prof. Wien's photographs show very clearly the decrease in the luminosity of the beam as it passes away from the cathode. H_{α} and H_{β} have the same decay constant, and the failure of the classical theory of radiation from accelerated electrons is again demonstrated by the incorrect relation which it predicts between the damping factors in this case, and in the allied Balmer series. The grating used by Prof. Wien was ruled at the National Physical Laboratory, Teddington, on a blank supplied by Messrs. Adam Hilger.

PROPERTIES OF METALS AT HIGH TEMPERATURES.—Part of a research carried out at the National Physical Laboratory by Messrs. Tapsell and Clenshaw on this subject is published in a pamphlet issued by H.M. Stationery Office, price 1s. 9d. Three metals are discussed: Armco iron and two steels with 0.17 and 0.24 per cent. carbon respectively. All the more important mechanical properties have been measured up to about 600° or 700° C. Although there is no fundamentally new result, the values which have been determined for the creep and fatigue strengths at

these temperatures will be examined with care by those engineers to whom the strength of steel at high temperatures is becoming of immediate importance. So far as the limiting creep strength is concerned there is a progressive fall as the temperature is raised, for the mild steels from about 35 tons per sq. in. at 250° C. to 5 tons at 500° C. The fatigue strength falls slightly as the temperature rises above the normal to a minimum at 150° C., from ± 13 to ± 12 tons per sq. in., then rises rapidly to ± 17.5 tons per sq. in. at about 450° C., and afterwards falls off to ± 7 tons per sq. in. at 600° C., the highest temperature used. There are many useful tables of test data and curves and a continuation of the work will be looked forward to with keen interest.

METALLURGICAL MICROSCOPES.—The latest edition of the catalogue of microscopes and accessories for metallurgical work issued by Messrs. W. Watson and Sons, Ltd., contains in addition to the already well-known designs of stands manufactured by them a new model "Service" microscope with one or two novel features. Most noteworthy of these is the stage, which may be swung out so that the stand may be used to examine large metallurgical samples too heavy to be placed on the stage. For ordinary works' use this model would appear to be eminently suitable. A form of microscope designed in conjunction with Messrs. Vickers, Ltd., for industrial use is illustrated and should appeal to those carrying out routine work of a high order. A projection cabinet designed by Mr. E. A. Atkins for demonstration and similar purposes is shown, and, where foremen and others are given some idea of microstructures, this would seem to be a piece of apparatus admirably suited to its purpose.

THE THOMAS GAS METER.—This meter, made by the Cambridge Instrument Co., Ltd., and designed primarily for the accurate measurement of industrial or town gas, in terms of standard cubic feet of dry gas measured at standard temperature (60° F.) and standard pressure (30 inches of mercury) utilises the fact that the specific heat per unit volume of such gases is practically constant throughout the variations of pressure, temperature, density, and composition which occur in gas practice. The stream of gas flowing past an electric heater inserted in the gas main is heated exactly through 2° F., the difference of temperature being determined by two platinum thermometers inserted one on either side of the heater and forming two arms of a Wheatstone bridge. Under these conditions the energy input to the heater, measured on a wattmeter, is an accurate measure of the rate of flow of gas in the main. In order to maintain the bridge in balance with the two thermometers differing by 2° F., a third compensating thermometer, having a resistance equal to the difference of the first two, is inserted in the appropriate arm of the bridge. This temperature-difference thermometer also corrects automatically for variations of the water vapour content of the gas. Throughout, with varying flow, the bridge is maintained balanced and the energy input necessary to maintain the 2° F. difference of temperature varied automatically and recorded by an integrating wattmeter. If the gas flow ceases the meter is automatically put out of action. The meter is made in two standard forms—the return flow type, in which the meter is jacketed by the gas; and the vertical type, in which the meter is jacketed by a dead space containing gas. There are fourteen standard sizes, having maximum capacities ranging from 25,000 cubic feet per hour upwards. About 300 meters of this type are in use in various parts of the world.