

## Research Items.

**A BRONZE AGE TUMULUS AT DUNSTABLE.**—*Man* for February contains a report of the opening of one of the barrows (No. 5) of the "Five Knolls Tumuli" at Dunstable by the University College and Hospital Anthropological Society of London. This is the most northerly of the mounds. It is regular in shape, with a diameter of 50 ft. and a height of 5 ft. The remains of thirteen individuals were discovered. With one exception, those skeletons which showed no sign of disturbance were buried in the extended position with the head raised. The one exception was that of a female of Mediterranean type which lay in a crouched position in an oval cist cut into the chalk, the sole furniture being a flint knife. The skull showed a remarkable advanced symmetrical thinning. This feature is discussed by Prof. Elliot Smith in a note, in which he points out that this peculiarity is rare in Europe but common in the aristocracy of ancient Egypt from the third to the nineteenth dynasties. The only features common to the other skeletons from the barrow are presented by the limb bones. The cranial forms vary, though within narrow limits, being all mesaticephalic. In the lower limbs the femurs are all platymeric. Remains of two cremation burials were found, one accompanied by a cinerary urn of late bronze age type, which it may be assumed is of later date than the burial by inhumation near which it was found.

**ROCK PAINTINGS FROM THE CENTRAL SAHARA.**—Dr. P. Durand and M. L. Lavauden describe in Vol. 36, No. 5-6, of *L'Anthropologie* some hitherto unpublished rock paintings in the cave of In-Ezzan, Central Sahara, a little to the north of the Tropic of Cancer. This cave, situated in a circle of rocks from which issues a subterranean stream, is about 1700 kilometres south-east of the Straits of Gibraltar. It has been a halting-place for the nomads of the region from times immemorial. The paintings are executed in white and red, while certain missing details may once have been shown in a black which has now disappeared owing to the perishable nature of the charcoal or other form of black pigment used. The paintings are obviously of very different ages. The question of their date and affinities are discussed in an appended note by the Abbé Breuil, who classifies the pictures and inscriptions into ten categories. Of these the oldest are nude human figures, male and female, accompanied by tree or palmlike forms; one man carries a bow, and with him seem to be associated figures of oryx in white and red. A man clothed and bulls closely resemble figures of the Spanish paintings of Cogul. In another class are human forms, clothed, more schematic in design than the human figure last mentioned but with the same type of clothing, part of which is a kilt recalling the early Egyptian costume. These figures are accompanied by hounds of Asiatic type. Paintings in both white and red show Arab horsemen, hunting scenes, and a man mounted and armed with a long lance. The style, especially of the horses, suggests Sassanid art, and is evidently comparatively modern, as also are the inscriptions in Arabic. Apart from the groups which are evidently modern, the paintings present a great diversity of style and date, and morphologically recall now the art of the Bushman, now that of eastern Spain, and now that of predynastic Egypt.

**BREWING IN BABYLON AND EGYPT.**—The Society of History and Bibliography of Brewing of Berlin has recently published the results of the first of a series of investigations on beer and brewing by the peoples of ancient civilisations ("Bier und Bier-

bereitung bei den Völkern der Urzeit," 1. Babylonien und Agyptien. Berlin, 1926). The art of brewing has now been traced back to 7000 B.C., when brewing was a common household occupation of the peoples of the valleys of the Tigris and Euphrates. Dr. E. Huber shows that the beer of the day also played an important part in the social and religious life of this period. Definite rations of beer were allotted to each class of workman, and it was also used as an offering to the gods and as a diluent in medicine. The evidence in support of the cultivation and use in brewing at this time of Emmer wheat and of barley is of particular interest in view of the recent correspondence in *NATURE*. By 5000 B.C. brewing businesses existed, often on a large scale. It is uncertain whether hops were used in Egyptian times, though there is evidence of the use of other flavouring herbs such as rue and safflower. The publication is profusely illustrated with photographs of Babylonian seal cylinders, chiefly of the time of Hamurabi, and of inscriptions and bas-reliefs from Egyptian tombs. A number of the latter are pieced together to form twenty-three scenes describing the complete brewing process. Dr. M. Phillipe contributes discussions of the brewing technique of these periods.

**SCOTTISH SEA TROUT.**—In a paper on the sea trout of the River Ailort and Loch Eilt (*Fisheries, Scotland, Salmon Fish.*, 1926, 3 (June 1, 1926)) Mr. G. H. Nall summarises the results deduced from figures and tables contained in an unpublished report. 1692 sets of scales, mostly between April and October 1925, were taken from fish varying in weight from a few ounces to 12 lb., and in age from 2½ years to 12½ years. Two fish, each of 12 lb., were in their thirteenth year, having both had 3 years of parr life, 2 years in the sea without spawning, and then spawned in seven successive winters. An interesting feature was the big run of heavy fish very early in the season in fat condition, with remarkably strong growth in the opening months of the year. An examination of the scales for 'slow growth' and 'rapid growth' zones indicated that these fish started rapid growth in December or January; growth ceased on entering fresh water, although the period of heavy feeding and rapid growth for the majority of fish was between spring and mid-August. There were indications that fish of the same smolt age tend to descend to salt water in company and remain together in homogeneous shoals during early sea life. Interesting comparisons are made between these sea trout and those from other districts in Scotland, which point to the fact that the farther north the district the longer the parr life and the later the approach of maturity. In the Ailort district, two-thirds of the smolts migrated after 3 years of river life, and there was a tendency for the older smolts after migration to mature earlier in life than the younger smolts.

**MARINE BIOLOGY IN THE PACIFIC.**—In publications on "Marine Zoology of the Tropical Central Pacific" (Bernice P. Bishop Museum, Bulletin 26 and 27. *Tanager Expedition Publications* Nos. 1 and 2, 1925) results obtained on the *Tanager Expedition* of 1923-24 are given. This expedition was organised under the auspices of the U.S. Navy, the National Research Council, the U.S. Biological Survey, and the Bernice P. Bishop Museum. A survey was made of the thirteen islands of the Hawaiian group, extending north-east from Kauai to Ocean Island, and also of Johnston and Wake Islands. The work opens with an account by C. H. Edmondson of the Crustacea, in which 12 new species are described and figured and

notes on distribution given, including a considerable number of new records for the North Pacific Ocean. W. K. Fisher deals with the sea stars, describing two new species and giving valuable information on the composition and distribution of the fauna. The remaining echinoderms are reported on by H. Lyman Clark. A short account of the polychaetous annelids by A. L. Treadwell, with a description of two new species, is included; the specimens were, however, rather few owing to unsuitable methods of collection. This first publication concludes with a chapter by J. A. Cushman on the Foraminifera collected on the expedition. Photographic reproductions of some of the species described in the above articles are given. H. W. Fowler and J. C. Ball describe the fishes of Hawaii, Johnston Island, and Wake Island.

**THE CILIATED CELLS OF THE GILL OF MYTILUS.**—D. Bhatia has examined the structure of the latero-frontal cells of the gills of *Mytilus* (*Quar. Jour. Micr. Sci.*, vol. 70, Part 4, Dec. 1926). Between the corresponding cells of American species of *Mya*, *Lampsilis*, and *Quadrula*, Grave and Schmitt (1925) observed inter- and intra-cellular fibrils which they suggested represent paths for the conduction of stimuli from cell to cell and for co-ordination of the epithelium. Bhatia emphasises the importance of careful sectioning of the epithelium so as to display the whole extent of the cell and its intracellular fibrils. Each latero-frontal cell bears a pair of cilia which, as Carter showed, are loosely united. The exposed surface of the epithelium is covered with a continuous gelatinous cuticle with a wavy outline through which the cilia pass at the crests. Each cilium, which has a small microsome at its base where it enters the cytoplasm, *i.e.* immediately below the cuticle, divides into two rootlets, right and left ( $r, l$ , and  $r', l'$ ). The  $r, r'$  and  $l, l'$  rootlets gradually converge and near the nucleus fuse to form single fibrils which pass respectively right and left of the nucleus, unite in the base of the cell, and are firmly attached to the subepithelial layer. It is suggested that fibrils described by Grave and Schmitt as connecting adjacent pairs of microsomes are the inner edge of the cuticle. The author, while stating that his observations do not throw any new light on the function of the ciliary rootlets, thinks it is probable that the co-ordination of movement is effected by cell contact rather than by any specialised fibrillar mechanism.

**FACTORS OF BIRD MIGRATION.**—It has usually been assumed that either food or temperature, or a combination of both, released the migratory instinct; but a recent paper by Prof. William Rowan ("On Photoperiodism, Reproductive Periodicity, and the Annual Migrations of Birds and Certain Fishes," *Proceedings of the Boston Society of Natural History*, vol. 38, No. 6, pp. 147-189) points out that neither of these are of sufficiently regular recurrence to account for the extraordinary accuracy of arrival-date in a number of migrating species. The only environmental factor which would seem to fulfil the necessary conditions is length of daylight; and the bulk of the paper is devoted to a discussion of the possible influence of this. The author's case is of course strengthened by reference to the well-known and important discoveries concerning the influence of day-length upon plants, an influence first properly investigated by Garner and Allard in 1920. If such extraordinary effects upon rate of growth and time of flowering can be exerted by this agency in plants, there is every reason for suspecting that it may be operative in animals also. In birds it might operate directly, or indirectly through length of time available

for feeding. In addition to a critical summary and discussion, Rowan refers to the results of his experimental investigations on the subject, of which a preliminary report appeared in *NATURE* (115, 494; 1925). He has definitely established that an increase of 'day' in autumn, produced by artificial illuminations after dark, will cause precocious growth of gonads (accompanied in the males by song) in the dead of a Canadian winter, in species which normally migrate southwards in early autumn. He has further established that control birds liberated in mid-winter when their gonads were at minimum size do not migrate southwards, while light-exposed birds whose gonads are beginning to enlarge, if liberated at the same time, disappear: one may, with the author, surmise that the light has so upset their normal endocrine equilibrium that they move northwards in spite of the arctic conditions. It therefore appears quite probable that relative length of day and light, acting via the gonads, determines the onset of migration.

**LEAF STRUCTURES AND WOUND RESPONSE.**—Although the healing of wounds in stems has provided a fruitful subject of investigation for numerous botanists, wound response in the leaf has so far received much less attention, and so it is of considerable interest to read the results of Prof. R. B. Wylie's experiments (*Science*, vol. 65, No. 473, Jan. 21, 1927). He considers that the thin structure of most leaves makes them well fitted morphologically for healing, on account of the comparatively small area of tissue exposed following lesion. Wounds made on leaves by removing circular areas with a punch are first of all closed up by a pseudocicatrice formed mainly from the collapsed thin-walled mesophyll cells damaged in punching. With the collapse of the interior cells, the upper and lower epidermal layers curve over and may even overlap, thus giving the wounded leaf a rounded edge. Certain secretions such as latex, gums, and resins may add efficiency to this preliminary barricade against water loss. One of the functions of the pseudocicatrice is considered by the author to be stimulation of the underlying tissues to the development of the cicatrice proper, which is formed by what corresponds to a phellogen layer developed by tangential divisions immediately behind the pseudocicatrice. Even the highly specialised epidermal layers respond by prompt mitosis, dividing by means of vertical walls only, a phenomenon one would scarcely expect in the very thick and heavily cutinised epidermal cells of sclerophyllous evergreen types. In brief, all cell layers of the leaf blade share in building up new protective tissue, and the cicatrice proper shows greater uniformity of cell size and content than the several cell elements which through mitosis have contributed to its formation. The cell walls in the cicatrice tissue are also usually modified chemically, and very early in its development the presence of lignin can be demonstrated behind the wounded margins. Wound healing may be complete in ten to twenty days, according to the particular species involved.

**COMPASS VARIATION IN CANADA.**—Bulletin 58 of the Topographical Survey of Canada (price 10 cents) is entitled "The March of the Compass in Canada, and Daily Variation Tables." The author, W. H. Herbert, gives a very interesting and well-written account of the secular change and daily variation of the compass declination, and their importance for all who make use of the compass in practical life. For nearly all the early land surveys in Canada the boundaries were defined in the deeds by compass bearings, and in order to re-trace and re-establish

these old boundaries, and to link together old surveys, it is desirable to have trustworthy and accessible information as to the past and present secular variation of declination throughout Canada. The Bulletin, therefore, which is prepared primarily for compass users, gives tables of the declination at 126 well-distributed stations for every tenth year from 1750 onwards (when data are available) to 1900, and thereafter for every fifth year to 1925. At many of the stations the earliest data are for 1820 or 1880. These tables thus indicate the secular variation at the corresponding stations and the regions around them. Tables of the average diurnal variation of declination, which must be taken into account in accurate surveying by compass, are also given for 24 stations for the summer, winter, and equinoctial seasons. Detailed examples of the use of the tables are given. The Bulletin should interest and help all who, for duty or pleasure, have occasion to travel off the beaten track in Canada.

**GOLD COAST SURVEY.**—The Report of the Survey Department of the Gold Coast for the year 1925-26 shows a record of continued progress in actual field work, in the training of surveyors and draughtsmen and the publication of further sheets of the topographical map. The surveys are now completed of the whole of the Gold Coast Colony, the greater part of Ashanti, and the eastern part of the Northern Territories. During the present year work is on hand in the Northern Territories, the western frontier of Ashanti, and the mandated territory of Togoland. It is of interest to note that the map sheets are now all printed in Accra instead of in Britain. The report includes a layer-coloured map of the southern part of the Gold Coast on a scale of 1 to 500,000, which shows the excellence of the local colour printing and technique.

**HEATS OF ADSORPTION ON CHARCOAL.**—The heats of adsorption of oxygen, chlorine, carbon dioxide, ammonia, ether, chloropicrin, and water on charcoal at 0° have been measured by F. G. Keyes and M. J. Marshall. The ice calorimeter was employed, and the charcoal was contained in an evacuated quartz tube. In every case a large initial adsorption was noticed, which rapidly fell to a constant value with increasing concentration. Interesting conclusions are drawn from the detailed results, which appear in the *Journal of the American Chemical Society* for January 1927. The adsorbed vapour is considered to be in a special state, and only the first layer is directly influenced by the adsorbent. Because of this special state, the first layers form new adsorbing surfaces which adsorb molecules of the same kind. This special state becomes less pronounced with each succeeding layer, and finally a layer is reached in which the molecular arrangement corresponds to ordinary contact.

**PROPAGATION OF SOUND IN WIDE PIPES.**—In the December number of the *Annales de Physique*, M. Th. Vautier describes a repetition of Regnault's classical researches on the propagation of sound in wide pipes. The pipe chosen for these experiments was a conduit intended for water. It was one metre in diameter, made of cast iron, and placed under the pavement of the Cours Gambetta, Lyons. A section of this conduit, of length 1640 metres, was available for the experiments. The ends of the section were closed with wooden planks, and a gap at one end of the section allowed the insertion of recording instruments. The latter consisted either of rubber membranes or suspended mirrors or microphones, which, owing to their inertia, could only be used to register the passage of the waves and not their form. Records of the form of the waves are promised in a later memoir dealing

with records obtained by an interferometer method. The source of the sound impulse was a pistol or a powerful spark from an electrostatic machine. Vautier gives numerous oscillograms which indicate the response of the recording apparatus. Reduced to dry air at 0° C., the velocity of sound found in these experiments was  $330.54 \pm 0.5$  metres per second. The value obtained by Regnault with a conduit 1.1 metre in diameter was 330.45 metres per second. The value obtained by Esclançon as the mean of a large number of experiments in the open air carried out during the War, was 330.9 metres per second.

**CARBON ASSIMILATION.**—In *Scientia*, vol. 41, Feb. 1927, Prof. Walter Stiles gives a lucid and closely reasoned review of the present state of our knowledge and conceptions of the mechanism of carbon assimilation in plants. He considers the conclusions regarding the process of photosynthesis arrived at by various chemical investigators invalid, on the ground that they are based on experiments conducted *in vitro*, and form no criterion of the actual processes going on in the plant amid the complex of physiological factors found in the actual protoplasm itself. So long ago as 1861, Butlerow was able to produce a sugar-containing substance from a derivative of formaldehyde, and there seems no doubt that formaldehyde can be produced from carbon dioxide and water, and sugar from formaldehyde, without the aid of the living green plant, but this constitutes no evidence that the course of synthesis *in vivo* follows on the same lines. Even the theory of Willstätter and Stoll, based on physiological work with living plant material, assumes the formation of formaldehyde as an intermediate product in photosynthesis, though the evidence for the presence of that substance in plants is of a very slim kind. Some considerations are adduced for concluding that the complete photosynthetic process must comprise both a photochemical stage and a 'dark' chemical stage in which light is not involved. Willstätter and Stoll thought the chemical stage was controlled by some enzymatic factor, and there is considerable evidence supporting this hypothesis. The problem of changing radiant energy to chemical energy in the assimilating cell is closely bound up with the function of the four leaf pigments, chlorophyll-*a*, chlorophyll-*b*, carotin, and xanthophyll, but no completely convincing explanation of the rôles of all four pigments has yet been given. While a satisfactory understanding of the mechanism of carbon assimilation is so far non-existent, knowledge on the subject is becoming fuller and clearer, but a complete solution of the problem will require the co-operation of workers in the three fields of botany, chemistry, and physics.

**ULTRA-VIOLET THERAPY APPARATUS.**—Messrs. Watson and Sons (Electro-medical), Ltd., have issued a new edition of their booklet on "Artificial Sunlight" as Bulletin No. 80. The first 10 pages are devoted to a brief account of the nature of ultra-violet rays, their method of production, and their properties; the remaining 36 pages contain a detailed account of the various sources of artificial sunlight now available. The illustrations are very good, and show how quickly the various medical needs of a technical character are being met by manufacturers. There is scarcely a part of the body for which some special piece of apparatus has not been designed, for the administration of ultra-violet rays to it. The booklet includes also an account of devices for the measurement of the rays when used clinically. There is no unanimity yet as to the best method to be adopted for this purpose, but in the meantime medical men will be glad to know of the selection that does exist.