

Research Items

Dating by Beads at Zimbabwe. A study of beads in Africa south of the Zambezi by Mr. P. W. Laidler (*Proc. Rhodesia Sci. Assoc.*, 34, pt. 1) aims at a classification of beads, ancient and modern, now or formerly in use among the natives. They are divided into ten classes, which are examined in relation, according to chronological considerations, with the stone structure culture of Rhodesia, thus incidentally raising the question of the tenability of Miss G. Caton-Thompson's dating of the Zimbabwe and associated cultures upon the basis of this class of evidence. Viewing the historical evidence, it would appear that no finds have been made which point to contact between South Africa and early Egypt. The Arabs landed trade beads on the East African coast previously to A.D. 1400; but it is impossible to say how much earlier, though Al Masoudi suggests that it was not long before A.D. 900. Before A.D. 1500, sites will show Indian beads only; after that date, European beads appear in increasing proportion. The Rhodesian excavations show three groups, of which Group I is judged to be pre-Zimbabwe; but there is little or nothing to distinguish it from Group II, which was regarded by Miss Caton-Thompson as belonging to a later occupation. Group I, showing beads with Indian affinities, was regarded by her as a "foundation deposit", pointing to an eighth or ninth century date for the Zimbabwe type of building. This ignores in this assemblage of beads one example which is probably of late origin and does not fit in with the historical record. It is more probable that it is a 'pre-Zimbabwe' deposit. Miss Caton-Thompson's dating leaves Class II of the second occupation period with an intervening gap of six hundred years; whereas there is evidence to show that there is continuity of importation as between Class I and II. If Group I is, in fact, related to a pre-Zimbabwe culture, it is probable that the foundation date is much later than is suggested by Miss Caton-Thompson.

Cultural Origins, Monte Alban, Mexico. It is now practically agreed among archaeologists, according to a communication circulated by Science Service, Washington, that the remarkable collection of ornaments of gold and precious or semi-precious stone, which were found in burials on Monte Alban by the Mexican expedition under Dr. Alfonso Caso in 1932, belong to an intrusive culture. Four seasons of intensive explorations have produced evidence of structures of a type found elsewhere in Mexico, and going back to a date believed to be contemporary with the Mayan Old Empire culture of Guatemala and Chiapas; but there is nothing to suggest any relation with the treasure find. More than seventy tombs have been explored, but no metal has been found. Recent excavation points to the civilisation of Monte Alban having flourished in A.D. 300-500; and it would appear possible that it may have been the point of origin of features, architectural and other, which appear on other sites of ancient Mexico. Among these is the cross-shaped tomb. An examination of the Dancers' Pyramid, so called from its carved dancing figures, has shown that its interior is a simple stone tomb, rectangular in shape, but with large niches on either side which are virtually the arms of a cross. This appears to be the germ of the idea which blossomed into the huge, mosaic-covered, cross-shaped tomb of Mitla, the site which stands

some twenty miles away. When the tomb of the Dancers' Pyramid was opened, it was found to contain the skeletons of several individuals in complete disorder. Among these scattered remains were five human teeth which had been inlaid with jade, while others were incrustated with hæmatite. The pyramid also had three temple bases with sloping stone sides and jutting wall panels. These are found in other parts of Mexico, but nowhere of an earlier date.

Man-Eating Sharks. A paper by Gilbert Whitley upon Australian shark tragedies shows that not only are attacks frequent, but also they have been increasing in number during the last few decades (*Victorian Naturalist*, Jan. 1935, p. 195). During the present century, whereas the number of records of attack traced in the ten years from 1912-21 was 13, the number between 1922 and 1931 was 45 and in the three years 1932-34, 16. The increase is probably associated with the more extensive use of shallow waters for bathing. In New South Wales, which yields more than forty records or more than half the Australian total, the greater number of shark attacks were made during the months December to April, and this coincides with the most popular bathing season. No attack occurred between May and September, although in May and June boats have been bumped or attacked. The only safe means of combatting this danger is the building of nets, fences or other enclosures for swimmers. On isolated beaches, observations from aeroplanes or from shark towers are said to have proved useful.

Pairing and Non-Disjunction of Sex Chromosomes in *Drosophila*. In *Drosophila* females with XXY as sex-chromosomes, there have been two views as to how synapsis takes place. It is agreed that they synapse in pairs and not in a triad, but Bridges suggested that there is an equal chance of any two of these chromosomes pairing, while Anderson concluded that pairing and crossing-over between the X 's is independent of the presence of the Y . Gershenson (*J. Genet.*, 30, No. 1) has obtained further evidence regarding the nature of the pairing and non-disjunction in XXY females by using so-called CIB stock in which one of the X 's has a large inverted section, which reduces crossing-over in females heterozygous for the CIB chromosome to a very low value. He found that the percentage of cross-over X -chromosomes is the same in the gametes of XX females and XXY females in this stock, indicating that synapsis is regularly between the two X 's, while the Y goes later to either pole independently. In females having the composition $XX - CIB$, it is found that about 99 per cent of the eggs produced have a non-cross-over X . Comparison of this frequency with the frequency of non-disjunction indicates that the mechanism of non-disjunction is similar in males and females of *Drosophila*, and is contrary to the hypothesis that regular chromosome pairing and disjunction depends upon chiasma formation.

Excretion of Glucose by the Rabbit Kidney. At a meeting of the Royal Irish Academy held on January 28, T. Dillon and R. O'Donnell described the excretion of glucose by the rabbit kidney. The threshold for the excretion of glucose by the kidney was defined as that blood plasma concentration (C_B) above which

glucose is concentrated in the urine. Glucose was found to be present in the urine below threshold level, the concentration increasing with the urine rate. Considering the distribution of the threshold values in the experimental animal, the mode of the distribution was 230 mgm. per cent, but an individual value may lie in the range 180-420. The threshold level was increased by intravenous injections of sulphate and urea, but remained unchanged after chloride injection. It behaved therefore in an analogous manner to the chloride threshold as determined by Conway. The important quality of the threshold as above defined is that it is independent of the rate of urine flow. The excretion of glucose below the threshold value may be expressed by the equation: $K = A\sqrt{(V/T - C_B)}$ where T = threshold, V = urine volume in c.c.'s per minute, and $A = (C_B - C_u)/C_B$, which is closely analogous to the equation derived by Conway for the diffusion of iodine from chloroform to potassium iodide solutions perfused over it, and also to the excretion of chloride below the threshold value. The value of K has a coefficient of variation for the individual result of 26, but this variation is independent of the variables used in equation. Above the threshold, glucose excretion is expressed by the equation: $K_2 = \sqrt{V(C_u - C_B)/(C_B - T)}$. The results in this region are obscured by the concomitant high chloride excretion. They indicate that glucose and chloride excretion are dealt with by the same kidney mechanism. In both cases the 'diffusion-secretion' theory as established by Conway alone accounts for the observed relationships.

Hepatics of Southern Japan. Y. Horikawa has made an important contribution to bryology entitled "Monographia Hepaticarum Australi-Japonicarum" (*J. Sci. Hiroshima Univ.*, B, Div. 2 (Botany). Tokyo: Maruzen Co., Ltd. 2.10 yen). Southern Japan is one of the least-explored regions of the world for the hepaticologist; high mountains (up to 3,962 m.), primeval forest and numerous streams are favourable for a rich and abundant hepatic flora. Reports by Stephani (1899-1924) and Okamura (1915-16) record 57 species; this number is reduced to 43, and the author collates later scattered records, including his own discoveries, based on the study of 5,000 gatherings made by himself in twelve visits covering seventy-one days (1930-34). Three hundred and one species, eighty-four genera, twenty-one families and four orders are credited to the region, of which one genus and one hundred and seven species are new to science. The text is in English with diagnoses in Latin; there is a list of Japanese names; the extensive field work and the care given to descriptive matter, illustrations, synonymy, etc., command attention. The conclusion is drawn from phytogeographical data that a land connexion lasted longer on the Japan proper side than on the South China side; the first separation came from the Formosan Channel and later erosion led to the successive separation of the islands of the Liukiu archipelago. Endemism is strongly marked. In the hepatic flora there is an almost total absence of Philippine elements. The presence of many boreal elements proves a former glacial epoch.

Early Daffodil Blooms. An article by Dr. J. Grainger (*Gardeners' Chron.*, March 9, 1935) outlines the principles underlying the production of precocious blooms from daffodil bulbs. The period between mid-

November and Christmas is usually characterised by a paucity of decorative flowers, and the process described in the article should help to bridge this gap. The young flower of a daffodil is normally formed during the period between lifting in June, until the end of August. A rest period then sets in, and usually lasts about six weeks. The period of flower bud formation can be hastened by about three weeks if the bulb is kept at a warm temperature (75° F.), whilst the rest period is shortened by storage in an ice-box, at a temperature of 40°-45° F. Planting is performed immediately after the low temperature treatment, and the application of suitable growth temperatures results in the production of blooms as early as November 25. The hastening of flower bud formation is the treatment already known as 'preparation' by bulb growers, but in the paper under review, emphasis is laid on the additional need for low temperatures to shorten the rest period.

Antiquarian Study of Fungi. A short paper by Messrs. G. W. Hendry and H. N. Hansen in *Phytopathology* (24, No. 11, 1313-1314, November, 1934) records a novel method of studying the fungi of bygone times. The church building of the Mission Nuestra Senora De La Soledad was erected in the Salinas valley of California in 1793-94, and was rebuilt in 1832, from adobe or sun-dried bricks. Wheat straw had been used to bind the clay of which these bricks were made, and it has been found possible to identify remains of *Triticum compactum humboldtii*, Keke. in bricks from the ruins. The straw also bore evidence of fungal attack, and *Puccinia graminis* and *Ustilago tritici* have been identified. These two fungi must have been present in California in 1832, and it is perhaps rather significant that the earliest mycological survey of California (that of Harkness and Moore in 1880) records *P. graminis*, but makes no mention of *U. tritici*.

Weed Killers. It has been said that agriculture is a 'controversy with weeds', and weed plants are certainly obstacles to the directive ecology of the gardener. Dr. M. A. H. Tincker has recently reviewed different types of weed-killers (*J. Roy. Hort. Soc.*, 60, Part 2, pp. 68-79, February 1935). The article deals mainly with chemical methods, although biological means of control are also mentioned. Common salt, petrol, ammonium and ferrous sulphates, carbolic acid, creosote, arsenic compounds, chlorates of sodium and calcium, sulphuric acid, copper sulphate, calcium cyanamide and ammonium thiocyanate are all useful for special purposes, though it would seem that the ideal weed destroyer has still to be discovered. Chlorates are regarded as the most practical weed killers, in spite of the danger of fire. Biological methods of control include the provision of vigorous 'smother crops', and the distribution of specific insect pests of weeds. Insects are sometimes too discriminating, however, as happened when the cochineal insect was used to control the prickly-pear cactus; it attacked only one species, *Opuntia monacantha*, and further methods had to be used to effect complete eradication.

Coal of the Upper Beeston Seam in West Yorks. Pub. No. 35, Physical and Chemical Survey of the National Coal Resources, issued by the Fuel Research Station of the Department of Scientific and Industrial Research (London: H.M. Stationery Office) constitutes Part I on the Upper Beeston seam, a highly important

seam in this coalfield, which extends through the Yorkshire, Nottinghamshire and Derbyshire coalfields, forming one complete unit extending continuously for nearly seventy miles in a southerly direction from Leeds. It is stated that "For convenience the field has long been arbitrarily divided into three areas, Nottinghamshire and Derbyshire, South Yorkshire, and West Yorkshire. The present report deals with the northernmost of these, the West Yorkshire area". The Upper Beeston seam has been the most widely worked in the above area since 1917. A characteristic of this seam consists in a very dull durain, which is a particularly good and clean coal, but hard and usually spoken of as 'hard bands'. A large number of samples have been analysed, and the position of these is indicated on a map forming the frontispiece of this volume. Upon that map the area of the seam is divided into five parts, in each of which the Upper Beeston seam exhibits a characteristic thickness and structural development; the thicknesses vary from 2 ft. 6 in. to 4 ft. 6 in., the latter containing the dull bands of durain at their maximum development. The volume contains a large number of detailed analyses, in which the durain, vitrain, clarain and fusain have been analysed separately, whilst in many cases the calorific power was also determined separately. The coal is typically banded throughout, and is shown to contain a number of bands and partings, which in some cases divide the seam into an Upper and Lower part. Where this is the case, the Upper part alone appears to be worked.

Study of Earthquakes in California. Several articles have recently appeared on the study of earthquakes in southern California. Mr. H. O. Wood, to whom we are indebted for the plan of investigation, has described its details and the work carried on in the Seismological Laboratory at Pasadena ("Yearbook of the Carnegie Institution of Washington", 1934, 2347-2353). Dr. B. Gutenberg has given a full account of this building and its valuable instruments (*Ergebnisse der kosmischen Physik*, 2, 213-237; 1934). Auxiliary stations have also been founded at Riverside, La Jolla, Santa Barbara and Mount Wilson, and at Haiwee and Tinemaha in the Owens Valley, the scene of the great earthquake of 1872. In 1922, Mr. Wood published a map of all the known faults in southern California. Soon afterwards, the Wood-Anderson torsion seismometer was devised, and this has proved most useful in the study of local earthquakes. More than 200 epicentral tracts have been determined. In most of them, less than a dozen shocks have originated, in others some scores or hundreds, and, in a few, thousands of after-shocks of strong local earthquakes. It is interesting to notice that, with one or two exceptions, these epicentral tracts do not cluster along known faults, and that very few of them are connected with the well-known San Andreas fault along which the earthquake of 1906 originated. Indeed, the section of this fault between Tejon Pass and Cajon Pass, the seat of the great earthquake of 1857, was almost completely inactive during the six years before 1933.

The Upper Atmosphere. In a paper entitled "Some Facts and Theories about the Upper Atmosphere" by C. K. M. Douglas (*Quart. J. Met. Soc.*, 61, No. 258) various observations of pressure and temperature made in recent years in the upper atmosphere with the aid of specially equipped aeroplanes in

different parts of Europe are discussed, with special reference to the light that they throw upon the mechanism of anticyclones and cyclones. During the year 1932-33, in which many countries co-operated in a special study of the meteorological conditions of polar regions, the so-called Polar Year, a Dutch expedition went to Reykjavik, and upper air data were extended temporarily to Iceland. These furnished a good opportunity for studying the changes in a given air mass in the course of one or two days while the air was travelling from Iceland to places in western Europe, where further observations aloft allowed its condition at the end of that journey to be ascertained. It was found that the change of temperature of a given air mass for a given height between 2 km. and 5 km. was often slow, but that rapid rises of temperature, up to 10° F. in 24 hours, occasionally took place, apparently as a result of the sinking of initially cold air to a lower level, which resulted in dynamical warming. Air which has been warmed in that way may often be identified by its very low relative humidity. The author came to regard subsidence of rather less than 1 km. a day as an average in an anticyclone that is developing in cold air of polar origin. He showed that the air ascending over a rain area is generally warmer than the adjacent air at a height of 4 km. Discussing the variations in the height of the tropopause, he comes strongly to the opinion that the air masses just above and below the tropopause move slowly up or down together. The parts played by various air movements in the life history of anticyclones and depressions are discussed.

Synchronous Time Motors and Accurate Time-keeping. A valuable property in connexion with alternating current motors of the 'synchronous' type is that they keep exactly in step with the frequency of the supply. With the advent of the national grid system in Great Britain, which eventually will give time-controlled frequency throughout the whole area, the synchronous motor enables a very satisfactory method of accurate time-keeping to be obtained. A paper on this subject by W. Holmes and E. Grundy was read on March 1 to the Institution of Electrical Engineers. The frequency of the supply given by many authorities is time-controlled, and the close relation it bears to standard time is very remarkable. Records of the error of a large supply undertaking connected with the grid show that the average errors from the standard time during the day varied between two seconds fast and one second slow. Continuity of supply has been observed independently in Cheshire, Lancashire and Yorkshire at private residences having synchronous clocks of the hand starting time. The interruptions occurred about once a year and varied in duration between a few seconds and a few hours. Considering that the tiny little motor rotates at a very high speed and receives no attention this is excellent. These motors are rapidly being applied for other purposes wherever accurate time-indicating is required. In the time switches used in electric supply they are rapidly superseding the spring driven clock movement generally used. It obviates the necessity for periodical winding and so is economical to supply authorities. For laboratory purposes an electric stop watch has been produced embodying a synchronous motor. When used on time-controlled frequencies, it will measure short intervals of time with an accuracy up to the twentieth of a second.