Research Items

Chinese Art and Chinese Ideas of Life

MR. BASIL GRAY, of the Department of Oriental Antiquities and Ethnography of the British Museum, in a lecture before the Royal Society of Arts on January 29 (*J. Roy. Soc. Arts*, 84, March 13, 1936) surveyed the development of art in China, which is not merely a guide to, but also the actual expression of, her ideas in religion and philosophy. Although Chinese civilisation has been as varied in its development as that of Europe, it has one common element throughout, that man is never the centre of the universe. Its art aims at reflecting the rhythm of life seen in the natural world. The bronze vessels and jades of the Shang Yin and Chou dynasties, dating from early in the second millennium to 221 B.C., were connected with the worship of ancestors, but they also expressed the desire for a larger unity outside the family or clan by representing natural forces, especially the reproductive powers, in the form of animals, dragons, etc. This was the art of a feudal society, an aristocracy which had the monopoly of education and power. With the break-up in the age of the Warring States and the accession to power of the Han dynasty, Confucianism gained the ascendancy and the scholar-official became, and ever since has remained, the ruling class, to whom art was primarily addressed. The last important new influence in China before the nineteenth century was that of Buddhism, to which practically the whole country had been converted by the end of the fifth century of our era. Notwithstanding some masterpieces, sculpture never became a central art. Paradise pictures and Bodhisattvas are by far the commonest among the pictures of the T'ang dynasty recovered by Sir Aurel Stein from Tun-huang; but the Zen sect of Buddhism, which eschewed outward observance, was a home for the mystic leanings of the Chinese, showing its greatest influence in the painting of the thirteenth century.

Stone Implements from Patagonia

A COLLECTION of stone implements from near Comodoro Rivadavia, Patagonia, numbering in all about one hundred and twenty specimens, has recently been presented to the British Museum by Mr. O. C. Elvins. A selection from the collection is figured with a description by Mr. Elvins and additional notes by Mr. H. J. Braunholtz, in *Man* of April. The stone age of Patagonia came to an end soon after the natives came into contact with the Spaniards, who recorded their use of the bow, arrow and dart. F. Ameghino puts the date at which the use of these arms was abandoned at about 1620, when the horse was introduced. These natives were the Tehuelche Indians, of whom little is known, beyond the fact that they were of more than ordinary height, the males averaging about six feet. The term 'patagon' (big foot) applied to them by the Spaniards is the origin of the present popular name of the country. Traces of the early industry of the Tehuelche are abundant in the form of flint implements and pottery. The latter, however, is found only in fragmentary condition, as the clay used, an absorbent fusible clay similar to fuller's earth, is practically devoid of plasticity and the crude pottery made from it is extremely fragile. The sites on which stone implements are found are usually along the sea coast. They are reminiscent of the sea-coast sites of Oronsay and Denmark, and like them are characterised by huge shell-mounds, particularly of clam shells, the beds being several feet thick. Burials in the sitting position, characteristic of South America from Peru southward, have been found in them, though burial places are more usually found on hill-tops. Some of the specimens were collected from the Lake Colhue Huapi, drained by the River Chico. Here flakes and worked implements are found on the surface of the sand and hard clay. This site was evidently a factory. Mr. Braunholtz points out that the collection contains a number of types which differ from those figured in the classic work of F. Outes on the Patagonian stone age.

A Malaria Survey in Western Bengal

DR. HARRY G. TIMBRES has published the results of a malaria survey carried out by him in western Bengal (*Rec. Malaria Survey of India*, 5, No. 4, 345; 1935). The studies covered seven villages, with a population of 2,582 persons, lying in an area of $9\frac{1}{2}$ square miles in the district of Birbhum. Rice is extensively cultivated, and although there are no swamps, irrigation channels are numerous, coming from small storage lakes. The survey occupied eighty-nine weeks from July 13, 1932, until March 31, 1934. Malaria is very prevalent in the district, sixty per cent at least of all cases of illness being due to this disease. It is conclusively shown that the chief mosquito conveying malaria in that region is *Anopheles philippinensis*, formerly only suspected of being a carrier. This species is definitely anthropophilic, that is, prefers man as a victim rather than animals. There are other related species in the district, anthropophilic and capable of carrying malaria, but to a much less marked degree. *A. philippinensis* is found to leave the houses during the day, and to return in numbers in the late hours of the night. It is much more readily infected with gametocytes early in the malaria season, when it is a comparatively rare mosquito, than later on when it is numerous. Other anophelines in the region, which are not concerned in carrying malaria, exhibit a preference for bovine to human habitations, and are zoophilic rather than anthropophilic. The author suggests that there may be a relation between anthropophilism and those factors which make an anopheline a carrier of malaria.

Economic Value of American Hawks

THE farmer often bases his estimate of the economic significance of wild birds upon the exasperation of a moment, when they attack his crops or stock. An impartial survey of the food habits of such creatures almost invariably reveals extensive activity upon the credit side, for harmful insects and vermin often form a large part of the diet. The Bureau of Biological Survey of the U.S. Dept. of Agriculture has published

an investigation into "Food Habits of Common Hawks" by W. L. McAtee (U.S.D.A. Circular No. 370, November 1935). This shows that of the seventeen species of common American hawks, only four stand heavily incriminated as unfavourable to agriculture. The rest are either definitely beneficial, or their harmful and beneficial habits cancel each other, except the pigeon hawk, which may be tolerated in small numbers, though not in abundance. A sufficiently large number of stomachs has been examined to establish these conclusions, and the circular makes a plea for local investigation into the food habits of offending birds, before any measures of control are put into practice against them.

Nuptial Coloration and Pearl Organs in a Japanese Fish

DR. MITSUO SATO in an interesting paper (*Sci. Rep. Tôhoku Imp. Univ.*, Fourth Series (Biology), Sendai, Japan, 10, No. 3, 1935) describes the nuptial coloration and pearl organs in *Tribolodon hakonensis* (Günther), a cyprinoid fish very common in Japan, occurring both in fresh and brackish water. The brackish water form attains a greater length than the fresh-water form and migrates into the river in the breeding season. The nuptial coloration and pearl organs are found in both sexes during the period of breeding, usually from spring until the beginning of summer; but they are less conspicuous in the female than in the male, especially in those from brackish water. The author finds that the change in coloration is brought about by the chromatophores, mainly the erythrophores, being caused by the change of their size and shape as well as by the increase of their numbers. The pearl organs appear a little later than the nuptial coloration, and all disappear before the coloration fades away. Their number and distribution vary with the sex, and males and females in the breeding season are readily distinguished by these organs which also vary in distribution in the fresh-water and brackish water forms. These pearl organs are shown to be conical elevations of the epidermis, and their formation is mainly due to both cornification and hypertrophy of the epidermal cells. They appear to serve as contact organs, holding the bodies of male and female together whilst fertilisation takes place in the eggs laid by the female.

Fossil Echinoids of Belgium

IN his revision of the genus *Echinocorys* in the Senonian of Belgium (*Mem. Mus. Roy. d'Hist. Nat. Belgique*, Mém. 67, 1935) Jerome S. Smister does not essentially change the groups recognised in Lambert's monograph of 1903, but he does change considerably the views upon the relationships of species and varieties. The details of these changes cannot be indicated here, but, generally, *E. gravesi* is looked upon as the ancestral form of the Belgian fauna, and evolution in closely related varieties is expressed consistently in changes in the general form of the test. When more widely separated species are compared, many other differences are apparent, such as differences in peristome, periproct and apex. End-products of a line of evolution are easily distinguished; but the minor steps in evolution appear not to influence in an obvious way these characters, and changes in body form are resorted to as a final guide to consistent separation of varieties.

Water-Table Effects on Fruit Trees

BULLETIN No. 154 of the Egyptian Ministry of Agriculture presents the results of an investigation by A. Fikry into the incidence of 'gumming and death' disease of stone fruit trees, particularly plum, apricot and peach, grown on terraces at different levels on the banks of the Nile. A study was also made of the influence of varying heights of the water-table on the growth of certain plum varieties and the severity of rust, shot-hole and mildew diseases. A high water-table renders the trees more subject to these diseases, the attack occurring during and immediately after the inundation period. The plum variety Wickson is very susceptible to functional disorder whilst Bokra and Japanese Gold are resistant under similar conditions, though they may be affected if grown on low land. The exceptionally high Nile flood of 1934 was detrimental to stone-fruit trees, the influence of high water-table starting either by wilting or shedding of the leaves and ending by death of the trees. Numerous photographs are presented to illustrate the condition of trees on terraces at three different levels.

Chemical Analyses of Southern Rhodesian Rocks

BULL. 29 of the Geological Survey of Southern Rhodesia consists of "Chemical Analyses of the Rocks, Ores and Minerals of Southern Rhodesia" by E. Golding; compiled, with brief petrographic descriptions and references, by A. E. Phaup. The analyses number 329 and demonstrate the enormous amount of work which Mr. Golding has accomplished since he joined the Survey in 1926, especially as most of the rock analyses are of a highly detailed character, with determinations of more than a score (sometimes twenty-five) of constituents. The data now made available include a considerable number of analyses that have not hitherto been published; they provide a sound foundation for a geochemical study of the region and comparisons with other regions. One example may be suggested (see *Quart. J. Geol. Soc.*, 88, 423; 1932), based on the occurrence of BaO and SrO. In most parts of the world BaO is generally more abundant in igneous rocks than SrO. In Southern Rhodesia, however, there are few exceptions to the rule that SrO is the more abundant. This rare constituent is also absolutely abundant, as well as relatively. These characteristics are found in the Pre-Cambrian granites, porphyries, diorites, gabbros, dolerites, epidiorites and greenstones of several cycles, as well as in the associated and, in part, older metamorphic rocks of sedimentary origin; in various auriferous quartz-veins; and in the Karroo basaltic rocks. It would be difficult to account for the persistence through geological time of such a remarkable geochemical peculiarity except on the hypothesis that the early rocks of the earth's crust in this region were SrO-rich and that igneous activity has simply rejuvenated material already there.

Bright Sunshine Statistics for the British Isles

SOME interesting facts relating to the climate of the British Isles are given in a paper by J. Glasspoole and D. S. Hancock that was read before the Royal Meteorological Society on February 19, entitled "The Distribution over the British Isles of the Average Duration of Bright Sunshine: Monthly and Annual Maps and Statistics", and now published (*Quart. J. Roy. Met. Soc.*, April). The number of places at which records of bright sunshine are obtained with the aid of the Campbell-Stokes sunshine recorder, in co-operation

with the Meteorological Office, has increased considerably in recent years, and the summaries covering the period 1901–30 which are given in the official publication M.O. 377, 1934, are more representative than any earlier summaries of this kind. They are the main basis of the paper under review, but some figures have been included from an earlier publication —those obtained at Ben Nevis Observatory in 1891–1902. For the British Isles generally, the period 1901–30 furnishes for the whole year some areas of less than 20 per cent of possible sunshine in the western highlands of Scotland, and of less than 25 in some industrial districts in the northern midlands of England; but this figure rises to just over 40 at a number of places on the south-east and south coasts from Felixstowe to Torquay, and to 42 in the Channel Islands. In Scotland the best is 35 in the low-lying island of Tiree, and the same figure is reached along a small strip of the south-east coast of Ireland. Consideration of individual months and seasons shows that, in general, one of the months April, May or June is the sunniest, expressed similarly as a percentage of the possible duration, April being favoured by most of north-west Scotland and Ireland, and May by the south-east of England. It is pointed out that, on the whole, the figures demonstrate the advantage of taking a summer holiday early. Comparing the duration of bright sunshine with that of the time during which rain is falling at not less than 0·004 inches per hour during the daylight hours, the two were found to be in the proportion of about 41 to 6 in the south-east of England and of 23 to 18 in northern Scotland, a striking climatic contrast.

Disintegration of Nuclei by Fast Particles

SEVERAL papers on the disintegration of the lighter nuclei by proton and deuteron bombardment have just appeared (*Proc. Roy. Soc.*, A, March). J. D. Cockcroft and W. B. Lewis have bombarded boron with deuterons, studying the particles emitted by counting them with an ionisation chamber and linear amplifier and estimating their energy by interposing absorbing screens. Two homogeneous groups of α-particles were attributed to the reactions:

$$^{11}B + {}^{2}H \rightarrow {}^{8}Be + {}^{4}He\,; \quad {}^{10}B + {}^{2}H \rightarrow {}^{8}Be + {}^{4}He.$$

There are also proton groups, discussed in previous work and due to $^{10}B + {}^{2}H \rightarrow {}^{11}Be + {}^{1}H$, and two continuous distributions of particles attributed to $^{10}B + {}^{2}H \rightarrow 3\,{}^{4}He$ and $^{11}B + {}^{2}H \rightarrow 3\,{}^{4}He + {}^{1}n$. The disintegrations of carbon, nitrogen and oxygen by deuterons were also studied in detail, and the energy exchanges intercompared. A slight amendment of the Bethe–Oliphant mass scale for the lighter elements is proposed. In a paper by P. I. Dee and C. W. Gilbert, the reaction

$$^{11}_{5}B + {}^{1}_{1}H \rightarrow 3\,{}^{4}_{2}He$$

is studied in detail with the cloud chamber. The target was actually placed inside the chamber. The former view, that this reaction often involved the production of three symmetrically emitted α-particles, had to be abandoned, and evidence was found that the three-body process actually takes place, but usually with the emission of two particles in nearly opposite directions, the third particle receiving little energy. An explanation is suggested in which an α-particle is first emitted with a range of about 2·4 cm., and the excited ^{8}Be nucleus disintegrates into two α-particles in about 10^{-21} sec.

Atomic Weight of Carbon

CONSIDERABLE interest has recently been taken in the value of the atomic weight of carbon, the International value 12·00 being probably somewhat too low. Most recent determinations of the densities and compressibilities of gaseous hydrocarbons and oxides of carbon have yielded higher values, and the mass-spectrograph value of ^{12}C is also somewhat higher than the whole number on the chemical scale. An allowance for approximately 1 per cent of ^{13}C raises the average value for the mixture of isotopes in ordinary carbon to about 12·01. G. P. Baxter and A. H. Hale (*J. Amer. Chem. Soc.*, 58, 510; 1936) have now carried out combustions in oxygen of some aromatic hydrocarbons of high molecular weight. The direct combustion of carbon in oxygen is not a suitable method for high accuracy, since the practical difficulties of preparing really pure carbon are very great, if it is possible to do so at all, while natural carbon is always impure and the composition of the impurities uncertain. The combustion of organic compounds was used by Dumas and Stas and also, in 1909, by Scott, but in these the formula of the compound was used in the calculation. Baxter and Hale have burnt pyrene, chrysene, triphenylbenzene and anthracene in oxygen and weighed the carbon dioxide and water. From the weight of water the weight of hydrogen was calculated. These higher hydrocarbons contain only a few per cent of hydrogen and no assumption of formula is necessary. Various uncertainties are involved in the calculation of the results; for example, the atomic weight of hydrogen and the isotopic composition of the oxygen and hydrogen in the materials. These uncertainties are small in magnitude. The final result, which is only provisional, is about 12·009, which agrees with some mass-spectrograph results.

Ketene Diacetal

MUCH attention was given a few years ago to the supposed compound ketene diacetal, $CH_2{=}C(OC_2H_5)_2$, which was later shown not to exist. F. Beyerstedt and S. M. McElvain (*J. Amer. Chem. Soc.*, 58, 529; 1936) now report a preparation of this substance by elimination of halogen acid from a halogenated acetal, $XCH_2CH(OC_2H_5)_2$, by means of alcoholic potash. Experiments showed that the elimination of halogen hydracid could be stopped at the ketene acetal stage by carrying out the reaction with iodacetal ($X = I$) and potassium in tertiary butyl alcohol. Sodium was much less satisfactory. The reaction was completed in one or two hours at the boiling point of the tertiary butyl alcohol, and after removal of the precipitated potassium iodide the ketene acetal was separated from the tertiary butyl alcohol by fractionation. The yield of purified product was 52 per cent of theory. The ketene diacetal is a colourless liquid boiling at 124°–126°, which reacts rapidly at room temperature with both water and ethyl alcohol with the evolution of considerable heat, to form ethyl acetate and ethyl orthoacetate, respectively. It polymerises on distillation or heating, and even slowly on standing at room temperature, to a semi-solid white gum. It is clear from these properties that the substance previously described as ketene diacetal was not this compound, which has not previously been obtained The boiling point is higher than was expected.