

Research Items

Divine Kings in Southern Nigeria

AMONG the Umundri group of the Igbo of southern Nigeria, there are two divine kings who are the spiritual heads of the people, and occupy different towns in the Akwa District, Onitsha Province. Originally there was only one king, but dissensions arose and part of the town of Aguku seceded to found Oteri with its own divine king. The descendants of the royal family live at Aguku and claim descent from a sky-being, Eri, who was sent down by Chiuku, the sun-god. They call themselves Umundri and declare that they are not Igbo. The king is chosen from three, originally four, royal families and is usually a youngest son, whose choice must be accompanied by wonders and signs. The coronation ceremonies, which have been studied by Mr. M. W. D. Jeffreys, administrative officer (*Africa*, 8, 3), have the twofold object of transforming a man into a god and of recreating the world. One condition must obtain invariably. Both the candidate's parents must be dead. Also he must make three prophecies which must be fulfilled. The ceremony opens with ritual death, burial and resurrection. The candidate remains buried for several hours and his tree of life is cut down and the usual sacrifices made. When the body is exhumed at sunset a banana-stem takes its place. The candidate's body is whitewashed with clay and water that he may fulfil the prayer that he shall rise with a vivid and shining body. He discards his ordinary clothes and thereafter wears only white or blue Igala ones. Copper greaves are put on his legs, but he goes barefoot. Henceforth he is a god, and his person sacred. His first wife, or queen, is also whitened and wears white garments. Together they begin a circumambulation, which occupies several months. On his return to Aguku, the king may never leave the royal city again. At the close of a year, before he ascends the throne, a ritual combat takes place in which he overcomes first a young and then an old man.

Amber in Palaeolithic Times

AMBER, which becomes abundant in neolithic times, is rare on palaeolithic sites. The first specimen of palaeolithic age was found at Arensan (Pyrenees) and some fragments appeared at Isturitz, where also the Comte R. de Saint-Périer found a bead, the first find of a definite form. Some fragments have also been recorded on central European sites. The Comte de Saint-Périer now reports (*L'Anthropologie*, 45, 3-4) the discovery in October 1934 of the first specimen of palaeolithic sculpture in amber. It was found in the Isturitz cave in the middle of a stratum, of which the age had already been determined as lower Magdalenian. It was beneath another Magdalenian level, which itself was beneath a stalagmite sheet. There can be no question, therefore, of an intrusion. The character of the material was not at first recognised. It was thought to be ivory; and it was only some time after that it was suggested by the Abbé Breuil, when he saw the object in the laboratory, that it might be amber. This opinion was confirmed by tests applied in the laboratory of the Louvre. The sculpture represents the head of a horse, of which

the anterior portion has suffered an ancient fracture. The head is massive in form, with a heavy mane; the neck, where it joins the head, is thick. The eyes, which are level with the surface of the head, are differently treated on either side. The musculature is well marked, especially on one side. The style is good and typically Magdalenian. The patination on one side is reddish-brown, and on the other yellowish-orange. Before this find, objects of art carved in amber were not known before the mesolithic, when animal figures appeared in Prussia and Scandinavia. Objects of neolithic age which have been found do not include animal figures.

An Ancient Aztec Herbal

THE Smithsonian Institution has published a pamphlet to make known the discovery of the Badianus Manuscript in the Vatican Library ("Concerning the Badianus Manuscript, an Aztec Herbal, 'Codex Barberini, Latin 241' (Vatican Library)", by Emily Walcott Emmart. Smithsonian Miscellaneous Collections, vol. 94, No. 2). This treatise—a herbal describing the various plants and other materials used in Aztec medical prescriptions—was the work of two Aztecs who were educated at the College of Santa Cruz, founded by the Spaniards in 1535. Composed originally in Aztec, it was immediately translated into Latin in 1552. The chief author appears to have been a certain Martin de la Cruz, the other was Juannes Badianus, the translator. The first chapter deals with head ailments; the second describes the treatment of sore and bloodshot eyes, cataract, fever and insomnia; the third is devoted to ear infections. Two interesting plants are described as cures for pain, which can be identified as being members of the *Datura* family. Besides the plants, various animal products, stones, earths and carbon, salts, 'bezoar stones', and others, were used in various concoctions. Facsimiles are given of the first and last pages of the Badianus Manuscript, and of the plate of the two plants of the *Datura* family. It is proposed to publish a facsimile of the full manuscript with its 91 colour plates should funds become available.

Alligator-Lizards in South-West America

A SYSTEMATIC study of the natural history of *Gerrhonotus* in south-western America (H. S. Fitch, *Trans. Acad. St. Louis*, 29; 1935) describes the alligator-lizards as showing indications of learning and rapid habit-forming, ranking high among reptiles for intelligence. These wood inhabitants exist on a diet ranging from the larger insects to small mammals and birds' eggs; hibernation and viviparity vary with the climatic characteristics of the habitat. As a means of self-protection, they will encircle a tree-branch with their bodies, holding the tail firmly in their mouths, or discard their tails as a decoy to divert the attention of the snakes and hawks that prey upon them. The high percentage of regenerated tails suggests that this ruse is frequently successful. The alligator-lizards show practically no trace of social behaviour; mating occurs once annually at a definite season governed by locality and species.

Gill Formation in the Embryo of *Triturus*

IN the earlier stages of the embryo of *Triturus*, gill formation can be effected by transplantation of any portion of the body surface, excepting the medullary plate; for self-differentiation of the surface tissue in this way, mesoderm appears to be essential for the formation of the gills (M. Ichikawa, *Mem. Coll. Sci., Kyoto Imp. Univ.*, Ser. B, 9; 1933). Transplantation of all three germ layers invariably causes perfect gills to develop, while if the endoderm is excluded in such grafting, gills are sometimes produced and sometimes not. As the embryo develops, the gill-forming faculty becomes increasingly restricted to the forward portions of the body; when the tail-bud appears, only the branchial ectoderm is capable of producing perfect gills, which have in all cases a definite polarity. The power of gill-production is now located solely in the proper position—the differentiated branchial ectoderm.

Colour Changes in the Eye of a Grasshopper

IN 1916, Prof. Okazaki noticed that the eyes of a long-horned grasshopper (*Hexacentrus japonicus*) were jet black when he collected the insects one evening, but on the following day were golden yellow. Several other insects show a similar change, and Hajime Uchida has studied the changes in another long-horned grasshopper, *Homorocoryphus lineosus* (*J. Fac. Sci., Imp. Univ. Tokyo, Zoo.*, 3, 517; 1934). Surrounding the cone of each ommatidium are two principal pigment cells which change their position according to the intensity of the light. They contain black granules. Accessory pigment cells occupy the interspaces between ommatidia, and contain yellowish reflecting pigment granules. When the eye is exposed to light, the principal pigment cells and the granules within them retreat proximally, so that the apparent colour is due to the accessory cells. In the dark-adapted eye the principal cells entirely encircle the cone, pushing aside the accessory cells. When light-adapted insects are transferred to a dark room, the distal migration of pigment granules takes place very rapidly during the first twenty minutes, and thereafter slows down, so that the full dark-adapted condition is attained only after fifty minutes. In the reverse process, the rate of retreat of the black pigment granules in the principal pigment cells is proportional to the intensity of the light.

High Temperature Variations in Fungi

DR. B. BARNES has shown that heating the spores of *Eurotium herbariorum* and *Botrytis cinerea* has induced relatively permanent variations in the morphology of these two species. He has now studied a third fungus, with similar results ("On Variation in *Thamnidium elegans*, Link, induced by the Action of High Temperatures", *Trans. Brit. Mycol. Soc.*, 19, Part 4, June 1935). Two separate variants were produced when spores were heated to 55° C. for two minutes, and another mutant appeared on heating to 70° C. for a similar period. Temperatures above 70° C. killed the spores. *Thamnidium elegans* is normally a fungus of stable character, and remains unaltered through several years of artificial culture. The variants produced by the lower temperature began to revert to the original form after three years of culture; but the other has remained permanent. Variations relate to the size of the spore-bearing head and prolificacy of spore production.

Secondary Spores of Polyporous Fungi

A SHORT paper by S. R. Bose in *Phytopathology* (25, No. 4, 426-429, April 1935) traces the cytology of secondary spore formation in *Ganoderma*. Peculiar bodies which are really hyphal projections appear in the hymenium, between the normal basidia. The projections are at first binucleate, but the two nuclei quickly fuse, then split into a number of dark-staining bodies, which migrate to the apex of the protrusion. This swells to form the secondary spore, and the dark bodies afterwards reunite to form the spore nucleus. The paper mentions other Polyporaceous fungi which produce secondary spores, and discusses the effect of weather upon their appearance.

Identification of Australian Woods

NOTEWORTHY contributions to this important, but difficult, problem are contained in two publications (Technical Papers Nos. 15 and 16; 1935) issued by the Council for Scientific and Industrial Research of Australia. The first, by W. E. Cohen, deals with the coloured species of *Eucalyptus*, and describes a series of simple chemical tests such as the determination of the alkalinity of the ash, extraction tests, colour- and turbidity-reactions between extracts of the wood in various solvents and ferric chloride, water, or potassium ferricyanide, and several specific chemical reactions of a similar nature. These tests have been combined to produce a systematic scheme of identification into which fall the 540 samples examined; these represent 37 species. The second paper, by H. E. Dadswell and A. M. Eckersley, is concerned with the remaining principal commercial Australian timbers, which are mainly pored woods (hardwoods). The scheme of identification evolved in this case is based principally on those macroscopic features which can be conveniently ascertained by means of a hand-lens, such as the nature of the pores, parenchyma, rays, gum ducts and ripple marks. These are supplemented in some cases by microscopical data, and in a few instances by chemical tests.

Geology of Northern Nevada

WE have received from the United States Geological Survey, Bulletin 847—A, The Contact Mining District (Elko County, Northern Nevada) by F. C. Schrader. The district appears to consist of carboniferous rocks, mainly carboniferous limestone, intruded by a mass of grano-diorite with intrusive dykes of alaskite, andesite and other igneous rocks, the Palaeozoic rocks being in places locally covered by Tertiary rocks, partly volcanic and partly stratified deposits. The ore deposits appear to be mainly distributed round the border of the grano-diorite, but are also associated with alaskite dykes. A large number of mines have been worked in this district, originally apparently for gold, but more recently for copper, which appears to be the main product, though none of the workings is very deep. Of course, with the low price of copper in recent years, operations have fallen off considerably.

Rock Salt in Road Construction

SECONDARY roads serving as connexions and feeders to the main highways are of two types, the 'floating surface' type and the soil stabilised type. The former is made by adding loose gravel or similar material to the road bed, the latter contains gravel

kept in place by a material containing clay which acts as a binder. The floating surface type requires almost constant maintenance as the loose material is cast about by the traffic. Unfortunately, clay expands and contracts between fairly wide limits when alternately damped and dried by rain, wind and sunshine. Untreated clay shrinks as it dries, and permits embedded material to form a floating surface. In *Roads and Streets* (U.S.A.) of August, the results of experiments on the effect of salt on clay, by Prof. H. Ries of Cornell University, are described. He finds that clay treated with salt shrinks much less than untreated clay and that it holds moisture much better. The rate of the capillary action of the soil moisture is slightly increased and this leads to the compaction of the soil producing greater density. Actual road construction in America during the last three years has proved the effectiveness in practice of rock salt for road stabilisation. It is not necessary to add salt to more than the top three inches of the road. The quantity of salt recommended varies from 8 tons per mile for a road 14 ft. wide to 12 tons per mile for a road 20 ft. wide. The amount of water required to produce the best compaction is more than sufficient to dissolve all of the salt. In dry weather a properly moistened surface 'sets up' in less than a day and requires little attention.

Research on Motor Vehicles

THE Research and Standardisation Committee of the Institution of Automobile Engineers has recently issued its fourth annual report. Two reports have been issued of the researches on cylinder wear, special attention being paid to the influence of various constituents in the lubricants used on the wear by abrasion and corrosion. The engine was run on medicinal paraffin to which various fatty acids were added. Much useful information was obtained in this way. A report of experiments on the wear and friction of brake linings has been issued, and gives the results of experiments on twenty-two different materials. The rate of wear and the coefficient of friction was found over a temperature range of 100°–400° C. Many manufacturers are urging the importance of carrying out further experiments on 'brake squeak', as definite information concerning its origin is lacking. It is interesting to notice that the results of the tests are improving the durability and performance of the vehicles. The vehicle operators therefore get the main benefit from these researches.

Ignition of Firedamp by Compression

WE have received from the Safety in Mines Research Board, Paper No. 93; not only is this paper interesting in itself, but it derives further interest from the fact that it is one of the last pieces of work done by the late Prof. H. B. Dixon (Mines Department: Safety in Mines Research Board. Paper No. 93: The Ignition of Firedamp by Compression. By the late H. B. Dixon and J. Harwood. Pp. 23. London: H.M. Stationery Office. 6d. net). The paper describes a series of laboratory tests, carried out with an appliance designed for the purpose, of the ignition temperatures and ignition pressures of various combustible gases together with air, mixtures of methane and air being, of course, the most important for the purpose of the Safety in Mines Research Board. It was found that a wide range of mixtures between 2 and 75 per cent of methane could be ignited, but that mixtures containing between 7 and 7.5 per cent

of methane had the lowest ignition temperatures when compressed, the pressure being about 20 atmospheres and the temperature being about 450° C., whilst mixtures of firedamp and air containing less than 5 per cent or more than 14 per cent of methane cannot be ignited in the ordinary way. It was further found that in order to ignite mixtures of methane and air, containing 7–10 per cent of methane with air at ordinary pressures, this mixture could easily be ignited when the hole in the end of the pressure piece of the apparatus was about 2.25 mm. in diameter; when larger holes than these were used, copper discs of varying thickness, through which a hole was blown by the operation itself, were found capable of igniting the methane-air mixtures. It is obvious that these experiments can, as indicated by a paper of Dr. Wheeler's, have certain results in practice, but the paper itself does not indicate the practical application of the results obtained experimentally.

Mandelic Acid in Urinary Infections

THE use of the so-called 'ketogenic' diet in the treatment of certain urinary infections is now well established. Mandelic acid has recently been shown to serve as a useful substitute. The acid has now been put on the market (*NATURE*, Sept. 7, p. 401). As supplied by the British Drug Houses, Ltd., London, N.1, the daily dose recommended is 12 gm. The acid is issued in the form of 3 gm. tablets, each containing also 1.6 gm. sodium bicarbonate, to neutralise the acid, and flavoured. One tablet should be taken after each meal dissolved in two tablespoonfuls (one fluid ounce) of water. As the acid exerts its bacteriostatic effect only in an acid urine, it is also necessary to give a drug which will keep the acidity of the urine at or below pH 5.3. For this purpose, ammonium chloride is recommended, and two 1 gm. capsules should be taken four times a day after the mandelic acid. The pH of the urine is conveniently tested with methyl red, a slightly pink colour indicating a pH of 5.3 or slightly less. The British Drug Houses, Ltd., issues a special outfit for the treatment, including mandelic acid tablets, ammonium chloride capsules and the indicator.

Photometry of Nebulae

THE first of a series of studies of extra-galactic nebulae by P. C. Keenan (*Astrophys. J.*, **82**, 62) describes the method in use at the Yerkes Observatory for measuring the total magnitudes of nebulae by comparisons of extra-focal images. This work forms part of a co-operative survey of nebulae organised by the International Astronomical Union under the leadership of Dr. Hubble, of the Mount Wilson Observatory. The zone assigned to the Yerkes Observatory being from +50° to the North Pole renders it possible to make direct comparisons with stars of the North Polar Sequence. Nebular images only slightly out of focus are used (the total blackening of the plate being measured), and the most serious source of error is the irregularity in the shapes of the images. Corrections are applied for differential atmospheric extinction and for size of image, the probable errors of the resulting magnitudes being about ± 0.06 . During the progress of this work, a number of hitherto uncatalogued nebulae were discovered. A list of thirty-two of these, with their positions and magnitudes, is given at the end of the paper.