Research Items

Racial Origins of the American Aborigines

ARGUMENTS which have been advanced recently, based primarily on somatological evidence, in support of the view that Melanesian and Australian elements are to be found in the indigenous peoples of America, have induced Dr. Aleš Hrdlička of the Smithsonian Institution, Washington, D.C., to recapitulate the evidence and to examine the validity of the conclusion (*Smithsonian Misc. Collect.*, **94**, 11). The supporters of the theory rely mainly on the evidence of skeletal material from Lagoa Santa, Brazil, Lower California and Patagonia, but recently the evidence of linguistics and culture has been invoked. So far as the argument from physical characters and skeletal material is concerned, it was pointed out by de Quatrefages and Ten Kate that certain crania, recognised as of primitive type, presented close resemblance to Melanesian and Australian skulls; but they did not go on to deduce racial affinity therefrom as subsequent theorists have done. These theorists, and popular writers following them, have given the presence of the Melanesian and Australian elements more and more of a reality until the belief has assumed the semblance of a demonstrated fact. As the result of a study of 10,000 American crania, personal visits to more than a hundred tribes in America and the study of a larger number of Australian skulls than any other man, the author is unable to accept the theory. The basic foundations of the theory are built on sand. So far as the skulls from Lower California are concerned, these skulls do bear a resemblance to some of those of Melanesia; but this type is found also in not a few other widely separated regions of America, both among Indians and Eskimo. There it is contemporaneous with other types of these people, connects with them, and is only one of several.

Romano-British Gloucester

FURTHER evidence of the culture of Romano-British Gloucester is afforded by pottery from two sites in the city, which has been described by Mr. Charles Green (Public Museum, Gloucester, Occasional Papers No. 3, 1935; 2*d*.). The first group, of which part has recently been acquired by the Museum, was found in excavating the foundations of the girls' school at the corner of Denmark and Lansdown Roads. It has been ascribed to the period A.D. 250–300, but this dating is too late. The potter's mark *off. Calvi*, referring to the factory of Calvus at La Graufesenque, fixes the date of manufacture in the period A.D. 54–94. The evidence afforded by the collections in the Museum, mostly unpublished, points to the introduction of *terra sigillata* into Gloucester during the Flavian period. The coarse ware here described falls into well-known types, most of which are dateable and can be compared with dated pottery from other sites in the district. Most of it is late Flavian. The second group is from a double interment found in the garden of a house in Dean's Way. Iron nails, some showing traces of wood, were found, which possibly had belonged to a coffin. Other fragments of iron were with parts of a small bronze bowl, for which it is difficult to find a parallel, as unlike the bronze pans of the period, it has no traces of handles. The pottery is in a fair state of preservation. A bulbous beaker belongs to a type which did not appear earlier than the beginning of the fourth century, while a pseudo-Samian bowl is also late. The jars belong to a type which persisted throughout the whole Romano-British period.

Psychology and Nutrition

AN article by David Katz on "Some Problems of Feeding in relation to Industrial Psychology" appears in the *Human Factor* (**9**, No. 4). The writer stresses the difference between rational and irrational aspects of nutrition. Man manages, in normal circumstances, to obtain a sufficient quantity of the basic substances of his diet as protein, carbohydrates and fats together with nutritive salts and vitamins, but the way he gets them is entirely at the mercy of the particular taste or preference that has been developed by the nation, race or climate, in which religious taboos, tradition and subconscious factors play an important role. Mr. Katz refers to the international results of the Japanese food habits compared with those of the Europeans; to Germany's errors in food policy during the War; to the increasing 'democratisation' of food; sex differences; and changes of taste with age. If it should seem necessary to modify the acquired taste of a people, the administration should always keep in mind the important difference between rational and irrational ways of satisfying human appetite.

New Zealand Whitebait

IN the *Victorian Naturalist* (**52**, No. 3; 1935) Mr. Gilbert Whiteley gives an account of the Galaxiidae, a family which includes the whitebait of New Zealand and the mountain trout, minnow, jollytail, eel gudgeon or native trout of Australia. They are mostly found in fresh water, from sea-level to the tops of mountains, some, like the whitebait, migrating to and from salt-water, but probably not travelling very far out to sea. The New Zealand whitebait of commerce consists of the young of more than one species which ascend rivers in hordes towards the end of the year. The chief species is usually called *Galaxias attenuatus*, although strictly speaking it should be named *Austrocobites attenuatus*. The breeding habits are peculiar: in spring, countless numbers of these small adult fishes are seen in the lower reaches of the rivers within tidal limits where are mud flats and muddy creeks with salt rushes and stranded brushwood débris. There, ova in huge numbers are laid and cling to the rushes and water plants near the surface of the water. In order that the young may hatch, the ripe ova must be washed from the plants at high spring tides and the newly hatched fry driven out to sea, where they remain for a few weeks and then struggle up the rivers against the current. In the day an advance of a mile in three hours may be made. In the fresh water they remain for a few months and then descend again to breed.

Insects of the Kalahari Expedition

IN the *Annals of the Transvaal Museum*, 7, Part 1, October 1935, are a series of reports on various groups of insects collected by the Vernay-Lang Kalahari Expedition (March–September 1930). Mr. Louis B. Prout deals with the moths of the family Geometridæ. Concerning this group, he remarks that, with the exception of a very few species, contained in the British Museum, from the N'Gami country, no specimens appear to have been previously obtained from the Kalahari Desert and its immediate vicinity. The number of Geometrid species collected was 51, distributed among 34 genera: six species and one subspecies are described as new. In the report of Mr. L. Gschwendtner, water beetles of the families Haliplidæ and Dytiscidæ are discussed. Altogether, 53 species are identified, three being described as being previously unknown, together with one new subspecies and one new variety. Beetles of the family Buprestidæ are reported upon by Dr. Jan Obenberger, who records 36 species, three being previously unknown. Dr. A. J. Hesse deals with the weevils (Curculionidæ). Out of 76 species, four are described as being new while the undetermined forms are represented either singly or belong to groups not sufficiently known at present. The last report, by Prof. T. D. A. Cockerell, is concerned with the bees. A very considerable proportion of these insects are described as new, namely, 29 forms out of a total of 62 species. The various reports make a substantial contribution to a knowledge of the fauna of a region of notable biological interest.

Role of Organic Matter in Plant Nutrition

CONTINUING the series of researches on the above subject, three further papers by Subrahmanyan and his associates have appeared (*Proc. Ind. Acad. Sci.*, 1, No. 12). These deal respectively with the economy of carbon during decomposition of cane molasses in swamp soil, the influence of fermentable organic matter on the transformation of iron, and the relation of the oxidation of organic matter in the soil to plant assimilation. Addition of molasses to water-logged soil was accompanied by much loss of carbon in gaseous forms, and still greater loss occurred after flooding. The distribution of total carbon was not appreciably affected by the concentration of molasses. Flooding removed the bulk of the organic matter in all cases. Fermentation and loss of carbon were increased by increase of temperature and access of oxygen. It is suggested that in the growing of rice it would be advantageous to convert the bulk of the added organic matter to insoluble forms before flooding. Addition of fermentable organic matter to swamp soils brought quantities of ferrous iron into solution, the amount varying with different soils, whilst insoluble ferrous iron in the soil sediment increased in all cases. Increasing concentration of organic matter increased the amount of ferrous iron brought into solution, and solution and subsequent precipitation were hastened by rise of temperature to 45° C. Evidence is presented to show that ferrous iron in solution is largely present in association with organic acids produced during fermentation, whilst insoluble ferrous iron is present as carbonate and sulphide. A survey of tropical soils showed most of them to be poor in organic carbon compared with soils from temperate regions. Addition of minerals may increase or depress the beneficial effect of organic manuring.

Fossil Fishes of Sokoto Province

DR. E. T. WHITE has described collections of fossil fishes collected by the officers of the Geological Survey during the course of water supply investigations in Sokoto Province (Geological Survey of Nigeria, Bull. No. 14, 1934). Two very distinct faunas are present, one from the Upper Cretacean, the other from the Lower Eocene. The material consists largely of isolated teeth and bones, but there are a number of skulls of bony fishes, chiefly catfishes (Siluroids) which still abound in this region and are a characteristic feature of the modern fauna. These fossil forms, however, cannot be referred to any living genera, therefore new genera have been established for them. The fishes from the Upper Cretaceous fauna include a Porbeagle shark (*Lamna*) of the same type as the living species, and a curious genus of saw-fishes (*Schizorhina*) of which no representatives have survived. Sokoto Province at the time when they lived was probably a tropical or subtropical sea. In the early Eocene period the deposits were coastal and the fishes were mainly sharks and rays and also cat-fishes. The cat-fishes very possibly did not actually inhabit the brackish waters in which the beds were formed, but are likely to have been carried down the rivers to the coast when dead or in a dying condition. Figures of the nearest living relatives of most of the fishes are given and there are several good text figures and photographic plates of the bones and teeth.

Origin of Copper Deposits

A GROUP of copper-bearing pyrrhotite veins of the Ducktown type and genetically related ore-bodies are widely distributed in the southern Appalachian region. The origin of these is the subject of a contribution by C. S. Ross (U.S. Geol. Surv., Prof. Paper 179; 1935) which is of particular importance on account of the valuable discussion which it contains of replacement phenomena and the criteria by means of which mineral sequences can be determined. A magnificent series of forty-four plates illustrates the evidence most convincingly. The veins are thought to have been derived from a differentiating magma, but no parental igneous rock has been traced in the region. The first event in vein formation was the intrusion of a felspathic magma. This was followed by introduction of vein quartz, after which followed a stage characterised by a large group of ferromagnesian minerals. Replacement of quartz by hornblende and actinolite is of particular interest. In most of the veins, this stage was succeeded by one in which calcite was the dominant mineral, associated in some cases with later dolomite and ankerite. There is good evidence that the carbonates do not represent replaced limestone, but are hydrothermal deposits. A small group of silicates followed and replaced carbonates, and finally (with insignificant exceptions) sulphides were introduced and replaced carbonates, quartz, felspars, ferromagnesian minerals and schists. As regards the physical chemistry of the processes involved, our knowledge is woefully deficient, and after a lengthy discussion the author is obliged to confess that the character, concentration and reactions of the volatile substances that formed the solvents and the transporting agents for the vein materials are little understood. As a demonstration of replacement, however, the occurrences described are of fundamental petrological importance, since there is a steadily growing body of evidence that certain

igneous rocks, commonly thought to be crystallisation products from magmas, may actually be complex metasomatic replacements of pre-existing crustal materials.

The Asama-yama (Japan) Eruption of 1935

FOR more than two years since the explosions of 1932, the volcano Asama remained inactive. In October 1934, however, the floor of the crater began to rise at the rate of about 8 in. a day, and the surface of the ground at the Volcano Observatory, three miles east of the crater, showed a considerable tilting. These changes were the preludes of the series of eruptions, in April and May 1935, that are now described by Mr. T. Minakami (*Bull. Earthq. Res. Inst.*, **13**, 629–643 ; 1935). The first and greatest eruption occurred on April 20, and was followed by forty others until May 28. During the explosions, the crater floor was broken up, and bombs, weighing altogether 4½ million tons—one of them 200 tons—were scattered over the surface of the cone. Ashes fell over a narrow zone entirely to the east of the volcano and including Tokyo and Tiba. In the same direction, there was no trace of a silent zone in the sound-area, but towards the north, west and south the zone was clearly developed, the boundary of the inner sound-area having a mean radius of 30 miles, while the boundaries of the outer area had mean radii of about 90 and 150 miles. During March, the ground of the Observatory tilted at the mean daily rate of 1·5″ towards the south-east. On April 17, the direction of tilting was reversed, and on April 20, the tilt was 2·5″. Another reversal occurred on May 2, and, after that, the daily rate of tilt began to decrease. It is interesting to notice that extraordinary tilts of the ground were invariably accompanied by violent explosions.

Physiology of Illumination

IN a paper read to the Illuminating Engineering Society on November 12, Dr. R. J. Lythgoe said that the eye can function over a range of illuminations between 0·00001 and 10,000 foot candles. It has been recently shown that even in occupations only requiring the crudest visual perception, the work is speeded up by an increase in illumination. Extremes of contrast are subjectively uncomfortable, and so it is advisable not to have a great difference in brightness between the task and the surrounding field of vision. It was stated that a single 'glaring' source of light hanging on a black wall near a visual test object may actually improve the perception. The general increase in the standards of artificial illumination is in keeping with the more generous economic outlook of to-day. Along with the rise of the level of living there has been an increase in the illumination of factories. Before the Great War, four foot candles was the minimum recommended ; it is now ten foot candles. So far as evidence goes, the standard of illumination seems to be continually rising. The limit is governed by technical and economic reasons. Skill is necessary to make a little go a long way. Anyone can take a snapshot out of doors in 5,000 foot candles, but skill enables us to arrange lights indoors so that a good portrait can be obtained with 100 foot candles only.

Miniature Thermionic Valves

THE midget type of three-electrode valve referred to in NATURE of October 27, 1934, is now accompanied by a pentode of the same general form and construction. These 'acorn' tubes, as they are known in the United States, have been developed by the R.C.A. Manufacturing Company, and a brief, illustrated description of them and their characteristics is given in a paper by B. Salzberg and D. G. Burnside in the October issue of the *Proceedings of the Institute of Radio Engineers*. On account of the decreased impedances of the leads and the lower inter-electrode capacities and transit times, these valves permit of considerable improvement to be made in receiving equipment for ultra-short wave-lengths. The triode can be operated as an oscillator in a conventional circuit down to a wave-length of about 40 cm., while the pentode can be used as a radio-frequency amplifier at wave-lengths down to about 70 cm. It is claimed that, at a wave-length of three metres, these pentodes enable an amplification of 10–15 times to be obtained under conditions at which the ordinary valve would be quite useless. The small size of the valves and their novel structural arrangements permit the construction of compact and convenient receiving apparatus. Even at longer wave-lengths, the excellent characteristics of the valves make them applicable to purposes where their small size and low weight are of importance.

Reaction of Hydrogen with Oxygen

MANY investigations have been made of the reaction of hydrogen atoms with oxygen molecules, but it has remained uncertain whether the reaction $H + O_2$ occurs as a two-body or as a three-body process. G. A. Cook and J. R. Bates (*J. Amer. Chem. Soc.*, **57**, 1775 ; 1935) have reinvestigated the reaction, the hydrogen atoms being obtained by the photo-dissociation of hydrogen iodide. A similar study was also made of the reaction between deuterium iodide and oxygen. It was found that, in parallel runs, more deuterium is oxidised than hydrogen, and that addition of nitrogen greatly increases the oxidation of hydrogen or deuterium. The results indicate that the reaction between hydrogen atoms and oxygen molecules is a three-body process. An analysis of two possible reaction mechanisms is made. It is also concluded that Steiner's value for the velocity coefficient k_{H+H+H_2} is to be preferred to the very different one given more recently by Smallwood.

Structure of Elliptical Nebulæ

THE true nature of the elliptical nebulæ is at present a problem of considerable difficulty, partly owing to the lack of sufficient observational data on which to found a satisfactory theory. With the object of remedying this deficiency, Sinclair Smith (*Astrophysical J.*, **82**, 192) has reeently made observations of polarisation, nuclear size and spectral character in Messier 32, a nebula which is regarded as typical of its class. He has found a definite nucleus of diameter approximately 0·8″, but no detectable polarisation within 75″ of this nucleus. The spectral type is *dG*3 and shows no variation along the major axis. Much work remains to be done on these lines ; but at present the observations do not support Jeans's gas-sphere model, or ten Bruggencate's hypothesis of an assembly of small particles illuminated by the nucleus. It is suggested that a star cluster model accounts best for the facts, though the resulting central density of $8{\cdot}8 \times 10^5$ stars per cubic parsec is extraordinarily high.