

Research Items.

THE RELIGION OF THE PRIMITIVE HUNTER.—In the *Sociological Review* for April, Mr. Christopher Dawson, in a communication on "Religion and Primitive Culture," argues that the remarkable resemblances in the "hunting cultures" of North America and Siberia, Australia and South Africa, to the culture of palæolithic Europe are too great to be fortuitous. They have a common religious foundation, a common attitude to life which may be called the "religion of the hunter." The fact that totemism extends from West Africa to North America, and was one of the constituent elements in predynastic culture in Egypt, is fatal to the claim of Australia to be the home and centre of diffusion of totemism as held by some writers, and makes it difficult to believe with Prof. Elliot Smith and his school that it was diffused by the historic Egyptians of the "Archaic Civilisation." Judging by the North American evidence, it seems clear that the religion of the hunter—the belief in animal guardian spirits—lies at the root of the whole development. First came the guardian spirit of the Shaman; then of the individual, and as population increased and the group became more complex, the same idea became the principle of the social organisation, on one side of the secret society with a common guardian spirit, on the other of the totemic clan, a group of kinsmen inheriting a common guardian spirit.

THE MAGIC OF COLOUR.—Mr. Stewart Culin, in a lecture delivered to the Textile Color Card Association of New York in February last, which is published in the *Brooklyn Museum Quarterly*, vol. 12, No. 2, describes some of the magical beliefs relating to colour, especially in China and Japan. The significance of colour with the fundamental associations, which have come down to our own day, was established when a belief in magic was universal. This applied in five directions, the seasons, the elements, the planets, the points of the compass, and the notes in the musical scale. In an old Korean book in Mr. Culin's possession, the musical notes are indicated in colour. The Chinese flags of the Manchu bannermen, green, red, white, black, and yellow, correspond with the east, south, west, north, and middle. Red is the colour for expelling demons and preponderates in the garments of European peasants, and this colour is used in the placards which the Chinese paste on their doors at the New Year. Yellow was the colour of the middle, of the element earth, of Saturn, of gold, of the grain rice, and of the emperor. Colour determined the value of gold, of precious stones, and turquoise and jade. In Japan colour flourished chiefly in Buddhist ceremonial and in the Imperial court; but the accessories of Shinto are without colour, and the Japanese of to-day dislike Chinese colour.

THE BLUE WHALE.—Sir Sidney Harmer (*Proc. Zool. Soc.*, 1923, p. 1085) contributes some interesting observations on two enormous cervical vertebrae of the blue whale, found in the Panama Canal Region and presented to the British Museum by Mr. F. Mitchell-Hedges. These vertebrae had the epiphyses completely fused, and this fact, coupled with their large size, when compared with available evidence from other specimens, bears out the original estimated length of the specimen of ninety-eight feet. This would appear to establish the fact that the northern blue whale may grow to at least one hundred feet, and that there is no substantial basis for the suggestion that the southern race of this whale is larger than

the northern. As the blue whale is considered an ice-loving species, this record from the tropics is of considerable interest from that point of view, as well as from its bearing on the possibility of a migration across the equator of blue whales from the northern to the southern hemisphere, and vice versa. Further evidence of the size at which the epiphyses in this whale become ankylosed is supplied by Sir Sidney in *Proc. Zool. Soc.*, 1924, p. 1175. In the southern race of the whale specimens measuring eighty-four feet were found to have the epiphyses free, while in one of ninety-one feet they were fully ankylosed.

BEAKED WHALES.—In *Proc. Zool. Soc.*, 1924, p. 541, Sir Sidney Harmer reviews the genus *Mesoplodon*, with special reference to *M. mirus* and *M. densirostris*, and discusses the cranial characters of the beaked whales in general, with a valuable criticism of the importance of the antorbital region of the skull as a valuable character for purposes of classification. He rejects the genus *Paieka* of Oliver as instituted on insufficient grounds, and includes it as a synonym of *Mesoplodon*. Detailed descriptions of two skeletons of *M. mirus* from the coasts of Ireland (two out of the only three known specimens) and one of *M. densirostris* from Madeira conclude a valuable contribution to our knowledge of Cetacea. Sir Sidney Harmer's ninth report on Cetacea stranded on the British coasts covers the years 1923-24, and, while not including any species of great rarity, several interesting records are deserving of notice. The white-beaked dolphin was more numerous than usual, and appears to be establishing its claim to be regarded, after the common porpoise, as the commonest British cetacean. Special attention is directed to the record of the false killer (*Pseudorca crassidens*) in a sub-fossil condition in the Cambridgeshire Fens, and to the unexplained occurrence of vertebrae of three large rorquals (two blue whales and one common rorqual) off Newhaven, Sussex.

MOSQUITO CONTROL.—The International Health Board of the Rockefeller Foundation has issued a very valuable pamphlet on "The Use of Fish for Mosquito Control." It includes a brief historical survey of the matter, a very complete summary of the work which has been accomplished in all parts of the world, with illustrations of the fish employed, and a general statement of the biological principles on which the control of mosquitoes by fish is based. Special attention is given to the requirements of fish as mosquito destroyers, and to the conditions under which they may be successfully used for this purpose, emphasis being laid on the use of indigenous species where possible. It is intended mainly for the use of the field staff of the Board, but has obviously a wider field of interest, and the biologist particularly will welcome this full statement of the results which have led to the elaboration of this method of controlling yellow fever and malaria, and to its successful establishment in various parts of the world.

A NEW PROLIFERATING LARVAL TAPEWORM.—B. Schwartz describes (*Proc. U.S. Nat. Mus.*, vol. 68, art. 24, 1924) cysticerci, which he refers to a new species of *Tænia*, from the lung of an Alaskan porcupine (*Erethizon epixanthum*). The cysticerci occur singly or in colonies; in the latter case the basal stalks or peduncles issue from larger stalks which are in the lung tissue. The scolex has four elliptical suckers and a double row of hooks—18 large and 18 small.

MYCETOZOA OR "POLYANGIDÆ."—Roland Thaxter in 1892 first described as Myxobacteria, primitive minute organisms which in the vegetative state, though retaining their separate individuality, radiated outwards as they multiplied on the substratum, as a slimy plasmodium-like mass. As their name suggested, Thaxter thought the individual organisms, multiplying probably by transverse fission, were allied to the bacteria, the whole mass in its slimy aggregate recalled the plasmodium of the Myxomycetes (or Mycetozoa). Jahn has recently reclassified the group, adding new forms that he has first described ("Beiträge zur botanischen Protistologie." 1. Die Polyangiden. Leipzig: Gebrüder Borntraeger, 1924. 10s. 6d.), and, not satisfied with the affinities suggested by Thaxter's name for the group, rechristens them the Polyangidæ, after the generic name under which a species of the group was first recorded (in 1809). Thirty-six species are now described under eleven genera, which are grouped in four families. The systematic characters are mainly based upon the form and structure of the very small, but sometimes very striking fruit bodies, into which the slimy mass of microscopic organisms aggregate themselves under suitable conditions, though the family regarded by Jahn as most primitive only heaps into irregular masses, never forming definite cysts.

STARCH AND OTHER CELL-CONTENTS.—The Mémoires de la Société Royale des Sciences de Bohême for 1923, published at Prague (1924), contains a number of papers, mainly mathematical and botanical; they are written in Czech or German and followed by a summary in French or English. Several botanical papers are systematic or ecological in nature. In addition, W. S. Iljin describes further experiments dealing with the effects of salts upon the hydrolysis of starch (NATURE, September 15, 1923, p. 407). Sodium chloride in concentrations from 0.05 M to 0.1 M causes the hydrolysis of the starch in the guard cell of stomata in many plants, but in the case of halophytes much higher concentrations are necessary. Vegetable cells placed in dilute solutions of maltose synthesise starch energetically, but the process is stopped by the addition of sodium chloride or other salts to the solution. E. Votoček and V. Ettel direct attention to the ease with which galactose yields a crystalline dibromo, 2.4-phenylhydrazone, thus permitting its quantitative separation under certain conditions from xylose, rhamnose, glucose, fructose, etc., but not unfortunately from arabinose, with which it is so often associated after hydrolysis of plant pectins.

THE FUNCTION OF NICOTINE IN THE PLANT.—J. J. Theron and J. V. Cutler have an interesting contribution to this problem, which is of both theoretical and commercial importance, in the *South African Journal of Science*, vol. 21, 1924, pp. 189-194. They show that the total nicotine content in the plant increases up to the flowering stage, after which there is a rapid decline, whilst the formation of seed immediately reduces the percentage of nicotine. They conclude that the nicotine is a storage product which is drawn upon to form other nitrogen reserves within the seed. The authors also record continued metabolic change in the harvested crop which produces a considerable diminution of nitrogen and can be prevented by methods which raise the temperature of the leaves shortly after the crop is cut.

THE GEOLOGY OF THE CHATHAM ISLANDS.—Early last year the Otago Institute organised an expedition to the Chatham Islands, and a preliminary account of the geological observations has now been given by R. S. Allan in the *New Zealand Journal of Science and Technology* (Feb. 1925, p. 290). The Islands consist structurally of a series of faulted

blocks which in the late Pliocene were relatively elevated or depressed to different levels, and have since been eroded, and linked up by immense sand banks and spits. The most southerly block of the main island now rises to nearly 1000 feet and ends suddenly in a magnificent line of basaltic cliffs up to 700 feet in height. The northern part of the island is low-lying and swampy, but here the oldest rocks, quartz-mica-schists striking approximately east and west, are exposed along the shores. Lithologically these schists resemble those of Otago, but the comparison throws no light on their age, as the Otago schists themselves have been referred to various periods from the early Palæozoic to the early Mesozoic. Lying on the foundation stones of the Islands with great unconformability are Bryozoan limestones and limburgite-tuffs of Oligocene age. Unconformably on these are Middle Pliocene sands and grits containing a fauna, 63 per cent. of which is identical with that of corresponding age in New Zealand. The Oligocene limestones, in striking contrast, have only 4 per cent. of the species in common. The volcanic rocks are of great interest and are referred to two main epochs of eruption. The earlier series (Oligocene) consists solely of tuffs and flows of limburgite. The later series (younger than the Oligocene and older than the late-Pliocene or Pleistocene fault-movements) is mainly made up of basalts, but associated with the predominant type are mica-andesite, trachyte, and phonolites.

ORIGIN OF PLATINUM AND GOLD NUGGETS.—Detailed physico-chemical analyses of platinum nuggets have enabled Prof. S. F. Zhemchuzhny (*Ann. Inst. d'analyse physico-chimique de l'Acad. de Science de Russie*, vol. 1, liv. 2) to come to the conclusion that the nuggets do not differ in their structure from alloys. Certain details of structure, as well as the presence within the mass of platinum of crystals of osmic iridium and of small round cavities, corresponding to bubbles of air, show that platinum has crystallised from the magma in which it has been dissolved in a molten condition. Gold nuggets, according to the same author (*loc. cit.* 2, liv. 1), are of a quite different origin, their structure and physical properties indicating that they have been formed by crystallisation of gold from solutions of that metal in the water solutions of sulphur salts or of sulphates of iron oxide, which are products of oxidation of gold-containing sulphur pyrites.

THE POLAR AURORA.—Prof. L. Vegard has recently shown by means of experiments made with solidified nitrogen diluted with argon at the temperature of liquid hydrogen, that it was possible to reproduce the N_1 aurora line by bombardment with cathode rays. In collaboration with Messrs. H. Kamerlingh Onnes and W. H. Keesom he describes in the *C.R. Acad. Sci.*, Paris, April 6, experiments in which the nitrogen was diluted with neon, and cooled with liquid helium. The N_1 band changes, when the proportion of neon is increased, in a similar manner to that observed with nitrogen and argon at the temperature of liquid hydrogen, but with a much slower displacement towards the red as the dilution is increased; the position of the principal maximum, indeed, remains nearly constant until 70 per cent. of neon is present. From this point on, the maximum commences to shift rapidly with an increase in the proportion of neon, on account of the resulting diminution in the size of the nitrogen particles. When the proportion of nitrogen has been reduced nearly to zero the N_1 band becomes a line, with wave-length 5578.6, which very nearly coincides with the green line of the aurora. The small difference is attributed to a specific action of the neon,

so that it is probable that, if similar small particles of nitrogen could be bombarded with electrons at very low temperatures without any additional substance, the auroral green line would be given out.

THE DENSITIES OF LIQUID AND GASEOUS HELIUM.—When the densities of a gas and of its liquid form, in contact with one another, are plotted against temperature, the two density curves meet at the critical temperature, the joint curve being roughly parabolic. If now the arithmetic means of the two densities at the different temperatures are plotted, the graph has been found to be nearly a straight line, which also passes through the critical point. In the *C.R. Acad. Sci.*, Paris, March 30, E. Matthias, C. A. Crommelin, H. Kamerlingh Onnes, and J. C. Swallow give the results of a series of measurements which verify this law of the rectilinear diameter for helium, the densities having been measured for nine temperatures ranging from 4.71° abs. down to 2.30° abs. The deviations from rectilinearity are small, but a little larger than for hydrogen and neon. By means of the equations deduced it is possible to calculate the value of the critical temperature of helium $\theta = 5.19^\circ$ abs., and the critical density $\Delta = 0.06930$. The critical coefficient $R\theta\Delta/\Pi$ is equal to 3.270, where R is the gas constant and Π the critical pressure; this is very nearly the same as for hydrogen (3.276).

DIRECTION OF RADIO SIGNALS DURING THE ECLIPSE OF JANUARY 24.—Prof. Merritt communicates a paper on the changes observed in the direction of radio signals at the time of the eclipse on January 24, 1925, to the April number of the *Journal of the Franklin Institute*. As a part of the programme of eclipse observations at Ithaca, N. Y., records were kept during the morning hours of January 23, 24, and 25 of the apparent directions of stations at Schenectady and New York as indicated by radio direction finders. Graphs are given in this paper of the results obtained. The observations were begun at least an hour before sunrise, and show in a striking way the large and extremely rapid changes in direction characteristic of night conditions. The time at which "day conditions" are established seems to vary largely from day to day. On the day of the eclipse, the night conditions persisted until an hour after sunrise, and this although the sun had been shining brightly. On the next day, which was very cloudy, day conditions were reached while it was still almost as dark as midnight. It is concluded that if the observed direction changes are due to sunlight at all, they must be brought about by the changes caused by light in the upper regions of the atmosphere. Although the variations in the direction during the early hours of January 23 were much less marked than on January 24, yet there is a definite indication that night conditions persisted nearly as long on both days, although January 23, like January 25, was a very cloudy day. There is some slight evidence that persistence of night conditions after sunrise is associated with high barometric pressure and a large pressure gradient. On the day of the eclipse, night conditions persisted until half an hour after the eclipse began. Six minutes after the end of totality a systematic drift towards the south began, and for eight minutes the settings indicated that the signals were coming from a direction 15° south of the true direction of New York. Thirty-five minutes after totality, the readings had become normal. It is stated that if the effect is due in some way to changes in the ionic concentration resulting from changing illumination in the upper atmosphere, then the delay in the appearance of an eclipse effect until after the end of totality might have been expected.

SEPARATION OF SELENIUM AND TELLURIUM.—V. Lenher and C. H. Kao describe a new method of separating selenium and tellurium in the *Journal of the American Chemical Society* for March. To a solution of the oxides in 100 c.c. of concentrated hydrochloric acid, 50 c.c. of acid saturated with sulphur dioxide is added. After vigorous stirring, and on standing, selenium settles out and is readily filtered off. The tellurium is then obtained from the mother liquor by precipitation with sulphur dioxide and hydrazine. The temperature of the solutions should never exceed 30° .

CONDUCTIVITY IN SOLUTION AND CONSTITUTION.—The conductivities of many saturated salt solutions in liquid hydrogen sulphide at the temperature of solid carbon dioxide have recently been measured by G. N. Quam and J. A. Wilkinson (*Journal of the American Chemical Society*, April). Many salts form conducting solutions; halides of the phosphorus family show increased conductivity with increase of atomic weight, except in the case of bismuth, which forms an insoluble compound with liquid hydrogen sulphide. The conductivity of solutions of acetic acid derivatives is higher the greater the negativity and positivity of the groups joining the compound. Ammonium chloride is insoluble in the solvent; the introduction of alkyl groups in place of hydrogen causes the compound to become soluble and the solution conducts in proportion to the number of groups introduced. Pure liquid hydrogen sulphide has a conductivity less than 1×10^{-11} reciprocal ohms.

A CONTINUOUS REFRIGERATOR.—Refrigerating plants may be broadly grouped into the vapour compression type and the vapour absorption type. Vapour absorption machines are generally intermittent in action, since the ammonia has to be expelled by heat from a solution in one stage of the cycle and absorbed back again in a later stage. These operations necessitate the manipulation of valves. In the issue of the *Machinery Market* of May 1, there is a description of a novel method of continuous refrigeration, working on the vapour absorption system, which is the invention of two Swedish engineers, Munters and Platen, and for which they were awarded the Polhem Medal in 1924. The Munters-Platen system has no moving parts and the pressure is the same through the circuit. The evaporator contains a strong solution of ammonia. At the base of the evaporator is a heater round the body of which is coiled a pipe which projects above the surface of the liquid. When heat is applied this pipe becomes so hot that the solution inside it boils, and rising, discharges water into the evaporator, the ammonia gas being liberated. The ammonia solution is drawn from an absorber into the evaporator by this novel thermo-syphon device which induces automatic circulation. The ammonia gas given off by the evaporator is passed into a condenser and liquefied. This liquid ammonia then passes into a generator, where it gasifies absorbing heat from its surroundings, thereby producing refrigeration. The ammonia gas from the generator mixes with the hydrogen filling the system. The resultant gas mixture is heavier than pure hydrogen and enters an absorber near the bottom where it meets a shower of water. The water absorbs the ammonia, and the hydrogen, denuded of the heavier ammonia gas, rises and returns to the generator, entering near the top. Thus there is an automatic circulation. The connecting pipes are so arranged as to function as heat interchangers in both the gas and the liquid circuits. The only motive force for the whole apparatus is the heating coil in the evaporator.