

Research Items.

DUALISM IN AFRICAN RELIGIONS.—In *Ancient Egypt*, pt. 4, 1927, Mr. G. W. B. Huntingford contributes some further notes on the dualism which can be observed in the various forms of African religions. In the Nilo-Hamitic group the good and evil gods are manifestations of the elements. The Galla, in addition to their god *Wak*, believe that there are two kinds of sunshine, *adu* the white, which destroys, and *biftu* (from *bifti*, colour), the good, which gives life. *Adu* is from the same stem as *adi*, a fabulous being white in colour, apparently a kind of *Εμπονσα*. The black and red gods of the Masai are the heavens in fine weather and in storm, or rather in dry and wet weather. The Nandi do not distinguish the good and bad thunder by colour. The Hottentot beliefs are contrasted. According to Kolben, they have two good deities and one bad, the "God of all Gods," the moon, and the "Father of all Mischief." The Galla, Masai, and Nandi pairs of gods are additional to their supreme god and do not come within their ceremonial system. The beliefs in good and evil forces in opposition may be divided into three groups: (1) Where the forces are the elements and subordinate to the chief deity, as among Galla, Masai, and Nandi; (2) where the forces are spirits, as among the Baganda, Azande, and Lugwari; and (3) where the worship is that of a trinity, the third member of which is evil, as among the Hottentots. It would appear, therefore, that dualism in East Africa is not limited to tribes of Hamitic speech as has been thought. The fact that the same colours appear as attributes of good and evil in other parts of Africa is perhaps a coincidence; though the opposition of red and black which appears on the Gold Coast is singular. Among the Galla the unlucky colour is white.

THE CART TRACKS OF MALTA.—Following closely on Miss Murray's communication to *Man* (see NATURE, Feb. 25, p. 297), Prof. Zammit has published in *Antiquity* for March a study of the cart-tracks of Malta, illustrated by a number of excellent air photographs. His conclusions as to the origin, purpose, and date of these ruts or deep grooves on the limestone, which are of such frequent occurrence in the island, are the result of a long and exhaustive examination. There can be little doubt that they were made by a wheeled vehicle—strong, heavy carts with wooden wheels without metal tyres. The sharp curves preclude the idea of a sledge with runners. They are triangular in section, and can easily be distinguished from the grooves, rectangular in section, made by the modern metal-tyred wheel. Further, it must be concluded that human power was used for traction, as the ancient ways show no sign of being cut up in the way in which modern tracks have been cut up by the hooves of animals. It is also probable that the tracks were started by human labour and deepened later by use. There are definite signs that they were first carefully laid. In only one case does a pair of tracks appear to enter the sea, namely, at the Bay of St. George at Birzebuggia, where they probably appear on the other side of the bay now covered with silt and field soil. There is nothing to suggest the existence of these tracks when the island was connected with the continent, quite independently of the fact that the islands could not have been inhabited by an industrial population at the end of the Ice Age. Nor are they so late as the Roman occupation. Further, they are earlier than the rock-cut tombs of the Phœnician occupation, one of which cuts right across one of the cart tracks. As they do not go near the megalithic monuments they were not used for carting stone for

these buildings. They were used by the energetic neolithic population for carting earth for their terrace cultivation made necessary by the bare character of the high lands and for carrying water to the ships of a busy maritime traffic in harbours near which were no springs.

PREPARATIONS OF VITAMINS A AND D.—We have received from Messrs. The British Drug Houses Ltd., London, N.1, samples of their "Radiostoleum" capsules. The oil in these gelatin capsules contains vitamins A and D: the latter is manufactured by irradiation of ergosterol, and together with a vitamin A concentrate is supplied in solution in a tasteless vegetable oil. No cod-liver oil is used in the preparation of this product. The vitamin A and D content is standardised by animal feeding tests and is twenty times that of the finest cod-liver oil: and in the case of vitamin A, the physiological assays are checked by a chemical test. 'Radiostoleum' may be used in all conditions in which cod-liver oil has hitherto been administered. It is supplied in capsules, in boxes of 50, and also in solution, in bottles containing half a fluid ounce.

THE NATURAL HISTORY OF THE HAKE.—In *Min. Agric. Fish., Fishery Invest.*, Ser. 2, vol. 10, No. 2, 1927, Mr. C. F. Hickling gives an account of the food and feeding of the hake, and of the periodic changes in the hake fishery. This paper is of especial interest, as it is based on observations made and experience gained during fourteen months of sea-time on commercial trawlers, and is illustrated to a considerable extent by statistical data supplied by the Ministry's Statistical Section. From a study of the weekly figures of landing of hake at Cardiff during the years 1922–25, it appears that from the fifth to the ninth full moons of the year there is a regular fluctuation in the landings, such that more fish is landed at full moon than at new moon. Mr. Hickling suggests that this is the result of a monthly period of activity in the reproductive organs of the fish. There is also a daily change in the abundance of hake on the sea-bottom. Long experience has taught skippers that there is so little hake on the sea-bottom during the hours of darkness that it is rarely worth while to trawl at night, especially when the hours of darkness are long, as in winter. This apparent nightly migration vertically from the sea bottom is believed by the author to be due to a 'sleep rhythm' in the fish, which is inactive by day but active by night. In support of this theory, it is pointed out that (a) it can be shown that the hake feeds at night, but apparently not during the day, and (b) the surface methods of catching hake, which are most successful at night, depend upon the hake seizing a hook or becoming entangled in stationary trammel-nets, whereas the method of catching hake on the bottom, which is most successful by day, depends upon the hake being swept along passively into a trawl which may be moving very slowly relatively to the hake's own presumed speed of locomotion.

LEECHES ON FISHES.—Mr. David H. Thompson ("An Epidemic of Leeches on Fishes in Rock River," State of Illinois Department of Registration and Education. Division of the Natural History Survey. Bulletin, vol. 17, art. 3, 1927) describes an epidemic of leeches in the fish *Ictiobus cyprinella*, the co-called 'red-mouth buffalo.' In the winter of 1925–26 almost every fish of this species in Rock River, near Rockford, Illinois, was infested by the leech *Piscicola*

punctata Verrill, from one to fifty on each fish. This leech was rare, and for two years of continuous work on the river during the handling of fish, had not been seen. It appeared quite suddenly in February when the river was covered with ice, and continued throughout March until the temperature was a few degrees above freezing-point over a stretch of twenty miles. By the end of April none was to be seen. The leeches were so numerous that the bottom of the boat in which had been a few hundred pounds of fishes was almost completely covered with them. The next winter at the same time, although several fishes were infested, the numbers were not nearly so great as to cause an epidemic. After the leeches had left their hosts they were found among water plants, where they apparently leave their egg cocoons. The young leeches attach themselves to the fishes, at first feeding on mucus, later on blood, and grow to maturity very quickly in the cold winter months. The leech is said not to harm its host, but in this case they were certainly harmful, as is shown by the large marks left on the fishes in the places of attachment, and also by the fact that the fishes with many leeches were so thin that they were quite unfit for food. This is the first time that this leech has appeared in sufficient quantities to affect the market, and no reason can be brought forward for its presence in such enormous numbers.

STARCH AND CAMBIAL ACTIVITY IN THE WOODY TWIG.—Swarbrick has recently directed attention to the complexity of the problems associated with the appearance and disappearance of starch in the woody twig (*Journal of Pomology and Horticultural Science*, 6, 296-312; 1928). Curtis has previously drawn conclusions as to the necessity of phloem for translocation from the retention of the starch in a region of the stem isolated between two rings made down to the cambium (*American Journal of Botany*, 7, 101-124; 1920). Swarbrick now shows that the retention of this starch depends upon the absence of buds in the region lying between the rings and is associated with the absence of cambial activity under these conditions. If buds are present, then cambial activity is initiated in this region and the starch quickly disappears. Experience with disbudded twigs, upon which an occasional adventitious bud regenerates, shows that, whilst a limited amount of cambial activity and xylem formation is found below this bud and nowhere else on the twig, starch hydrolysis begins below this bud and then continues throughout all the tissues of the twig below this bud. In this case starch disappearance seems rather dependent upon cambial activity than the latter upon the food reserves, and both seem to be connected with the initiation of bud development.

WOOD-PULP IN AUSTRALIA.—When ground wood or mechanical pulp was first introduced, the paper industry received considerable impetus in countries where soft wood was easily obtained, and the later development of the sulphite process, or the chemical conversion of wood to pulp, brought about an even greater expansion. In Australia, however, the industry has developed slowly, for owing to the absence of suitable indigenous material, nearly all the pulp has had to be imported. Experiments have been carried out (*Australian Journal of the Council for Scientific and Industrial Research*, vol. 1) with the view of utilising indigenous eucalypts, etc., in order to establish the industry on an independent footing. It has been found that by employing certain modifications of the soda process a pulp suitable for the important type of papers classed as 'book and fine printings' can be produced from the eucalypts. The quick-growing candlenut *Aleurites moluccana* is also

promising, but since the pulp is bleached with some difficulty, it is recommended for use in the manufacture of brown paper. There seems little prospect of being able to utilise the indigenous grasses or sedges. With regard to other methods of pulping, the sulphate process has hitherto been considered uneconomic in Australia, but it is of great importance in the production of strong (kraft) pulp. Laboratory and mill trials, however, have shown that it can be successfully used with exotic conifers such as *Pinus insignis*, the results comparing favourably with the pulp from spruce or firs, for which the climate is unsuitable. The possibility of producing a long-fibred sulphite pulp is still under investigation. It is hoped that in this case also *Pinus insignis* will prove suitable, or that the process can be so modified as to allow of its use, in the event of which the paper industry in Australia would be almost self-contained. Further, trials are in progress regarding the manufacture of newsprint from short-fibred eucalypts instead of from the longer fibred spruce and fir. Under special grinding conditions, immature eucalypts have yielded very promising results on a laboratory scale, a paper stronger than the standard newsprint being obtained.

ARCTIC ICE IN 1927.—The *Annual Report* by the Danish Meteorological Office on the state of the ice in Arctic Seas in 1927 has recently been published. In the Barents Sea the most noteworthy features were the congestion of ice off the entrance to the White Sea from March until May, and the open sea up to Franz Josef Land in September. The west coast of Novaya Zemlya was clear in July, and the Kara Sea was almost clear in August and quite clear in September. Around Spitsbergen there was much less ice than usual, except in October and November, when a broad belt of pack lay off the west coast. Bear Island, however, was not clear of ice from the autumn of 1926 until the end of May. On the east coast of Greenland the belt of ice seems, on the whole, to have been wider than usual, but the coasts of Iceland were free throughout the year. In Davis Strait there was less ice than usual and on the Newfoundland Banks the ice season was short and had ended entirely by August. In Baffin Bay and the channels of the Canadian Arctic Archipelago, ice was scarcer than in most years. Davis Strait was almost clear in July, but Wrangel Island was not approachable until August. The report is furnished with the usual ice distribution charts for the spring and summer months.

THE TASMANIAN TEKTITES.—Sir Edgeworth David, Dr. H. S. Summers, and Mr. G. A. Ampt have made a very valuable study of the remarkable variety of tektite known as Darwin Glass (*Proc. Roy. Soc. Victoria*, vol. 39, pp. 167-190; 1927). The mode of occurrence in what are probably outwash gravels from a Pleistocene ice sheet suggests that a 'hail-storm' of small meteorites fell on the ice, which transported the fragments to the margin. It is shown that the schonite of Sweden, the moldavites of Moldau, the billitonites of Banca, Billiton, and Borneo, the australites of Australia, and the Darwin glass of Tasmania, all occur close to a single great circle. By means of variation diagrams, the genetic relationship between the various tektites is convincingly brought out, and a comparison of the graphs with those for the common acid igneous rocks indicates that the latter are quite distinct in composition. Two fresh analyses of Darwin glass are recorded; they show 86-87 per cent. of SiO₂. Such a percentage is higher than that for any analysed australite, but is approached by some of the moldavites. Various hypotheses of the origin of tektites

—artificial, volcanic, fulguritic, dust fusion by lightning, etc.—are discussed, and by a process of elimination the conclusion is reached that the mysterious fragments are of meteoritic origin.

MAGNETIC MEASUREMENTS.—The September and December (1927) quarterly issues of *Terrestrial Magnetism and Electricity* have recently appeared together under one cover (103 pp.). The principal article is one on earth-resistivity measurements in the copper country, Michigan, by W. J. Rooney, in which interesting details are given of the survey, which proved very successful in locating bodies of copper ore, as tested in cases where direct data obtained by boring were available. The conditions under which magnetic methods of prospecting for underground discontinuities are likely to be of service are discussed. The journal contains also many reports, reviews, and short articles, one of the latter being on magnetic observations made in Spitsbergen in 1927 by a Cambridge expedition, while others deal with questions of computation. In an article by D. Stenquist on the diurnal variation of the normal earth-current in southern Sweden, attention is directed to the fact that in his memoir "Étude des courants telluriques," 1925 (see also NATURE, Feb. 18, p. 242), the values given on pp. 21-23 of that paper are ten times too great.

DEVELOPMENT OF NATURAL GAS.—On Mar. 13, Col. S. J. M. Auld discussed before the Institution of Petroleum Technologists some of the more complex problems affecting natural gas exploitation. Facilities for utilising the gas produced either simultaneously with oil at the well-head, or afterwards by evolution by reduced pressure, vary to some extent with the environment of the field, e.g. climatic conditions, and in many limestone fields, such as parts of Texas, Mexico, and Persia, the matter is complicated by the presence of hydrogen sulphide, sometimes exceeding 10 per cent. by volume. The author dealt with a type of gas-oil separator designed for high gas-oil ratios, most proprietary types being more suited to conditions of low gas-oil ratios. The measurement of quantity of gas released was next considered, various standard equations coming up for critical analysis and comment. Equally important is the duration of gas production and, as pointed out, accurate estimates of reserves are always problems of great difficulty; much depends on the gas-oil system involved, and on the degree to which calculations based on gas laws are applicable in particular cases. An interesting section of the paper dealt with the use of highly sulphurous gas as a fuel which, contrary to expectation, results in no serious trouble with modern boilers equipped with efficient methods of firing. It was also shown by experimental data that the active charcoal recovery process is inapplicable to sulphurous gases; in view of recent interest abroad in the possible use of solid adsorbents for gas extraction and gasoline stripping from such extracted gas, this conclusion is not without significance. The author also discussed many of the conditions affecting the oil absorption process for gasoline extraction, and urged the importance of efficient operation depending on knowledge and application of the gas laws.

METEOROLOGICAL INSTRUMENTS.—The latest instrumental catalogue (No. 548) of Messrs. C. F. Casella and Co., Ltd., gives particulars of a wide range of meteorological instruments. We notice that the various types of cup anemometer do not include any with three instead of four cups, nor is there a cup instrument designed to give direct readings of velocity instead of the number of miles of air that have passed the instrument since its erection. The advantages of

having only three cups have been proved experimentally by J. Patterson of the University of Toronto, who published his results about two years ago (*Trans. R. Soc. Canada*, Third Series, vol. 20, Sec. 3; 1926), and the *Meteorological Magazine* for September last contains a photograph of such an anemometer adapted for direct reading by the incorporation of a Stewart magnetic speedometer. It is to be hoped that an instrument of this kind will appear in the next catalogue. Accurate thermometry continues to be an expensive matter. It is, however, possible to purchase an outfit of thermometers—maximum, minimum, 'wet and dry'—with a rain gauge, and with a screen that should give good results if properly mounted, for £7. This outfit is designed for schools. A very handy pocket set, with maximum and minimum, as originally designed for Dr. Livingstone, costs £2 10s., and should continue to be in demand among explorers and mountaineers.

NEW SYNTHESIS OF NICOTINE.—The synthesis of an alkaloid generally involves the closing of a ring system containing a nitrogen atom. In the classical synthesis of nicotine, the molecule of which consists of a pyridine ring and an *N*-methylpyrrolidine ring linked together in the β -position to the former and the α to the latter, Pictet employed comparatively violent means to obtain the second ring system attached in the desired manner to the pyridine ring. The new and simple synthesis described in the February issue of the *Berichte* (vol. 61, p. 327) by E. Späth and H. Bretschneider, of the University of Vienna, is therefore very welcome. Prof. Späth employs the novel method of starting with both nitrogen ring systems already formed, in the shape of ethyl nicotinate and *N*-methylpyrrolidone. These compounds are condensed together under the influence of sodium ethoxide, and a ketone is obtained in which the two ring systems are separated by the carbon atom of the ketone group. There is a second ketone group present in the pyrrolidone ring, and by treatment of the compound with hydrochloric acid this group is removed as carbon dioxide. This opens the ring, which is, however, closed again by converting the first $-\text{CO}-$ group into $-\text{CH}(\text{OH})-$ and thence into $-\text{CH}_2-$, for removal of hydrogen iodide now draws the bridge carbon atom into the *N*-methylpyrrolidine ring to replace the carbon atom which had been lost, and (racemic) nicotine is at once obtained. The yields in the synthesis are good, that of the initial condensation being 70 per cent., that of the ring opening 37.5 per cent., and that of the complete ring closure to give nicotine 31 per cent.

RÔLE OF COPPER SULPHATE IN THE DEACON PROCESS.—The work of Hensgen and others has shown that many metal sulphates are decomposed by dry hydrogen chloride gas with the formation of chlorides and liberation of sulphuric acid. If this is the case, it would appear that when the Deacon process is started with copper sulphate as a catalyst, the mechanism is the same as when copper chloride is used. Experiments to test this view have been made by R. A. Beebe and D. B. Summers and are described in the January issue of the *Journal of the American Chemical Society*. Hydrogen chloride, both in the pure state and mixed with oxygen, was passed over pure anhydrous copper sulphate heated to 450° C. (the temperature used in the Deacon process) and the liberated sulphuric acid determined. In each case the sulphate was completely decomposed after several hours, and copper chloride, CuCl_2 , or oxychloride, $\text{CuO} \cdot \text{CuCl}_2$, remained. The use of copper sulphate initially in place of cupric chloride does not, therefore, seem to complicate the mechanism of the Deacon process.