

Research Items

Indian Village Godlings.—In an account of the cult of Bāro Bhāiyā, a form of 'demon worship' prevalent in Eastern Bengal (*J. and Proc. Asiatic Society of Bengal*, N.S., vol. 26, No. 1), Mr. Chintaharan Chakravarti points out that no trace of the religious rites of the village folk of India, often very interesting, is found in any scriptural text, though the people retain palpable traces of undoubtedly ancient rites. In the cult of Bāro Bhāiyā, or the Twelve Brothers, as observed in Kotālipādā in the district of Faridpur, the objects of worship are twelve brothers and their sister or mother. It is known also popularly as the cult of Vanadurgā (the mother of the twelve brothers) or Nisānātha. The brothers are described as demons and terrible in appearance. Any displeasure on their part brings disease and calamity. Vanadurgā has been described as a tree goddess, as her worship takes place under a tree and she has no separate image. There is no fixed time for the worship of these deities; but it usually takes place on Tuesdays and Saturdays and in the day-time. Generally no images are made; but there is an effigy of one of the brothers in a house in the village of Unasiā. At Kotālipādā the worship is performed at the base of a big Aśvattha tree, the place being known as Nisāi-kholā, or the place of worship of Nisāi. There is no provision for daily worship as in the temples. The rites of worship follow those laid down in the scriptures with regard to worship in general, except that the heads of the sacrificed animals are not taken back, but are left in the hollow of a tree. The mantras used are all in Sanskrit, and the whole worship has been made to conform to the Tantra form, the deities being given Sivaite implements and attributes, showing how a purely popular cult has been affiliated to Aryandom.

Fortifications at Tell el-Ajjūl.—Lieut.-Col. N. P. Clarke offers a reconstruction of the defences of Tell el-Ajjūl, Southern Palestine, so far as revealed by excavation to date, in *Ancient Egypt*, pt. 1, 1932. On the south-west side the tell is protected by the Wady Ghazze; on the remaining three sides by the Great Fosse, from which the earth was thrown out on the hill to form a slope of 35°; while the slope of the counterscarp is 1 in 4. The dominance of the site over the neighbourhood and its strength were due entirely to artificial works. On the north-east the ground was undulating and probably afforded cover to an attacking enemy. As might be expected, there appears to have been a work in this direction to deny this ground to an enemy. A pit has been discovered, the earth from which, contrary to normal practice, has been thrown *outwards* to form a bank. This was a self-contained outpost, the great depth of which gave perfect cover from archery. A tunnel leads from near the main entrance on the north-east side to the work, which holds, possibly, one hundred men. A sunken road also leads from the tell to the pit. A similar pit, which was probably also connected with the tell by a tunnel, lies several hundred yards to the north. These belong to the earliest system of defence, and there is evidence to suggest that they are of the copper age (3500–3000 B.C.) or shortly after. The northern trenched enclosure includes the pit outpost and must be later. A different system of trenches runs off the north-east corner; but instead of the irregular lines of the pits, the trenches run in long straight lines. They strengthen the entrance of the tell itself by outflanking any attack on the gates.

The Trunk of a Mammoth.—Some eight years ago a Tungus hunter found a well-preserved mammoth's trunk in the Bolshaya Baraniha River in Siberia, the first proboscis-tip to have been seen since the days of the palæolithic age (Science Service, Washington, D.C.). After various wanderings, the proboscis-tip reached the Museum in Leningrad, and it has now been described by Dr. G. Flerof. In general, there is a resemblance to the trunk-tip of the Indian elephant, but the 'lip' is much longer and wider than that of any modern elephant and gives the entire tip a bilobed appearance. Its adaptation is towards the efficient plucking of large bunches of grass or moss, at which it would be more adept than Indian or African elephants, which feed largely upon the leaves of trees and shrubs. An interesting point, the report states, is that European cave drawings sometimes represent the mammoth as having a bilobed trunk-tip, and the recent discovery of the frozen specimen shows again how keen was the perception of the artists of the old stone age, and how accurate were their drawings.

Bibliography of the Sardines.—The sardine is of enormous commercial importance in both Europe and America. But throughout their entire existence the sardine fishing, curing, and canning industries have always suffered from disconcerting fluctuations in the stocks of the various sardine species. On both sides of the Atlantic much research has therefore been undertaken in an as yet more or less unsuccessful attempt to elucidate the life histories of these fishes and to understand the causes underlying their erratic habits. A vast and scattered literature has therefore grown up around them. In order to facilitate reference to all the published works on *Sardina pilchardus* (Europe), *S. melanosicta* (Japan), *S. ocellata* (South Africa), *S. sajar* (west coast of South America), and *S. caerulea* (west coast of North America), a bibliography has been compiled and is now published as *Fish Bulletin* No. 36 of the Bureau of Commercial Fisheries, California. With few exceptions, the compiler, or her associates, has consulted every paper or publication listed, and a brief summary of the contents of each is appended immediately following the title. The usual system of listing the authors alphabetically and the papers of each author chronologically has been adopted. This carefully compiled and very full bibliography should prove of immense benefit to all students of the sardine in the spheres of both natural history and of commerce. Copies are offered free of charge to interested persons and in exchange for the publications of other bodies engaged in marine research. Address: California State Fisheries Laboratory, Terminal Island, California.

Indian Fungi.—Dr. E. J. Butler and Dr. G. R. Bisby have recently published a book which attempts to collect together our knowledge of the fungi of India (The Imperial Council for Agricultural Research, Scientific Monograph No. 1: "The Fungi of India". Government of India Central Publication Branch, Calcutta, 1931, pp. 237, 11s.). The authors have consulted more than five hundred scientific papers, and have compiled a descriptive list which should help the student of mycology in the large area under review. The introduction is perhaps the most interesting part for the general student. Comparisons of the fungus floras of India and Europe are made, and show that more than twenty-three per cent of the total number of species are also represented in Europe. This is more than the proportion of phanerogams, for only six per cent of the number of species of flowering

plants occur also in Europe. There are other interesting comparisons of distribution which should interest the ecologist as well as the student of mycology. An extensive list of synonyms is given and will go far towards clearing up many difficulties of nomenclature.

Twisted Trees.—Recent observations of trees the trunks of which have a clockwise or counter-clockwise twist appear to show that this is not produced either by the wind or by any reaction to the movement of the sun. Mr. F. Knorr (*J. Heredity*, vol. 23, No. 2) has made a number of further observations on conifers in California. In 1926, search disclosed 486 twisted trees, in 44 per cent of which the twist was clockwise, 56 per cent the reverse. The following year, with still larger numbers belonging to six species, 27 per cent of the trees were found to be twisted, 52 per cent of them clockwise. In later years it was found that only part of the species in a particular area would show twisting. In the giant redwood and in certain deciduous trees, secondary growths showed the same twist as the parent trees. Examination of conifer seedlings showed that the twisting begins with the woody thickening both in stem and root, while in older trees the branches and twigs show the same twist as the main trunk, although the intensity of twist may vary to some extent. These observations all suggest that twisting of the wood may be a genetic character, and if this is the case, the habit of western lumbermen in leaving twisted trees for seeding purposes because they are of less economic value will be very unfortunate in its effects.

Microscopic Determination of Ore Minerals.—The optical and microchemical study of opaque minerals is now reaching a mature stage in its development. The most recent work on the subject in English (*U.S. Geol. Surv. Bull.* 825, 1931, pp. 204) has been written by M. N. Short, who has himself been occupied with the investigation of improved methods during the last four years. From a research point of view, the book is noteworthy because, for the first time, full determinative tables are given incorporating the effects of polarised light on polished surfaces of ore minerals. A far-reaching and critical study of qualitative microchemical tests for elements forms the basis of another and equally useful set of determinative tables. A combination of these two methods with the etching processes devised by Davy and Farnham, Murdoch, and others brings the whole technique up to the level of reliability attained by the better known petrographic methods involving the use of transmitted light. The work concludes with a list of specific tests for minerals, the latter being arranged alphabetically. It is obtainable from the Superintendent of Documents, Washington, D.C., at a cost of 60 cents.

Boring for Oil in Egypt.—The third section of the Report on "Boring for Oil in Egypt" (Cairo: Government Press, 1931) deals with the eastern desert and adjoining islands. Mr. T. Sutton Bowman gives a full and detailed account of his investigations of the samples from various wells drilled in this territory, and the report is of note as being one of the few lengthy expositions on the use of sedimentary petrography ('heavy' minerals, etc.) in oilfield (subsurface) problems, published outside America. The specialist in this subject will profit by reading Mr. Bowman's account of his methods and findings, and while some of the former are open to criticism, there is little doubt that this region has provided yet another case of the value of intensive petrological work in competent hands. The stratigrapher will find that the problem of the Nubian Sandstone has been re-attacked, and, although admittedly the evidence is at present

of local significance and based on work which is incomplete, the sharp petrographic distinction established between the Cenomanian on one hand, and the Turonian and Santonian and true Nubian Sandstone on the other, is indicative of at least a promising means of analysing this composite lithology in other regions of Egypt.

Greenland Weather.—The weather of Greenland has importance in the institution of a great circle flying route between Great Britain and North America, and was investigated by the recent British Arctic Air-Route Expedition. Some results are given in a paper by Mr. S. T. A. Mirrlees in the *Geographical Journal* for July. During summer, visibility on the east coast was good when once the low fog belt over the pack ice was left behind, and during winter, apart from the short hours of daylight, it was fairly good. Winds on the east coast were light in summer, but gales were very frequent in winter and of great violence. They were, however, local and might possibly be avoided if choice of landing places were available. The observations from the ice cap station are, however, the most important and cover a period of about eight months. Poor visibility showed a frequency of 44 per cent, but probably drifting snow accounted for fully half of these occasions, and since the drift layer is shallow, it would not affect aviation. Strong northerly winds were frequent and calms rare, but gales were less common than on the coast. The average temperature of the air on the ice cap varied from 2° F. in September to -33° in February, and the variation of temperature was great from day to day and depended on the direction and force of the wind. Inversion of temperature at heights of 1000-1500 ft. was found to be common, and the lowest temperature recorded at those heights was -14° F., but there are no records for June, July, October, and November. Cloudiness at the ice cap station was small. Flight-Lieut. D'Aeth concludes that a summer flying route over Greenland would be entirely practicable, but that winter flying would be difficult and necessitate an efficient ground organisation.

Structure of Atomic Nuclei.—Now that neutrons have been detected as probable products of the artificial disintegration of light elements, it will be necessary to accommodate them in some way in the scheme of nuclear structures. An attempt at this has been made by F. Perrin (*J. Physique*, May, p. 96, S.). In his first scheme, the particles employed for the light elements are helium nuclei (α), neutrons (ω) and protons (π). The scheme explains nicely the strong emission of neutrons, without protons, in the artificial disintegration of beryllium, the structure of which becomes $2\alpha 1\omega$, and is otherwise fairly satisfactory, except in the case of nitrogen, which, written as $3\alpha 1\omega 1\pi$, should apparently be capable of giving neutrons as well as protons, whereas the former are not emitted. Largely on this account, a second scheme, which is highly suggestive, has also been proposed, in which the protons are supposed linked up with neutrons to give 'demihelions' (η), particles of mass 2 and unit charge, which are in fact known now through the discovery of the heavy 'hydrogen' isotope spectroscopically. On this scheme beryllium remains the same as before, but nitrogen becomes $3\alpha 1\eta$. The important implication of this second scheme is that the particles produced in artificial disintegration which have been generally supposed to be protons may actually be demihelions. The experimental evidence already extant should be adequate to decide this point, but it is noted that it could at least account for certain features of Blackett's photographs of the artificial disintegration of nitrogen. Perrin also gives

schemes for the nuclear structure of the elements from neon to potassium, analogous to his second scheme for the lighter elements, but with the modification that the maximum number of α -particles which could occur on purely numerical grounds is not employed, to obtain agreement with the results of disintegration experiments. It is interesting to note that there is some indication from this of why potassium (41) should have a natural radioactivity.

The Bleaching of Cellulose Materials.—In 1927, Clibbens and Ridge, of the Shirley Institute, carried out some important work on the action of chlorous bleach liquors on cotton, and revealed the surprising fact that in such cases the degradation of the cellulose was most rapid at a pH value of about 7, that is, at the neutral point. Subsequent work by Kauffmann, Weiss, and others, along different lines, has led to the same conclusions, although none of the theories advanced in explanation is entirely satisfactory, since they ignore the effects of variations in the concentration of cellulose. The problem has now been

attacked from the point of view of the bleaching of wood cellulose by F. H. Yorston, of the Canadian Forest Products Laboratory (*Proc. of the Canadian Pulp and Paper Assoc.*, p. 31; 1932), who has found that an experimental bleaching mixture may be buffered to a pH value of 8.8-9.2 by addition of light magnesia, increase in acidity by neutralisation of the free lime by carbon dioxide being thereby avoided. In addition, it was possible to follow the rate of reduction, at pH 9, of hypochlorite by pulps which had already consumed various amounts of bleach, and to show that this reaction is monomolecular with respect to hypochlorite. It is concluded that the proportion of those substances present in the pulp in relatively high concentrations (for example, celluloses and pentosans) is probably little changed by the action of the hypochlorite, especially if allowances are made for the effect of the oxidation of soluble lignins on the apparent rate of reduction of hypochlorite and for the autodecomposition of the hypochlorite itself. An additional observation of interest is the superior colour of pulps bleached in an alkaline medium.

Astronomical Topics

Comets.—It is now established that there was a nebulous object near Newman's comet on the evenings of June 25 and 29. *U.A.I.Circ.* 392 contains a letter from Dr. Schmitt stating that he observed the object visually on June 29 with the Algiers equatorial, and also found it on his plates; he then examined the two exposures made on June 25, and found two images that indicated nearly the same motion as that of Newman's comet, which was registered on the same plate. On the first four days of July, observers at Bergedorf, Neubabelsberg, Heidelberg, Norwood, Yerkes failed to find any companions to Newman's comet, but on July 6 and 7, M. Delporte photographed two companion bodies at Uccle. Computations by Dr. M. Davidson make it unlikely that either of these is identical with the object of June 25 and 29.

A plausible conjecture is that Newman's comet has been expelling a series of vaporious masses, which have remained visible for a few days and then dissipated. The following table gives the distances of the three objects from Newman's comet:—First Object, June 25, E.100.43^{sec}, N.11' 44.8"; June 29, E.114.42^{sec}, N.7' 29.9"; Second Object, July 6, E.49.17^{sec}, S.3' 34.9"; July 7, E.47.09^{sec}, S.1' 45.4"; Third Object, July 6, W.65^{sec}, N.7'; July 7, W.68^{sec}, N.5'. It will be recalled that the great comet of 1882 expelled several portions. A sketch by C. L. Prince on Oct. 23 showed 4 nuclei (see Chambers' "The Story of the Comets", page 152, which also records that "on one occasion the comet seems to have thrown off a mass of matter which became, and for several days was observed as, a distinct comet").

Harvard Cards No. 224, 225, 227 give the following positions of comet 1932 *g* (Geddes). They are for the equinox of 1932.0. The observers at Cordoba were Dr. Bobone and Mr. Tretter; at La Plata, M. Dartayet. The magnitude was 9.

U.T.	R.A.	S.Decl.	Place.
June 25-9666	10 ^h 43 ^m 13.5 ^s	81° 43' 38"	La Plata.
27-0366	10 55 16.7	80 53 25	Cordoba.
27-9847	11 4 30.4	80 7 46	Cordoba.
29-0740	11 13 28.3	79 14 40	La Plata.

An erroneous position was given in *Card* 226; it is corrected in *Card* 227.

Hydrogen Content of the Stars.—Sir Arthur Eddington pointed out some years ago that the discordance between the calculated and observed brightness of

the stars (the calculated one being about ten times too bright) could be removed by supposing a larger proportion of hydrogen in the stars than at that time seemed probable. He now gives reasons for believing that the proportion of hydrogen is actually large enough to remove the discrepancy (*Mon. Not. R.A.S.*, April). He shows that there are two solutions for the percentage of hydrogen, one 33 per cent, the other 99.5 per cent. He regards the smaller value as more probable, but does not absolutely rule out the larger one; five cases are worked out: the sun, Capella, Krueger 60, Algol, V Puppis. The agreement is close except in the case of the last star; it is suggested that the proportion of hydrogen may be greater in very massive stars.

Sir Arthur notes that a paper by Dr. B. Strömngren, which he did not receive until his own was nearly finished, deals with the same problem and reaches results in very good agreement with his. The existence of the second solution with the very high percentage of hydrogen was noticed by both investigators. Incidentally, Sir Arthur notes that he has changed his adopted value of the sun's absolute bolometric magnitude from 4.85 to 4.60.

A Hebrew Zodiac.—Mr. Moses B. Cotsworth, the well-known advocate of calendar reform, reproduces in his Pamphlet *W*, issued last year, a photograph of a zodiac, executed in mosaic work, which was discovered in 1929 under the ancient synagogue of Beth Alpha, in the valley of Jezreel; the date is conjectured to be the reign of the Emperor Justin, A.D. 518-527. Several of the figures depart considerably from the usual types. The Lion has its head towards the Virgin, the Scorpion towards the Archer, the Scales are in a man's hand (possibly to correct the anomaly that the Scales, being an inanimate object, break the circle of living things). The Hebrew names of the constellations are inserted, and several of them are distinctly legible in the reproduction: Shor the Bull, Ariyah the Lion, Bethulah the Virgin, Aqrab the Scorpion, Qesheth the Bow; the others are indistinct. Mr. Cotsworth states that a similar zodiac has since been discovered near Jericho. The late Mr. E. W. Maunder, in his "Astronomy of the Bible", collected several passages in the Old Testament that might be allusions to the signs of the zodiac; but this is the first distinctly Hebrew zodiac that has come under the notice of the writer of this note.