

Research Items

Venezuelan Archaeology

THREE new archaeological sites in the State of Falcón, Coro, El Mámón and La Maravilla, in the important but little explored coastal area of northern Venezuela, have been described by Gladys Ayer Nomland (*Ibero-Americana*, 11). They are situated in the midst of shifting sand dunes in the flat coastal strip at the edge of the plain, which lies between the inland range of mountains and the present coast line, and was left by the retreat of the sea with which it was covered in Pleistocene times to a distance of twelve kilometres inland. This flat strip must have served as a cultural highway between central and eastern South America. The location of the sites, excepting the hill-top site of El Mámón, was determined by the seasonal presence of dammed water in the gullies. The inhabitants lived by hunting and fishing. The absence of any signs of European contacts is strong presumptive evidence of a pre-Columbian dating. Notwithstanding the fragmentary condition of both pottery and skeletal remains, it is evident that the inhabitants practised urn burial, presumably as a secondary interment, judging from the size of the mortuary vessels, which could not have held a corpse entire. The artefacts from the sites consisted of pottery, implements of black and green stone, and ornaments of shell, pottery and stone. The pottery comprises a grey-brown ware, painted ware and a red ware. The ornament is geometric. In the Venezuelan fictile art, which is of a high degree of excellence, the plain red and grey-brown ware appear to form the basic substrata from which the more complex painted ware was developed. Certain groups can be differentiated, but phylogenetic relations are to be traced. The site of Coro, however, stands apart, the red ware diverging from the orderly progression into the highly complex incised group and not in the direction of the painted ware as elsewhere. This may be due to chronological difference, Coro probably being the earliest and La Maravilla, with its rich development of painted wares, the latest; but this is mere conjecture. The groups cannot be affiliated with any other datable groups.

Courtship of Manakins

THE manakins (not to be confounded with the fashionable variety!) are small passerine birds (family Pipridæ) inhabiting the tropical and sub-tropical regions of America, exclusive of the Antilles. They show courtship behaviour which in some species is complex, co-operative and well organised, and the existence of fundamentally similar habits among widely distributed and strongly differentiated members of the same family suggests that these are rooted in the origin of the family itself and are as much part of its evolution as its form. Frank M. Chapman has made a particular study of the courtship of Gould's manakin (*Manacus vitellinus vitellinus*) on Barro Colorado Island (*Bull. Amer. Mus. Nat. Hist.*, 68, 471, Sept. 1935). About a fortnight before courtship activities begin, the males commence to gather at an established lek or courting ground in the forest. The arrival of the breeding season is marked by the making of a 'court' from which the male removes

all loose material, and into which the chief object of its existence is now to induce a female to enter. The courting ground generally contains from five to seven courts, thirty to forty feet from each other. Since the males have limited vocal powers, they announce their presence by making snapping and whirring sounds with their wing-feathers. When a female has once entered a court, there is no further competition for her favours by other males. The courting site has no immediate connexion with the nesting site, for the nest is built in a forked branch a short distance off the ground (twenty inches to five feet) usually a hundred yards or more from the nearest court.

Evolution of the Human Foot

HERBERT ELFTMAN and John Manter (*J. Anat.*, 70, Part 1, Oct. 1935) state that the fundamental similarity in architecture of the foot of the chimpanzee and that of man leaves no doubt as to the evolution of the human foot from that of an ape. Superimposed upon this structural similarity are important differences, considered in some detail, which the foot has undergone in evolution. The authors state that although the gorilla resembles man more closely than does the chimpanzee in the relative shortness of the lateral digits of the foot, it shows no indication of the more fundamental changes which are essential for the development of the human condition. "The fact that the human foot, adapted as it is for walking on the ground, bears a closer resemblance to the ape foot as used in arboreal than in terrestrial locomotion, may be regarded as another evidence of man's arboreal ancestry. It would also suggest that the essential features of man's foot were acquired at an early stage of his terrestrial existence, rather than after long apprenticeship on the ground."

Crustacea of Jehol

IN the report of the first scientific expedition to Manchoukuo under the leadership of Shigeyasu Tokunaga, June–October 1933 (Sect. 5, Div. 1, Part 2) various crustacea are described by Masuzô Uéno (Phyllozoa), Tane Sakai (Decapoda-Brachyura) and Hajime Uchida (terrestrial Isopoda and freshwater Amphipoda). Most of the text is in Japanese, but there are descriptions of species and bibliography in English, and all the papers are beautifully illustrated, some in colour. *Apus numidicus* was found in a swamp of alkaline water in the northern part of Jehol. It is a form typically inhabiting water of warm and arid regions of Africa and the southwestern parts of Asia. The extension of its distribution into Manchoukuo from these western regions is probably due to the similarity of ecological conditions in both countries. Only one crab was collected by the expedition, *Eriocheir sinensis*, the mitten crab, which has now become notorious from its having been accidentally imported from China into Germany and settling there. It is now difficult to eradicate. Of terrestrial Isopoda, only one species was found, a new one, *Porcellio jehoensis*; and one new species of Amphipod, *Gammarus nekkensis*, inhabiting a cold spring, 1,000 metres above sea-level.

Plankton Production in the Southern Hemisphere

THE yearly cycle of events in the production of marine plankton has been followed for many years and in many places in the northern hemisphere. Similar observations are, however, to a large extent lacking from coastal waters in the southern hemisphere. It is therefore worthy of note that the yearly sequence has been followed in Australian waters off Sydney (Dakin, W. J., and Colefax, A., "The Marine Plankton of the Coastal Waters of New South Wales (1)", *Proc. Linn. Soc. N. S. Wales*, 58, Parts 3-4, 186-222; 1935). Collections made at fortnightly intervals throughout the year showed that in its main essentials the seasonal cycle is similar to that known for northern waters. The phytoplankton production shows two peaks, one in early spring and a smaller one in late summer. The spring outburst is not so markedly great as in northern seas; but it is of interest to find that the similarity extends also partially to the sequence of species, in that *Rhizosolenia* species follow those of *Chaetoceros*. The zooplankton appears also to show two maxima, occurring respectively just after the two phytoplankton maxima. Tables are given for all the plankton catches, the organisms being identified to species so far as possible. This work forms a valuable foundation for further research on the plankton of Australian waters.

Primitive Colour-Pattern of Insect Wings

MR. HEMMING LEMCHE, of the Zoological Laboratory of the Royal Veterinary and Agricultural College, Copenhagen, discusses this subject in a recent paper (*Vidensk. Medd. fra Dansk naturh. Foren.*, 99, 45-64; 1935). His chief contention is that there exists in insect wings a primary colour-pattern, which can be traced back to an archaic pattern common to all insect groups. This archaic pattern comprises a number of cross-bands (most probably seven) separated by hyaline interspaces. He further points out that these archaic cross-bands traverse the wing in such a way that the bifurcations of the veins lie at the inner edge of the bands. It follows from this contention that the primary vein-forks cannot have been scattered irregularly over the wing, but have been located in cross-lines represented by the inner edges of the bands. The theory, it is claimed, is supported by evidence afforded by the most primitive fossil insects. Traces of the primitive banding are also retained among generalised Lepidoptera, in Mecoptera and in Acridiidae among living forms. The present paper, it is stated, will be followed by more detailed studies which will form the subject of a later contribution.

Leaf and Scale Types in *Pinus*

WITHIN this single genus, indeed upon a single tree, are found four distinct types of branch system, long shoot, dwarf shoot, staminate cone axis and ovulate cone axis, and the generally accepted theories of this last one would add yet another, the axis of the seed scales. Upon these varying branch systems are found no less than eleven types of foliar structures which include some leaf types, many scale types and the sporophylls. A most instructive analysis of these different foliar and branch types, of their development and structure and of their homologies, has been prepared by Dr. C. C. Doak (*Illinois Biol. Mon.*, 13, No. 3, August 1935). Evidence for reduction of

leaf number both in the fascicles of the short shoots and in the number of simple leaves or cotyledons in the seedlings thus emerges very convincingly, whilst the influence of the closely knit surrounding bud scales upon the shape and growth of the meristematic basal regions of the needles growing within is very clearly brought out. Alike in its extensive and clearly recorded observations upon some thirty-five species of pines and in its extensive and critical survey of the relevant literature, this monograph will have permanent value as a contribution to some of the most intriguing problems of shoot morphology.

Asparagus Cultivation

A SHORT note by Mr. A. N. Rawes (*J. Roy. Hort. Soc.*, Oct. 1935) gives some very useful information about the cropping of *Asparagus*. Several series of beds containing all male plants were compared with beds planted with female crowns. The result showed that in every case the male plants yielded about 60 per cent more saleable stems than the females. The series covered a variety of planting methods and differing cultivation, but the superiority of the males was obvious in every case. Very little difference in the relative grades of produce was, however, demonstrable between the two sexes. The paper reports a continuation of previous experiments made at the Wisley gardens, with confirmation of the earlier results, and also discusses the merits of close and wide planting.

Antarctic Moraines

IN his presidential address to the Australian and New Zealand Association for the Advancement of Science, 1935, now reprinted in pamphlet form, Sir Douglas Mawson gave a lengthy review of the unveiling of Antarctica, and discussed several of the problems which that continent presents. He stressed the evidence of the former much more extensive glaciation and noted particularly the recent recognition of terminal moraines on the sea floor often fifty to one hundred miles beyond the real coast line. These moraines are frequently hundreds of feet in height. Off Adelie Land the height of the chief off-shore moraine is about three thousand feet. It is the occurrence of these submarine banks that has much to do with the ice-obstruction that prevents access to certain coasts of Antarctica. Huge icebergs become grounded in 600-1,000 ft. of water and hold up floating pack, and thus coastal waters are blockaded. It is noticeable that where the sea floor is down-faulted, as on the west of the Ross Sea or the east of the Weddell Sea, deep water prevents these moraines acting as barriers to moving ice. Such shores are relatively accessible. It is only the action of periodic super-tides as described by O. Pettersen that moves the more securely anchored ice obstructions.

Earthquakes and Rainfall

MR. J. F. BRENNAN, Government meteorologist in Jamaica, has recently made an interesting comparison between the mean monthly frequency of earthquakes and the mean monthly rainfall in Jamaica (*Earth. Notes, East. Sect. Seis. Soc. America*, 7, 25-26; 1935). During the years 1908-34, 480 earthquakes were recorded. The curve representing the mean monthly frequency shows two maxima, in February (60 earthquakes) and July (46), both months of minimum rainfall, and two minima in May (25) and

October (31), months of maximum rainfall. The author suggests that the greater frequency of earthquakes during the dry seasons may be due to the withdrawal of water from underground water-courses, which may thus facilitate the fall of large masses of rock.

Irrigation Research

THE Punjab Irrigation Research Institute has issued two further reports of its work. In "Protection below Khanki Weir" (2, No. 8, Nov. 1934), Mr. J. P. Gunn gives an account of the experiments made, by means of models, to determine an effective and simple method of preventing scour at the reconstructed portions of the Khanki Weir, which is built on a sand foundation. The arrangement adopted and incorporated in the new works consisted of three rows of 'arrows' pointing upstream, followed by several rows of control blocks, as it had been found that this gave a low velocity of flow at the bottom without local turbulence and had the effect also of raising the level at which maximum velocity occurred sufficiently near the surface of the water to stabilise the scour. The results in practice are so far reported as satisfactory, but a complete investigation could not be made until the fall of the river. In the second of these reports, entitled "Influence of an Upstream Sheet Pile on the Uplift Pressure on a Floor" (2, No. 9, Jan. 1935), Dr. N. K. Bose, mathematical officer, and H. L. Uppal, assistant research officer, present the results of one of a series of experiments directed towards ascertaining the influence of different arrangements of sheet piling on the distribution of floor pressure. The work has involved extensive observation and mathematical analysis of the data obtained, and from it two general conclusions are drawn: namely, that, length for length, a long sheet pile is less effective than a short one, and that the longer the sheet pile the less effective is the floor. As the investigation proceeds, it is hoped to be able to determine data for safe and economical dimensions under varying working heads.

Solar Radiation and Weather Studies

IN "Solar Radiation and Weather Studies" by C. G. Abbot (*Smithsonian Miscellaneous Collections*, 94, No. 10) an account is given of an investigation begun by Dr. S. P. Langley, formerly secretary of the Smithsonian Institution, into the dependence of weather on variations in the radiation emitted by the sun. While few physicists or meteorologists are likely to dispute the probability of a connexion between the two, some may doubt whether the problem of measuring the solar radiation, which involves various assumptions about the relation between its intensity outside the earth's atmosphere and at the point where measurement is made, has been solved, and may regard any apparent variations of the intensity, after due allowance has been made for the varying distance between the earth and the sun, as mere errors of measurement and computation. Such doubts may perhaps be dispelled by the generally close resemblance found between graphs representing the day to day values of the solar 'constant' obtained by measurements made at places so far apart as Montezuma (Chile), Table Mountain (California) and Mount Brukkaros (South West Africa) illustrated in this work. The solar variations on which the comparisons in this discussion are mainly dependent are those revealed by ten-day means of the solar

'constant' for the period 1920-34. A number of periodicities ranging from 7 months to 68 months were revealed by a variant of the periodogram method of analysis, and these suggested the existence of a well-marked 23-year period. For tracing the connexion between these and weather, use has been made of long meteorological records collected together in an earlier Smithsonian Publication—"World Weather Records". Considerable success is claimed in this, and practical application of the results was made in long-period forecasts for 1934, 1935 and 1936; it is stated that these were fairly well verified for temperature and precipitation in 1934.

Vibration of an Incomplete Circular Ring

FINDING that Lamb's method of treatment is applicable only to relatively small arcs of rings, Mr. T. Ikebe has investigated, by means of a mathematical analysis, the frequency and form of vibration of a ring having a very small air gap ("On the Vibration of an Incomplete Circular Ring", *Sci. Pap. Inst. Phys. and Chem. Res., Tokyo*, 27, No. 589). His investigation is based on equations given by Prescott in "Applied Elasticity", and proceeds by the application of Ritz's method and of an integral equation to determine values of the frequency of a ring of negligible cross-sectional dimensions. Comparison of these results with those obtained experimentally reveals marked discrepancies, which are considered to be due to the effect of rotational energy in the test ring, the radial thickness of which cannot be regarded as negligible. A further investigation, giving effect to the influence of rotational energy, yields more comparable results; but as the experiments were carried out on a magnetised ring and in a magnetic field, some doubt is expressed as to the effective value of Young's modulus and as to the condition of free oscillation.

A Method of Improving the Radio Beacon

IN 1929, the Air Ministry erected an improved rotating beacon at Orfordness, Suffolk, for direct navigational use in the North Sea. Mr. H. A. Thomas has discussed the possible errors of this method when the navigator uses it to find the direction of the beacon from the ship (*J. Inst. Elec. Eng.*, 77, 285). An analysis of the records of bearings taken on this beacon by ships at sea shows that within a range of 100 miles, about 80 per cent of the bearings obtained were correct within 2°, whether taken by day or by night. At greater distances the day observations showed reasonable consistency up to 250 miles, but the night observations gave evidence of the well-known 'night effect' errors. These effects are known to be due to interference at the receiver on the ship between the ground ray and other rays which have travelled through the upper atmosphere. These produce false bearings owing to the lack of definiteness of the minimum points. With the operating frequency 288.5 kilocycles (1,040 metres) at present allocated to rotating beacons, it is necessary to use a large aerial system, and rotating this produces mechanical difficulties. In the system described by Mr. Thomas, there are two pairs of spaced aeriels supplied by two power amplifiers. These amplifiers, automatically controlled, provide the necessary voltage variations. Experiments show that a controller of this type can advantageously fulfil the function of an excitation apparatus. It is concluded that the system would be suitable for incorporation in a full-sized rotating radio beacon for marine navigational purposes.