Research Items.

Class Distinction in the Society Islands.—A study of traditional history and political grouping in the Society Islands, by Dr. E. S. Craighill Handy (*Bull.* No. 79, Bernice P. Bishop Museum), is devoted to the elucidation of the ethnic and cultural relations of the *manahune* (landless commoners) who dwelt mostly in the interior of Tahiti in the days prior to the breaking down of class distinctions by the missionary system. A preliminary investigation had indicated that they represented a survival of an earlier population that had been conquered and pushed back by the ruling dynasty, the *Hui Arii*, who were supreme in all the islands when they were discovered by Europeans. The customs and traditions of this invading dynasty were of an entirely different order from those of the earlier tribal culture. The *manahune*, who were the most numerous element in the population, were the serfs of the *arii* (feudal lords) and their supporters the *raatira* (landed proprietors). They were the wood-cutters for the royal family, the high-priest, and the warriors, the pickers of taro leaves, the fishers of eels and fresh-water fish. Of the two types of house, the rectangular and the apsidal, the former belongs to the earlier culture. The *manahune* were valley-dwellers, cultivating the taro and sweet potato on irrigation terraces. The warriors' house was probably their central social and political institution, and the chief cause of war was blood-revenge. Human skulls and jawbones were preserved and reverenced. Tane, Roo (Rongo), and Tu were worshipped as patrons of woodcraft, agriculture, and war respectively. On the other hand, among the *Arii* the furniture and domestic utensils of their apsidal houses were supported on legs, their boats were composite built-up vessels, and they were distinctly maritime and not agriculturists, excelling in sea fishing which was a royal sport. They wore the *pareu*, the short skirt, as opposed to the loin-cloth, and made fine mats, used for articles of clothing and other purposes. Their outstanding contribution to Tahitian religion was the god Taaroa, their ancestor, who assumed the position of creator and supreme god of the local cult.

Pottery of Ancient Mexico.—A study of certain characteristics of the pottery of ancient Mexico, referring particularly to the types and distribution of decorative motives on specimens in the Museo Nacional of Mexico, is contributed by Sr. Eduardo Noguera to the *Journal de la Societe des americanistes de Paris*, N.S., t. 22 (fasc. 2). Taking the collection as a whole, without reference to cultures, 39·7 per cent of the pottery vessels showed no decoration, the next highest percentage being shown by those with geometric motives, 27·7 per cent; anthropomorphic motives came next with 19·7 per cent. Of the pottery objects, other than vessels, in the collection, 89 per cent were anthropomorphic, 5·6 per cent zoomorphic, and 4·1 per cent skeuomorphic. When the cultural grouping is taken into account, the Aztec pottery showed the highest percentage of decorated ware. It also showed the highest percentage with geometric decoration. It is suggested that this preponderance of geometric motives is due to the fact that in other cultures decorative art developed through the stylisation of a realistic symbolism. The small number of skeuomorphic motives is attributed to the relatively backward stage of industrial development. Here again the predominance in Aztec art is due to the later and more developed stage attained by the Aztecs before the Conquest. The low percentage of phytomorphs is noticeable, and may be due to the fact that the geographical zones occupied by these cultures were of a relatively high altitude and vegetation was not so luxuriant as in the coastal regions. It is possible that a study of Maya and Huaxtec pottery on these lines would show a high percentage of phytomorphs to correspond with the more abundant vegetation of their habitat. Following the same line of argument, it may be shown that the Toltec and Aztec potteries are inferior in the percentage of zoomorphs to the Zapotecan, Mixtecan, and Tarascan cultures, owing to the fact that the two former inhabited the Valley of Mexico, in which animals were less abundant than in the habitat of the latter.

Detection of Syphilis.—In a paper presented in the *Rendiconti della Reale Istituto Lombardo di Scienze e Lettere* (parts 6-10), Dr. L. V. Blina gives the results of the application of the Wassermann and Kahn reactions to 650 samples of blood sera from syphilitic and non-syphilitic patients. In a number of cases of syphilitic infection, the Kahn procedure reacted positive and the Wassermann procedure negative, and the tendency to give negative indications as a result of therapeutic treatment proved less pronounced with the Kahn than with the Wassermann reaction. The former reaction reaches its highest degree of positivity for secondary syphilis and often shows negative with the tertiary form. These experiments are in favour of the Kahn reaction as a means of detecting syphilis, and the simpler technique and more rapid execution of this reaction give it an added advantage over that of Wassermann.

Mimicry in Indian Butterflies.—The Punjab University proposes to publish in the *Bulletin of the Department of Zoology*, of which the first part has reached us, a series of papers devoted to an intensive study of the fauna within a radius of five miles of Lahore. The first contribution, by Dev Raj Puri, deals with the butterflies, which, probably because of the extremes of climate in the summer and winter months at Lahore, are abundant only during August, September, and October. Keys and descriptions are given for the identification of families, genera, and species, and these are supplemented by thirty excellent coloured figures. In such a work, however, the lengthy synonomy of specific names is unnecessary, and since it occupies as much space as the essential descriptions, it might be drastically reduced. The author observed several new examples of protective coloration and mimicry. In *Melanitis leda*, always found resting on dry bamboo leaves under bamboo trees, the undersides of the wings resembled the colouring of the leaves. *Junonia orithya*, a common species, has wings of brilliant colour, and in rest the colours are exposed on the spread wings, but on the approach of danger the wings are folded up and only the obscure dust-coloured undersides exposed. *Pareronia hyppia* and *Delias eucharis* females resemble each other and occur together, but since the former was always entire, while the latter had sometimes the edges of the wing torn by birds, the former would appear to be distasteful and the model. Another suggested case of mimicry is that between the female of two species of Pieridæ, *Huphina nerissa* and *Ixias pyrene*.

The Evolution of the Excretory System in Cercariæ.—Lieut.-Col. R. B. Seymour Sewell (*Rec. Ind. Mus.*, **32**, part 4, Dec. 1930) discusses the evolution of the excretory system in certain groups of furcocercous cercariæ. A study of the evolution and development of this system tends to show that every flame-cell

pattern (that is, the number and arrangement of the flame-cells) is reached by the division of an original single-pair flame-cell system. Such a system is known only in certain miracidia: for example, of *Amphistomum*, *Fasciola*, *Gastrodiscus*, *Gorgodera*. The next stage in evolution is represented by the excretory system of the miracidia of the genera *Holostomum* and *Schistosoma*, in which the originally single flame-cell of each side has divided into two, so that four flame-cells altogether are present. A further division of each of these flame-cells would give four flame-cells on each side of the body, and it is such a system that seems to be the starting point in several different lines of evolution in the furcocercous cercariæ. This is the condition in the schistosomes, in which there are four pairs of flame-cells, three pairs in the body of the cercaria and the fourth in the tail-stem. The author, starting from this condition, traces the different modes of division of the flame-cells and of the grouping of the flame-cells so produced, dealing first with cercariæ which are apharyngeal and brevifurcate and then with those which are pharyngeal and longifurcate. This last series is subdivided into three groups. While recognising the difficulty of constructing a classification of the fork-tailed cercariæ based only on the excretory system, Lieut.-Col. Sewell is convinced that this system is the most important for the correct determination of the systematic position of any given species in the evolutionary series. The paper contains helpful diagrams illustrating the different modes of derivation from four flame-cells of the systems exhibiting five to twelve flame-cells, and the probable lines of evolution of the principal forms.

Chromosome Linkage in a Triploid *Œnothera*.—The triploid *Œnothera pycnocarpa*, which was supposed by Catcheside to have a ring of twenty-one chromosomes, has now been re-studied by him (*Jour. of Genetics*, vol. 24, No. 2) and a variety of arrangements found in diakinesis. This is the most detailed study that has yet been made of the diakinesis stage of meiosis in a triploid *Œnothera*. The great variety of linkages found is in harmony with the great range of genetic types, including many trisomic mutations, known through the work of de Vries to be obtained from triploids when selfed. As an example of the conditions, one nucleus is found to contain four ring pairs of chromosomes, two rod pairs, three univalents, one Y-shaped trivalent and a chain of three. Another contains five univalents, a chain of six, and a chain of eight with two attached to one of its ends. All the groupings, with one possible exception, conform to the segmental formula proposed, and are in harmony with the view that the chromosome linkages have originally arisen by crossing of species, followed by rearrangements of segments of the chromosomes.

Eocene Mollusca of North-west India.—A memoir on the molluscan fauna of the Laki and basal Khirthar Groups by L. R. Cox (*Trans. Roy. Soc., Edinburgh*, 57, pp. 25-92, pls. i-iv; 1931) is based mainly on a collection made in recent years by Lieut.-Col. L. M. Davies, but the author has also studied the material collected by earlier geologists, from 1834 onwards, with the important result that the horizons of most of the species described in the great work by d'Archiac and Haime (1853–54) can now be fixed. The fauna is of Ypresian age and includes nearly a hundred species of gasteropods and lamellibranchs. The Laki fauna is very distinct from that of the underlying Upper Ranikot beds, but this is due partly to difference in the facies of the deposits. On the other hand, there is no great difference between the faunas of the Laki and Khirthar groups. A considerable number of the species, especially of the gasteropods, are confined to India, and those with a wider range are mainly limited to the Tethyan province. A few, however, are found in the Eocene of Europe, and one even in Jamaica.

Jointing and Tectonics of the Craven Area.—In the *Quart. Jour. Geol. Soc.*, 1931, pp. 392-421, L. R. Wager describes the jointing of the Great Scar Limestone of Craven and its relations to the tectonics of the area. The joints fall into two sets that are nearly at right angles to each other and fairly constant in direction. They are interpreted as shearing fractures due to a maximum horizontal compression in an approximately north-west–south-east direction. The jointing was produced in the early part of the interval between the Coal Measures and the Permian, and is contemporaneous with the Dent Fault, the North and Middle Craven Fault-systems, and the folding in South Craven. The North Craven Fault-system is a tear-fault, and the drag due to the relative horizontal movement has caused a local modification of the joint directions in the neighbourhood of the fault. The deep burial of the pre-Carboniferous floor in South Craven and the shallower burial of this floor in North Craven are responsible for the different reactions of the two areas to the Hercynian compressive forces. Renewed sinking of the South Craven area took place in post-Permian times, partly along the early faults and partly along newly initiated faults which followed one or other of the directions of jointing.

Photographic Vibrograph.—Messrs. Askania-Werke A.-G. Bambergwerk, Berlin-Friedenau, Kaiserallee 87-88, have issued a pamphlet (Geo. 105E) describing their latest pattern vibrograph. The instrument, which consists of two units joined by a light-tight tube, employs a photographic recording system. One unit comprises the camera, utilising 6 cm. wide bromide paper and a 4-volt lamp for illumination. Various paper speeds are obtainable, and short lengths of record can be cut off with a knife and removed in daylight for subsequent development. The vibrograph proper is normally constructed so that all three components of motion, vertical and two horizontal, are recorded side by side on the paper. Instruments can also be supplied which record only two or one of the components. The natural frequency of the units is stated to be five cycles/second, a value sufficiently low for most practical work on roads and in buildings, and variable liquid damping is provided. A useful feature is an arrangement whereby the mechanical magnification of the instrument can be altered in the ratio of ten to one. In addition, a choice of three lenses is available, thus permitting in all a choice of six values of magnification, varying from 125 to 3000 times.

Atomic Weights Deduced from Mass-Spectra.—Some new values for the atomic weights of a number of elements are given by Dr. F. W. Aston in an account of an investigation of their mass-spectra which appears in the August number of the *Proceedings of the Royal Society*. In the majority of cases these agree with the accepted chemical values. Amongst these is rhenium, which is perhaps of particular interest, Dr. Aston's value being $186{\cdot}22 \pm 0{\cdot}07$ and Hönigschmid's 186·31. For the three elements selenium, tellurium, and osmium, there are, however, serious discrepancies; the atomic weights found by the mass spectrograph for these are $78{\cdot}96 \pm 0{\cdot}04$, $128{\cdot}03 \pm 0{\cdot}1$, and $190{\cdot}31 \pm 0{\cdot}06$ respectively, against chemical values of 79·2, 127·5, and 190·9. It remains to be seen if the chemical values are actually inaccurate, but it will be recalled that in two other instances—krypton and xenon—more recent redeterminations by classical

methods have tended to support the validity of the values found electrically.

Conductivity of Tetraethylammonium and Ammonium Salts.—The August number of the *Proceedings of the Royal Society* contains some data for the conductivity of various ammonium and tetraethylammonium salts in methyl alcohol, which have been obtained by Sir Harold Hartley and a number of collaborators. The measurements were made at 25° C. and show the rather curious result that the mobility of the complex ethyl ion (NEt_4^+) is seven per cent greater than that of the relatively simple ammonium ion (NH_4^+). With a single exception, the results for the eleven salts studied agree with the prediction of the Debye theory of electrolytes that the molecular conductivity should change in a linear manner with the square root of the concentration; the rate of change of conductivity with concentration also affords evidence for the essential accuracy of some recent developments of Debye's theory, observed and calculated values of the rate of change agreeing on an average to within twenty per cent. The general trend of the results, and particularly the behaviour of the good conductor tetraethylammonium perchlorate, indicates that the magnitude of the deviations from theory increases with the speed of the ions present.

Insulin Therapy.—Although our knowledge of the mechanism of the action of insulin in the body is very incomplete, there is no question of its value in the treatment of diabetes mellitus. The principles of its practical use are well defined, although the actual details may vary; in every case it is necessary to ensure a balance between the diet and dosage of insulin, such that the blood-sugar is kept within normal limits and none is excreted in the urine. The amount of insulin required will naturally vary according to the severity of the disease and the amount of food taken. The details, which vary according to the physician in charge of the case, are concerned with the methods of determining the amount of insulin required and of calculating the diet. A convenient account of the treatment of diabetes with insulin is given in a small brochure recently issued by the manufacturers of "A.B." Brand Insulin (British Drug Houses, Ltd., and Allen and Hanburys, Ltd.). Simple methods for estimating sugar in blood and urine are described, as well as a simple dietary scheme. The practical use of insulin is given in detail. Sections are devoted to the treatment of the various conditions which may complicate the disease. Although insulin rarely cures, it can undoubtedly prolong life when properly employed; a cure can only be expected when the affection of the pancreas passes off without damaging the organ permanently. In such a case insulin may tide the patient over the infection and permit of recovery of function by the gland. In many cases, however, the timely use of insulin may promote a definite improvement in the condition of the pancreas. In all, its use permits of a better dietary being prescribed, with greater comfort to the patient. Insulin has also found a use in the treatment of various nondiabetic conditions: it is employed to improve the metabolism of carbohydrate, and may be used in states of malnutrition and when it is advisable to stimulate the metabolism of these food-stuffs, as in various forms of vomiting and in liver affections. The booklet may be recommended to those in search of a short and readable account of insulin treatment, based on selected excerpts from current medical literature.

Astronomical Topics.

A Daylight Meteor.—A brilliant meteor was observed by Mr. J. R. Clarke, University, Sheffield, just before sunrise, from Loch Doon, Ayrshire, on Aug. 26 at about $4^h\ 15^m$ G.M.T. It travelled from west to east with very low apparent velocity, and was visible for about half a minute. No other reports are to hand at present.

Stellar Photometry.—Some years ago the photographic magnitudes of stars in the zone $+90°$ to $+73°$ declination were obtained by Parkhurst at Yerkes, and this work has now been continued by A. S. Fairley at the same observatory over the zone $+75°$ to $+60°$. The method used is that of extra-focal images, obtained 6 mm. inside the focus of a Zeiss 14·5 cm. doublet of 81 cm. focal length. A series of fourteen accurately graded artificial images was impressed on each plate before development, thus providing an independent scale for the comparison of densities, which were measured in a Hartmann microphotometer. The zero point was calculated for each plate from stars in the Potsdam Photometric Durchmusterung, the magnitudes of which were first corrected for colour index (assumed from spectral type) and then reduced to the international scale. The methods employed are described in the *Astrophysical Journal*, vol. 73, p. 125, in which Fairley gives the resulting photographic magnitudes of 2354 stars down to magnitude 8·25 within the above-mentioned zone.

The Apparent Recession of the Spiral Nebulæ.—*Leaflet* 37 of the Astronomical Society of the Pacific gives an account by Mr. Milton L. Humason of the methods now adopted at Mount Wilson of measuring the radial velocities of the distant spiral nebulæ. A new spectrograph lens, designed by Dr. W. B. Rayton, has been brought into use, which greatly shortens the exposures; these, however, still have to be continued on several successive nights in the case of the fainter nebulæ. The photographic plates measure $\frac{5}{8}$ inch by $1\frac{1}{2}$ inch, and the length of the spectrum varies from $\frac{1}{25}$ inch to $\frac{1}{12}$ inch, according to the prisms used.

Up to three years ago the measures of distance extended up to 6 million light-years; they now reach 105 million. Reasons are given for assuming that the smaller and fainter nebulæ are the more distant, and it is then shown that these small faint nebulæ have also the largest velocities of recession. The question whether the recession is real, or arises from the properties of space, does not affect the use of the shift to the red as a measure of distance.

A photograph, taken with the 100-inch reflector, is reproduced, showing a group of faint nebulæ in Leo. The brightest of these is of magnitude 15·5, and is stated to be the faintest and most distant object for which a measurable spectrum has been photographed. The deduced distance is 105 million light-years, and the measured recession is 12,000 miles per second, or $\frac{1}{15}$ of the velocity of light.

Measures are given of seven other nebular groups, in which 30 nebulæ were examined. The results show that the distances estimated from apparent brightness and diameter are in excellent agreement with those deduced from the velocities of recession. So far as the results extend at present, they indicate a fairly uniform distribution of nebulæ in different regions of space.