

## RESEARCH ITEMS

## Travellers in Tibet

A SERIES of communications by the late H. Hosten, S.J., dealing with records of Jesuit missions in India in the seventeenth and eighteenth centuries, published recently by the Royal Asiatic Society of Bengal (4, 1938, No. 4. *Letters*, 1939) includes correspondence, for the greater part unpublished, of the Jesuit missionary, Fr. Ippolito Desideri, with the authorities of his order at Rome in the years 1713-21. He left Rome at the end of September 1712, and arrived at Joa in August of the following year. On June 26, 1715, accompanied by Fr. Manoel Freyre, he arrived at Leh (Ladakh) by way of Srinagar, Kashmir. Up to this point Desideri was aware only of the existence of two Tibets, a Little Tibet (Baltistan) and Great Tibet (Bhutan). In Ladakh he heard of a third, a Great Tibet, U-Tsang, of which the capital was Lhasa. Desideri's object in visiting Tibet was to re-establish the Jesuit Mission of de Andrada (1624-1640) which he now erroneously concluded had been in Lhasa, but in fact had been in Tsaparang. Desideri reached Lhasa on March 18, 1716, but as the Capuchin Mission claimed priority there he was recalled in 1721. He returned to India and finally reached Rome on December 23, 1727. While from the point of view of evangelization his career in Tibet was a failure, he learned Tibetan, which he wrote in both prose and verse, translated Tibetan books, and may have composed, as he intended, a catechism, grammar and a dictionary for the use of the Capuchin Fathers. In addition to interesting material relating to Tibetan society, Desideri records how "this great kingdom of Great Tibet fell into the hands and power of the Tartars", an event which took place during his stay in Lhasa.

## Kurds of the Rowanduz Area, Iraq

AN account of the Kurdish social organization in the Rowanduz area of Iraq by E. R. Leach (*Monographs on Social Anthropology* No. 3: London School of Economics, 1940. Pp. 74 + 16 plates. 5s.), based upon evidence collected in a five weeks survey carried out in 1938, records data relating to a people and an area concerning which information is scanty. Although linguistically of 'aryan' rather than 'semitic' stock, a close correlation undoubtedly exists between Kurdish social forms and those of Arabia in general. The study, which deals with contrasting factors of cohesion and conflict that affect the lives of this small group of people, rather than with "manners and customs", in other words ethnographic facts, illustrates once more the futility of attaching psychological labels to cultural groups. Again and again the Kurds as a group have been labelled treacherous, bloodthirsty, lazy, virile, stupid and a dozen other things besides; this study at least shows that there is no such easy classification, but that while the structural pattern of a society does impose upon individuals some standardization of behaviour, it affects the interests of individuals in widely different ways, and their resulting reactions differ accordingly. There can never be absolute conformity to the cultural norm. Until ten years ago the Rowanduz area was extremely inaccessible. Investigation was

confined mainly to the Soran and Balik tribes of the mountainous region in which poverty of soil, severity of the winter and difficulties of inter-communication between the valleys are the most prominent characteristics. Tribal organization has been much affected by contact with external authority and to-day is undergoing extremely rapid and at times violent changes.

## Biology of Parasites of Teak Defoliators

IN *Indian Forest Records*, Entomology, 5, Nos. 4-6, 1939, are three papers on the above subject. P. F. Garthwaite and M. H. Desai deal with one hundred and sixteen species of parasites reared from two moths, namely, *Hapalia machaeralis* Walk., and *Hyblaea puera* Cram., the larvæ of which are common defoliators of teak trees in Burma. They include both primary parasites and hyperparasites. Of the latter, most of them are Chalcids, while the primary parasites are mainly Ichneumonidae and Tachinidae. Some further notes on the biology of these parasites are contributed by C. F. C. Beeson and S. N. Chatterjee. The third paper, by P. N. Chatterjee, is a detailed study of the biology and morphology of a single species of parasite, namely, the braconid *Apanteles machaeralis* Wlkn. The work embodied in these three papers is a contribution towards a knowledge of the natural controlling agencies of teak defoliators. This survey of the parasites aims at assessing the value of each species, with the ultimate object of examining whatever possibilities there may be of increasing any desirable species by sylvicultural and biological methods. The two moths referred to are the most important of the teak defoliators. Each passes through thirteen or fourteen generations in a single year, and control by other than biological means is stated to be impracticable. Considerable difficulty has been experienced in getting the parasites identified owing to the great paucity of specialists in the groups concerned. The result has been that only thirty-three out of the one hundred and sixteen species dealt with had been named at the time of publication.

## Japanese Gephyrea

UNTIL 1904 only four species of Gephyrea had been recorded from Japan, but in that year Ikeda brought the number up to thirty-seven, twenty-four of which were new. As the result of the examination of three collections, twenty-three species from Formosa, eight species from the Riukiu Islands and fifteen species from Korea, Hayao Satô (*Sci. Rep. Tôhoku Imp. Univ.*, 14; 1939) has been able to add eight new species. This brings the total number of Gephyrea now known from Japan and Korea up to ninety. The author not only describes the new species, but also makes it an opportunity for reviewing the whole of the group in Japanese seas. The paper thus provides a most useful survey of our present knowledge, and is furnished with full keys to groups, genera and species. It is provided with five plates illustrating by photographs many of the species. There are also a large number of text-figures.

### Amphipod Bathyporeia in Tow-nettings

E. EMRYS WATKIN has studied the migrations of four species of Bathyporeia at Millport (*J. Marine Biol. Assoc.*, 23; 1939). The species represented live in a sandy bay, burrowing an inch or less into the sand between tide marks. A distinct zoning was found from high-tide mark to low-tide mark. *Bathyporeia pilosa* occurs above the high-water mark of neap tides, *B. pelagica* is a mid-tidal form and *B. elegans* a low-water form. The latter, together with *B. guilliamsoniana*, extends beyond low-water mark. Tow-nettings taken at night over the same area show that these amphipods come out of the sand and swim about, although none is taken in the daytime. The same zoning of the species occurs. The reasons for these migrations are by no means clear, but in his detailed discussion the author suggests that the nocturnal vertical movements into the waters of the tidal flow may be determined, in part, by the influence of the tides, which has some relation to the double breeding cycle in each month. These problems require much further investigation.

### Temperature of Grain Heaps

A METHOD of storing grain in Egypt, that has persisted from the times of Ancient Egypt, is the 'shouna' system, in which various types of grain are simply exposed in heaps in the open on a small piece of enclosed land. The method is particularly utilized by banks and money-lenders, part of the value of the grain having been borrowed against this security. Such heaps are built up of most various samples and must be contaminated by pests; the question then arises whether the pests will multiply in the grain under such storage conditions. The possibility has been stressed by Willcocks that under Egyptian conditions hard dry grain in well-ventilated conditions which permit of the powerful drying action of the sun may prove the most practicable method of controlling pests. Rizk Attia has, therefore, recently published (*Bull.* No. 192, Technical and Scientific Service, Cairo, 1939) a very full study of temperature distribution in such a heap of stored grain, associated with studies of pest distribution in the grain heap. The kind of grain and especially its colour will modify the range of temperatures, which rise generally in the sun, though loss of water from the heap may produce a considerable cooling effect. All factors found to affect the temperature are tabulated and they are numerous, but in general the results show a marked fall in the number of pests in the deeper layers of an unstirred heap, and especially species of Calandra seemed to be kept under, as the result of the high temperatures, in heaps stored in the sun. In general, wheat at humidities higher than 32 per cent will absorb water and increase in weight; at lower humidity it usually loses water.

### The 'Rhizosphere'

UNDER this term A. G. Lochhead, Dominion agricultural bacteriologist, includes the soil in the immediate neighbourhood of a growing root system, and in a series of recent papers (*Canadian J. Res.*, 16, 152-161; 1938: 16, 162-173; 1938: 18, 42-53; 1940) he has examined the influence of the root system upon the bacterial flora. In the rhizosphere gram-negative rods are proportionately increased, gram-positive rods, coccoid rods and spore-forming types less abundant. In the rhizosphere there is a notably greater proportion of motile

forms and a pronounced increase in chromogenic types, also a higher incidence of liquefying bacteria and of those fermenting glucose. To date, Mr. Lochhead concludes that his results suggest that plant varieties resistant to soil infection may exhibit a more selective action through root excretions upon the saprophytic soil microflora.

### Origin of Maize

P. C. Mangelsdorf and R. G. Reeves (*Bull.*, 574, Texas Agric. Exp. Stat.) provide a fascinating story concerning the origin of maize. This thorough and penetrating analysis of the taxonomy, history, archaeology, genetics and cytology of the Maydeae summarizes the previous work on the subject and puts forward a novel theory of the origin of maize. Zea is definitely of New World origin, and is closely related to Tripsacum and Euchlæna. It had been assumed either that these three genera are segregates of a large aggregation or that Zea arose from Euchlæna. The authors bring forward the view that maize arose from a wild Amazonian progenitor, and was brought into domestication in the Andes. The secondary large distribution centre is Mexico and is believed by the authors to have arisen from crossing between Euchlæna and Zea. The most interesting hypothesis is that wild Euchlæna arose originally from crosses between wild Tripsacum and cultivated Zea. The wealth of data derived from actual cytogenetical experiments, taxonomy and history make this theory highly plausible. If one prefers to follow the older theory that maize originated from wild Euchlæna, this well-designed monograph still provides a standard source of reference on the origin of maize.

### Exchange between a Metal and its Ions in Solution

IN experiments with radioactive lead, Hevesy and Biltz in 1929 showed that there is an exchange of atoms between metallic lead and a solution of a lead salt: in an hour, the quantity of lead exchanged corresponded with a depth of about a thousand atomic layers in the metal. B. V. Rollin (*J. Amer. Chem. Soc.*, 62, 86; 1940) has prepared radioactive silver  $^{106}\text{Ag}$  by bombarding palladium with deuterons, using a cyclotron. By treating a silver plate with a solution of the radioactive silver nitrate, it acquired an activity corresponding with an exchange with the solution of about 150 atomic layers after some hours. Sheets of gold and platinum also acquired an activity corresponding with about 100 atomic layers. When an active silver surface was shaken with silver nitrate solution, an exchange of silver corresponding with ten atomic layers was found in two hours. The exchange was increased by a factor of ten if the surface was pretreated with sodium nitrate solution, which may be due to some kind of activation of points on the surface of the silver by sodium ions.

### Separation of Isotopes

THE method of Clusius and Dickel for the separation of gases of different molecular weights, and particularly isotopes, using simultaneous thermodiffusion and convection, has proved of considerable value in the separation of mixtures of gaseous isotopes into light and heavy fractions. In its simplest form the apparatus consists of a long vertical tube, cooled on the outside, along the axis of which passes an electrically heated wire. The apparatus was used by Clusius and Dickel to alter the isotopic composition of chlorine,  $^{37}\text{Cl}$ :  $^{35}\text{Cl}$ , from

77 : 23 to 0.6 : 99.4. Many light elements contain very small concentrations of isotopes which are of interest from the point of view of nuclear physics, and their enrichment is therefore a matter of some importance. R. Fleischmann (*Phys. Z.*, 41, 14; 1940) reports experiments carried out with nitrogen. With two separation tubes of 9 mm. and 11 mm. diameter and 12 m. long, 770 c.c. of gas containing 9.2 per cent of  $^{14}\text{N}^{15}\text{N}$  were obtained in six weeks, and from this, 110 c.c. of gas containing 18 per cent of  $^{14}\text{N}^{15}\text{N}$  were obtained. The band spectra of the products indicated that separation had occurred. W. Groth and P. Harteck (*Naturwiss.*, 28, 47; 1940) have recently carried out separation experiments with krypton using an apparatus of a similar type. After 5-8 days separation, the atomic weight of the krypton was 1.51 units less than normal, and after 9-14 days it was 1.74 units less. The large amount of work done on isotopes is reflected in an article by O. Hahn, S. Flügge and J. Mattauach, appearing in a recent issue of *Phys. Z.* (41, 1; 1940). It includes a table giving all relevant data for each element up to the end of 1939. The isotopic weights, and relative abundance of all known isotopes, together with packing fractions and mass defects, and the chemical atomic weight calculated from the isotopic composition of each element, are given. The maximum abundance of isotopes at present undetected is also given.

#### High Temperature Photolysis of Acetaldehyde

G. K. Rollefson and D. C. Grahame (*J. Chem. Phys.*, 8, 98; 1940) report that the mechanism of the photolysis of acetaldehyde vapour is almost identical with that put forward to explain the thermal decomposition of acetaldehyde. Photolysis was carried out by 3130 Å. and 2652 Å. mercury radiation at 96°-350° and by 3303 Å. at 60°-300°. The mechanism, by which methyl and formyl free radicals are formed and through them further decomposition of acetaldehyde is brought about, can be represented as: (i)  $\text{CH}_3\text{CHO} + h\nu \rightarrow \text{CH}_3 + \text{CHO}$ ; (ii)  $\text{CH}_3\text{CHO} + h\nu \rightarrow \text{CH}_3 + \text{CHO}$ ; (iii)  $\text{CH}_3 + \text{CH}_3\text{CHO} \rightarrow \text{CH}_4 + \text{CH}_3\text{CO}$ ; (iv)  $\text{CH}_3\text{CO} \rightarrow \text{CH}_3 + \text{CO}$ ; (v)  $\text{CHO} \rightarrow \text{CO} + \text{H}$ ; (vi)  $\text{CH}_3\text{CHO} + \text{H} \rightarrow \text{CH}_3\text{CO} + \text{H}_2$ ; (vii)  $\text{CH}_3 + \text{CH}_3 \rightarrow \text{C}_2\text{H}_6$ . Photolysis of the mixed vapours of acetaldehyde and acetone at 200° and 300° has also been studied. At 3130 Å. more free radicals are produced from acetaldehyde than from acetone, whilst at 2652 Å. acetone yields more free radicals than acetaldehyde. Neither acetone nor acetaldehyde shows any afterglow  $\frac{1}{100}$  sec. after irradiation with 3130 Å., indicating either that their fluorescence does not arise from recombination of acetyl radicals (that is, from activated diacetyl molecules) or that the life-time of acetyl radicals is less than  $\frac{1}{100}$  sec.

#### A New Ionization Gauge

THE requirements of an ionization gauge to measure pressures of the order  $10^{-8}$  mm. of mercury are: a wide connecting tube, ease of removing occluded gas, electrical leakage to the plate small, and reasonably high sensitivity. R. S. Morse and R. M. Bowie, of Distillation Products, New York, claim that their new gauge fulfils these demands more thoroughly than any gauge previously described (*Rev. Sci. Inst.*, March 1940). The bulb of the gauge is 5.5 cm. in diameter, of Pyrex glass, with an exit tube of 1.6 cm. diameter. The plate or collector is a

platinum film deposited on the inner wall and is connected to an outside deposited ring by a fine wire embedded in the glass. The grid is a double wound spiral of tungsten wire, each end having a terminal. The filament is pure tungsten. Owing to the large volume between grid and plate and the open form of the grid, the sensitivity is higher than usual. Below pressures of  $10^{-4}$  mm. the plate current is found by comparison with a McLeod gauge to be proportional to the pressure. The best working conditions are 3.5 volts for the filament, 150 for the grid and -25 for the plate.

#### New Method in Quantum Mechanics

A NEW method for determining eigenvalues and eigenfunctions has recently been developed by E. Schrödinger (*Proc. Roy. Irish Acad.*, A, 46, 9; 1940), which, he considers, gives the most direct insight into the way the line spectrum depends on the structure of the wave equation. This method avoids cumbersome transformations and expansion in power series, using instead the factorization of the second order operator occurring in the wave equation into two mutually adjoint operators of the first order. For the problem of Planck's oscillator, it gives one eigenfunction by integration of a very simple differential equation, and then derives all the other eigenfunctions and their corresponding eigenvalues by application of a differential operator of the first order. Prof. Schrödinger also applies the method to the Kepler motion of the hydrogen atom, and also to Kepler motion "in the hypersphere" (that is taking account of the curvature of the universe). This last problem is a new one, which appears difficult when treated by any other method. It has some interesting features, such as the obliteration of the sharp distinction between elliptic and hyperbolic orbits, and the resolution of the continuous spectrum into an intensely crowded line spectrum.

#### Solar Eclipse of October 1, 1940

A COMMUNICATION from the U.S. Naval Observatory, Washington, D.C., published as a supplement to the American Ephemeris of 1940, gives much useful information concerning the total eclipse of the sun on October 1. The booklet is designed especially for use along the paths of totality in South America and South Africa; but the entire region covered by the eclipse on both continents is indicated on two large-scale maps (c. 150 miles to the inch) contained in a pocket on the cover. Red lines overprinted on these maps show the times of beginning and ending of the eclipse at 5- or 10-minute intervals, so that even for points not in the path of totality the times of beginning and ending of the partial phase can be estimated to a fraction of a minute. Data are given dealing with the meteorological conditions that prevail in or near the paths of totality, and the most favourable locations for observing the eclipse are suggested. In addition to the usual astronomical data, eight pages are devoted to the convenience of those who plan to make ionospheric observations during the partial and total phases, for the purpose of testing various hypotheses underlying the theory of origin of the E region of the ionosphere. In an appendix are reprinted special temperature, rainfall, and cloudiness data compiled from volunteers' observations made within the African totality belt at 3, 4, and 5 p.m. local time during September and October for a period of five years since September 1933.