

THE BIOLOGICAL INSTITUTE OF TIHANY, HUNGARY

THE Hungarian Biological Research Institute is situated near the village of Tihany on a small peninsula running out from the northern shore of Lake Balaton. It is about a hundred miles south-west of Budapest in an attractive position on the edge of the lake with wooded hills behind.

The Institute, founded in 1926, was well known before the War as the largest freshwater biological station in Europe; and the plant and animal life of the lake and its shores have been the subject of intensive study. The lake itself is fifty miles long, 6-9 miles wide and 10 ft. deep on the average; near Tihany the depth increases to about 30 ft.

During the War the Institute was fortunate in having suffered comparatively little material damage and has now become the main centre for biological research of all kinds in Hungary. With Dr. A. B. L. Beznak as director, accommodation has been afforded to workers who would otherwise have been deprived of facilities for research by the destruction of their laboratories in other parts of Hungary; in this manner an isolated residential community has been created of some seventy scientific workers, many of whom had earned international reputations before the War. The isolation is partly physical due to the present lack of transport, and partly scientific due to difficulties in maintaining contact with men of science in other countries; in recent months institutions and individuals in Great Britain have been sending a certain amount of scientific literature which has been very gladly received and has helped to keep research going at the Institute.

The work of the hydrobiological department is directed by Dr. Bela Entz, assisted by Dr. Olga Sebestyen. Research is concerned mainly with limnological problems; in particular, investigations on organic detritus, on biocenosis, on *Cladocera*, on phytoplankton and on sponges are being carried out or are projected.

Dr. J. Horvath is now working on soil fertility, sterility and exhaustion, and later intends to work on soil bacteriology.

Research in plant physiology is being carried out by L. J. Havas, mainly in relation to colchicine; he proposes to investigate effects of vegetable substances on animal tumours and pathogens.

Dr. L. Felföldi is concerned with plant geography and plant sociology; he is also interested in cytogenetics and hopes to study polyploid plants with a view to their practical applications.

Drosophila research is being done by Dr. G. Fabian, who has found and bred his own special stock. Present work is concerned with inheritance of fertility and sterility; it is later intended to work on the biochemistry of gene substances.

Work on the sociology of birds is carried out by Dr. N. Udvary, who studied bird life on the Hortobagy during the War.

Dr. S. G. Maltoltsy is investigating cell physiology and has recently been working on the hereditary effects of carcinogenic materials on *Drosophila* and on plants, and on the biological effects of ultra-violet rays.

Research on animal physiology is being done by the director, Dr. A. B. J. Beznak, by his wife, Dr. M. Beznak, and by Dr. I. Hajdu; the work is mainly concerned with the physiological mechanism of the

hyperglycaemia caused by the thrombosis or ligation of one of the heart vessels. The physiological mechanisms of heart hypertrophies and of suprarenal hypertrophies as well as the physiology of nutrition have also been studied by these workers.

Dr. T. Csaky plans to study the biochemistry of nutrition and also the production of protein food-stuffs for human and animal nutrition by the action of synthesizing agents such as yeast and nitrogen-fixing bacteria.

Dr. A. G. B. Kovacs is concerned mainly with animal metabolism. He is now working on the physiological mechanism of the temperature response following histamine injections. In the future he wants to work on the part played by histamine in the central nervous system, and on surgical shock.

Dr. Zsuzsanna Rady works mainly on human nutrition, and after completing the results of a survey of nutritional conditions at the comparatively wealthy village of Valko, intends to carry out a similar research at the poorer village of Tihany. She hopes in this way to relate the needs of the population in a particular locality to the agricultural conditions of the country, and hence to make recommendations for the manner in which agriculture should be developed. At present she is working on the protein metabolism of fish, on fungal diseases in fish and on the bactericidal action of their skin secretions.

Biochemistry is represented by Dr. M. Gerendas, who is working at present principally on blood-clotting and the isolation and inactivation of thrombin and also (in collaboration with Prof. Szent-Györgyi) on muscle structure.

In addition to the researches mentioned above, work on organic (sterol) chemistry is being done by Dr. A. Kramli and on experimental animal psychology by Dr. M. Nagy.

THERMODYNAMIC EQUILIBRIA OF HIGHER ORDER

FOR two phases of the same substance to be in equilibrium, the thermodynamic potential, G , must have the same value in both phases. P. S. Epstein ("Textbook of Thermodynamics", p. 131; 1937) has suggested that, in order to derive the equilibrium conditions, the Taylor series for G should be expanded to terms of high order. If, in this expansion, the n th order derivatives of G are the lowest which have different values in the two phases, and all derivatives of lower order are equal in the two phases, then $d^n G' = d^n G''$ is the condition for equilibrium of the n th order, where the symbols ($'$) and ($''$) indicate the separate phases. E. F. Lype (*Phys. Rev.*, 69, 652; June 1946) has followed Epstein's suggestion and derived from the above condition the set of thermodynamic relations, which, in addition to the equivalence of the potentials, must hold for a system of a single substance which is in n th order equilibrium.

The relations for the equilibria of the first four orders, and the equations of the corresponding equilibrium curves, are examined in some detail. For a system in first-order equilibrium, the equation of the equilibrium curve is simply the Clausius-Clapeyron equation. The transitions, between the two modifications of liquid helium, and between those of solid methane, have been interpreted as second-order equilibria. Adequate descriptions of the

transition curves, and of the thermodynamic properties of these substances along the curves, have been given (for helium by Keesom, and for methane by Clusius and co-workers), so that the theoretical relations obtained by Lype can be checked by comparison with experiment. It is shown that the relations yield values for the physical properties which are in excellent agreement with those observed, even when Ehrenfest's equation (*Leiden Comm. Supp.*, 75b., 1933), which has been applied to second-order equilibria, leads to values twice as high as the observed values.

Certain transformations in metals, such as the transition at the Curie point from the ferromagnetic to the paramagnetic state, or between two forms of a crystal lattice, as observed, for example, for cobalt at 450° C., have been considered to represent equilibria of the third order. The equation for the third-order transition curve is used to calculate the variation of the transition temperature with pressure, and in the case of nickel at the Curie point, for which reliable experimental data exist, good agreement is obtained between the value calculated by Lype and the experimental value determined by Englert (*Z. Phys.*, 97, 94; 1935).

Although the existence of a fourth-order equilibrium has not yet been observed, this order of equilibrium is of interest, as a means of extending the vapour pressure curve beyond the critical point. It is shown that the points of inflexion of various thermodynamical functions in the overcritical region can be regarded as such an extension, and some verification for this, though sufficient data are lacking, is obtained by comparison with the experimental values of the specific heat of high pressure steam in the overcritical region as measured by Havlíček and Miškovský (*Helv. phys. Acta*, 9, 161; 1936).

1/6 NATIVE CULTURE OF THE MARIANAS ISLANDS

THE Marianas Islands, Micronesia have not received so much attention from anthropologists as have most of the other island groups, and yet they present an extremely interesting field of study ("Native Culture of the Marianas Islands." By Laura Thompson, *Bernice P. Bishop Museum Bull.*, 18; 1945). Discovered by Magellan in 1521, these islands were a regular stopping place for the early voyagers, but the inhabitants were left practically undisturbed for about 150 years. In the middle of the seventeenth century, a permanent mission was established by a band of Jesuits supported by Spanish soldiers. The natives, who numbered about 100,000, were friendly but resisted conversion; however, with the help of the soldiers their resistance was overcome and the reduced population gave in to Spanish domination. The population was further diminished by other factors (disease, etc.), and in the first census early in the eighteenth century, only some 3,678 natives survived. These intermarried with the Spaniards, Filipinos and others, and a mixed population completely replaced the indigenous one, the cultures blending with influences both from the Old and the New Worlds to form a new pattern. To-day only the Chamorro language, altered by Spanish additions, persists.

There are, however, archaeological remains and a number of old Spanish documents from which much

can be deduced concerning the Chamorro, who are remarkable for their size and strength and for their fondness for the water. From these documents, Laura Thompson has pieced together a reasonably detailed account of the daily life and social structure of the vanished tribe, together with their material culture, and much of interest emerges. It is clear that the ancient Chamorro had an elaborate social organisation with matrilineal clans and village chiefs whose power was based mainly on inherited wealth and monopolies. The society was divided into three classes, the upper and middle consisting of sailors, carpenters, fishermen and warriors, which professions were not open to the lower and physically inferior class. Their economy was of the usual South Sea type, based on gardens, food collecting and fishing, but different in that rice was also cultivated.

Taking it all round, the ancient Chamorro had a highly developed neolithic culture which rivalled in interest the high centres of central and marginal Polynesia, and may be compared to the Indonesian or pre-Malay level in the Philippines.

K. RISHBETH

FORTHCOMING EVENTS

Wednesday, October 2

SOCIETY OF PUBLIC ANALYSTS AND OTHER ANALYTICAL CHEMISTS (at the Chemical Society's Rooms, Burlington House, Piccadilly, London, W.1) at 6 p.m.—Scientific Papers.

ROYAL INSTITUTE OF CHEMISTRY, NEWCASTLE-UPON-TYNE AND NORTH-EAST COAST SECTION (joint meeting with the SOCIETY OF CHEMICAL INDUSTRY, in the Chemistry Lecture Theatre, King's College, Newcastle-upon-Tyne), at 6.30 p.m.—Dr. H. J. T. Ellingham: "Chemical Metallurgy".

Thursday, October 3

PHYSICAL SOCIETY, COLOUR GROUP (at the Lighting Service Bureau, E.L.M.A., 2 Savoy Hill, London, W.C.2), at 3 p.m.—Mr. N. E. G. Hill: "The Recognition of Coloured Light Signals which are near the Limit of Visibility" and "The Measurement of the Chromatic and Achromatic Thresholds of Coloured Point Sources against a White Background".

INSTITUTION OF ELECTRICAL ENGINEERS (at Savoy Place, Victoria Embankment, London, W.C.2), at 5.30 p.m.—Mr. V. Z. de Ferranti: Inaugural Address as President.

PHYSICAL SOCIETY (in the Lecture Theatre of the Science Museum, Exhibition Road, London, S.W.7), at 5.30 p.m.—Prof. Max Jakob: "Some Experiments on Forced Convection".

CHEMICAL SOCIETY (at Burlington House, Piccadilly, London, W.1), at 7.30 p.m.—Scientific Papers.

Friday, October 4

SOCIETY OF CHEMICAL INDUSTRY, MANCHESTER SECTION (in the Lecture Theatre, Central Library, St. Peter's Square, Manchester), at 6.30 p.m.—Prof. E. K. Rideal, M.B.E., F.R.S.: "Physical Chemistry in the Dyestuffs Industry" (Ivan Levinstein Memorial Lecture).

Saturday, October 5

ASSOCIATION FOR THE STUDY OF SYSTEMATICS IN RELATION TO GENERAL BIOLOGY (at the Royal Botanic Gardens, Kew), at 2.15 p.m.—Exhibits and demonstrations on Modern Plant Systematics.

APPOINTMENTS VACANT

APPLICATIONS are invited for the following appointments on or before the dates indicated:

ASSISTANT CHEMISTS in the Chief Inspector's Department—The Clerk and Office, West Riding of Yorkshire Rivers Board, 71 Northgate, Wakefield, Yorks, endorsed "Assistant Chemist" (October 1).

LECTURER IN ELECTRICAL ENGINEERING—Acting Clerk to the Governors, South West Essex Technical College and School of Art, Forest Road, London, E.17 (October 3).

HORTICULTURE INSTRUCTOR at the Pibwriwyd Farm Institute, Carmarthen—The Director of Education, County Education Offices, County Hall, The Castle, Carmarthen (October 5).

UNIVERSITY READERSHIP IN EXPERIMENTAL PHYSIOLOGY at University College—The Academic Registrar, University of London, Senate House, London, W.C.1 (October 7).

LECTURER IN CIVIL ENGINEERING—The Principal, Technical College, Normanton Road, Derby (October 7).

LECTURER IN THE DEPARTMENT OF PHYSIOLOGY—The Secretary, The University, Aberdeen (October 11).