

RESEARCH ITEMS

Natives of Bolivia and Western Matto Grosso

EASTERN BOLIVIA was the mythical *tierra rica* or *eldorado* of which the Spanish explorers dreamed. Alfred Métraux has given, in 170 pages, an account of the little-known native peoples of this part of the world (Bur. Amer. Ethnol., Smithsonian Inst., Bull. 134). The various tribes are considered separately, and an account given in respect to their boundaries, history, manner of life, language, religion, etc. Anyone interested in South America and the still little-known populations of the remote interior of the sub-continent will welcome this volume, which brings together for the first time much scattered material not always very easy to consult.

Distribution and Origin of British Lepidoptera

UNDER the foregoing title, B. P. Beirne attempts to throw light on the origins and reasons for the present distribution of Lepidoptera occurring in the British Isles. This order of insects is well suited for a study of this kind because the local distribution of the majority of the species commonly known as "Macrolepidoptera" is fairly accurately known in Great Britain, in Ireland and on the Continent. In fact, their distribution is known better than that of most groups of animals. Both in Great Britain and in Ireland, Lepidoptera fall into two groups. (1) Those in which the species have a local or discontinuous range; many of them exhibit local racial variation. (2) Those in which the species have a wide continuous distribution with little or no racial variation. It is concluded that the two groups represent two waves of immigration into the country. Species with a wide and continuous range were probably post-glacial in their time of arrival, while those with a local or discontinuous range came in during the late-glacial Zone II period and were confined in their distribution by the mountain glaciation of the Zone III period. The various points for and against this theory are discussed and the paper is published in *Proceedings of the Royal Irish Academy*, 49, Section B, No. 2, 1943, and can be purchased separately (price 2s.) from Hodges, Figgis and Co., Dublin, and Williams and Norgate, London.

Role of Blue-Green Algae in Nitrate Formation in Deserts

A WORKING hypothesis that the formation of nitrate in the desert may be due to the fixation of atmospheric nitrogen by bacteria of the *Azotobacter* type has been tested by S. V. Odintzova in the high desert of the Western Pamirs (*C.R. Acad. Sci. U.R.S.S.*, 32, No. 8; 1941). Nitrate deposits were found by the author in the cracks and cavities of rocks in a zone extending between the limit of the permanent snow and approximately 4,000 m. above sea-level. Rock samples were taken under sterile conditions from the ceilings of such rock cavities and seeded upon nutrient media, in the hope of inducing the development of the bacteria if they were present, but with completely negative results. On the other hand, when rock samples were seeded upon a mineral medium of Knop and Geitler, growth of blue-green algae was invariably obtained, *Gloeocapsa minor* being the species concerned. Tests of the ability of *G. minor* to fix atmospheric nitrogen gave positive results; after two months of cultivation on Bortel's mineral medium deprived of nitrogen, there was a definite increase of nitrogen in the culture. When molyb-

denum and vanadium in Bortel's medium were replaced by calcined limestone, a considerable formation of nitrates was observed.

Sex-determination in the Wood-louse

H. W. HOWARD (*J. Genet.*, 44, 143; 1943) reports further experiments on the sex-determination of *Armadillidium vulgare*. It would appear that the female is the heterozygous sex, but some females produce only males or only females, and others both males and females. It is suggested that the segregation of the X- and Y-chromosomes to the egg and polar body is not at random and may be controlled by cytoplasmic factors or by the Y-chromosome. The considerable data on sex-determination and transmission in natural populations are discussed.

Evolutionary Processes in Crepis

E. G. Babeock and his co-workers D. R. Cameron, J. H. Jenkins, G. L. Stebbins and others have discovered highly important facts in the genus *Crepis*. In a recent paper (E. G. Babeock, G. L. Stebbins and J. H. Jenkins, *Amer. Nat.*, 76, 337; 1942) there is a concise statement of the more important facts relating to species relationships and origin. The genus is of distinct interest to geneticists since structural hybridity, polyploidy and gene and chromosome mutations are commonly found in the species. The authors show that gene mutations play the most important part in speciation, but that chromosome changes also initiate new forms. Secondary processes in the evolution of *Crepis* species are polyploidy, apomixis, and interspecific hybridization.

Control of the Club-Root Fungus

THE use of a 4 per cent calomel dust raked into the soil before sowing seeds of cabbage, radish, swede, turnip and kohlrabi was found by D. E. Green to be the most successful method of controlling club-root disease (*J. Roy. Hort. Soc.*, 68, Pt. 4; April 1943). Lime, mercuric chloride and two proprietary compounds all gave considerable less control than the calomel under the conditions at the Royal Horticultural Society's Wisley garden. This result is somewhat at variance with other trials, where mercuric chloride provided the best control.

Age Determinations of Intrusive Rocks, Ontario

H. C. Horwood and N. B. Keevil have discussed (*J. Geol.*, 17; 1943) the age relationships of a long sequence of intrusive rocks in the Red Lake area of the district of Kenora, North-west Ontario. Field work has shown that there are ten ages of post-Timiskaming igneous activity. These the authors group into three cycles, which they call early pre-Algoman, late pre-Algoman and Algoman, respectively. Helium age-determinations have furnished corroborative data, unaltered minerals with close-packed structures and high retentivities, such as magnetite, pyroxene and hornblende, having been separated from the rocks and used as index minerals. After appropriate correction the ages of the cycles are estimated as approximately 1,760, 1,490, and 1,360 million years respectively. It is also shown that the final 'Algoman' granite is followed in turn by basic dykes, ore deposits and later basic dykes, all of which have ages of the same order. The adoption of the term 'Algoman' is unfortunate. It has been generally used in Canada for Pre-Cambrian granites of younger age than the Laurentian granites. Since

the age of the latter is well established at about 1,050 million years, while the granites and associated rocks investigated by the authors are about 300 million years *older*, it is obvious that these rocks cannot be Algonian in the accepted sense of the term. Apart from this unnecessary introduction of confusion, the authors have made a most valuable contribution to the Pre-Cambrian geology of Ontario.

A New Synthesis of Pyridine

THE reaction of glutarimide with phosphorus pentachloride was studied by Bernheimer in 1882 and he reported that a crystalline compound was formed, to which he assigned a formula. W. W. Crouch and H. L. Lochte (*J. Amer. Chem. Soc.*, **65**, 270; 1943) have now shown that the compound is a trichloropyridine, 2,3,6-trichloropyridine, not previously identified. This was hydrogenated to pyridine. Similar reactions with methyl and dimethyl glutarimides yielded the corresponding pyridine homologues, 2,5,6-trichloro-3-picoline and 2,6-dichloro-3,5-lutidine.

Electrolytic Oxidation of Formaldehyde

THE electrolytic oxidation of formaldehyde in acid, neutral, and alkaline solutions, with a variety of anodes, has been investigated over a wide range of current densities by A. Hickling and F. Rodwell (*J. Chem. Soc.*, 90; 1943). The results show a complex dependence on the experimental conditions, but three main sets of oxidation products were distinguished: (1) formic acid and hydrogen, (2) formic acid and water, and (3) carbon dioxide and water. The results are explained by the assumption that the primary oxidation is due to hydrogen peroxide formed at the anode, nascent oxygen and oxides formed with the electrode materials playing supplementary parts. The hydrogen peroxide may oxidize formaldehyde to $\text{CH}_2(\text{OH})\cdot\text{O}\cdot\text{O}\cdot\text{CH}_2\cdot\text{OH}$, which in alkaline solution decomposes into $2\text{H}\cdot\text{CO}_2\text{H}$ and H_2 , and in acid or neutral solution into $\text{H}_2\text{O} + \text{H}\cdot\text{CO}_2\text{H} + \text{H}\cdot\text{COH}$. The peroxide may also form water and nascent oxygen (which may be partly evolved as gaseous oxygen). The nascent oxygen may oxidize formaldehyde to formic acid and this to carbon dioxide and water, or it may form with the anode a metallic oxide which in acid or neutral solution has very little action but in alkaline solution may oxidize formaldehyde to formic acid, and/or hydrogen and formic acid.

Specific Heats of Hydrocarbons

THE question of the hindered rotation of molecules such as ethane, $\text{H}_3\text{C}\cdot\text{CH}_3$, in which the two groups joined by a single bond encounter potential barriers as atoms or groups on the rotating parts come near one another, has been studied from the side of the specific heats, from which the existence of a sinusoidal hindering potential has been confirmed. In the case of ethane this is approximately 3,000 gm. cal. The experimental results are not always in good agreement, and B. P. Dailey and W. A. Felsing (*J. Amer. Chem. Soc.*, **65**, 42, 44; 1943) have re-determined the values for ethane, propane, *n*-butane and *iso*-butane over the temperature range of about 340–700° K., using an adiabatic flow type calorimeter. The agreement between the experimental and calculated values in the cases of ethane and propane is within the limit of experimental error (1 per cent). The specific heat of *n*-butane was slightly higher than that of *iso*-butane, and the results at lower temperatures were in agreement with

theory within the limits of experimental error. At higher temperatures deviations are found. In another paper, J. F. Lemons and W. A. Felsing (*ibid.*, 46) give some determinations of the latent heats of evaporation of *n*-hexane, 2-methyl-pentane and 2,3-dimethyl-butane, and find that the latent heat is smaller the greater the branching of the chain.

Demonstrations of Base Exchange

USE of the ordinary bath sponge as a model for demonstration of ionic exchange phenomena has been described by S. Mattson (*Lantbrukshögskolans Ann.*, **10**, 56–73; 1942). Demonstrations of simple exchange (calcium and ammonium) and of the valence effect are thereby made easy. One experiment with sponge, using sodium and alkaline-earth salts in conjunction with methylene blue, also shows the lyotropic effect. Methylene blue is very suitable for demonstrating the laws of ionic exchange, as its activity in combination with the sponge acidoid is great enough to allow a considerable displacement of the common cations. Effects of hydrolysis are readily shown, and by inference the formation of soda when a saline soil is leached: the 'classical' theory relating to this is called "one of the most bungled in soil science". Mattson points out the need for making students familiar with the fundamental relationships of ionic exchange. "There is no such thing as a definite exchange capacity of a soil. The capacity to bind base and exchange metal cations varies greatly with the nature and concentration of the ions in solution". The points made would probably have interest for physical and inorganic chemists, especially since Mattson shows how to demonstrate the ability of a silver chloride precipitate to bind and exchange cations. The exchange capacity of "the simple, 'stoichiometric' compound we think of as AgCl " is as great as that of many a sandy soil.

Obscuration around the North Pole

E. G. MARTIN gave an account of an examination of counts of stars in the Greenwich Astrophysical Zone (*Mon. Not. Roy. Astro. Soc.*, **102**, 5; 1942), a summary of which appeared in NATURE of January 2, p. 27. As these counts were not compiled for the region within 3° of the north pole of the sky, and as it is now fairly certain that there is obscuration in this area, Martin has examined this region (*Mon. Not. Roy. Astro. Soc.*, **102**, 6; 1942). The Greenwich counts show that stars of mag. 8 are not obscured and that absorption at a distance of 200 parsecs is unlikely. Other sources were examined in which colour excesses and spectroscopic distances were used with the object of detecting reddening. Seares has given -0.14 mag. as the mean colour index for unobserved 40 stars—a figure which has been used to correct the zero of the Harvard photovisual magnitudes—and Martin has examined the 40 stars to see if they confirm this figure. He finds that the mean result is -0.07 mag., and, while admitting from other evidence that this may be slightly small numerically, he considers that -0.14 mag. is numerically too large and that its adoption has exaggerated the reddening near the north pole of the sky. There is therefore little evidence of reddening at 200 parsecs affecting stars of mag. 8, and it is suggested that a more reasonable distance is 500–600 parsecs where *A*-type stars of mag. 9.0 or 10.0 are affected. Further research is advocated, but with a number of modifications and precautions in deriving the colour index of 40 stars.