

RESEARCH ITEMS

Caddis Flies of Illinois

A WELL-POLISHED monograph on the Trichoptera of Illinois forms the subject of Article 1 of Vol. 23 of the *Bulletin of the Illinois Natural History Survey*. The author, Herbert H. Ross, mentions that some 150 species of these insects are known from the State of Illinois, and that the immature stages of no fewer than a hundred and twenty of the species are treated in this work. A considerable number of the species are described as new, and it is estimated that about three-quarters of a million specimens were actually collected and examined. Many of them were either females or larvæ, and consequently could not be identified any further than their genera. Keys are given for the identification of the larvæ, pupæ and adults of the seventeen families of caddis flies that are represented in North America. The monograph is very fully illustrated by more than a thousand separate figures of structural details which are clearly represented and greatly enhance the value of the work for purposes of identification. At the end of the monograph there is a useful check list of the Trichoptera of the nearctic zoological region. The whole treatise forms an admirable introduction to the study of these insects in North America, and is also likely to be useful to students of the European species.

Colour Changes in Feathers of Hens

THE *F* males of barred Rock and Brown Leghorn fowls have feathers which are barred at the apex and Leghorn-like at the base. Mary Juhn (*J. Hered.*, 36, 355, 1945) has shown that when males were raised with thiouracil in their diet the shape of the feather, the pattern and especially the proportion of barring and Leghorn patterns on the feather were altered. In some cases there was a complete reversal of pattern—Leghorn apex and barring at the base. Phenotypic alterations may be brought about in the colour of feathers by depressing the metabolic level as by thiouracil. This is held by the author to support her hypothesis that patterns of genetic origin were affected by morphogenetic levels.

Interpretation of the Golgi Apparatus

NEARLY fifty years have elapsed since the cytoplasmic structure known by the above name, was first recognized, but a generally acceptable conception of it is still lacking. L. G. Worley has published a useful critical review of the whole subject (*Ann. New York Acad. Sci.*, 47, 1; 1946). The reason for much of the uncertainty regarding the interpretation of the nature of the Golgi apparatus appears to lie, to a high degree, in over-emphasis being given to the study of fixed, stained material, and inadequate examination of the living cells. During the past few years, it has come to be realized that the Golgi bodies are to be found in most, if not all, living animal cells. The apparatus is to be regarded as a series of intracellular, sponge-like structures which on account of their peculiar chemical nature and behaviour are continually engaged in mobilizing the protein and fat reserves of the cell, some of which are transformed into specialized secretory products. It is claimed that great opportunities await the cytologist who can bring himself to realize that the Golgi apparatus is something more important than a phenomenon that can be observed chiefly in dead tissue. There is, for example, the almost com-

pletely unexplored question of the structure and activities of Golgi bodies in diseased, as compared with living, cells. Also, little is known of the effects of the presence or absence of various hormones, vitamins and combinations of amino- and fatty-acids on the Golgi apparatus in different organs and tissues. Finally, there is the problem of the difference in character and behaviour of the Golgi system in young, as compared with ageing, tissues for all the body organs.

Specific Time of Action of a Gene

R. W. STOFFNER (*J. Hered.*, 36, 375; 1945) describes a recessive mutation affecting the toes of hens. It is of considerable and general importance since this recessive gene appears only to affect a short period of the chick's life and yet may have a lasting or even a lethal effect. At about one week old the chick, which is homozygous for the gene, develops sclerosed areas in the foot. These at this period do not heal and may lead to loss of toes. If the chick is given care, healing will take place later and the bird will appear normal except for possible lack of toes. Pathological conditions due to ergot, to dermatitis and to lack of vitamins show some similarity to the condition caused by this dactylosis gene. As the author points out, to guard against deleterious genes which only affect the organism for a short period raises more difficulties for the breeder.

Chromosome Numbers in Iris

L. F. RUDOLPH (*Bull. Amer. Iris Soc.*, 95, 37; 1944) provides a comprehensive list of chromosome numbers in the cultivated bearded irises. As well as providing useful information for breeders, it is seen that most of the 420 varieties listed of the modern irises are tetraploids. Before 1910, most of the horticultural varieties were diploid. It is significant that the chromosome number and therefore the potentialities for the breeder cannot be recognized by external characteristics. The tetraploids are usually larger in flower, and of stronger texture of petal, but there are exceptions.

Mutations in Bacteria

M. DEMEYNE (*Proc. Nat. Acad. Sci.*, 32, 36; 1946) shows that both ultra-violet radiation and X-rays increase the mutation-rate of the susceptibility to T1. bacteriophage in *Escherichia coli*. The increase in mutation-rate is comparable to that found in higher organisms after irradiation. A most interesting discovery is that the mutation-rate remains high for several generations after irradiation. Various hypotheses to account for this delayed effect are discussed by the author.

Solid Diffusion and Retrogenesis

A DISCUSSION by J. A. W. Bugge of the geological importance of diffusion through solids (*Norske Videnskaps Akad. Oslo*, 1, 1945, No. 13; 1946) is of great interest in connexion with current investigations of granitization. The driving forces of all diffusion processes are related to differences in the chemical potentials (μ) of the elements concerned, and the variation of μ with composition, external pressure and temperature is given detailed description. From theoretical considerations it is supposed that the rates of migration are greater under the thermodynamic conditions of the deeper zones of the earth's crust than those found in laboratory experiments. It is suggested that the migrations responsible for metasomatism occur partly by ionic diffusion through the

crystal lattices and partly by molecular and/or ionic diffusion through the interstices ('intergranular film' of Wegmann) between the minerals. Large ions, such as O, OH and F, will usually diffuse in the 'film', while small ions, such as Si, Al and Na, may migrate almost as quickly through the crystals themselves. The melting phenomena met with in granitized rocks are ascribed to a preponderance of exothermic reactions and to energy supplied from the depths by the primary diffusing particles. Geological consequences are illustrated by examples (showing increasing distances of diffusion) from the Archæan rocks of southern Norway: (a) exsolution processes in feldspars and other mix-crystals; (b) isomorphous substitution in feldspars, etc.; (c) reaction zones between minerals, for example, coronas around olivine in hyperites; (d) reaction zones between rocks, for example, skarn formation and the development of cordierite-anthophyllite-rocks; and (e) metablastic and paligenetic rocks, for example, granites and pegmatites.

Capacitors for Measurement Purposes

A PAPER read before the Institution of Electrical Engineers in London by C. G. Garton deals with the variations of capacitance and loss-angle occurring in precision capacitors used for measurement purposes. The degree of accuracy required in current practice is discussed and compared with the performance of available instruments. It is shown that improvements in stability are required in some cases, and could be achieved. The causes of variation are reviewed with relation to time, humidity, temperature, frequency, voltage and screening, and the properties of materials used in capacitor construction are discussed in the same relation. Special attention is given to the less well-known causes of change in capacitance and loss-angle, and also to experimental difficulties which lead to errors in the measurement of these quantities. In particular, attention is directed in an appendix to an apparently unrealized source of error in loss-angle measurements on samples with a guard ring.

Solar Rotation and Shift Towards the Red Measured in Prominence Spectra

J. EVERSHED has continued measurements of the shifts of the H and K lines in prominence spectra from Aug. 1935 to March 1939 (*Mon. Not. Roy. Ast. Soc.*, 105, 4, 204; 1945). The auto-collimating spectrograph consists of solid glass prisms of 6-in. aperture (*Mon. Not. Roy. Ast. Soc.*, 95, 504; 1935), and the comparison spectrum is formed by a carbon arc containing traces of calcium, and giving the H and K lines of approximately the same width and intensity as the prominence lines. Previous measures showed that the prominences gave values of the angular speed of rotation in different zones of latitude greatly in excess of values derived from spectra of the reversing layer, or from the motions of sunspots, and the present results confirm this. The equatorial speed of the reversing layer is 14.5° , according to Adams, and Evershed finds that the speed in the prominences is 16.9° . The general shift of the H and K lines towards the red in this series of measures exceeds the relativity shift by only 0.0081 Å. On comparing the results with previous measures it appears that the rotation values were about 2° a day greater at times of maximum solar activity than they were near the minimum of 1933. There seems to have been a decrease in the general shift from 0.015 Å.

to 0.009 Å. in the period 1926-39, and the general mean of all the measures is 0.012 Å., which is 0.004 Å. in excess of the relativity shift.

Determination of Pentoses in Nucleotides and Nucleosides

A METHOD developed by Wanda Mejbaum in Prof. Parnas' laboratory in Lwow and published in 1939 (*Z. physiol. Chem.*, 258, 117; 1939) enables determinations to be made of free purines, purin nucleotides and nucleosides in microgram quantities: the method, in the original form or with modifications, is widely used. Miss Mejbaum has investigated the value of this method for other nucleotides, for it was found with a preparation of cozymase and phosphocozymase received from Prof. Otto Warburg that only one pentose was found for two phosphorus atoms. This was interpreted by Parnas ("Hdbk. der Enzymologie", 908; Nord-Weidenhagen, 1940; American photoprint, 1943) as indicating that only one of the mononucleotides in the cozymases is a pentose; this interpretation was wrong. Miss Mejbaum has found (*Biochimia*, Moscow, 10, 359; 1945) that the pentose contained in pyrimidine nucleotides (uridylic acid and cytidylic acid) and nucleosides (uridine) are not determined by her method; they give no coloration with the orcinol-reagent. Dihydrouridine behaves like free pentose or like purin nucleotides. The same holds for the determination of pentoses in nucleic acids, where only about one half of the pentoses is determined, namely, those linked with purines, and not those linked to pyrimidines. The same applies probably to the nicotinic part of the cozymases.

Determination of Fluorides in Water

THE importance of the fluoride content of a drinking water in relation to the production of mottled teeth is well known, and methods for the determination of small amounts of fluoride in water are thus important. O. J. Walker and G. C. Gainer (*Canad. J. Res.*, 23B, 275; 1945) describe a method using a photo-electric colorimeter. It is based on the bleaching of the lake from a zirconyl salt and sodium alizarin sulphonate by the fluoride ion. The photo-electric colorimeter is direct reading, the light passing through a long vertical absorption cell, and the apparatus is calibrated with solutions containing known amounts in parts per million of fluoride. The method is not suitable when more than 1.5 parts per million of fluoride is present, and in such cases dilution is necessary.

Oxides of Lead

SOME years ago, LeBlanc and Eberius reported that in the decomposition of lead dioxide, PbO_2 , a range of homogeneous oxides of non-stoichiometric formulae were formed. Byström (*Arkiv. f. Kemi, Min. Geol.*, 20, No. 1; 1945) has made a careful X-ray study of the system and has shown that the oxygen content of PbO_2 cannot be below $PbO_{1.95}$, that it gives on decomposition an oxide α - PbO_x which has a range of homogeneity close to the formulae Pb_3O_5 and Pb_2O_3 , and β - PbO_x with a composition very close to Pb_2O_3 and probably no range of homogeneity; and that the range of homogeneity of Pb_3O_4 is very narrow. The modifications of PbO have no or very narrow ranges of homogeneity. The cell dimensions of all the compounds were determined. It appears that the oxides of lead do not present an example of non-stoichiometric compounds, and more careful investigations of other systems would probably diminish further the examples quoted.