

RESEARCH ITEMS

Insect Transmission of Beet Mosaic and Beet Yellows

THE intimate relations which exist between a virus and its insect vector are gradually becoming amenable to classification. M. A. Watson (*Proc. Roy. Soc., B*, 138, 200, 1946) has recently added two more studies of virus-insect relations to our present knowledge. Vectors of beet mosaic virus are optimally infective after feeding for only a few minutes upon infected plants, after preliminary fasting. Infection is quickly lost thereafter, when aphids are fed upon healthy plants. Beet mosaic virus is an example of a group of viruses which are non-persistent in their insect vectors. Other members of the group have generally similar physical properties to beet mosaic virus. Beet yellows belongs to a group of viruses which persist in the insect vector. Its infectivity is not affected by preliminary fasting, and increases with increased feeding time on both infected and healthy plants. The difference between persistent and non-persistent viruses now appears to be that the latter are taken up more readily by an insect after preliminary fasting, whereas the latter are not. The aphid *Myzus persicae* was used as vector for both viruses, thus showing that the differences in behaviour are properties of the viruses themselves. Some success has been attained in separating the two viruses from the same host by differential feeding methods of the same vector.

Nodule Bacteria of Legumes

TWENTY-TWO cross-inoculation groups of leguminous bacteria are now known, and in a review of twenty-eight papers, J. D. Wilson (*Cornell Univ. Agric. Exp. Sta., Mem.* 267, 1945) summarizes the data concerning the reciprocal relations of the nodule bacteria of the cowpea and the soya bean. A detailed analysis of twelve isolates from soya bean showed that none was specific for this host, and twenty-four species of *Crotalaria* formed nodules with one or more of the isolates. There is evidence of variation of bacteria from a single plant, which makes difficult the clear delineation of cross-inoculation groups.

Gene Action

S. G. STEPHENS (*J. Gen.*, 46, 331 and 345; 1945) considers the genetics and development of various leaf shapes in *Gossypium*. These are mainly controlled by a multiple allelomorph series of genes. The author shows that the leaf character is also affected by other genes. Among these is one which controls the time of flowering. When a leaf-shape is transferred from a late to an early flowering species, the action of the gene is accelerated, but the duration of the development is reduced. Since these two influences are not correlated, a change in the leaf characters can occur. Intergradation of leaf shapes in species crosses may result from the transgressive segregation of the rate of development. The author points out that modifiers or minor genes for a particular character may be a major gene as regards another character. Further, in the absence of a knowledge of the physiological processes controlled by the genes, there is no *a priori* reason to suppose that modifiers have minor effects. The five genes for leaf shape appear to control a canalized system lying in five developmental tracks which may be modified by the environment or by genetical modifiers. The alterations in shape are due to differences

in time and rates of development. The author points out that, in regard to dominance, it would appear that the general cell activity and development controlled by the allelomorph rather than the activity of the allelomorph itself determine the dominance observed. Regarding non-adaptive trends of evolution, the author suggests, as D'Arcy Thompson does, that where cell-growth is involved, a canalized system of development will be involved which will be largely influenced by timing rates of development.

Cytogenetics of *Rosa canina*

A. GUSTAFSSON (*Hereditas*, 30, 407; 1944) confirms by the more satisfactory genetical evidence that the dog-rose is not apomictic and that fertilization is heterogamous. It will be remembered that Blackburn and Harrison, Gustafsson and Hakansson had shown by cytological methods that the egg with 28 chromosomes was regularly fertilized by the pollen nucleus with seven chromosomes. When used as a female in hybrids with *R. rugosa* and *R. rubiginosa* the *F1* plants are markedly heterogeneous, whereas when *R. canina* is used as a male on *R. rubiginosa* the hybrids are more uniform. Similarly the fertility of the *F1* plants differs considerably in the reciprocal parental crosses. This is correlated with differences in the meiosis of these hybrids. The chromosome constitutions are suggested to be *R. canina*, *aa acd*; *R. rubiginosa*, *bbbcf*; and *R. rugosa*, *cc*. The author indicates the changes necessary in the taxonomy of the *Rosa canina* complex in the light of the cytogenetical evidence.

Sex Ratios

It is sometimes difficult to assess the sex ratios in animals at an early stage. S. E. Smith (*J. Hered.*, 36, 105; 1945) has shown that the heteropycnotic phenomenon of sex chromosomes may be used in a Lepidopteran, *Archips*, to discover the sex ratio before the third instar of the larva. The sex chromosome of the female is deeply stained through the nuclear cycle, whereas that of the homozygous male is not so differentiated.

Mosaics in *Drosophila*

C. AUERBACH (*Proc. Roy. Soc. Edin.*, 52, B, 120; 1945), by chemically treating embryos, has produced a large number of single or twin spots of marked characters in *Drosophila melanogaster*. More than 40 per cent of the treated individuals showed these mosaic types. By several experiments the author shows that these spots result from somatic crossing over, and are not due to chromosome deletions or duplications.

Convulsions Produced in Frogs by Sudden Changes of Temperature

Miguel Norio de Almeida, H. Moussatché and M. Vianna Dias describe the effect of sudden changes of temperature upon frogs (*Rev. Brasil. Biol.*, 5, No. 1; April 1945). The frogs were placed in a glass cylinder of about 5 litres capacity, containing water and ice. After remaining for a period which was varied in the experiments, the animal was suddenly placed in a similar flask containing water at a temperature of 30°-35° C. When placed first in the cold water the frog attempts to escape but gradually becomes lethargic. After 20-30 minutes the animal is withdrawn and placed in the warm water; it displays the symptoms of an epileptic attack. While some of the frogs succumb to the effects an hour or two after

being placed in warm water, most of them survive and show no ill-effects from their experience. The partial or total destruction of the nervous system prevents the attacks which ordinarily result from the sudden change of temperature. The destruction of a portion of the central nervous system inhibits the attack in the parts that are not injured. A study of the effects of the destruction, unilateral or bilateral, of the labyrinths of the internal ear shows that the production of an attack is not inhibited, but there are numerous negative cases.

416 *Tinea nigra*

A. E. Area Leão, Amadeu Cury and J. Martins Ferreira Filho have given a historical review of *Tinea nigra* and described a new case (*Rev. Brasil. Biol.*, 5, No. 2; July 1945). A photograph shows the disease on the palm of the hand, where it starts as a few small spots scattered about or forming a few groups. These slowly increase and unite to form dark spots which are distributed irregularly on the palm. Two photographs (magnification 100 and 500) show the progress of the parasite. The new case which the authors discovered is described and illustrated with seven photographs, and there is a discussion regarding the causative fungus, which has been put in the genus *Cladosporium*. Attempts were made to reproduce the disease in human beings, rabbits, guinea pigs and rats, by transplanting portions of the skin, but the results were negative.

415 New Zealand Earthquakes during 1943

THE annual report, for the year 1943-44, of the Dominion Observatory, Wellington, New Zealand (Acting Director: Mr. R. C. Hayes), contains, among other things, an account of the seismic activity in New Zealand during 1943. Slight or moderate activity continued in the Wairarapa region with generally decreasing frequency. There were occasional rather strong shocks in that region in the early part of the year. Of special note was the unusual activity in the South Island, particularly in the south-western portion of the Island. Two shocks reached minor destructive intensity (VII on the Modified Mercalli Scale). One occurred on May 8, in the Lake Wanaka region, and the other on August 23 in the Arthur's Pass region. The shock on May 8 was apparently the most pronounced felt in Dunedin for many years. The intensity recorded there was IV-V on the Modified Mercalli Scale (equivalent to 5 on the Rossi-Forel Scale). Groups of small or moderate local shocks occurred in the Wairoa region in January and April, and in the Rotorua region in February. June was the quietest month of the year. The total number of earthquakes reported felt in 1943 was 176. Of these, 122 were felt in some part of the North Island and 57 in some part of the South Island. Only three shocks were felt in both Islands. The maximum intensity reported in the North Island was VI on the Modified Mercalli Scale, and in the South Island VII. The above figures are based on reports furnished by officials at post-offices, lighthouses and by several private observers.

416 Galactic Influence

By converting some thousands of meteorological records from solar to sidereal time, the veteran Russian man of science, N. A. Morozov (born in 1854), has discovered evidence of a centre of powerful cosmic influence situated in the region of the constellation Argo Navis (R.A. 8-11 hr.). This discovery

is supported by the curves of temperature, relative humidity of the atmosphere, velocity of evaporation, rainfall and magnetic and electrical phenomena. This galactic influence, in his opinion, has a very important influence on terrestrial climate. The presence of a body in this region of the galaxy is postulated, and from the consideration of certain cyclic phenomena it is suggested that this body has a period of revolution of $280 \pm$ years (*Bull. Acad. Sci. URSS, Sér. géograph. géophys.*, 8, 63; 1944).

Mechanical Stresses in Transformer Windings

IN a paper read by E. Billig before the Institution of Electrical Engineers in London, the forces and stresses set up in transformer windings and their clamping structures under short-circuit conditions are considered in detail. Various arrangements of windings and tappings in large power transformers are described, and the points at which particularly high mechanical stresses occur in concentric windings are discussed. Axial forces between the top and bottom halves of each winding or between different windings are responsible for (a) bending stresses in turns near the ends or adjacent to gaps in the windings, (b) compressive stresses in the body of the winding, and (c) tensile and compressive stresses in the clamping gear. Radial forces produce tensile stresses in the outer winding and buckling stresses in the inner winding, these stresses being more pronounced in coils adjacent to the main leakage duct. The paper considers in some detail the excessive mechanical stresses which can be caused by internal electrical breakdowns, the mechanism of cumulative shrinkage, the loss in clamping pressure due to switching stresses and thermal cycles, and the danger of subsequent movement of the windings causing abrasion of the insulation and final electrical breakdown. A rule is given for determining the minimum clamping pressure that should be maintained within the windings.

Photoelectric Recording of Meteors

Sky and Telescope of October 1945 contains a short notice of a photo-electric apparatus, devised by Dr. C. W. Martlein at Cornwell, and an associate, which automatically counts meteors and also records their duration and brightness. Two photocells in a balanced circuit are directed to different parts of the heavens, and are so synchronized that when one cell intercepts light which is brighter than that received by the other, a recording pen on the graph is set in motion. The apparatus was originally designed for aurora work, and it was used with success during the period of the August Perseids.

Radcliffe Observatory, Pretoria, 1939-44

A PAPER on occultations observed at the Radcliffe Observatory, Pretoria, during 1939-44 has been published (*Mon. Not. Roy. Astro. Soc.*, 105, 3; 1945). The occultations—in each case disappearance at the dark limb—were observed with the 4½-in. finder of the reflector, but when the altitude of the moon was less than 30°, the 3-in. altazimuth was used. Six of the earlier occultations were observed by the late E. G. Williams, and those in November and December 1943 by R. O. Redman, all the other observations and reductions being made by H. Knox-Shaw. Stars used in the Nautical Almanac are marked in Table 1 by an asterisk, and Innes's method of reduction was employed for the fainter stars and for all stars in 1943 and 1944.