GENETICAL SOCIETY OF GREAT BRITAIN

ABSTRACTS of Papers read at the HUNDRED AND FOURTH MEETING of the Society, held on 15th NOVEMBER 1950, at the GALTON LABORATORY, University College, London, W.C. 1

A GENERAL THEORY OF SELF-INCOMPATIBILITY

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Biologists, attracted by the simplicity of East's scheme for the inheritance of self-incompatibility in *Nicotiana*, have tended to assume the operation of a similar mechanism in any other self-incompatible species until it has been disproved. It must be admitted that the number of species in which a *Nicotiana*-type of mechanism has actually been proved by adequate testing is rather small. On the other hand, there have been very many species in which the *Nicotiana* scheme has been found inadequate. This applies in particular to the Cruciferæ. Experimenters had been led to make many more or less plausible modifications which have, however, been seldom put to critical tests. Evidence is accumulating that the Compositæ are quite different again in the self-incompatibility mechanism. An attempt is made to derive a generalised scheme which will fit a wide range of species.

CLOSE LINKAGE OF THREE LOCI CONTROLLING BIOTIN REQUIREMENTS IN *ASPERGILLUS NIDULANS*

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It has been suggested (Pontecorvo, 1950) that close linkage might be expected between genes controlling steps in biochemical reactions of millimicromolar order. A first attempt to investigate this has been made with three biotin-requiring strains of *A. nidulans* all responding to biotin or desthiobiotin but not yet further characterised with other possible precursors.

(1) The three requirements are conditioned by three different genes since crosses two by two of the strains in all cases give prototrophs. (The complementary classes of double requirers cannot yet be identified.)

(2) The three loci, bi_1, bi_2 and bi_3 are very closely linked and any two of them cannot be more than 0·4 unit apart. This has been shown both by recombination tests two by two and by testing each locus for linkage with the locus *y* (spore colour) which had already been shown (Pontecorvo, Forbes and Adam, 1949) to be $5{\cdot}5 \pm 0{\cdot}9$ units (all available crosses in repulsion) or $4{\cdot}8 \pm 0{\cdot}6$ units (all available crosses in coupling) distant from bi_1. The loci bi_2 and bi_3 have been shown to be $4{\cdot}3 \pm 1{\cdot}0$ units and $4{\cdot}0 \pm 0{\cdot}8$ units respectively distant from the *y* locus. The order of the genes and a more precise biochemical characterisation of the mutants are being investigated.

MOTTLED, AN INHERITED PHENOTYPE IN MICE

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The mottled phenotype has been traced through three generations of crosses to normal. It is inherited in a dominant manner, but does not give the 1 : 1 ratio expected from a monogenic segregation. All the mottleds (14) have been female, a significant deviation from the normal sex ratio. The overall sex ratio in progeny

from mottleds is abnormal, approximating to 2 ♀♀ : 1 ♂♂, whereas the sex ratio in progeny from the normal offspring of mottleds is 1 ♀♀ : 1 ♂♂. These facts can be interpreted as the results of the mottled phenotype being a dominant effect of a gene which has a prenatal lethal effect so far shown only in males. This restriction can be explained either by sex-linkage or by sex-limitation.

A PROBABLE DELETION IN A HUMAN Rh CHROMOSOME

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A sample of blood has been found to lack any detectable representative of the C and E series of allelomorphic antigens. The genotype of the donor may therefore be written -D-/-D- ; that she is homozygous for this extraordinary chromosome is due without doubt to her parents being half second cousins.

Of various possible genetical explanations the most probable seems to be that the C and E genes have been involved in a small deletion ; but whatever the cause, the fact that C and E and not D are affected supports Fisher's tentative proposal, made some years ago, that the order of the genes on the chromosome is DCE. Further, the separation of C and E from D answers the highly controversial question of the separability of these genes.

NUCLEAR INCORPORATION OF P^{32} AS DEMONSTRATED BY AUTORADIOGRAPHS

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The use of the autoradiograph technique permits the presence of a radioactive tracer to be detected in individual cell nuclei. Using root-tips of *Vicia faba* seedlings grown in P^{32} as NaH_2PO_4, which after fixation were treated with N/1 HCl at 60° C. to remove phosphorus compounds other than nucleic acid, phospholipid, and phosphoproteins, the time of synthesis of these compounds can be determined in relation to the cell cycle. The autoradiographs are mainly due to P^{32} in the cell nuclei. From the first appearance of autoradiographs above dividing cells and from the percentage of cells with autoradiograph in the meristem and in the proximal differentiating region of the root, it is concluded (1) that nuclear incorporation of P^{32} in the observed organic form takes place during the resting stage but not during cell division, (2) that this incorporation occurs only in nuclei which are preparing for division, (3) that P^{32} so incorporated is inherited by the daughter cells.

COMPOUND CHROMOSOMES AND POLYPLOIDY IN *SPIROGYRA*

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Those species of *Spirogyra* in which there is parallel separation of chromatids also have a prophase in which the chromosomes are seen as a number of widely separated dots, which approach each other and finally become associated in linear sequence to form a few large chromosomes at metaphase. Other species have at metaphase large numbers of dot-like chromosomes, or small linear ones in which the activity of a median centromere can be observed.

It is suggested that the large chromosomes are associations of small ones each possessing a centromere ; or that they have become differentiated into regions each

possessing the characteristics of a dot-like chromosome. Thus they are polycentric and there is no need to postulate diffuse centromeres to account for their behaviour and shape. The recent statement by Hedda Nordenskiöld (Uppsala) that in *Luzula* hybrids the small chromosomes pair with parts of the large ones at meiosis also seems to point to the compound nature of the large chromosomes in *Luzula* and adds weight to the above suggestion of compound chromosomes in *Spirogyra*. Thus polyploidy in *Spirogyra*, where the chromosome number ranges through numerous intermediate numbers from 4 to 84 large, medium, and dot-like chromosomes, would be a different phenomenon from polyploidy as usually understood. In the species with 2 " compound " chromosomes there is evidence that these are two homologous pairs. Thus the " compound " chromosomes are associated with " normal " polyploidy.