GENETICAL SOCIETY OF GREAT BRITAIN

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TIME OF ACTION OF DOMINANT LETHALS IN MAMMALS

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Dominant lethal mutations induced in the sperm of a mouse manifest themselves in two ways : as fertilised eggs which fail to implant, and as implants which fail to develop. The relative frequencies of these two classes, usually described as pre-implantation and post-implantation deaths, may vary within wide limits.

A preliminary study has been made of the factors responsible for this variation, such as maternal effects, timing of insemination, amount and vitality of sperm, and nature of the dominant lethal mutation itself. Though only the last of these is a dominant lethal phenomenon, the others are all obstacles to the proper interpretation of dominant lethal studies.

EFFECT OF PARENTAL ENVIRONMENT ON OFFSPRING CHARACTER IN FLAX

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All eight combinations of N, P and K (parental) fertiliser treatments were applied to 40 flax plants of the variety Stormont Cirrus. The seed collected from them varied in weight but germinated evenly the following year when the progeny were grown in all 16 combinations of N, P, K and Ca (offspring) fertiliser treatments. The 640 plants grown were cut at ground level at maturity and weighed. The parental treatments (as well as the offspring treatments) produced large and significant differences in weight, some treatments producing two or three times the weight produced by others. These differences appear to be in no way diminished in the second generation growing this year. Small, but significant, interactions occurred between parental and offspring treatments, plants responding more to phosphate, for example, if their parents received phosphate. Responses of this magnitude, due to changes in the cytoplasm, may be obtained only when the parental treatments are applied in poor growing seasons of damp, cool conditions with little sun, but once produced they can persist through a good growing season to appear again the following year even though the seed sown then is of high and uniform weight.

POLYGENIC INHERITANCE OF ASCOSPORE SIZE IN *NEUROSPORA CRASSA*

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Selection for large ascospores in *Neurospora crassa* has increased the mean size from 14·1 microns × 26·9 microns to 16·8 microns × 35·8 microns in the course of 16 generations. The greater part of this increase in size is due to a steadily

increasing frequency of asci containing 4 ascospores of about twice normal size instead of 8 normal ascospores. The number of asci containing 8 mature ascospores has steadily decreased but selection has also increased the size of the more or less normal ascospores.

All the asci produced by reciprocal crosses of strains from the sixteenth generation of selection with stock wild-types, have been of the normal 8-spored type. Thus the eight-spored character is " dominant " and the size of ascospore and type of ascus apparently depend chiefly on nuclear and not cytoplasmic characters. There is some suggestion of a cytoplasmic effect however since crosses with the stock wild-type as the maternal parent show a slightly, but probably significantly, larger mean ascospore size than the reciprocals.

A range of mean ascospore size found in both F1 crosses and in backcrosses indicates that a considerable number of genes affecting ascospore size differentiate the selected and wild-type strains. The steady response to selection also suggests a polygenic character.

NEW MATING TYPES IN *ESCHERICHIA COLI*

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Among many micro-organisms there exists a wide diversity of mating types, even within a single species. In *Escherichia coli* only three types have hitherto been described (F−, F+, Hfr), all within strain K12. These differ in their mating behaviour ; in their ability to infect other bacterial strains with a transmissible mating-type agent ; and in their susceptibility to infection by such an agent. Other strains of *E. coli* were studied with respect to these criteria, and several new mating types have been discovered.

One of these strains, WG3, possesses an agent " F3 " which was compared with the K12 agent " F12." Suitably marked F− strains, derived from K12, were infected with the F3 and F12 agents, and the F3+, F12+, and F− were crossed in all possible combinations. The agents differ in the degree of fertility they confer, and in their inheritance among progeny (F3 is not invariably inherited). Most notably, the frequencies of genetic recombination in each region of the genome were greatly dependent on the agent used. The " F polarity " characteristic of F12 is not found in the case of F3, and the " donor-receptor " concept of mating behaviour applied only to F12+ × F− crosses.

BACTERIAL MOTILITY : AN ANALYSIS OF VARIATION AMONGST CELLS OF IDENTICAL GENOTYPE SHARING A COMMON " UNIFORM " ENVIRONMENT

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A clone of a non-motile *Salmonella* strain grown in a uniform environment (*e.g.* a shaken broth culture) may contain some motile individuals, not mutants, since their progeny are non-motile.

These motile cells may result from the transmission, through many generations, of non-replicated ancestral particles : either flagella, possession of one of which confers motility ; or, in abortive transduction, of a supernumerary gene for synthesis of flagella, introduced into the ancestor.

In some strains, however, a minority of cells acquire, apparently at random, a transient ability to synthesise flagella. The resulting differences between cells in

ability to synthesise flagella are not due to differences in their genotypes, nor to detectable differences in their environments. Such " residual " variation may, speculatively, be attributed to such minor environmental differences as may occur within a uniform liquid. This deterministic hypothesis should be accompanied by a probabilistic description, *viz.* that knowledge of genotype, parental phenotype, and environment, with the greatest accuracy now feasible, permits prediction, for an individual, only of the *probability* of a particular phenotype.

Spontaneous mutation occurring " at random " is a special case in which residual variation affects a genetic, instead of a somatic, cell component.

THE CONTROL OF MAMMALIAN SEX RATIOS

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Weir has reported that the sex ratio of a strain of mice depends on the blood *p*H of the sires. There is evidence from several sources that this principle extends to other mammals, including Man, cattle, sheep and rats. It also appears that induced changes of *p*H may be as effective as the genetically determined deviations in Weir's selected lines of mice. The equilibration of a gene which affects the sex ratio (but only when present in one of the sexes) presents a new problem in population genetics.

THE GENETICS OF ESSENTIAL HYPERTENSION

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Evidence has recently been accumulating which points to two conclusions (1) that there is no qualitative difference between hypertension and normality, hypertensive subjects representing the positive tail of the continuous frequency distribution of arterial pressures (2) that over the whole range of pressures, including hypertension, the genetic component is represented by a correlation of a little more than 0·2 between first degree relatives. The most recent work, including parallel studies by Miall and Oldham, shows that the same regression applies to several different samples of the general population and to relatives of hypertensives. When a possible confusing factor, arm-circumference (or obesity) is held constant, the genetic resemblances are increased. The frequency distribution of arterial pressures turns out to be closely lognormal, both in the general population and relatives of hypertensives, so providing evidence against bimodality.

AN IMPROVEMENT IN THE TASTER-NONTASTER CLASSIFICATION

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1. The sensitivity of a person to PTC-solutions depends on the genetical constitution at the T locus and on other general factors for which the sensitivity to solutions of quinine or brucine can provide some measurement.

2. Brucine does not show any bimodality of thresholds.

3. By considering the quinine threshold as well as age and sex of a person the PTC threshold can be so corrected as to arrive at a better genotypical classification. Corrections appropriate for samples from European populations are suggested in the form of a diagram.

COLOUR POLYMORPHISM IN THE EARTHWORM *ALLOLOBOPHORA CHLOROTICA*

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Two types of *Allolobophora chloratica* exist in one of which porphyrins and a biliverdin-like substance accumulate during the individual's lifetime, rendering it green. Populations of the green form occur in grassland and pure pink populations in woodland gardens and certain types of grassland. Mixed populations were found in cultivated fields and in grassland which had been previously cultivated. Evidence is presented which seems to indicate that the possession of the green pigmentation is controlled by a single recessive Mendelian factor. Various possibilities, among them predation, are discussed which could account for the ecological distribution of the green and pink populations.