GENETICAL SOCIETY OF GREAT BRITAIN

TITLES AND SUMMARIES OF DEMONSTRATIONS given at the HUNDREDTH MEETING OF THE SOCIETY, held in CAMBRIDGE, on 29th and 30th JUNE and 1st JULY 1949.

AUTO-SEXING BREEDS OF POULTRY

M. S. PEASE

Small Animal Breeding Research Station, Cambridge

The sex-linked Barred gene is present in several well-established varieties of poultry. In all these breeds it occurs in association with black down and plumage. The Barred gene produces a light spot on the back of the head of the chick, which shows up clearly on the otherwise black down. Being sex-linked, this gene is duplex in the male and simplex in the female chick. But generally speaking, it is not possible *in the presence of the Black gene* to distinguish between the homozygous and the heterozygous light head patch : dominance is perfect. But in the absence of the Black gene, as in Brown Leghorns for example, the dominance of the Barred gene becomes imperfect as far as concerns the light head patch. The enormously extended condition of the homozygous (male) light head patch compared with the heterozygous (female) light head is at once clear at hatching, when the dominant Black gene is removed.

Several new varieties on this principle, have been made at Cambridge, by transferring the Barred gene from a black to a non-black breed. These new breeds have been graded up and are now finding their way into commercial use. Examples of these are shown at the Animal Research Station, Huntingdon Road.

LYTHRUM SALICARIA OPEN FERTILISATION PLOT

R. A. FISHER *et al.*

Department of Genetics, Cambridge

Framework of recessive pollen-parents, pink, long-styled, for fertilising short-styled seed-parents, usually purple, the genotype of which is thus tested. Usually a hundred or more seed-parents are tested each year as second backcrosses to the triple recessive. A few plants of known genotype are also kept as sources of first backcrosses.

OXALIS VALDIVIENSIS

Portion of progeny bred for the evaluation of linkage between mid and short genes. The linkage is in coupling with expectation about 14 long : 1 mid : 15 short. All three style types should thus be available.

PISUM SATIVUM

Progenies segregating for four of the plant characters and the two seed characters used by Mendel.

GENETICS OF MICRO-ORGANISMS

There is a new bacteriological laboratory in the department, and Dr Cavalli will be pleased to show the work in progress to a few people at a time.

GENETICS OF THE HOUSE MOUSE

Small parties may also be interested in the factors used in genetic work with mice.

POLYPLOID MOUSE EGGS

R. A. BEATTY and M. FISCHBERG
Animal Breeding and Genetics Research Organisation, Edinburgh

Eggs from the morula to late blastula stage were examined and found to be diploid in most mouse stocks. In one particular stock, however, there was a spontaneous occurrence of polyploidy (mainly triploidy) in 6 per cent. of the eggs and 20 per cent. of the mice examined. Polyploidy could also be induced experimentally by warming eggs *in vivo* at certain critical temperatures under conditions designed to prevent cell division at specific times in development. Eggs treated at the time when they were expected to contain the maternal chromosomes in *diploid* number and a sperm developed in a high proportion of cases into triploids.

Treatment at the expected time of the first cleavage metaphase gave tetraploid eggs. These embryos, which have been examined up to the late blastula stage are the most advanced polyploid mammals known at present.

CULTURAL METHODS FOR THE MYCETOZOON *DIDYMIUM NIGRIPES*

E. A. BEVAN
Department of Genetics, University, Glasgow

Demonstration of the various stages in the life-cycle: (1) myxoamoebae; (2) plasmodia; (3) fruiting bodies.

Growth of *Didymium* in two-member culture, with *Escherichia coli* as food.

Elimination by means of streptomycin of *E. coli* from the two-member culture in order to study the genetics of nutritional requirements in *Didymium*.

EXPERIMENTAL STUDIES ON ISOLATED AMPHIBIAN OOCYTE NUCLEI

H. G. CALLAN
Institute of Animal Genetics, Edinburgh

The physical properties and chemical nature of the nuclear membrane have been examined by a variety of techniques. The membrane is a double structure: on the outside is a porous sheet, thickness 500 Angstrom, with pores 300 Angstrom wide, repetition distance 800 Angstrom, the pores being uniform and in hexagonal close packing; on the inside is a "structureless" protein membrane, thickness 100 Angstrom, with remarkable elastic, adhesive and hydrophobic qualities. The permeability properties of this membrane are under examination.

The colloidal properties and chemical nature of the nuclear sap has also been examined by a variety of techniques. The nuclear sap consists of structural and disperse phases of a protein or proteins rich in cyclic amino-acids; nucleic acids are absent, though ribose nucleic acid is present in high concentration in the nucleoli.

A start has been made on a study of the metabolic activity of isolated nuclei.

THE DEVELOPMENT OF TIBIAL HEMIMELIA IN MICE

T. C. CARTER
Institute of Animal Genetics, Edinburgh

Tibial hemimelia in mice is due to a single mutant in Linkage Group III: recombination with macrocytic anæmia, W^v, is 16 per cent. and with piebald spotting,

s, is 50 per cent. The heterozygote may be normal or may show preaxial polyphalangy or polydactyly of one or both the hind feet ; occasionally there is a reduction of the distal part of the tibia. The homozygote shows similar or more severe defects ; tibia and pubis may be absent, the femur represented only by its epiphyses ; the kidneys may be hydrotic.

Limb defects are clearly identifiable in homozygous embryos of 12½ days' gestation : there is excessive growth of the proximal preaxial part of the hind footplate. Abnormally narrow and pointed limb buds can be seen in some embryos of 11½ and 12 days, before the differentiation of the footplate, and may represent an earlier stage of the defect. The condition is thus due to abnormal mesenchymal condensation. A similitude of faulty chondrification is found in some later embryos but is due to abortive condensation of the tibia anlage ; after the outer shell of condensed mesenchyme has formed perichondrium there is no inner core left, such as would normally form cartilage, so the tibia appears to be replaced by a ligament ; this, however, represents cartilage-less perichondrium.

ICHTHYOTIC MICE

T. C. CARTER and R. S. PHILLIPS
Institute of Animal Genetics, Edinburgh

Ichthyosis is an inherited condition in mice probably due to a single recessive mutant ; its linkage relations are unknown. There is no evidence of incomplete penetrance.

A young ichthyotic mouse can be recognised when 4 days old by the reduced amount of pigment which should then be forming in the hairs under the skin. By 6 days it can be seen to be comparatively hairless ; in this it differs from Naked, hairless, rhine and *hypotrichosis juvenilis* mice, which grow a normal first coat. At about 3 weeks the skin may become scaly and be sloughed off, especially from the neck, rump, tail and feet : this may interfere with the tail circulation and the distal part of the tail may become necrotic. Adult ichthyotics are always small, appear to suffer from respiratory disorders and may be mute : some grow a thin, downy coat. Males are cryptorchid and sterile, but one female has borne and suckled a small litter.

The condition was first found in the fourth generation of one of ten sublines of a stock maintained by sib-mating : it probably arose in that subline by spontaneous mutation.

CYTOGENETICS OF MAIZE

D. G. CATCHESIDE, M. BLACKWOOD and J. N. HARTSHORNE
Botany School, Cambridge

TWO NEW MUTANTS WITH NEUROLOGICAL ACTIONS IN THE HOUSE MOUSE

D. S. FALCONER
Institute of Animal Genetics, Edinburgh

" Trembler " is a dominant gene that arose by spontaneous mutation in 1946. It produces a spastic paralysis, particularly of the hind legs, and a generalised tremor in the adult, particularly of the head. The young are subject to convulsions upon stimulation. Females are fertile and rear their young well : males breed only irregularly. Homozygotes are indistinguishable from heterozygotes.

" Reeler " is a recessive gene that arose by spontaneous mutation in 1948. Homozygotes have a defect of balance that affects the hind quarters. When standing they sway from side to side, and when running they frequently fall right over on their side. They give a strong impression also of being mentally deficient. Males are sterile : one female has bred but failed to rear her young.

LARGE AND SMALL MICE

D. S. FALCONER and J. W. B. KING
Institute of Animal Genetics, Edinburgh

CROSS-BREEDING EXPERIMENT.—Two strains of mice that had been independently selected for large size over many generations were obtained from H. D. Goodale of Mount Hope Farm, Massachusetts, and Prof. MacArthur of Toronto. These strains now give little response to continued selection for large size. The two strains were crossed and the F_1 gained about 8 per cent. from heterosis. Selection in both directions among the F_1 produced no change. It seems probable, therefore, that genetic variability was lacking in both the original strains and in the F_1. Selection in both directions is now being applied to the F_2, in which new genetic variability ought to be available.

SMALL MICE AND DWARFS.—A strain of mice selected for small size was also obtained from Prof. MacArthur. This strain has recently produced pathological dwarfs, a condition that appears to be determined by a single recessive gene. At the age of 6 weeks the weight of the dwarfs is about 21 per cent. of the weight of cross-bred large mice. The genetics and physiology of the dwarfs are being investigated.

HETEROPLOID HYBRIDS IN NEWTS

M. FISCHBERG
Animal Breeding and Genetics Research Organisation, Edinburgh

Different nuclear and nucleo-cytoplasmic combinations can be effected in newt eggs by artificial fertilisation with sperm of other species. The maternal chromosomes are often either eliminated or doubled by hot (or cold) treatment of the egg immediately after fertilisation. By this means the balance between genomes of different species can be studied in combinations additional to the only two (homo- or heterozygote) possible in diploids.

The characters of *Triton alpestris* prevail in general over those of *T. palmatus*. If enucleated *palmatus* cytoplasm is combined with *alpestris* sperm a haploid embryo results which dies at a certain stage. A *palmatus* egg (cytoplasm+nucleus) combined with *alpestris* sperm gives a diploid hybrid which is mainly *alpestris* in character. If, however, a diploid *palmatus* egg (2 chromosome sets+cytoplasm) is combined with an *alpestris* sperm, a triploid hybrid arises with two " recessive " *palmatus* genomes+cytoplasm of *palmatus* and only one " dominant " genome of *alpestris*. Here therefore the two " recessive " genomes are stronger than the single " dominant " one, and the triploid hybrid resembles the " recessive " *palmatus*. By this means the effect of gene dosage on gene expression can be studied in vertebrates.

DIFFERENTIAL SENSITIVITY OF CHROMOSOME REGIONS TO BREAKAGE BY NITROGEN MUSTARD

C. E. FORD
M.R.C. Radiological Research Unit, Harwell, Berks.

THE GENETICS OF A COLONY OF THE MOTH *PANAXIA DOMINULA*

E. B. FORD, P. M. SHEPPARD and R. A. FISHER
Department of Zoology, Oxford and Department of Genetics, Cambridge

The spread of the *medionigra* gene in an isolated colony of this species has been studied for many years. Previous to 1928 it occupied 1·2 per cent. of available loci. By 1938 its frequency had risen to 9·2 and by 1940 to 11·1 per cent. Its frequency then suddenly dropped, and from 1941 to 1948 it has fluctuated between 6·8 and

4·0 per cent. of available loci. It is possible to make a detailed analysis of this situation since all three genotypes are recognisably distinct, while the gene-frequency and total numbers of the population in the locality can be calculated year by year. It appears that other genes responsible for easily recognised varieties are also being selected for in this population.

GENETICAL RATIOS IN SAINFOIN

J. L. FYFE
School of Agriculture, Cambridge

Examples are shown of recessive types which segregate in first inbred progenies of common and giant sainfoin. The ratios obtained are tetrasomic, indicating that sainfoin is an autotetraploid.

CYANOGENESIS IN WHITE CLOVER

J. L. FYFE and A. K. CHAKRAVARTY
School of Agriculture, Cambridge

Plants and picrate-paper tests are demonstrated to show the different types of cyanophoric and acyanophoric plants and the inheritance of the factors concerned.

CYTOLOGY OF SPIROGYRA

M. B. E. GODWARD
Queen Mary College, London

(*a*) *Centromere organisation in Spirogyra.*

Photographs and preparations demonstrate that the different species may have :

(a) large chromosomes without a localised centromere,
(b) medium sized chromosomes with a localised centromere,
(c) minute chromosomes.

The existence of the type (c) having numerous minute chromosomes may mean that the large chromosomes of Type (a) are polycentric rather than possessed of " diffuse centromeres." Some evidence of only partially localised centromeres may be presented.

(*b*) *Variability in the nucleolar organiser in somatic cells of Spirogyra crassa* will be illustrated by photographs.

(*c*) *Variability in the activity of the nucleolar organisers, characteristic of different species of Spirogyra ;* with the resulting differences in the distribution of " nucleolar material " with regard to the chromosomes, in the different stages of mitosis. Photographs.

MINOR SKELETAL VARIATIONS IN THE MOUSE

H. GRUNEBERG
Department of Biometry, University College, London

A survey of six pure lines and several less inbred stocks of mice has revealed many inherited skeletal variations, many of them of low penetrance. Some of these conditions have shown interaction with major skeletal genes for which they act as " modifiers." Four of these conditions are exhibited, namely :

(*a*) *Foramina transversaria imperfecta.*—Some foramina in the cervical vertebræ are transformed into ventrally open gutters. Almost completely penetrant in C57 Black ; also occurs in many wild populations.

(*b*) *Dyssymphysis atlantis et epistrophei.*—Abnormalities of fusion in the first two cervical vertebræ ; manifests in rather more than half the animals of the same stock.

(*c*) *Dystopia caudalis tuberculi anterioris.*—The tuberculum anterius of the sixth cervical vertebra is shifted on to the seventh cervical vertebra in about one-quarter of the animals of the X stock.

(*d*) *Variations of the vertebra prominens.*—In all mouse stocks examined, the processus spinosus of the second thoracic vertebra may vary from a large spatula-shaped affair down to complete absence. The distribution is very different from stock to stock, with peaks either near one end of the distribution, or near the other, or near the middle, or near both ends.

REVIEW OF THE WORK DONE IN THE GENETICS OF *DROSOPHILA SUBOBSCURA* DURING THE LAST TEN YEARS

J. B. S. HALDANE *et al.*
Department of Biometry, University College, London

Demonstration of photographic, diagrammatic and live material.

RESULTS OBTAINED BY A NEW METHOD OF DIAGNOSING TASTE THRESHOLDS

H. HARRIS and H. KALMUS
Galton Laboratory, University College, London

CHANGES ACCOMPANYING SELECTION FOR PLEIOCOTYLY

G. HASKELL
John Innes Horticultural Institution

The demonstration shows that polygenic selection, using seedling cotyledon number as selection criterion, produces correlated disturbances in the normal, balanced condition of adult Dicotyledonous plants. These are comparable with the changes following chaetæ selection in *Drosophila melanogaster* observed by Mather, Wigan and Harrison.

The gamut of pleicotyly from monocotyly to tetracotyly is illustrated and pedigrees are given showing the results of pleicotyly selection in outbreeding species (Cruciferæ), partly outbreeding species (Umbelliferæ) and inbreeding species (Solanaceæ). Selection has increased the frequency and range of pleicotyly in the first two groups but so far has been ineffectual with inbreeding species. Environmental influences on cotyledon manifestations are also shown.

Tables of various economic forms of *Brassica oleracea* give the comparative morphology between dicot controls and plants from selected pleiocotylous seedlings grown to seed in isolation groups. The controls were normal with few exceptions, while some selections gave pleiocot seedlings which grew either into normal or abnormal adults. Photographs show the types of abnormalities which accompanied pleiocotyly selection in brassicas and other species. Although the disturbed growth may be due to pleiotropic effects of genes controlling pleiocotyly, lowered fertility and reduced vigour indicate other genes are also involved in producing these correlated changes.

DERMAL RIDGE COUNTING AS A PRELIMINARY TO GENETICAL STUDIES

S. B. HOLT
Galton Laboratory, University College, London

P^{32} AUTORADIOGRAPHS OF MOUSE TESTIS

A. HOWARD and S. R. PELC
Medical Research Council, Radiotherapeutic Research Unit, London

Young male mice were injected with 200*u*C of radioactive phosphorus (P^{32}). After 2, 5, 9, 12 and 18 days testes were removed and preparations made as follows : (1) 5*u* sections fixed in acetic acid-alcohol ; (2) smears fixed likewise ; (3) squashes fixed in methyl alcohol and spread and washed in 45 per cent. acetic acid ; (4) whole tubule mounts fixed in methyl alcohol. Autoradiographs were prepared by the stripping film technique : exposure was for 7-28 days. In smears and sections autoradiographs appeared at 9 days and more intensely at 2 days above interstitial tissue, associated with Leydig cells. Whole tubule mounts at 2 days show patches along their length at approximately 3 mm. intervals. At 9 days and later autoradiographs were seen above Sertoli cells and above spermatocytes at late diplotene and thereafter. In squashes autoradiographs of chromosomes were found at late diplotene and diakinesis ; none were found at earlier meiotic stages. Mature sperm in squashes show no autoradiograph, which is, however, present (in 5 to 18 day mice) above immature sperm in smears and sections, presumably due to Sertoli cell cytoplasm.

Points arising from the above are (1) Leydig cells apparently accumulate acid-insoluble phosphorus to a large extent. This may be due to their supposed hormonal function. Patches of autoradiograph observed along the tubules may be of similar origin and/or may be associated with the spermatogenic wave. (2) A schedule of the time taken by different stages of spermatogenesis can be attempted from results on a series of mice.

H. W. HOWARD
School of Agriculture, Cambridge

" Genetics of *Armadillidium vulgare*."—Dominant and recessive red animals occur in natural populations. The two genes may be at the same locus.

" Cytology of *Avena sativa*."—F_1 hybrids between spring varieties and winter varieties of *Avena sativa* have a high frequency of univalent formation which is only slightly less than the frequency for the cross winter variety of *Avena sativa* × *A. fatua*.

" Grafting experiments with potatoes."—The short-day species *S. demissum* grafted with scions of the long-day adapted variety Epicure sets a larger yield of tubers than when not grafted. There is some effect of the grafting in the following year on plants grown from tubers of the grafted stock.

" Chromosome numbers and systematic in the cruciferous genera *Nasturtium*, *Rorippa* and *Cardamine*."—Diploid and tetraploid forms occur in several species of these three genera.

LETTERS OF THE EARLY MENDELIANS

R. HURST
Horsham, Sussex

Mrs Hurst will give a short explanatory talk, the place and time of which will be announced at the meeting.

SEROLOGICAL TYPING OF PEDIGREE MATERIAL FOR LINKAGE STUDIES

S. LAWLER and L. S. PENROSE
Galton Laboratory, University College, London

INCREASED VARIABILITY AFTER X-IRRADIATION IN INBRED LINES

D. LEWIS and B. J. HARRISON
John Innes Horticultural Institution

SPECIES CROSSES IN ANTIRRHINUM

K. MATHER and A. VINES
Department of Genetics, University of Birmingham

(*a*) *Cleistogamy.*—In an F_2 from *Antirrhinum majus* × *A. glutinosum* two plants were found to have flowers which failed to open. Their foliage was also of an unusual type.

This cleistogamy is heritable, though not simply so. Intermediate forms appear. Fully cleistogamous flowers set seed naturally only by self-pollination—bees cannot penetrate into the flower. Thus two species, one of them an obligatory crossbreeder and the other regularly showing some crossbreeding, have between them all the genetical material for producing an obligatorily inbreeding form.

(*b*) *Flower Colour.*—*A. glutinosum* has a little anthocyanin colour but its flowers appear acyanic (ivory white) to casual inspection. This whiteness is not due to any of the available major gene mutations which are known to reduce or remove anthocyanin pigments in *A. majus*. At least two genes of more major action are involved in the species difference and there is also evidence of a polygenic system affecting flower colour.

In the F_2, plants with the flower colour of *glutinosum* have not been observed so far, although plants with acyanic flowers do occur in the expected proportions when the *majus* parent introduces one of the mutant genes having this effect.

GENETICS OF *BOMBARDIA LUNATA*

M. J. MATHIESON
Botany School, Cambridge

SOME X-RAY-INDUCED MUTATIONS IN *COPRINUS LAGOPUS*

U. MITTWOCH
Galton Laboratory, University College, London

A NEW INHERITED POLYDACTYLY IN THE HOUSE MOUSE

R. S. PHILLIPS
Institute of Animal Genetics, Edinburgh

Preaxial (1st toe) polydactyly of the hind feet in mice has been reported by numerous workers. Postaxial (Vth toe) polydactyly of the fore feet has been described by Strong (1934). Holt (1945) found two animals with duplication of the Vth toe of the hind feet, but was unable to report on the inheritance.

Animals with a complete or partial duplication of the fifth toe of the hind foot, have recently been found on inbreeding mice obtained from a fancier. This condition is associated with a postnumional protuberance on the fore foot, resembling that described by Strong (1934). The abnormalities were found to be heritable, but the inheritance does not follow a simple Mendelian pattern. On outcrossing to various inbred lines (CBA, C.57 black, A strain, etc.) the fore foot condition was found in about one-fifth of the F_1 mice ; but the hind foot condition only reappeared after backcrossing to the original stock. When the fore foot abnormality is unilateral, the right side is more often affected than the left.

"BALANCED" HETEROKARYONS IN *ASPERGILLUS NIDULANS*

G. PONTECORVO

Department of Genetics, University, Glasgow

Demonstration of heterokaryons between mutant strains differing in the colour of the conidia as well as in growth-factor requirements. Grown on agar medium not supplying the growth factors, these heterokaryons are " balanced " (permanent). Both colours of the parental strains can be seen in different chains of conidia arising from individual fruiting heads. Heterokaryon (intracellular syntrophism) and component strains (intercellular syntrophism) are in equilibrium. The equilibrium varies with the growth factor requirements of the component strains and changes as the growth factors accumulate in the medium, presumably from autolysis of older cells. In the case of vitamin requirements the equilibrium involves a small proportion of heterokaryotic mycelium and a high proportion of component strains ; with less diffusible factors, and/or growth factors required in large amounts, the heterokaryon is favoured. During growth of a heterokaryotic colony addition to the solid medium of the required growth factors shifts the equilibrium in favour of either or both constituent strains. The shift is clearly seen by the change in colour in the part of the colony grown after such addition.

GENETICS OF THE HOMOTHALLIC ASCOMYCETE *ASPERGILLUS NIDULANS*

G. PONTECORVO, E. FORBES and O. B. ADAM

Department of Genetics, University, Glasgow

Heterokaryons between strains differing in three or more pairs of characters are established.

The ascospores from these heterokaryons are of parental type, mainly from self karyogamy, and biochemical or morphological recombinant, all from cross karyogamy. In any one cross certain classes of recombinants (morphological or biochemical) are taken as markers to study segregation and recombinations of other genes in these classes. The " morphological " recombinants (colours of the conidia) are identifiable by inspection ; the biochemical ones by using selective media on which only certain types of recombinants can grow (*cf.* Lederberg).

Ten loci have been identified, two affecting the colour of the conidia and eight affecting growth factor requirements ; four loci belong to one linkage group. An insertional translocation is present in one strain.

Preliminary work on the cytology of the species suggests the haploid number of chromosomes to be four.

PRODUCTION OF MUTANTS IN *ASPERGILLUS NIDULANS*

G. PONTECORVO and J. A. ROPER

Department of Genetics, University, Glasgow

(*a*) Production of the mutants following mutagenic treatment.
(*b*) Identification of the growth factor requirements of " biochemical " mutants ; details of " auxanographic " techniques.
(*c*) Detailed biochemical characterisation of a number of arginine-requiring, lysine-requiring and nicotinic acid-requiring mutants.

PEDIGREES ILLUSTRATING THE INHERITANCE OF HUMAN BLOOD GROUPS

R. R. RACE, S. D. LAWLER, D. BERTINSHAW and H. HOLT

Medical Research Council, Blood Group Research Unit, Lister Institute, London

With the exception of the Lewis gene all known blood group genes express themselves in the single dose of the heterozygote ; expression in the homozygote is usually recognisably greater.

Pedigrees are shown illustrating the inheritance of the A_1 A_2 B O, the MNS, the Rh, the Lutheran, the Kell and the rare Levay blood groups.

The Lewis gene, in the adult, has to be present in the homozygous state if the Lewis antigen is to be found on the red cells. All persons so far tested whose red cells carry the Lewis antigen are salivary non-secretors of the ABO blood group substances. The inability to secrete these substances in the saliva has long been recognised as a recessive character. Pedigrees are shown of families tested for these two characters.

THE INHERITANCE OF BODY SIZE IN *DROSOPHILA MELANOGASTER*

E. C. R. REEVE and F. W. ROBERTSON
Institute of Animal Genetics, Edinburgh

A study is being made of the inheritance of body size in *Drosophila*. Extensive selection experiments have been carried out for wing and thorax length, and strains have been produced which differ greatly in size. These differences are due primarily to changes in cell size rather than cell number. Other morphological and physiological changes are being examined in detail. Selection for each character has altered both the ratio of the two dimensions and the relative sizes of the sexes.

Using progeny tests of factorial design and crosses to standard strains, the genetic situation in the various lines is being analysed, to assess the extent and nature of the free variation remaining at different stages in selection ; to examine the genetic differences between lines of different size and to study the basis for the heterosis which has appeared in certain crosses.

CYTOLOGICAL MAPPING OF MAMMALIAN CHROMOSOMES

B. M. SLIZYNSKI
Institute of Animal Genetics, Edinburgh

Mammalian testes offer an opportunity for detailed morphological studies of meiotic prophase chromosomes. A method of aceto-carmine rapid or delayed fixation followed by squashing and/or smearing of small bits of tubules, followed by treatment with Feulgen reagent or by staining with basic Fuchsin after hydrolysis, is used for obtaining slides. On such slides the spread prophase chromosomes can be studied in detail and cytological maps can be drawn. Structural patterns which are typical for each chromosome make the exact identification of any chromosome possible, though difficult. A preliminary map of the complete set of mouse chromosomes has been made and a similar map of bull chromosomes is well advanced. In full pachytene the over-all length of mouse chromosomes is about 170 microns. Slides and photographs show typical preparations from mouse testis and from bull testis.