populations were derived from the cross between Mammoth Delcrest, a short-day mutation of the flue-cured tobacco variety Delcrest, and Praecox, a day-neutral pipe tobacco. The observed data gave monofactorial segregation of day-neutral against short-day plants, the latter character being recessive. Negative heterosis was observed for days to flower, number of leaves and plant height but it was positive for leaf width and length. In inheritance of days to flower, in addition to the pair of alleles determining short-day response, one to two gene groups are indicated, operating probably in an additive fashion. Parameters describing additive gene effects were important for all the characters tested but none of the parameters for dominance and digenic epistatic effects was significant. It seems that the segregating major gene for the mammoth character did not excessively influence the relationship of gene effects in the remaining genotype as determined by the generation-mean analysis.

Leucocyte Cultures in Five Strains of Mice

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Five inbred strains of mice (LG, Swiss, SM, C3H and C57) were used. One to two ml. of blood were aspirated from the heart with a heparinized syringe and placed in a tube containing 0.1 ml of heparin. White blood counts were recorded before and after plasma separation.

Methods for separating the leucocytes from the erythrocytes were tested with and without the addition of separating agents to the whole blood. Separation with 6% dextran was successful and resulted in a consistently higher yield of leucocytes than that obtained without the use of a separating agent.

The cells were grown in tissue culture medium in the presence of phytohemagglutinin and fetal calf serum. Transformation occurred in all strains, but mitotic divisions were observed only in the LG and Swiss strains at a maximum on the second day of culturing. The maximum mitotic index was 3.4% in both strains. The addition of human AB serum to the cultures increased the death rate of the cells and there was no mitosis.

A Cytoplasmic Effect on Sex Expression in *Plantago lanceolata*

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A variety of outbreeding mechanisms are found in the flowering plants, and of these self-incompatibility and dioecy have been extensively studied. Among the lesser known outbreeding mechanisms is gynodioecy. Here male-sterile plants must be pollinated by hermaphrodites, while the hermaphrodites may be self-pollinated.

The common weed *Plantago lanceolata* is gynodioecious with often from about 5 to 30 per cent male steriles in wild populations. The inheritance of male sterility is affected by the cytoplasm. The results of breeding experiments suggest that in "normal" cytoplasm there are two genes governing sex expression, with the double recessive as the male sterile. In "sterile" cytoplasm derived from a different wild male-sterile plant greater proportions of male steriles are produced. Some progenies were entirely male sterile, while others segregated, sometimes in apparently regular Mendelian ratios and sometimes in irregular ratios. When hermophrodites of different cytoplasmic origin were crossed, some reciprocal differences were obtained.

The action of the cytoplasm in terms of a regulator-gene hypothesis and the possible origin of this and other outbreeding mechanisms will be discussed.

Cytotaxonomic Studies on *Eremopyrum*

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The genus *Eremopyrum* consists of the annual species formerly included in the genus *Agropyron*, in its wider sense. The present report is on a study of plants grown from 43 seed acquisitions. With a few exceptions, these plants fit into the morphological description of one or the other of the five species assigned to this genus by Nevski, viz., *E. triticeum*, *E. hirsutum*, *E. buonapartis*, *E. orientale* and *E. distans*. A number of undescribed mor-

phological types may necessitate recognition of additional taxonomic categories, possibly at the subspecific level.

All the taxa studied so far can be grouped into six karyotypic classes, four of which (A,B,C,D) are diploids with $2n = 14$ chromosomes and the other two (AB and BC) tetraploids with $2n = 28$ chromosomes. The tetraploids, AB and BC, seem to be allopolyploids derived from the diploid types A, B and C.

Plants identified as *E. triticeum* are always diploid ($2n = 14$), and those identified as *E. orientale* are always tetraploid ($2n = 28$). However, the morphological descriptions of both *E. buonapartis* and *E. distans* encompass diploid, as well as tetraploid plants.

On the basis of karyotypes, the phylogenetic interrelationships among the taxa in *Eremopyrum* may be hypothesized to be as follows:
E. buonapartis (A) + *E. distans* (B) → *E. buonapartis* (AB); *E. distans* (B) + *E. hirsutum* (C) → *E. orientale* (BC) and *E. distans* (BC); *E. triticeum* (D).

Diploid Chromosome Pairing in Colchicine Induced Autopolyploid Seedlings of *Saccharum spontaneum*

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Based on some cytological peculiarities of interspecific hybridisation in sugar cane, Sisodia (1967) suggested that artificially produced autopolyploid *Saccharum officinarum* varieties would be more suited in crossing with the wild species for the production of commercial sugar cane. Regular meiosis and normal fertility in the doubled *officinarum* varieties are the important pre-requisites for their successful use in breeding. Experimental evidence in support was obtained from colchicine induced autopolyploid seedlings ($2n = 224$) of a *S. spontaneum* clone with 112 somatic chromosomes. Complete diploid pairing with 106 to 112^{II} and a few univalents was observed; multivalents were rare, if any. Examination of pachytene also revealed diploid pairing. Upon selfing, seedlings with 220 to 224 somatic chromosomes were obtained, indicating a regular meiosis. Pollen and seed fertility were normal to the standard of control. Morphologically no obvious difference between normal and the double forms was observed. These observations are rather peculiar and no parallel example in other plants is known to the author.

Sisodia, N.S. 1967. Colchiploidy in sugar cane.
Sugarcane Breeders Newsletter (in press).

Production of Mutations in *Bacillus subtilis* with N-methyl-N'-nitro-N-nitrosoguanidine (NTG)

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In order to study the genetic control of alkaline phosphatase synthesis in *B. subtilis*, it was desirable to develop an efficient technique for obtaining mutants. Because NTG is a powerful mutagen in other bacteria, it seemed worthwhile to try its effects on this species.

Adelberg *et al.* (Biochem. Biophys. Res. Comm. 18: 788 — 795) obtained a maximum yield of mutants in *E. coli* by treating log phase cells with 100 μ g NTG per ml. of buffer at pH 6.0 for 15 to 30 minutes. This treatment produced mutations in *B. subtilis* but at a frequency too low to obtain at least one mutant per treatment. The mutation rate was increased by using a concentration of 300 μ g of NTG per ml. for varying treatment periods. Many mutant colonies were also obtained by first growing the cells to log phase in a nutrient broth containing NTG (50 — 500 μ g per ml.), followed by treatment with NTG in buffer as before. Nearly every treatment yielded mutant colonies, sometimes in large numbers, so that very few plates were needed in order to detect them. However, only one colony can be used from each treatment. Although the first method required many more colonies to be plated out, all mutants could be kept. Both methods proved superior to ultraviolet light and gamma rays under our conditions.

An autosomal dominant condition affecting movement of the forearm

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Inherited abnormalities affecting the ability to pronate and supinate the forearm pre-