acetyldopamine, with the cuticular matrix, or an enzyme, possibly one of the compounds of the complex phenoloxidase system (*7*).

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Fertility Restoration and Its Inheritance in Cytoplasmic Male-Sterile Wheat

Abstract. *Male-sterile* Triticum aestivum *L. 'Bison,' possessing cytoplasm of* T. timopheevi *Zhuk., typically produces male-sterile progeny when pollinated with common wheat cultivars. A fertility restorer developed by transferring genes from* T. timopheevi *to* T. aestivum *produced fertile hybrids when used as the pollen parent in a cross with male-sterile Bison. Data on the* F_2 *and testcross plants indicate that two dominant genes, designated* Rf_1 *and* Rf_2*, condition fertility in wheats with* T. timopheevi *cytoplasm.*

Male sterility due to the interaction of nuclear genes with specific cytoplasm is known in many plant species (*1*). This kind of male sterility frequently makes possible mass production of crossed seed of economic species and thus permits commercial culture of vigorous hybrids.

Three cases of male sterility attributable to interactions of genes and cytoplasm have been reported in common hexaploid wheat, *Triticum aestivum* L. ($2n = 42$). The first two were produced by breeding procedures which resulted in substitution of the chromosomes of common wheat in the cytoplasm of related species of goatgrass, *Aegilops caudata* L. (*2*) and *A. ovata* L. (*3*). Common wheats used thus far as pollinators of these two male-sterile types have produced only male-sterile hybrids. Recently, a more promising sterility system was developed (*4*) by backcrossing so that the chromosomes of the common wheat Bison were substituted in the cytoplasm of *T. timopheevi* Zhuk. ($2n = 28$). Male-sterile Bison was pollinated with a hexaploid having *T. timopheevi* ancestry and fertile plants were produced (*5*). The report is concerned with the inheritance of fertility-restoring genes transferred from *T. timopheevi* to hexaploid wheat.

A hexaploid fertility restorer with *T. timopheevi* cytoplasm was developed by crossing *T. timopheevi* × *T. aestivum* 'Marquis' and then backcrossing twice to Marquis as the pollinator. The resulting F_2 generation had the pedigree *T. timopheevi* × Marquis^3 (*6*). A selected plant from this population proved to be homozygous for genes conditioning fertility in *T. timopheevi* cytoplasm. All progeny resulting from self-pollination were fully fertile. Furthermore, when male-sterile Bison was pollinated with this selected plant, seven hybrid plants were produced in which the pollen and the number of seeds developing was normal showing restoration of fertility to be completely dominant. The fertile members of the F_1 generation were self-pollinated and also backcrossed with male-sterile Bison. Plants of the resulting F_2 and testcross generations were classified according to the microscopic appearance of the pollen as normal, partially fertile, or sterile. Distribution of segregating F_2 and testcross plants into these three fertility classes is recorded in Table 1. Chi-square tests indicate that a two-factor hypothesis is in accord with the observations.

These results can be explained by assuming that the newly-developed fertility restorer is homozygous for two dominant genes, designated Rf_1 and Rf_2, which produce normal fertility in wheats with *T. timopheevi* cytoplasm. Male-sterile Bison exemplifies the recessive genotype $rf_1rf_1\ rf_2rf_2$ in combination with *T. timopheevi* cytoplasm. Normal Bison, essential as a pollinator in propagation of the male-sterile form, has the same recessive genotype and owes its pollen fertility to possession of *T. aestivum* cytoplasm. The heterozygote, $Rf_1\ rf_1\ Rf_2\ rf_2$, produced by crossing male-sterile Bison with the new fertility restorer, proved to be fully fertile. The partially fertile segregates encountered presumably possess either the dominant gene Rf_1 or Rf_2 but not both.

Table 1. Frequency distribution in the F_2 generation and testcross populations segregating for male sterility compared with expectations from digenic inheritance.

Pollen class	Normal	Partly fertile	Sterile
F_2, male sterile × fertility restorer			
Ratio tested	9	6	1
Observed	30	28	3
Calculated	34	23	4
Chi-square probability .41			
Testcross, male sterile × fertile F_1			
Ratio tested	1	2	1
Observed	31	46	29
Calculated	26.5	53	26.5
Chi-square probability .40			

Experience obtained by breeding wheat with the kind of male sterility developed in Bison has shown that it can be readily transferred to many common wheat cultivars by backcrossing. In view of its mode of inheritance, no problem is anticipated in transferring fertility restoration to other wheats as desired. Thus it is clear that the genetic requisites for experimental production of hybrid wheat are now available.

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Histones from Developing Tissues of the Chicken: Heterogeneity

Abstract. *Electrophoretic analysis of the molecular heterogeneity of histones from developing and adult chicken tissues demonstrates that differentiation need not be correlated with changes in the relative proportion of individual histone molecules during development.*

One of the chief reasons for thinking that histones may be regulators of genetic activity is that histones display molecular heterogeneity, a possible provision for selective regulation of genetic activity widely thought to occur in tis-