9. Interallelic complementation at the Sh_1 locus.

EMS induced mutations at the Sh_1 locus were reported last year (MNL 42:53). Six of the 16 mutants are CRM^+ by immunological tests and the presence of a Sh_1 protein band can be demonstrated electrophoretically. Two of these mutants, designated sh_1^F (fast) and sh_1^S (slow), show an altered rate of migration of the protein in starch gel electrophoresis. The migration rate of the Sh_1 protein in the other four CRM^+ mutants, designated sh_1^A, sh_1^B, sh_1^C and sh_1^D, is not altered.

F_1 hybrids were made between all the mutants to test for interallelic complementation at this locus. Positive results, as indicated by the occurrence of plump nonshrunken seeds in the F_1 hybrid, have been obtained. Complementation is observed in heterozygotes where the sh_1^S allele is combined with sh_1^F, sh_1^A, sh_1^B, sh_1^C, or sh_1^D. No other combination shows complementation. These alleles give rise to the typical sh_1 phenotype when homozygous or heterozygous with the standard sh_1 allele. The complementation at the phenotypic level is complete since the complemented phenotype of the hybrid is indistinguishable from the Sh_1 phenotype. The starch gel electrophoretic analysis of the complementing hybrid always reveals the two parental protein bands and no hybrid band is seen.

The complemented hybrid on selfing segregates in a 1:1 ratio for plump and shrunken seeds as expected and when crossed to the standard sh_1 yields seeds of only mutant phenotype. The individual endosperms of a selfed ear of a sh_1^S/sh_1^F hybrid, when subjected to starch gel electrophoresis, gave a segregation ratio of 1F:2FS:1S and those produced in the testcross to sh_1 exhibited 1F:1S (Table 1).

Protein subunit interaction has been shown to be the molecular basis of interallelic complementation in fungi and bacteria. A similar mechanism probably occurs in this system. No hybrid band is present in the complementing heterozygote although such a band could easily be detected if present. However, a hybrid protein may actually exist *in vivo* and its absence after electrophoresis may be an artifact of the electrophoretic technique, as is the case with the hybrid hemoglobins.

Prem S. Chourey

Table 1

Type of Cross	Segregation in F_2 and Testcross Generation						
	Seed Phenotype			Electrophoretic Pattern of 20 Day Old Endosperm			
	Plump	Shrunken	X^2	F	S	FS	Total
sh_1^S/sh_1^F ⊗	1275	1520	1.65	19	24	39	82
sh_1^S/sh_1^F x sh_1/sh_1	0	1200	-	34	38	0	72

(See article 9 by Prem S. Chourey on preceding page.)