OAK RIDGE NATIONAL LABORATORY[1]
Oak Ridge, Tennessee
Biology Division

1. Genetic studies on developing endosperm proteins.

Over the past two years we have been studying protein differences in developing endosperm tissue of mutants which affect starch synthesis and composition. We have used the technique of "substrate electrophoresis" separating the endosperm proteins on starch gel which is substrate for the enzymes involved in starch synthesis and degradation. In this technique, the separation of the proteins depends upon enzyme substrate affinity as well as charge. It is possible to directly test for the enzymes which alter the structure of starch, by staining the gel with iodine following the electrophoretic separation. Those enzymes which reduce the size of the starch polymer by digestion or branching appear as red bands against the blue background of the stained starch gel.

We have found that the $\underline{Sh}_1$ gene controls the synthesis of a major protein component which is present in the highest concentration in the immature endosperm. This protein is completely lacking in $\underline{sh}_1/\underline{sh}_1/\underline{sh}_1$ endosperm. The concentration of this protein (designated Sh_1) is dose dependent increasing with increasing doses of the $\underline{Sh}_1$ allele. This has been corroborated by immunochemical studies as well as moving boundary electrophoresis. Suppression of $\underline{Sh}_1$ by $\underline{Ds}$ also results in the complete absence of the Sh_1 protein, however, in the presence of $\underline{Ac}$ the Sh_1 protein reappears but in reduced amount as is expected. We have not been able to detect the presence of a new protein band in $\underline{sh}_1/\underline{sh}_1/\underline{sh}_1$ material; however, the intensity of the band which occupies a position just ahead of the Sh_1 protein is increased in this mutant. This band (designated G) shows a faster migration rate in the $\underline{sh}_4$ mutant material and appears to be missing in $\underline{su}_1$ and its allele $\underline{su}_1^{am}$, $\underline{bt}_1$ and its allele $\underline{sh}_3$, $\underline{sh}_2$, and $\underline{du}_1$. That different genes are responsible for the absence of this protein band in these mutants is indicated by the presence of the band in the F_1 hybrid between $\underline{su}_1$ and $\underline{sh}_2$, each of which lacks the band. Analysis of double mutant combinations points to gene interaction in the control of the synthesis of this protein.

-- Drew Schwartz

---

[1] Operated by Union Carbide Corporation for the U. S. Atomic Energy Commission.

UNIVERSITY OF PAVIA
Pavia, Italy
Institute of Genetics

1. Investigations on induced polygenic mutability in maize.

An experiment was started in 1957 with the goal of studying polygene mutability in maize. A monoploid stock, HD 73, 1375/11 kindly supplied by Professor G. F. Sprague was used. 8 lines were established in 1957 by selfing as many plants obtained from seed of a single selfed ear. In 1958 three groups of about 5 plants were selfed within each line, one to be treated with 3,000 r applied to the tassel 2 days before using the pollen for self-fertilization, one to be treated with 1,500 r and one receiving no treatment. Treatments were given using an X-ray machine operated at 230 KV, 12 mA, 4 mm. Al filter. In Winter 1958-1959, the R_1 generation was obtained growing the plants in Somali-