Mangelsdorf, P. C. (1961). Introgression in maize. Euphytica 10:157-168.

Mangelsdorf, P. C., and Cámara-Hernández, J. (1967). Prehistoric maize from a site near Huarmey, Peru. Maize Genet. Coop. News Letter 41:47-48.

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1. Reaction of germinating maize pollen to Helminthosporium maydis pathotoxins.

Hooker et al. (Plant Disease Reptr. 54: 708-712, 1970) have shown that Helminthosporium maydis race T is virulent for maize plants which carry the Texas (T) male-sterile cytoplasm. Maize with nonsterile cytoplasm, as well as that with C or S male-sterile cytoplasm, is resistant to the race T pathotoxin. When germinating seeds are incubated in solutions of the race T pathotoxin, the elongation of primary roots of seedlings with T cytoplasm is inhibited. Root growth of seedlings with C, S or normal cytoplasm is not inhibited. The race O pathotoxin is not specific as to cytoplasm (Lim and Hooker, Genetics 69: 115-117, 1971). We have conducted studies to determine whether the race T pathotoxin has a similar differential effect on germinating maize pollen grains.

The technique of Cook and Walden (Can. J. Bot. 43: 779-786, 1965) for the in vitro germination of pollen was modified to incorporate toxin into the medium. As sources of race O and race T toxin, we have used both extracts of infected leaves and filtrates of Fries medium in which the fungus has grown. Pollen tubes were both fixed and stained with lactophenol aniline blue.

We have tested many lines and their different cytoplasmic versions, as well as the normal and T cytoplasm versions of some F_1's. Pollen germination of T and P cytoplasm plants is consistently inhibited in the presence of the race T toxin at concentrations which allow growth of

pollen with normal, C and S cytoplasms. The race O toxin has no differential effect on pollen germination.

This procedure can be accomplished in one to two hours and does not require sterile technique. Only small amounts of toxin are required for a test both because the pollen is very sensitive and because only a small volume of test medium is necessary. Plants are tested while they are still flowering and since the cells being assayed are reproductive cells, this procedure may be adapted for use as a selective device, for example, to select for toxin resistance. This procedure may also be of use in the isolation and purification of the race T pathotoxin since it permits the identification of the toxic fraction in a fractionation procedure.

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2. Nuclear restoration of fertility in S male-sterile cytoplasm in maize.

We reported previously (Genetics 60: 226, 1968; MGCNL 45: 30, 1971; Genetics 71: 607, 1972) on numbers of changes of the S cytoplasmic sterile condition to the fertile or semifertile condition. These changes occur at the cytoplasmic rather than nuclear level; they are not pollen transmissible. The fertility was assigned to changes in the cytoplasmic S element with the reservation that transmission of cytoplasm through the male gametophyte may be involved.

The present report deals with studies of four recent independent occurrences of mutations which restore fertility in S sterile cytoplasm and are pollen transmissible. These cases of mutation at restorer loci occurred in the progenies which were being searched for changes in the cytoplasm from male-sterile to male-fertile condition.

Male-sterile and male-fertile (maintainer) versions of five shrunken-2 inbred lines, R839, R851, R853, R853N and M825, were employed in these studies. The male-sterile cytoplasm incorporated into these lines traces to a Vg source which has been shown to be equivalent to the S (USDA) sterile cytoplasm.

Male-sterile plants from the sh_2 inbred lines were crossed by their corresponding maintainer inbred lines. The resulting progeny were searched for male-fertile exceptions, plants with entire tassels fertile or those