Pollen tube growth in vitro and in vivo — Fresh pollen grains were germinated in cavity slides in aqueous culture medium consisting of 0.45M sucrose supplemented with Ca, B and Mg. More than 50% of pollen grains germinated, and mean pollen tube lengths were obtained for the parents and $F_1$'s of the 8x8 diallel at ½, 1, 2 and 3 hours. Pollen tube growth in live silks was studied with the help of radioactive $^{32}P$ (House and Nelson, J. Hered. 69:18, 1958). Actively shedding tassels were removed from plants and the cut stalk end was immediately immersed in water in a conical flask. Radioactive $^{32}P$ in the form of $H_3PO_4$ of 350 µCi activity was administered in water. Radioactive pollen from the tassels was collected after 24 hours and used for pollination on silks specially prepared by cutting back on the previous afternoon. At 2, 4 and 6 hours after pollination cobs were harvested and the tips of the silks washed to remove ungerminated hot pollen. Silks were removed, dried by pressing between blotting paper sheets, and mounted in autoradiographic frames with X-ray film in direct contact. The films were developed after 5 weeks and the lengths of pollen tubes were measured.

Significant variability for rate of pollen tube growth both in vitro and in vivo was observed in the eight lines. The ranges were 1.50 - 3.69 µ per minute in vitro and 33 - 108 micra per minute for in vivo studies. In most of the crosses pollen from the hybrids had shown either intermediate rate or slower than either parent. Heterotic effects in rate of tube growth were obtained in a few crosses only.

Correlation studies involving pollen size and rate of pollen tube growth in artificial medium revealed that larger pollen showed a higher rate of pollen tube growth than the smaller pollen. A correlation coefficient for pollen tube growth in vitro computed over two hours after inoculation was 0.84 and significant. On the other hand, negative but non-significant correlation coefficients were obtained between pollen size and rate of tube growth in live silks. There was no correspondence between rates of pollen tube growth in vivo and in vitro.

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Stabilization of freshly broken chromosome ends in the endosperm mitoses — We have previously shown that B chromosomes cause loss of knobbed segments of members of the regular chromosome complement. We hypothesized that replication of the heterochromatic knobs was delayed at, and only at, the second microspore mitosis. We suggested that a dicentric chromosome is formed at anaphase; following bridge breakage, a broken chromatid passes to one sperm cell and an intact chromatid goes to the other sperm. Data from high-loss plants carrying a knobbed chromosome 9