1. Reversed germ.

On the ears of most varieties of corn the germinal face of each kernel is oriented toward the tip of the ear. Occasional kernels may be found, in which the orientation is toward the base of the ear spoken of in the literature as reversed germ (r.g.). Such kernels are found regularly in Country Gentleman sweet corn. The inheritance of the character was studied in dent corn lines which showed a relatively high percentage of reversed germ kernels and some crosses were also made with Country Gentleman. The character was found to be recessive and inherited as a maternal plant character.

Its morphology may be summarized as follows: In corn two spikelet primordia develop into one upper and one lower floret each. In most varieties the upper floret is functional and develops into a mature kernel while the lower one aborts. In Country Gentlemen sweet corn the writer found that about 50% of the kernels were reversed when counted from the part of the ear where no rows could be detected. The interpretation is that here both florets develop, the upper one into a normal and the lower one into a r.g. kernel. From this fact it was concluded that the so called reversed germ kernel is not reversed at all, but has its position determined by the location of the second floret which is a mirror image of the first and thus is a mere consequence of the development of the second floret.

One of the r.g. lines used showed a considerable variation in r.g. kernels (0 - 63.7%). This was explained as being due to variable expressivity of the gene or genes involved. All ears but two had some r.g. kernels. Thus penetrance seemed to be complete, the two exceptional ears probably being contaminations. A study of 30 ears from the r.g. parent, the F_2 and the backcross to the r.g. parent revealed that the r.g. kernels are not distributed at random on the ear. Based on the average of the 30 ears 3.9% of the r.g. kernels were found in the upper third of the ear, 7.4% in the middle and 14.1% in the lower third of the ear. Another study of a possible relationship between kernel number on the ear and r.g. kernels revealed that in general the average percent abnormalities decreased as the kernel number increased. This apparent relationship found in the r.g. line was present to a much less degree in the segregating population.

The inheritance study which included both parents, F_1, F_2 and both backcrosses revealed the following facts:

The character is due to one major and one minor gene, either factor alone or both together causing the reversed germ character. The minor factor gives an intrinsic low percentage of reversed germ kernels. The backcross ratio was 1:3 and the F_2 ratio was 9:7. Some exceptions were found to these ratios. Some backcrosses, in which a different normal had been used, segregated in a 1:7 ratio. The results indicate that normals may carry factors affecting the inheritance of this character, with some indication of a dominance effect.

Reciprocal crosses between the r.g. line and Country Gentleman sweet corn lead to the conclusion that ear type, i.e. presence or absence of rows as well as reversed germ kernels are maternally transmitted.

A second r.g. line received from Dr. F. S. Warren, Central Experimental Farm, Ottawa, Canada had a much higher percentage of reversed germ kernels (93.5% in the original ear). It also behaved as a recessive character. Crosses between the two lines indicated they carry different genetic factors.