

6. Cytomorphology of chloroplasts.

Microscopic observation of plastid morphology for the five major gene types in the normal green, albino, and suppressor stocks has been made. Chloroplast size and shape have been measured. The expression of green color in the leaves is not based solely on the number of chloroplasts per cell, but is related to the quantity of pigmentation in plastids as well. There appeared to be no significant difference in the shape or size of chloroplasts among these stocks. The most common shape is circular (2-3 μ) but ovoid forms are not infrequent. Partial suppressors showed a wide range of pigmentation in the chloroplasts of even a single cell. The maximum size of chloroplast was attained within a week in the growth chambers, and represented a simple enlargement of a proplastid in a majority of cases.

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7. Hornlike coleoptile (hc).

A heritable and unrelated variation was observed in seedlings of one of the chlorophyll mutant stocks. These seedlings show hornlike projections on the coleoptile tip. A comparable case has been reported by Sass and Sprague where a green leaf-bladelike outgrowth occurred on the maize coleoptile. Sprague (1959 personal communication) indicated that this character is controlled by a single recessive gene ac. Recently, Bianchi (1960 personal communication via Galinat) found a single ear segregating for "bikeeled" outgrowths borne either on the coleoptile or on the first true leaf apex. These mutants appear to be quite distinct from the hornlike coleoptile mutant (suggested symbol hc). In the dark growth chamber, this mutant has a blunt, rough coleoptilar apex. Eventually hornlike growths occur which often reach a length of 2.5 - 3.0 cms. over a two week period. The outgrowths may be equal or unequal and are associated with the vascular strands. Often, the outgrowths show a marked curvature and less frequently horns were seen to be fused. The apical tip of the first leaf is rolled and compressed. At the time this leaf opens to form a spatula or spoon-shaped tip, the hornlike structures cease growth.

In five segregating ear progeny there was a good fit for a 3:1 ratio. Four abnormal seedlings were selfed under the greenhouse conditions. All selfs bred true for hornlike coleoptile. Subsequent crosses between homozygous mutants hc hc and heterozygous normals Hc hc showed 1:1 segregation ratios. Critical crosses with the ac stock and the mutant discovered by Bianchi have yet to be made. Based on the data at hand "hornlike coleoptile," hc, is proposed as a new simple Mendelian recessive gene. Linkage studies are being carried out.

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8. Anatomy of hornlike coleoptile (hc).

Mesocotyl anatomy of normal corn seedlings has been considered by Tucker (1957). The normal coleoptile (Hc) is characterized by two lateral vascular bundles. Both of these bundles run parallel and approach the anterior end of the tapering coleoptile apex. In the hc mutant, each of the two hornlike outgrowths possess one vascular strand which appears to be a continuation of one of the two main vascular strands. There is, however, considerable variation in expressivity of the hc gene. It is worth mention that Bianchi's material seems to possess a regular tendency toward equal sized accessory bundles in the bikeeled coleoptiles. Only two of them are present when the spurs are present at the apex of the first leaf blade and absent from the coleoptile.

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