

Synthesis of a red pigment in corn seedling breis

In the course of experiments with aqueous leaf extracts it was noted that breis prepared from homozygous blue fluorescent-1 seedlings formed a pigment upon overnight incubation. (blue fluorescent-1, described by Teas and Anderson in 1951, is characterized by bright blue fluorescence of the seedling leaves when illuminated with 3650 Å. ultraviolet light. Anthranilic acid was shown to be accumulated by the mutant.) Breis prepared from non-blue fluorescent seedlings (i.e. from various inbreds, albinos, and yellows) developed no color under the same conditions, but red pigment was formed in all extracts if anthranilic acid was added. It was at first surmised that the production of pigment was due to an enzymatic conversion of anthranilic acid since boiling the breis for a short time destroyed their ability to produce the red pigment. However, the possibility of an enzymatic reaction was eliminated when it was found that the red color formed at a slow rate spontaneously when the ether extract of breis was allowed to stand with anthranilic acid. This colorless, thermolabile material from the breis showed a broad peak at R_f .6 to .8 on ascending paper chromatograms run in water-saturated butanol. The red color precursor in seedling leaf breis apparently is either not present or does not react in vivo, since bf-1 seedlings contain sufficient anthranilic acid to give a bright red color in vitro but appear green in ordinary light. Older corn seedlings as well as seeds fail to give a color. Inasmuch as neither N-acetyl anthranilic acid nor methyl-anthranilate give the color, the reaction appears to require that the amino and carboxyl groups be free. Tests with over thirty other aromatic compounds revealed that the property of forming colored substances with leaf breis is not limited to anthranilic acid. In the case of P-aminobenzoic acid, the pigment which is formed is orange-red and can readily be separated from the red anthranilic acid pigment by paper chromatography. If treatment with acid is involved in the isolation of the red anthranilic acid pigment, the colored material obtained has different mobility on paper chromatograms from the original. It appears that one form in which the anthranilic acid pigment can be isolated contains a sugar, determined to be glucose by chromatography.

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