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Anthocyan pigments

Paul Sears
University of Nebraska - Lincoln

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Anthocyan pigments.—NOACK[7] has found rhamnose-free flavonol diglucosides to be much more abundant in green leaves than has generally been supposed. In such leaves as he studied he was able to establish the existence

[7] NOACK, K., Zeitschr. Botanik 14:1–74. 1922.

of flavonol-anthocyan in couples of similar glucosidal nature, but secured no evidence of aromatic nucleus composition in such cases. He suggests that these couples function as a reduction mechanism during photosynthesis.

WHELDALE[8] had already indicated reasons for believing anthocyan formation associated with photosynthetic defect. NOACK's work strengthens this view. He finds fluorescent media in the presence of light capable of oxidizing anthocyanins to flavonols, and a general inverse relation between chloroplast integrity and anthocyan content. Especially has he shown that absence of carbon dioxide will cause anthocyanin formation in sunlight, and that engorgement with sugar probably acts indirectly (he thinks by disturbing the photosynthetic mechanism) in producing anthocyanins. That there are serious gaps in his work he has been the first to admit. He has, however, given added dignity to a point of view which comes surprisingly close to harmony with much of our knowledge. The action of narcotics, low temperatures, high insolation, and ultraviolet light, nitrogen and phosphorus starvation, as well as extremes of youth and senescence in photosynthetic organs, certainly fall in line with such a conception in a most disarming way.

The formation of anthocyanins by reduction from flavonols, as well as WILLSTÄTTER'S[9] general scheme for color change, are elucidated by EVEREST and HALL[10] in a trenchant reply to the paper of SHIBATA, SHIBATA, and KASIWAGI.[11] It will be recalled that the latter workers attribute color conditions to metal organic or complex compounds of reduced flavonol glucosides, rather than to alkaline phenolic salts, free stages, and red oxonium salts of anthocyanins. In the present paper strong evidence is adduced that this contention is based upon work with supposedly pure substances which were actually mixtures, and the resultant analyses are pronounced of no value. It is interesting to note that EVEREST and HALL now believe blue flower pigments to be of two general types, the alkali phenolic salt of anthocyan, which polymerizes to colorless on standing, and the iron double salt, stable in dilute solution. They have also demonstrated the existence of flavone substances in a number of very young buds previous to anthocyan formation, but have failed to find anthocyans preceding flavone formation in flavone-holding organs.

There can be little doubt that botanists are now ready to look with the keenest interest toward precise chemical comparisons of flavone and anthocyan pigments wherever the two are found associated, whether simultaneously or in sequence.—PAUL B. SEARS.

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[8] WHELDALE, M., The anthocyan pigments of plants. 1916 (p. 81).

[9] WILLSTÄTTER, R., and EVEREST, A. E., Liebig's Ann. Chem. **401**:189–232. 1913.

[10] EVEREST, A. E., and HALL, A. J., Proc. Roy Soc. B **92**:150–162. 1921.

[11] SHIBATA, SHIBATA, and KASIWAGI, Jour. Amer. Chem. Soc. **41**:208. 1919.