Populus tremula. The Anthocyanins of Leaves and Catkins

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The young leaves of many higher plants exhibit a red colouration due to the presence of anthocyanins. This colour disappears as the plant grows and redevelops in the autumn if the climatic factors are favourable. One such plant whose young leaves exhibit a transient red colour which reappears in the autumn is *Populus tremula*. Since no anthocyanins could be found in the matured leaves we have studied the anthocyanin pattern in young and autumn leaves. For comparison the red pigmentations of male and female catkins as well as those of male catkins of a *Populus* hybrid (*P. alba* × *P. tremula*) have also been investigated. The results are summarized in Table 1.

Table 1. Isolated cyanidin derivatives.

	3-Glucoside	3-Xylosyl-glucoside	3-Rhamnosyl-glucoside
Spring leaves	+	+	−
Summer »	−	−	−
Autumn »	+	+	−
Male catkins	+	−	+
Female »	+	+	+
Male » (hybrid)	+	−	+
Stigmas	+	+	+
Stamina	+	−	+

All the isolated anthocyanins were found to be cyanidin derivatives and cyanidin-3-glucoside was found in leaves as well as in catkins. Besides this anthocyanin both the spring and autumn leaves also contain cyanidin-3-xylosylglucoside, an anthocyanin which seems to be a rather uncommon leaf pigment.[1] Furthermore in the autumn leaves traces of a third pigment were also detected. It was, however, obtained in such small quantities that it was not possible to identify it. Judging from its R_F-values in different solvents it might be a cyanidin-triglycoside.

The glucosidic pattern of the catkins is somewhat different from that of the leaves in so far that the former contain cyanidin-3-rhamnosylglucoside. The female catkins differ from the male ones in containing a third anthocyanin, *viz.* cyanidin-3-xylosylglucoside. The male catkins of the hybrid contain the same anthocyanins as those of *P. tremula*.

Experimental. The catkins were collected at the end of April and the leaves at the end of May, in the middle of July and at the end of September. The methods used for extraction of the anthocyanins and for PC and TLC have been described earlier.[2,3] The anthocyanins were separated by chromatography on cellulose columns in BAW (butanol-acetic acid-water, 6:1:2, by vol.) and further purified by PC on Whatman No. 3 in BAW, in 1 % HCl (conc. HCl-water, 3:97 v/v) and in 15 % aq. acetic acid. The purity of the isolated pigments was tested by TLC in the usual four solvents. Hydrolysis of the anthocyanins was performed as described earlier.[2] The aglycones, the sugars and the anthocyanins were identified by spectral measurements and co-chromatography with authentic specimens in different solvents. The two diglycosides yielded, after controlled hydrolysis, three spots when chromatographed on paper in 1 % HCl which were identified as cyanidin, cyanidin-3-glucoside, and unchanged pigments. Their identities were proved by spectral measurements and co-chromatography with authentic specimens.

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