Identification of Flavonols and Anthocyanins in the Flowers of Cichorium Intybus

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Chicory (Cichorium intybus) a perennial herb of the Composite family is native to the Old World and widely naturalized in North America. It has rayed flower heads with usually blue florets, but some white and red flowers are occasionally observed. In Missouri, the plant is a prolific roadside weed that grows to 3 feet tall with blue flowers. The plant is very hearty and will continue to flower at ground level even if mowed. The dried, roasted, ground roots of this plant are used as an additive to or substitute for coffee. Our interest lies in the blue coloration of the flower petals and the molecules that are responsible for this color. The blue color of numerous flowers throughout the plant kingdom is associated with the anthocyanin delphinidin. Previous work done on the Old World relative in Denmark by Norbaek, Nielsen, and Kondo in 2002 identified four anthocyanidins based on glycosylated derivatives of delphinidin. The current investigation was able to identify the same anthocyanins in the Missouri plant. However, in addition to the previously reported compounds, two new derivatives of delphinidin were identified along with several other uniquely modified anthocyanins and flavonols. The two new delphinidin derivatives are tentatively identified as delphinidin 3-O-(6-O-malonyl-beta-D-glucoside)-5-O-(formyl-6-O-malonyl-beta-D-glucoside) and delphinidin 3-O-(6-O-malonyl-beta-D-glucoside)-5-O-(tartaryl-beta-D-glucoside). The attachment points of the formyl and tartaryl groups are still being determined.

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