Metabolic Modifications of Birch Leaf Phenolics by an Herbivorous Insect: Detoxification of Flavonoid Aglycones *via* Glycosylation

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The metabolic modifications of birch (*Betula pubescens* Ehrh.) leaf phenolics in the digestive tract of its major defoliator, larvae of the autumnal moth *Epirrita autumnata*, were studied. The main phenolic acids of birch, *i.e.* chlorogenic and *p*-coumaroylquinic acids, were isomerised in the alkaline digestive tract. Moreover, only 16 to 92% of the ingested amounts of chlorogenic acid were found in the faeces of individual larvae; the missing portion is possibly being used in the formation of reactive *o*-quinones. Water-soluble flavonoid glycosides were mostly excreted unaltered. In contrast, lipophilic flavonoid aglycones were not excreted as such, but as glycosides after being detoxified by *E. autumnata via* glycosylation. When the larvae were fed with leaf-painted acacetin and kaempferide, *i.e.* two naturally occurring birch leaf flavonoid aglycones, acacetin-7-*O*-glucoside and kaempferide-3-*O*-glucoside appeared in larval faeces as major metabolites. However, the efficiency of aglycone glycosylation varied, ranging from 17 to 33%, depending on the aglycone and its dietary level. There was also large variation in the efficiency of glycosylation – from 2 to 57% – among individual larvae. These results demonstrate a compound-specific metabolism of phenolic compounds, leading to different phenolic profiles in the insect gut compared to its leaf diet.

Key words: Phenolic Metabolism, Flavonoid Aglycones, Glycosylation