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Hepatotoxic Pyrrolizidine Alkaloids in Pollen and Drying-Related Implications for Commercial Processing of Bee Pollen

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Abstract:

Using HPLC-ESI-MS, several saturated and 1,2-dehydropyrrolizidine alkaloids were detected, mainly as their N-oxides, in fresh pollen collected from flowers of the pyrrolizidine alkaloid-producing plants *Echium vulgare*, *E. plantagineum*, *Senecio jacobaea*, *S. ovatus*, and *Eupatorium cannabinum*, and/or pollen loads from bees (bee pollen) that foraged on those plants. A major alkaloidal metabolite in *S. ovatus* was tentatively identified, using its mass spectrometric data and biogenic considerations, as the previously unreported, saturated alkaloid, 2-hydroxysarracine. Heating had very little effect on the 1,2-dehydropyrrolizidine alkaloids and their N-oxides from a variety of sources. Considered in conjunction with international concerns about the adverse effects of these alkaloids, the results strongly indicate a need for monitoring pollen supplies intended for human consumption, at least until conditions for processing and/or selection are clearly defined such as to significantly reduce the hepatotoxic (and potentially carcinogenic and genotoxic) pyrrolizidine alkaloid content of bee pollen.

Keywords: Pyrrolizidine alkaloid; pollen; bee pollen; *Senecio*; *Echium*; *Eupatorium*