〔*Shoyakugaku Zasshi*, **43**, 259 (1989)〕

Chemotaxonomic Studies on the Genus *Citrus* (III) Coumarins in *Citrus intermedia* and *C. medica*

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Many citrus breeds and cultivars have been produced by accidental hybridization of both geographycally and morphologically remote parents. Morphological characteristics alone often not sufficient to identify the parent-progeny relationship. To construct the chemotaxonomy of citrus the constituents of the peels of *C. intermedia* and *C. medica* were examined. Meranzin, isomeranzin and umbelliferone were isolated from *C. intermedia*, and limetin, scoparone, scopoletin and unbelliferone from *C. medica*. The structures of these coumarins were elucidated by the spectroscopic analysis.

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Correlatiotn of Papain-like Enzyme Production with Laicifer Formation in Somatic Embryos of Papays

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A protease similar to papain was produced by somatic embryos of *Carica papaya* in association with the development of laticifers containing characteristic vesicles which probably originated from the endoplasmic reticulum. In contrast to somatic embryos, a papain-like protease was not detected in either friable or compact callus cultures which failed to develop laticifers. These observations strongly suggest that the differentiation into laticifers is required for papain production in papaya.

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Energy-requiring Uptake of Protoberberine Alkaloids by Cultured Cells of *Thalictrum flavum*

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Cultured cell of *Thalictrum flavum* take up berberine exogenously added to medium against the concentration gradient. This uptake was temperature-dependnt and sensitive to plasma membrane-bound ATPase inhibitors such as sodium orthovanadate and diethylstilbestol, indicating that the process is mediated by an energy-requiring system. The time-course of pH-shift during berberine uptake suggests the participation of a berberine-proton antiport system in the berberine uptake by the cultured cells. In addition, the existence of a specific transport system was suggested by the competitive inhibition of berberine uptake by berberine analogues, coptisine and jatrorrhizine.