Studies on the Chemical Constituents of Chinese Herbal Medcines in Taiwan (I)

by

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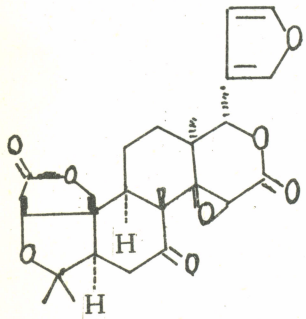
In this paper, we will study on the chemical constituent of the roots of (1) *Citrus kotokan* Hay. (*Rutaceae*), the leaves of (2) *Garcinia spicata* Hook. (*Guttiferae*) and the roots of (3) *Peucedanum formosanum* Hay. (*Umbelli ferae*). There are all treated as folk remedy drugs in Taiwan.

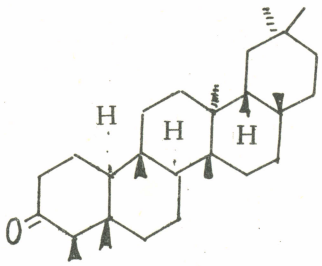
The peels of *Citrus kotokan* had been isolated hesperidin, neohesperidin,[1] and limonin.[2] But xanthyletin[3] and limonin were first found from the root.

The bark of *Garcinia spicata* had been isolated (±)-fukugetin, (+)-fukugetin, (±)-3'-O-methyl-fukugetin, fukugiside[4],[5] and spicataside, (±)-volkensiflavon[6]. But friedelin is first isolated from the species.

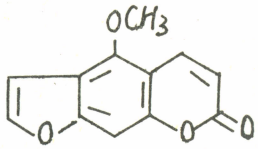
The roots of *Peucedanum formosanum* had been isolated a new coumarin-peuformosin[7] and anomalin[8]. Now, besides the two compounds, we also isolated bergapten from the ethereal extract.



(1) Limonin



(2) Friedelin



(3) Bergapten

Experimental

(1) **Limonin** --- The dried roots (2Kg) of *Citrus kotokan* were collected from Hsin-chu county in July 1973 and macerated with ether at room temperature. The ether solution was concentrated to brown oil (100 ml). After cooling, a solid crystalline obtained.

Filtreated and recrystallized with ethanol, a colorless prism, mp. 297-298°, limonin obtained. It confirmed by m.m.p., IR spectrum and Co-TLC with authentic sample.

(2) **Friedelin** --- The dried leaves (0.5Kg) of *Garcinia spicata* were collected from Cha-i county in August, 1974 and reflux with methanol. Concentrated the methanol extract to a mucilage like substance. The chlorophyll removed by n-hexane and then extract with ethanol. Concentrated the ethanol solution, when cooling, a yellowish solid afforded. Collected and recrystallized with ethylacetate, a colorless needle, mp.263-5°. It give a positive Lieberman Burchard's reaction (pink), $[\alpha]_D^{12}$ -26.9° (c=1.04, $CHCl_3$) M^+=426 in mass analysis, $C_{30}H_{50}O$,

Anal. Calcd. C,81.57; H,11.60
Found : C,84.63; H,12.08

Mixed with the specimen of friedelin was no depressed, and IR spectrum was identical.

(3) **Bergapten** --- The dried roots of *Peucedanum formosanum* were collected from Ping-tung county in June, 1974 and extracted with ether at room temperature. The ether solution was concentrated to a dark brown oilly substance. It was chromatographed over the column of silicic acid (Merck, 70-325 mesh) with n-hexane. From the n-hexane: $CHCl_3$ (3:1) portion, a solid crystalline obtained. From the decolorization and recrystallization, a colorless fine needle, mp.189-190°, $C_{12}H_{18}O_4$,

Anal. Calcd. : C,66.67; H,3.70
Found : C,66.80; H,3.80

The IR spectrum was identical and exhibited characteristic peak at 1725 cm^{-1} assignable to lactone carbonyl group. It confirmed by m.m.p. and Co-TLC with authentic sample.

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Summary

In the paper, limonin isolated from the roots of *Citrus kotokan*, friedelin isolated from the leaves of *Garcinia spicata* and bergapten isolated from the roots of *Peucedanum formosanum*.

中文摘要

臺灣產中國藥材之化學成分研究（Ⅰ）

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本報報告由虎頭柑 *(Citrus kotokan)* 根分離出 limonin，福木 *(Garcinia spicata)* 葉分離出 friedelin 以及由台灣前胡 *(Peucedanum formosanum)* 分離出 bergapten，以上各成分經與標準品作混融試驗，紅外線吸收光譜及薄層色層分析而加以確認。

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