行政院國家科學委員會補助專題研究計畫成果報告

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※ 柏科及杉科植物成分研究 - X ※
※ (Chemical Studies of the Plant of Cupressaceae and Taxodiaceae-X) ※
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計畫類別：■個別型計畫 □整合型計畫
計畫編號：NSC －91－2113－M－002－028
執行期間：91 年 8 月 1 日至 92 年 7 月 31 日

計畫主持人：郭悅雄
共同主持人：
計畫參與主持人：文永順，簡世昌，詹益福，陳政琪
林煥佑，邱錫臨

成果報告類型(依經費核定清單規定繳交)：□精簡報告 ■完整報告

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□赴國外出差或研習心得報告一份
□赴大陸地區出差或研習心得報告一份
■出席國際學術會議心得報告及發表之論文各一份
□國際合作研究計畫國外研究報告書一份

執行單位：國立台灣大學化學系

中 華 民 國 92 年 1 月 3 日

行政院國家科學委員會專題研究計畫成果報告

柏科及杉科植物的成分研究

Chemical Studies of the Plants of Cupressaceae and Taxodiaceae

計畫編號：NSC 91-2113-M-002-028

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主持人：郭悅雄　國立台灣大學化學系

計畫參與人員：文永順，簡世昌，詹益福，陳政琪（博士生）

林煥佑，邱錫臨（碩士生）

一、中文摘要

台灣杉是抗黴菌強的好建材. 尤其皮部共純化出四種新化合物及一種已知化合物. 台灣杉的材部找出9種已知化合物並測定其抗氧化活性, 以及從皮部發現五種新的三帖化合物. 台灣鵝掌柴葉部其抗癌成分, 經分析找出 18 種成分. 而其中 8 種成分被測試出有抗癌活性. 台灣扁柏千年以上巨樹是最有價值建材, 尤其心材發現四種新的及二種已知之木酚素, 再深入探討又發現四種新化合物. 阿勃勒在民間用於治胃潰瘍及殺蟲劑. 從他的種子中找出四種新的以及四種已知化合物. 牛奶榕是半年落葉樹, 其根部民間用於處理關節炎, 糖尿病. 由其根部分出 5 種新酚類. 從正榕的氣根找出三種新骨架之三帖類.

關鍵詞：台灣杉；台灣鵝掌柴；扁柏；阿勃勒；牛奶榕；正榕

Abstract

The wood of *Taiwania crytomerioides* is an anti-fungal and good material. From its bark, we have purified four new and one known compounds. Nine known abietane-type diterpenes, were observed from heartwood of *T. cryptomerioides*. Four of them possessed antioxidative activity. The further studies, five antioxidative trinorditerpenes were isolated from the barks of *T.cryptomerioides*. Eighteen components were purified from the leaves of *Schefflera taiwaniana*, among then eight compounds possessed cytotoxic activety. *Chamaecyparis obtusa* var. *formosana* is a huge tree, over thouthan years old and also best valuable building material. Four new and one known lignans together with four new compounds were purified from its heartwood. *Cassis fistula* is widely distributed in India, South China, and Taiwan. It has been used as folk medicine to treat gastritis and make insecticide. Four new components were observed. *Ficus beecheyana* ia a semideciduous tree. Its rhizomes have long been used as a folk medicine to treat rheumatism and diabete. From the extract of its roots, five phenolic compounds were obtained. Three new skeletonal triterpenes were isolated from the aerial roots of *Ficus microcarpa.*

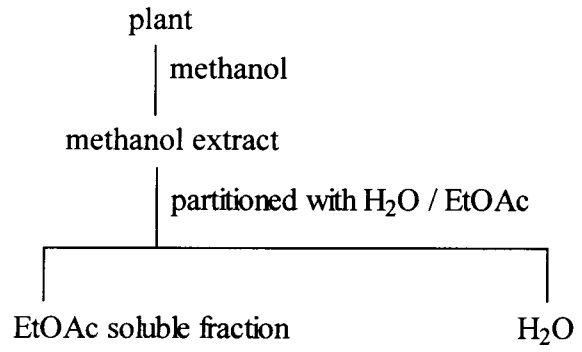
Keywords: *Taiwania cryptomerioides* ; *Schefflera taiwaniana* ; *Chamaecyparis obtusa* var. *formasana* ; *Cassia fistula* ; *Ficus beechyana* ; *Ficus microcarpa*

二、Purpose of Project

α-Cadinal has the best activity against *Coriolus versicolor* (white-rot fungi) and *Laetiporus sulphurens* (brown-rot fungi). We are encouraged to research the chemical studies from the bark of *Taiwania cryptomerioides* and found 4 new podocarpene-type diterpenes. From the structures of isolates, we knew that they possessed the antioxidative activities. The methanol extract of the leave of *Schefflera taiwaniana* exhibited cytotoxic activity. Therefore the active components were investigated. *Chamaecypairs obtusa* var. *formosana* is a best valuable building material and strong resistance to wood-decaying fungi, we tried to investigated the antifungi principles. The aril part of *Cassia fistula* has been used as treatment of anti-gastritis andinsecticide. We investigated the compound from its seeds. *Ficus beecheyana* is semideciduous tree. Due to treatment of rheumatism and diabete, the chemical studies on its rhizomes were performed. Aerial roots is an unique event in the plant kingdom. Due to its vital force, we studied the components of aerial root of *Ficus micricarpa.*

三、Content of Project

The separative procedure of every plant was achieved as following



The EtOAc soluble fraction was separation with repeatedly SiO_2 chromatograthy and HPLC (normal phase). And the structure of pure component was elucidated principally from spectral evidence (^{1}H-NMR, ^{13}C-NMR, MS spectroscopy, two D techniques). From the acetone of bark of *Taiwania cryptomerioides*, four new podocarpane-type trinorditerpenes (**1** – **4**) were isolated. Their structures were elucidated by two-dimensional NMR spectroscopy. Nine phenols from the heartwood of *T. cryptomerioides* were tested antioxidative activity, ferrugiol (**5**) and hinokiol (**6**) showed higher activity. From the bark part of this plant, five new podocarpanes (**7** – **11**) and a known compound (**12**) exhibited antioxidative activity. From among, compounds **9** – **12** have the activity like vitamine C. The ethyl acetate soluble fraction from the leaves of *Schefflera taiwanian* was tested for significant growth-inhibition activity to four cell line 59T, DLDT, HONE1, SCM1, respectively. Eighteen components were purified, among these compounds **13** – **15** caused NUGC cells to survive 3%, 67% and 48% with 10μm. And compounds **16** and **17** inhibited the NUGC cell to 5% and 17% survival, respectively (10μm). The research on the heartwood of *Chamaecyparis obtusa* var. *formosana*, four new lignans (**18** – **21**) two new dimric monoterpenes (**22** – **23**) and two new demerit diterpenes (**24** – **25**) were characterized by spectroscopic and chemical means. *Cassia fistula* has the potential antidiarrhea property. We investigated the components of seeds and found four new compounds (**26** – **29**). The rhizomes of *Ficus beecheyana* have long been used as a folk medicine to treat rheumatism and diabet. Therefore the roots of this plant were studied on the chemical priciples, five new phenolics (**30** – **34**) were elucidated. *Ficus microcarpa* is a popular ornamental plant in Taiwan. Its aerial root exhibited antiplatelet coagulation property. From this part, we elucidated three novel skeleton of triterpene (**35** – **37**).

四、Published papers

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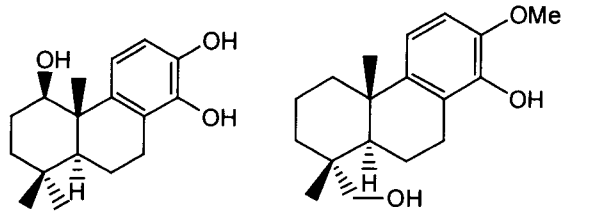
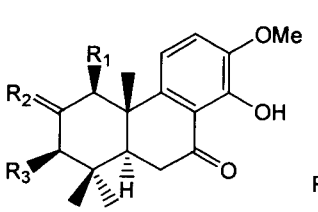
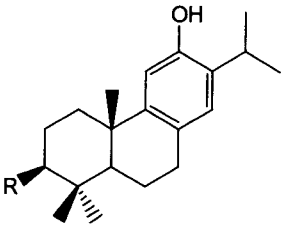
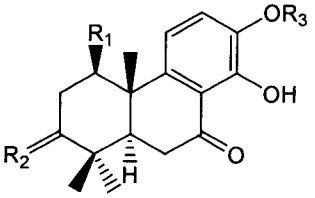


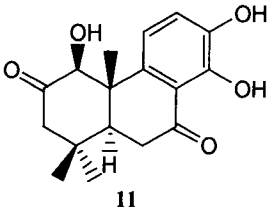


3 R_1=OH, R_2=O, R_3=H
4 R_1=H, R_2=H_2, R_3=OH



5 R=H
6 R=OH





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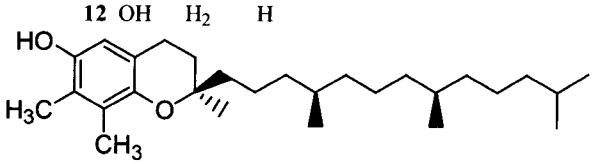
	R_1	R_2	R_3
7	H	O	Me
8	OH	H_2	Me
9	H	O	H
10	H	β-OH	H
12	OH	H_2	H



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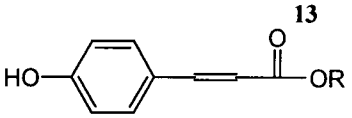
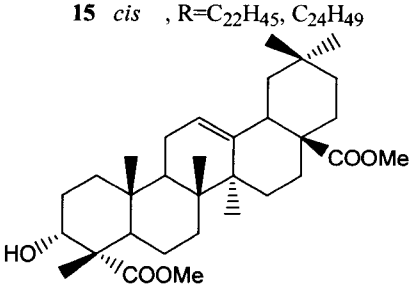


14 *trans*, R=$C_{22}H_{45}$, $C_{24}H_{49}$
15 *cis* , R=$C_{22}H_{45}$, $C_{24}H_{49}$



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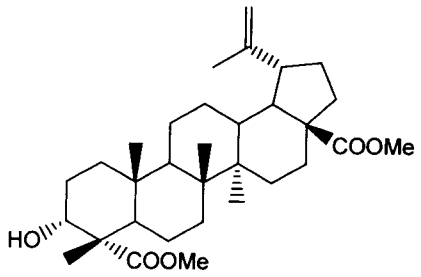

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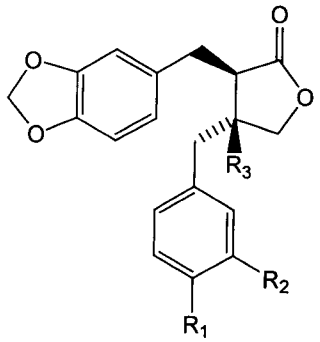
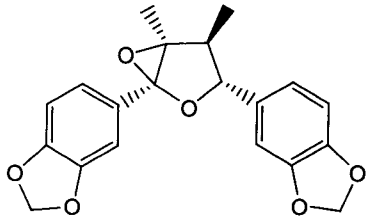


18 R_1=R_2=OH, R_3=H
19 R_1=OH, R_2=R_3=H
20 R_1+R_2=-OCH_2O-, R_3=OH



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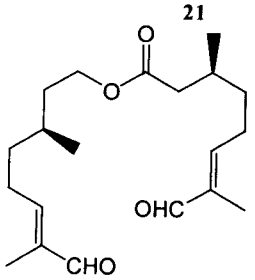

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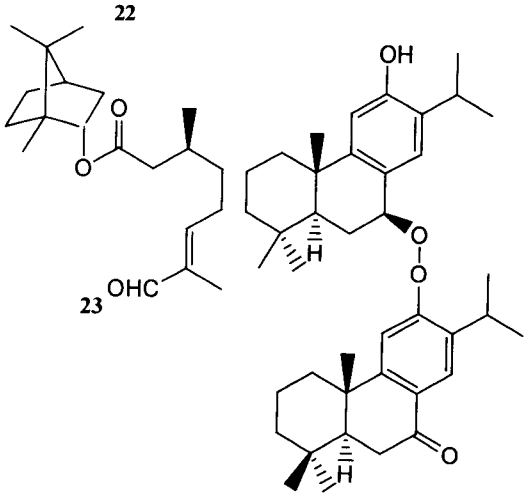
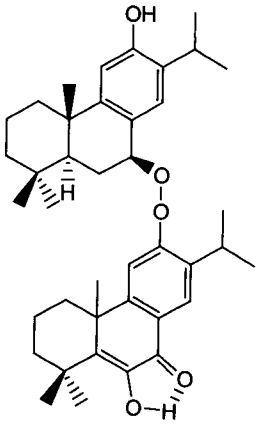


23 **24**



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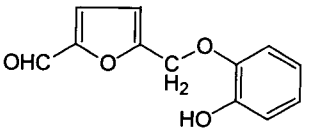

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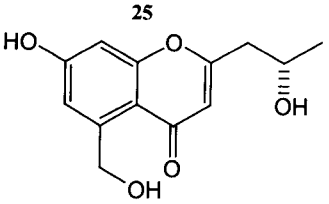

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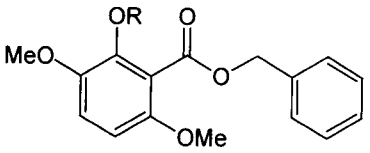
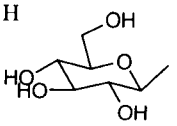
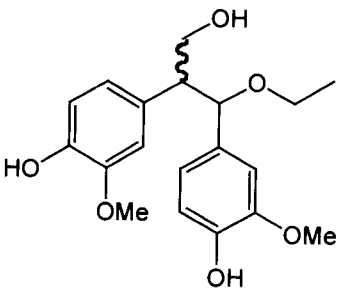
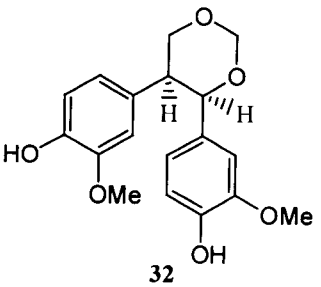


28 R = H
29 R =





30 *threo*
31 *erythro*



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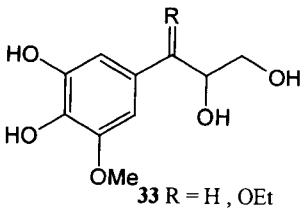
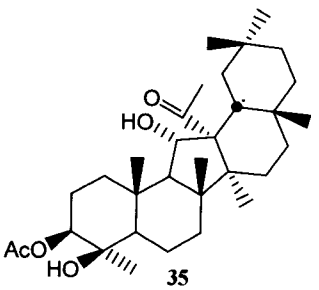


33 R = H , OEt
34 R = O



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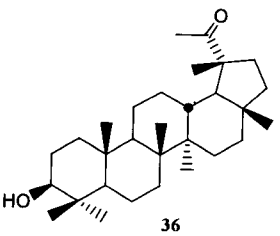

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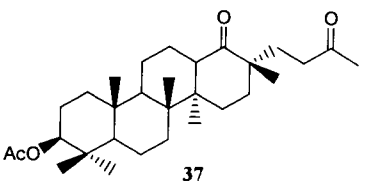

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