

柏科及桑科植物的成分研究

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行政院國家科學委員會專題研究成果報告

柏科及桑科植物的成分研究

Chemical Studies of the Plants of Cupressaceae and Moraceae

計畫編號：NSC 89-2113-M-002-018

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一、中文摘要

正榕有強生命力並且有抗血小凝聚活性，由其氣根共分三種不同骨架(taraxastane, ursane 及 oleanane)之三帖物，共有 11 個新化合物。柏屬含很多類骨架化合物，由同色刺柏之心材找出 4 種新的倍半帖。再由清水圓柏之材部找出四種新的倍半帖，又由台灣刺柏之根獲得二個新而獨特之二帖之偶合物，以及 4 個已知倍半帖。台灣扁柏是抗腐敗菌的最好木材，除了以前已分離四種新雙帖類，再分離四種新雙帖化合物。

關鍵詞：正榕氣根；同色刺柏心材；清水圓柏心材；台灣刺柏心材；台灣扁柏心材；成分

Abstract

Ficus microcarpa has strong vitality and antiplatelet activity. From its aerial root, we isolated three different skeleton (taraxastane, ursane and oleanane) diterpenes including eleven new compounds. Various skeletons including sesquiterpene, diterpene, lignan, steroid and flavonoid were observed in the species of *Juniperus*. From the heartwood of *J. formosana* var. *concolor*, we have purified four new sesquiterpenes. Four new different skeletons of sesquiterpenes were isolated from the heartwood of *J. chinensis* Linn. var. *tsukusiensis*. Besides four known compounds, we have yielded two unique dimeric diterpenes from the root of *J. formosana*. The wood of *Chamaecyparis obtusa* S. et al. Z. var.

formosana is an important material for building due to its strong antifungal decay. In the early days, four new diterpenes were observed, and in this time we also elucidated four new diterpenes.

keywords: root of *Ficus microcarpa*; wood of *J. formosana* var. *concolor*; wood of *J. chinensis* var. *tsukusiensis*; root of *J. formosana*; wood of *Chamaecyparis obtusa* var. *formosana*

二、Purpose of Project

Ficus microcarpa is a popular ornamental tree of Moraceae. Due to strong vitality and antiplatelet activity of the aerial root extract caused us to study the chemical components. *J. formosana* var. *concolor*; *J. chinensis* var. *tsukusiensis*, and *J. formosana* all grew in high level mountain (sea level 1500-2000 m). They have many interesting and skeleton of natural products, meanwhile many biological active principles also discovered from these natural products. The wood of *Chamaecyparis obtusa* S. et al. Z. var. *formosana* is an important building material in Formosa due to its strong resistance to wood decaying fungi. It also led us to study the antifungal principles from the wood of *C. obtusa* var. *formosana*.

三、Content of Project

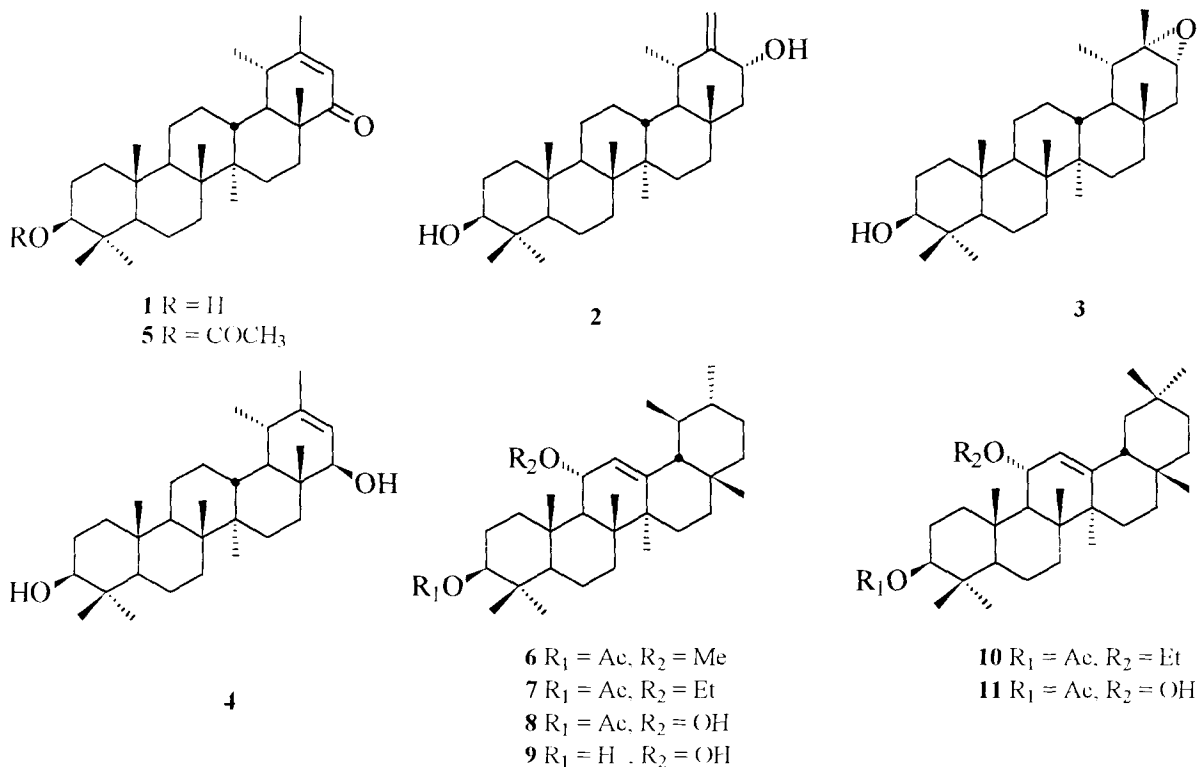
Ficus microcarpa was a popular ornamental plant in the Orient. The strong vitality of this plant as well as its antiplatelet

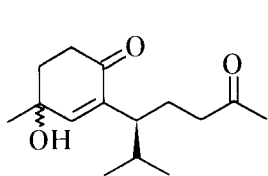
activity led us to study its aerial root. The methanolic extract was concentrated to give a residue, which was suspended in water. The aqueous solution was partitioned with EtOAc and *n*-BuOH, successively. The EtOAc soluble layer was separated with column chromatography and HPLC. Based on the physical and chemical evidence, five new taraxastane triterpenes(**1**, **2**, **3**, **4**, and **5**), four new ursane triterpenes(**6**, **7**, **8** and **9**) and two new oleanane triterpenes(**10**, and **11**) were elucidated.

Various skeletons including sesquiterpene, diterpene, lignan, steroid and flavanoid *et. al.* were observed in the species of *Juniperus*. In the early day, we have examined the chemical principles of *J. squamata* var. *morrisonicola*(heartwood), *J. formosana* Hay.(heartwood), *J. chinensis* Linn(root), *J. chinensis* Linn. var. *kaizuka*(bark), and *J. formosana* Hay. var. *concolor*(bark). They are indigenous in Taiwan. In this year, we continued the chemical studies of three species, the heartwood of *J. formosana* var. *concolor* and *J. chinensis* Linn. var. *tsukusiensis*, and root of *J. formosana* Hay. From the heartwood of *J. formosana* var. *concolor*, four new sesquiterpenes(**12**, **13**, **14** and **15**) were

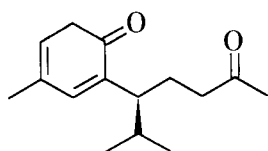
purified and elucidated. Four new different skeleton of sesquiterpenes(**16**, **17**, **18**, and **19**) have been isolated from heartwood of *J. chinensis* Linn. var. *tsukusiensis*. Their structures were principally elucidated by 2D-NMR method. Besides four known 4 α -hydroxyendosm-7(11)-ene, kongol, δ -cadinol and 14-hydroxy- δ -cadiene, two new unique compounds formosal A(**20**) and B(**21**) have been gotten from the root of *J. formosana* Hay. Based on the spectral and chemical methods, those structures were elucidated as the shown formula. The known compounds were identified the physical data with those of in the literature.

The wood of *Chamaecyparis obtusa* S. et Z. var. *formosana* is an important building material in Formosa due to its strong resistance to wood-decaying fungi. Previous chemical studies reported one novel diterpene(obtunone) and three new diterpenes, 11, 14-dihydroxy-8, 11-13-abietatriene-7-one, obtuanhydride and 18,19-(*l*)-isopropylidene-18,19-dihydroxy-isopimar-8(14), 15-diene. Further studies on same extract, we also obtained four new diterpenes, their structures were assigned as structures **22**, **23**, **24**, and **25** by spectral and chemical methods.

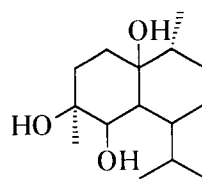




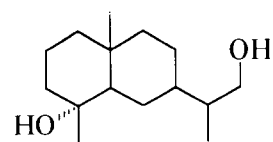
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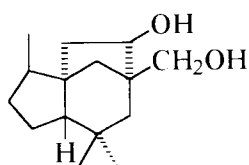
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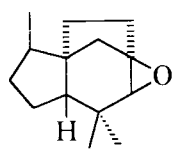
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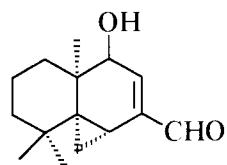
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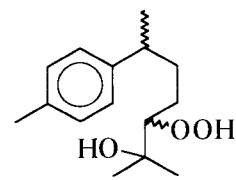
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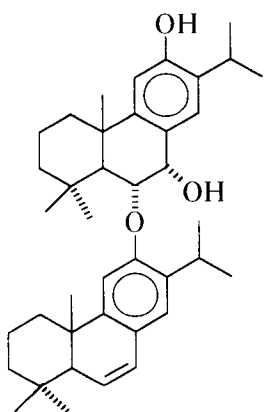
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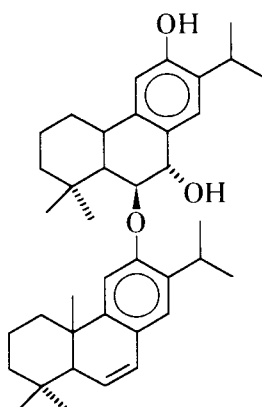
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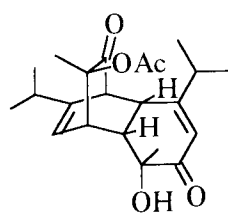
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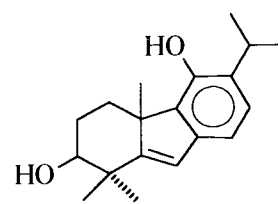
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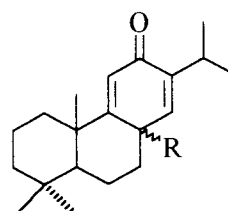
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22



23



24 R = β - OH
25 R = α - OH