

Xanthenes and Triterpenoids from *Mesua daphnifolia* and *Garcinia maingayi*

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ABSTRACT Ananixanthone and two triterpenoids, lup-20(29)-en-3 β -ol and friedelin were isolated from the stem bark extracts of *Mesua daphnifolia*. Meanwhile, chemical studies on the stem bark extracts of *Garcinia maingayi* yielded 1,3,7-trihydroxy-2-(3-methylbut-2-enyl)-xanthone and a triterpene, stigmaterol. Their structures were derived based on spectroscopic evidence, mainly 1D and 2D NMR spectroscopy. All the crude extracts obtained were bioassayed against the larvae of *Aedes aegypti*. It was found that the crude hexane and chloroform extracts of *Mesua daphnifolia* were strongly active against the larvae with LC₅₀ value of as low as 9.7 and 6.0 ppm respectively

ABSTRAK Ananixantone bersama-sama dengan dua triterpenoid iaitu lup-20(29)-en-3 β -ol dan friedelin telah dipencilkan daripada ekstrak kulit pokok *Mesua daphnifolia*. Kajian kimia ke atas ekstrak kulit pokok *Garcinia maingayi* telah menghasilkan 1,3,7-trihidroksi-2-(3-methylbut-2-enyl)-xanthone dan stigmaterol. Struktur sebatian-sebatian tersebut telah diterbitkan berdasarkan bukti-bukti spektroskopi terutamanya 1D dan 2D RMN. Semua ekstrak yang diperolehi telah diuji bioaktiviti masing-masing ke atas larva *Aedes aegypti*. Didapati ekstrak heksana dan ekstrak klorofom bagi *Mesua daphnifolia* telah menunjukkan aktiviti yang kuat terhadap larva tersebut dengan nilai LC₅₀ serendah 9.7 and 6.0 ppm.

(*Mesua daphnifolia*, *Garcinia maingayi*, Guttiferae, ananixanthone, 1,3,7-trihydroxy-2-(3-methylbut-2-enyl)-xanthone)

INTRODUCTION

Mesua daphnifolia and *Garcinia maingayi* are medium sized trees belonging to the family of Guttiferae. Plants from these genera are rich in secondary metabolites such as xanthenes and triterpenoids [1-4]. Although many phytochemical studies have been carried out on the *Mesua* and *Garcinia* species, no investigation on *Mesua daphnifolia* and *Garcinia maingayi* have been reported. This paper reports the isolation of compounds as well as bioassay data for the crude extracts from the stem bark of these two species.

EXPERIMENTAL

The stem bark of *Mesua daphnifolia* and *Garcinia maingayi* were collected from Fraser's Hill in Pahang. Voucher specimens are kept in the Chemistry Department, University Putra Malaysia. The powdered stem bark material of

Mesua daphnifolia and *Garcinia maingayi* (2.0 kg, each) were extracted successively with n-hexane, chloroform and acetone. The hexane extract of *Mesua daphnifolia* (16.0 g) was

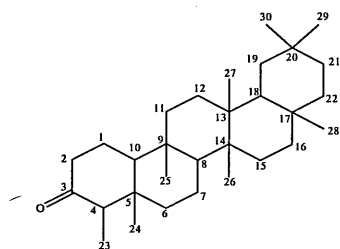
chromatographed on a silica gel column, eluted with hexane, hexane-chloroform, chloroform, chloroform-acetone and acetone to furnish 50 fractions. Fraction 20 (65 mg) afforded friedelin **1**. Fraction 23-27 were combined and rechromatographed over a silica gel column to give lup-20(29)-en-3 β -ol **2** (23 mg). Fraction 31-32 were combined and subjected to Sephadex LH-20 column chromatography, eluted with methanol to give 12 fractions. Fraction 11 (12 mg) yielded ananixanthone **3**. Fractionation of the acetone extract of *Garcinia maingayi* (12.0 g) over a silica gel column with hexane, hexane-chloroform, chloroform, chloroform-acetone and acetone afforded 20 fractions. Fraction 6 (82 mg) was purified by silica gel

column chromatography to give 10 fractions. Fraction 3-4 were combined and chromatographed over a Sephadex LH-20 column to yield 1,3,7-trihydroxy-2-(3-methylbut-2-enyl)-xanthone **4** (12 mg). Silica gel column chromatography of the chloroform extract of *Garcinia maingaiyi* afforded stigmasterol **5** (16 mg).

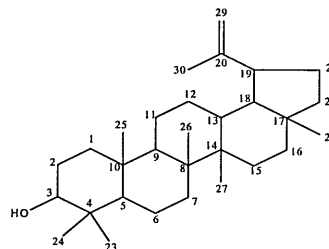
Infrared spectra were measured in KBr/NaCl pellet on a Perkin-Elmer FTIR Spectrum BX spectrometer. EIMS were recorded on a Shimadzu GCMS-QP5050A spectrometer. NMR spectra

were obtained using a Unity INOVA 500MHz NMR/ JEOL 400 MHz FT NMR spectrometer with tetramethylsilane (TMS) as an internal standard. Ultra violet spectra were recorded on a Shimadzu UV-160A, UV-Visible Recording Spectrophotometer. Chromatographic separation was carried out using silica gel Merck 9385 and Sephadex LH-20.

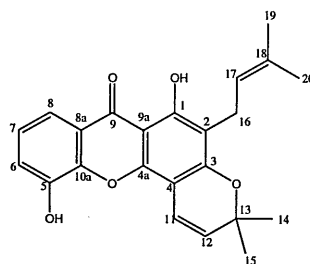
Bioassays of the crude extracts were performed on the larvae of *Aedes aegypti* according to the protocols of the World Health Organisation [5].



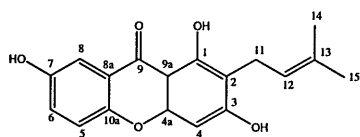
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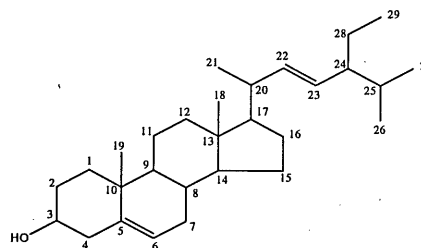
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RESULTS AND DISCUSSION

All the compounds isolated are known and were identical by comparison of their spectral data with those previously published. From the stem bark of *Mesua daphnifolia*, three compounds were isolated. They were two triterpenoids, friedelin **1**

[6] and lup-20(29)-en-3 β -ol **2**, as well as a prenylated xanthone, anixanthone **3** [7].

The stem bark of *Garcinia maingaiyi* was shown to contain the ubiquitous triterpene, stigmasterol

5 [8] and also a prenylated xanthone, 1,3,7-trihydroxy-2-(3-methyl but-2-enyl)-xanthone 4 [9].

All the crude extracts obtained were bioassayed against the larvae of *Aedes aegypti*. It was found that the crude hexane and chloroform extracts of *Mesua daphnifolia* were strongly active against the larvae with their LC₅₀ value of as low as 9.7 and 6.0 ppm respectively. The larvicidal activities for the other crude extracts are shown in Table 1.

Table 1. Larvicidal activities of crude extracts against larvae of *Aedes aegypti*

Plants	Extracts	LC ₅₀ (µg/ml)
<i>Mesua daphnifolia</i>	Hexane	9.7
	Ethyl Acetate	6.0
	Acetone	68.9
<i>Garcinia maingayi</i>	Hexane	110.0
	Chloroform	NA
	Acetone	NA

NA-not active

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