



**UNIVERSITI PUTRA MALAYSIA**

**CHEMICAL CONSTITUENTS OF *DYSOXYLUM*  
*ACUTANGULUM* Miq. AND THEIR BIOACTIVITIES**

**MOHD IZWAN MOHD LAZIM**

**IB 2012 11**

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**MOHD IZWAN MOHD LAZIM**

**MASTER OF SCIENCE**

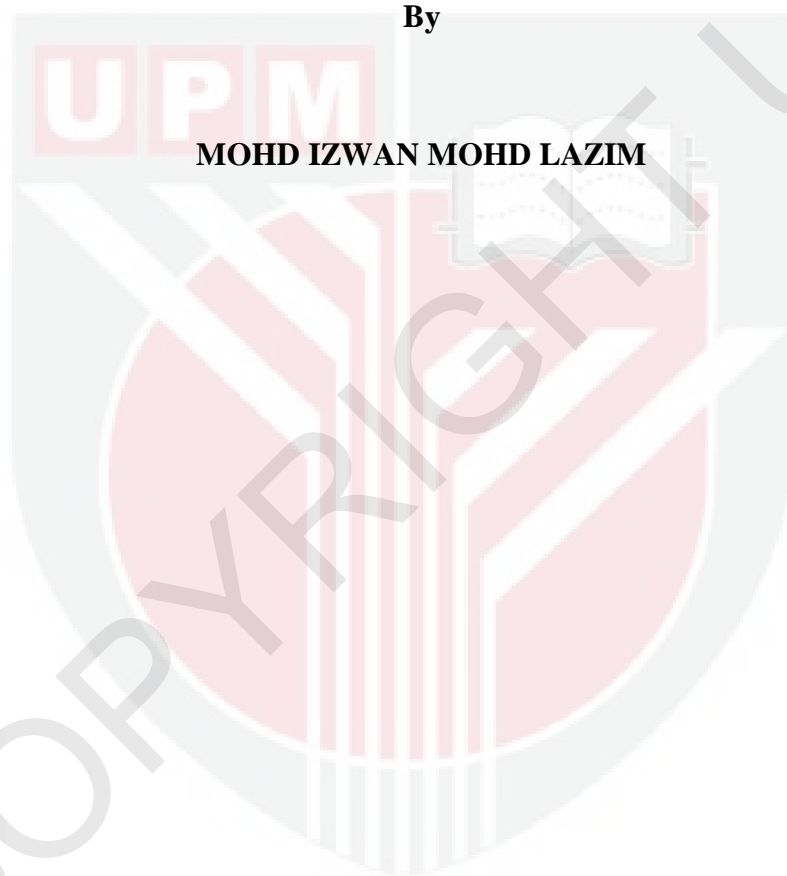
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**2012**

**CHEMICAL CONSTITUENTS OF *DYSOXYLUM ACUTANGULUM* Miq.  
AND THEIR BIOACTIVITIES**

By

**MOHD IZWAN MOHD LAZIM**



**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,  
in Fulfilment of the Requirements for the Degree of Master of Science**

**March 2012**

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment  
of the requirement for the degree of Master of Science

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**March 2012**

**Chairman : Intan Safinar Ismail, PhD**

**Institute : Bioscience**

A phytochemical studies on *Dysoxylum acutangulum* leaves have been carried out and resulted in the isolation of seven compounds including two new compounds assigned as chrotacumine E (**62**) and F (**63**), along with four known compounds; rohitukine (**10**), noreugenin (**38**),  $\beta$ -sitosterol (**60**), hexadecanoic acid (**61**) and one unsolved compound, Chrotacumine G (**59**). The structures of the compounds including their relative configurations were elucidated based on the spectroscopic data including Nuclear Magnetic Resonance (NMR), Gas Chromatography-Mass Spectrometry (GC-MS), Fourier Transform Infrared (FT-IR), Circular Dichorism (CD) and also by comparison with the previous reported works.

*Dysoxylum* has been the subject of research interest in the field of natural products due to their unique chemistry and biological properties. *Dysoxylum acutangulum* are among those known to be used as traditional medicines. From the early

investigations on these plants, some interesting new compounds were discovered, some of which exhibited noteworthy biological properties such as anti-tumor promoting, anti-acetylcholinesterase and ichthyotoxic activities. Screening for biological activities is an important preliminary step in natural products research when aiming at discovering bioactive compounds from plant. In this research, two extraction methods have been done which is liquid-liquid partition and acid base extraction to obtain alkaloidal extract. All extract was subjected to column chromatography silica gel to fractionate and purify.

Based on a bioautographic Thin Layer Chromatography (TLC) profile of anti-acetylcholinesterase activity on the major fractions of *D. acutangulum* leaves, hexane fraction has showed a promising activity. The most active hexane subfraction was further fractionated and purified by a bioassay-guided fractionation wherein hexadecanoic acid (**61**) was obtained showing as a potent acetylcholinesterase (AChE) inhibitor. On the contrary, the AChE activity of **61** was not significant (1mg/mL) when tested by Ellman's method. In the ichthyotoxic assay carried out on Zebra fish (*Denio rerio*), EtOAc fraction was found to possess significant ichthyotoxicity compared to other fractions; hexane, BuOH, CHCl<sub>3</sub> and aqueous. Meanwhile, BuOH fraction showed 70% inhibition in the tyrosinase assay. All of the isolated compounds were tested for their ichthyotoxicity, anti-acetylcholinesterase and anti-tyrosinase activity. However, none of them showed any significant activities.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

**KANDUNGAN KIMIA *DYSOXYLUM ACUTANGULUM*  
Miq. DAN AKTIVITINYA**

Oleh

**MOHD IZWAN MOHD LAZIM**

**Mac 2012**

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Kajian sebatian kimia terhadap daun *Dysoxylum acutangulum* telah menghasilkan tujuh sebatian termasuk dua sebatian baru yang dikenali sebagai chrotacumine E (**62**) dan F (**63**) bersama-sama dengan empat sebatian lain yang telah ditemui sebelum ini iaitu; rohitukine (**10**), noreugenin (**38**),  $\beta$ -sitosterol (**60**), asid heksadekanoik (**61**) dan satu sebatian yang belum dikenalpasti iaitu chrotacumine G (**59**). Struktur sebatian termasuk konfigurasi relatif telah dikenal pasti berdasarkan data spektroskopi seperti NMR, GC-MS, FTIR, CD dan perbandingan dengan penemuan yang terdahulu.

*Dysoxylum* merupakan salah satu genus yang telah menjadi subjek penyelidikan sebatian semulajadi yang utama disebabkan oleh kandungan sebatian kimia dan biologinya. *Dysoxylum acutangulum* telah dikenalpasti dan digunakan sebagai ubat tradisional. Beberapa sebatian baru yang menarik telah ditemui semasa proses

saringan dan penyelidikan awal ke atas tumbuhan ini, dimana terdapat sifat-sifat biologi yang perlu diberi perhatian seperti menggalakkan anti-tumor, anti acetylcholinesterase dan ichthyotoxic aktiviti. Saringan untuk aktiviti-aktiviti biologi adalah langkah awal yang penting dalam sesuatu penyelidikan yang bertujuan untuk menemui sebatian bioaktif dari sesuatu tumbuhan. Penyaringan awal akan membantu dalam memilih sampel tumbuhan untuk kajian yang selanjutnya berdasarkan aktiviti-aktiviti tertentu. Dalam kajian ini, dua kaedah pengekstrakan telah dijalankan iaitu cecair-cecair pemisah serta asid dan bes pengekstrakan untuk mendapatkan ekstrak alkaloidal. Semua ekstrak dipecahkan dan disaring sehingga mendapat satu sebatian tulen dengan menggunakan kromatografi silika gel.

Berdasarkan profil Lapisan Kromatografi Nipis autografi-bio, aktiviti perencatan acetylcholinesterase pada pecahan utama daun *D. acutangulum*, ekstrak heksana telah menunjukkan potensi sebagai aktif ekstrak. Pecahan heksana yang paling aktif dipisahkan dan diasingkan berpandu bioassay di mana asid heksadekanoik (**61**) telah dikenalpasti sebagai perencat acetylcholinesterase. Sebaliknya, aktiviti perencatan AChE (**61**) (1mg/mL) tidak ketara apabila diuji dengan kaedah Ellman. Dalam aktiviti ichthyotoxic yang telah dijalankan terhadap ikan zebra (*Denio rerio*), EtOAc telah menunjukkan aktiviti ichthyotoxic yang tinggi berbanding dengan pecahan lain; heksana, BuOH, CHCl<sub>3</sub> dan air. Manakala, pecahan BuOH menunjukkan perencatan 70% dalam ujian tyrosinase. Semua sebatian tulen yang diperolehi telah diuji untuk ichthyotoxicity, anti-acetylcholinesterase dan anti-tyrosinase aktiviti. Walau bagaimanapun, tiada satu sebatian pun menunjukkan apa-apa aktiviti yang penting.

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I certify that a Thesis Examination Committee has met on 1<sup>st</sup> March 2012 to conduct the final examination of Mohd Izwan Bin Mohd Lazim on his thesis entitled 'Chemical Constituents of *Dysoxylum acutangulum* (Meliaceae) and Their Bioactivity Studies' in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the degree of Master of Science.

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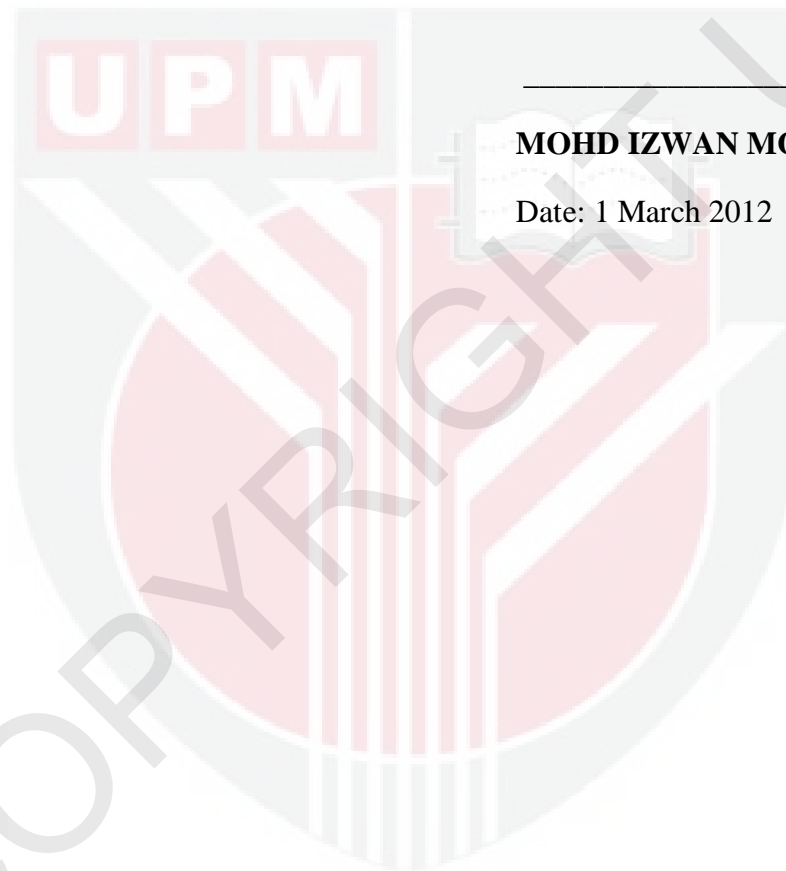
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Date:

## DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.



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**MOHD IZWAN MOHD LAZIM**

Date: 1 March 2012



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