CHEMICAL CONSTITUENTS OF *RENNELUA ELLIPTICA:* THE MALAYSIAN GINSENG

BY:

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MARCH 2011

Contents

UNIVERSITI TEKNOLOGI MARA

PEMENANG *f%.*
Anuqerah Kualiti /Pj W^
Perdana Menteri ***LA*** **L/**
2G98^%^7

Rujukan Kami : 600-RMI/ST/FRGS 5/3/Fst (29/2009)
Tarikh : 30 Oktober 2009

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Ketua Projek

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Fakulti Sains Gunaan
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Tuan/Puan

KELULUSAN PERMOHONAN FRGS FASA 02/2009
TAJUK PROJEK : ***CHEMICAL CONSTITUENTS OF RENNFFLUA ELUPTtCA : THE MALA YSIAN GINSENG***

Dengan segala hormatnya perkara di atas adalah dirujuk.

Dengan sukacitanya, Institut Pengurusan Penyelidikan (RMI) mengucapkan tahniah kepada tuan/puan kerana telah berjaya ditawarkan Geran FRGS bagi projek penyelidikan tersebut.

Syarat-syarat kelulusan Geran FRGS adalah seperti berikut:

i. Tempoh projek penyelidikan ini ialah dua (2) tahun, iaitu bermula **01 November 2009** hingga **30 April 2011.**

ii. Kos yang diluluskan ialah sebanyak **RM40,000.00 sahaja.** Tuan/puan diminta mengemukakan proposal beserta bajet yang baru seperti yang dicadangkan dan bersesuaian dengan jumlah kelulusan yang telah diluluskan.

iii. Pembelian peralatan komputer/printer/PDA/alat multimedia adalah tidak dibenarkan.

iv. Setiap pembelian bahan atau peralatan hendaklah mematuhi Prosedur Perbendaharaan Bendahari yang telah ditetapkan contohnya setiap pembelian aset/bahan melebihi RM500 hendaklah disertakan sebutharga dan borang analisa harga. Pihak tuan/puan juga diminta untuk mengembalikan peralatan (aset) yang dibeli ke fakulti atau kampus cawangan setelah tamat projek penyelidikan.

v. Tuan/puan perlu menandatangani Borang Perjanjian Penyelidikan dengan kadar segera kerana penggunaan geran hanya akan dibenarkan setelah perjanjian ditandatangani. Borang Perjanjian Penyelidikan boleh didapati di laman web RMI.

vi. Pihak tuan/puan dikehendaki mengemukakan laporan prestasi (BORANG FRGS - P1 (R)) pada setiap bulan **April** dan **Oktober** sepanjang tempoh penyelidikan tuan/puan berjalan.

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rtagian Perundingan : 603-5544 2100/2753/2092
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Bahagian Penerbitan : 603-5521 1425/5544 2747
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5.2 Enhanced Executive Summary

Rennellia ellitpica Korth. is a tropical shrub that can be found in lowland tropical rainforest in Malaysia. It is locally known as 'segemuk' and dubbed as Malaysia Ginseng due to the resemblance between roots of *R. elliptica* and roots of ginseng, as well as its many traditional uses. The decoction of the roots of this plant is traditionally used as treatment of body aches, as afterbirth tonic and also being claimed as aphrodisiac. The dried roots of *R. elliptica* that were previously collected from Taman Negara Kuala Keniam, Pahang were successively extracted using hexane, dichloromethane and methanol. The dichloromethane extract were absorbed onto acid washed silica (previously shaken with 4% oxalic acid, filtered and activated at 89 °C) and introduced to acid washed silica gel bed (60 cm X 5 cm) eluted with series of solvents, comprising of various compositions of hexane-dichloromethane and dichloromethane-methanol in increasing polarity. Further isolation and purification utilizing various chromatographic procedures followed by careful analysis of spectral data including MS, IR, UV, 1D and 2D NMR as well as x-ray crystallography lead to identification of one new anthraquinone, 1,2-dimethoxy-6-methyl-9,10-anthraquinone (1) along with ten known anthraquinones namely nordamnacanthal (2), 2-formyl-3-hydroxy-9.10-anthraquinone (3), damnacanthal (4), 1-hydroxy-2-methoxy-6-methyl-9,10-anthraquinone (5), lucidin-cj-methyl ether (6), 3-hydroxy-2-methyl-9,10-anthraquinone (7), rubiadin (8), 2-hydroxy-3-methoxy-6-methyl-9,10-anthraquinone (9), rubiadin-1-methyl ether (10) and 3-hydroxy-2-hydroxymethyl-9,10-anthraquinone (11). The dichloromethane crude extract and the anthraquinones were screened for antiplasmodial activity *in vitro.* The dichloromethane extract inhibited the *Plasmodium falciparum* growth *in vitro* with IC_{50} value of 4.04 (jg/ml while most of anthraquinones tested were active inhibitors and the strongest inhibitor was shown by 3-hydroxy-2-methyl-9,10-anthraquinone with IC_{50}0.34|jM. The new anthraquinone, 1,2-dimethoxy-6-methyl-9,10-anthraquinone is an active inhibitor with IC_{50} value of 1.10 |jM.

5.3 Introduction

Plants are important source of drugs. About 25% of drugs used worldwide today are plant-derived pharmaceuticals. Tropical rainforest cover only 12% of earth's land area; however they constitute about 50% to 90% of world species. Even though less than 1% of world's tropical rainforests have been tested for pharmaceutical properties, at least 25% of all modern drugs originate from rainforests (Kong, Goh, Chia, *et a*/., 2003). As Malaysia is listed as 12th most biodiverse nation in the world and mainly covered by tropical rainforests, the chemical diversity would provide vast opportunities of finding new important lead compounds. However, rapid destruction of our tropical rainforest will hamper our search for new lead compounds for chronic diseases. Therefore, continuous phytochemical studies are important to ensure that our tropical plants are extensively investigated and any potential bioactive compounds are developed for drug candidacy.

Identification of potential tropical plants from our rainforest will promote the preservation of our rainforest. It was reported in 1953 that in Peninsular Malaysia alone there are about 550 genera of tropical plants containing over 1300 species possessing medicinal values (Burkill, 1935). The rate of our tropical rainforests destruction is alarming, therefore immediate exploration of our tropical rainforests chemical diversity need to be intensified so that valuable secondary metabolites are not missed during our search for new lead compounds. For example, Calanolide A, a potent HIV-1 inhibitor that was isolated from *Calophyllum lanigerum var austrocoriaceum* from Sarawak tropical rainforests (Kong, Goh, & Chia, 2003). Due to potential of Calanolide A, the National Cancer Institute visited Sarawak for more plant materials, unfortunately the trees were destructed (Cordell, 1995). Sarawak later banned the destruction of *Calophyllum* trees.

At present, about 80% of world population depends on alternative system of medicine (Daniel, 2006). The plants have been used as medicines since the early human civilization. The plants are consumed in various forms such as tinctures, teas, poultices, powders and other herbal formulation (Balunas, *et a*/., 2005). In India, 2000 medicinal plants are used in Ayurveda practice while 5757 medicinal plants are used in the Traditional Chinese Medicine (Daniel, 2006). Most Malay traditional medicines depend on old references such as Mujarabat Melayu, Tajul Muluk, Tajus as Salatin and Surat Tib Ubat The first authentication of Malaysian herbal materials was documented in Malaysian Herbal Monograph that was first published in 1999 (Jamal, 2006).

Conventional medicine on the other hand, emphasizes on isolation and identification of single bioactive compound for pharmaceutical formulation (Pieters & Vlietinck, 2005). Despite the long history of plants consumed to heal diseases, it was not until 19th century that men began to isolate the active components of medicinal plants. One particular