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**CHEMICAL INVESTIGATION OF *MYRISTICA CEYLANICA*
AND *XYLOPIA NIGRICANS*
AND
SYNTHETIC STUDIES ON (2*S*,3*R*,1'*R*)-STEGOBINONE**

A THESIS PRESENTED BY

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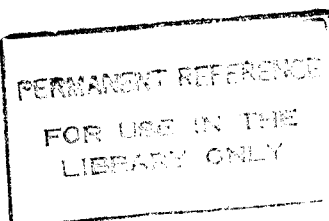
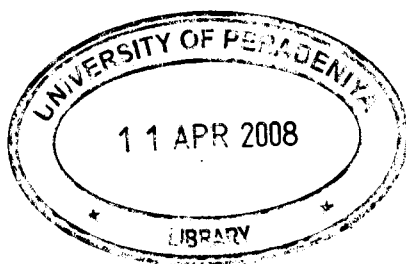
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SYNTHETIC STUDIES ON (2*S*,3*R*,1'*R*)-STEGOBINONE**

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ABSTRACT

This thesis comprises three parts, Part I, Part II and Part III. Part I describes the isolation of compounds from the root bark, seed mace/aril and seeds of *Myristica ceylanica* (A.Dc) belonging to family Myristicaceae. All the isolated compounds were tested for mosquito larvicidal assay against the second instar larvae of *Aedes aegypti*. The hexane extract of the root bark yielded 1-(2,6-dihydroxyphenyl)tetradecan-1-one (**81**), malabaricone A (**83**), (7*S*,7'*R*,8*R*,8'*R*)-3,4:3',4'-bis(methylenedioxy)-7,7'-epoxylignane (**92**), (10*Z*,13*Z*)-17-(5-ethyl-6-methylheptan-2-yl)-10,13-dimethyl-2,3,4,7,8,9,10,11,12,13,14,15,16,17-tetradecahydro-1H-cyclopenta[a]phenanthren-3-yl nonadeca-10,13-dienoate (**148**), β -sitosterol (**149**) and 4'-hydroxy-3,4-methylene-dioxy-4'-methoxylignane (**150**). The dichloromethane extract of the root bark gave malabaricone B (**41**), 1-(2-hydroxy-6-methoxyphenyl)-9-(4-hydroxyphenyl)nonan-1-one (**86**), (8*R*,8'*R*)-3,4:3',4'-bis(methylenedioxy)lignane (**90**) and (7*S*,7'*R*,8*R*,8'*R*)-4,4'-dihydroxy-3,3'-di-methoxy-7,7'-epoxylignane (**94**). Malabaricone C (**42**) was isolated from the methanol extract of the root bark.

The hexane extract of the mace/aril yielded glycerol-2-hexadecanoate-1,3-di(*cis*-9-octadecanoate) (**151**). Its dichloromethane extract gave malabaricone D (**84**). The methanol extract of the mace/aril yielded giganteone A (**106**) and 1-(2,6-dihydroxyphenyl)-4-hydroxy-9-(3,4-dihydroxyphenyl)nonan-1-one (**156**).

The hexane extract of the seeds yielded oleic acid (**153**).

Two esters (148) and (151) and the diarylalkanone (156) were found to be new and their structure elucidations have been described in detail. The lignanes (90), (92) and (150), oleic acid (153) and giganteone A (106) are isolated from *M. ceylanica* for the first time although lignanes (90) and (92) have been previously reported from *M. dactyloides* and the other compounds 150, 106 and 153 have been respectively isolated from *Virola calophylla* (Myristicaceae), *M. gigantea* and *Annona muricata* (Annonaceae). Structures were determined by spectroscopic analysis and chemical correlations. The lignanes (90) and (92) and the arylalkanones (81) and (84) showed moderate activity against second instar *A. aegypti* larvae.

Part II deals with chemical studies on the stem bark of *Xylopia nigricans* Hook f. & Thoms. (Annonaceae). There has been no previous work on this plant. The oxoaporphine alkaloid, 10-methoxyliriodene (176) was isolated from its dichloromethane extract together with two kauranes, kauranoic acid (231) and 15 β -hydroxykaur-16-en-19-oic acid (232). Its methanol extract yielded the oxoaporphine alkaloid, oxoxylophine (166) and the isoquinoline alkaloid, (+)-*S*-reticulin (208). The kaurane (231) showed moderate activity against the second instar larvae *A. aegypti*.

Part III of this thesis describes the attempted stereoselective synthesis of stegobinone, (2*S*,3*R*,1'*R*)-2,3-dihydro-2,3,5-trimethyl-6-(1'-methyl-2'-oxobutyl)-4H-pyran-4-one (271) the sex pheromone of the drugstore beetle, *Stegobium paniceum*. A synthetic route involving enantiomerically pure (4*R*,5*S*)-5-hydroxy-4-methylhexan-3-one (282) and (2*S*,3*S*)-3-tert-butyltrimethylsilyloxy-2-methylpentanoic acid (283) as building blocks was proposed from retrosynthetic analysis. In an attempt to improve on a previous synthesis, a new route to the hydroxyketone (282) was attempted. A mixture of diastereoisomeric forms (282) and (285) of the hydroxyketone (69% yield) was prepared by treating pentan-3-one with a chiral borontriflate and purified using the lipase catalysed acylation method to give hydroxyketone (282) (68% yield, e.e. >99%). (1*S*,2*R*)-norephedrine (290) was converted in two steps to (4*R*,5*S*)-3-propanoyl-4-methyl-5-phenyl-2-oxazolidinone (292) in an overall yield of 80% as part of the planned synthesis of the acid (283), which could not be completed due to time constraints. The synthesis of stegobinone could also therefore not be completed.