**Faculty of Applied Sciences**

**Name:** Agustono Wibowo  
**Title:** Phytochemical Study Of Dryobalanops From Malaysian Dipterocarpaceae, And Structure - Activity Relationship Studies  
**Supervisor:**  
Associate Prof. Dr. Norizan Ahmat (MS)  
Prof. Dr. Ahmad Sazali Hamzah (CS)  
Associate Prof. Dr. Zurina Hj. Shaameri (CS)

Dryobalanops is one of the genera in the Dipterocarpaceae family, which is distributed as major species in emergent canopy of Lambir Forest and Sarawak lowland dipterocarps forest. The genus is very unique, as there are only seven species available in the whole world, which confined to the tropical forests of West Malesia. The chemical constituents of Dipterocarpaceae are reported to possess various biological activities such as cytotoxicity, antiviral, antibacterial and anti-inflammatory activities. The aims of this study are to isolate secondary metabolites, to determine their antibacterial, DPPH scavenging and cytotoxic activities, to study structure-activity relationship, and to propose biogenesis pathway and chemotaxonomic significance in Dryobalanops. The dried powder of the stem bark of *D. aromatica*, *D. lanceolata*, *D. rappa* and *D. becarii* were macerated with acetone and evaporated under reduced pressure. The crude acetone extract was subjected to vacuum liquid chromatography to give several fractions. Purification of fraction with combination of several chromatography techniques gave four new oligostilbenoid derivatives; malaysianol A (1), B (2), C (3) and D (4), and a new galloylglucoside derivative; malaysin A (5), together with 15 known oligostilbenoid (6-20) and six known non-oligomeric compounds (21-26). The chemical structures of isolated compounds were elucidated.

**Name:** Dr. Karimah Kassim (CS)  
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This study reports the synthesis, characterization and catalytic activities of palladium(II) Schiff base complexes, both as homogeneous and MCM-41 supported heterogeneous catalysts for cross-coupling C-C bond formation reactions. Three broad groups of inexpensive Schiff base ligands (L1, L2 and L3) have been synthesized through condensation process between four benzylamine derivatives with aldehyde or ketone in 1:1 molar ratio. 12 ligands and 20 metal complexes of Pd(II) and Ni(II) have been successfully obtained. The metal complexes were prepared through the complexation reaction between the Schiff base ligands with Pd(II) and Ni(II) acetates in a 2:1 molar ratio. All the synthesized ligands and complexes have been characterized using CHN elemental analysis, infrared, $^{1}$H and $^{13}$C NMR, UV-Visible, melting point determination, molar conductance and magnetic susceptibility. The molecular geometries of ten complexes namely PdL1c, PdL1d, NiL1c, NiL1d, PdL2a, PdL2d, PdL3b, PdL3c, PdL3d and NiL3d have been solved by single crystal X-ray crystallography. It revealed that these Schiff bases behave as bidentate ligands, coordinating through the imine N and phenolic O donor atoms, as also shown by the infrared data. Magnetic susceptibility suggests square planar

**Name:** Shaameri (CS)  
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Mukim Tg Kupang and its adjacent coastal habitats harbour a rich variety of seagrass meadows, mangroves and rocky shores which are home to myriad endangered species and other cryptic fauna. However this area is slated for development and the local fishing community who depend on it needs to be equipped with the ability to cope with inevitable urbanisation and change. This case study proposed a long-term science-based environmental education program aimed at a primary audience of local children and youth (aged 6-18, n=34) that would disseminate conservation knowledge and encourage environmentally-friendly behaviour and a conservation mindset to the wider community. After two years of the education program, another year on-site focussed on developing community empowerment through an extended initiative that roped in older youth (aged 19-28) and local women, and this proved to be the key success factor in the study. Document analysis and the collation of local ecological knowledge by local youth as well as their habitat

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**Title:** Coastal Habitat Conservation Using Community Education As A Tool : A Case Study In Mukim Tanjung Kupang, Johor  
**Supervisor:**  
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Dr. Esther Daniel (CS)

**Faculty of Computer & Mathematical Sciences**

**Name:** Hanizan Shaker Hussain  
**Title:** DCT Domain Stegasvsm-Shifted Lsb Model For Highly Imperceptible And Robust Cover-Image  
**Supervisor:**  
Prof. Dr. Saadiah Yahya (MS)  
Dr. Fakariah Hani Mohd Ali (CS)

The importance of information security in protecting data and information has increased due to the increased use of computers and the Internet. Similarly, with one of its exciting subfields i.e. information hiding. Information hiding is a technology where the secret-messages are hidden inside other files (e.g image files). One of the areas that are popular now applying this technology is digital image steganography (image steganography). In image steganography, the most popular and widely used techniques is the least significant bit (LSB) that hide data into a cover-image in a spatial and discrete cosine transform (DCT) domain as well. Beside the LSB technique, there is other technique that is also influential i.e support vector machine (SVM) normally used to strengthen the embedding algorithm. Whatever techniques used in the image steganography
Based on the spectroscopic data evidences and comparison with reported authentic data. Biogenetically, the biosynthesis routes of non-oligomeric compounds were formed from the shikimate pathway, while oligomeric compounds were from the combination of shikimate and acetate malonate pathways. Based on the radical species and their condensation types, 19 oligostilbenoids isolated from this study were formed from the oxidative coupling reaction of two radicals with active site at carbons C-8 and C-14 (C8-C14 type), carbons C-8 and C-8 (C8-C8 type), carbons C-3 and C-8 (C3-C8 type), and oxygen O-13 and carbon C-8 (C7-C14 type). The finding of oligostilbenoids with the condensation types C3-C8 and C7-C14 are not commonly found in Dipterocarpaceae family. Based on the chemotaxonomic study, the presence of several compounds that were only found in the tribe Dipterocarpeae and never reported in the tribe Shoreae supported the previous studies on the morphological character that suggested the placement of Dryobalanops under the tribe Dipterocarpeae.