

**MOLECULAR PHYLOGENETIC STUDY ON
CHINGIA-SPHAEROSTEPHANOS-
CHRISTELLA GROUPS OF GENERA
(THELYPTERIDACEAE) USING *rbcL* GENE
SEQUENCES DATA FROM SABAH**

SCF0018-AGR-2006

**DR. IDRIS MOHD. SAID
DR. NAZIRAH BT MUSTAFFA**

2010



UMS
UNIVERSITI MALAYSIA SABAH

ABSTRACT

MOLECULAR PHYLOGENETIC STUDY ON CHINGIA-SPHAEROSTEPHANOS-CHRISTELLA GROUPS OF GENERA (THELYPTERIDACEAE) USING *rbcl* GENE SEQUENCES FROM SABAH

This study determined the phylogenetic relationship of Chingia, Sphaerostephanos and Christella groups of genera. The study sites consisted of Crocker Range Park and few of the West Coast Sabah area. In this phylogenetic study, *rbcl* gene marker was used to infer phylogenetic relationships of the study groups. In the phylogenetic study of Chingia, Sphaerostephanos and Christella groups, 977 base pairs of DNA sequences were obtained from 32 samples representing the 3 groups of genera. The phylogenetic relationships revealed that Sphaerostephanos is a taxonomically-problematic group especially for *Pronephrium* and *Sphaerostephanos*. The phylogenetic analyses found that there were two clades derived from the primitive *Sphaerostephanos* group, consisted of a monophyly advanced *Sphaerostephanos* clade and a monophyly clade of Chingia group and Christella group. It was found that some of the *Christella* spp. (*C. subpubescens* and *C. papilio*) were established a lineage to Chingia group in the *rbcl* analyses. The grouping of *Chingia* and *Plesioneuron* into the Chingia were not completely supported by the *rbcl* analyses since *Chingia* spp. (*C. clavipilosa* and *C. perrigida*) were clustered into Christella group. *Chingia* and *Christella* were found to form a monophyletic clade together in both analyses. However, *rbcl* analyses does not support this grouping very well with <70% of bootstrap probability, and showed that Chingia group and Christella group were almost separated into two independent monophyly clade. It can be seen that Chingia group and Christella group were derived from a monophyletic group together and gradually evolved to form two independent groups. *Pneumatopteris* was verified being the genera under the Sphaerostephanos group since *Pneumatopteris* was found appear in the monophyletic advanced *Sphaerostephanos* clade in the *rbcl* analyses. Despite being that, the grouping of genera within Sphaerostephanos group cannot be displayed clearly. This could be due to the insufficiency of morphological characters used in morphological analyses were not strong enough to separate or distinguish certain genera into the Sphaerostephanos group. Genetic factors were also believed to influence the outcomes of *rbcl* analyses on the Sphaerostephanos group. Undoubtedly, more details studies should be carried out to support the proposed conclusions since this is the first time phylogenetic study conducted on Chingia, Sphaerostephanos and Christella groups of genera.

ABSTRAK

Penyelidikan ini mengkaji hubungan filogenetik dalam kumpulan Chingia, Sphaerostephanos dan Christella dan pengelompokan kumpulan genus-genus ini berdasarkan kepada hasil analisis rbdL. Kawasan kajian melibatkan beberapa Taman Banjaran Crocker dan beberapa kawasan di Pantai Barat Sabah. Dalam kajian ini, rbdL digunakan untuk membentuk hubungan filogenetik bagi kumpulan yang dikaji. Dalam kajian ke atas hubungan filogenetik Chingia, Sphaerostephanos dan Christella, 977 pasangan bes jujukan DNA diperolehi daripada 32 sampel mewakili 3 kumpulan genera. Analisis hubungan filogenetik mendedahkan bahawa kumpulan Sphaerostephanos merupakan kumpulan yang bermasalah dari segi taksonomi terutamanya Pronephrium dan Sphaerostephanos. Analisis hubungan filogenetik mendapati dua kled utama terhasil daripada evolusi kumpulan Sphaerostephanos primitif, yang terdiri daripada kled monofiletik Sphaerostephanos maju dan kled monofiletik kumpulan Chingia dan kumpulan Christella. Didapati dua spesies Christella (C. subpubescens dan C. papilio) membentuk hubungan dengan kumpulan Chingia di dalam analisis rbdL. Pengelompokan Chingia dan Plesioneuron dalam kled Chingia tidak disokong sepenuhnya oleh analisis rbdL memandangkan Chingia spp. iaitu C. clavipilosa dan C. perrigida berada dalam kumpulan Christella. Chingia dan Christella didapati membentuk satu kumpulan monofiletik bersama dalam analisis rbdL. Walau bagaimanapun, analisis rbdL tidak menyokong sepenuhnya pengelompokan ini dengan nilai kebarangkalian <70%, memandangkan kumpulan Chingia dan kumpulan Christella hampir terpisah kepada dua kled monofiletik berasingan. Secara kesimpulannya, kumpulan-kumpulan Chingia dan Christella diinterpretasikan sebagai kumpulan-kumpulan monofiletik bersama dan kemudiannya terevolusi membentuk kumpulan masing-masing. Pneumatopteris pula disahkan sebagai genera dalam kumpulan Sphaerostephanos memandangkan Pneumatopteris didapati menduduki kled monofiletik Sphaerostephanos maju dalam analisis rbdL. Meskipun begitu, pengelompokan genera dalam kumpulan Sphaerostephanos tidak dapat ditunjukkan secara jelas. Faktor-faktor genetik dipercayai mempengaruhi hasil analisis rbdL ke atas pengelompokan kumpulan Sphaerostephanos. Tidak dinafikan, lebih banyak kajian terperinci perlu dijalankan untuk menyokong kesimpulan yang dicadangkan memandangkan ini adalah merupakan kajian filogenetik yang pertama kali dijalankan ke atas kumpulan genus Chingia, Sphaerostephanos dan Christella.