

Abstract

Project Title Discovering diversity of Thai epiphyllous bryophytes with DNA barcoding
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Period of the Report 2 May 2016 to 2 May 2018

Leaf-colonizing (epiphyllous) bryophytes are ubiquitous in tropical ecosystems and can be found on a number of vascular plants. However, studies on diversity of these bryophytes have been limited, because of minute and incomplete specimens, as well as lack of taxonomical expertise. The recent development of the DNA barcoding approach has allowed taxon identification and species discovery of many obscure groups of organisms. We compared the efficiencies of six DNA markers (rbcL, matK, trnL-F, psbA, ITS1 and ITS2) in their ability to amplify, using a standard set of primers, as well as their discriminatory power, using distance- and tree-based approaches on nucleotide data. The amplification success was relatively high (70-90%) in all of the markers, except for matK, which yielded no success. The barcoding gap, as calculated from the difference between inter- and intraspecific genetic distances, was the highest in ITS2, while the highest number of monophyletic groups were found in ITS2 and rbcL. Consistent with the recommendation by the Consortium of Barcoding of Life Working Group, rbcL should be used a main barcoding marker, along with the addition of ITS2, for epiphyllous species. The development of DNA barcoding as a tool for discovering currently poorly known species diversity will provide a rapid and reliable identification tool for epiphyllous bryophytes in Thailand.

Keywords : biodiversity; molecular markers; liverworts

Executive Summary

Thailand is a home to hyper-diverse ecosystems, but our ability to study and inventory all of the natural resources have been limited to a handful of experts, who could only do so much in the constraints of resources and time. To keep up with the rate of extinction and the need of conservation, we must attempt to find a more efficient way to assist with this enormous task of studying biodiversity.

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The results of this study provide 303 reference sequences for 16 species of epiphyllous bryophyte from Thailand, as well as the comparison for efficiency of the studied markers. Most notably, the *rbcL* and ITS2 emerged as the most efficient markers to separate epiphyllous species in Thailand. These markers have also been used for identification of other land plants, which makes it possible to develop a technical and computational pipeline for metabarcoding work in the future.

The funding for this project has led to a number of outputs, including one manuscript for a publication in an international journal, two awards from international conferences, and one poster presentation award from a national conference. One research student has also used part of this funding to complete his bachelor thesis and support part of his master's thesis in Botany at Kasetsart University.