

Research Theme: Computational biology
Research Project Title: Identifying biosynthetic pathways for high-value compounds
Principal Investigator/Supervisor: Asst/Prof Marek Mutwil (SBS)
Co-supervisor/ Collaborator(s) (if any):
Project Description
<p>a) Background: Plants naturally produce a multitude (estimated 200.000) of interesting high-value chemical compounds, which can be used in a wide range of industrial contexts, e.g. dietary supplements, natural ingredients in food and cosmetics, health products and pharmaceutical medicine. The ability to efficiently produce and use these high-value plant compounds will be even more important in the future in order to meet consumers' requirements regarding healthy food and to achieve a better economic efficiency in plant production. However, the identity of the genes (coding for i.e. enzymes, transporters, co-factors) that are involved in biosynthesis of most of these compounds is largely unknown and difficult to elucidate experimentally, which precludes us from mass-producing these compounds.</p> <p>Proposed work: We have recently shown how gene expression data can be used to identify multiple metabolic pathways in plants (e.g. see www.gene2function.de). You will extend these computational methods with publicly available and your own genomic, transcriptomic and metabolomic data (~10% lab work) to uncover enzymes, transporters, and co-factors involved in the biosynthesis of secondary metabolites of plants. You will learn how to work with large data, and to develop guilt-by-association and machine learning algorithms and predictions needed to identify the relevant genes (~90% computational work). The outcome of the project will allow unprecedented insights into biosynthetic pathways of high-value compounds, which is important for basic research and the pharmaceutical and chemical industry.</p> <p>About you: You have a degree in molecular biology, biochemistry (or related) and keen interest in programming, algorithm development, mathematics, complexity, and puzzles. Or, a degree in mathematics, physics, bioinformatics (or related) and keen interest in biology. You have strong analytical and problem-solving skills, experience with programming (preferred Python), or high interest to learn it. You are proficient in spoken and written English, have excellent communication and writing skills and are interested in working in a highly interdisciplinary team of experimentalists, theorists, and computational scientists. You are independent, creative and have team spirit.</p>
Supervisor contact:
<p>If you have questions regarding this project, please email the Principal Investigator: mutwil@ntu.edu.sg</p>
SBS contact and how to apply:
<p>Associate Chair-Biological Sciences (Graduate Studies) : AC-SBS-GS@ntu.edu.sg Please apply at the following: http://admissions.ntu.edu.sg/graduate/R-Programs/RWhenYouApply/</p>