

Phylogeny and biogeography of the Asian tropical blueberries of the tribe Vaccinieae (Ericaceae)

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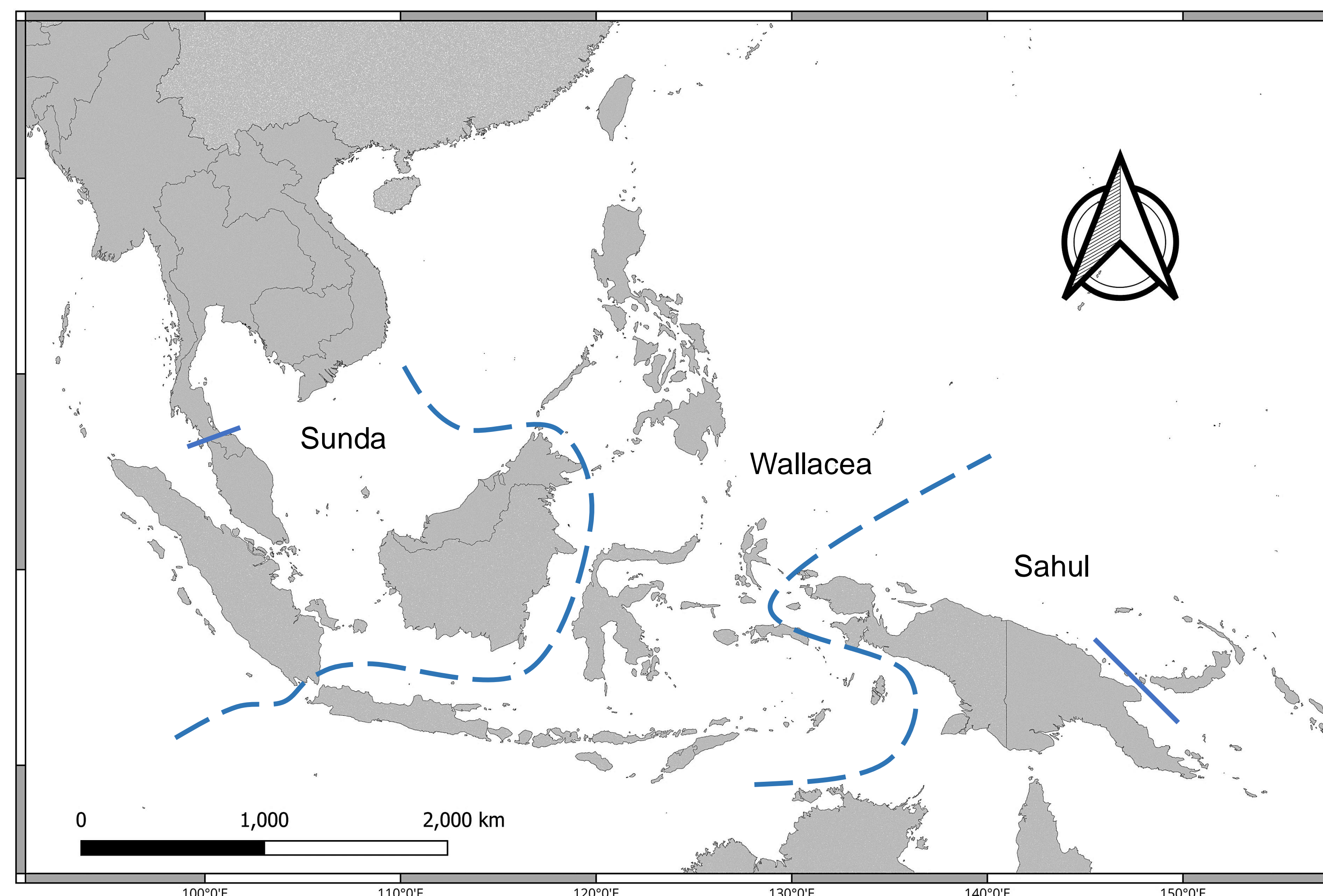
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INTRODUCTION

Malesia is a vast phytogeographic region in Southeast Asia, spanning roughly one-fifth of the world's circumference and considered one of the most biodiverse regions of the world. It is divided into three subregions: Sahul, Sunda, and Wallacea, primarily distinguished by their geological history and differences in floristic composition. Research based on fossil-calibrated phylogenetic trees has begun to provide insights into the historical phytogeography of Malesia, specifically regarding the reciprocal migration of plant lineages across the Sunda and Sahul regions known as the “**Sunda-Sahul floristic exchange (SSFE).**”



The phytogeographic region of Malesia sensu Van Welzen et al. 2011. This region encompasses countries like Brunei Darussalam, Indonesia, Malaysia, Papua New Guinea, Philippines, Singapore, Timor Leste, including the southernmost tip of Thailand.

RESEARCH OBJECTIVES

This study aims to:

- ✓ Test the SSFE hypothesis with the use of the Asian tropical blueberry clade of tribe Vaccinieae (Ericaceae).
- ✓ Resolve the classification of the Asian tropical blueberries.

METHODOLOGY

Leaf sampling (fresh silica-dried specimens and herbarium)

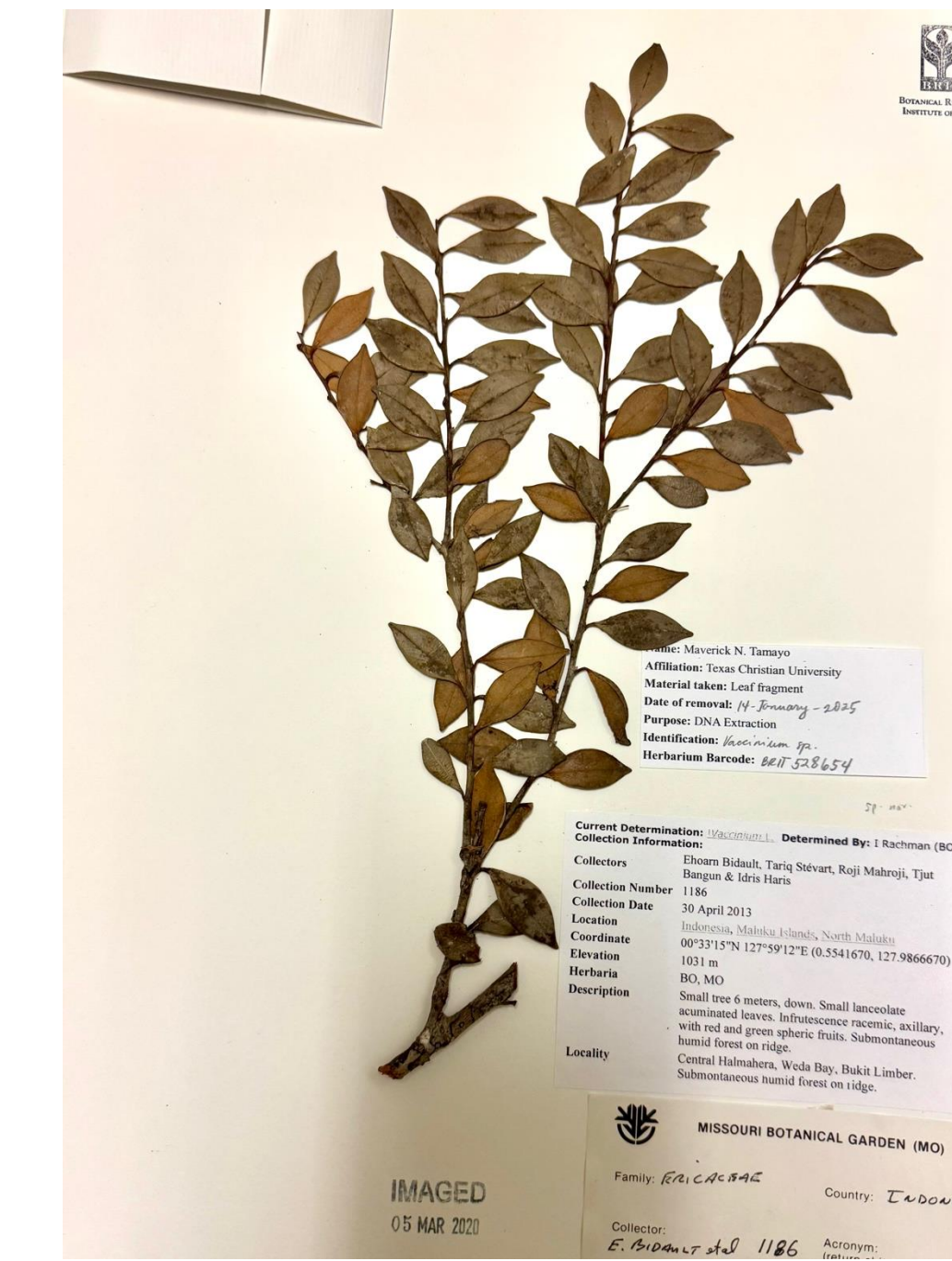
Silica-dried specimens from previous fieldwork, garden-grown plants of wild origin, and herbarium specimens were used to extract genomic DNA.



Montane forest of Mt. Trusmadi, Sabah, Malaysia.

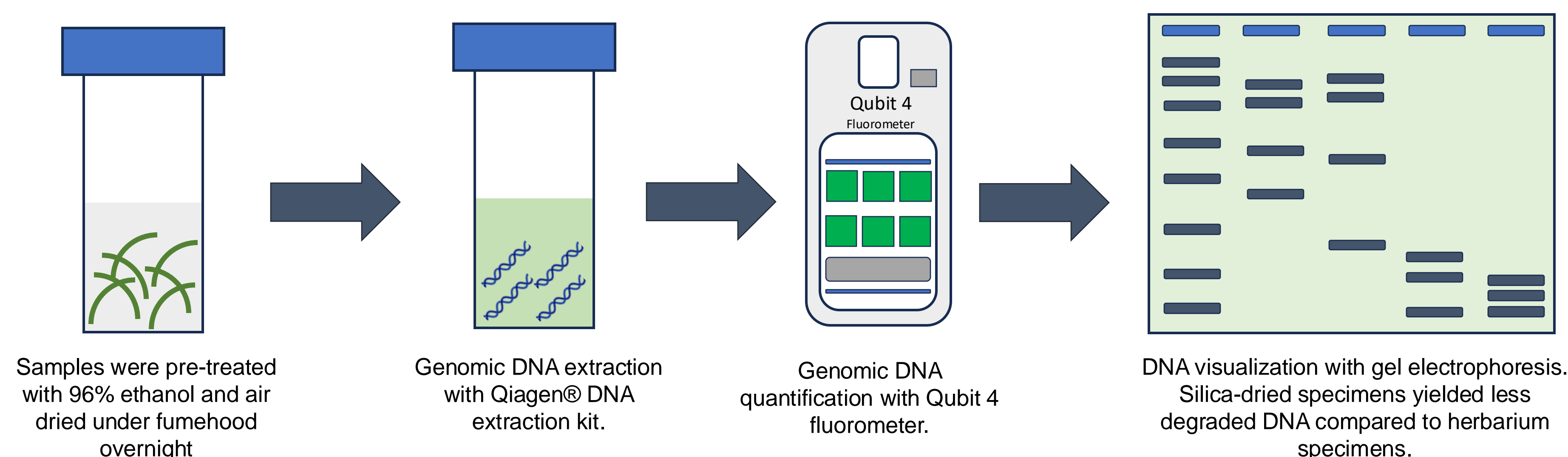


Obtaining samples from the USDA germplasm repository in Corvallis, Oregon.

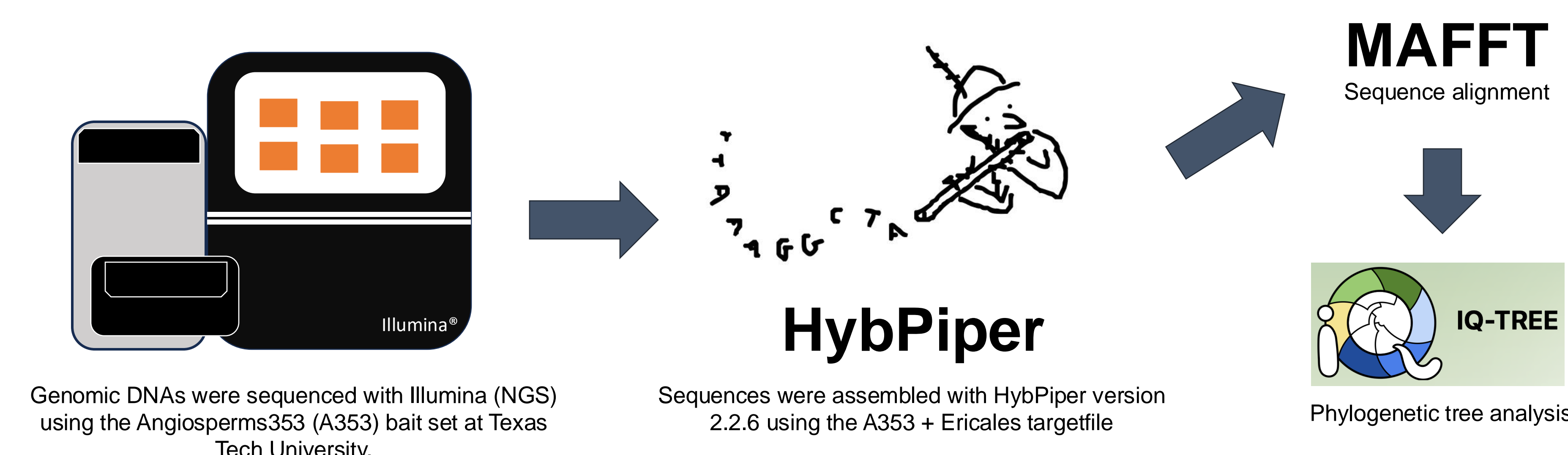


An herbarium specimen at BRIT with leaf fragment sampled.

Genomic DNA extraction, quantification, and visualization

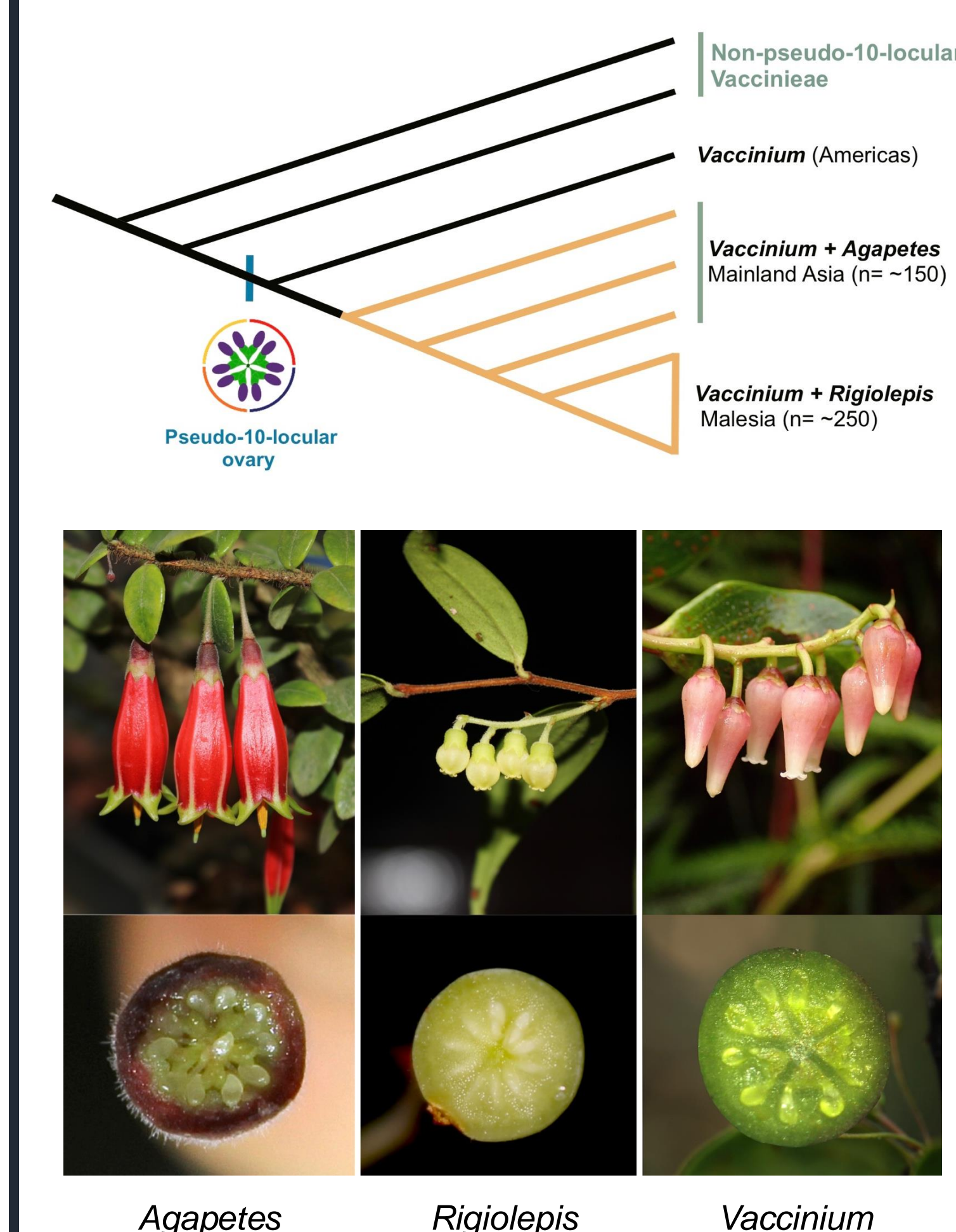


Sequencing and downstream analysis



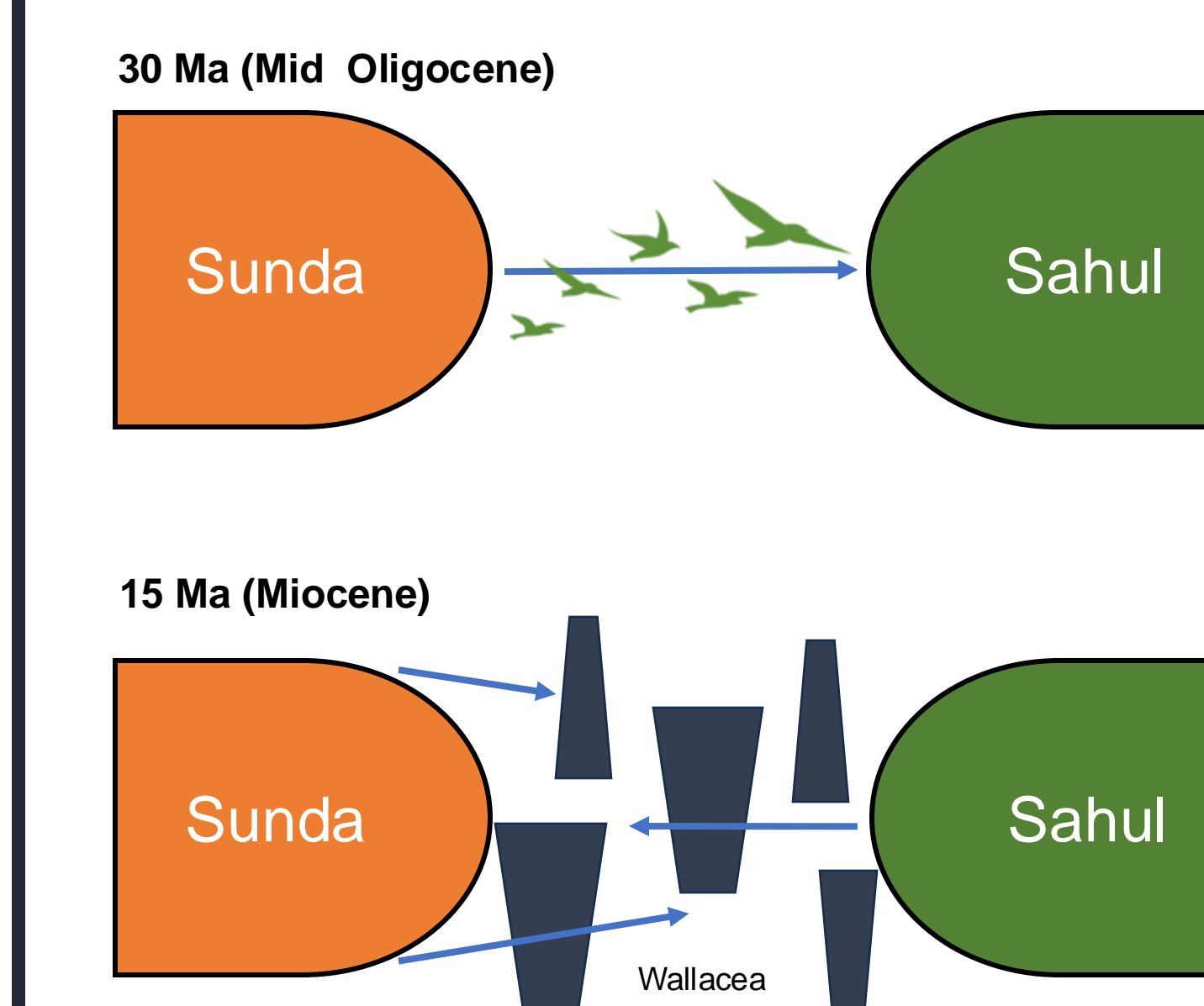
RESULTS

Phylogeny and Classification



- ✓ The pseudo-10-locular ovary is a synapomorphic character for some blueberries in the Americas and the Asian tropical blueberries.
- ✓ Asian tropical blueberries originated from the Americas.
- ✓ *Vaccinium* is paraphyletic, with *Agapetes* and *Rigirolepis* nested within it.
- ✓ *Rigirolepis* has a pseudo-10-locular ovary, albeit the partition walls extend deeper into the axis of the ovary.
- ✓ The sectional classification of Asian tropical blueberries are also paraphyletic.

Biogeography



- ✓ Prior to the emergence of Wallacea, tropical blueberries from Sunda migrated to Sahul via long distance dispersal.
- ✓ The emergence of Wallacea facilitated the exchange of tropical blueberries throughout Malesia.
- ✓ Orogeny created high elevation areas which facilitated rapid diversification of tropical blueberries.

CONCLUSIONS

Due to their high endemism, tropical blueberries can be used as a good model to test the SSFE hypothesis. Phylogenetic analyses indicate that prior to the geological emergence of Wallacea, long-distance dispersal facilitated the migration of tropical blueberries from Sunda to Sahul. Furthermore, molecular phylogenetic evidence supports the inclusion of *Agapetes* and *Rigirolepis* within *Vaccinium* sensu lato.

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