

Introduction

Understanding the diversity and distribution of species on Earth is crucial in the face of biodiversity loss. Herbarium specimens—collected dried plants preserved over centuries—combined with modern tools like DNA sequencing and microscopy, allow botanists to study plant diversity across time and space. Specimens are a powerful data source to unravel evolutionary histories, discover new species, and inform about conservation.

Methods

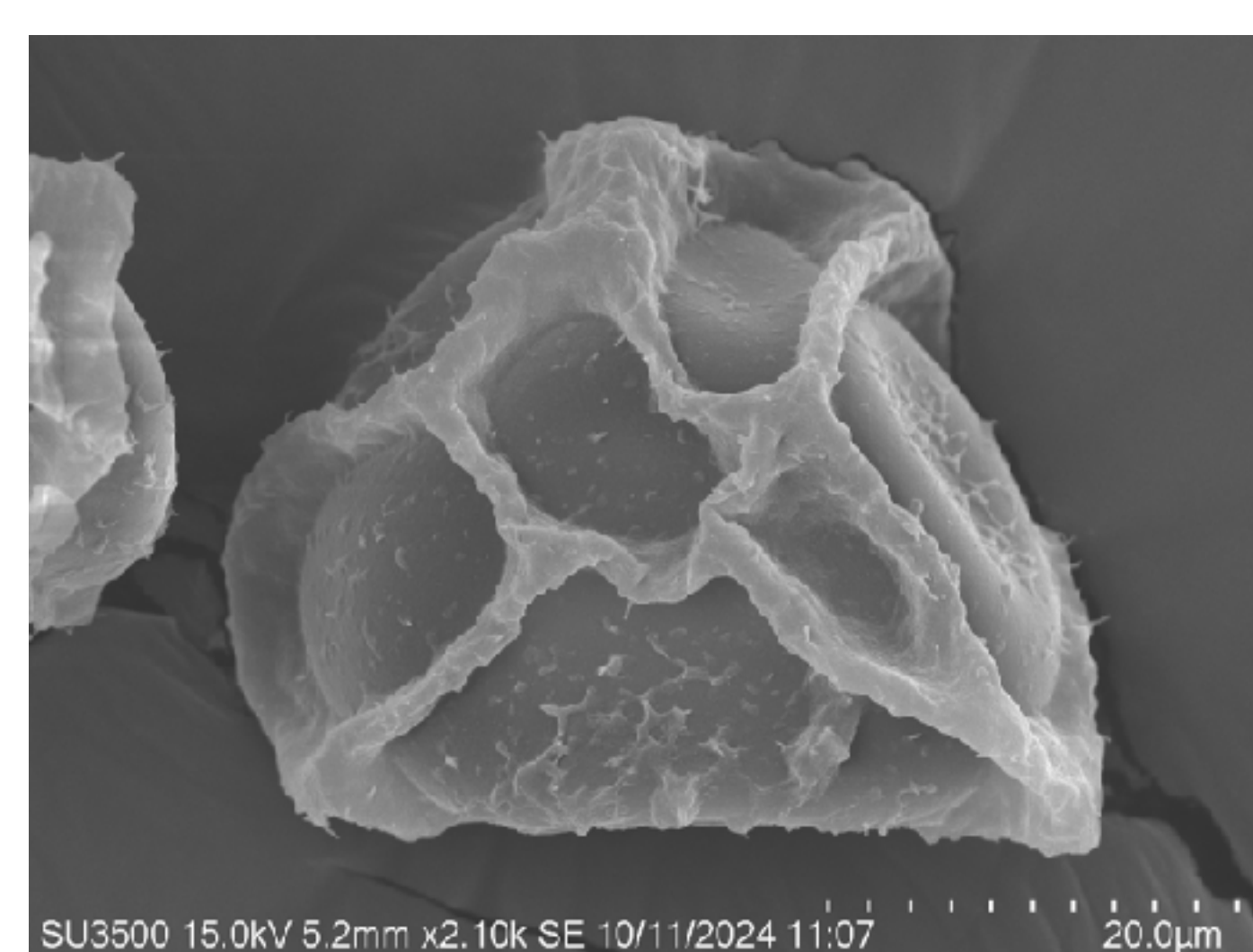
Herbarium revision & morphological studies

Visit herbaria, loans or digitized specimens



Microscopy

Micro-morphological characters
e.g. spores & scales



Geographic Distribution Analysis

From collection localities

DNA extraction and sequencing

From collections

Chloroplast markers
Nuclear genes (e.g. GoFlag probes)

Phylogenetic Analysis

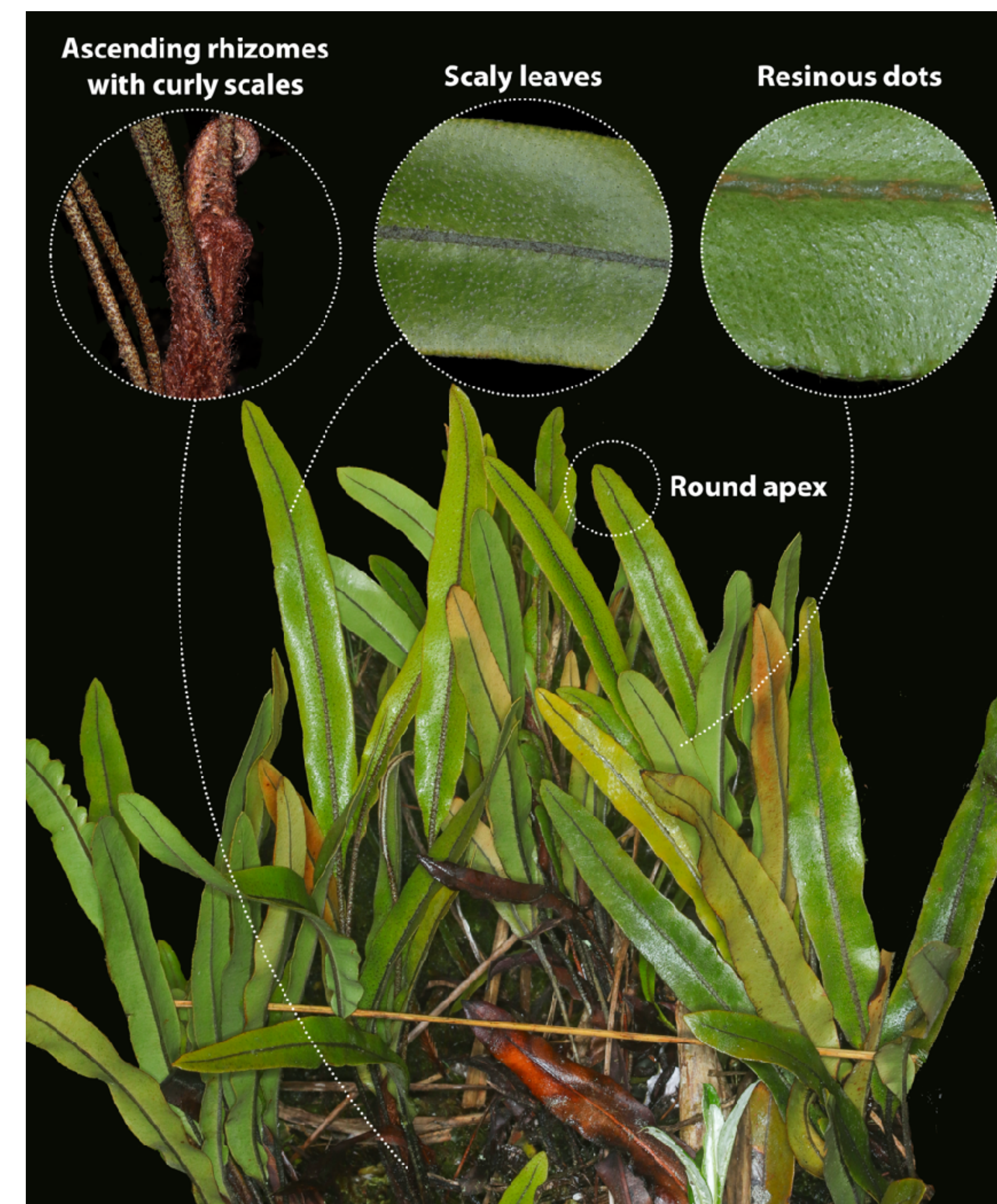
Gene trees, species trees, character evolution

Extinction risk assessment

IUCN Red List of Threatened Species
Based on distribution range (B criterion)



Study Case: Ferns –*Elaphoglossum dendricola* Clade



- Ferns are one of the oldest lineages of land plants and still hold many scientific mysteries, particularly in tropical regions where diversity is high and underexplored
- Our research is on *Elaphoglossum*, one of the most diverse and taxonomically challenging fern genera, with more than 600 species distributed across the Tropics
- We aim to overcome some of the challenges in the study of *Elaphoglossum* reviewing the systematics of the *E. dendricola* clade

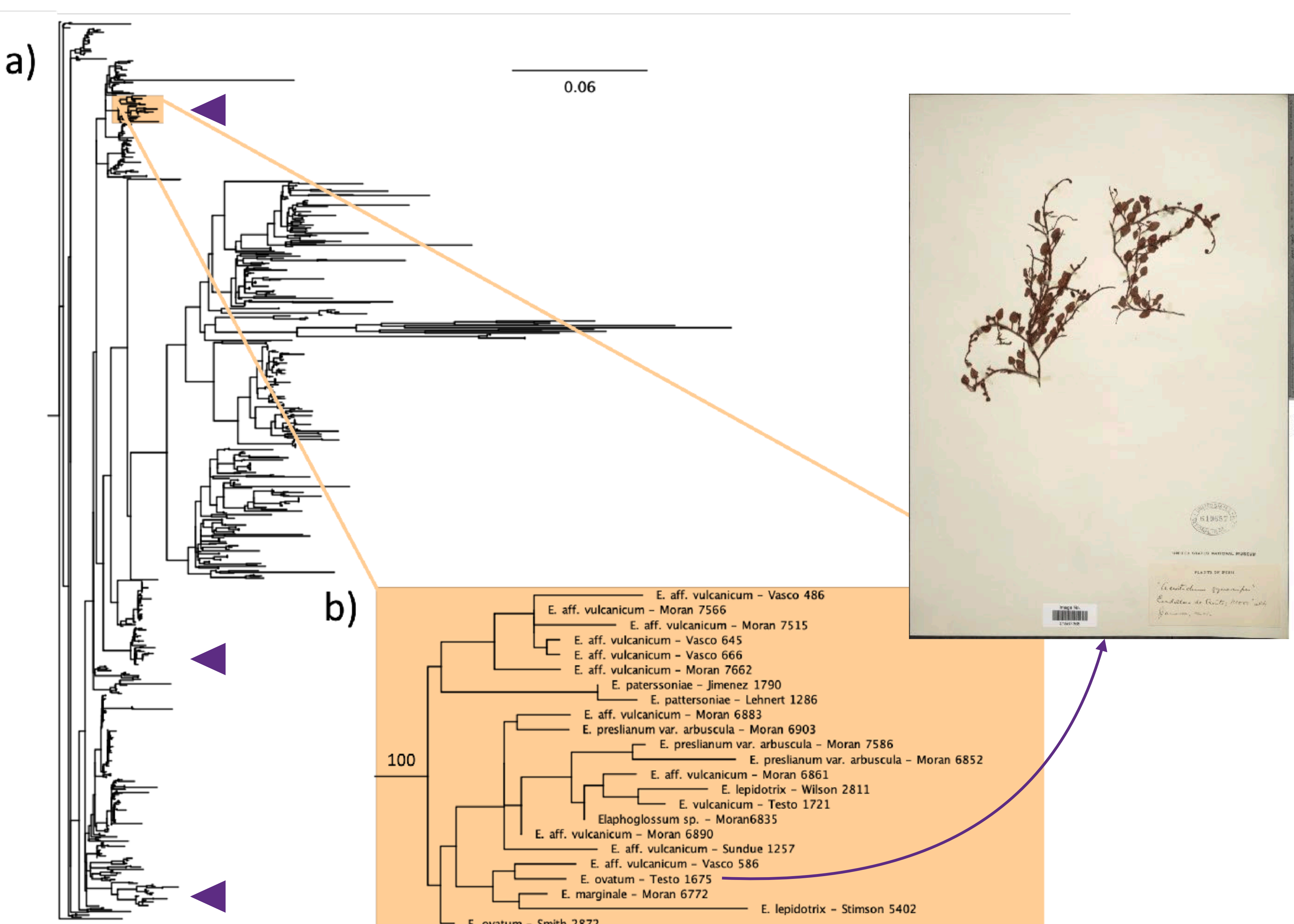
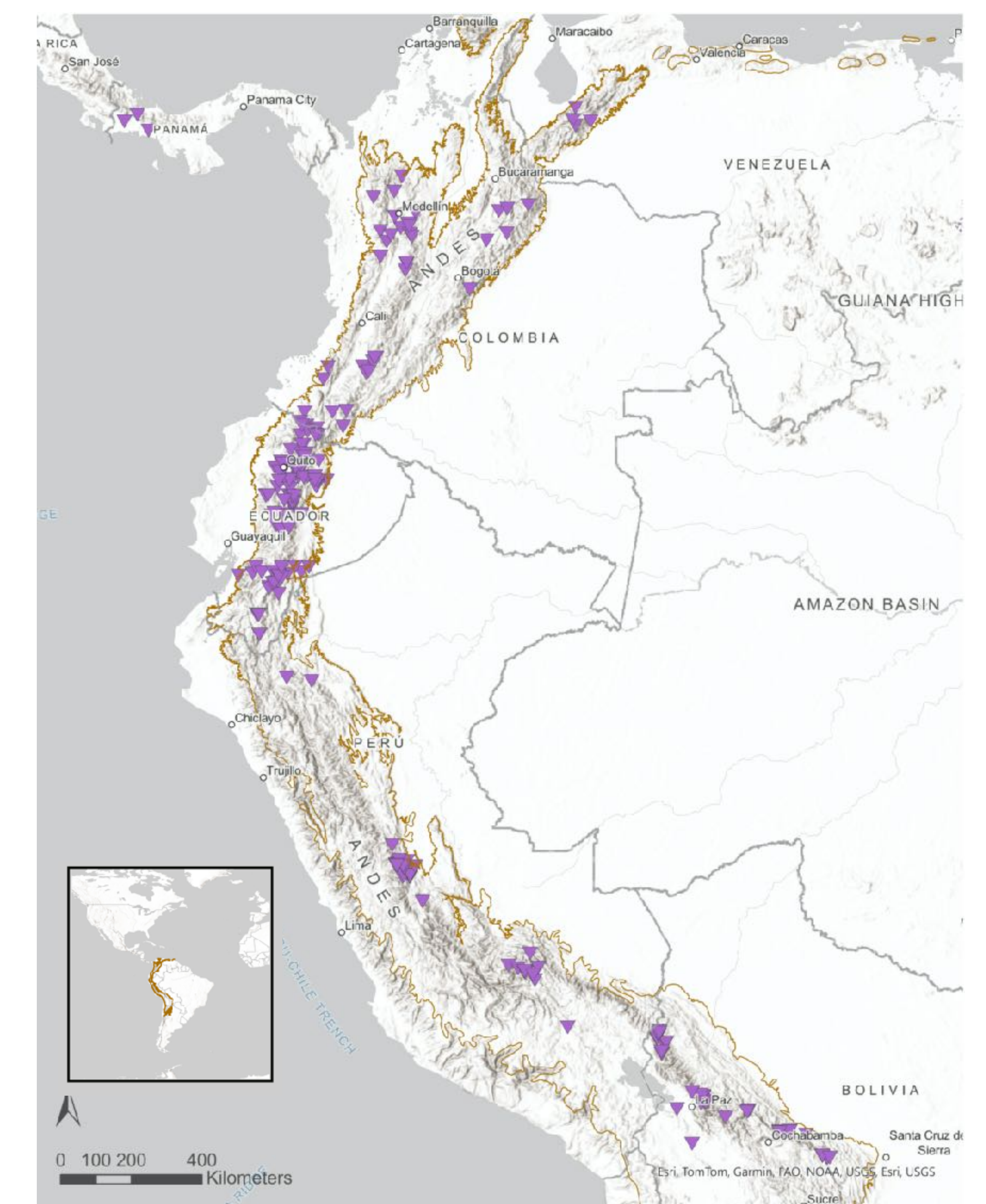
Our objectives:

- Clarify species boundaries
- Uncover undescribed species
- Reconstruct evolutionary relationships
- Track character evolution
- Evaluate conservation status

How? –using dry plants and DNA!

Elaphoglossum dendricola - Monophyletic group

- 13 already described species under 22 different names
- 6 undescribed species
- Distributed mostly in the Tropical Andes –biodiversity hotspot for conservation priority
- Of the 14 evaluated species, 14% fall into threatened categories and 21% are considered data deficient according to IUCN criteria



Key evolutionary findings

- Surprisingly, the minute species *E. ovatum* is part of the clade
- Resinous dots have evolved independently multiple times within the clade
- All clade species share folded perispores with irregular deposits, though this trait is not exclusive to the clade

Take-Home Message:

Combining traditional herbarium taxonomy with modern molecular tools allows us to uncover hidden fern diversity and provide essential knowledge for conservation.