

DR. GREGORY CHANDLER

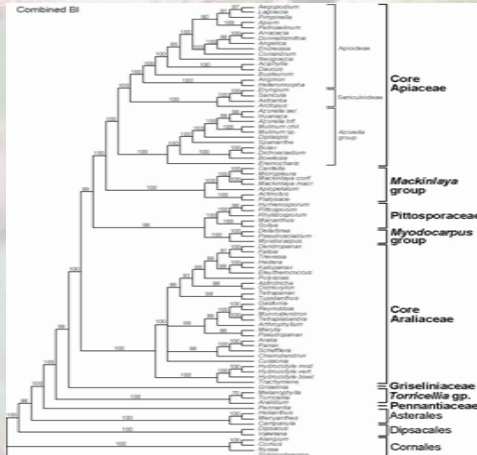
PLANT SYSTEMATICS LABORATORY

What is Systematics?

Systematics is the study of organismal diversity, aiming to uncover the patterns and processes of evolution. It entails the discovery, description and interpretation of diversity, as well as the synthesis of this information via predictive classifications. Systematists aim to unravel branches on the evolutionary tree of life, documenting changes that have occurred throughout evolutionary history. This makes systematics more than just a descriptive science, as it aims to uncover evolutionary processes.

Molecular Systematics

Our plant systematics lab uses the most advanced molecular techniques to study evolutionary processes and events, including direct sequencing of DNA (e.g., PCR), and genomics (AFLP analysis, SSCP and MAMA analyses). We use these tools to reconstruct phylogenies (akin to plant "family trees"), using data coded in a plant's genome. We also use genomics data to study polyploidy (genome expansion), which is a major mechanism of speciation (creation of new species) in plants.



Molecular phylogeny of Apiales

Research Projects

Apialean Evolution

This "big picture" project examines the evolution of Apiales, an order of plant families including Apiaceae (carrot family) and Araliaceae (ginseng family), involving direct sequencing relatively conserved DNA regions, including the 26S large ribosomal subunit and *rbcL*, a gene that codes for the large subunit of rubisco.

Current projects include fine-tuning the ordinal phylogeny, and an examination of the hydrocotyloid group, an artificial construct. This will involve collecting material in Central and South America, with funding currently being sought from the National Geographic Society.



Azevella compacta (Apiaceae)



Marianthus bigellor (Pittosporaceae)

Amorpha (Fabaceae)

As part of a local, ongoing research collaboration with Dr. Alan Weakley (UNC-Chapel Hill), we are investigating a legume group that occurs predominantly in the SE USA. *Amorpha* is unique in the family in lacking 4 of the usual 5 petals in a pea flower, possessing only the banner petal.



Amorpha canescens



Gastrolobium polystachyum

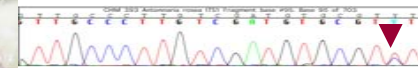
Gastrolobium (Fabaceae)

An Australian endemic legume genus, *Gastrolobium* had not been studied in c. 150 years. Many areas of SW western Australia have since been explored, with many new species among all plant groups described. This revision provided descriptions for over 30 species new to science, as well as providing evolutionary insights into Australian legumes.

Antennaria (Asteraceae)

Antennaria belongs to the sunflower family, and possesses several interesting evolutionary features, including many polyploid members and gametophytic apomixis (production of seed from only maternal tissue). We are studying *Antennaria* using the genomic techniques of chromosome counting, amplified fragment length polymorphism (AFLP) analysis, Mismatch Amplification Mutation Assay (MAMA) and Single Strand Conformation Polymorphisms (SSCP).

There are a variety of projects available for students in all facets of this research, including Directed Individual Study, Honors, and Masters students. Funding from the National Science Foundation is currently being sought to provide student stipends, tuition money, supplies, and travel to field sites and professional meetings.



Example of using MAMA to detect very rare mutations in *Antennaria rosea* (maroon arrow). This mutation indicates the presence of multiple alleles (gene forms), so is evidence of hybridization. This can be exploited to determine the original parental species of the hybrid.



Antennaria rosea

Floristics Projects

Floristics is the study of the number, distribution, and relationships of plant species in one or more areas. This involves producing taxonomic treatments, species lists, and general plant survey techniques.

Aspects that we are undertaking include a revision of *Gastrolobium* for the Flora of Australia series, a recently published monograph (detailed taxonomic treatment) on *Gastrolobium*, and local floristics projects, like those investigating the species diversity of the long-leaf pine savannas.



Class field trip to Green Swamp

Contact Information

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