

## **Botany 940: Issue in Fern Systematics (Tuesday 12:05-12:55)**

Primary source:

Ranker and Haufler (2008) *Biology and Evolution of Ferns and Lycophytes*. Cambridge University Press [ISBN 978-0-521-69689-0 paperback]

### **January 19: Introduction and organization - [Ken Sytsma](#)**

### **January 26: Fern phylogeny – [Evie Williams](#)**

- Schuettpelz and Pryer. Fern phylogeny inferred from 400 leptosporangiate species and three plastid genes. *Taxon* (2007) vol. 56 (4) pp. 1037-1050
- chapter 15 in B&EFL, "Fern phylogeny"

### **February 2: "Fern allies" – [Shahrizim Zulkifly](#)**

- Pryer et al. Horsetails and ferns are a monophyletic group and the closest living relatives to seed plants. *Nature* (2001) vol. 409 pp. 618-622
- Schneider et al. Is morphology really at odds with molecules in estimating fern phylogeny. *Systematic Botany* (2009) vol. 34 (3) pp. 455-475

### **February 9: Fern classification – [Deniz Aygoren](#)**

- chapter 16 in B&EFL, "Fern classification"

### **February 16: Ancient fern diversification – [Chris Cardona](#)**

- Rothwell and Stockeychapter 13 in B&EFL, "Phylogeny and evolution of ferns: a paleontological perspective"

### **February 23: Modern fern diversification – [Rafael Arevalo](#)**

- Schuettpelz and Pryer. Evidence for a Cenozoic radiation of ferns in an angiosperm-dominated canopy. *PNAS* (2009) vol. 106 (27) pp. 11200-11205
- Schneider et al. Ferns diversified in the shadow of angiosperms. *Nature* (2004) vol. 428 (6982) pp. 554-557

## **March 2: Species concepts in ferns – Emily Sessa**

- Yatskievych and Moran. Primary divergence and species concepts in ferns. *American Fern Journal* (1989) vol. 79 (2) pp. 36-45
- Paris et al. Cryptic species, species delimitations, and taxonomic practice in the homosporous ferns. *American Fern Journal* (1989) vol. 79 (2) pp. 46-54
- Barrington et al. Hybridization, reticulation, and species concepts in the ferns. *American Fern Journal* (1989) vol. 79 (2) pp. 55-64
- chapter 12 in B&EFL, "*Species and speciation*"

## **March 9: Polyploidy: in general (debate format) – Ken Cameron**

- Wood et al. The frequency of polyploid speciation. *PNAS* (2009) vol. 106 (33) pp. 13875-13879
- Lynch and Conery. The evolutionary fate and consequences of duplicate genes. *Science* (2000) vol. 290 pp. 1151-1155
- Otto and Whitton. Polyploid incidence and evolution. *Annual Review of Genetics* (2000) vol. 34 pp. 401-437
- Gastony. Electrophoretic evidence for the origin of fern species by unreduced spores. *American Journal of Botany* (1986) vol. 73 (11) pp. 1563-1569

## **March 16: Polyploidy: example from Appalachian *Asplenium* – Lois Anderson**

- Wagner. Reticulate evolution in the Appalachian *Aspleniums*. *Evolution* (1954) vol. 8 (2) pp. 103-118
- Perrie. Insights into the biogeography and polyploid evolution of New Zealand *Asplenium* from chloroplast DNA sequence data. *American Fern Journal* (2005) vol. 95 (1) pp. 1-21

## **March 23: Fern life cycle/breeding systems – Emily Sessa**

- Masuyama and Watano. Trends for inbreeding in polyploid pteridophytes. *Plant Species Biology* (1990) vol. 5 pp. 13-17
- Soltis and Soltis. Evolution of inbreeding and outcrossing in ferns and fern-allies. *Plant Species Biology* (1990) vol. 5 pp. 1-11
- Soltis and Soltis. Genetic variation within and among populations of ferns. *American Fern Journal* (1990) vol. 80 (4) pp. 161-172
- Soltis and Soltis. Polyploidy and breeding systems in homosporous pteridophyta: a reevaluation. *The American Naturalist* (1987) vol. 130 (2) pp. 219-232
- chapter 2 in B&EFL, "Alternation of generations"

## **March 30: Spring Break**

### **April 6: Fern biogeography – Brian Sidoti**

- Geiger et al. Molecular biogeography and origins of the Hawaiian fern flora. *Brittonia* (2007) vol. 59 (2) pp. 142-158
- Wolf et al. Geographic distributions of homosporous ferns: does dispersal obscure evidence of vicariance?. *Journal of Biogeography* (2001) vol. 28 pp. 263-270
- chapter 14 in B&EFL, Robbin Moran's chapter, "Diversity, biogeography, and floristics"

### **April 13: Genome structure & evolution – Ken Sytsma**

- chapter 6 in B&EFL, "Structure and evolution of fern plastid genomes"
- chapter 7 in B&EFL, "Evolution of the nuclear genome of ferns and lycophytes"

### **April 20: Fern identification in WIS Herbarium / class**

### **April 27: Fern identification in WIS Herbarium / class**

### **May 4: field trip to greenhouse/gardens and/or on Saturday May 8 to Baraboo Hills**

## Format and Grading of Spring 2010 Systematics Seminar

This semester we have a diversity of approaches to learn about issues in fern systematics.

1. Nine sessions are typical student led discussions (20 min max powerpoint presentation on the topic and paper(s) & group discussions)

These 9 sessions include Jan 26, Feb 2, Feb 9, Feb 16, Feb 23, Mar 2, Mar 16, Apr 6, Apr 13

2. One group debate (2 sides) on "whether to be a polyploid" – Mar 9
3. One workshop led by Emily Sessa on new "fern life cycle charts" – Mar 23
4. Two workshops on identification of Great Lakes fern genera and species – Apr 20 & 27
5. One local fieldtrip (greenhouse/gardens) - May 4; and/or Sat May 8 field trip to Baraboo Hills

### **Grading** – based on three areas

1. Students and attendees are expected to attend all sessions, read the material assigned prior to the Sunday preceding each topic, participate in weekly small discussion groups
2. Students (and attendees) submit to the next student presenter, by Sunday p.m., a specific question they had on the next reading or topic
3. Student presenter:
  - a. takes charge of one topic
  - b. verifies reading material with the instructor and give class information on the reading(s)
  - c. prepares 20 min max powerpoint summarizing the topic and important points from the paper(s)
  - d. organizes the questions provided by students and attendees and sets up three or four subgroups (each with faculty) to address the main questions