



FERN PROPAGATION FROM SPORES

With a focus on *Staghorn Ferns*

Men's Garden Club of Asheville

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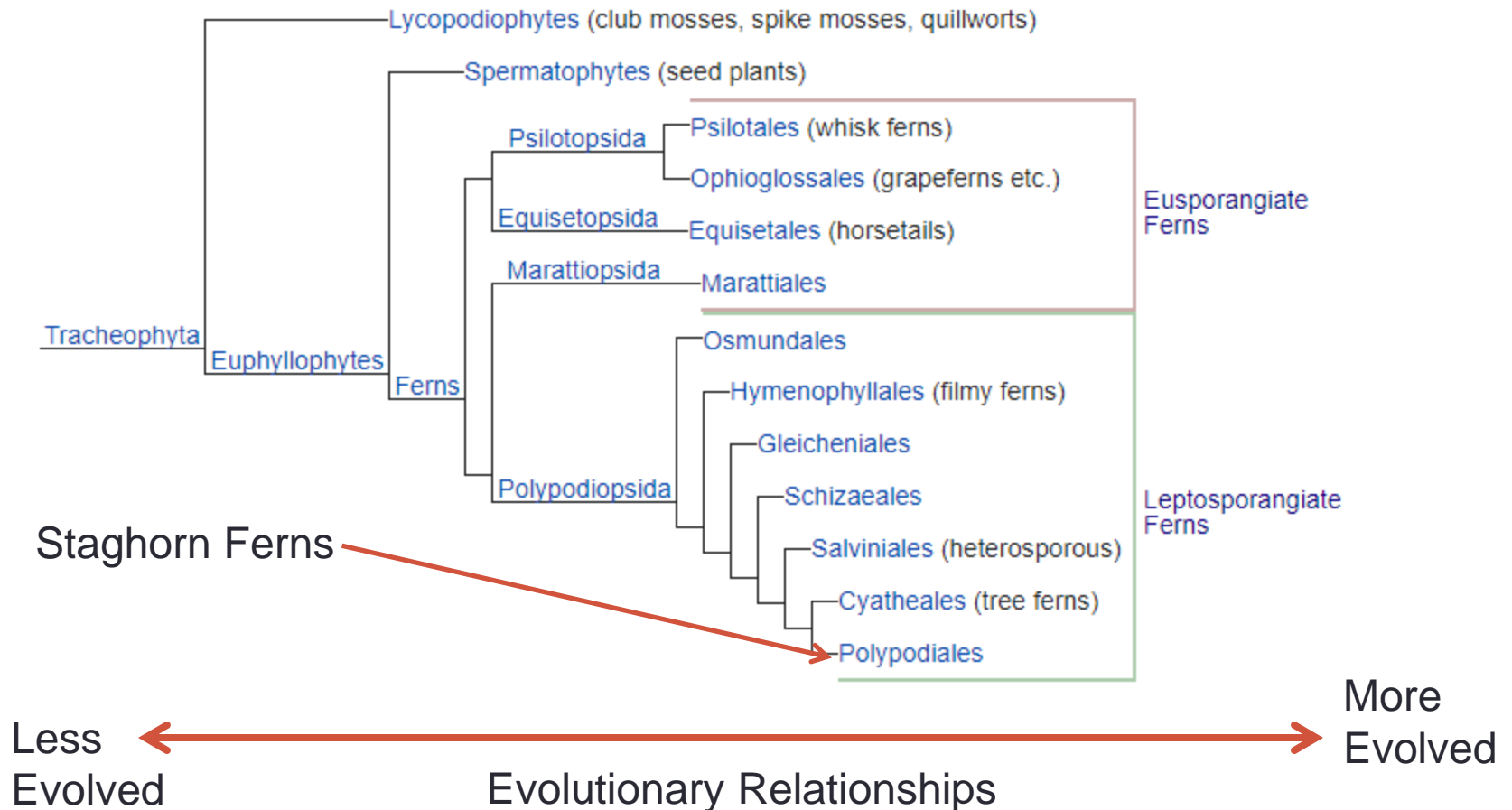
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"If you have remarked errors in me, your superior wisdom must pardon them. Who errs not while perambulating the domain of Nature?"

LINNAEUS

Ferns & fern allies - taxonomy

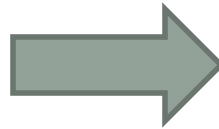
Vascular plants that reproduce with spores, rather than seeds



Carolina fern (& fern allies) facts

Manual of the Vascular Flora of the Carolinas

Native Ferns	
Families	16
Genera	30
Species	89



UNC Herbarium

NC Ferns	
Families	22
Genera	46
Species	122

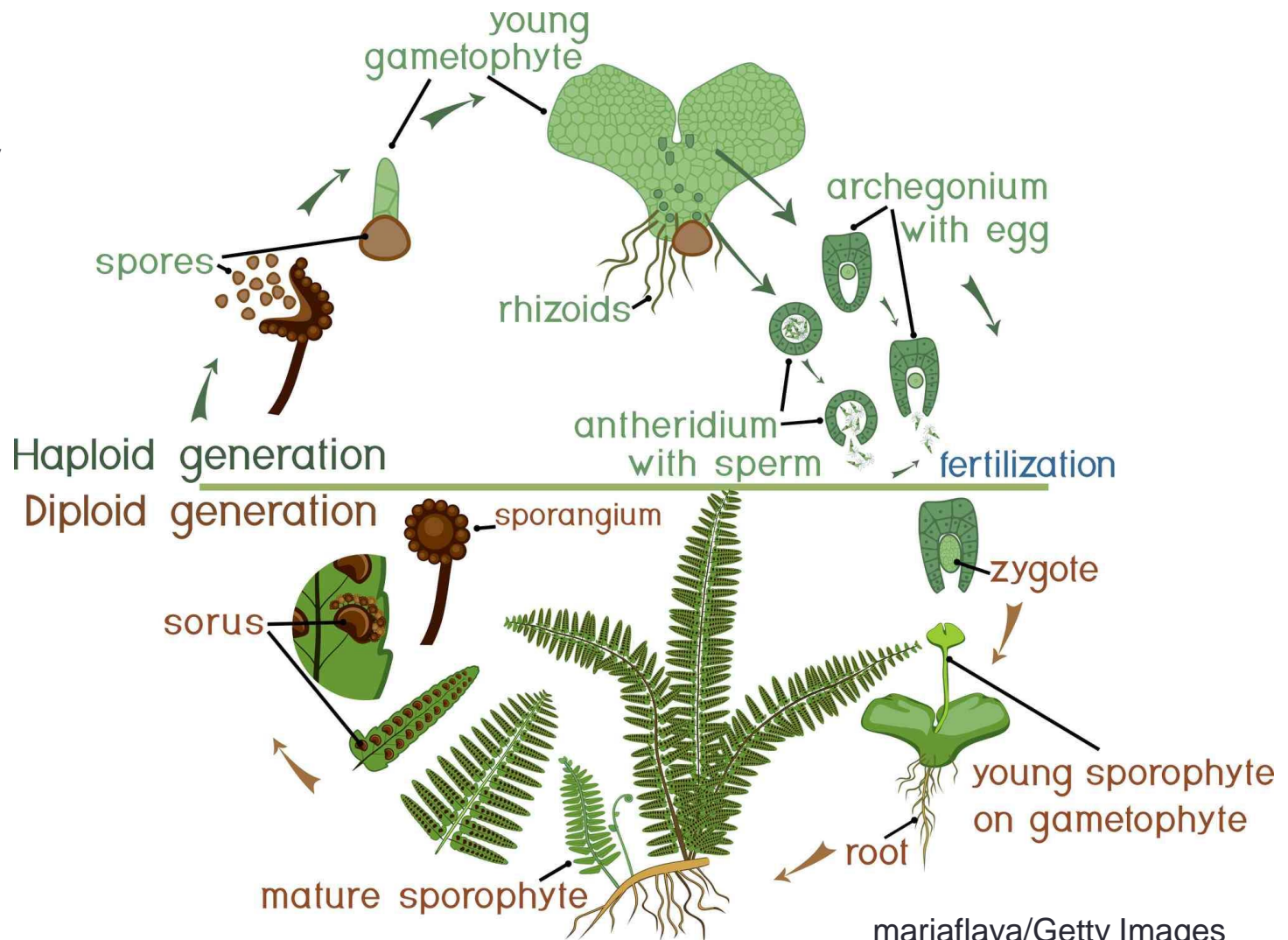
http://www.herbarium.unc.edu/FernLecture_2.pdf

Fern Family	Common Name
Aspidiaceae	So. Lady Fern
Aspleniaceae	Spleenwort
Azollaceae	Mosquito Fern
Blechnaceae	Chain Fern
Equisetaceae	Horsetail
Grammitidaceae	Dwarf Polypody
Hymenophyllaceae	Filmy Fern
Isoetaceae	Quillwort
Lycopodiaceae	Clubmoss
Ophioglossaceae	Adder's Tongue
Osmudaceae	Cinnamon Fern
Polypodiaceae	Resurrection Fern
Psilotaceae	Whiskfern
Pteridaceae	Maidenhair Fern
Selaginellaceae	Spikemoss
Shizaeaceae	Climbing Fern

Recall the life cycle of a fern

Ferns
“alternate”
generations by
producing two
different plant
morphologies:

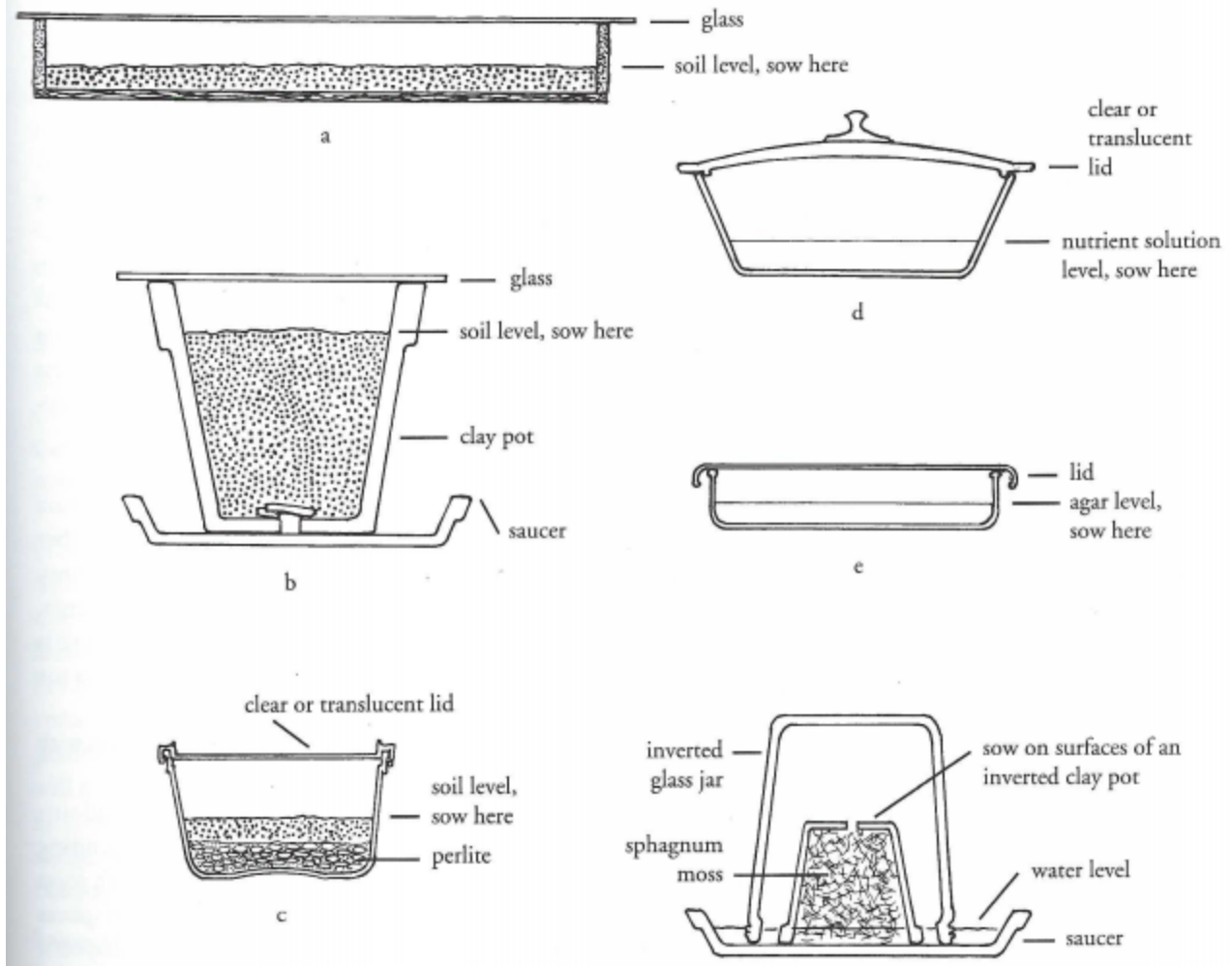
A simple, non-vascular, very small thallus with half the chromosomes of the bigger, well known vascular fern.



Fern culture methods from spores

Spores dusted onto moist sand, held at 75-80F (e.g. on a seedling heater mat) will germinate in about a week. They are too small to view without a microscope.

Best to use very dilute solution of RapidGrow in rain water for irrigation.



Staghorn fern spores - ~35μ length

Collecting spores from mature plants is easy. Scrape them off into a small container with a lid and keep them cool until ready for sowing. Dust spores onto culture media with an artist's brush.

Once exposed to water, live spores (single cells inside a cuticle) begin growing by first producing a small, photosynthetic filament.

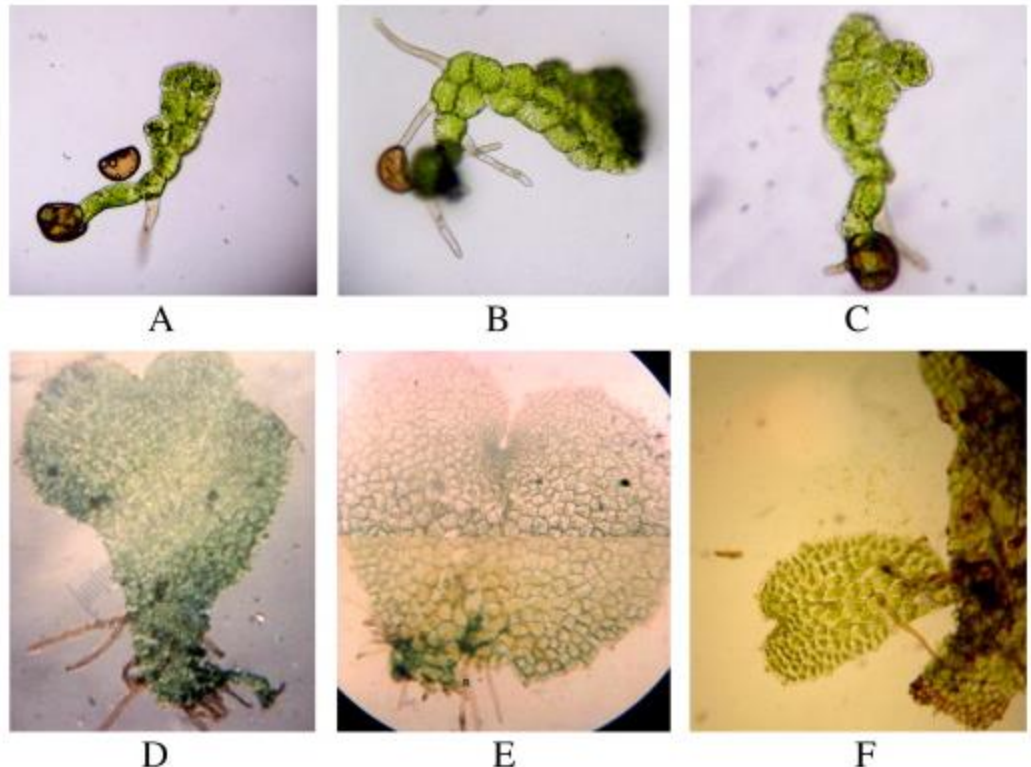


From "Sporophyte and gametophyte development of *Platycerium coronarium* (Koenig) Desv. and *P. grande* (Fee) C. Presl. (Polypodiaceae) through *in vitro* propagation, Reyno A. Aspiras (Brazil), 2010

Staghorn fern gametophyte - ~0.125in

Germinated spores develop into the gametophyte which will develop sex organs: archegonia (egg cells) and antheridia (sperm cells). 4-6 weeks to mature.

Since these are tropical species, best to use a 12 hour light/12 hour dark cycle in your propagator.



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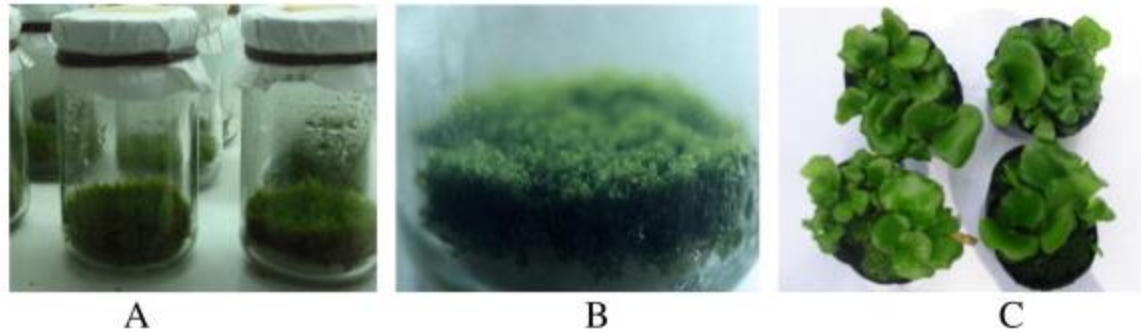
Staghorn propagation (my) research discoveries

1. Staghorn gametophytes are protandrous, which means they produce antheridia (male) first (for about 3 weeks), then switch to archegonia (female) next.
2. Production of plantlets is therefore enhanced by creating an overlap of gametophyte maturities in the culture (as you would expect in nature.)
3. Apply a second dusting of spores into the cultures about 4 weeks after the first sowing to enhance overlap of gametophyte sex structures, and thus, fertilization.
4. Manage water level in the cultures. Try to mimic what moisture levels would exist on/in a moss mat after a rain (wet but not saturated/submerged.)
5. Use a fine artist's paint brush (sterilized in alcohol) to dust spores. Manage spore density onto sand/growth media to enhance crowded populations of gametophytes.

Propagation in glass jars – Aspiras method

Any clear container that will hold moisture will work, but all culture materials need to be sterilized to control algae invasion.

Staghorn plantlets will emerge in about 2 months from the sowing of spores.



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Ideal conditions invite volunteers

Staghorn babies volunteering on wet osmunda + mosses. These are *P. madagascariense* plantlets.

Mature, spore bearing plants are nearby and shedding spores into the air.



Staghorn ferns are epiphytes in nature



P. Andinum, So. America



P. angolense, Africa



P. holtumii, SE Asia

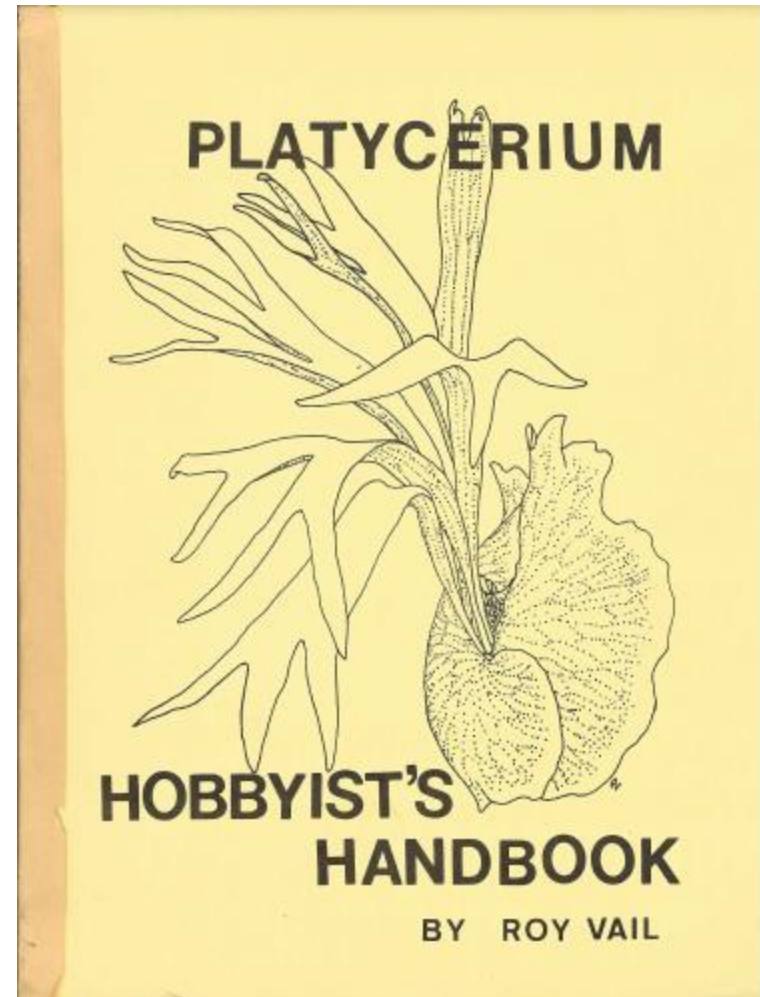
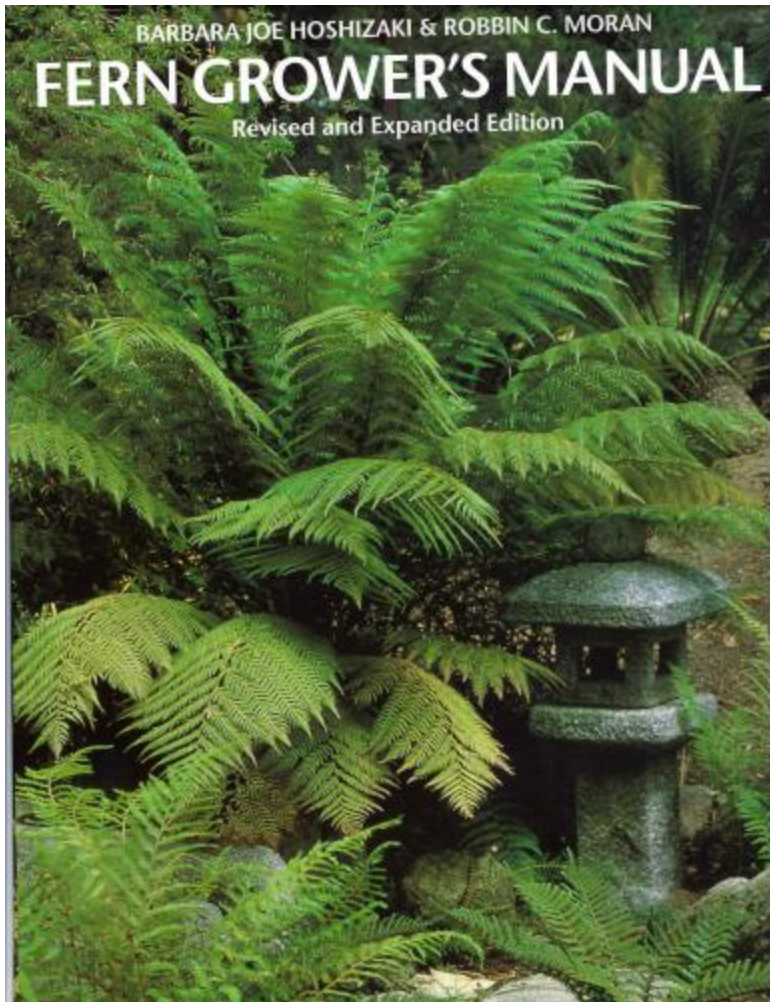


P. bifurcatum, Australia

My collection – now in Weaverville



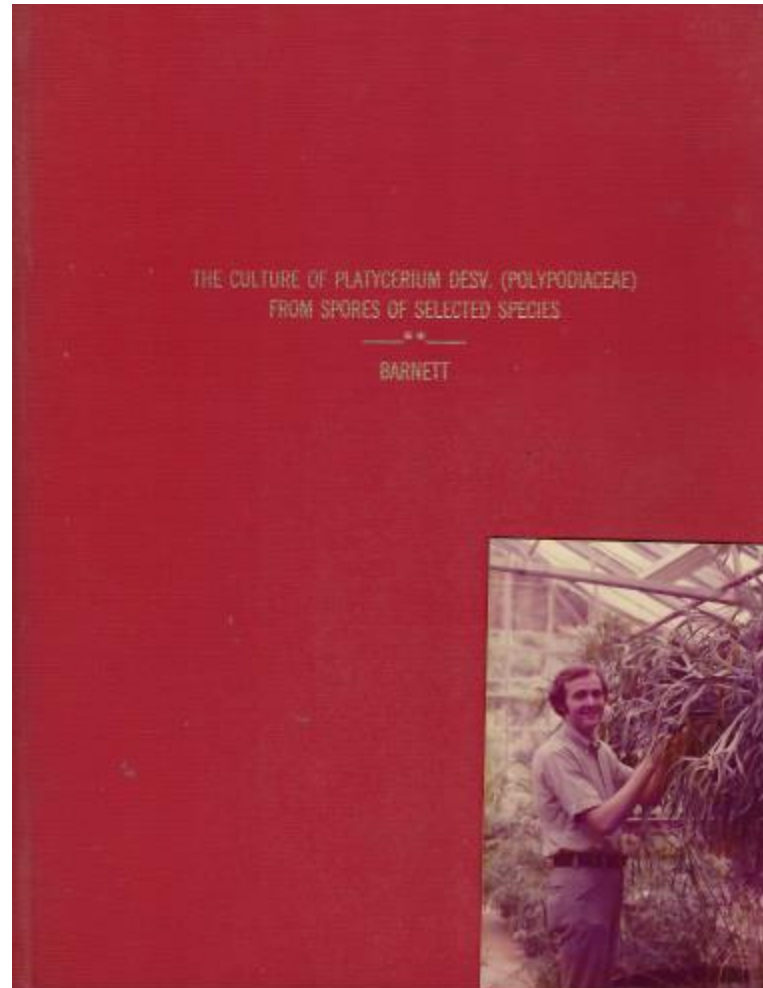
Fern resources



Fern resources

Source	Link
AFS Partners	https://www.amerfernsoc.org/partners
American Fern Journal	https://bioone.org/journals/american-fern-journal/author-guidelines ,
American Fern Society	https://www.amerfernsoc.org/
Links to Fern Websites	https://www.dcnicholls.com/byzantium/ferns/links.html
Los Angeles International Fern Society	https://laifs.org/
The British Pteridological Society	https://ebps.org.uk/
The Fern Society of South Australia	https://www.fernsocietyofsouthaustralia.org/

“Once upon a time in a galaxy far, far away”



Acknowledgements & sincere thanks

Dr. Hendrik B. Weyland, Major Professor, Stephen F. Austin State University, Texas

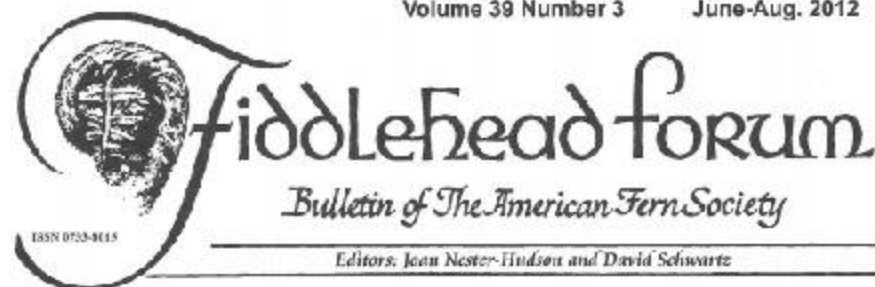
Los Angeles International Fern Society, Bee Olson

Los Angeles City College, Dr. Barbara J. Hoshizaki

Botanic Gardens of Berlin, Brooklyn, Kew, Missouri, Philippines, Singapore, Sydney (supplied research material)

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Barbara Joe Hoshizaki 1928-2012

Barbara Joe Hoshizaki, born June 14, 1928, in Oakland, CA, died at age 83, May 30, 2012 in Los Angeles, CA. Barbara attended public schools in Los Angeles and received her BS from the University of California, Los Angeles in 1951. There she met Mildred Mathias, a botany professor, who became Barbara's mentor and encouraged her to study ferns. Her MS was awarded by UCLA in 1954. Barbara was professor of biology and taught 28 years at Los Angeles City College. She was also Curator of Ferns at the UCLA Herbarium.

Barbara traveled widely. Early in her career she spent three months in Costa Rica studying ferns with the Organization for Tropical Studies. She continually worked with and developed close relationships with her academic colleagues and also with amateur and professional growers around the world. She introduced many fern species into cultivation and wrote numerous scientific and popular papers on ferns. An avid taxonomist, she corrected scientific names of misidentified ferns through extensive research.

Barbara was president of the American Fern Society, the Southern California Horticultural Institute, the Los Angeles International Fern Society, and vice-president of the Pacific Horticultural Foundation. She served on the boards of many horticultural and botanical organizations. She was an honorary member of the American Fern Society, the Los Angeles International Fern Society, and the Tropical Fern and Exotic Plant Society, Inc.

She is well known for *The Fern Grower's Manual*, published in 1975. This seminal work established a benchmark for ferns in cultivation in the United States. A revised and expanded second edition with co-author Robbin C. Moran of the NY Botanical Garden was published in 2001.



Barbara was an academic who didn't confine her work to the herbarium; a gardener who actually grew the ferns she wrote about. Her garden, many years in the making, was her research library. The hands-on experience informed her work and made her an in-demand speaker for professional meetings and for amateur groups. It was a fabulous garden that was both a pleasure and a privilege to visit. Barbara was a good friend who shared her knowledge, expertise, and plants from her garden. We will miss her generosity and kindness.