Pteridophyte reproduction

Embryophytes

"Bryophytes"

Liverworts

Hornworts

Mosses

Transition to land

Microphylls

- One vascular trace
  - No branching vasculature in leaf
  - Forms from protostele

http://28.media.tumblr.com/tumblr_lgpco8M9ls1aa2auo1_500.jpg
Megaphylls
- Branching vascular traces (veins) in leaves
- Typically large


Are not always large.

Highly reduced megaphylls in Equisetales.

http://www.missouriplants.com/Ferns/Equisetum_hymenale_stems.jpg

Remember the STELES
Stele modification in Pteridophyta

(a few with eustele)

ancestor had protostele, like Lycopodiophyta.

Protosteles

Lycopodiophyta

Protostele

Epidermis

Siphonosteles

Most ferns, though, have siphonosteles with leaf gaps

Xylem

Leaf gap

Phloem

(p) Epidermis

Cortex
Eustele
equisetales—eustele; convergent with seed plants.

Modification of life cycle and reproduction in Pteridophyta

Filicales  
Heterosporous ferns
leptosporangia  
Equisetales
above-ground photosynthetic gametophyte
ancestor had dominant homosporous sporophyte with underground non-photosynthetic gametophyte, like Lycopodiaceae

Life cycles: above-ground photosynthetic gametophyte
Heterosporous ferns
Equisetales
Eusporangiate ferns

Modification of life cycle and reproduction in Pteridophyta

2. Leptosporangia

Life cycles: eusporangia vs. leptosporangia

**Eusporangia:**
- large
- 1 to 1000's of spores
- the basal (primitive) condition
- walls several cells thick
- found in most land plants

**Leptosporangia:**
- small
- 64 spores
- walls one cell thick
- have annulus (thickened ring)
- grouped into sori (sing. sorus)
- only in Filicales and heterosporous ferns

Life cycles: eusporangium development
Life cycles: eusporangia in a eusporangiate fern (Botrychium)

Life cycles: leptosporangia

Life cycles: leptosporangia in Filicales
Life cycles:
leptosporangia grouped into sori in Filicales (Thelypteris)

Life cycles: leptosporangia grouped into sori in Filicales (Asplenium)

Modification of life cycle and reproduction in Pteridophyta
3. Heterospory and endosporic gametophytes

Heterospory and endosporic gametophytes

Filicales

Equisetales

leptosporangia

above-ground photosynthetic gametophyte

ancestor had dominant homosporous sporophyte with underground non-photosynthetic gametophyte, like Lycopodiaceae
The life cycle of Selaginella is the same as that found in the heterosporous ferns and in the seed plants.

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Equisetales: brief overview

--highly reduced megaphylls
--eusteles
--homosporous
--eusporangia
--above-ground photosynthetic gametophyte
--strobili
--hollow, jointed stems embedded with silica
--one genus, *Equisetum*, about 15 species;
Equisetales is the only fern group with strobili. Strobili are stems with modified leaves—sporophylls—clustered on them. These sporophylls are often called sporangiophores on *Equisetum*.

http://www.sbs.utexas.edu/br/0504/images/pics/equi/Equisetum%20hyemale%20strob1.jpg
Eusporangiate ferns: brief overview

--megaphylls
--protosteles
--homosporous
--eusporangia
--underground, non-photosynthetic gametophyte
--includes Psilotales and Ophioglossales
--7 genera, about 70 species

Eusporangiate ferns: Ophioglossales: Botrychium

What you're seeing here is one leaf

http://www.rook.org/earl/bwca/nature/ferns/botrychium-multifidum-1sm.jpg
Eusporangiate ferns: Ophioglossales: Ophioglossum

http://hengduan.huh.harvard.edu/fieldnotes/photos/show_image?image_id=1140

Eusporangiate ferns: Psilotales: Psilotum

http://t6.gstatic.com/images?q=tbn:ANd9GcRNvXD52gT892PloJD7fNseMnehkWmcUygqTlfyF_A_TvFbdvh0

Liverworts
Hornworts
Mosses

Embryophytes

Bryophytes
Lycophytes
Rhynia (Fossil)
Lycopodiophyta
Pteridophytes

To be cont.

Transition to land
megaphylls
Heterosporous ferns: brief overview

--all aquatic
--megaphylls
--siphonosteles
--heterosporous
--leptosporangia
--endosporic gametophyte
--includes Marsileales and Salviniales
--5 genera, about 70 species

Heterosporous ferns: Salviniales: Azolla

Heterosporous ferns: Salviniales: Salvinia
Heterosporous ferns: Marsileales: Marsilea

Embryophytes

“Bryophytes”
Liverworts
Mosses
Hornworts
Mosses

Pteridophytes
Filicales

To be cont.

Filicales: brief overview

--megaphylls
--siphonosteles (mostly) – few with eusteles
--homosporous
--leptosporangia
--above-ground, photosynthetic gametophyte
--about 320 genera, 10,500 species
Filicales: *Dennstaedtia*

[Image of *Dennstaedtia*]

Filicales: *Pteridium*

[Image of *Pteridium*]

http://t2.gstatic.com/images?q=tbn:ANd9GcQSnzinzDmcXng7WDPh3-KaIypqI3JUDSxUWSbCjSa91eTQOzcg