

So Far—Quick review

- Introduced the basis for potential value of forensic plant evidence
- Introduced tools/reference facilities used to extract information from plant evidence—herbarium tour, Conservatory Tour
- Introduced evolutionary and ecological context
- Have introduced general aspects of plant form—including transition to woodiness in development

And....

- We have to have exposure to plant structure etc., but also to the tools and facilities we use to determine the salient aspects of plants
- Hence we have begun to learn about plant structure and morphology, we will also learn how the herbarium is a useful resource, we will see how SEM/TEM microscopy has been useful in pollen studies, Look at plant diversity in the Conservatory.
- AND—we have introduced a case that allowed groups to interact and use ChatGPT

AGAIN FOR REVIEW, WHAT IS THE NATURE OF BOTANICAL EVIDENCE?

- ASSOCIATED DISSEMINULES (What are disseminules)
- PLANT MATERIAL INVOLVED IN CRIME
- ASSOCIATED IN SITU PLANT MATERIAL
 - Plant growth rates
 - Plant substrate growth patterns
- CHEMICALS—POISONS, DRUGS
- PLANTS AFFECTED BY THE CIRCUMSTANCES OF THE CRIME
- GROWTH RATE OF PLANTS OR THEIR ORGANS

And what are Key Plant Parts (Not chemical)in Forensics

- Wood—all year, but history of seasonality for years, built in
- Leaves—Seasonal or not, depending on the taxon
- Leaf Trichomes
- Flowers--Seasonal
- Fruits and seeds--Seasonal
- Pollen—Seasonal

Forensic aspects of these plant parts

- Basically the uniqueness of the plant part in question (aka identifiability), its position in time and space—these provide or can provide a great deal of context in combination with the victim's condition and association with plant parts and space. (This also applies or could apply to various chemicals)

Yet Again, ----Botanical Forensic Evidence

- *Anatomy*
- *Life cycles—we were looking at these in the context of disseminules*
- Diversity/geography-distribution
- Structure
- Biogeography
- *Chemistry*
- *Molecular Genetics*

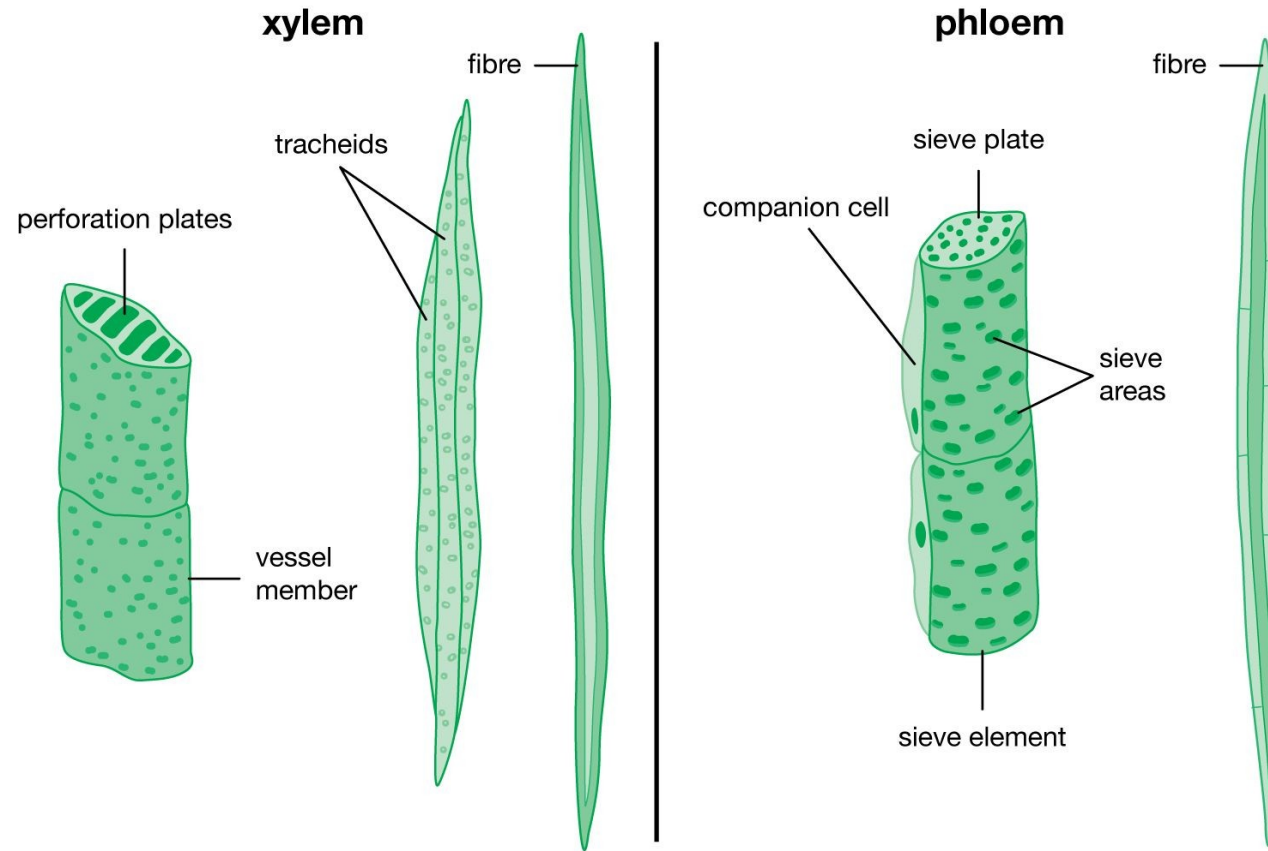
PLANT GROWTH, DEVELOPMENT, WOOD AND ITS NATURE

- This subject provides context for a number of cases
- We considered how wood originates and what are some of its structural features
- We saw that wood was a key piece of evidence in the Lindbergh trial
- We did not tie this though to what we now now about wood—we will do that today
- We will then look at examples of how wood has been used in prosecuting cases—both civil (Dr. Niklas) and Criminal

Wood review

- Wood (xylem is the tissue name but not all plants with xylem have wood) is produced by living seed plants only (there are extinct non seed plants that produced wood)
- Wood provides support to large plants and also is composed of water conducting cells that constitute the vascular system
- Part of the vascular system that is smaller and conducts photosynthesis products (called the phloem) is not often used as evidence—at least not that I know of.
- The conductive elements of wood are tracheids or vessels

Xylem and Phloem



Let's finish up relevance of wood in Lindbergh



Lindbergh residence, Hopewell - kidnap ladder alongside nursery window



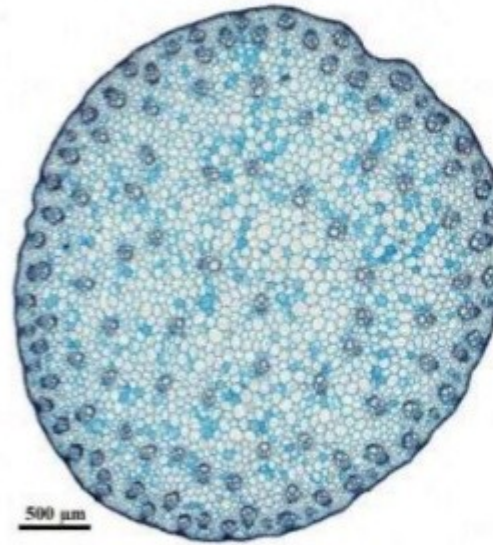


PLANTS

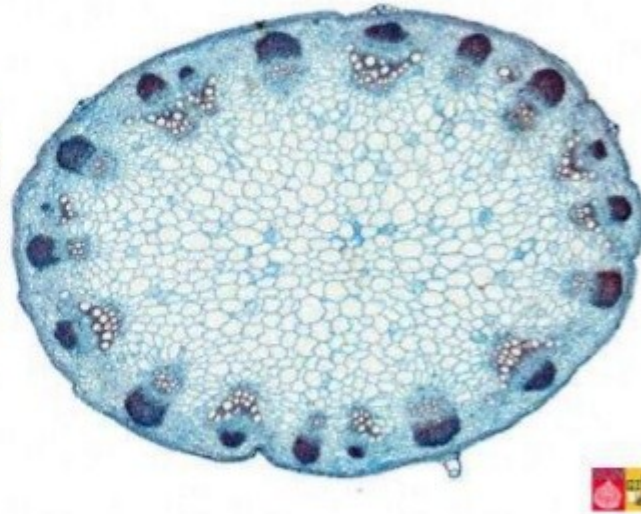
Monocots vs. dicots

Monocot stem

Dicot stem



Primary vascular bundles scattered



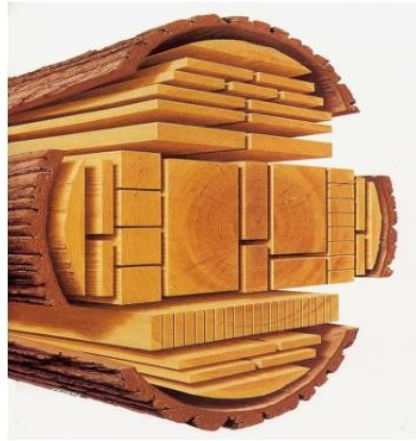
Primary vascular bundles in a ring



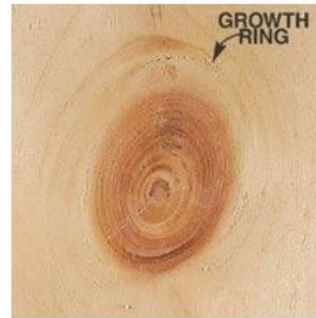
Pinus resinosa



WOOD 280 – Macroscopic wood anatomy features



Grain



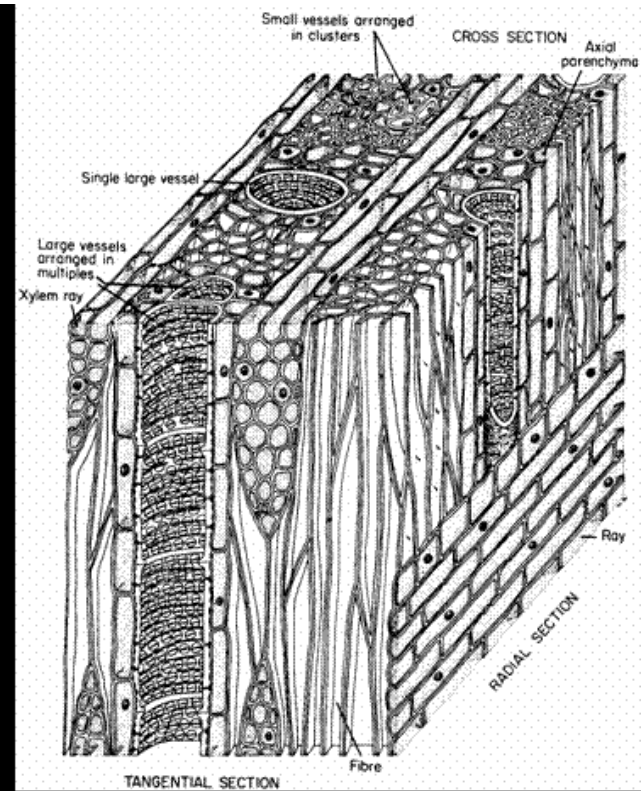
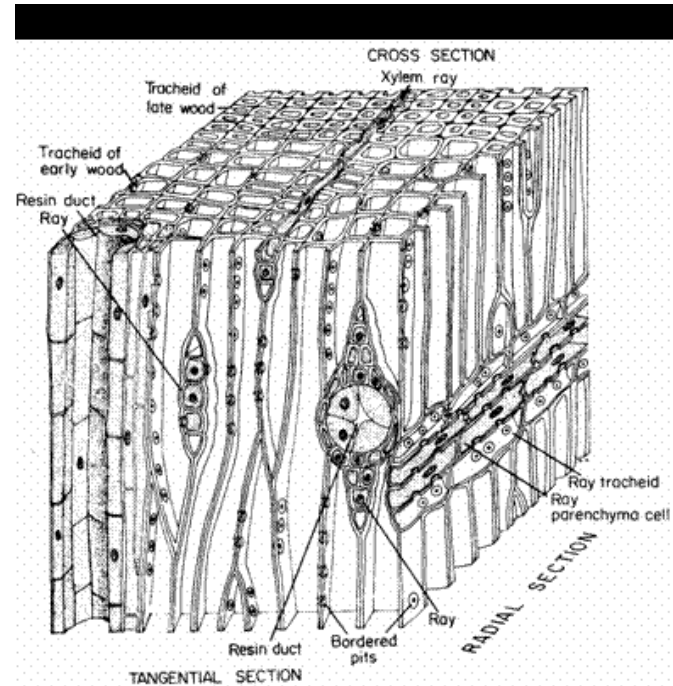
Knots

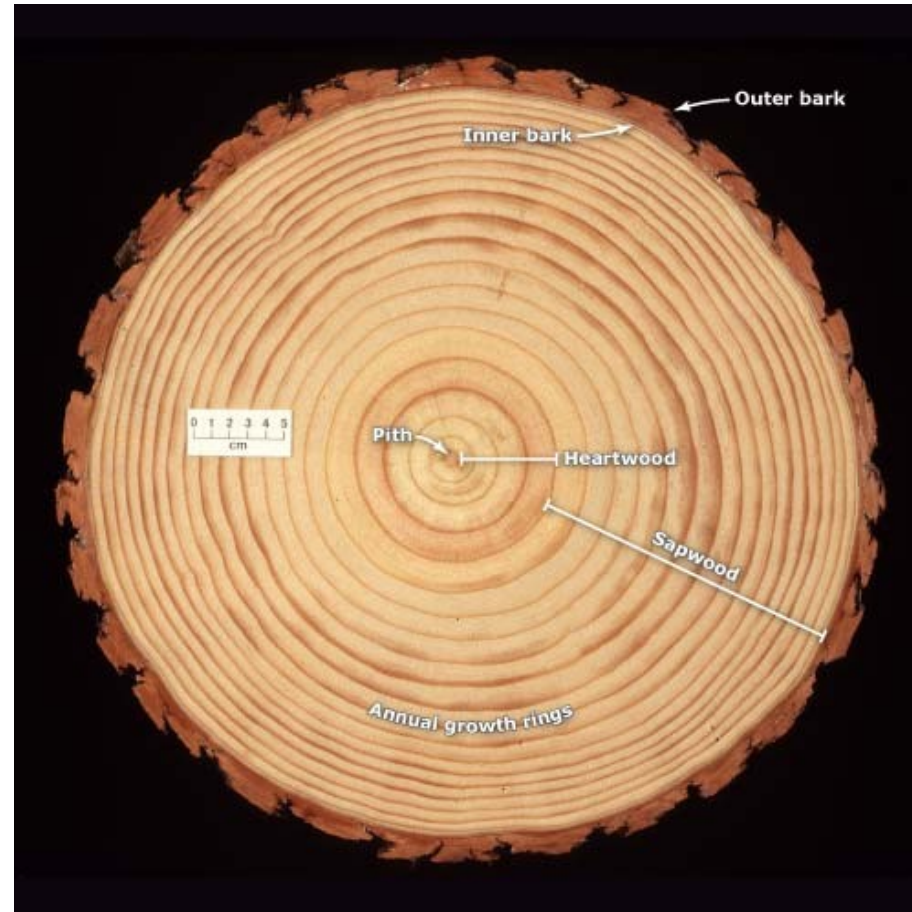
(CMSA)



Figure

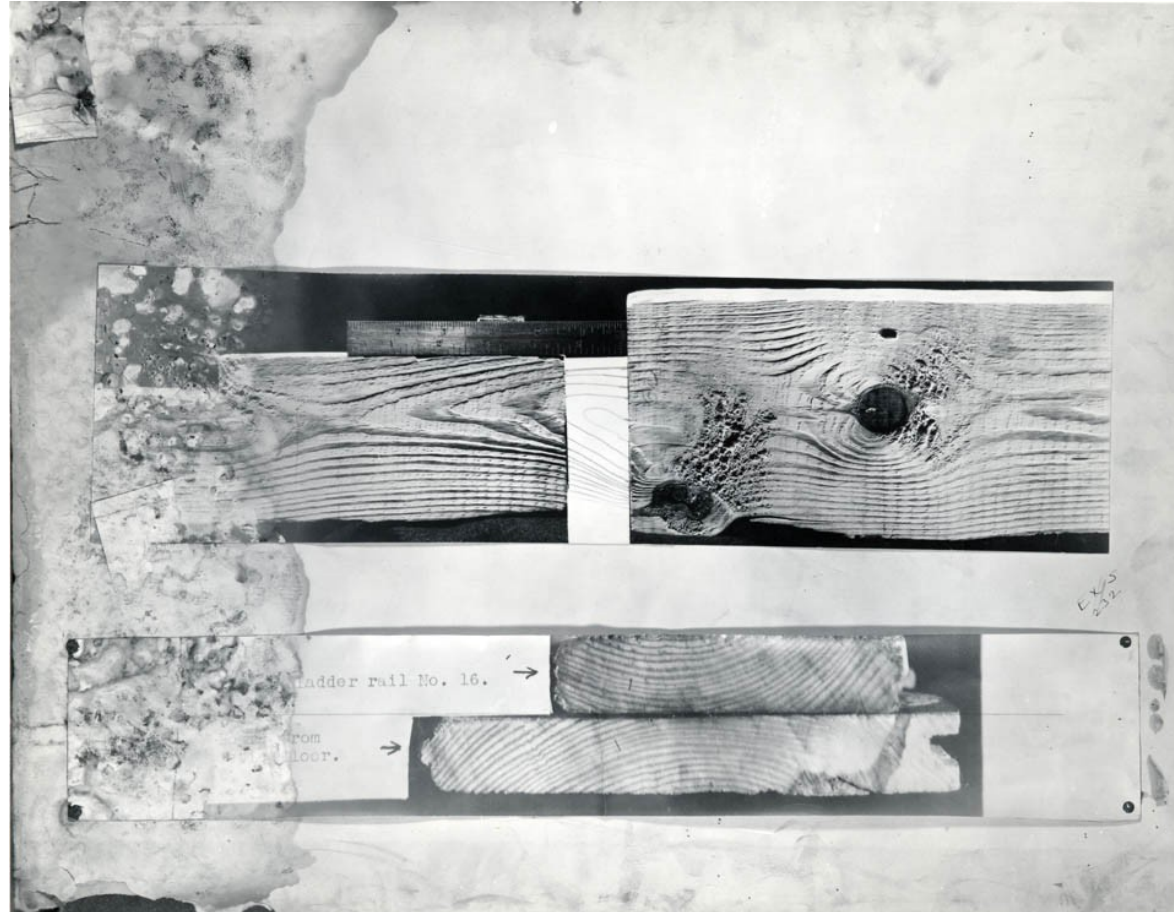
(Hoadley)



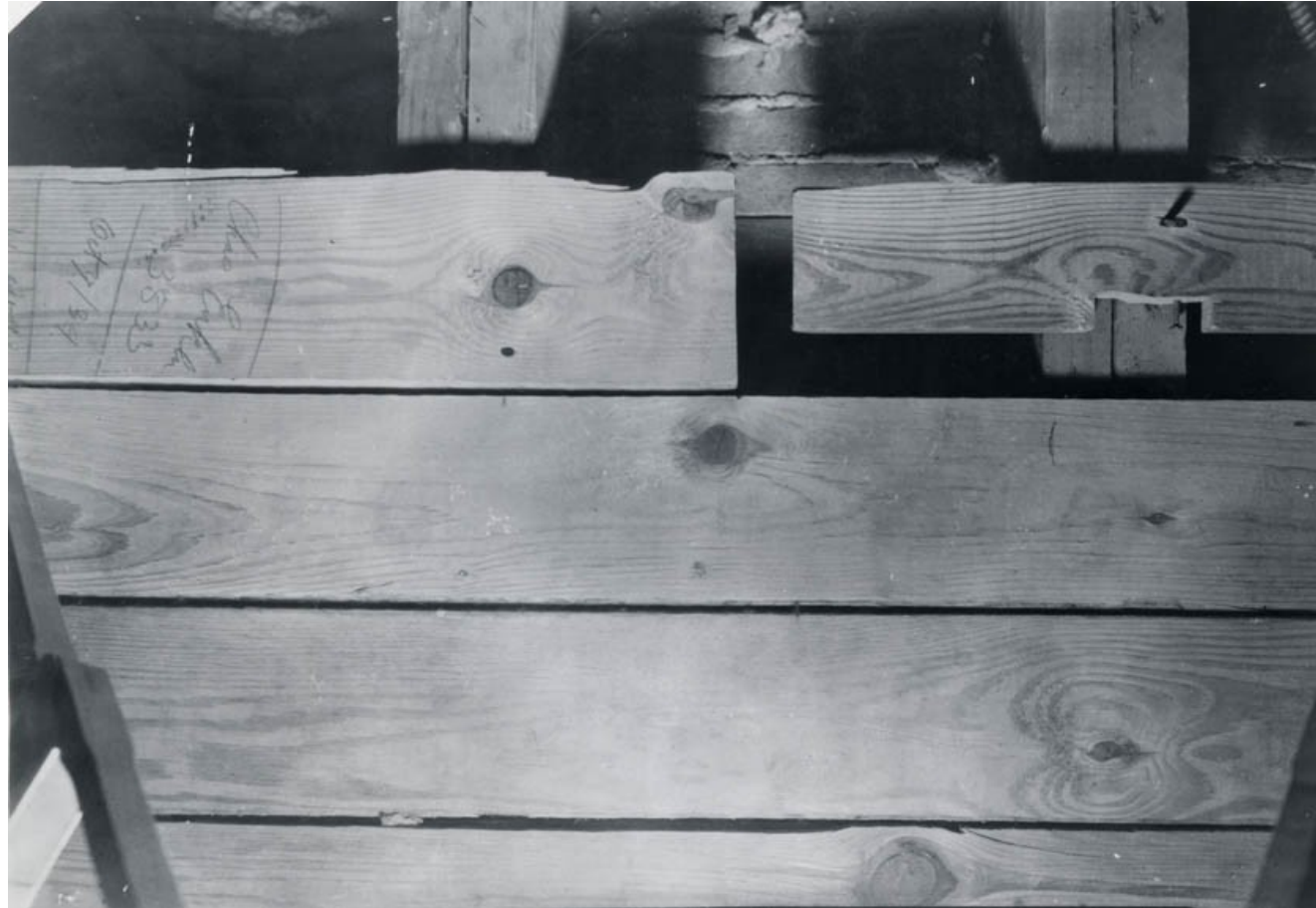




Comparison of wood grain in ladder rail #16 with attic floorboard, face and end grain



Hauptmann attic, Bronx - close up of ladder rail #16 in place on attic floor



Comparison of wood grain in ladder rail #16 with attic floorboard

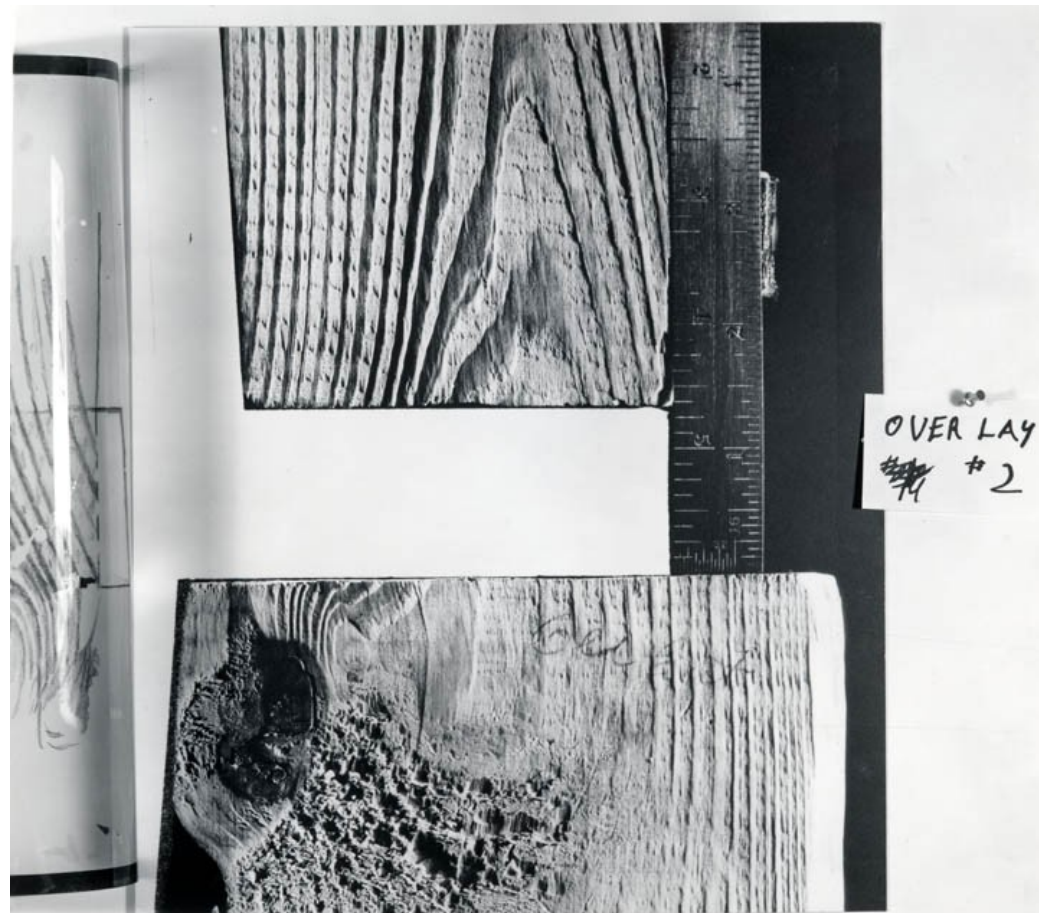
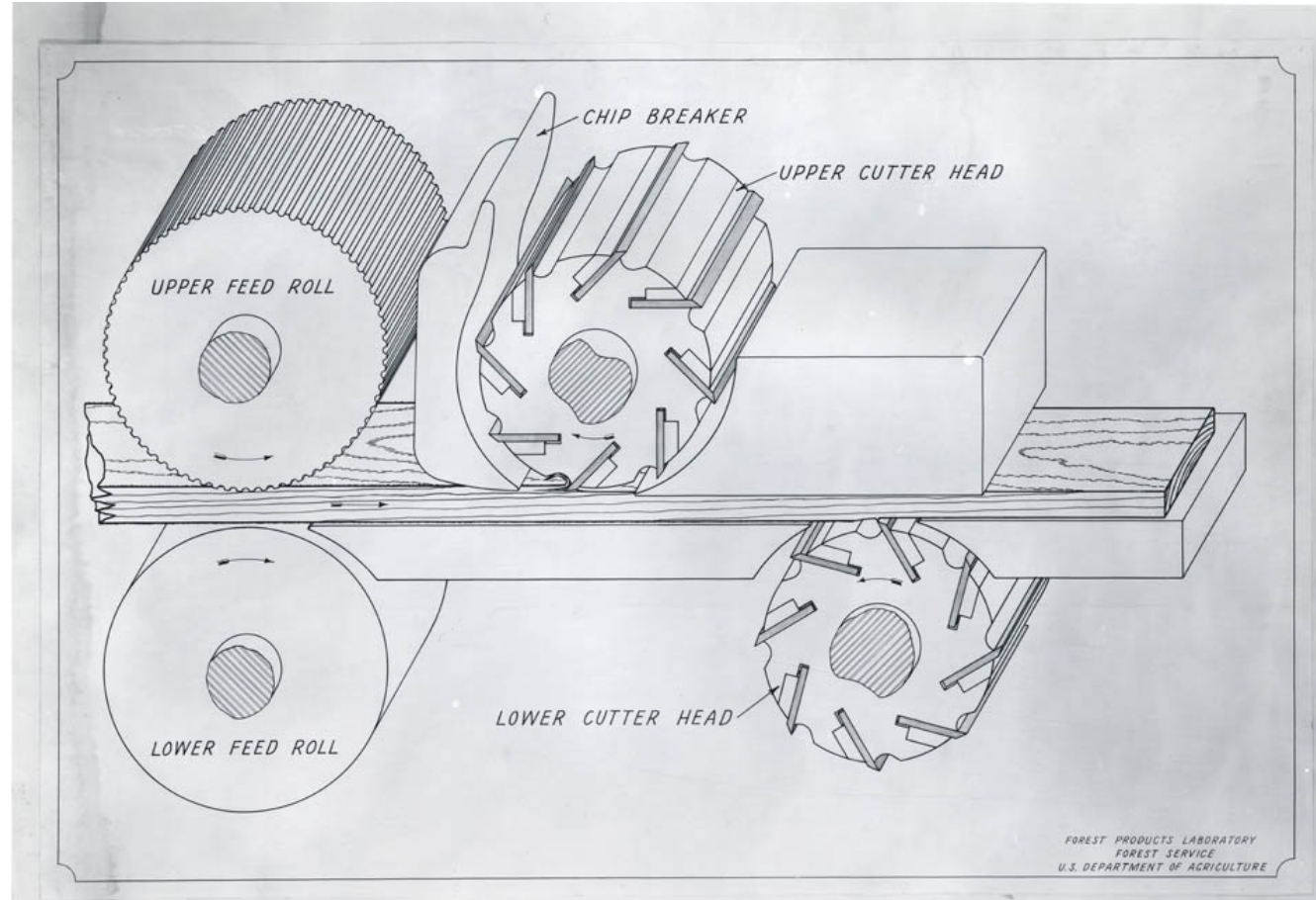
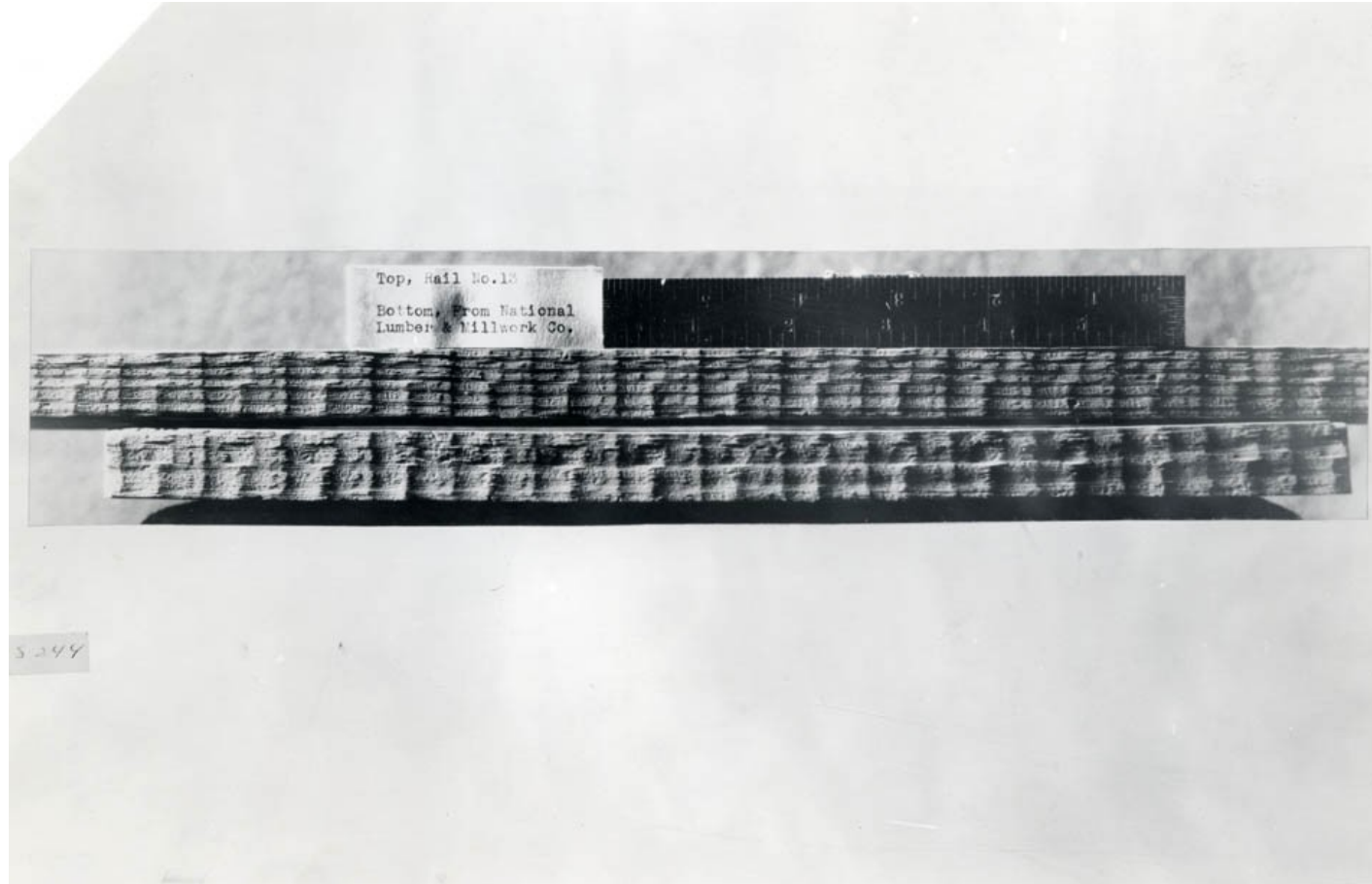
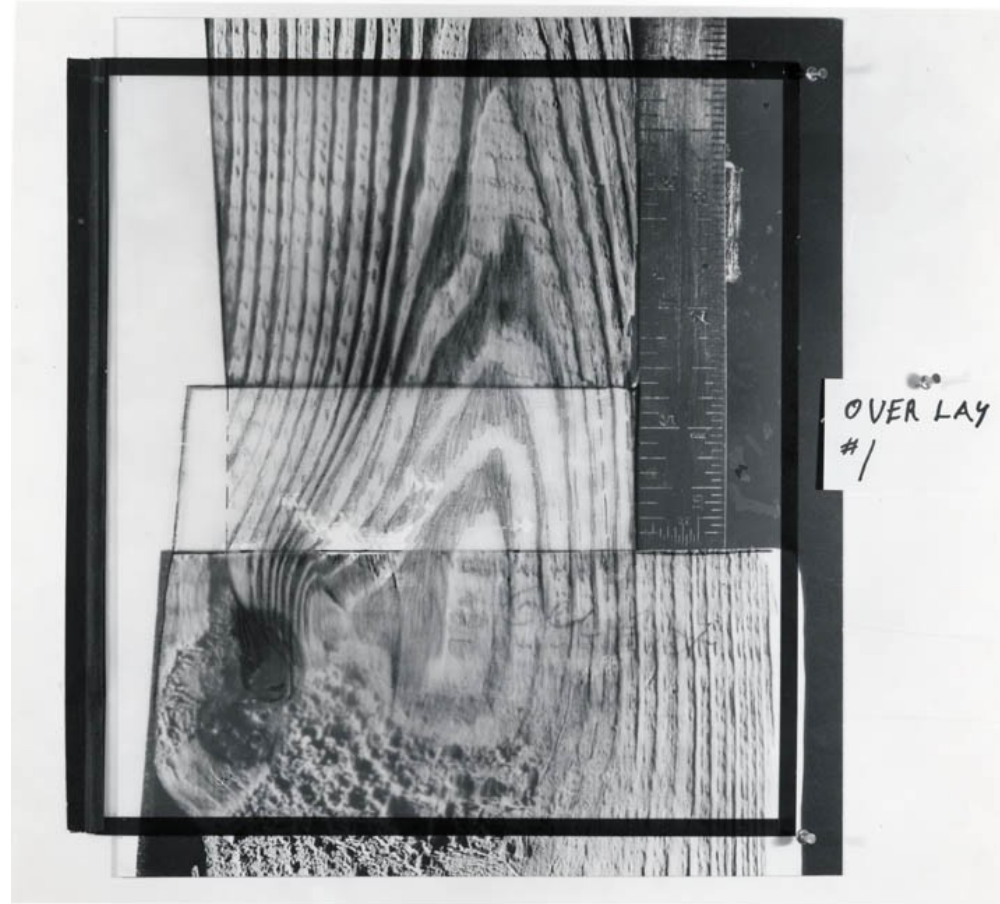


Diagram of milling machine for ladder lumber



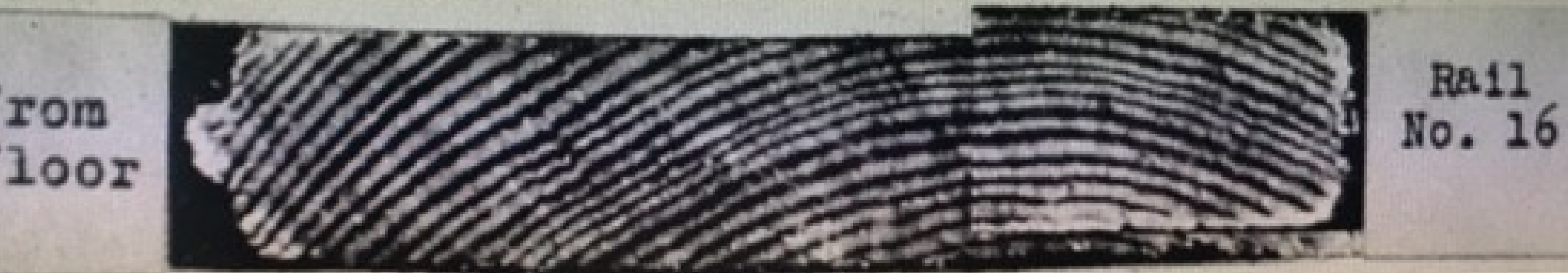
Comparison of milling marks in ladder rail #13 with lumber from National Lumber & Millwork Co., New





OVER LAY
#1

- Koehler microscopically examined portions of the ladder and discovered marks that suggested that a planing machine had been used to smooth the side rails. He discovered several distinctive marks on the wood that had been made by the machine. Koehler asked for planed wood samples from more than 1,500 mills across the country and discovered the same marks on wood milled by Dorn Lumber in McCormick, South Carolina. From there, he traced the wood used in the ladder to National Lumber and Mill Work Company in the Bronx, where much of the ransom money had turned up.

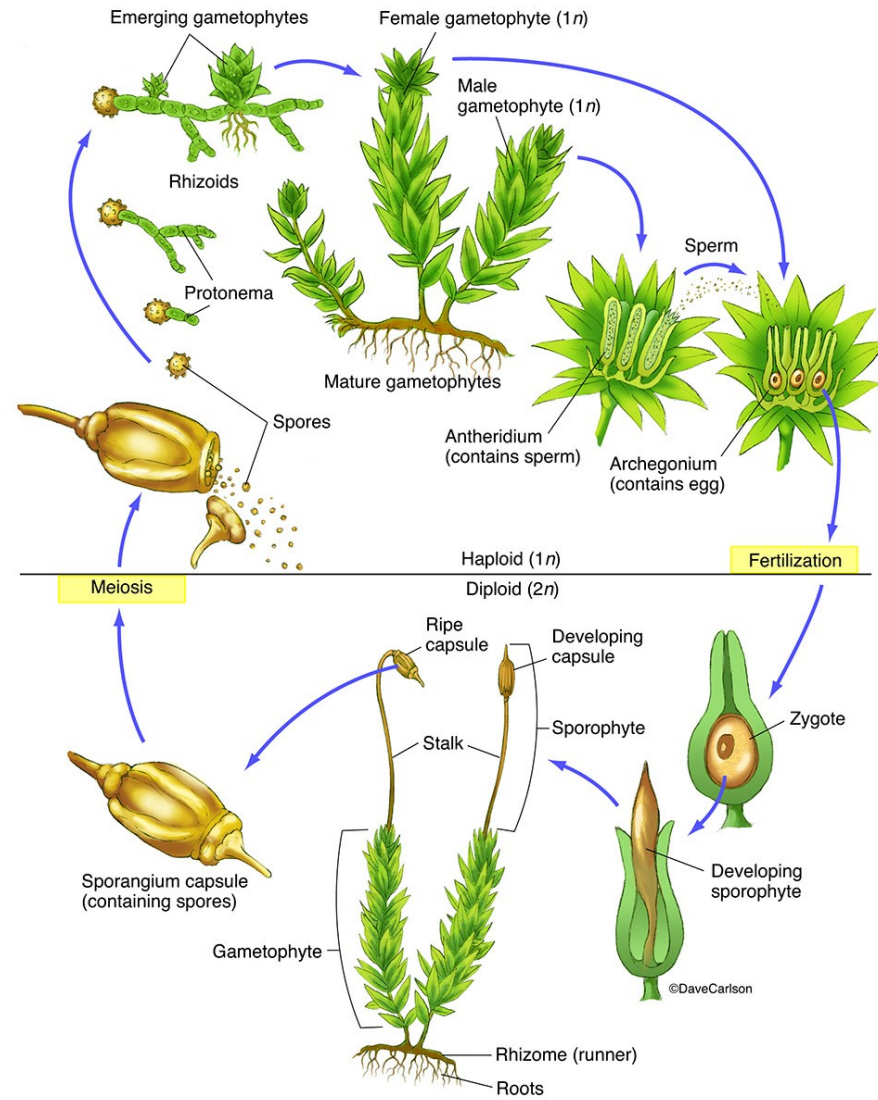


quence is offset by two rings. This was found to be consistent with the surf visible on the bark side surface of S-226, at a swell near a knot at the end of the surface of Rail 16²¹ (Figure 8). Therefore the offset of the rings that is photograph is not a discrepancy. In reality it displays consistency between the patterns, and demonstrates that the combined ring patterns of the two boards are in a relationship

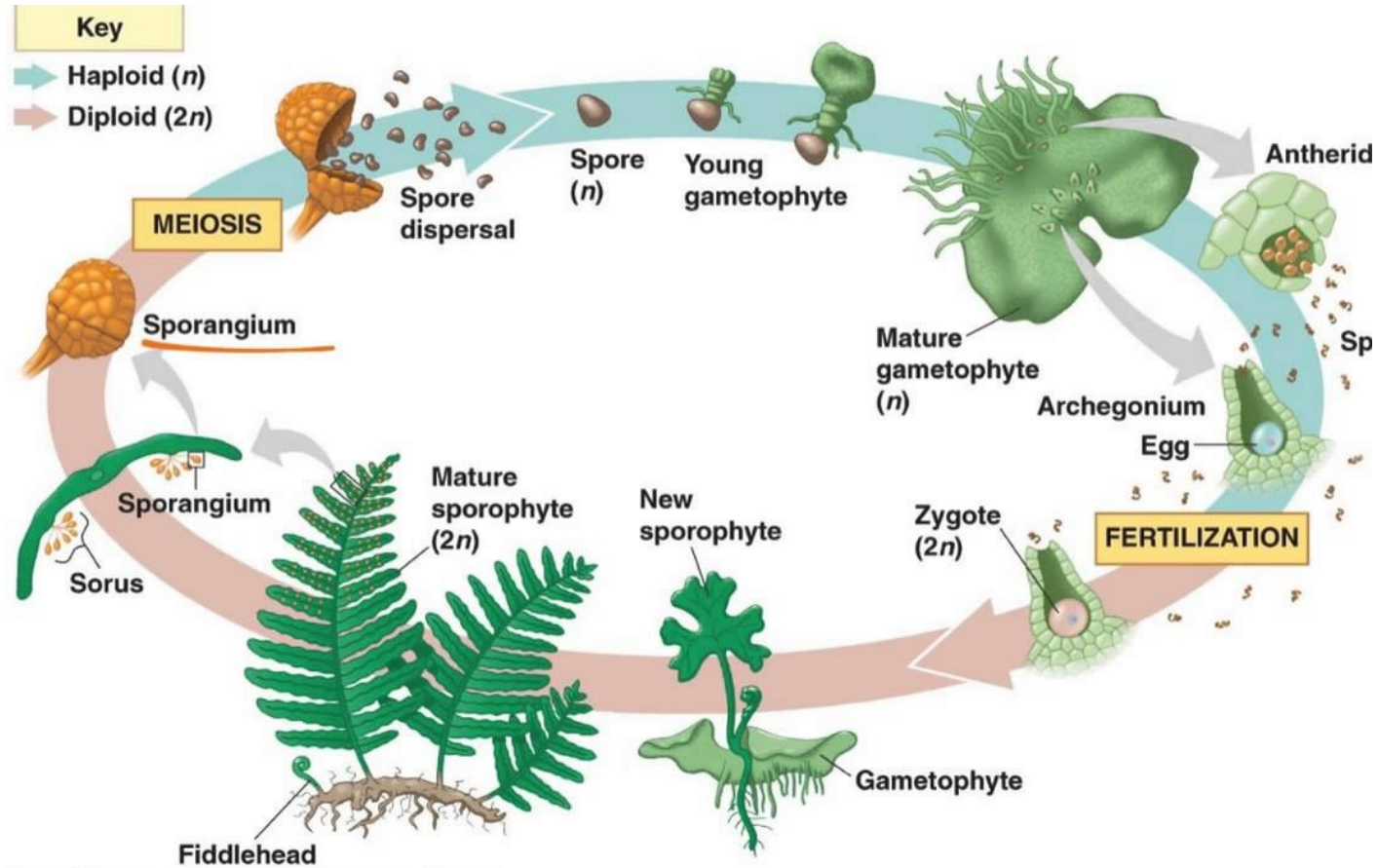
Now Disseminules and Life Cycles

- We started to introduce disseminules in the contexts of their life cycles and will continue, but we will get into greater detail in some of these later as specific ones become important in solving cases.
- A new concept to some of you will come into play now and that is the relationship between phases of plant life that are characterized by different ploidy levels—that is by different complements of chromosomes—we have 46—diploid (23 from each parent)
- In some plants there are haploid phases

Moss Life Cycle



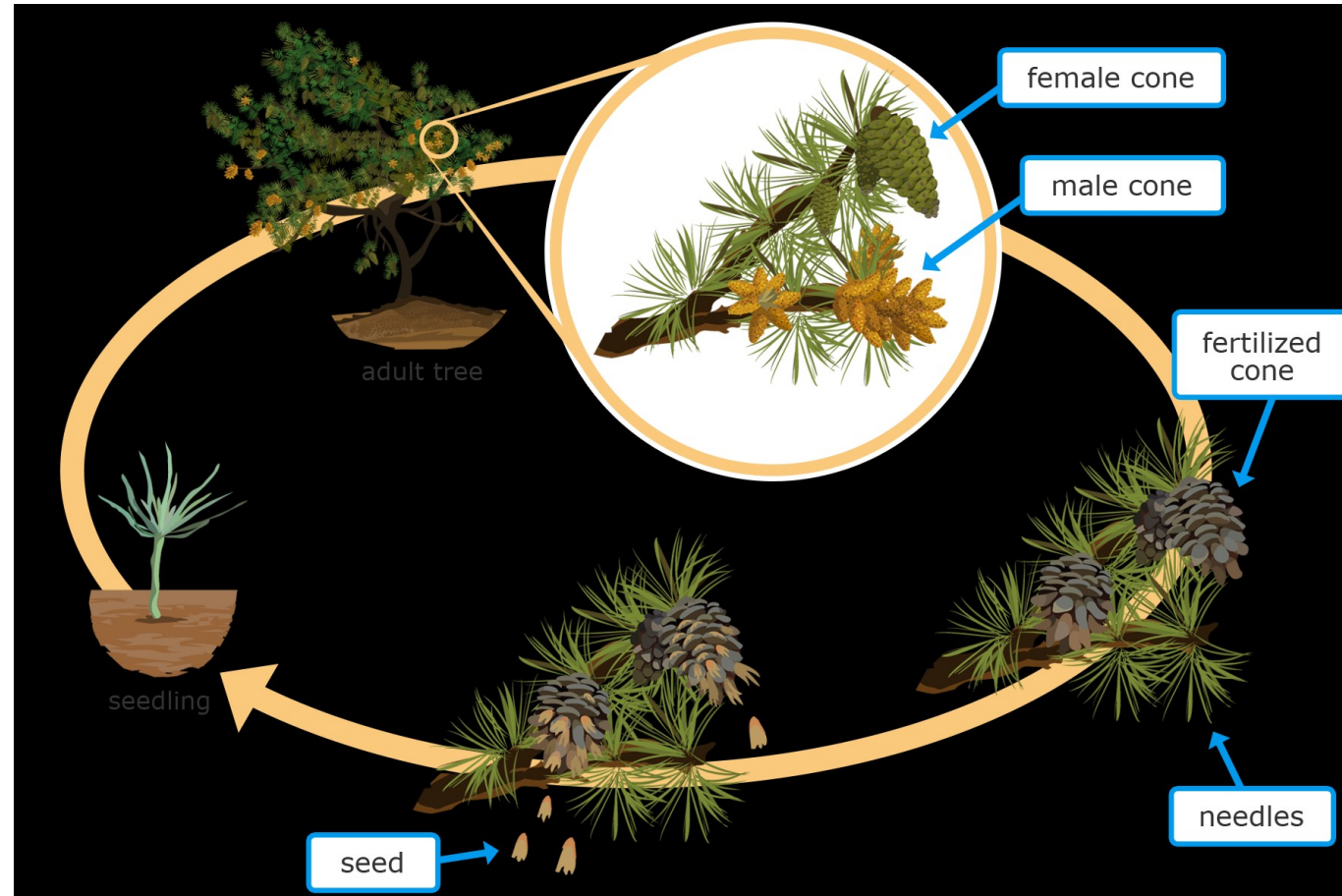
Disseminules in Ferns



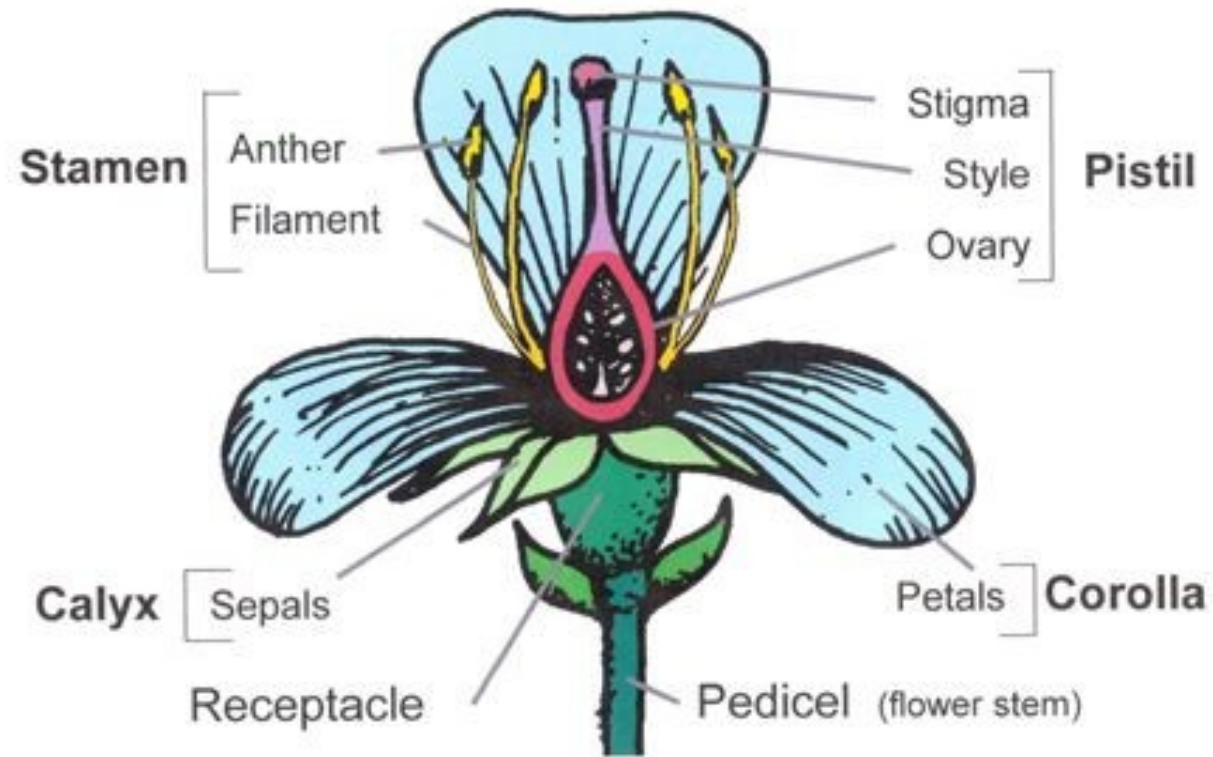
Pollen



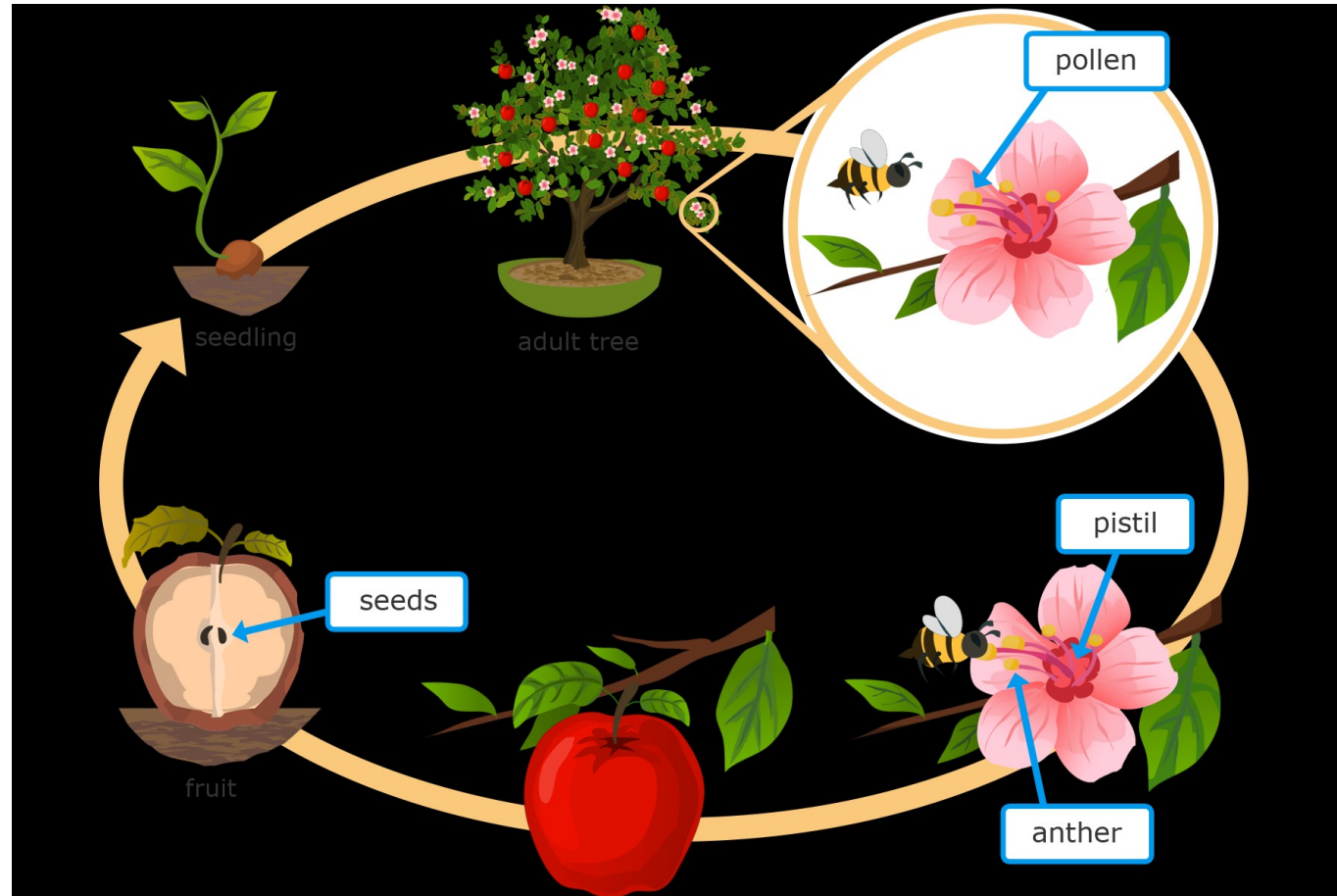
Disseminules--Conifers

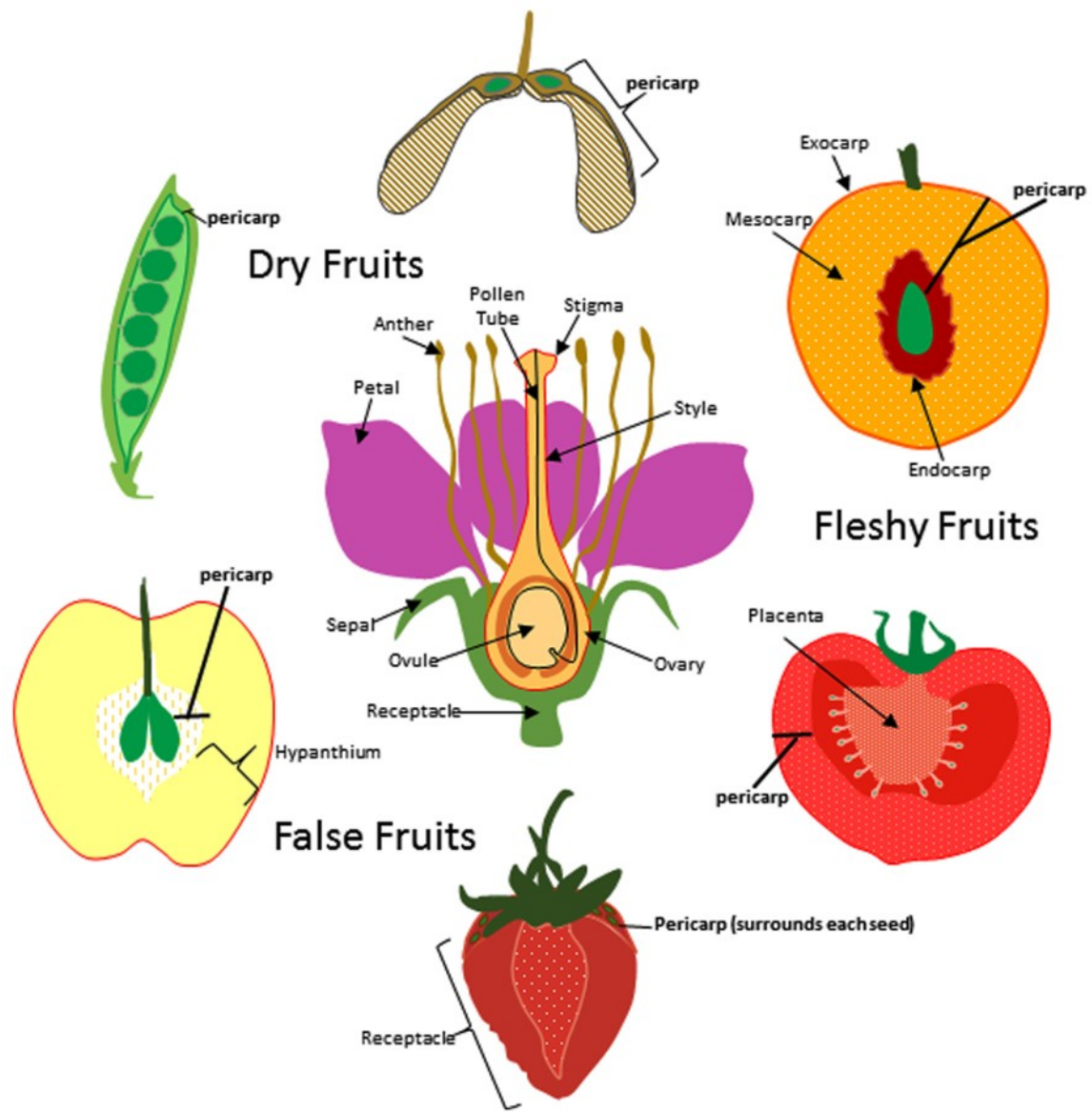


Flowers--disseminules



Disseminules and the life cycle flowering plants







Seeds as dispersal units

How Seeds Travel

by the wind



milkweed



dandelion



maple

by animals



beggar-ticks



sandbur



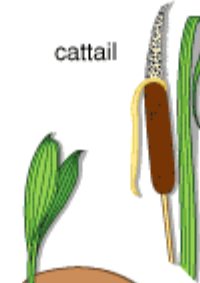
blackberry

by water

lotus



cattail



coconut

by bursting



violet



jewelweed



witch hazel

by humans



bean



wheat



cherry

Disseminules-Trichomes

