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Chestnut Phenotypes and Plant Pathogens

B3 Summer Science Camp
at Olympic High School

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Collecting samples in nature

- What is the goal?
- How do you identify those specimens you want from everything else that looks similar but is something else?
- What part of the specimen is important to later studies?
- How do you preserve the part(s) you care about?
- How do you make sure your record-keeping is good? What things should go in the record?

Known differences in the two species

- The overall height and shape of the two trees is quite different
- Density of simple vein hairs on the lower (abaxial) surfaces
 - The abaxial interveinal leaf surface of the American chestnut is glabrous (smooth, without hairs)
 - The abaxial interveinal leaf surface is pubescent in the Chinese chestnut (very hairy)
- Density of simple twig hairs in the leaf midribs and secondary veins
 - The petiole, midrib and secondary vein of the Chinese chestnut Sun leaves are covered in dense simple hairs as are the twigs, while they are not visible on the twigs and sparse on the other parts of the American chestnut
- Stipule size (little outgrowths on each side of a leaf where it joins the petiole)
 - Stipules are wide at the base (5-10mm) of the Chinese chestnut and taper to a point
 - The American chestnut stipule is narrow at the base (1mm) and slowly tapers to a point.
- Stem color
 - Growing American leaves have a reddish stem
 - Growing Chinese leaves have a green or tan stem.



American at Maturity: 75-100 ft high, 15 ft in diameter, have a single main trunk



Chinese at Maturity: 40-60ft with a 40-50ft crown, multiple main trunks, branches droop.

Pollination

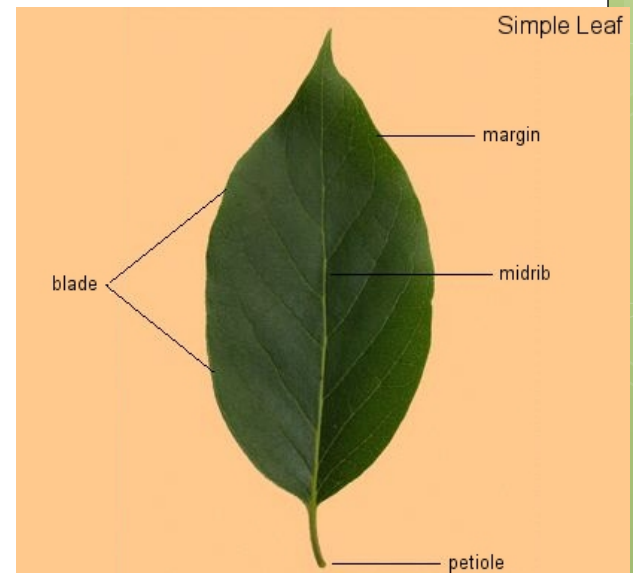
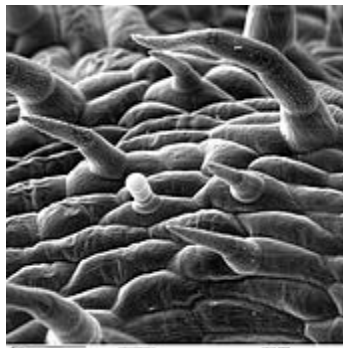
- Chestnuts are monoecious (mono-ee-shus): both male and female flowers appear at the same time on the same shoots of a tree.
 - Flowers are on the tips (after leaves expand).
- Chestnuts are self sterile – they will not self pollinate. The wind is the major way they are pollinated (not insects).
- Seedlings need 5-7 years before they produce nuts.



These are called catkins – the female flowers are at the base and the male flowers extend along the length.

Leaf anatomy and vocabulary

- The upper surface of a leaf is called adaxial
- The lower surface of a leaf is called abaxial
- The main part of the leaf is the leaf blade or lamina
- The little hairs that you can see are called trichomes.



Nuts and Leaves



American leaves have sharp 'teeth' and are 5-10 inches long.. Usually there are 3 - 7 nuts in a bur. The nuts are hairy near the tip.

Chinese chestnut leaves are 4-8 inches long, oblong with serrated edges. There are 1-3 nuts per bur, they are 1-3 inches across, and smooth.

American Chestnut: Twigs and Leaves

- The leaves are smooth and thin
 - There are few hairs on abaxial surface or twig
 - Petiole is red, twig is brown
 - There is a very sharp angle where the leaf joins the petiole.



Chinese Chestnut Twigs and Leaves

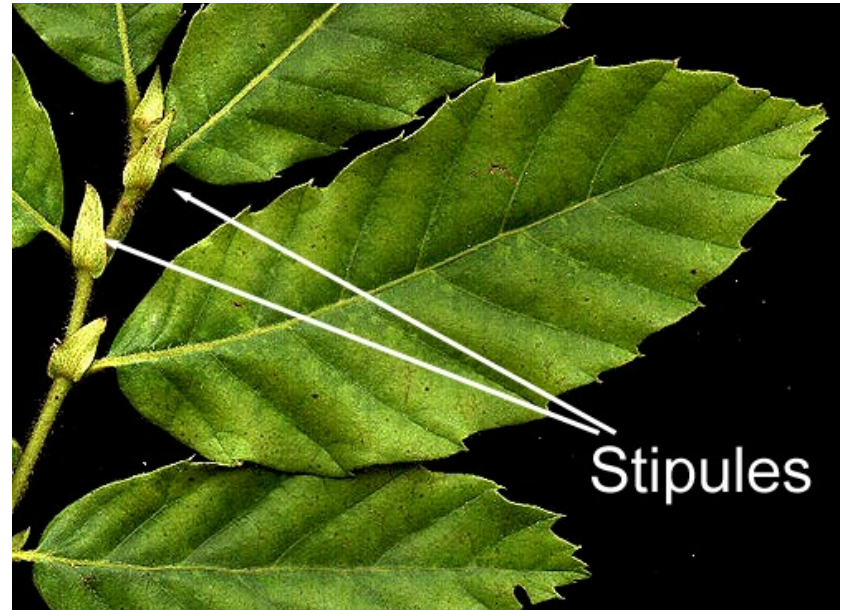
- Chinese: the leaves are thicker, hairy on the lower surface
- The twigs are brown and have hairs.
- The base where the leaf meets the petiole is wider.
- The petiole is green or tan



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Bark /Blight (Cryphonectria parasitica)



Now that you know some of what you will be measuring, here are some good tools

- Measuring tape, rulers to mm
- Magnifying glass
- Camera that can take close-ups.
- Notebook or voice recorder
- GPS(location, including altitude)
- Sample collection and labeling materials (baggies, tubes, water-proof pens)
- Sample preservation materials (ice, dry ice, drying agents, enzyme inhibition materials)