From Macro to Micro:

American Chestnut Tree Identification

KENDRA COLLINS

MAY 2, 2020

American Chestnut 101

The basics

American Chestnut (*Castanea dentata*)

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- Member of the *Fagaceae* family
  - Beech (*Fagus*), chestnut (*Castanea*) and oak (*Quercus*)
- Species of *Castanea* native to north America
  - ***Castanea dentata* – American chestnut**
  - ***Castanea pumila* – Chinquapin or Allegheny Chinquapin**
  - *Castanea ozarkensis* (*Castanea pumila* var. *ozarkensis*)– Ozark Chinquapin
- Non-native *Castanea* species
  - ***Castanea mollissima* – Chinese chestnut**
  - ***Castanea crenata* – Japanese chestnut**
  - ***Castanea sativa* – European chestnut**
  - *Castanea henryi* – Henry's chinquapin (China)
  - *Castanea seguinii* – Seguin chestnut (China)

A Tale of Two Chestnuts…

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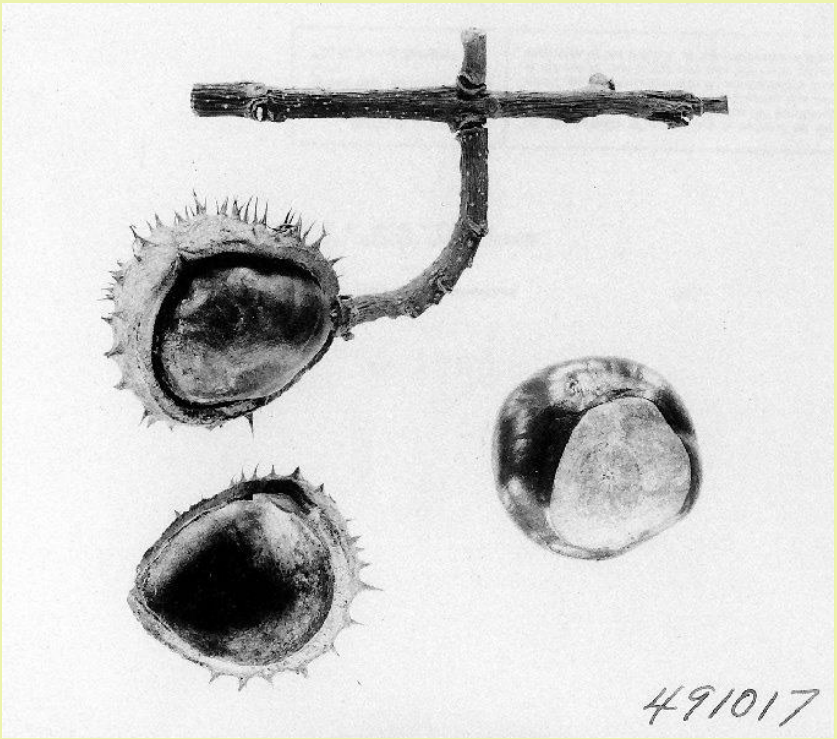
American chestnut: *Castanea dentata*

Horse chestnut: *Aesculus hippocastanum*

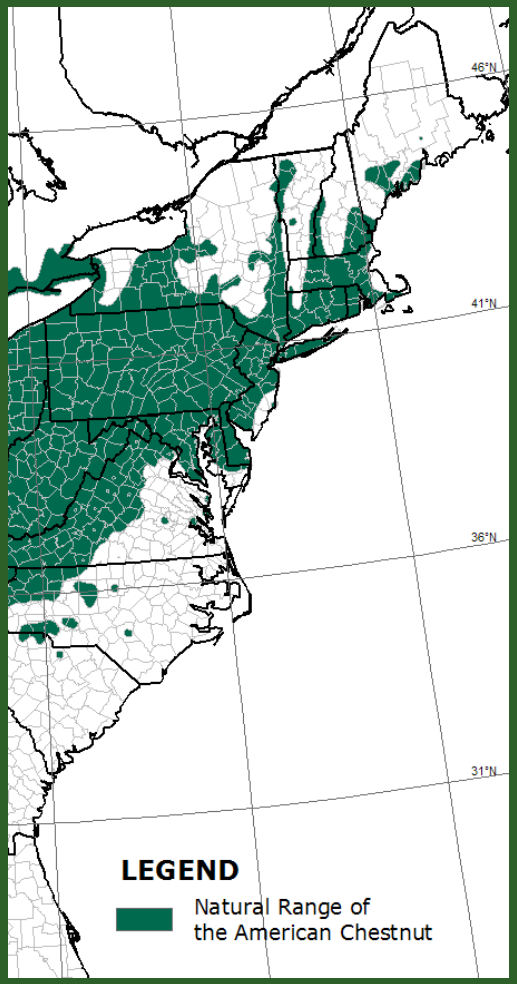


Robin R. Buckallew @ USDA-NRCS PLANTS Database

Chestnut Species

- Native:
  - American chestnut (3 nuts/bur)
  - Allegheny chinquapin (1 nut/bur)
  - Ozark chinquapin (1 nut/bur)
- Imported (with recorded dates):
  - European chestnut (1773)
  - Japanese chestnut (1876)
  - Chinese chestnut (1912)
- Hybrid Chestnuts:
  - Hybridizing efforts have been recorded in the US beginning in 1895
  - The Connecticut Agriculture Experiment Station has been breeding chestnuts since the 1920's

Historic Range



Simple, Alternate

Deeply toothed, teeth hooked or curved in

Narrow taper at base

Small, pointed buds

American Chestnut ID: Leaves

Male and female flowers

Self-infertile

Flower in late June, after risk of frost

Wind and insect pollinated

American Chestnut ID: Flowers

Densely spiny bur

Nuts three to a bur, large, brown and shiny

Un-pollinated nuts are flat and rectangular

American Chestnut ID: Burs and Nuts

Timber-form

Bark has wide, flat ridges

American Chestnut ID: Mature Tree

Root-collar sprouts are most common today

American Chestnut ID: Root-Collar Sprouts

Germplasm Conservation

Identification and use of American Chestnuts by TACF

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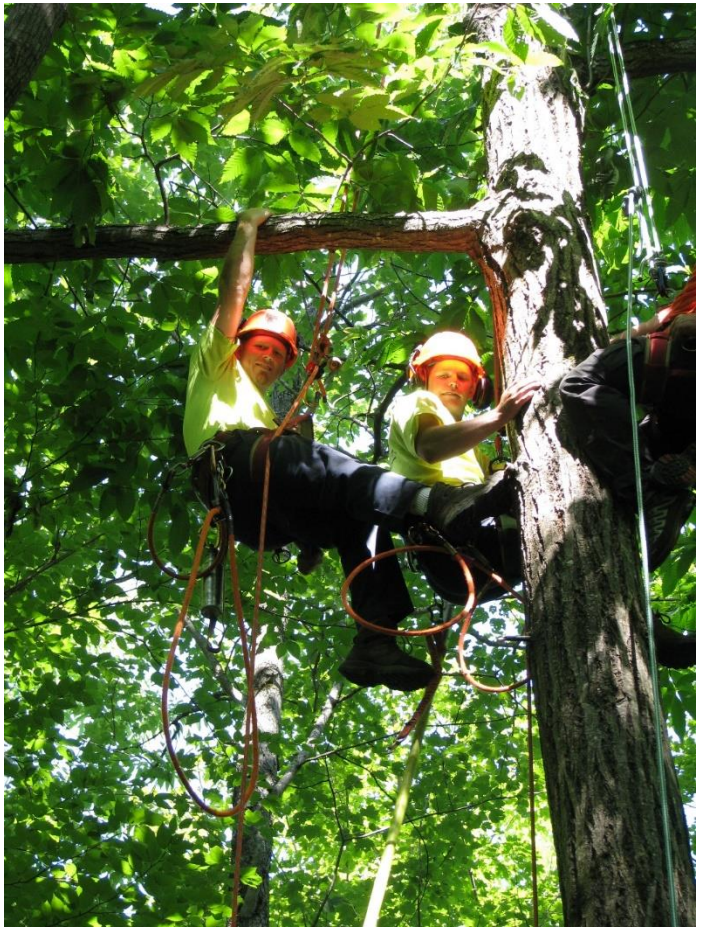
Finding American Chestnuts

Looking for trees that are:

- American
- Native to their state or source known
- Flowering

- Tree Locator Program:
  - Tree Locator Form
  - TreeSnap
  - Collect and press leaf/twig sample
  - Send in for ID
  - Documentation in *dentata*Base
  - Use for pollination, grafting, etc.



Website:
www.acf.org/resources/identification/

Tree Locator Form:

- Location information, including TreeSnap ID (if used)
- Tree observations (or in TreeSnap)
- Contact information for submitter and/or owner
- Do NOT wrap in plastic or ship in a plastic envelope – samples get moldy
- Typically takes 4-8 weeks to get results – no need to spend a lot on fast shipping
- Sample after full leaf-out
- Timing may be impacted by COVID-19 office closures. Please check in with TACF staff member before shipping to ensure best address during this time.

Purpose: This form is to help TACF® record, map, and analyze chestnut trees across their native range.

Result: An analysis of the macro and microscopic characteristics of the leaf and twig sample will be completed by a TACF identification expert and the results will be sent to the submitter in 4-8 weeks.

LEAF and TWIG SAMPLE

- 6-12" of twig and *attached, mature* leaves growing in the full sun.
- Press sample *flat* between sheets of cardboard and place in an envelope.
- Use a single paper towel between the sample and cardboard to cushion and absorb moisture.
- Do *not* wrap in plastic, as samples will mold in the mail.
- Do *not* ship overnight. It's not necessary and we won't ID your sample right away.

Learn more about our Partner TreeSnap at TreeSnap.org

Tree Locator Form

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Location:

County: _____

Town: _____ State: _____

Latitude (N): _____ Longitude (W): _____

TreeSnap Submission ID (Optional): _____

Location information is crucial. The closer you can get us to a tree with your directions, the better. Lat/Long measures are the best.

- You may obtain location information from **Google Maps** (http://maps.google.com). Right-click and select "What's here".
- If you can't obtain Lat/Long measurements, then please **attach a map and/or directions** to the tree from the nearest road.

Tree Information:

SIZE: Diameter (inches @ 4.5ft): _____ Height (feet): _____

HOW MANY: ☐ Isolated Tree ☐ Clump of Trees (number): __

☐ Clear-cut w/ many sprouts/trees _____ (~acres)

NUTS: Burs: ○ None ○ Few ○ Many ◉ Unknown

CATKINS: ○ Present ○ Absent ◉ Unknown

SURROUNDINGS: ○ Full Sun ○ Partial Shade ◉ Full shade

BLIGHT: ☐ Not Visible ☐ Visible < ☐ Sunken Canker, ☐ Swollen Canker

Could we reach the tree with a large truck? ○ Yes ◉ No

Comments: _____

Owner of Property Information

Name: _____ Phone: _____

Address: _____

City: _____ State: _____ Zip: _____

E-mail: _____

Form Submitted By:

Are there restrictions to viewing the tree? ◉ Yes ○ No

Is permission of the owner suggested before viewing? ◉ Yes ○ No

Name: _____ Date: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ E-mail: _____

Submission address - please choose the office closest to the tree located.

Tom Saielli, TACF, 900 Natural Resources Drive, Charlottesville, VA 22903

Sara Fitzsimmons, PSU, 206 Forest Resources Lab, University Park, PA 16802

Kendra Collins, USFS NRS/UVM Forest Science Lab, 705 Spear St, South Burlington, VT 05403

v. 04/15/2020

American Chestnut

US Units

Submitted By	Jack Swatt
Custom Tree Identifier	NSF5
ID	1006191
Nuts/burrs	None
Catkins	Present
Crown Health	1 - Healthy
Planted vs. Wild	Wild
Tree Height	15 Feet
Tree Diameter	2 Inches
Address	304 Hunters Mountain Rd, Naugatuck, CT 06770, USA
Coordinates	41.47177855022389, -73.08321436873923
Location Accuracy	Within 5 meters radius
Date Collected	June 23, 2018 10:23 AM
Photos	See All Photos

Photos | Map

TreeSnap

Tree: Naugatuck3 (State Forest) Edit Delete

Genet: Naugatuck3 (State Forest) (sole member)
Aliases: CT-NK185
Alive? Alive
Shortcode: CT-NK003
Classification: American

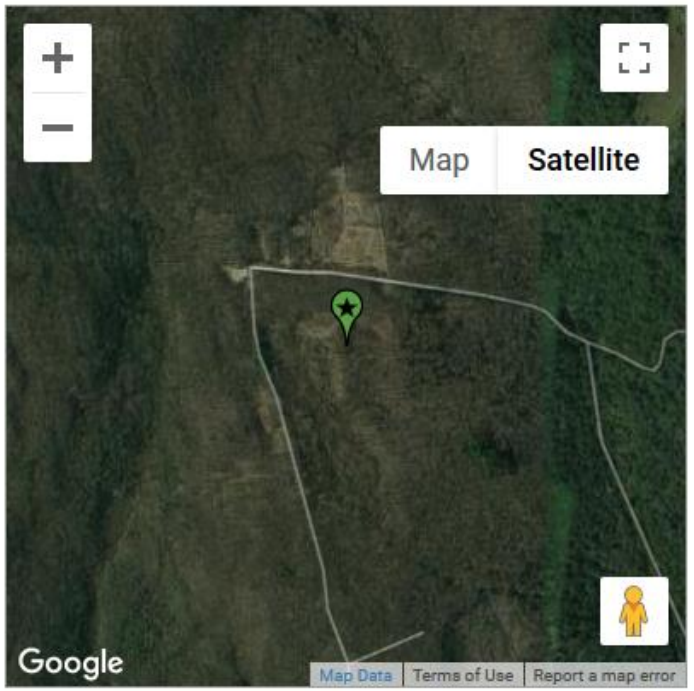
Comments:
In regenertating tree patch with many young trees nearby. Recently dead chestnut nearby

City: Naugatuck
County: New Haven
State: CT

Submitted by: Jack Swatt
Owner: State of Connecticut

Number of trees: Single tree
Planted? Unspecified
Are there restrictions to viewing the tree? Unspecified
Should contact owner before visiting site? Unspecified
Permission to use the tree for pollinating activities? Unspecified
Permission to use the tree for harvesting nuts? Unspecified

Accessible by:
bucket truck? No
ladder? No
tree climber? No



Observations

Observations on this tree, as well as all related entities

Germplasm Conservation Orchards

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ID and Harvest

- Tree Locator Program
- Harvest at least 30 nuts per tree

Plant and Use

- Typical 100 nuts/GCO: 10 sources, 10 nuts each
- Uses:
  - Long-term conservation
  - Diversify transgenic chestnuts
  - Nuts for research
  - Educational opportunities
  - Diversity research (i.e. phenology)

Chestnut Species ID

Comparing *Castanea*

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American chestnut

Leaf hairless, except for sparse hairs on veins

Leaf fairly thin and papery

Leaf canoe-shaped with deeply toothed margins

Twig hairless and red to chestnut-brown

Bud **smooth**, and brown, **pointed** and usually askew on the twig

Large, timber-form tree (at maturity)

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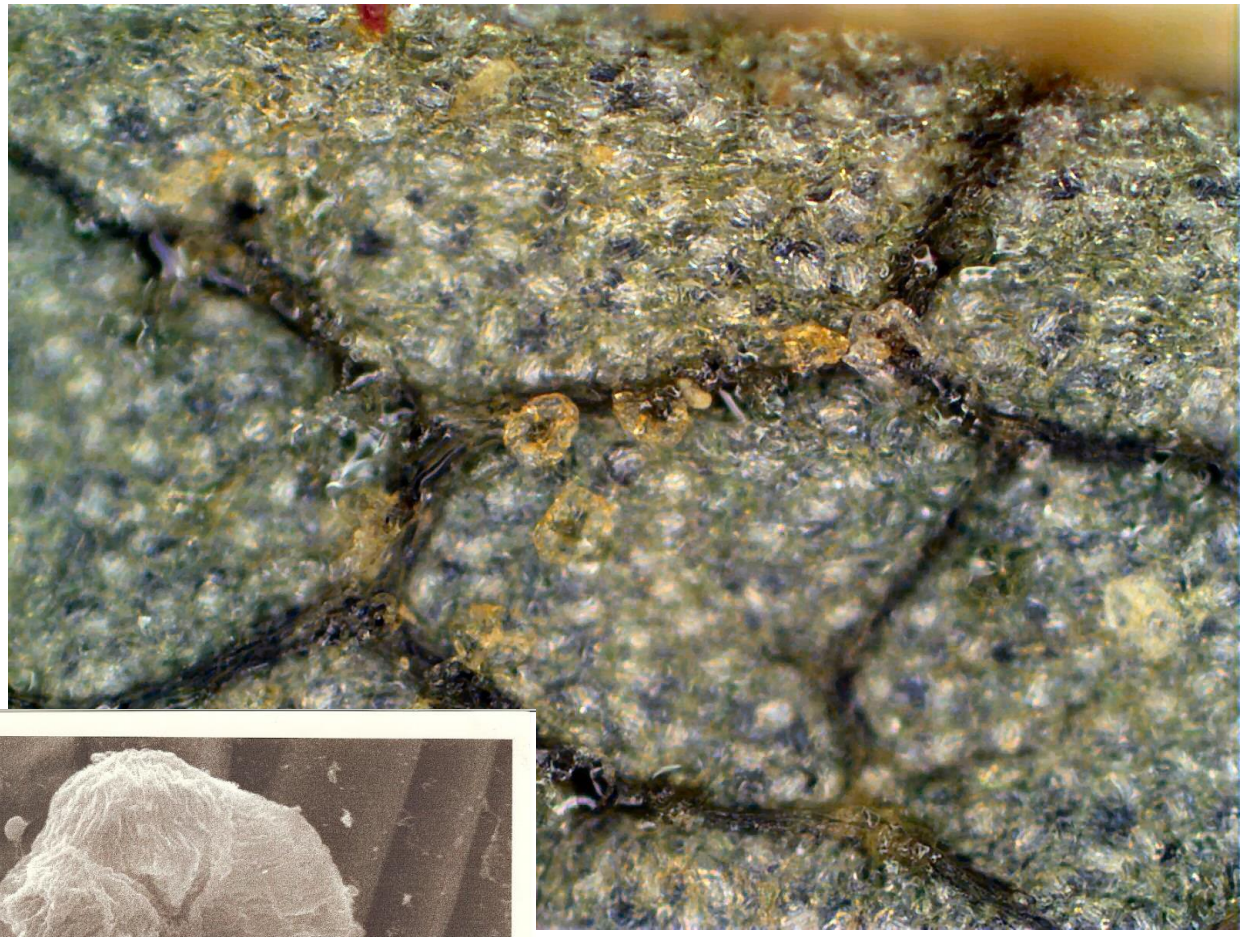
American chestnut

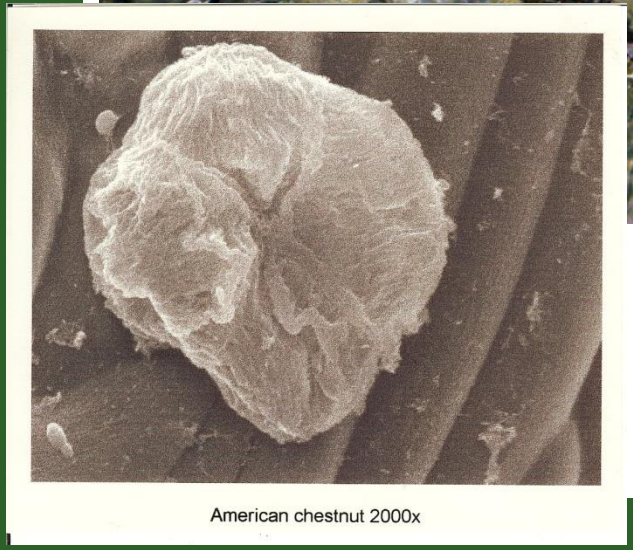
Underside of the leaf:

No hairs, besides a few on veins

4-celled glandular hairs, called trichomes, on leaf surface

4-celled American trichomes have **"hot cross bun"** shape





American chestnut 2000x

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Chinese chestnut

Leaf **glossy**, usually **hairy** on underside

Leaf **thick**, may be leathery in texture

Leaf **oval** to row-boat shaped with wedge-toothed margins

Twig **pea-green** to tan, new growth **hairy**

Bud **round**, pea-green to tan, **hairy** and in-line with stem

Spreading, orchard-form tree

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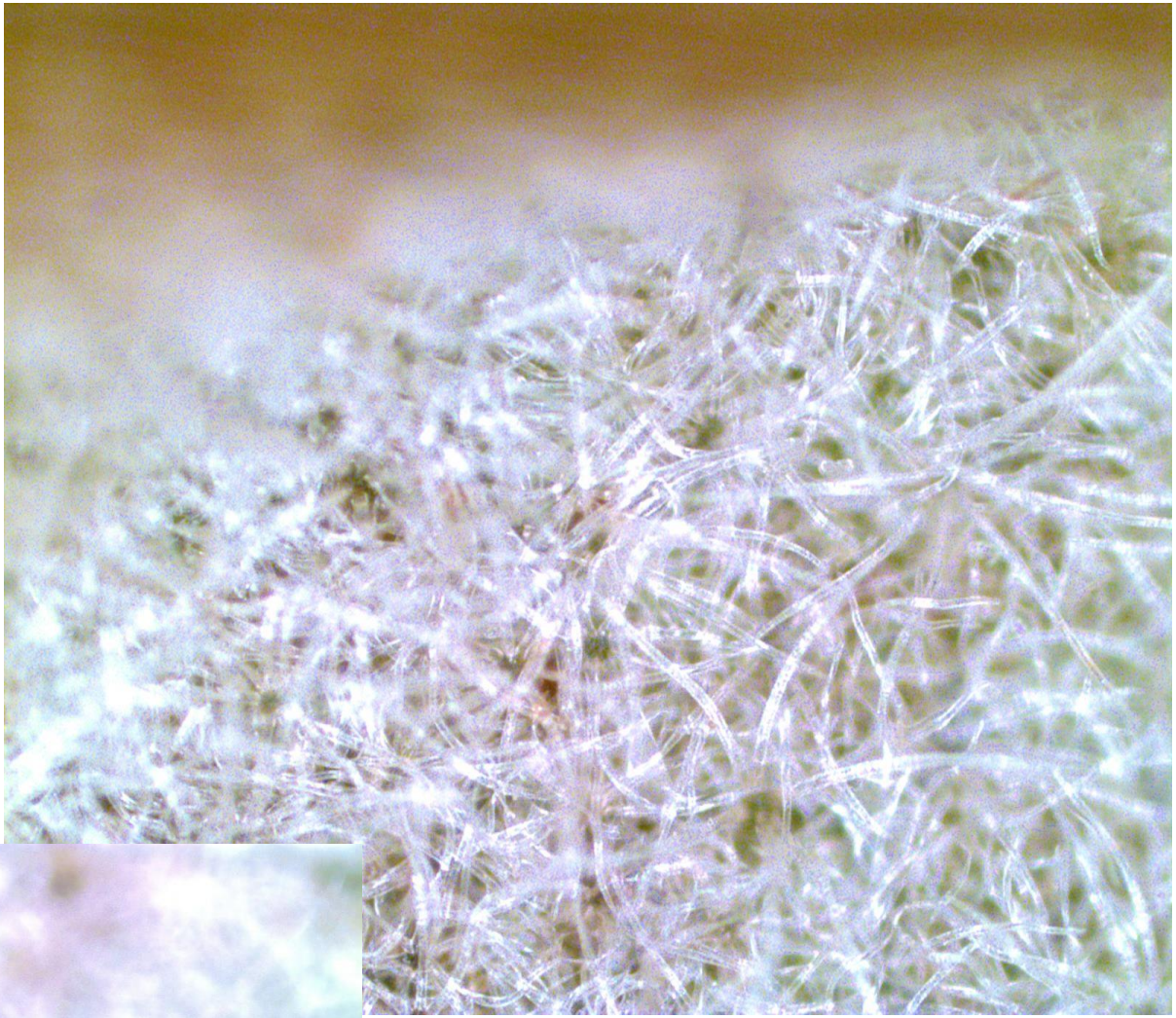
Chinese chestnut

Underside of the leaf:

Sun leaf **very hairy** – both stellate (star-shaped) and simple hairs

Stalked glandular hairs with **prominent heads**, (trichomes) on **leaf veins only**



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Japanese chestnut

Sun leaf **glossy**, **hairy** on underside

Leaf **narrow**, oval with **blunt base**

Bristle-toothed margins

Twig **pinkish-brown**, new growth hairy

Spreading, orchard-form tree

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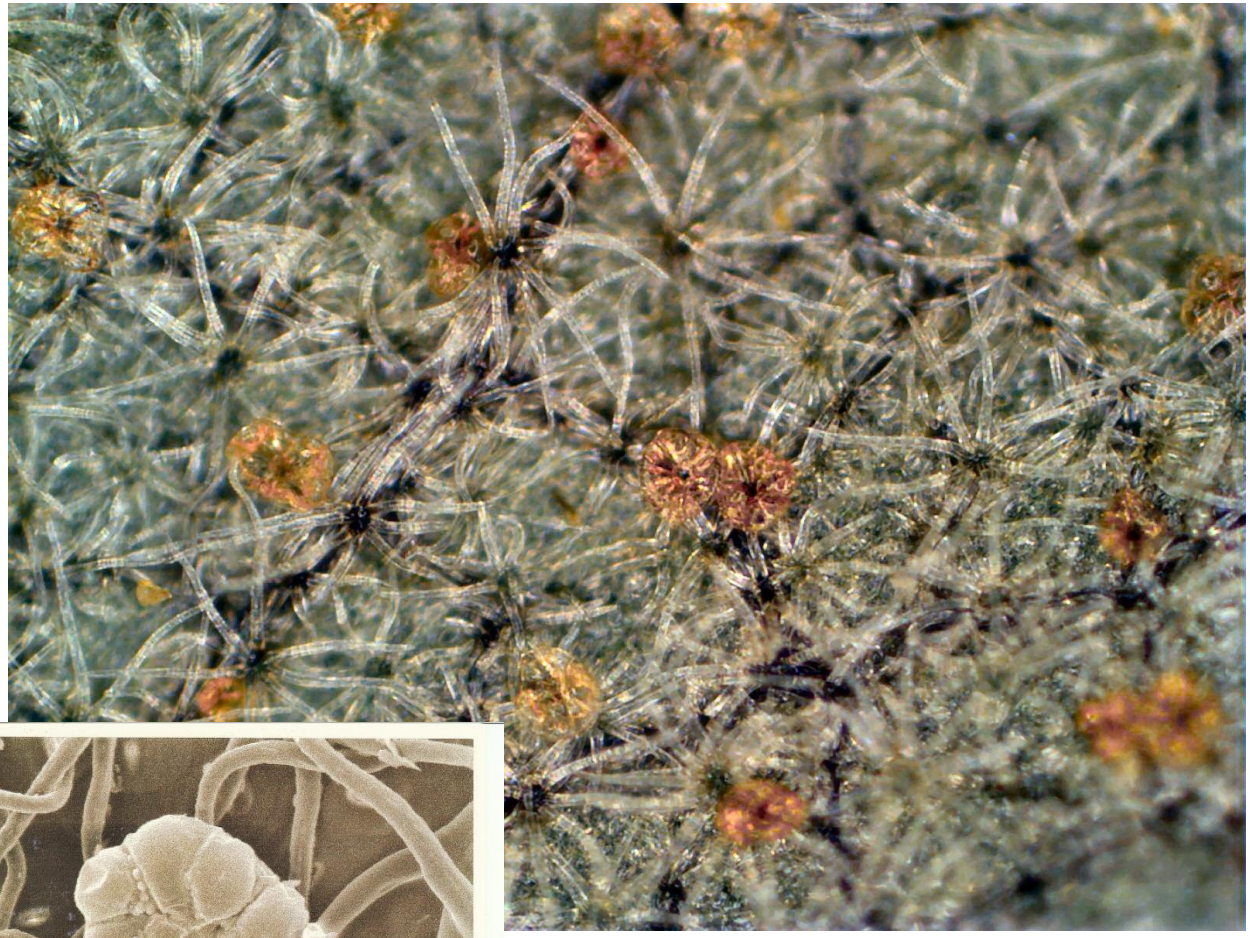
Japanese chestnut

Underside of the leaf:

Sun leaf **hairy** – both stellate (star-shaped) and simple hairs

9-celled glandular hairs (trichomes) on leaf surface

9-celled trichomes **much larger** than American trichomes



Japanese chestnut 1000x

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European chestnut

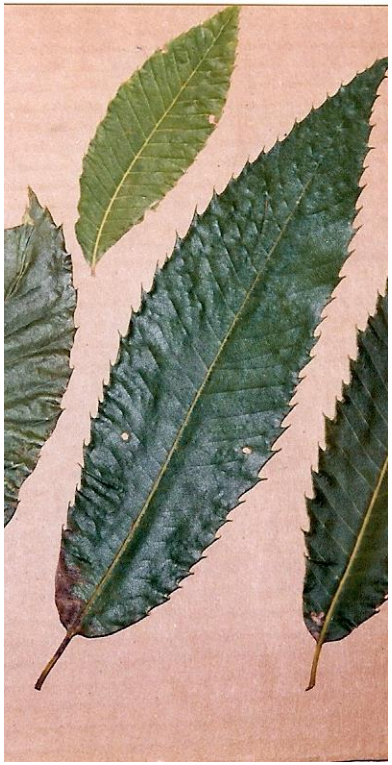
Leaf **most similar** to American, more triangular leaf margins

Leaf base often **rounded,** with a **long petiole**

Leaf underside may be **hairy**

Twig **very thick** and coarse, **dark brown** at maturity

Bud **very large**, may be reddish



Spreading, orchard-form tree

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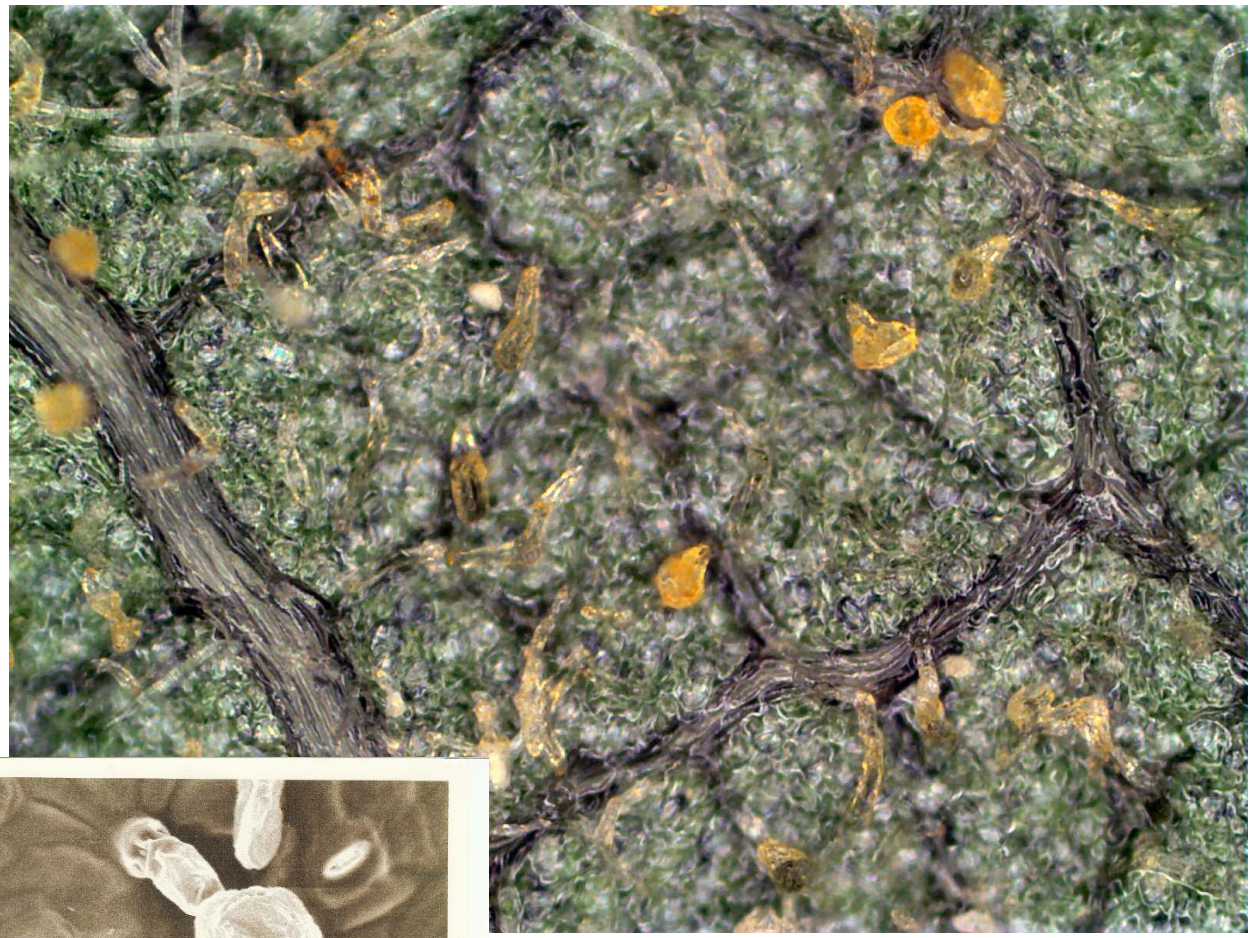
European chestnut

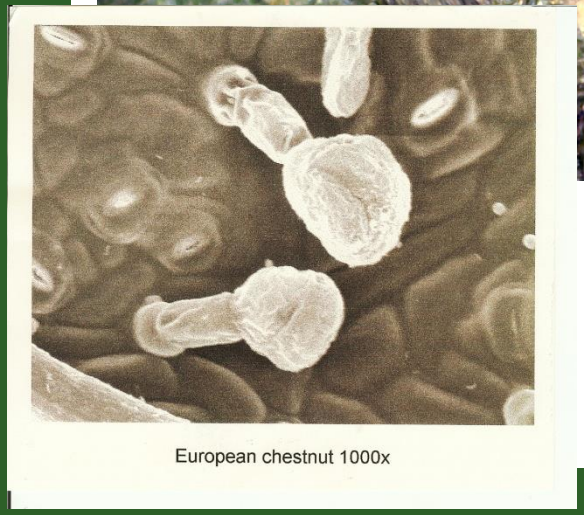
Underside of the leaf:

Vary between very hairy and not hairy

Stalked, club-shaped glandular hairs (trichomes) present, though often **difficult** to see

Stalked trichomes on **leaf surface** and **leaf veins**





European chestnut 1000x

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Allegheny chinquapin

Leaf usually **hairy** on underside

Leaf margins slightly to deeply toothed

One pointed **nut per bur**, instead of three

Burs form in **clusters**

Burs open in **two parts**, instead of four

Shrub or small tree

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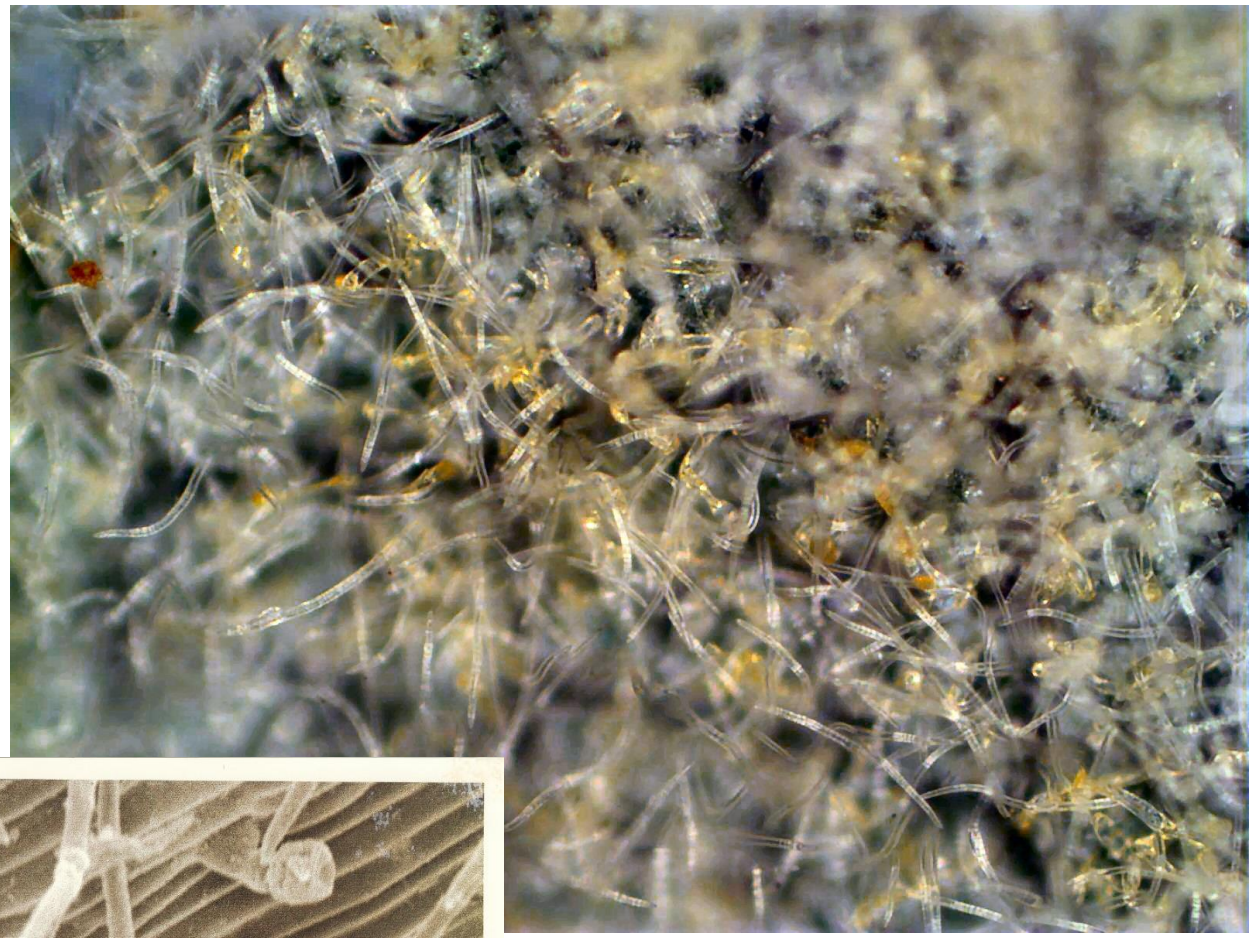
Allegheny chinquapin

Underside of the leaf:

Sun leaf usually **very hairy**

Both **simple** and **stellate** hairs

Bulbous glandular hairs (trichomes) on leaf surface



Chinkapin 1000x

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Species Comparisson

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Top side of leaves:

Underside of leaves:

Top row: Allegheny chinquapin
Bottom row: American, Chinese, European and Japanese chestnuts

Top and Side Views of Chestnuts.

From Left: American, Chinese, Japanese, and European

Species Comparison: Nuts

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Got Chestnuts?

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- **TACF and CT Chapter Websites:**
  www.acf.org and www.acf.org/ct/
- **Tree Locator Form:**
  www.acf.org/resources/identification/
- **TACF Fact Sheets:**
  www.acf.org/resources/tacf-fact-sheets/