

DNA-Based Identity Testing in Apples

In Search of the Forgotten and Old New

WESLEY CRUMP

USU EXTENSION
HORTICULTURE

WASATCH AND SUMMIT
COUNTIES



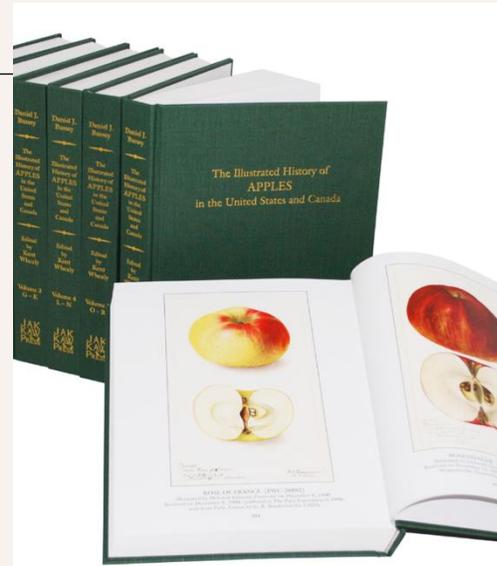
Backstory

- Wasatch Back Fruit Tree Project began in 2023
 - *"Identifying and preserving fruit trees that survive and thrive along the Wasatch Back"*
- 60 participants
- 350+ apple and peach trees
- Report bloom and harvest dates
- Problem we kept running into
 - What kind of apple is this?

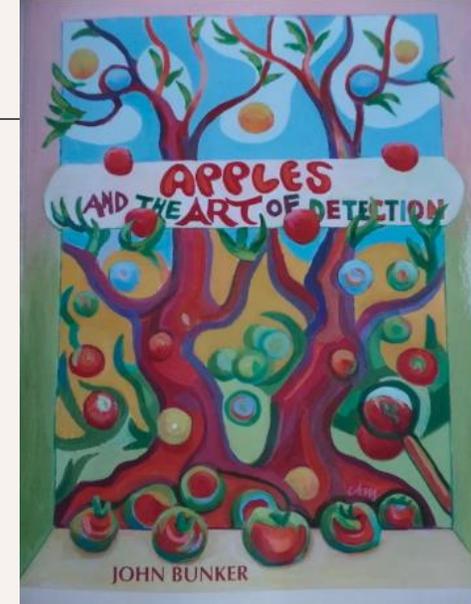


Project within the project

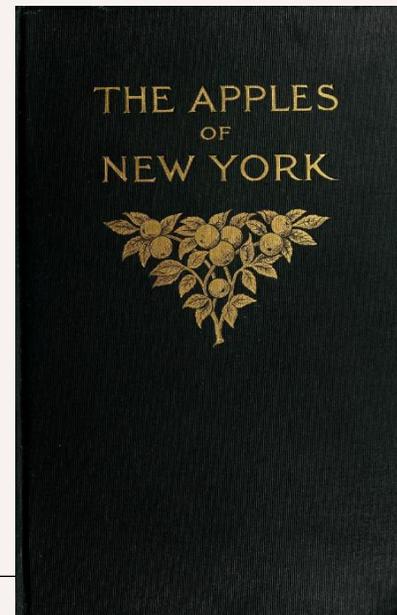
- Focus on older trees - preservation
- First step = what is the name? What is the cultivar?
- How to determine?
 - Physical = Phenotype
 - How does it look?
 - How does it taste?
 - Process
 - DIFFICULT!



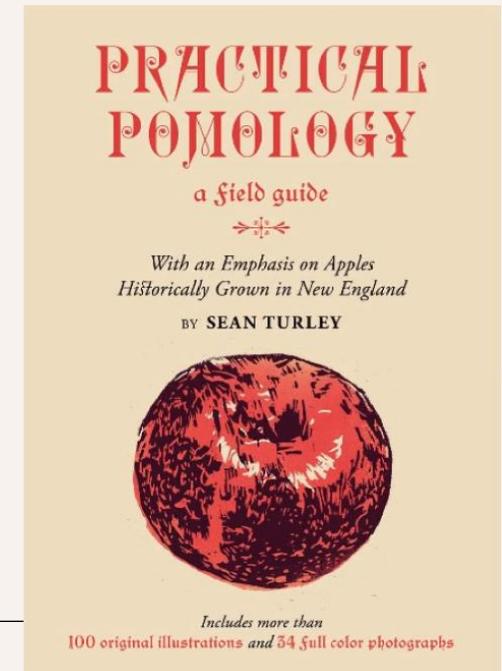
<https://www.jakkawpress.com/book/the-illustrated-history-of-apples-in-the-united-states-and-canada>



<https://www.outonalimbapples.com/store/book2>



https://www.loc.gov/resource/gdcmassbookdig.applesofnewyork00beac_0/?sp=1



<https://www.fromthegroundupne.org/bookshelf/practical-pomology-a-field-guide-by-sean-turley>

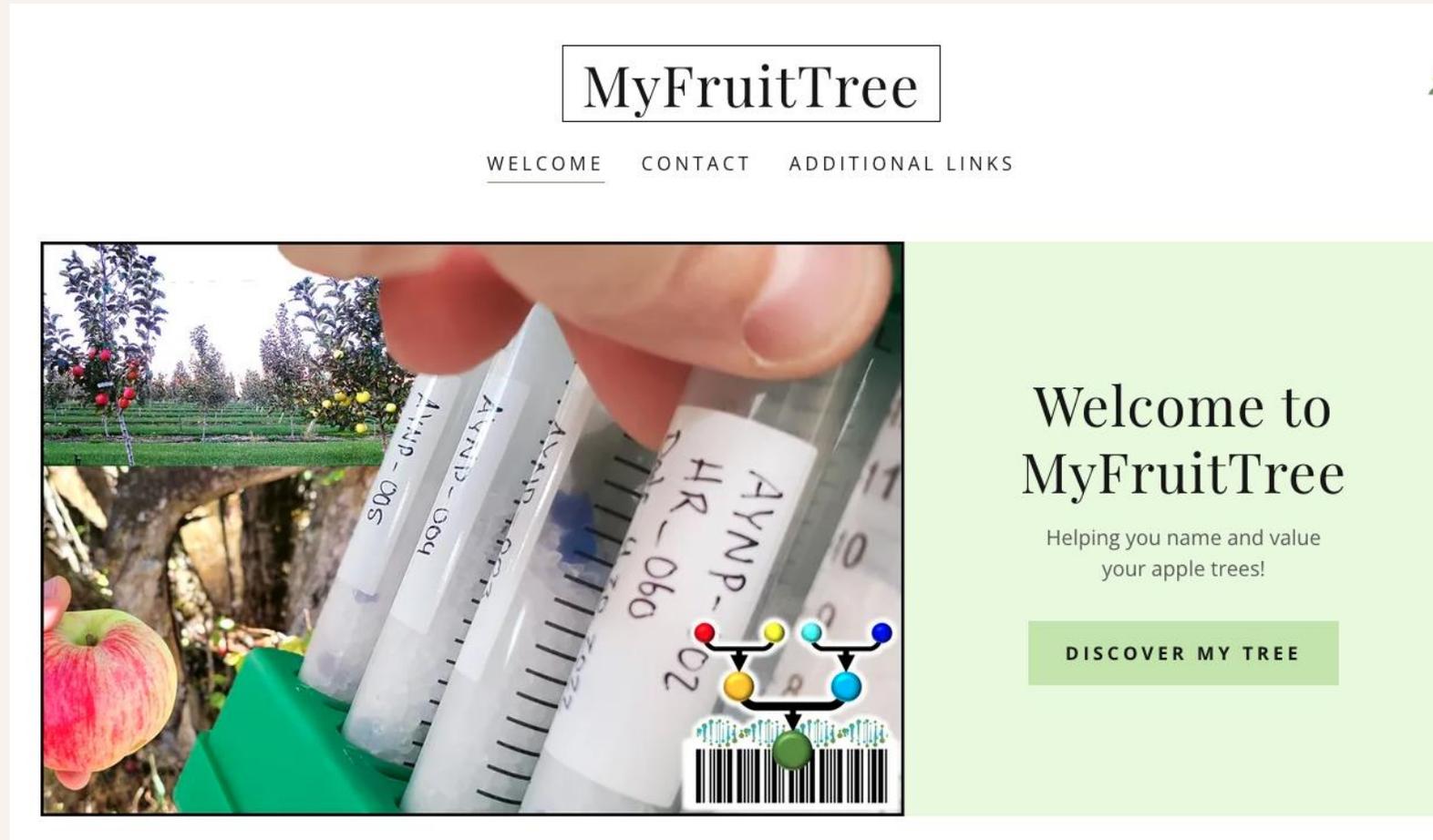
Project within the project

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 - DNA = Genotype
 - What is the DNA sequence?
 - DNA Fingerprint

	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17
Unknown Apple 1	A	T	C	A	T	T	T	G	C	A	A	C	G	G	T	A	T
		↓			↓			↓			↓			↓			↓
Honeycrisp	A	T	C	A	A	T	T	G	C	A	A	C	G	G	C	A	T
Gala	T	T	C	A	T	T	A	G	C	A	T	C	G	G	T	A	T
Fuji	A	T	G	A	T	T	A	G	C	A	A	C	G	G	T	A	T
Granny Smith	A	T	G	A	T	T	T	G	C	A	A	C	C	C	T	A	T
Delicious	A	T	C	A	T	T	T	G	C	A	A	C	G	G	T	A	T
Pink Lady	T	T	C	A	T	T	T	G	C	A	A	C	G	G	C	A	T

Project within the project

- Myfruittree.org
- \$50 per sample
- Collect and send in leaf sample
- 6-month (ish) turnaround time



The screenshot shows the MyFruitTree website. At the top, the logo "MyFruitTree" is centered in a white box. Below it, navigation links "WELCOME", "CONTACT", and "ADDITIONAL LINKS" are displayed. The main content area features a large image of a hand holding several clear plastic tubes with white labels, each containing a leaf sample. The labels are marked with "AYNP-005", "AYNP-004", "AYNP-003", and "AYNP-002". A green apple is visible in the bottom left corner of the image. In the bottom right corner of the image, there is a small graphic of a tree with colorful nodes and a barcode. To the right of the image, the text "Welcome to MyFruitTree" is displayed in a large, bold font, followed by the tagline "Helping you name and value your apple trees!". Below this, a green button with the text "DISCOVER MY TREE" is visible.

MyFruitTree

[WELCOME](#) [CONTACT](#) [ADDITIONAL LINKS](#)

Welcome to MyFruitTree

Helping you name and value your apple trees!

[DISCOVER MY TREE](#)

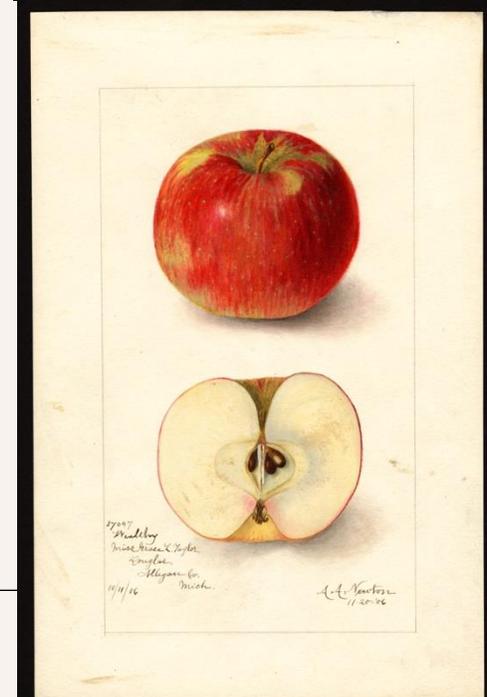
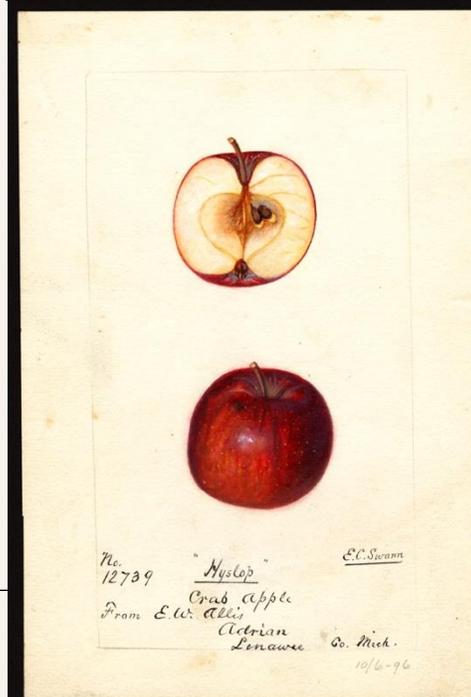
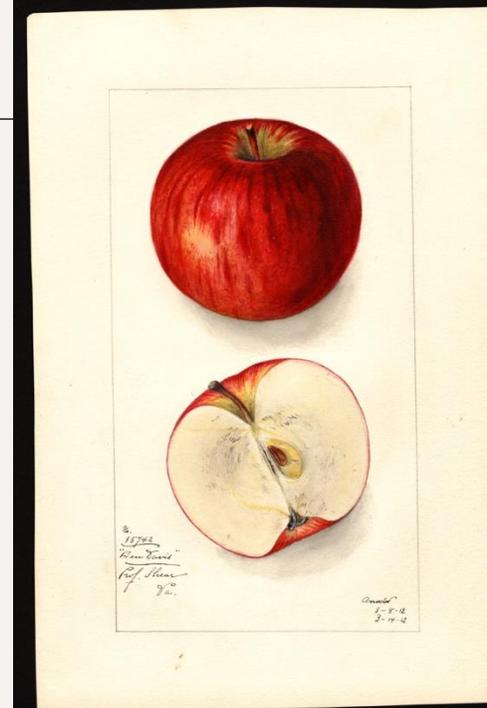
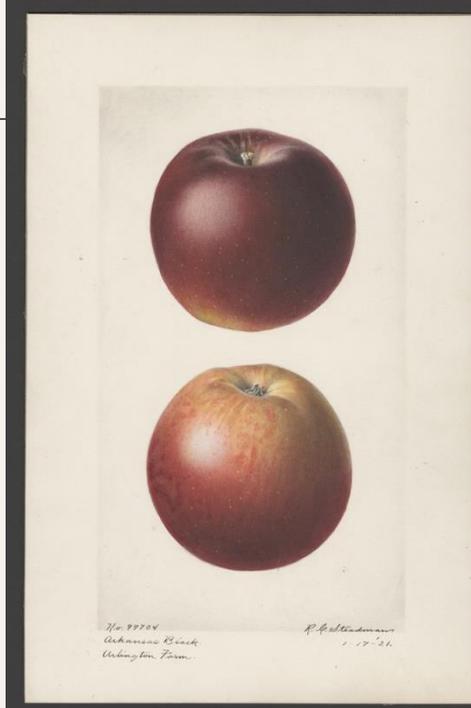
Project within the project

- Submitted 168 samples
 - Still waiting on 47 results
 - Of 121 results received
 - 78 matched cultivars in database
 - 43 did not match cultivars in database
 - What does this mean?
 - Real cultivar not in database
 - Genetically unique
"seedling" tree -
your own cultivar!
-



Known cultivars we identified

- Arkansas Black
- Ben Davis
- Duchess of Oldenburg
- Gravenstein
- Grimes Golden
- Hyslop
- Whitney
- Wealthy
- Winesap
- Wolf River
- Yellow Transparent



Cultivars identified as different cultivars

- Huber Grove in Midway, UT has ~120 - 130-year-old apple orchard
- Most trees not labeled, but some labeled as "Red Astrachan"
- DNA test came back "Wealthy"



Discovering lost cultivars

- Two samples did not match anything in reference panel, but did match DNA fingerprint of other samples submitted from different location(s)
- These are likely old, forgotten cultivars
- In depth genotyping and phenotyping being done now to identify which cultivar



Unique seedling trees

- Result of sexual reproduction
- Unique
- May have heard “you can’t grow apples from seed”
- You CAN, and you SHOULD (if you want genetically one-of-a-kind apples)
- Why not?
 - Genetic lottery when compared with asexual reproduction
 - Might get a dud



Unique seedling trees

- What to do when you find a good seedling tree?
 - Propagate it!
 - Trial it!
 - Observe it!
 - Name it!
 - Share it!
- That's what we're doing
 - Giving new life to our Old New trees along the Wasatch Back



Unique Utah apples



Capitol Reef Red
