DNA Bootcamp

Tests, Tools, and Techniques

Hand-out

DNA Testing: The Science

Facts

1. **DNA** (Deoxyribonucleic Acid) **carries our genetic information** and is located in the nucleus of every cell in our body (minus our red blood cells)
2. **DNA exists as two long, paired strands, woven together in a double-helix** formation (James D. Watson and Francis Crick, Cambridge University, ca 1953), called a chromosome
3. As human beings, **we have 23 pairs of chromosomes in our cells**
4. For each pair, **one chromosome is inherited from the father, the other chromosome is inherited from the mother**

DNA Testing: What do you want to learn?

Testing Goals

1. I want to discover family, find my matches, grow my trees.
2. I want to learn all I can about my family's ethnicity – where did they come from?
3. I want to find out more about my mother's line and her family's earliest origins.
4. I want to find out if two men of the same surname (or variant) share a common ancestor.

DNA Testing: The Science

Types of DNA

1. **Autosomal DNA*** is concerned with your 22 chromosomes, shared genetic segments, passed down from both parents
2. **The 23rd chromosome** is significant to sex; e.g., a male inherits one Y chromosome from his father and an X chromosome from his mother; a daughter inherits one X chromosome from her father and another X chromosome from her mother
3. **Mitochondrial DNA (mtDNA)** exists outside the cell nucleus (in an organelle found in each of our cells called the mitochondria) and this DNA is passed down (unchanged) **from mother to mother to mother** – matrilineal inheritance
4. **Y chromosome DNA** exists inside the (male's) cell nucleus and is passed down (largely unchanged) **solely by a father to his son**; females cannot inherit Y DNA (nor can they pass it down!) – patrilineal inheritance

*Autosomal DNA distributes differently among siblings!

DNA Testing: Where to find answers?

Outcomes

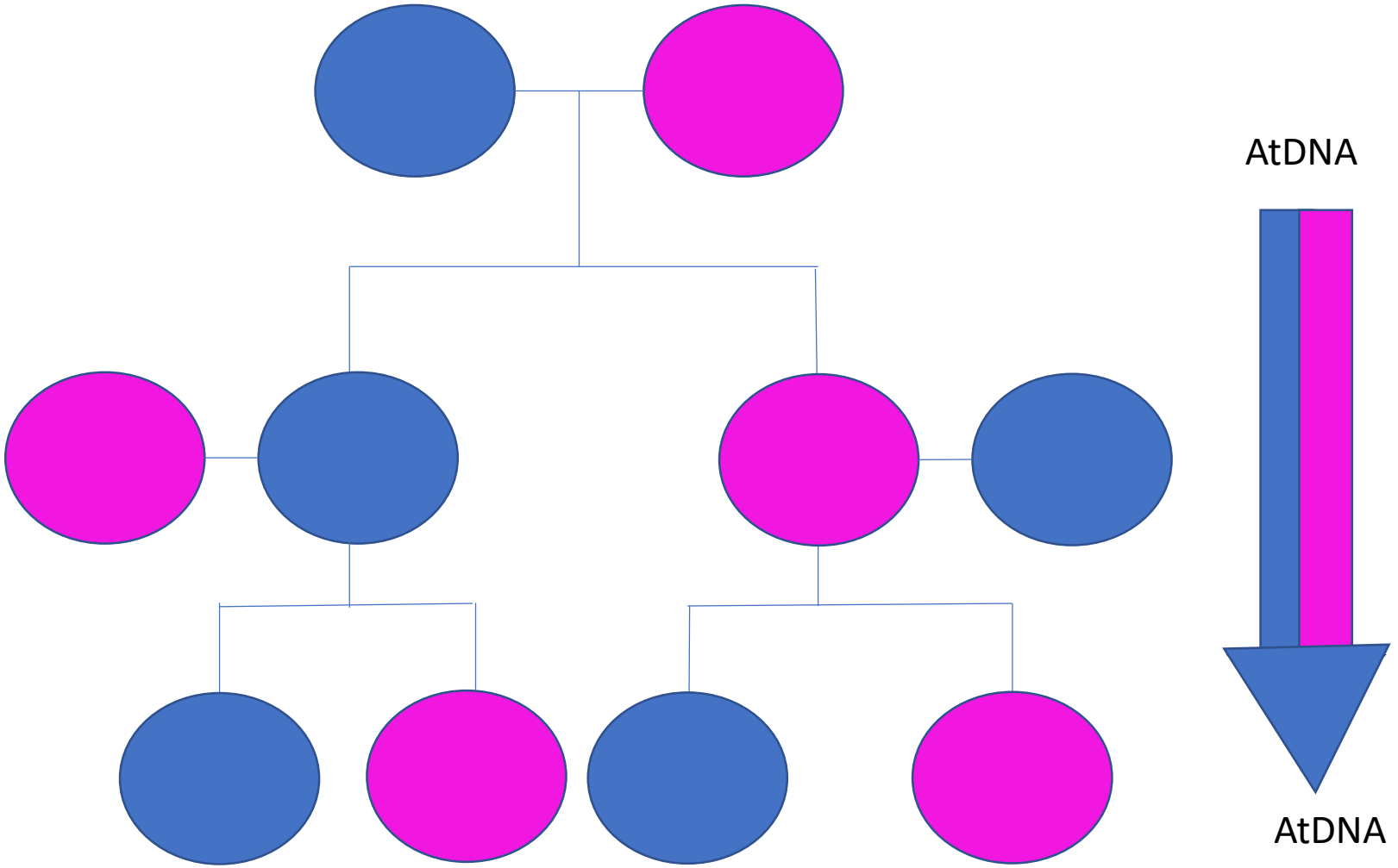
1. Autosomal DNA Tests help you find genetic cousins and grow trees
2. Autosomal DNA tests help you explore ethnicities and percentage ancestry
3. Mitochondrial DNA tests help you trace matrilineal (mother-to-mother) ancestry, find matches
4. Y Chromosome DNA tests help you research surname lines, from father-to-father, find matches

DNA Testing: What are options?

Products and Tools

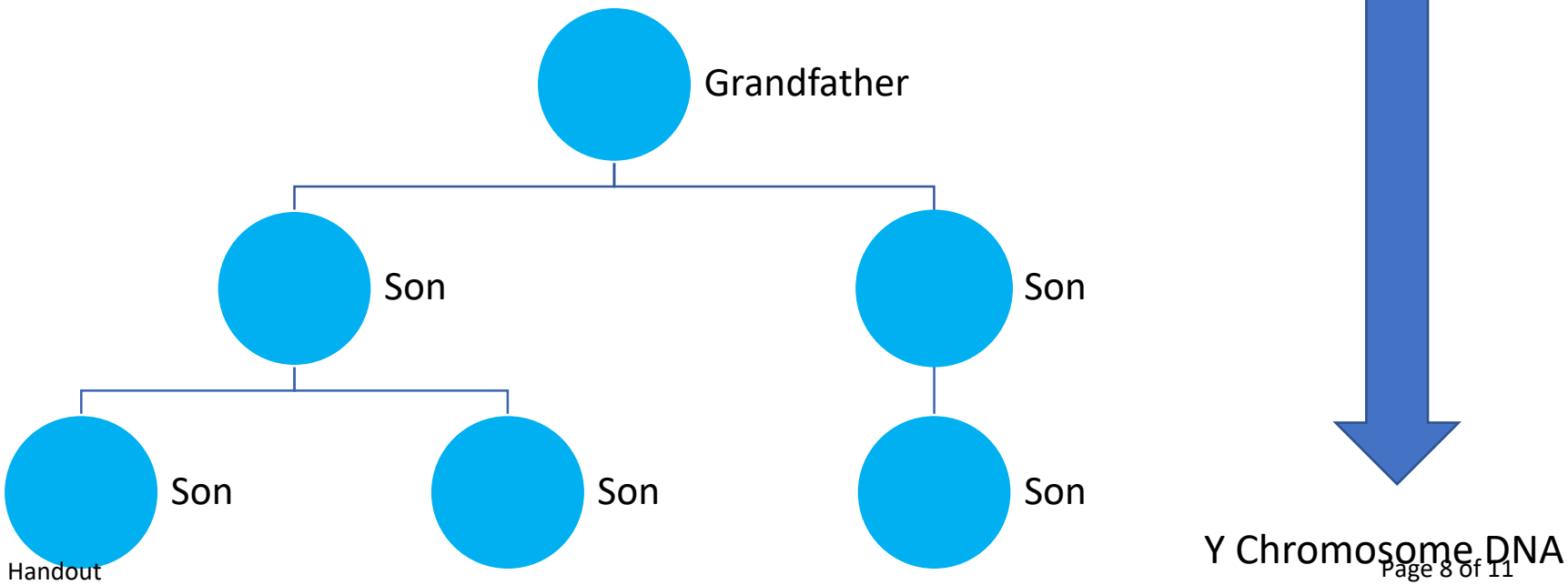
1. Autosomal DNA: FTDNA Family Finder; My Heritage, Ancestry, 23&Me, others…
2. Percentages: FTDNA My Origins, My Heritage, Ancestry, 23&Me and Gedmatch
3. Full Mitochondrial Sequence (FMS): Family Tree DNA
4. Full Y Chromosome DNA Tests: Family Tree DNA

Autosomal DNA Inheritance



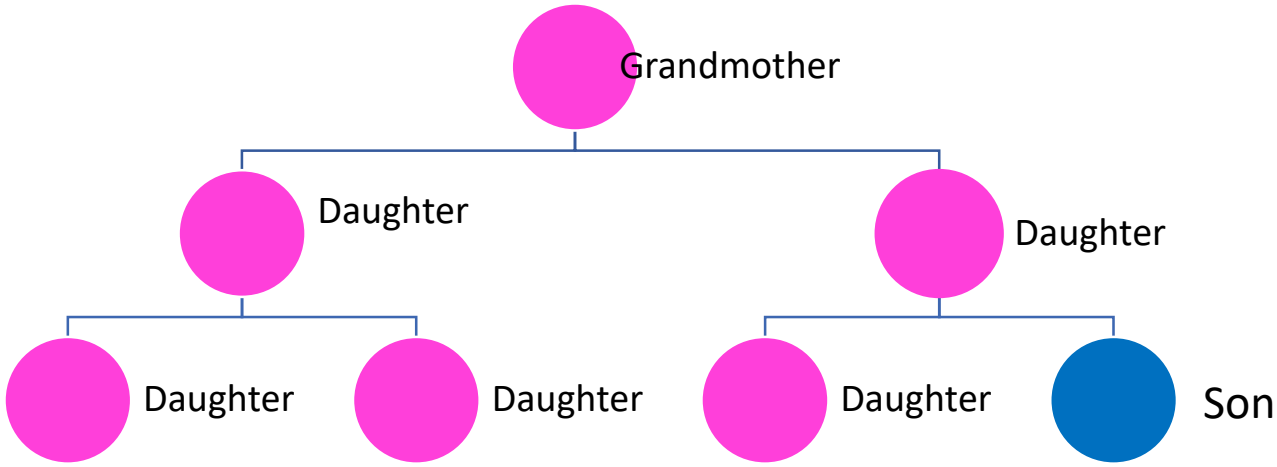
Y DNA and Paternal Line Ancestry

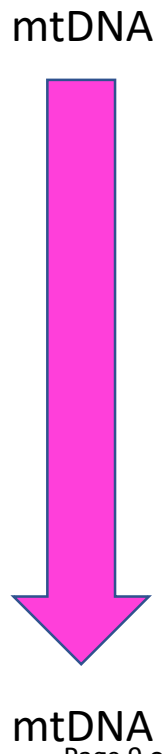
Y DNA is useful for tracing patrilineal ancestry as Y DNA is passed from father-to-father unchanged.



mtDNA and Maternal Line Ancestry

mtDNA tests help with researching matrilineal ancestry as mtDNA is passed from mother to mother unchanged.

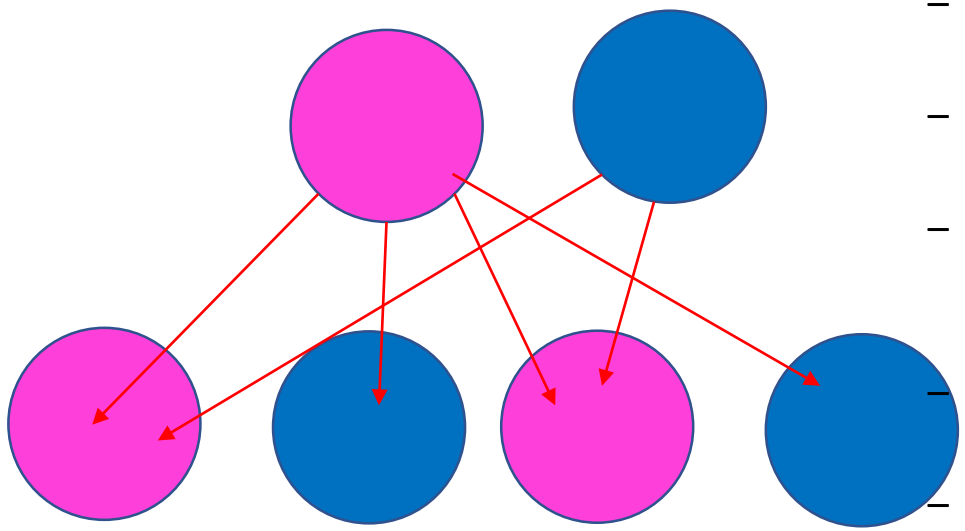




The Power of "X" for Genealogy

"I want to discover family, find my matches, grow my trees"
X chromosome matching with Family Finder and Gedmatch

- X chromosomes are transmitted by females to female offspring and males to female offspring (but father-son blocks X transmission)
- Possibilities for X transmission



  - A woman receives 2 "X" chromosomes: one from her mother, the other from her father.
  - A man receives an X chromosome from his mother and a Y chromosome from his father.
  - Therefore, the X chromosome offers additional opportunities for matching and X chromosome test results have been added to the Family Finder test suite.
  - Males can find genealogical matches on the MATERNAL X chromosome.
  - Females can find genealogical matches on the MATERNAL and PATERNAL X chromosome.

Websites, Blogs and References

- Family Tree DNA Website: https://www.familytreedna.com/
- Acadian Amerindian Ancestry DNA Project: https://www.familytreedna.com/groups/acadian-amerindian/about
- C-P39 Y DNA Project:
- https://www.familytreedna.com/public/ydna_C-P39/
- A2 mtDNA Project: https://www.familytreedna.com/groups/mt-dna-a2/about/background
- My Heritage DNA:
- https://www.myheritage.com
- AncestryDNA: https://www.ancestry.com/
- 23andme: https://www.23andme.com/
- DNAGedcom: https://www.dnagedcom.com/
- Gedmatch: https://www.gedmatch.com/
- DNA-Explained: https://dna-explained.com/
- DNA-Genealogy-History: https://www.dna-genealogy-history.com/index.html
- Family Heritage Research Community: http://familyheritageresearchcommunity.org/
- Acadians Were Here: https://acadianswerehere.org/index.html
- WikiTree: https://www.wikitree.com/