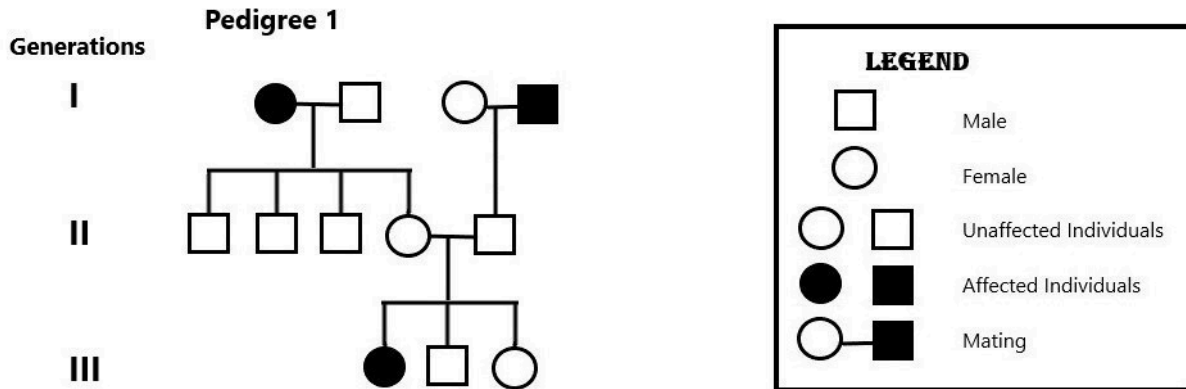


Gender-Inclusive Pedigree Charts



A typical pedigree chart in biology education.

Image from <https://www.theknowledgegroundtable.com/tutorials/decoding-pedigrees-made-easy/>

What is a pedigree chart?

A pedigree chart is a diagram that shows the occurrence of phenotypes through several generations of genetically related individuals. Because a pedigree chart uses symbols to differentiate males from females, and is often taken as a “family tree”, it is important for educators to give clear and inclusive messaging to their students about these charts.

Pedigrees in context

Every diagram is created for a specific purpose. The pedigree chart was originally developed to track the “purity” of nobility bloodlines in England. It also had early use in selective breeding of animals. Today, with new knowledge about genetics, we mainly use pedigrees to observe and apply patterns of genetic inheritance. The pedigree chart is useful in studying genetics, but it does not fully represent anybody’s family or relationships.

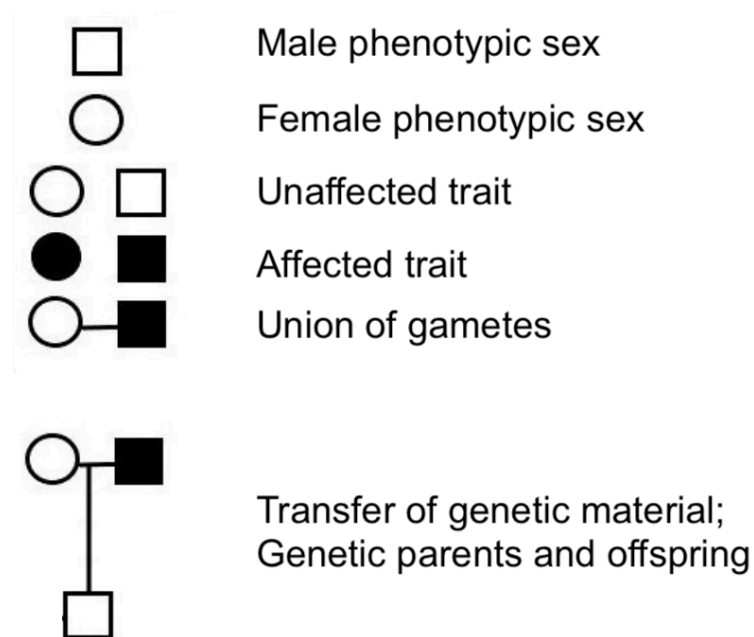
Precise and pertinent language

When teaching about pedigree charts, we encourage educators to modify existing diagrams and/or give supplemental instruction to make the following technical points:

- A pedigree chart is not a family tree. It only represents the passing down of genetic traits from ancestors to descendants.

- Squares and circles denote male and female sex, respectively (not gender.) As most human and nonhuman individuals never receive a karyotype test, the symbols usually represent external genitalia rather than chromosomal sex.
- A pedigree chart shows phenotype and not genotype unless otherwise indicated. We typically construct a pedigree chart out of macroscopic observations only, then we apply our knowledge of genetics when analyzing the chart.
- When two individuals are connected by a horizontal line, this represents a union of their gametes. It does not necessarily represent a marriage, relationship, or even sexual activity because reproductive technologies may be used to unite egg and sperm.
- Vertical lines represent genetic parent-offspring relationships, with about 50% of the parent's genetic material being transferred. These lines do not necessarily represent parenting, caregiving, legal guardianship, or any social relationship.

Suggested legend or key for basic pedigree charts



Representing diversity

The pedigree tradition has a history of misrepresenting people with marginalized identities, with a notable example in transgender history. For many generations, British genealogists have

compiled large books called peerages which list names and relationships within noble families. [L. Michael Dillon](#), an early 20th century transgender man and the son of a Baronet, was publicly outed when a tabloid reporter noticed that two different peerage books listed him under two different names and genders.

Today, most of the pedigree charts used in K-12 science education have no means of representing diverse family structures or representing individuals who are lesbian, gay, bisexual, transgender, queer, or intersex (LGBTQI+). We suggest asking your students, *“Who is not represented by these diagrams? Could these identities be relevant to the purposes of the diagram? If so, could we create a way to represent them?”* This will get students thinking about the limitations of the diagrams and possible solutions that could fulfill a need.

Students can compare their created representations to some of the symbol systems that are displayed online. There are no absolutely standard symbols, with different systems used throughout the years and across disciplines, including:

- [A traditional diamond for unknown sex](#) - can you think of multiple reasons why this symbol would be needed in the past? In the present?
- [Symbols for relationships that have ended, and consanguinity](#)
- [Symbols for miscarriages, abortions, and stillbirths](#)
- [Symbols for adoption, infertility, not having children by choice, and sperm donors](#)
- Annotations for intersex traits [1](#), [2](#)
- Genograms, which are an alternative to a pedigree chart, used in a variety of fields outside of genetics. Genograms include symbols for LGBT identity, nonbiological children, and even habits and social relationships. [Basic](#), [More in depth](#) (start on slide 16)

Additional Resources

- [What is intersex? Frequently Asked Questions from interACT](#)
- [There Are More Than Two Human Sexes - Video by SciShow](#)
- [GLSEN Gender Triangle - A graphical foundation for understanding gender identity](#)
- [Signaling Inclusivity In Genetics Topics - Article By Karen G. Hales](#)
- [The Misuse of Pedigree Analysis in the Eugenics Movement - Article by Mark Shotwell](#) (starts page 10)
- [Beyond circles and squares: A commentary on updating pedigree nomenclature to better represent patient diversity - Article by Tuite, Piazza, Brandi, & Pletcher](#)

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