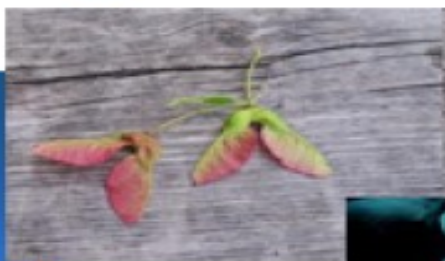


Scientific Theory

What adaptations do you notice?



Is This True?

Hypothesis



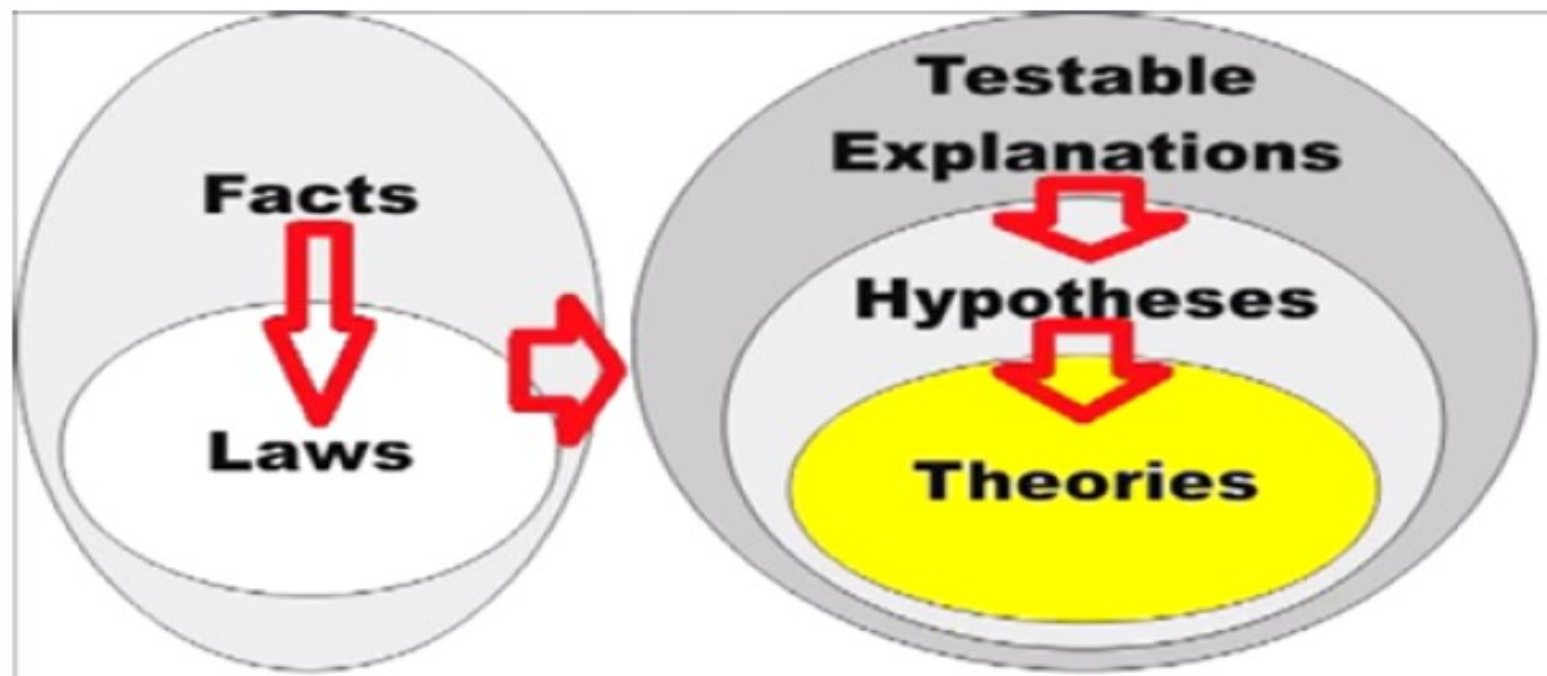
Theory



Law



It's ONLY a Theory...



What is a Hypothesis?

- A proposed **explanation** based on limited evidence
- An **educated** guess
- The basis for **further research**

What is a Scientific Law?

- A law describes **what** (something) occurs
- A law can usually be summarized **mathematically**

What is a Scientific Theory?

- The term theory is often misused
- It is often used to mean an educated guess (this is a hypothesis)
- A theory explains **why (ie. what is the mechanism)**
- A theory is NOT on its way to being a law

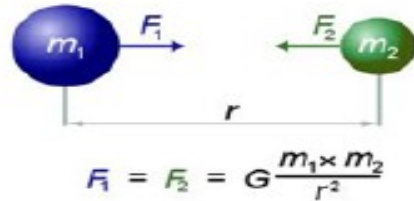
Scientific Theory Is...

- Supported by evidence (facts) that have been **repeatedly** and **independently** collected
- The best explanation for a wide range of observations and is accepted as true (how and why)
- Used to make predictions about new situations
- Revised with improved evidence and technological advances
- can incorporate facts, laws, inferences and tested hypotheses
- can take far more effort to develop and establish than laws do

Theory versus Law

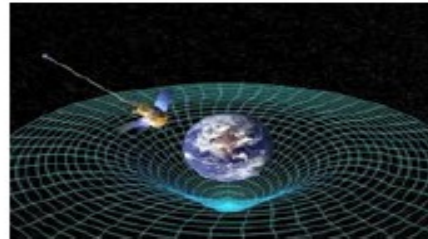
Law of Gravity

- Mathematically describes how an object moves under the force of gravity



Theory of Gravity

- Explains why gravity exists and where it comes from



Some Biological Theories

- Cell Theory
- Germ Theory of Disease
- Chromosomal Theory of Inheritance
- Theory of Evolution
- Theory of Natural Selection

6 Rules for Empirical Reasoning: FiLCHeRS

(Is it Science? Is it a testable question?)

- Falsifiable
- Logical
- Comprehensive
- Honest
- Repeatable
- Sufficient

"FILCHERS"

6 Rules of Empirical Reasoning:

1) Falsifiability- "Prove me wrong!"

*claims must be testable or possible to prove untrue

2) Logical--arguments must be sound

*conclusions must follow from the premises, which in turn must be true and sound

3) Comprehensiveness --All available evidence must be considered

4) Honesty--No self-deception and a willingness to change belief when the facts dictate a change

5) Repeatability--others must be able to reproduce your results

6) Sufficient--Evidence must be adequate.

Scientific or Not?

- 1.The pyramids were built with the assistance of aliens from outer space.
- 2.The sun will rise tomorrow at 6:23 am.
- 3.The earth is obviously motionless because a person who jumps into the air for one second does not come down 190 km away.
(Flat Earth Society)
- 4.A Voice spoke to me in my dreams last night and said I must be a good student in class.
- 5.King Harold lost his life in the Battle of Hastings in 1066 because of the appearance of a comet the night before the battle.
- 6.The boiling of water is 100 degrees Celsius.
- 7.Some people are lucky at cards
- 8.The earth is beautiful from space.
- 9.I will make sure it will snow for Christmas this year.

Theory of Evolution

- The process in which significant **changes** in the **inheritable traits** (e.g. genetic make-up) of a species occur **over time**.