

## Teaching Materials Associated With Module 1

### Taung Child:

- Discovered in 1924 by Australian anatomy professor Raymond Dart
- Among the first human fossils to be found in Africa
- Dated to between 2.5 and 3 million years ago
- Based on dental eruption patterns, Taung child's age at death was ~3.3 years old
- It is thought that an eagle killed Taung child based on what appear to be talon puncture marks on the skull

### Discovery of Taung Child:

- Dart's discovery: "Australian anatomy professor Raymond Dart was adjusting the collar of his dress suit in preparation for a friend's wedding when a box, shipped from a limestone quarry near Taung, South Africa, arrived at the doorstep of his Johannesburg home in November 1924. Dart abandoned his collar to dig through the package's contents—all the while ignoring the grumblings of his wife and the groom, who were anxious to begin the wedding ceremony. Inside the box, he found a fossilized mold of a brain and a matching child's skull partially buried in stone. Dart quickly realized the significance of the finding, and by February 1925 had published an article in *Nature* identifying a new species: *Australopithecus africanus*. The 2.5-million-year-old "Taung Child" or "Taung Baby," as Dart called it, was the first member of the *Australopithecus* genus discovered, and it challenged contemporary ideas about human evolution." – The Scientist Magazine
- This can be considered "armchair paleoanthropology" as Dart did not participate in the excavation of Taung child himself. Instead, he was sent the samples and completed the analysis from Johannesburg.
- This is less common now, as paleoanthropologists tend to be involved in both the field and the lab (from discovery to analysis).

### *Homo naledi*:

- Discovered in 2013 in the Rising Star cave system in Johannesburg, South Africa by Lee Berger and his excavation team
- 1550 fragments that comprise as many as 18 individuals
- Dated to 900,000 years ago
- How and why the individuals were in the cave is unknown

### Discovery of *Homo naledi*:

- Berger posted an ad on Facebook looking for petite individuals with a PhD or masters in paleoanthropology who would be able to fit through the extremely narrow openings of the cave system; 57 people applied to be on his team and 6 paleoanthropologists (all women) were selected to be on the excavation team
- Berger is committed to making the discoveries available to the public (scans of the bones are open source and the findings were originally published in *Nature*)
- Excavations at Rising Star are ongoing

Dating methods available in the early 1900s:

- Relative dating = the science of determining the relative order of past events without necessarily determining their absolute age
  1. Stratigraphy = a method of relative dating based on the principle of superposition where the oldest layers (which were put down first) will be at the bottom and the youngest layers (which were put down last) will be at the top
  2. Biostratigraphy = a method of relative dating where flora/fauna that are known to have only existed during a certain period of time are used to date surrounding fossils that are found in the same geological strata
- Absolute dating = the science of determining the age of an object with reference to a specific time scale, therefore getting an “actual” date
  1. Dendrochronology = counting growth rings in trees (not helpful in paleoanthropology)

Dating methods available in the early 2000s:

- Relative dating = the science of determining the relative order of past events without necessarily determining their absolute age
  1. Stratigraphy = a method of relative dating based on the principle of superposition where the oldest layers (which were put down first) will be at the bottom and the youngest layers (which were put down last) will be at the top
  2. Biostratigraphy = a method of relative dating where flora/fauna that are known to have only existed during a certain period of time are used to date surrounding fossils that are found in the same geological strata
  3. Fluorine analysis = measure the ratio of fluorine to nitrogen to determine how long the organic component has been dead
- Absolute dating = the science of determining the age of an object with reference to a specific time scale, therefore getting an “actual” date
  1. Carbon-14 dating = a method of dating that calculates the age of the specimen based off of the known half-life of carbon 14 and the existing ratio of carbon 12-carbon 14 found in the specimen
  2. Potassium-Argon and Argon-Argon: similar to carbon-14 dating, these methods also measure elemental decay
  3. Thermoluminescence: this method involves heating samples and thus freeing electrons, which return to their stable energy state and release the excess stored energy in the form of light (which is subsequently measured)
  4. Electron Spin Resonance: measures the number of trapped electrons in a specimen by measuring their absorption of microwave radiation
  5. Dendrochronology = counting growth rings in trees (not helpful in paleoanthropology)

And many more!

Dating methods:

- Have changed a lot in the past 100 years
- It is easier to get an absolute date now than it was 100 years ago

Things that Raymond Dart and Lee Berger and their discoveries have in common:

- Both had appointments at University of Witwatersrand
- Both made huge discoveries that propelled them into stardom
- Both published their findings in *Nature*
- Both criticized for their conclusions by others in the field

This module has been adapted from the following sources:

<http://humanorigins.si.edu/evidence/human-fossils/fossils/taung-child>

<http://www.pbs.org/wgbh/aso/tryit/evolution/taung.html>

<http://www.the-scientist.com/?articles.view/articleNo/32291/title/The-First-Australopithecus-1925/>

[http://www.press.uchicago.edu/Misc/Chicago/284158\\_brain.html](http://www.press.uchicago.edu/Misc/Chicago/284158_brain.html) <http://www.radiolab.org/story/taung-child/>

<http://pages.ucsd.edu/~jmoore/courses/anth42web/DATINGmethods.pdf>

<http://www.pbs.org/wgbh/nova/next/evolution/lee-berger/>