Voices of Naturalism

D\_\_\_\_\_: Naturalist, Biologist, Father of the Theory of Evolution

Carl \_\_\_\_\_: Astronomer with NASA

Richard \_\_\_\_\_: Outspoken atheist who promotes evolution and a denial of God. Evolutionary biologist. Wrote The God Delusion.

Stephen \_\_\_\_\_: "I think the universe was spontaneously created out of nothing, according to the laws of science.”

Carl Sagan

Sagan wrote The Dragons of Eden (where \_\_\_\_\_ intelligence came from), Cosmos (where \_\_\_\_\_ came from), Which turned into a TV series.

Richard Dawkins

“When you consider the beauty of the world and wonder how it came to be, you are naturally over-whelmed with a feeling of awe, a feeling of admiration, and you almost feel a desire to worship something. It is tempting to translate that feeling of awe and worship into a desire to worship some particular thing, a person, an agent. You want to attribute it to a maker, to a creator. But what science has now achieved is an emancipation from that impulse to attribute these things to a creator... It was a \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_ to realize that there is a better explanation for these things. That these things can come about by purely \_\_\_\_\_ CAUSES.”

Romans 1:18-25

19 For what can be known about God is plain to them, because God has shown it to them.

21 For although they knew God, they did not honor him as God or give thanks to him, but they became futile in their thinking, and their foolish hearts were darkened.

Romans 1:18-25

22 Claiming to be wise, they became fools… 23 …and exchanged the glory of the immortal God for images resembling mortal man and birds and animals and creeping things.

25 because they exchanged the truth about God for a lie and worshiped and served the creature rather than the Creator, who is blessed forever! Amen.

**Darwin’s Theory of Evolution**

A sea voyage helped Darwin frame his theory of evolution

Charles Darwin is best known for his book *On the* \_\_\_\_\_ *of* \_\_\_\_\_ *by Means of Natural Selection*, commonly referred to as *The Origin of Species*, which launched the era of evolutionary biology.

Darwin’s early career gave no hint of his future fame. He enrolled in but left medical school. Then he entered Cambridge University to become a clergyman. The cultural and scientific context of his time instilled Darwin with a conventional view of Earth and its life.

Most scientists accepted the views of the Greek philosopher Aristotle, who generally held that \_\_\_\_\_ are fixed, permanent forms that do \_\_\_\_\_ change. Most Christian churches taught that each form of life was individually created in its present-day form. Thus, the Traditional View of his time: Young Earth Inhabited by \_\_\_\_\_ Species.

At the age of 22, Darwin took a position on HMS *Beagle*, a survey ship preparing for a long expedition to chart poorly known stretches of the South American coast.

As the ship’s naturalist (field biologist), Darwin spent most of his time on shore collecting thousands of specimens of fossils and living plants and animals and kept detailed journals of his observations. Darwin was particularly intrigued by the \_\_\_\_\_ distribution of organisms on the \_\_\_\_\_ Islands, including marine iguanas, giant tortoises.

**Darwin in a Nutshell**

Darwin observed \_\_\_\_\_ and noticed 7 different kinds of \_\_\_\_\_ based on \_\_\_\_\_ for various foods (competition).

While on his voyage, Darwin was strongly influenced by Lamarck’s ideas and the newly published *Principles of Geology*, by Scottish geologist Charles Lyell.

The book presented the case for an ancient Earth sculpted over millions of years by \_\_\_\_\_ geologic processes that continue today (Uniformitarianism).

**Jean-Baptiste L**\_\_\_\_\_

Tried to explain how change occurs over time (evolution?). Stated that changes are adaptations to environment \_\_\_\_\_ in an organism’s lifetime.

Proposed that by selective \_\_\_\_\_ OR \_\_\_\_\_ of organs, organisms acquired or lost certain traits during their lifetime. These acquired changes were passed to offspring. Over time this led to new species.

Lamarck’s Mistakes

Proposed Mechanism for Evolution: \_\_\_\_\_ of \_\_\_\_\_ Characteristics.

Lamarck did \_\_\_\_\_ know how traits were inherited (traits are passed through genes in gametes).

\_\_\_\_\_ are NOT changed by activities in life.

A sea voyage helped Darwin frame his theory of evolution

By the early 1840s, Darwin had composed a long essay describing the major features of his Theory of Evolution by Natural Selection.

But he delayed publishing his essay, continued to compile “evidence” in support of his \_\_\_\_\_, and finally released his essay to the scientific community when learning of the work of another British naturalist, Alfred \_\_\_\_\_, who had a nearly identical hypothesis.

Darwin’s Theory of Evolution: the idea that living species are descendants of ancestral species (\_\_\_\_\_ \_\_\_\_\_) that were different from present-day ones (\_\_\_\_\_). That \_\_\_\_\_ \_\_\_\_\_ is the mechanism for evolutionary change.

\_\_\_\_\_ Evolution

* occurs when unrelated species develop \_\_\_\_\_ as they have adapted to similar \_\_\_\_\_ challenges…
* …NOT because they “evolved” from a common ancestor but due to environmental pressures.
* The likenesses that result are \_\_\_\_\_ (not Homologous).
* Ex. The presence of Wings on insects, birds, and mammals (bats).
* These species are completely \_\_\_\_\_, but all 3 have the ability to fly (Analogous Structures).

\_\_\_\_\_ Evolution

* Species \_\_\_\_\_ become increasingly different from their \_\_\_\_\_.
* Often attributed to migration or geographic isolation.
* Development of \_\_\_\_\_ structures.

Adaptive \_\_\_\_\_

*Process of many related species originating from one* \_\_\_\_\_ *ancestor.* Ex. Galapagos Finches

There are 13 “species” found on the Galapagos Islands. Evolutionists say that all the finch species descended from one mainland finch species. Through natural selection they became more different from one another and formed into 13 different species.

Major Problem: No \_\_\_\_\_

“There are all sorts of gaps: absence of graduationally \_\_\_\_\_ "transitional" forms between species, but also between larger groups -- between say, families of carnivores, or the orders of \_\_\_\_\_. In fact, the higher up the Linnaean hierarchy you look, the fewer transitional forms there seem to be.”

“New species appeared \_\_\_\_\_ in the fossil record with \_\_\_\_\_ smoothly intergradational intermediates between them and their ancestors.” Eldredge, Niles, *The Monkey Business: A Scientist Looks at Creationism*, 1982, pp. 65-67.

Both schools of thought (Punctuationists and Gradualists) despise so-called scientific creationists equally, and both agree that the major gaps are \_\_\_\_\_, that they are true \_\_\_\_\_ in the fossil record. The only alternative explanation of the sudden appearance of so many complex animal types in the Cambrian era is divine creation and (we) both reject this alternative." Dawkins, Richard, *The Blind Watchmaker*, W.W. Norton & Company, New York, 1996, pp. 229-230)

Archaeopteryx:

Is still falsely promoted (in textbooks, journals, etc.) as the “\_\_\_\_\_ form” between a reptile and a bird to support gradualism although it is NOT genetically transitional to living birds.

Eohippus:

Is still falsely promoted (in textbooks, etc.) as the “common ancestor” of the horse is remarkably similar to the modern hyrax, a rock badger.

Rate of S\_\_\_\_\_

P\_\_\_\_\_ E\_\_\_\_\_

Tries to explain the long periods of apparent stasis punctuated by \_\_\_\_\_ explosions of \_\_\_\_\_ and \_\_\_\_\_ -developed life forms with no intermediates from an evolutionary point of view.

Proposed by Stephen Gould and Niles Eldredge (1971)

“\_\_\_\_\_ evolution”

Defined as a \_\_\_\_\_ in the genetic composition of a population from generation to generation.

MICROevolution is the observed effects of natural selection due to genetic \_\_\_\_\_ on populations. Creationists and Evolutionists (both) believe this process does happen in nature.

Nevertheless, Creationists believe it does NOT create new or previously non-existent genetic information or kinds of organisms.

In other words, it does \_\_\_\_\_ lead to \_\_\_\_\_evolution.

N\_\_\_\_\_ S\_\_\_\_\_

Creationists believe that all organisms are created with much genetic potential to \_\_\_\_\_ to its environment as a result of Natural Selection.

Natural Selection simply acts through the built-in \_\_\_\_\_ variability of all organisms.

In other words, Natural Selection works upon the genetic \_\_\_\_\_ that is present in the organism at the moment it is created.

Natural Selection 🡪 the fundamental goal of all species is to \_\_\_\_\_ and survive, \_\_\_\_\_ on the genetic information of the species from \_\_\_\_\_ to \_\_\_\_\_.

* \_\_\_\_\_ Reproduction
* O\_\_\_\_\_
* Hereditable Traits (NOT acquired)
* Variation
* Adaptation
* C\_\_\_\_\_
* Survival of the Fittest

H\_\_\_\_\_-W\_\_\_\_\_ Principle

To understand how MICROevolution works, we need to start with a simple population in which microevolution is not occurring and thus the gene pool is not changing.

In this kind of population, the \_\_\_\_\_ OF EACH \_\_\_\_\_ in the gene pool will remain constant.

This equilibrium is the Hardy-Weinberg Principle.

S\_\_\_\_\_ Gene Pool

The frequency of an allele in the gene pool of a population will NOT change IF:

* The population is \_\_\_\_\_.
* The population is isolated (no \_\_\_\_\_ or emigration).
* There is no \_\_\_\_\_.
* Mating is \_\_\_\_\_.
* All individuals survive and produce the same number of offspring (no Natural Selection).

This is known as Hardy-Weinberg Equilibrium.

Few populations in nature meet all 5 conditions, therefore most populations are NOT in genetic equilibrium. Thus, alleles and genotype frequencies often DO change.

Violations to any of these 5 conditions are considered mechanisms of evolutionary change (\_\_\_\_\_ evolution), but the 3 main mechanisms are: Genetic Drift, Gene Flow, Natural Selection.

Genetic Drift

*In this process chance,* \_\_\_\_\_ *events can cause allele* \_\_\_\_\_ *to change unpredictably from one generation to the next. The smaller the population, the more impact genetic drift is likely to have.*

*B*\_\_\_\_\_  *Effect – a drastic reduction in population (volcanoes, earthquakes, landslides …), followed by rebound. Reduces genetic* \_\_\_\_\_*. Smaller population may not be able to adapt to new selection pressures (changes in environment).*

Loss of Genetic Variation

Cheetahs have little genetic variation in their gene pool.

This might contribute to the potential extinction of this endangered species.

This can probably be attributed to a population bottleneck they experienced, barely avoiding extinction.

*F*\_\_\_\_\_  *Effect – occurs when a new colony is started by a few members of the original population. The smaller the group, the* \_\_\_\_\_ *likely the genetic makeup of the colonists will represent the gene pool of the larger population they left.* \_\_\_\_\_ *genetic variation.*

Gene Flow

A population may gain or lose alleles when fertile individuals move into or out of a population or when \_\_\_\_\_ (such as plant pollen) are transferred between populations.

Gene Flow tends to reduce differences between populations, thus making them more similar

Natural Selection

*Results in alleles being* \_\_\_\_\_ *to the next* \_\_\_\_\_ *in proportions different from the ones in the present generation.*

*Individuals with variations that are better* \_\_\_\_\_ *to their environment tend to produce more* \_\_\_\_\_ *(have more Reproductive Success) than those with variations that are less suited.*

G\_\_\_\_\_ TIME SCALE

The geological time scale is a way in which the age of the earth is broken into subdivisions of Eons, Eras, Periods, Epochs, and others.

These subdivisions are determined by events that supposedly took place during the times indicated. Developed using \_\_\_\_\_ decay methods.

Origin of Life
(Evolution)

Conditions on Early Earth
(According to Evolutionary Theory)

The Earth formed about \_\_\_\_\_ \_\_\_\_\_ years ago.

As the Earth cooled and the bombardment slowed about 3.8 billion years ago, the conditions on the planet were extremely different from those today.

The first atmosphere was probably thick with water vapor and various compounds released by volcanic eruptions, including nitrogen and its oxides, carbon dioxide, methane, ammonia, hydrogen, and hydrogen sulfide.

From Chemicals to Cells

The actual ages of rocks and fossils mark geologic time

RELATIVE DATING: Method used to determine the age of rocks by comparing them with those in other younger and older layers.

Based on the Law of \_\_\_\_\_: Rock layers are deposited with the youngest \_\_\_\_\_ layers on \_\_\_\_\_.

Fossils are found within these layers.

Phanerozoic E\_\_

E\_\_\_\_\_ smallest unit of geologic time

P\_\_\_\_\_ consist of two or more epochs

E\_\_ consist of two or more periods

Boundaries between eras marked by Mass Extinctions

3 Eras:

* P\_\_\_\_\_
* M\_\_\_\_\_
* C\_\_\_\_\_