

Evolution



Evolution describes the processes of the natural world, from the origins of life to the present. It addresses the dynamics between a common genetic base of life and the mechanisms of population changes over generations or descent with modification. While seemingly simple, contemporary notions of evolution refer to a synthesis, consensus or mosaic, building on but far beyond Darwin or neo-Darwinian notions of natural selection. The evolutionary concept comes from dozens of disciplines: paleontology, genetics, biology, botany, embryology, genetics, biochemistry, taxonomy, geology, ecology and natural history.

Evolutionary data includes research on specific relations between amino acids, proteins, cell structures, genetic sequencing, gene flow and drift, and mutations. This is combined with analyses of morphology, radioisotope-dating, environmental stress, and extinctions. Each part is precise and technical. Evolution has micro mechanisms of change, such as phenotypes and genotype relationships, and macro mechanisms related to changes in ecological niche and inter or extra-species stress.

The process of evolution is non sequential, nonlinear and uneven, leading to terms such as punctuated equilibrium and emergent or developmental evolution. Just one evolutionary process, natural selection, is itself a composite of dynamics, adaptation, genetic transformations, speciation, opportunities, and environmental and population changes. Evolution delineates complex processes of multiple and intricate mechanisms. It represents the gathering of data from distinct methods and ongoing changes in theories, resulting in a colossal amount of evidence.

To understand the processes and mechanisms of evolution requires teams of researchers engaged in sophisticated and detailed observation, analysis and interpretation, with an ability to suspend judgment in the face of the unexpected. The overwhelming agreement is that evolution is not a hypothesis: it is the developing descriptions of the dynamic and organic processes of life on Earth (Mayr, 2001). Evolution teaches from mammals emerged multiple species of squirrel size, then primates, monkey's proto-primates and apes. From 23 million years ago there is evidence of the first hominids, likely from bonobos and chimpanzees.

This animal was bipedal four million years ago, with a shift from Homo erectus to Homo sapiens four to three hundred thousand years ago. Here is a creature with technological savvy, greater memory, elaborate brain functions, symbolic representation, culture, language and consciousness, loosely defined. This tale is told with reference to linear time but this process is not linear in any conventional way. It is living and dynamic, not orderly or mechanistic, not random or determined. It is patterned but not predictable. To understand evolution fully is impossible.

The level of precision is astonishing. Each aspect mentioned has volumes of evidence and publications attesting to it. Data cross numerous disciplines from geology and plate tectonics to particular amino acid reactions in biochemistry. The terms evolutionary mosaic or synthesis represent the combination and assimilation of an immense quantity of data. The synopsis above is generally agreed that some of the mechanisms of transformations are deliberated. And it represents a droplet in a sea of date (Eldredge, 1999).

The first controversy surrounds the claim that evolution is a theory, not a fact.

Theory is juxtaposed to fact. Theories are usually seen to be provisional hypothetical, substantiated by facts. In science a theory is neither a hunch nor a hypothesis. It is a systematic expression of data. It is predictive, logical and testable. In science, a body of knowledge is called a theory only if it has a firm empirical basis, supported by many strands of evidence rather than a single foundation. A scientific theory is correctable with new data and is empirically testable. For science, evolution is a theory, meaning it best represents the facts.

Evolution is not a hypothesis, a guess, an idea or an ideology. It is the name of foundational processes and patterns of life. While evolution is overwhelmingly accepted by the scientific community, there are debates and knowledge gaps. Among scientists the debates center on the processes and mechanisms of evolution, not its validity. Those who opposed evolution use these internal debates to discredit the deductions. The main players in these controversies are those espousing creationism or proposing Intelligent Design (Dembski & Colson, 2004).

Although there are many versions of creationism, the following is a summary of shared oppositions to evolution. The starting point is most often that evolution is just a theory, not fact. Creationism is then presented as an alternative or counter theory. Neither evolution nor creationism can offer proof or facts. So they must be treated equally. Creationism provides two bases from which to refute evolution: biblical and scientific. The primary

reference is the Bible, with little or no discussion about historical analyses, epistemology, hermeneutics, or critical and political theories.

Evolution is opposed because it is not in the Bible, and the Genesis account is perceived to be the alternative and genuine creation account. Evolution is dismissed because it is in opposition to faith, characterized by the mantra, " I choose to believe in God rather than evolution". Many creationists are young Earth theorists, who claim that the Earth is between four and ten thousand years old. A common belief is that humans are not primates, and that ontological divisions exist between humans and the rest of creation. Creationist's scientific objections to evolution are less homogenous (Nilsson & Pelzer, 1995).

Intelligent Design is significantly more complex, diverse and intellectually compelling than creationism. For example generally speaking Intelligent Design advocates accept aspects of evolution and scientific methods. They agree that the Earth is 4.4 billion years or so old this conflict with young Earth creationists and they will frequently accept much of the evolutionary synthesis. The Intelligent Design and evolution debates usually focus on scientific data, although most Intelligent Design campaigners are not scientifically trained.

Proponents of Intelligent Design hold the view that, "...certain features of the universe and of living things are best explained by an intelligent cause rather than an undirected process such as natural selection. In a broader sense, Intelligent Design is simply the science of design detection and how to recognize patterns arranged by an intelligent cause for a purpose" (Intelligent Design Network). The modest versions of Intelligent Design claim

to be an intellectual movement that includes scientific research, and investigates intelligent causes or design.

The purpose is to detect or discover intelligence and design within natural processes. They challenge naturalistic or happenstance explanations of life origins, evolution, systems complexity, emergence of consciousness and intelligence. Further, they see the implications of intelligent design and purpose within the scientific data. Intelligent Design positions are in scientific disagreement with the main claim of evolutionary theory that the apparent design of living systems is an illusion. Here is where Intelligent Design is controversial. One Intelligent Design is a theory presupposing design and purpose.

It focuses on patterns and systems interpreted from scientific data. On the other hand, Intelligent Design supporters do not make overt that their disagreement with evolutionary science is more philosophical than scientific. Thus many evolutionary scientists reject the science, the implications, or both. Evolutionary science is more philosophical than scientific. Thus many evolutionary scientists reject the science, the implications, or both (Barbour, 2005). There is much discussion about Intelligent Design and its relationship to religion.

Most Intelligent Design advocates claim that theirs is not a religious position, and distance themselves from religion or evolutionary theists. Design inferences can be compatible with religious views, but Intelligent Design, strictly speaking is not a religious stance. However, other Intelligent Design positions do conflate design and designer, and so leans towards or explicitly

hold a religious position. In addition, some Christian theologians use the work of Intelligent Design to make theological claims, further confusing the issues.

The relationship between Intelligent Design and creationism is not straightforward, and is tangential to this essay. However, even when the distinctions are blurred, there are irreconcilable differences between the best of Intelligent Design and the worst of creationism. Creationists and Intelligent Design proponents challenge the evolutionary synthesis on specific grounds, though their reasoning differs. I will outline a sample of three challenges that expose how each considers evolution.

The bulk of the creationist arguments and the scientific data are omitted here, but there are innumerable discussions and publications, and literally millions of web sites to turn to for further information (Behe, 1996). The major difference between creationists and Intelligent Design proponents lies in their grasp of science. Creation science is intellectually incoherent, and scientifically illiterate. It ignores vast quantity of data and masks scientific intricacies. Creationism is a religious ideology, and is religiously and scientifically reductionist.

Intelligent Design may be a sophisticated version of creationism, but its proponents have a better understanding of scientific issues. In one sense Intelligent Design is a counter hypothesis to the materialist reductionist scientific worldview, and commitments to a meaningless universe and random life processes. For Intelligent Design evolution has considerable but insufficient explanatory power, some Intelligent Design proponents borrow notions of an anthropic principal and a fine-tuned universe from which to make a case for intelligent design.

Their chief argument is that intelligence, and hence design, is evident in evolutionary science. However, Intelligent Design fails to meet conventional scientific standards. Thus the Intelligent Design conclusions are either scientifically implausible or are moving within a level of meaning that cannot be derived from science (Eldredge, 1999). Most theologians who take evolutionary science seriously, and believe that God, providence or even directionality is at work within evolution, reject Intelligent Design.

This includes a range of scholars working at the intersection of religion or theology and evolutionary science. They maintain that evolution best represents Earth's processes. They are careful as to what one can extrapolate from science, and where religious reflection begins. For these theologians, God's divine action is embedded in evolutionary dynamics, not extraneous to it. A natural process has sufficient explanatory powers. They are adamant that there is not direct special divine intervention at any time within evolutionary processes.

From religion they use multiple metaphors and to claim that we are "in God", within Divine consciousness or enfolded within a process of Divine revelation. These theologians adopt varying positions on questions such as the significance of the human species, theistic evolution and the relationship between religion and science. They do not, however, diverge on their commitment to understanding evolution on scientific terms. They do not waver in a commitment to accepting the world as they find it, and in acknowledging that what is there has primacy over what is believed to be here (Mayr, 2001).

Evolution is the umbrella term for the dynamics of emergent life. Nonetheless, there are many intriguing questions surrounding evolution. Is life just random experiments and waste? After all, most creatures have become extinct. Or is it about abundance? Is the Earth self-organizing, even alive? Why, for example, is the basic morphology of vertebrates the same? Is this an evolutionary prototype? Are evolutionary options limited? What about the evolution extinction and the re-evolution of photo-sensitive eyes?

It is curious that such an eye had evolved independently in a least forty autonomous evolutions, with at least nine distinct design principles (Nilsson & Pelger 1995, 53-8). Is there a direction to evolution? The patterns of emergence, the self-organization of vital systems, or the advancement of consciousness evoke engaging questions of evolutionary orientation, or even teleology. The answers are tentative. What is certain is that when evolution is considered seriously, it is impossible to take humans to be the reference point, either in time, in the process, or as an end point. Humans are emergent from dynamic processes.