

Species – the Basic Element of Biology

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1. INTRODUCTION

Plants and animals compete and cooperate in their environment resulting in what is often described as a "Balance of Nature" within an ecosystem. Organisms thrive or perish within biomes depending on their ability to adapt. In 1850, Charles Darwin published *The Origin of the Species* in which he postulated that all plants and animals originated with a single cell and over time has evolved into the complex number of species that we know today. This theory has become the organizational principle that biologists use to explain the life sciences. In biology, a species is one of the basic units of biological classification and a taxonomic rank. A species is often defined as a group of organisms capable of interbreeding and producing fertile offspring.

2. SPECIES

The term "species" refers to a fundamental taxonomic unit. All living organisms have a species classification, and most of us are pretty comfortable using the term "species." However, actually pinpointing what makes one group of organisms distinct from another group can be difficult. The word "species" are reliable methods of identifying particular species is essential for stating and testing biological theories and for measuring biodiversity. Some biologists may view species as statistical phenomena, as opposed to the traditional idea, with a species seen as a class of organisms. In that case, a species is defined as a separately evolving lineage that forms a single gene pool. Species is given a formal, scientific name. When a species is named, it is placed within a genus. From a scientific point of view this can be regarded as a hypothesis that the species is more closely related to other species within its genus than to species of other genera. Species and genus are usually defined as part of a larger taxonomic hierarchy. In biological nomenclature, the name for a species is a two-part name (a binomial name), treated as Latin.

2.1. Darwin- Natural Selection

Darwin coined the term natural selection to describe the process by which organisms with favorable variations survive and reproduce at a higher rate. An inherited variation that increases an organism's chance of survival in a particular environment is called an adaptation. Over many generations, an adaptation could spread throughout the entire species. In this way, according to Darwin, evolution by natural selection would occur.

2.2. The Origin of Species

Darwin compiled evidence for evolution by natural selection for about 20 years. Between 1842 and 1844 he wrote a 230-page essay summarizing his theory and the evidence for it. In the 1850s he began working on a detailed, multivolume book to present his theory to the scientific community. Darwin might never have completed the book if another British scientist, Alfred Russel Wallace (1823-1913), had not come up with the same idea in 1858. While living in the Malay Archipelago in the Pacific Ocean, Wallace formulated his theory and wrote it in an essay, which he sent to Darwin. Darwin's fellow scientists persuaded him to let them present his theory and Wallace's essay jointly at a scientific meeting. The presentation excited very little attention, according to the modest Darwin. However, the publication of Darwin's book "The Origin of Species" in 1859 changed biology forever. The first printing of the book sold out in one day. Darwin clearly and logically presented the idea that natural selection is the mechanism of evolution. In Darwin's own lifetime many scientists became convinced that evolution occurs by means of natural selection. Today this theory is the unifying one for all biology.

3. SPECIES – THE BASIC ELEMENT

Natural selection can ultimately lead to the formation of new species. Sometimes many species evolve from a single ancestral species. Similarities in skeletal and muscular structure of Hawaiian honeycreepers led scientists to conclude that the 23 species of honeycreepers evolved from one ancestral species. Such an evolutionary pattern, in which many related species evolved from a single ancestral species, is called adaptive radiation. Adaptive radiation most commonly occurs when a species of organisms successfully invades an isolated region where few competing species exist. If new habitats are available, new species will evolve. The biological species concept defines a species as members of populations that actually or potentially interbreed in nature, not according to similarity of appearance. Although appearance is helpful in identifying species, it does not define species. Darwin's theory of evolution states that, all modern species are derived from earlier species and that all organisms, past and present, share a common ancestry. Darwin's theory of evolution, which has become a unifying theme in biology, is the organizing principle of modern taxonomy. The generally accepted criterion for defining a species is that organisms of the same species interbreed under natural conditions to yield fertile offspring. Individuals of different species normally do not mate. If they are forced to mate, the mating is either unsuccessful or the offspring are sterile. For example, a horse (*Equus caballus*) can be mated to a donkey (*Equus asinus*), and the result will be a mule. However, mules are sterile and cannot reproduce. Thus, the horse and donkey are classified as different species. A quarterhorse and a thoroughbred can mate and produce a fertile offspring. Therefore, both are classified as the same species: *Equus caballus*. For humans, there is only one living species: *Homo sapiens*. However, in past ages other species, such as *Homo erectus*, may have coexisted with *Homo sapiens*. *Homo erectus* is considered a separate species because presumably it could not mate with *Homo sapiens*.

4. CONCEPTS OF SPECIES

Numerous concepts have been proposed to define a species, but the biological species concept is the most applicable. According to the *biological species concept*, a species is a group of individuals who interbreed or have the potential to interbreed in nature. By this definition, a new species exists when individuals of a population become sufficiently different and can no longer interbreed. This very useful definition does have its limitations.

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The *morphological species concept* defines a species as a group of individuals with shared morphologies (appearances). In other words, if a group of organisms appears distinct from other groups, it constitutes a separate species. The *evolutionary species concept* (also known as the phylogenetic species concept) groups organisms based on shared evolutionary history. According to this definition, two species might actually be able to interbreed, yet because they have different histories they are considered different species. The problem with this concept is that it can be difficult to know the complete history of a species. Most biologists apply the biological species concept when it is practical; when not, they turn to one of the other concepts.

5. CONCLUSION

A species is the fundamental taxonomic unit also it is the fundamental unit of evolution. The available data indicate that most new species arise from existing species, in a process known as cladogenesis. Species is a group of individuals who share at least one common diagnostic feature and a unique evolutionary path. Moreover, this feature can be biochemical or morphological but it must be heritable and reproducible between the members of the species.

Discovery