

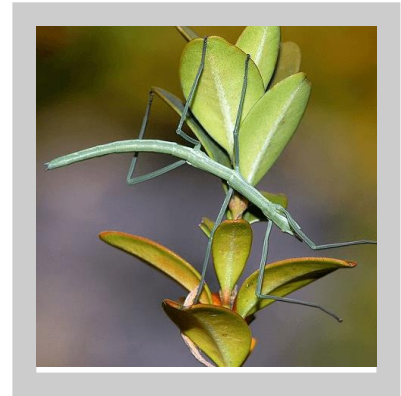
Name _____

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Biological Adaptation

Natural Selection

The theory of natural selection is the centerpiece of *On the Origin of Species* and of evolutionary theory. It accounts for the adaptation and evolution of organisms, those innumerable features that so wonderfully equip them for survival and reproduction. Furthermore, it accounts for the divergence of species from common ancestors and thus for the endless diversity of life. According to Darwin, an organism that exhibits favorable characteristics will tend to survive and reproduce in greater numbers than others of their kind, thus ensuring the perpetuation of those characteristics in succeeding generations.



It is by way of this passive choosing, this *natural selection*, that the physical features of an entire population come to change over time. This can be observed in nature: the hardiest plant survives the drought while others wither and die; the quickest antelope outruns its predators while others are caught and killed; the prettiest songbird attracts a mate while others are relegated to solitude. It can be observed that in any system in which resources are limited, a competition to acquire those resources arises and the best, or the "fittest," as Darwin would say, are predisposed by nature to secure those resources. The fittest organisms are those that are best suited to specific environmental pressures. They elude predators, withstand extreme climate, obtain food, and attract mates, and they do it better than others of their kind.

Biological Adaptation

Within the larger theory of natural selection lies the theory of biological adaptation. A biological adaptation constitutes any change in the structure or function of an organism or any of its parts that results from natural selection and by which the organism becomes better fitted to survive and multiply in its environment. Although this may sound eerily similar to the theory of natural selection itself, there is a subtle, yet important, difference. Natural selection is a mechanism (the only mechanism) known to cause the evolution of adaptations, so many biologists would define an adaptation as a characteristic that has evolved by natural selection. The word "adaptation" also refers to the process whereby the members of a population become better suited to some feature of their environment through change in a characteristic that affects their survival or reproduction.

Adaptations in Action: Striking Examples

- In most terrestrial vertebrates, the skull bones are rather rigidly attached to one another, but in snakes they are loosely joined. Most snakes can swallow prey much larger than their heads, manipulating them with astonishing versatility.

- Among the 18,000 to 25,000 species of orchids, many have extraordinary modifications of flower structure and astonishing mechanisms of pollination. In pseudocopulatory pollination, for example, part of the flower is modified to look somewhat like a female insect, and the flower emits a scent that mimics the attractive sex pheromone (scent) of a female bee, fly, or thynnine wasp, depending on the orchid species. As a male insect “mates” with the flower, pollen is deposited precisely on that part of the insect’s body that will contact the stigma of the next flower visited.
- After copulation, male red back spiders (relatives of the “black widow” spider), often somersault into the female’s mouthparts and are eaten. This suicidal behavior might be adaptive, because males seldom have the opportunity to mate more than once, and it is possible that a cannibalized male fathers more offspring.
- The Phasmatodea, or stick bug, exhibits a unique camouflage that gives it a stunning resemblance of many species of sticks or leaves found in its natural habitat. This makes it extremely difficult to spot by predators.