Homologous Structures Encyclopedia Article

Homologous Structures

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Homologous Structures

Homologous structures are structures on different organisms that display a similar base structure, but have different functions. An example of a homologous structure is the human arm, bat wing, and whale flipper. Although very different in appearance, and dissimilar in their purposes, each of these are appendages that share some similarities in bone structure and the presence of five digits (so-called pentadactyl limbs). Structures that have similar uses but dissimilar structures are described as being analogous.

Homologous structures typically developed, or evolved, from a common ancestral body part. Over evolutionary time, functional divergence occurred in different species. This relationship between homologous structures and **evolution** has existed since the dawn of life. Examination of dinosaur fossils reveals features in creatures apparently as disparate as Tyrannosaurus Rex and modern birds.

The observation of homologous structures was one of the underpinnings of the theory of evolution. In 1848, Richard Owen, a British medical practitioner and comparative anatomist, coined the term "homology" to refer to his observations of structural similarities among organisms. These similarities indicated to Owen that organisms were created following a common plan. Owen's views greatly influenced a contemporary of his, Charles Darwin, who a few years later published his seminal views on evolution. It is now generally accepted that homologous structures are strong evidence of evolution, and that evolution operates by modifying pre-existing structures.

Homologous structures extend even to the microscopic world. For example, the membranous skin that surrounds most organisms is very similar in structure. With the discovery and unraveling of the **genetic code**, such structural homology was found to extend to the composition of the genes that code for the structures.

Some homologous structures have no function in one species, but do have a function in another species. These are known as **vestigial structures**. Examples of vestigial structures are the pelvic region of a whale and the eyes of blind, cave-dwelling creatures, such as the grotto salamander. If evolution did not operate, vestigial structures would make little sense. However, such structures do make sense if traits are inherited from some ancestor and gradually modified, even to the point of being functionless, over time.