

Scientific Names

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About two million kinds of plants and animals have so far been described by science. That represents only a small percentage of the estimated ten million to one hundred million kinds of organisms on Earth, but it is still a lot of names to keep track of. To eliminate the ambiguity that would arise from the casual application of names to plants and animals, Carl Linnaeus, an eighteenth-century Swedish medical doctor and botanist, developed a rigorous system for naming and organizing them. The Linnaean classification system assigns every known kind of organism to a kingdom, phylum, class, order, family, genus, and species.

The "atomic" unit of classification is the species, and each kind of organism is to be universally referred to by a two-part name (binomial) that includes its genus and its species names. That binomial is usually derived from Greek or Latin, the languages used for scientific writing worldwide in Linnaeus's day. Binomials are traditionally written in italics to show that they are scientific and not common names. The genus name is always capitalized, and the species name is always in lower case. Here is the hierarchy of classification for the okapi (*Okapia johnstoni*).

Kingdom	Animalia (animals)
Phylum	Chordata (vertebrates)
Class	Mammalia (mammals)
Order	Artiodactyla (even-toed ungulates)
Family	Giraffidae (giraffes)
Genus	<i>Okapia</i>
Species	<i>johnstoni</i>

The okapi has numerous common names in many different languages, but whenever a scientist says or writes the name *Okapia johnstoni*, other biologists around the world know precisely what kind of animal he or she is referring to.

Over the past two centuries, Linnaeus's system has been revised in some substantial ways. For example, the Linnaean system originally used the number and type of reproductive parts in plants for dividing them into different categories, or taxa. That approach resulted in some very awkward and "unnatural" groupings and was eventually replaced by one made popular by the English naturalist John Ray. Ray's system looks at morphological attributes from all parts of an organism in all stages of its development to draw conclusions about how to group it. But both Linnaeus's system of hierarchical classification and his binomial nomenclature are still in use today, and Linnaeus is generally credited as the founder of modern taxonomy.

Discovery of the evolutionary nature of the history of life on Earth brought a new dimension to the science of taxonomy. Not only do modern scientists want to group organisms based on their physical characteristics, or morphology, but they also want their groupings to reflect the relationships between different organisms over time on the branches of the evolving tree of life. Phylogenetics is the science that studies the evolutionary relationships, or the phylogeny, of organisms. It expresses these relationships through diagrams, called cladograms, which show the relative genetic similarity of species.

Today, when a new mammal species is discovered, biologists examine its morphology, range, behavior, habitat requirements, and usually its DNA before determining just where in the Tree of Life it should be placed. Modern genetic techniques sometimes turn up big evolutionary surprises, showing organisms that look quite similar, for instance, to be only distantly related. But this kind of surprise predated genetic techniques as well. The okapi is a good example of an animal first thought to be related to one group (the zebras) and later found, through detailed morphological examination, to be instead a very close relative of another (the giraffes).

At the American Museum of Natural History and in other museums and universities around the world, the Linnean project of naming and classifying Earth's diversity of life continues. But with only a small percentage of life forms described, biologists have likened our attempts to understand life and the systems that sustain it to doing chemistry while knowing less than a fifth of the elements in the periodic table.