Metadata of the chapter that will be visualized online

Chapter Title	Taxonomy	
Copyright Year	2014	
Copyright Holder	Springer-Verlag Berlin Heidelberg	
Corresponding Author	Family Name	**Rosselló-Móra**
	Particle	
	Given Name	**Ramon**
	Suffix	
	Organization/University	IMEDEA (CSIC-UIB)
	City	Esporles, Mallorca, Balearic Islands
	Country	Spain
	Email	rossello-mora@uib.es
Keywords (separated by “-”)	Classification - Hierarchy - Systematics	

Author's Proof

Encyclopedia of Astrobiology
DOI 10.1007/978-3-642-27833-4_1562-4
© Springer-Verlag Berlin Heidelberg 2014

Taxonomy

Ramon Rosselló-Móra*
IMEDEA (CSIC-UIB), Esporles, Mallorca, Balearic Islands, Spain

Keywords

Classification; Hierarchy; Systematics

Synonyms

Classification

Definition

Taxonomy (from Greek taxis [order or arrangement] and *nomos* [law or science]) is the scientific discipline that deals with the classification of the living organisms.

Overview

Taxonomy pursues the generation of a classification system that is operative and predictive with the ultimate goal of identifying the patterns of recurrence (▶ species) that can be observed in nature. However, the word "taxonomy" is often used as a synonym for "classification," and both terms indicate the hierarchical system that organizes biological diversity. Taxonomy is an essential discipline of the biological sciences because it provides a framework that facilitates the scientific community's understanding and knowledge exchange. The main basis of taxonomic classification is the category of "species" that is considered as the unique entity. Different taxonomies tailor their species circumscriptions with different criteria depending on their ability to reveal genetic, phenotypic, and ecologic particularities. Thus, such units are not always comparable. However, higher-rank categories (from genus to phylum) are considered abstract entities and thus comparable among the different taxonomies. The main success of taxonomy will be to achieve a classification that reflects the natural genealogical and evolutionary relationships among living (and fossil) organisms.

It is perhaps one of the oldest biological sciences, having been in existence for at least 2,400 years, since Aristotle devised the first hierarchy based on creationist and essentialist tenets. Linnaeus established the first serious taxonomy in the eighteenth century when he created the binomial system of nomenclature (genus and specific epithets) for plants, as well as the first hierarchical system based on five taxonomic ranks (kingdom, class, order, genus, and species). Later, in the middle of the twentieth century, Mayr and Simpson enlarged the hierarchical system in about 19 different taxonomic ranks as a result of an enormous increase of classifications and the difficulties in fitting them into the five-rank system. One of the major drawbacks of the current view on taxonomy is that scientists take for granted that the whole of biological diversity, including prokaryotes and eukaryotes from any source, can be organized by following a single

*Email: rossello-mora@uib.es

Uncorrected Proof

Author's Proof

Encyclopedia of Astrobiology
DOI 10.1007/978-3-642-27833-4_1562-4
© Springer-Verlag Berlin Heidelberg 2014

hierarchical model of categories, equally ranked for any kind of organism, which is a tendency called "monism" by philosophers. However, some scientists advocate for the allowance as many parallel taxonomies as possible, following a tendency called "pluralism" by philosophers, as the only solution to the so-called species problem.

The success of taxonomy as a science will be the achievement of a classification system that is operative and predictive (i.e., the identification of an individual belonging to a given taxon will be accompanied by the prediction of genetic, phenotypic, or ecologic traits) and reflects the natural relationships among the classified organisms.

See Also

- ▶ Evolution, Biological
- ▶ Phylogeny
- ▶ Species

References and Further Reading

Ereshefsky M (1994) Some problems with the Linnaean hierarchy. Philos Sci 61:186–205
Hull DL (1965) The effect of essentialism on taxonomy – two thousand years of stasis. Br J Philos Sci 15:314–326, 16:1-18
Hull DL (1970) Contemporary systematic philosophies. Ann Rev Ecol Syst 1:19–54
Larson JL (1971) Reason and experience. University California Press, Los Angeles
Rosselló-Móra R (2005) Updating prokaryotic taxonomy. J Bacteriol 187:6255–6257
Sneath PHA (1995) Thirty years of numerical taxonomy. Syst Biol 44:281–298
Sokal PH, Sneath RR (1973) Numerical taxonomy. W. H Freeman, San Francisco

Uncorrected Proof