

Editorial

Towards a Better Understanding of Diversity

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When we look at Planet Earth, its material and organisms, a prominent feature is the **diversity** of these components and the mechanisms underlying their functions. Biodiversity, which includes the diversity of the living organisms, their genes and the biomes, is a fascinating product of millions of years of evolution. Biodiversity is not static but in continuous change. In addition to the intrinsic natural causes, the biodiversity on Earth is increasingly challenged by human interference. Among the critical factors are the destruction of habitats (by agriculture or technical development, especially loss of rain forests and coral reefs), climate change, direct persecution and extermination of species (for traditional pharmaceutical use, game hunting or in fishery), as well as the introduction of invasive species and environmental pollution (some of them apparently influencing our climate) [1]. Global changes (land-use and climate) and human population growth (with a world population of more than 6.7 billion in 2009 and an annual increase of almost 80 million) are ultimately responsible for affecting biodiversity worldwide. The exact impact of human interference on the Earth's diversity may not be realised until it is too late to save critical species.

In spite of all this, the number of species inhabiting this planet is overwhelming. The approximate numbers of the described species (about 2 million) on our planet are summarized in Table 1. Nevertheless, the real number of species is certainly much higher, because many species in the tropical systems or in the deep sea have not been discovered yet. There is a great dispute about the numbers of Archaea and Bacteria, and their taxonomies are in great flux. However, these given numbers are likely to be undercounted because of the limitations in culturing microbes and horizontal gene flow. The same applies to many single-celled Eukaryotes. If we want to analyse or document how many species are lost in historic terms or are threatened with extinction, either at present or in the future, it is extremely important to obtain a precise assessment of biological diversity. We can not counteract the current loss of biodiversity unless we understand the processes driving the diversity patterns, the basic numbers and their variation in time and space. Besides, the universal definition of a species remains one problem unresolved. Modern techniques of molecular biology (i.e. PCR, DNA sequencing of marker genes or

even complete genomes, microsatellite analysis, genomic fingerprinting coupled with bioinformatics) are extremely helpful in defining species and exploring biodiversity. However, the molecular approach needs the input of classical taxonomy. The study of diversity (including ecological complexity, dissimilarity, functional diversity, diversity at various levels of organisation) can also help to understand the rules that regulate species coexistence in biological communities.

Table 1. Approximate numbers of properly documented [2-5] living species on Earth. Rough estimates of known and undescribed species vary between 5 and 50 million [5].

Prokaryotes	
Archaea	260
Eubacteria	9,100
Eukaryotes (main groups only)	
Metamonadina/Parabasali	650
Euglenozoa	1,400
Chromalveolata	15,000
Stramenopilata	106,000
Metabionta (plants)	290,000
Mosses	25,000
Ferns, horsetails	10,000
Gymnospermae	850
Angiospermae	234,000
Fungi	108,000
Choanoflagellates	120
Metazoa (Animals)	
Porifera	10,000
Cnidaria	9,000
Protostomia	1,132,950
Lophotrochozoa	150,000
Ecdysozoa	978,000
Deuterostomia	58,000
Echinodermata	6,000
Cephalocordata	13
Urocordata	1,300
Myxinoidea	22
Chondrichthyes	846
Osteichthyes	31,100
Amphibia	6,433
Mammalia	5,488
Reptiles	8,734
Aves	9,990

Diversity is also an inherent property of humans and all human activities. Evolution apparently favours differences, as natural selection can only work if there is variation. Diversity is not only present in the genetic outfit of humans, but also in all of our social, cultural and religious activities. Variation, rather than similarity and equality (as demanded by political correctness), is the main feature in all aspects of human life and activity as well as in those of other organisms.

Diversity is a new international and interdisciplinary journal of science and technology concerning diversity concepts, applications, assessments and conservations. Diversity will focus on the mechanisms that create, maintain and affect biodiversity and the consequences of diversity loss. Its topics cover any source of biodiversity (from genes, species to biomes), chemico-physical diversity, sociobiological diversity, cultural diversity, religious diversity, political diversity and multiculturalism, to name a few. Papers will discuss general aspects of diversity assessments such as those through mathematical models and by computational methods. A main focus will be the biodiversity on the species and ecosystem level (ecology and biogeography). The analysis of diversity will include not only molecular evolution and phylogeny, but also ecological, biocultural and social evolution. On the cultural level, it will discuss multiculturalism, political, social and religious diversity and related topics such as tolerance and intolerance. We invite contributions to the theoretical aspects of diversity such as entropy, information, complexity, self-organization, stability and reversibility. Contributions from physics, chemistry and engineering sciences may investigate the role of diversity in thermodynamics, material science and complex chemico-physical phenomena. For both natural science and social sciences, diversity preservation strategies are of prime importance. Under this topic, studies on related international treaties, laws, agreements and plans for preservation projects will also be considered.

The scope of *Diversity* is to publish reviews, research papers and short notes in the regular issues. Related news and announcements will also be considered for publication. Our aim is to encourage both social scientists and natural scientists to thoroughly publish their theoretical and details. There is no restriction on the length of the papers. For computational and experimental studies, the details must be provided so that the results may be reproduced.

Diversity is the first international and interdisciplinary Open Access journal with this scope published in English. It will have all the advantages of the Open Access journals, most importantly a fast review process and reasonable publication costs for authors, and free access for all. In addition, there are three unique features:

- Manuscripts regarding research proposals and research ideas are particularly welcome.
- Comments on any related papers published in this journal and other journals can be made public immediately in a mailing list, or as short letters, in this journal.
- Electronic files describing or explaining the full details of calculations and experimental procedures will be deposited as supplementary material if unable to be published as the main paper.

As Editor-in-Chief, I hope that *Diversity* will stimulate the rapid dissemination of information from scientists from around the world on new topics and developments in all fields of diversity. The journal will offer a ground for scientists to expose scientific evidence, theories and reasonable speculation where permitted, which will help to record, analyse, understand, value and protect diversity on the Earth.

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