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MONOGRAPH

Introduction

Speciation and Taxonomy: digressions at the edge of a meeting

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The title of the meeting organized by the Biodiversity Journal leads itself to reflections upon the cognitive relation between man and nature. Two different ways of looking at biodiversity are approached: explanation of its origin and classification of its diversity. The first looks into the processes that have led to the formation of that extraordinary, wonderful, tragic and cruel world that we call life. The result has been the impressive system of knowledge of the biological evolution. We are confident, on the other hand, that the processes of life are independent of any our interpretation. The second meets our need to name and describe the living beings appearing as separate discrete entities. The outcome of this activity is taxonomy, an object of our mind, whose first systematic form dates back to the Systema Naturae, elaborated by Linnaeus far before the emergence of the evolutionary theory, nearly actualizing the first job of Adam (Genesis 2, 19).

Speciation is a crucial event of evolution: genetic variations and adaptations to different environmental contexts have produced a multiplicity of species and a great diversity of living organisms. Taxonomy is able to represent only a time confined image of the result of this process; however its system becomes a new subject of our knowledge with implications on our perception of the diversity of life. May rules and methods of taxonomy affect the comprehension of the life evolution? Indeed, we can suppose that, in the interaction between the static description of biodiversity and the analysis of its development, the mechanism of our mind plays a relevant role in guiding the thoughts towards the established knowledge.

Phylogenetic analys is try to connect taxonomy to speciation and contributes to its redefinition. However both phylogeny and taxonomy respect a tacit postulate whose rational foundation is not considered problematic: similarity among beings indicates a common origin and the chain of reproductive events brings us to the common life origin. And, if life, in the famous primordial soup, had originated uncountable times, as an unavoidable consequence of the properties of inorganic matter, as the inorganic molecules arise from chemical reactions rigorously determined by their context? Should we hypothesize that at least a part of biodiversity was determined by distinct origins in the primordial soup?

Removing this heretic thought, arisen from the hesitations of my mind, let us consider a less worrying problem of our taxonomic system: the indefiniteness of taxonomic categories, detectable from a comparison between different phyla, classes or orders. Are taxonomic categories pure classification tools or they attempt to measure some aspect of diversity? Molecular analysis has allowed the

measurement of the genetic distances among taxa and to calculate the time of their separation, even in absence of paleontological data. But, the results, despite the sophisticated mathematical methods utilized, are grossly inadequate: solution of problems at the species or subspecies level is possible, but the phylogenetic trees remain highly hypothetical.

Current taxonomy tries to represent the surprising phenotypic diversity of beings that has a magnitude many times larger than the diversity of genetic material. It would be most likely possible to redefine the taxonomic categories according to the level of phenotypic diversity. This would require a free access to an exhaustive species'documentation (description, figures, ecological notes, and so on). Some farseeing scientists are pursuing this aim for a few taxa.

However there are good reasons to preserve the stability of taxonomy. For example, the great role of taxonomy in nature conservation strategies: one cannot preserve any living organism that does not have a name. The prerequisite for the creation of the IUCN Red List of Threatened Species is precise taxonomic knowledge and changes in taxonomy (for example variation in synonymy) can determine changes in the status of a species. Also the level of nature protection in a territory may be increased by a new taxonomic evaluation of a biological species. Of course there is a great need for taxonomy experts to monitor the populations of protected species and to evaluate the status of habitats relevant for nature conservation. But, may these considerations of mine reveal a conflict of interest?

At the end, we will have a good solution if, while many mathematical minds endeavor to elaborate models to resolve evolutionary puzzles, traditional taxonomy continues to fulfil the biblical job of giving a name to animals and plants, whose shapes, colours and adaptations always attract the interest of numerous enthusiastic scientists, as proven by the success of this journal and of the meeting.