

Light after dark: the partnership for enhancing expertise in taxonomy

The recognition of the value of biological diversity, especially after the famous Rio convention, has caused a flurry of national and international plans aimed at the exploration of biodiversity. Biodiversity is a magic word that opens many doors in funding agencies¹. The three definitions of biodiversity (subspecific, specific and supraspecific) involve genetic, organism, population and ecological approaches, even though the concern about biodiversity stems from the still unanswered question 'How many species are there on earth?'².

Genetics at a molecular level and ecology at a functional level were well represented in the scientific arena even before the biodiversity frenzy, whereas the science of species description, naming and classification (taxonomy and systematics) is passing through a world crisis that is far from being solved. There are two reasons for this crisis. One is the non-existent Impact Factor (IF) of most of the journals that publish species descriptions and taxonomic revisions. The IF is a widely used parameter to score the performance of researchers, leading to career opportunities and advancements. If you have a low IF, your future is dark. The other reason is that species description is seen as an old-fashioned way of doing research. The result is that experts in taxonomy retire and are not replaced, zoology and botany disappear from university curricula and new researchers in biodiversity end up being either molecular biologists or ecologists.

Too extreme a statement? Consider this: a recent paper on animal evolution in *Trends in Genetics*³ included a glossary explaining the following terms: Bilaterians, Cambrian explosion, Clade or Natural group, Diploblasts, Evolutionary radiation, Metazoans, Monophyletic taxon, Phylum, Superphylum, Synapomorphy, Taxon, Triploblasts. This means that the editor of this journal supposes that a general reader interested in animal evolution is not familiar with these concepts. Look at a species list in a standard ecological paper and check how accurate are the data sets that, often, are

then analyzed with the most sophisticated statistical packages.

This is the dark. And here is the light. The dismissal of taxonomy worldwide originated from the USA. This mistake has now been recognized and a strategy has been implemented in the USA to correct it. The National Science Foundation of the USA has realized that taxonomy is dying and that the USA cannot have a scientific community that is deprived of taxonomists. This led to the launch of the Partnership for Enhancing Expertise in Taxonomy (PEET) (<http://web.nhm.ukans.edu/~peet/>). Although other countries have begun to neglect their taxonomic expertise, they still have taxonomists and the situation is not as dire as that in the USA. Italy, for example, is the only country to have published a complete checklist of its fauna simply because it still has a breed of taxonomists⁴. Italian taxonomists are, however, getting older and are not being replaced, meaning that Italy is suffering today from the same mistake that affected the USA scientific community some 20 years ago. These non-USA countries harbor the experts in traditional taxonomy (those in the USA are very advanced in molecular aspects) and often provide the actual founders of the new breed of USA taxonomists. The PEET project on the Hydrozoa, for instance, is based on work by an Italian and a Brazilian student.

A PEET taxonomist is a blend of a traditional morphological specialist and a molecular systematist. These two approaches to biodiversity rarely interact, producing paradox that traditional taxonomists have many problems that their techniques cannot solve, whereas molecular taxonomists have powerful techniques but not so many problems to solve, once the most obvious ones have been done. A standard product of a PEET project is a thorough revision of a taxon, which includes studying all the existing literature, inspecting type specimens, collecting new material, molecular analysis of specimens referred to as many nominal taxa as possible, disentangling of

synonymies and production of a phylogeny based on both morphological and molecular approaches.

Despite having no impact, taxonomic publications have eternal life and one cannot ignore old descriptions simply because they are old. A complete library is thus a prerequisite for good taxonomic work. Many PEET projects require that bibliographic data bases are made available through the Internet for free, also with the option of downloading articles in PDF format when possible. In this way, taxonomy will be enhanced not only in the USA but also in the rest of the world. As an example, refer to the bibliographic database on the Hydrozoa (<http://siba2.unile.it/ctle/hydro/index.php3>).

The prominence of Europe as a land of taxonomists will not last long unless more PEET-like projects are launched soon, each with a carefully planned strategy of specialist training and proper career opportunities. If this does not happen, in 20 years, Europeans will send their youngsters to learn taxonomy in the USA.

The problem of the decline of taxonomy, finally, is also due to taxonomists. Specialists in astrophysics are able to convince funding agencies to invest enormous amounts of money to look for extraterrestrial life. The same people who invest public money in these irrelevant enterprises⁵ are obviously not convinced by taxonomists that it is worthwhile investing money to explore the life of this planet!

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