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Conference Abstract

Taxonomy and Systematics in Biodiversity Informatics: Lessons learned from ichthyology and general perspectives

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Abstract

Although still strongly intertwined, taxonomy and systematics are diverging more and more in their paradigms, methods, and agendas: it is not possible to consider them as synonyms anymore. While taxonomy remains an analytical science based on abductive reasoning (trying to find the historical pathways leading to present species delineations), systematics diverged as an information science since the rise of computers: summarizing, organising, and exposing taxonomical, biological, and ecological data, information, and knowledge in the most efficient ways, with respect to various targeted audiences. One could even consider synonymising biodiversity informatics with systematics instead!

Schematically, this led to two different types of information systems: one dedicated to pure taxonomic and nomenclatural data; one oriented to record life-traits. Obviously, the latter must be built along reliable taxonomic backbones, therefore the former should have been built before the latter. It did not happen as exemplified in fishes by the Food and Agriculture Organisation (FAO) Fisheries Global Information System (FIGIS) and related, Catalog of Fishes, and FishBase, and later the databases of the International Union for Conservation of Nature (IUCN) and World Register of Marine Species (WoRMS), or for aggregators with Catalogue of Life and e.g., GBIF, Encyclopedia of Life. This has created some confusion

for end users, “which system should I use” being their regular question with the invariable answer, “it depends”.

In the absence of a formal preexisting taxonomic information system, each biodiversity information system has developed its own way to manage its taxonomic backbone with more or less impact of taxonomists. For fishes, we are not far from reconciling the various systems, and data to knowledge flows are becoming clearer, but it is not without unnecessary extra work. A real breakthrough is necessary to move from a collaboration stage to a cooperative stage, where systems are interconnected (not necessarily integrated) in such a way that the same taxonomic work is not repeated over and over to synchronise the systems. The difficulty is that taxonomic information systems must be designed for the needs of taxonomists, while their resulting classifications and the way they are exposed must fit the needs of systematics/biodiversity systems purposes, and by extension of the rest of scientific domains and the society in general. Conditions for this breakthrough to happen are discussed.

The breakthrough does not reside in only one action but rather is the result of multiple simultaneous advances in the theory of taxonomy, its (mathematical?) formalization and informatics implementation, technology (although progress in that domain may be well in advance over others), data entry, networking, and sociology of science. The "potential taxon" concept (Berendsohn 1995) led to important theoretical progresses but its actual implementation lags behind in many systems, due probably to the huge effort of data entry it requires. Data entry is certainly a part that was neglected at the beginning of biodiversity informatics, because it has to be sustained endlessly, while the development of new systems was seen as more rewarding in time-limited frameworks. This has been corrected at least for occurrences and specimens, with the development of national and international digitization programs. Besides, the development of the Biodiversity Heritage Library and text extraction technologies is quite promising for taxon information.

As in all complex situations with many interacting dimensions (e.g., fisheries management in ichthyology), progress must be balanced among all dimensions to have effective results for the overall domain. Among others, issues in sociology of sciences, for instance, must be addressed to make significant progresses. In particular the way data, information and knowledge are published, and jobs delineated and careers evaluated, must still be seriously reviewed in the light of information system development.

Keywords

taxonomy, systematics, integration of information systems, ichthyology

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