Improved Sharing and Linkage of Taxonomic Data with the Taxon Concept Standard (TCS)

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Abstract

The term 'taxonomic backbone' is often used to indicate the compromise taxonomies that form the taxonomic backbone of systems like the Global Biodiversity Information Facility (GBIF) and the Atlas of Living Australia (ALA). However, the term can also be seen in the broader sense as the entire expansive and continually evolving body of taxonomic work that underpins all biodiversity data and the linkage of all the different concepts that are used in various parts of the world and by various groups of people.

The Taxon Concept Schema (TCS; Hyam and Kennedy 2006), which was ratified as a TDWG standard in 2005, came forth from the need of providers of taxonomic information for a mechanism to exchange data with other providers and users. Additionally, there was the knowledge that taxon names make poor identifiers for taxa and that more than names are needed for effective sharing and linking of biodiversity data. The same name can be associated with multiple taxon concepts or definitions, especially when a name has been around for a long time or is used in a heavily revised group. In order for others to know what a name means, people who use a name should also indicate which concept of that name is being used. Traditionally, the Latin 'sensu' or `sec.` have been used for this purpose; in TCS, an 'according to' property is used. The taxon concept, along with a language to relate different concepts, which is also in TCS, was later introduced to a systematic audience in an article by Franz and Peet (2009).

Unfortunately, TCS has never enjoyed wide adoption and since Darwin Core (Wieczorek et al. 2012) was ratified in 2009, sharing of taxonomic information has mostly been done with the Darwin Core Taxon class. However, various issues with the Darwin Core Taxon class (e.g., Darwin Core and RDF/OWL Task Groups 2015) have made us look at TCS again and in 2020 the Taxonomic Names and Concepts Interest Group was formally renamed the TCS Maintenance Group. In 2021, a TCS 2 Task Group was established with the goal to update TCS to a Vocabulary Standard (like Darwin Core) that can be maintained under the TDWG Vocabulary Maintenance Specification (Vocabulary Maintenance Specification Task Group 2017).

As it currently stands, TCS 2 (TCS 2 Task Group 2023) has two classes for dealing with taxonomy, the Taxon Concept and Taxon Relationship classes, and two classes for dealing with nomenclature, the Taxon Name and Nomenclatural Type classes. TCS 2 describes objects that are present and known in the domain and uses terms that are used in the domain (e.g., Greuter et al. 2011, Hawksworth 2010), so is easily understood by practitioners in the domain and other users of taxonomic information, as well as data specialists and developers. At the same time, it is in accordance with the OpenBiodiv Ontology (Senderov et al. 2018) and the Simple Knowledge Organization System (SKOS; Miles and Bechhofer 2009).

TCS 2 can be used to mark up taxon concepts of any type, including taxonomic treatments, checklists, field guides, as well as systems like the Catalogue of Life and Avi Base. Once marked up as TCS, concepts of all types look the same and therefore a small standard of under 40 terms can be used to share and link all taxonomic information and to link to other types of biodiversity data, for example occurrence data or descriptive data.

Keywords

TCS, Taxonomic Concept Schema, standard, taxonomy

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Conflicts of interest

The authors have declared that no competing interests exist.

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