Conference Abstract

Making Parasite-Host Associations Visible using Global Biotic Interactions

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Abstract

A wealth of information about how parasites interact with their hosts already exists in collections, scientific publications, specialized databases, and grey literature. The US National Science Foundation-funded Terrestrial Parasite Tracker Thematic Collection Network (TPT) project began in 2019 to help build a comprehensive picture of arthropod ectoparasites including the evolution of these parasite-host biotic associations, distributions, and the ecological interactions of disease vectors. TPT is a network of biodiversity collections whose data can assist scientists, educators, land managers, and policymakers to better understand the complex relationship between hosts and parasites including emergent properties that may explain the causes and frequency of human and wildlife pathogens. TPT member collections make their association information easier to access via Global Biotic Interactions (GloBI, Poelen et al. 2014), which is periodically archived through Zenodo to track progress in the TPT project. TPT leverages GloBI's ability to index biotic associations from specimen occurrence records that come from existing management systems (e.g., Arctos, Symbiota, EMu, Excel, MS Access) to avoid having to completely rework existing, or build new, cyber-infrastructures before collections can share data. TPT-affiliated collection managers use collection-specific translation tables to connect their verbatim (or original) terms used to describe associations (e.g., "ex", "found on", "host") to their interpreted, machine-readable terms in the OBO Relations Ontology (RO).

These interpreted terms enable searches across previously siloed association record sets, while the original verbatim values remain accessible to help retain provenance and allow for interpretation improvements.

TPT is an ambitious project, with the goal to database label data from over 1.2 million specimens of arthropod parasites of vertebrates coming from 22 collections across North America. In the first year of the project, the TPT collections created over 73,700 new records and 41,984 images. In addition, 17 TPT data providers and three other collaborators shared datasets that are now indexed by GloBI, visible on the TPT GloBI project page. These datasets came from collection specimen occurrence records and literature sources. Two TPT data archives that capture and preserve the changes in the data coming from TPT to GloBI were published through Zenodo (Poelen et al. 2020a, Poelen et al. 2020b). The archives document the changes in how data are shared by collections including the biotic association data format and quantity of data captured. The Poelen et al. 2020b report included all TPT collections and biotic interactions from Arctos collections in VertNet and the Symbiota Collection of Arthropods Network (SCAN). The total number of interactions included in this report was 376,671 records (500,000 interactions is the overall goal for TPT). In addition, close coordination with TPT collection data managers including many one-on-one conversations, a workshop, and a webinar (Sullivan et al. 2020) was conducted to help guide the data capture of biotic associations.

GloBI is an effective tool to help integrate biotic association data coming from occurrence records into an openly accessible, global, linked view of existing species interaction records. The results gleaned from the TPT workshop and Zenodo data archives demonstrate that minimizing changes to existing workflows allow for custom interpretation of collection-specific interaction terms. In addition, including collection data managers in the development of the interaction term vocabularies is an important part of the process that may improve data sharing and the overall downstream data quality.

Keywords

biotic associations, natural history collections, specimen digitization, vertebrate parasite, Terrestrial Parasite Tracker

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