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The Global Biodiversity Information Facility

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Abstract

"Biodiversity or biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems" (Convention on Biological Diversity, Art. 2, para. 1). The Global Biodiversity Information Facility (GBIF) (www.gbif.org) mission is to make the world's biodiversity data freely and universally available via the Internet. GBIF was established and is being maintained by an ever-growing consortium of forward-thinking countries, economies and international organizations. Its charge is to carry out specific tasks that are essential to a worldwide infrastructure that can overcome current barriers to the universal availability of species-level biodiversity information. Significant parts of the tripartite (gene, species, ecosystem) biodiversity information resource are already online, such as the DNA data served by GenBank, EMBL and DDBJ and other sequence (RNA, protein, etc.) data served by various sources such as RNAbase, SCOR and ExPASy. These community research resources have already contributed substantially to medical, pharmaceutical and agricultural industries and through these to society, which has footed the bills for the establishment and maintenance of the digital information resources. Ecological, ecosystem and planet-wide data are provided online by, for example, MABnet and LTERnet, the U.S. National Aeronautics and Space Administration (NASA) through its Mission to Planet Earth (MPE) and other national and bi- or trilateral consortia. These online ecological resources are just beginning to be thoroughly analyzed and the results synthesized into larger understandings of the functioning of the natural systems of our planet. Nonetheless, they hold great promise for predictive modeling of global climate change and other large-scale ecological phenomena. Though there are areas of the world that still do not have either full access to the Internet or the onsite infrastructure to fully utilize data that might be received (one hopes that this situation will be rectified in the near future), the molecular and ecological data discussed above are available to anyone and everyone with an Internet connection. One of the reasons that this is so is that the available data have all been collected in the past few decades, during the age of computers. The piece, in fact the anchor stone, of biodiversity information that to-date has been missing from digital availability is data about individuals, populations and species of whole organisms. These data are not online because most pre-date the computer age. They have been collected over nearly three centuries and recorded in the only medium available: paper and ink. These data are on the labels of natural history specimens, in libraries and in handwritten notebooks or typewritten card files. Species-occurrence data are essential to many kinds of analyses, and one of GBIF's four major areas of work is aimed at making these data digital and therefore more useful and available. All of GBIF's tasks are aimed at making digitally available the bridging pieces (data about individuals, populations and species) that tie the whole biodiversity information pattern together (see Figure 1). Without the Taxonomic Name Service (a function that uses both the Registry of Shared Biodiversity Information and the Electronic Catalogue of Scientific Names) that will be provided by GBIF, there is no way to obtain a seamless response to a query that requires a call upon both ecological and molecular data, such as "What other organisms live in the same kinds of habitats as this one from which I have extracted a gene that enables it to tolerate high levels of lead acetate, and are able to do so because of either homologous or analogous gene function?" The pieces

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