

TAXONOMY: IMPEDIMENT OR EXPEDIENT

SCIENCE **305**: 1103-1104

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Taxonomy is a critical tool in understanding biodiversity, and we applaud the view by Wheeler et al. (“Taxonomy: Impediment or Expedient,” Editorial, 16 January, p. 285) that natural history collections and an evolving cyber-infrastructure are central to the taxonomic mission. But their vision needs to be even bolder if we are to accomplish related grand challenges such as documenting the diversity of life, deciphering the Tree of Life, determining how biotas and their ecosystems shape global environmental systems, and creating a universal bioliteracy that enables practical outcomes and education for society.

Innovative tools such as genomic and biodiversity informatics and molecular-based identification can, for the first time, make these grand challenges attainable while there is still enough biodiversity left to matter. One critical piece is the 300 years of information associated with approximately 3 billion specimens of animals and plants in museums and herbaria worldwide [1 – 5]. Wheeler *et al.* worry about some of these data being “outdated or unreliable.” Yes, specimen collections and their databases are imperfect, requiring taxonomic and geospatial updating and verification. But these improvements are now ongoing while we deploy verified collections data for powerful analyses of environmental and societal phenomena, such as the spread of invasive and disease species, biosecurity, and the effect of climate change on species distributions and conservation. When museums use modern informatics tools to digitize and fully share specimen data, they are fostering the collections and their information for research *on the very biodiversity phenomena that those collections were intended to help elucidate* (6 - 9).

Informatics complements expertise in taxonomic and morphological research, which are essential to understanding the complexity of life. But the biodiversity community needs to automate large segments of the process of species discovery and documentation using rapid identification with unique gene sequences and informatics-mediated taxonomic tools [5, 8–10]. From the onset, large-scale floral and faunal studies should be web-mediated digital library projects, with species treatments published online, and the biotic information disseminated by instant, open-access networks that empower the scientific community, the public, and policy-makers. Doing it the old-fashioned way won't do, whether web-based or not. It has taken 300 years to discover and describe 1.8 million species, perhaps one-tenth of Earth's total biodiversity, a rate that writes off the taxonomic future and the biodiversity that remains.

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