



Telescopes through time: natural history collections as models of Earth's diversity

Vanessa Pike



Why does species diversity matter?

- **Economic Driver:** Ecosystem services that support life on Earth (e.g. crop pollinators, air and water quality regulators) valued at \$30-40 trillion
- **Risk:** UN-sponsored Millennium Ecosystem Assessment states 60% of these essential services are being degraded/ used unsustainably
- **Policy:** EU target is to halt biodiversity loss by 2010
- **Challenge to Taxonomic Researcher Community:** Document of diversity is needed

The Name Game

- 1.5 million named species to-date; estimates range from 5-15 million for number of species in existence
- Circa. 10,000 new species described per annum
- Records exist on files in herbaria and museums
- Improved databasing technology and use of molecular techniques are helping to speed up the naming process
- Physical collections developed over 200 years can now begin to be integrated virtually to provide a map of Earth's diversity through time
- Collections act as the best available model of the Earth's diversity

Natural History Collections as Infrastructures

- Collections, like telescopes, work well in arrays and can look back in time and help to predict future trends/ events
- A large collection (e.g. NHM) holds 70 million specimens, has value of over 7.5 billion euros which, uniquely, increases over time



FP6-funded I3: SYNTHESYS

- **Networking Objective:** Create a single 'virtual' collection consisting of many physical natural history collections and development of an integrated data source about those collections
- **Networking Outcome:** Enhance collections accessibility to European researchers
- **Access Objective:** Offering over 26,000 User days of access to European research community
- **Access Outcome:** Taxonomic revisions, environmental monitoring, biodiversity management plans

Examples of Users of Natural History Collections

- **Public Health Officials:** working on vectors of diseases and monitoring their spread in Europe
- **Agriculturalists:** identifying of wound causing pests in cattle
- **Fisheries Researchers:** species monitoring in European waters
- **Biostratigraphers:** micropalaentological analysis of core samples for global oil and gas exploration
- **Biodiversity Planners:** mapping global species distribution
- **Environmental Change Modellers:** developing lichens as bioindicators of air quality

Future Challenges

- Continue the task of filling the gaps in the document of the diversity of life, ultimately build a complete species list
- Integrate the data with other environmental data sets (e.g. meteorological and oceanographic data) to help enhance the robustness of environmental modelling
- Making high quality virtual access a reality e.g. via remote microscopy, online 3D-images and data for verification of 'field' samples via DNA barcoding