The Atlas of Living Australia

Challenges and Opportunities for Managing Biodiversity Information

Biodiversity information

Braconidae - ? *Chaoilta sp.*

Parasitises

Huntsman spider
Holconia montana

Preys upon

Feeds upon

Tagasaste (tree lucerne)
Chamaecytisus palmensis

Uresiphita ornithopteralis (Guenée, 1854)

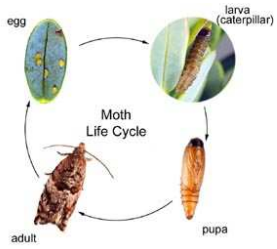
= *Mecyna ornithopteralis* Guenée, 1854

English: tree lucerne moth

Identified as

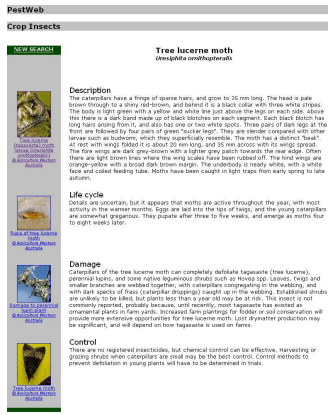
Kingdom: Animalia
Phylum: Arthropoda
Class: Insecta
Order: Lepidoptera
Family: Crambidae
Subfamily: Pyraustinae
Tribe: Pyraustini
Genus: *Uresiphita* Hübner, 1825

Biology and ecology



Molecular biology

Fact sheets



Locality: Reid, ACT
GPS: 35.280S 149.138E
Date: 1 January 2008

Distribution

All Leps Barcode of Life

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Uses: Biosecurity

- Questions
  - What is this organism?
  - What does it eat?
  - Does it carry disease?
  - Could it spread in Australia?
  - How can it be controlled?
- Information needed
  - Names and classification
  - Identification keys
  - Images
  - Distribution data
  - Food webs
  - Literature (biology and control)

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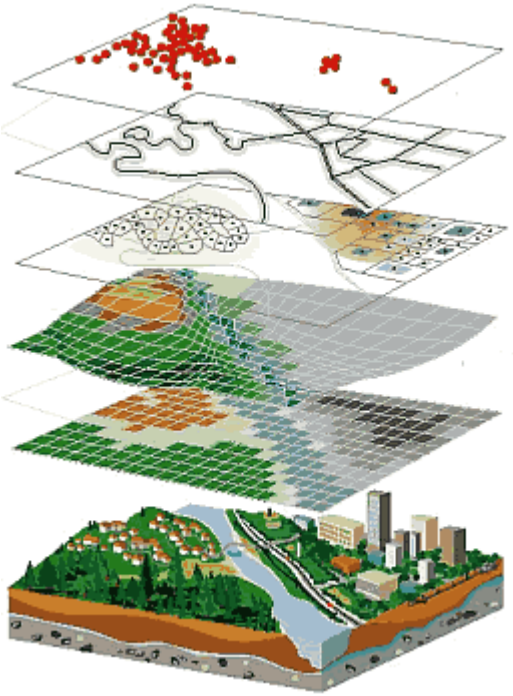
Uses: Land-use planning

- Questions
  - What species are found here?
  - Are they threatened?
  - What are their needs?
  - How can impacts be minimised?
  - How can habitats be restored?
- Information needed
  - Names and classification
  - Distribution data
  - Food webs
  - Literature (biology and control)



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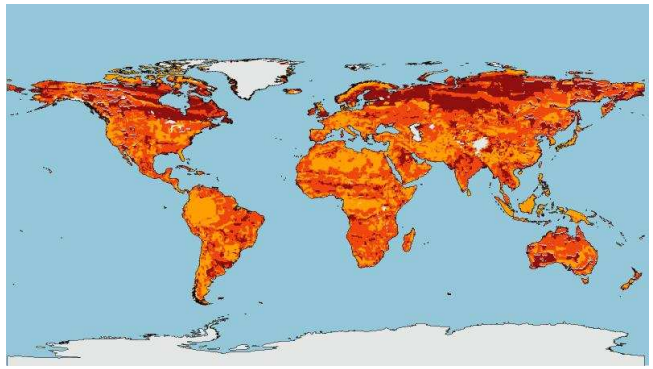
Uses: Conservation and climate change

- Questions
  - Which species will be affected?
  - How will their ranges be affected?
  - Can they colonise more favourable regions?
  - Will pest species benefit?
- Information needed
  - Names and classification
  - Climate change models
  - Distribution data
  - Environmental niche models
  - Food webs
  - Literature (conservation and biology)



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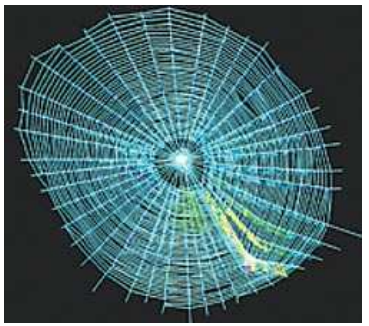
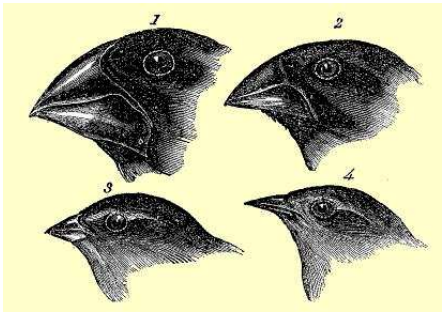
Other uses

- Crop improvement
- Sustainable use
- Health and medicine
- Biomaterials
- Forensics
- Taxonomy





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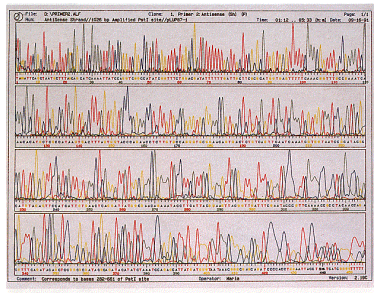
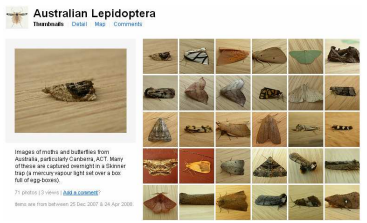
Sources of biodiversity information

- Natural history collections and herbaria
- Living collections
- Field studies
- Literature
- Molecular research
- Images and multimedia
- Experts





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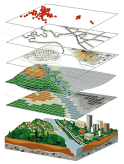
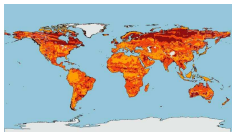
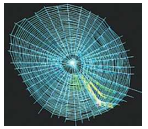
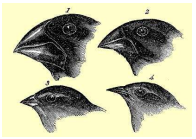
Making information available to users







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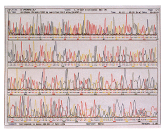
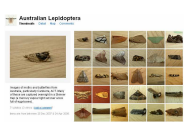
ATLAS OF LIVING AUSTRALIA



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Atlas of Living Australia

- Government-funded (NCRIS) project to June 2011
- Mission:
  - To develop an authoritative, freely accessible, distributed and federated biodiversity data management system that links Australia's biological knowledge with its scientific reference collections and other custodians of biological information
- Participants
  - CSIRO
  - The Australian Museum
  - Museum Victoria
  - Queensland Museum
  - The Tasmanian Museum and Art Gallery
  - Southern Cross University
  - The University of Adelaide
  - DAFF
  - DEWHA
  - CHAH
  - CHAFC
  - CHAEC
  - AMRRN

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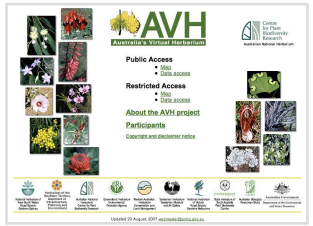
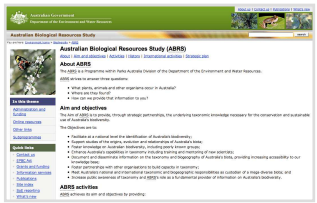
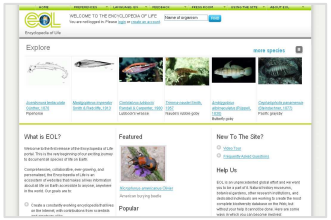
Timing of Atlas

- Builds on other national and global projects
  - Australian Virtual Herbarium
  - Online Zoological Collections of Australian Museums
  - Australian Biological Resources Study
  - Global Biodiversity Information Facility
  - Oceanographic Biogeographic Information System
  - Encyclopedia of Life
  - Many more







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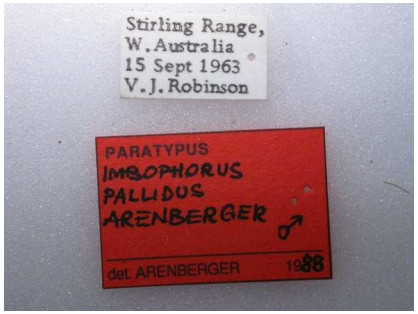
Challenges: Digitising information

- Important information in non-digital forms:
  - History of printed descriptions and other literature
  - Specimen labels (estimated 1.5 billion globally)
  - Field notebooks
- Many millions of dollars required to make all of this information fully accessible
- Work shared with GBIF and other projects



ScientificName:	*Imbophorus pallidus*
Family:	Pterophoridae
Locality:	Stirling Range
State:	WA
DateCollected:	1963-09-15
Latitude:	-34.3
Longitude:	118.0
CoordinatePrecision:	10000
CoordinateMethod:	Google Earth
TypeStatus:	Paratypus

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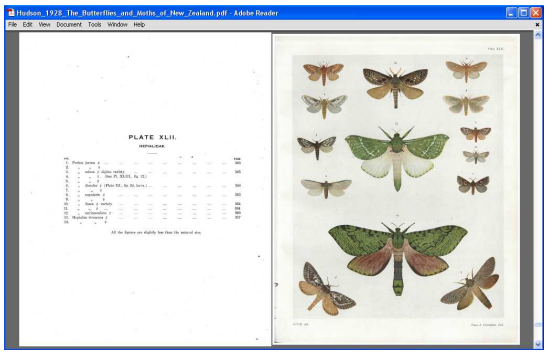
Challenges: Digitising literature

- An example:
  - BUGS - Bibliography of New Zealand terrestrial invertebrates 1775-1985
  - BUGZ online

    http://entdocs.landcareresearch.co.nz
  - Scanned entomological literature
  - Searchable text
  - Downloadable PDFs
- Result:
  - A significant body of literature more accessible and better managed than ever before



Challenges: Standardising data

- Need structured data for machine use
- Need agreed standard data elements
  - ScientificName
  - DecimalLatitude, Decimal Longitude
  - CoordinatePrecision
- Need standard formats for data values
  - New South Wales vs. NSW vs. N.S.W.
  - Australia vs. Australien vs. AU
  - 2008-05-15 vs. 05/15/2008 vs. 15 May 2008
  - Specimen vs. S vs. Voucher
- Standards allow data to be combined and reused
- Biodiversity Information Standards (TDWG)

Biodiversity Information Standards TDWG

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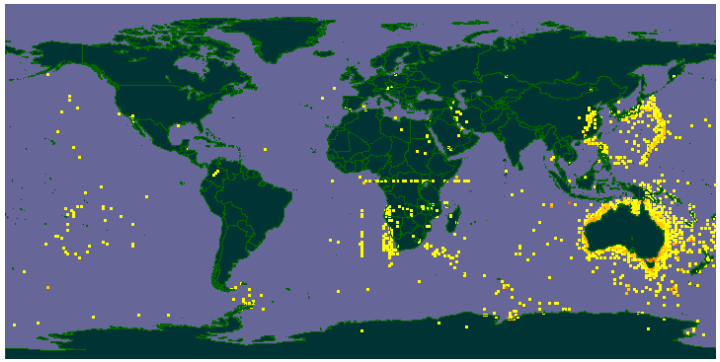
Challenges: Detecting errors

- Misspellings:
  - *Ornithorynchus* or *Ornithorhynchus*?
  - Mount Tambourine or Mount Tamborine?
- Coordinate problems:
  - Positive values for South or West
  - Latitude and Longitude transposed
  - Coordinates not near Locality
  - Unknown precision



- Other issues:
  - Same record shared through different routes
  - Missing information on collecting strategy

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Challenges: Handling taxonomy

- 250-year history of seeking to interpret biodiversity
- Many names for the same species
  - *Ornithorhynchus anatinus* vs. *Ornithorhynchus paradoxus*
  - Species described more than once
  - Species moved to new genus
  - Split into multiple species concepts
  - Merge into one species concepts
- Common names
- Alternative opinions on higher classification
- Result:
  - Related information found under different names

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Developing the ALA

- User needs analysis
  - Document how users find biodiversity information today
- Collaborative software development
  - Reuse code from GBIF data portal
  - Share components with Encyclopedia of Life, OBIS, etc.
  - Develop taxonomic tools with ABRS and ANBG
- Work with other Australian infrastructure projects
  - NCRIS Platforms for Collaboration
  - NCRIS Australian Phenomics Network
  - NCRIS Australian Plant Phenomics Network
  - NCRIS Australian Biosecurity Information Network
- Start with general purpose tools
  - In future develop portals for specific user groups

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ALA: Metadata Repository

- Metadata: information about data resources
- Describe all relevant resources, including:
  - Collection databases
  - Ecological and observational databases
  - Images and image libraries
  - Online bibliographies and literature
  - Sequence data
  - International networks
- Metadata includes:
  - Description
  - Ownership and access details
  - Terms from vocabularies, gazetteers, ontologies…

Title	Australian National Insect Collection	
Access point	http://anic.ento.csiro.au/tapirlink/www/tapir.php/anic/	
Description	The world's largest collection of Australian insects and related organisms.	
Language	English	
Subject	Australia, insects, ANIC	
Rights	Source of data should be cited where possible	
Created	2007-08-07T06:25:49	
Modified	2008-05-15T09:31:06	
Institution	**Role**	Technical host
	Identifier	ANIC
	Name	Australian National Insect Collection, CSIRO Entomology
	Address	Canberra, Australia
	Related information	http://anic.ento.csiro.au/
Contact	**Role**	Data administrator
	Full name	Steve Shattuck
	Title	Research Scientist
	Telephone	+61 2 6246 4273
	Email	steve.shattuck@csiro.au

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ALA: Taxonomic authorities

- Australian authority lists:
  - APNI – Australian Plant Name Index
  - APC – Australian Plant Census
  - AFD – Australian Faunal Directory
- International projects:
  - International Plant Name Index
  - Index Fungorum
  - ZooBank
  - Catalogue of Life
  - World Register of Marine Species
- Other checklists:
  - Red lists, CITES, regional species lists, new taxonomic revisions
- Build tools to bring these resources together

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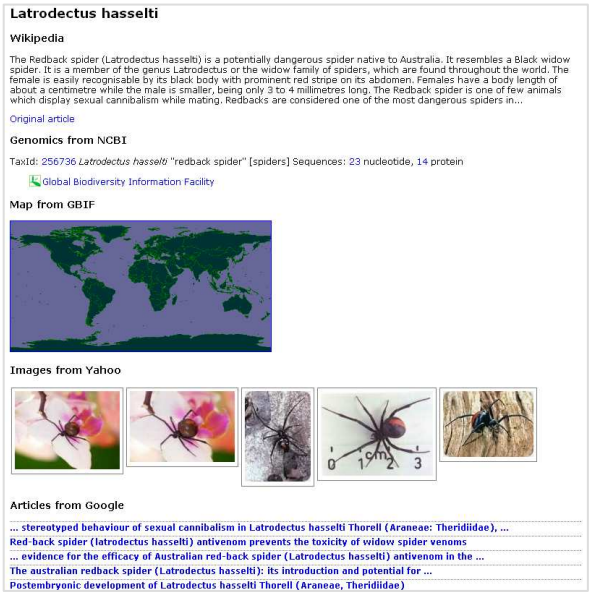
ALA: "Yellow Pages" for species

- Pages for every species (and higher taxon)
  - Links to all information resources
  - Organised by major category
  - Image thumbnails
  - Literature links
  - Links to GIS mapping
- Dynamically generated from index of data
- Provide links to original resources
- Web services
  - Allow other sites to embed ALA content



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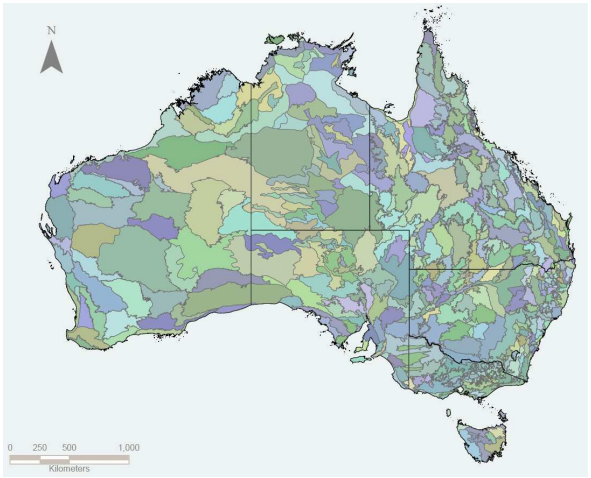
ALA: Regional biodiversity atlas

- All georeferenced data for Australian biota
  - Specimen records
  - Observations
  - Ecological data sets
- Integrated GIS layers
  - Climate, geology, soil, vegetation, etc.
- Indexed by regions
  - Local government areas
  - Water catchment areas
  - IBRA regions
  - National parks
- Fact sheets/species lists for each region



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ALA: Annotating data

- Need tools to store comments on any record
  - User-suggested errors or corrections
  - Corrections from automated validation tools
  - Comments or structured corrections
  - Links to further information
  - Responses from data providers (conversation threads)
- Services to retrieve comments via record identifier
- Allow any tool or web site to see comments
- Allow data providers to import comments

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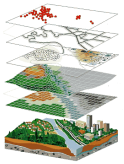
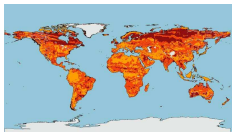
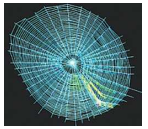
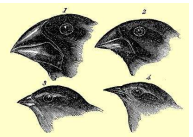
ALA: Putting it all together







GLOBAL BIODIVERSITY INFORMATION FACILITY
data.gbif.org

Encyclopedia of Life

Regional Atlas

Yellow Pages

Biosecurity Portal

Occurrence Index

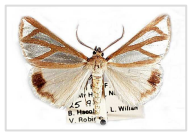
Metadata repository

Name Index

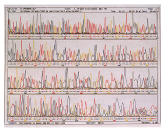
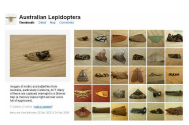
Annotation Tools

Metadata

Data

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Thank you

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