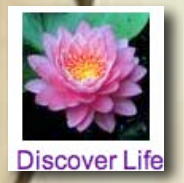
Mapping Biodiversity Specimen Data: Opportunities for Collaboration

Gail E. Kampmeier
Illinois Natural History Survey

John Pickering
University of Georgia



Challenges:

- Mitigating the looming crisis of maintaining access to electronic research products
- Facilitating sharing of datasets from those without robust technological support
- Reaching out to those with non-traditional datasets e.g., agricultural, public health, etc.

Maintaining Access...

- What happens when
  - Project funding ceases
  - Project members disperse
  - Principal Investigators retire, change research topics, move...?
- Who should be responsible?
  - Institutions originally receiving project funding?
  - Funding agencies?
  - Those creating the resources?
  - Professional societies?
  - Data federation groups?

Facilitating sharing...

- Many museums & large dataset holders have the infrastructure & desire to control & maintain their own databases.
- An underdeveloped, unappreciated resource lies in the datasets developed by individual systematists, smaller institutions, and agriculturally, locality-based, or public health-related projects.

Value of the non-traditional

- High quality on specific groups of organisms by experts
- Long-term monitoring systems for agriculture & public health have immediate, specific goals of forecasting, but changes over time are indicators of larger issues such as climate change, land use issues, & biodiversity assessments
- Conservation groups desire long-term purpose-driven datasets for decision making
- Invasive, threatened & endangered species often rely on local monitoring systems

Where are these datasets?

- Sometimes they are
  - On the web
    - As a static webpage (list)
    - Dynamically searchable in various formats
    - Database driven but password protected for registered users
  - On paper or file cards only
  - In Excel®, Word®, or PDF files
  - Bound up in reports or published literature
  - In a variety of desktop databases


Saving, preserving, &
accessing our data is a
Global Issue

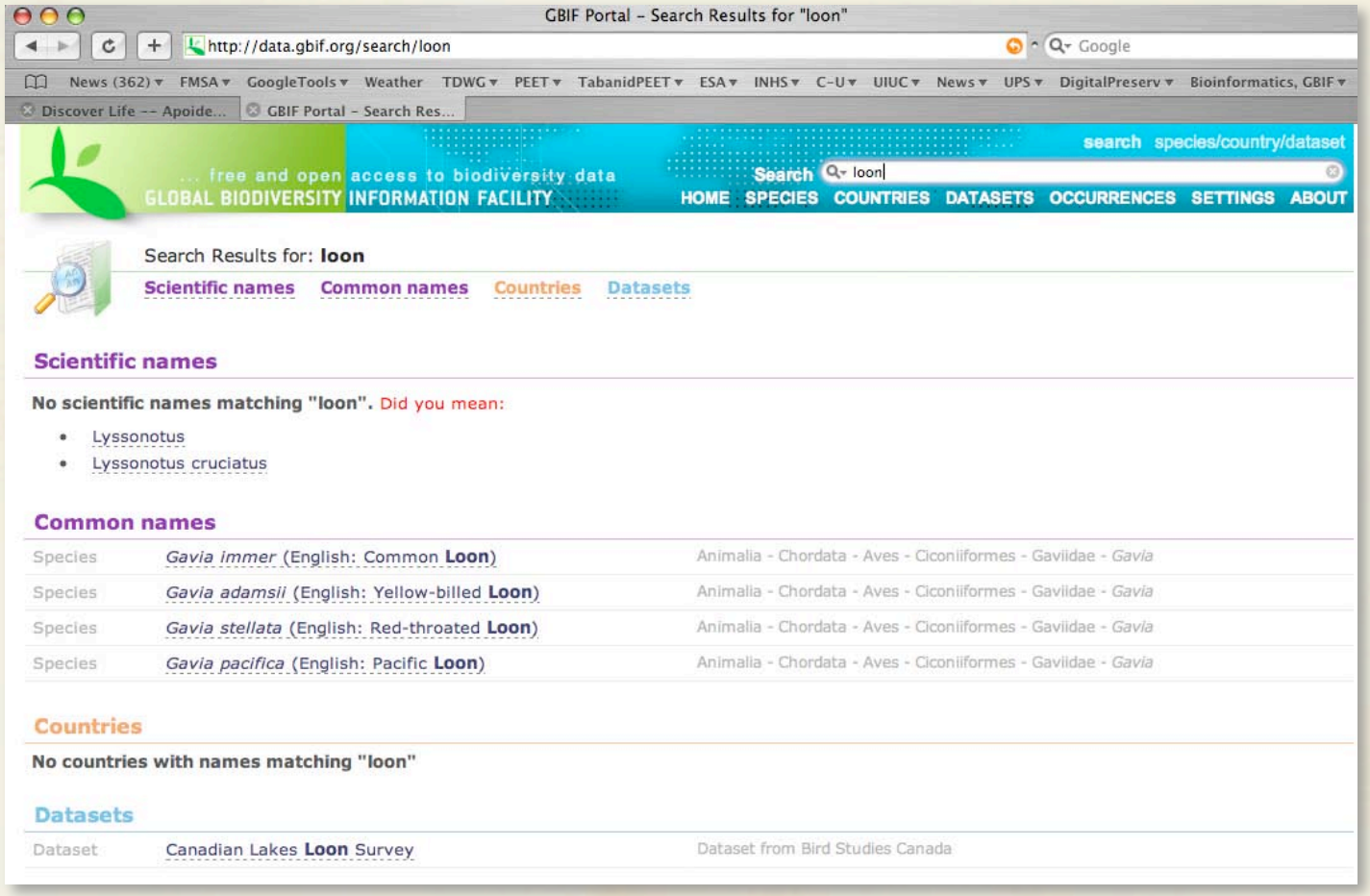
Federating Data - GBIF

http://data.gbif.org/

GBIF Data Use

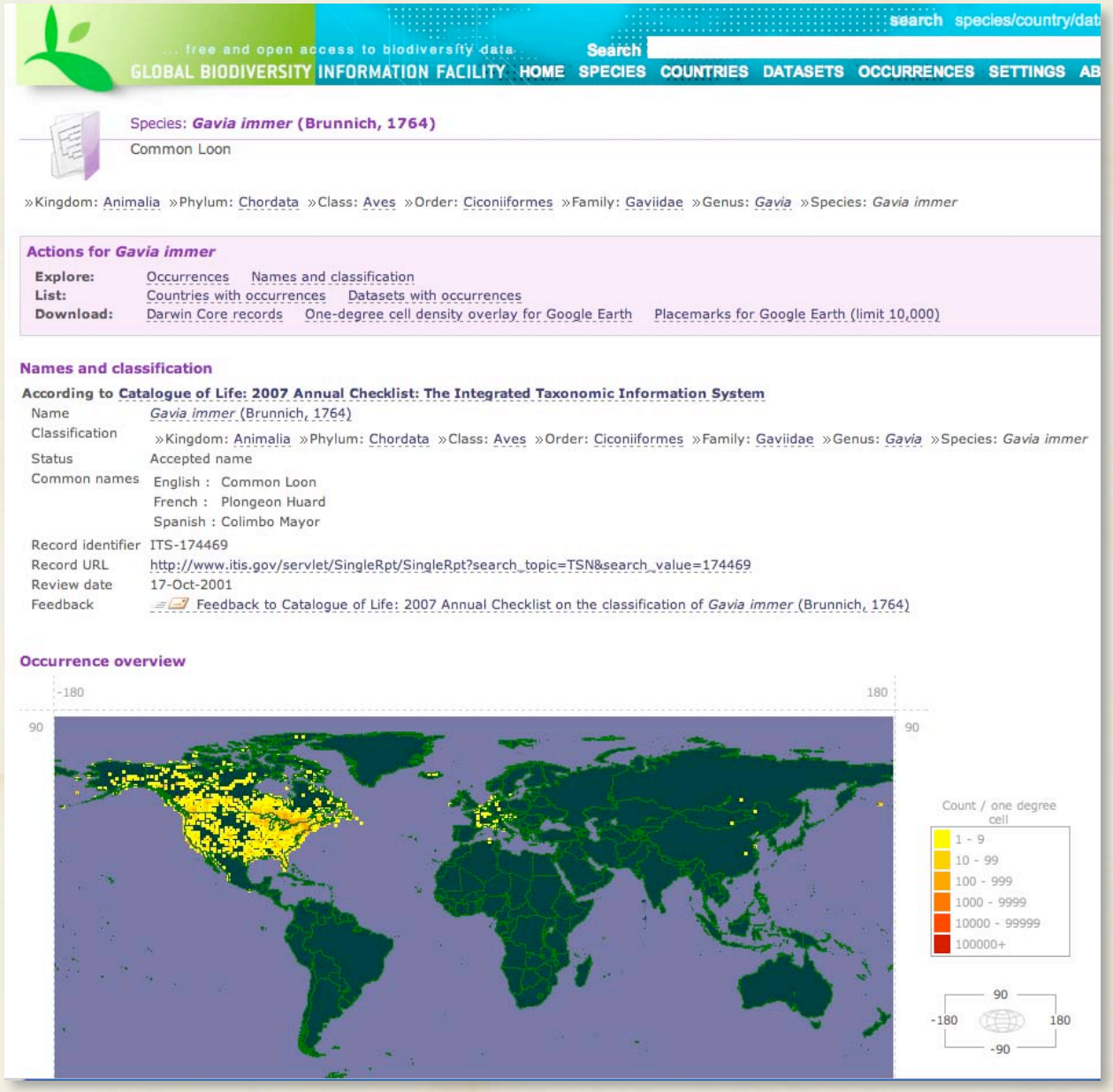
- Participants are signatories to a memorandum of understanding
- Users must actively accept terms of use
- Single point of entry to >130 million records from 200+ institutions from 30+ countries
- Search scientific or common names; by dataset or country
- Strict adherence to data standards
- Requires use of specific client/server protocols for retrieving information from distributed sources

Searches…


GBIF Portal – Search Results for "loon"
http://data.gbif.org/search/loon
Google
News (362) FMSA GoogleTools Weather TDWG PEET TabanidPEET ESA INHS C-U UIUC News UPS DigitalPreserv Bioinformatics, GBIF
Discover Life -- Apoide...
GBIF Portal – Search Res...
... free and open access to biodiversity data
GLOBAL BIODIVERSITY INFORMATION FACILITY
search species/country/dataset
Search loon
HOME SPECIES COUNTRIES DATASETS OCCURRENCES SETTINGS ABOUT
Search Results for: loon
Scientific names Common names Countries Datasets
Scientific names
No scientific names matching "loon". Did you mean:
Lyssonotus
Lyssonotus cruciatus
Common names
Species Gavia immer (English: Common Loon) Animalia - Chordata - Aves - Ciconiiformes - Gaviidae - Gavia
Species Gavia adamsii (English: Yellow-billed Loon) Animalia - Chordata - Aves - Ciconiiformes - Gaviidae - Gavia
Species Gavia stellata (English: Red-throated Loon) Animalia - Chordata - Aves - Ciconiiformes - Gaviidae - Gavia
Species Gavia pacifica (English: Pacific Loon) Animalia - Chordata - Aves - Ciconiiformes - Gaviidae - Gavia
Countries
No countries with names matching "loon"
Datasets
Dataset Canadian Lakes Loon Survey Dataset from Bird Studies Canada

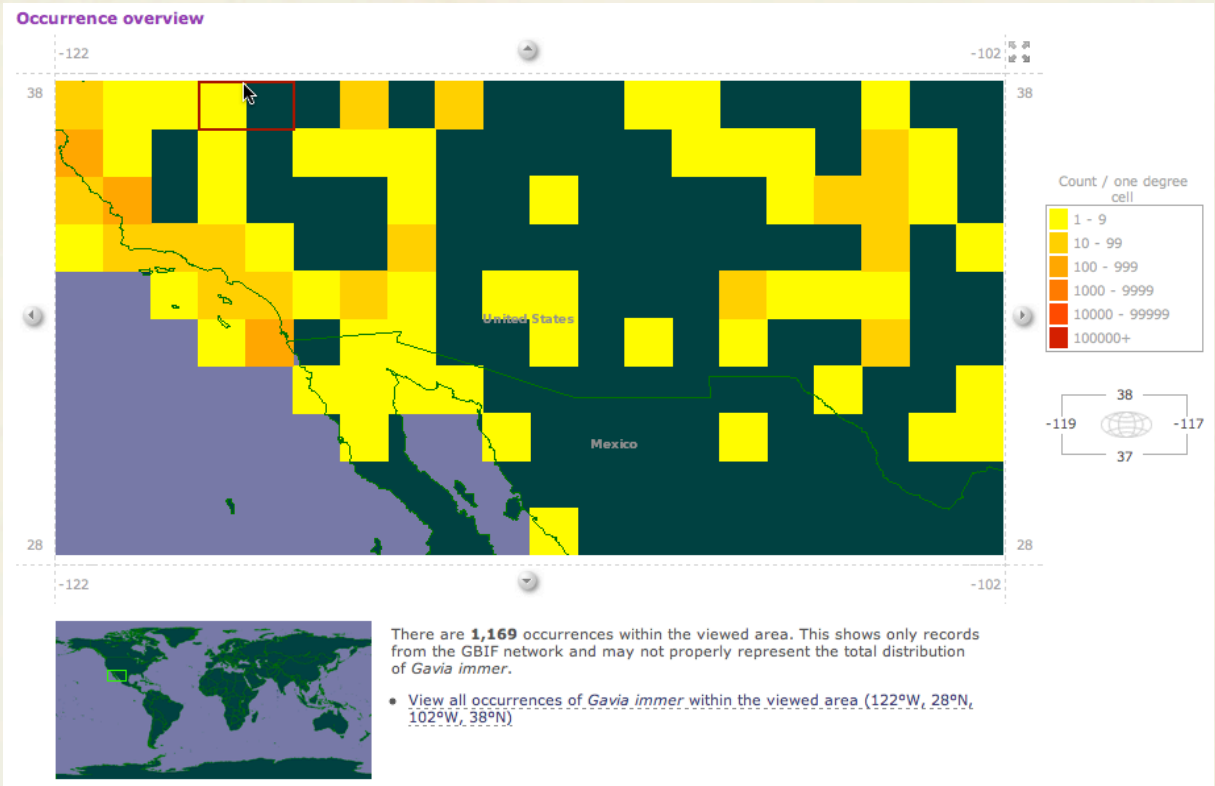
Common Loon

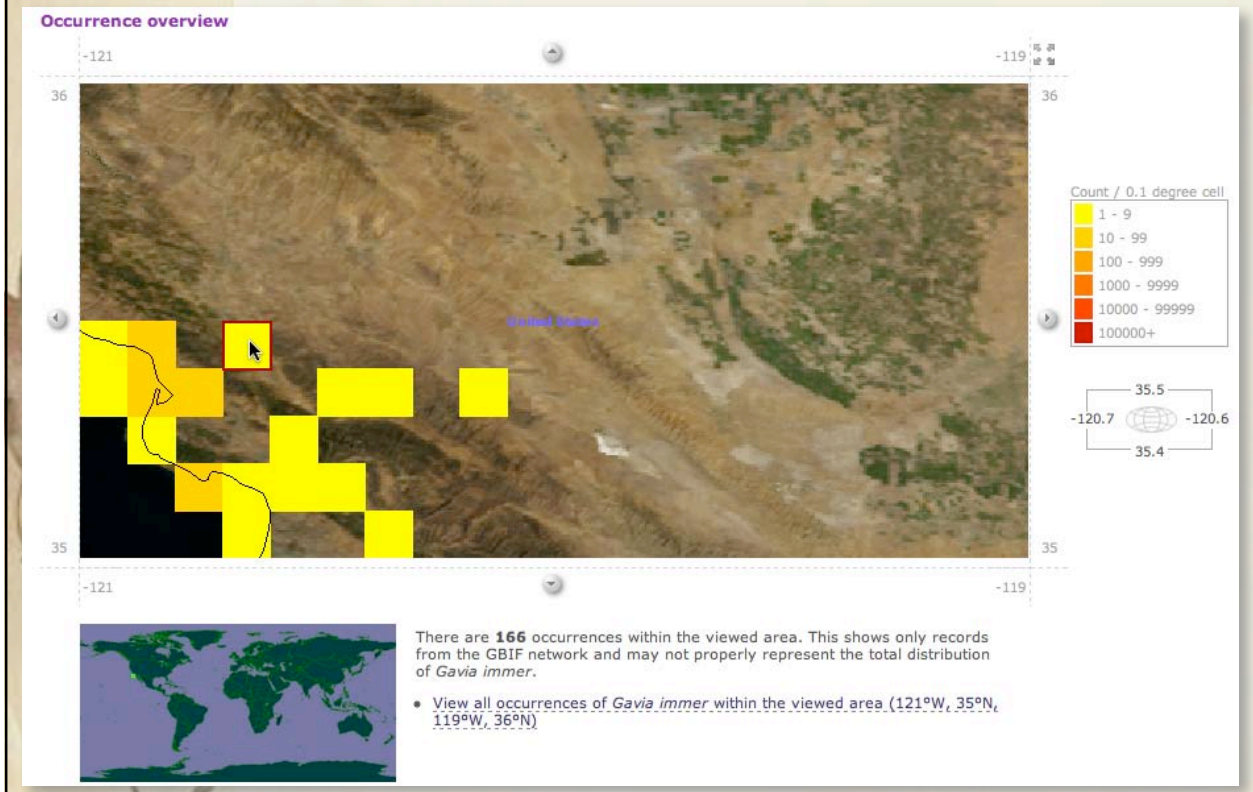
- Taxonomic names data tied to major providers



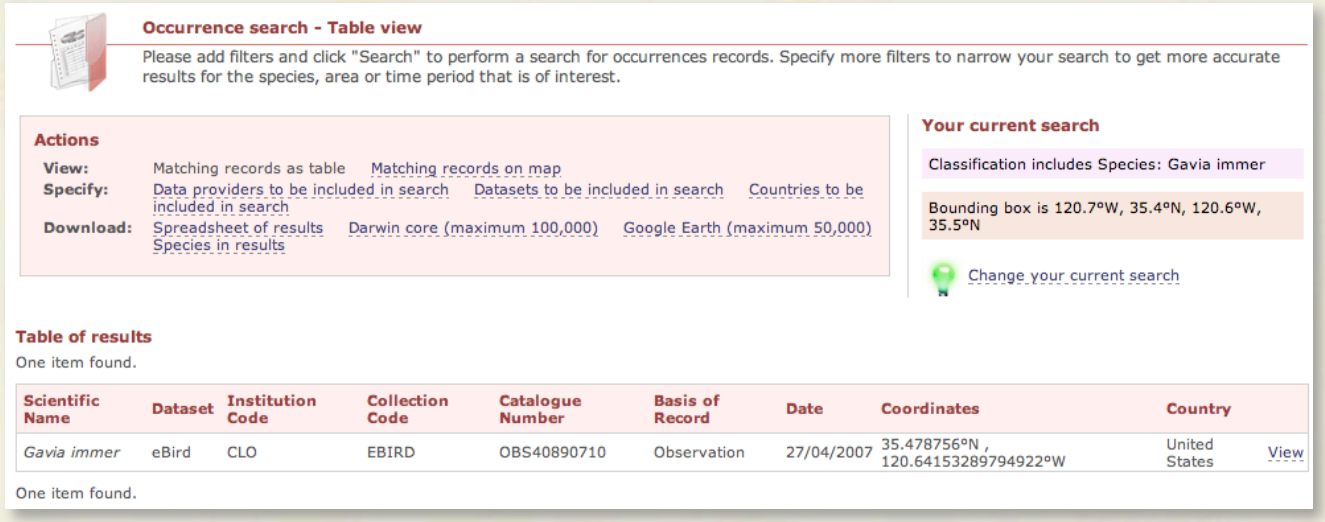
Mapping in GBIF's Data Portal

- Initial mapping is in one degree cells on which the user can click





- Cell size is 0.1 degree here
- Darker shading =more specimens or observations



Mapping linked to GoogleMaps

Geospatial

Continent:	North America (inferred from country)
Country:	United States
County:	
State/Province:	California
Locality:	
Latitude:	35.4787572
Longitude:	-120.6415343
Coordinate precision:	
Altitude:	
Depth:	

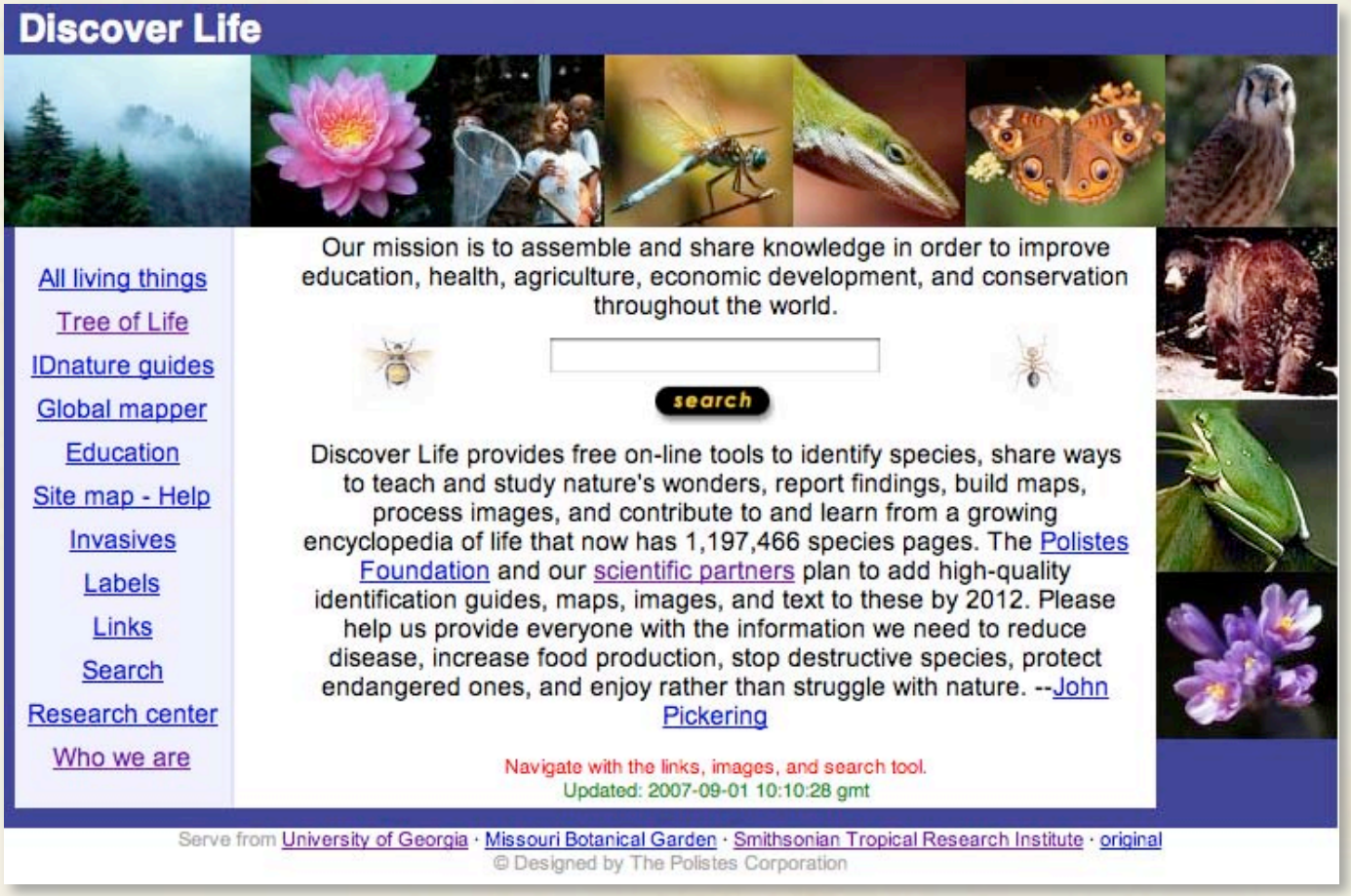
View on large map

View on large map

GBIF's New Portal - Strengths

- Taxonomic name linkage to major names providers
- Apparently links specimens with synonymies of a taxonomic name (good) but questionable if all are real (fuzzy)
- Partnership with GoogleMaps is major improvement
- Easy navigation via breadcrumbs

Federating Data - Discover Life



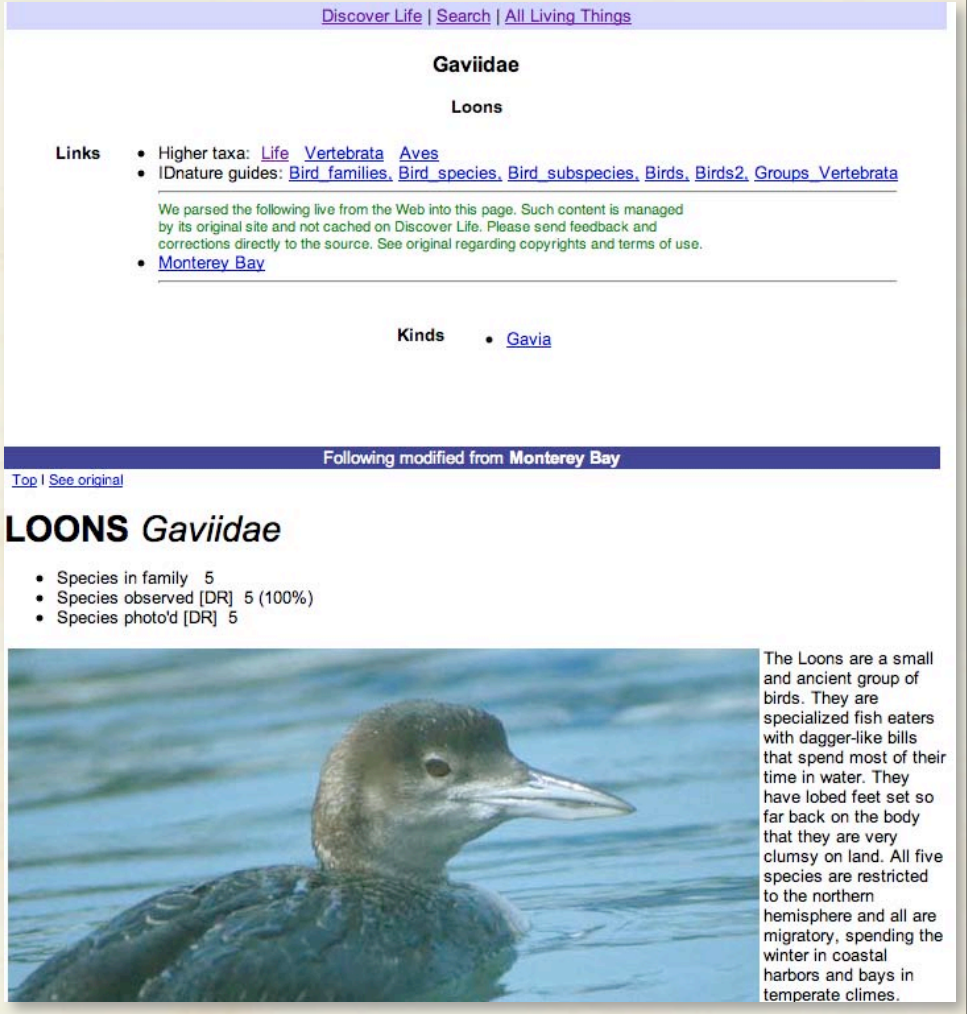
http://www.discoverlife.org/

Discover Life Data Use

- Like GBIF, data ownership is retained by each provider
- Educational features emphasized, including identification guides (keys), distribution maps, & images
- Accesses information on nearly 1.2 million species
- Can plot between 20-25 thousand points/sec
- Contributions can be as simple as providing a delimited text file for taxa & specimen information; no other web presence required.

Searching for "Loon"...

- An emphasis is placed on illustrations, commentary, current taxonomic names, simple taxonomic hierarchy, maps, attribution of data



Discover Life - Diptera: Therevidae Burmeister, 1837:614 - Stiletto flies

http://stri.discoverlife.org/mp/20q?search=Therevidae

Discover Life | Search | All Living Things

Therevidae Burmeister, 1837:614

Stiletto flies

Links

- Higher taxa: Life Insecta Diptera

Global map

- IDnature guides: Diptera, Groups_Insecta, Therevidae, Therevidae_species

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- National Science Foundation PEET Site
- Australian Government: Department of the Environment and Heritage

80x5 - 240x3 - 240x4 - 320x1 - **320x2** - 320x3 - 640x1 - 640x2

Set display option above. Click on image to enlarge.

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Ozodiceromyia nanella

Kinds

- Acantothereva
- Acathrito
- Acatopygia
- Acraspisa
- Acraspisoides
- Acrosathe
- Actenomeros
- Actorthia
- Acupalpa
- Agapophytinae
- Agapophytus
- Ambradolon
- Ammonaios
- Ammothereva
- Amplisegmentum
- Anabarhynchus
- Anolinga
- Apenniverpa
- Araeopus
- Dialineura
- Dichoglena
- Distostylus
- Ectinorhynchus
- Efflatouniella
- Elcaribe
- Entesia
- Euphycus
- Eupsilocephala
- Hemigephyra
- Henicomyia
- Hermannula
- Hoplosathe
- Iberotelus
- Incoxoverpa
- Insulatitan
- Irwiniella
- Johnmannia
- Laxotela
- Pandivirilia
- Parapherocera
- Parapsilocephala
- Patanothrix
- Penniverpa
- Pentheria
- Peralia
- Peratrimera
- Pherocera
- Phycinae
- Phycini
- Phycus
- Pipinnipons
- Platycarenum
- Procyclotelus
- Protothereva
- Pseudothereva
- Psilocephala
- Ptilotophallos

"http://stri.discoverlife.org/mp/20p?see=I_NAT1701_1&es=640"

Discover Life -- Therevidae species identification guide & checklist

iscoverlife.org/mp/20q?guide=Therevidae_species

Google

Discover Life | All living things | Therevidae species

Help | Credits | Guides | Restart | Checklist | Images off | Menu | Report | Search

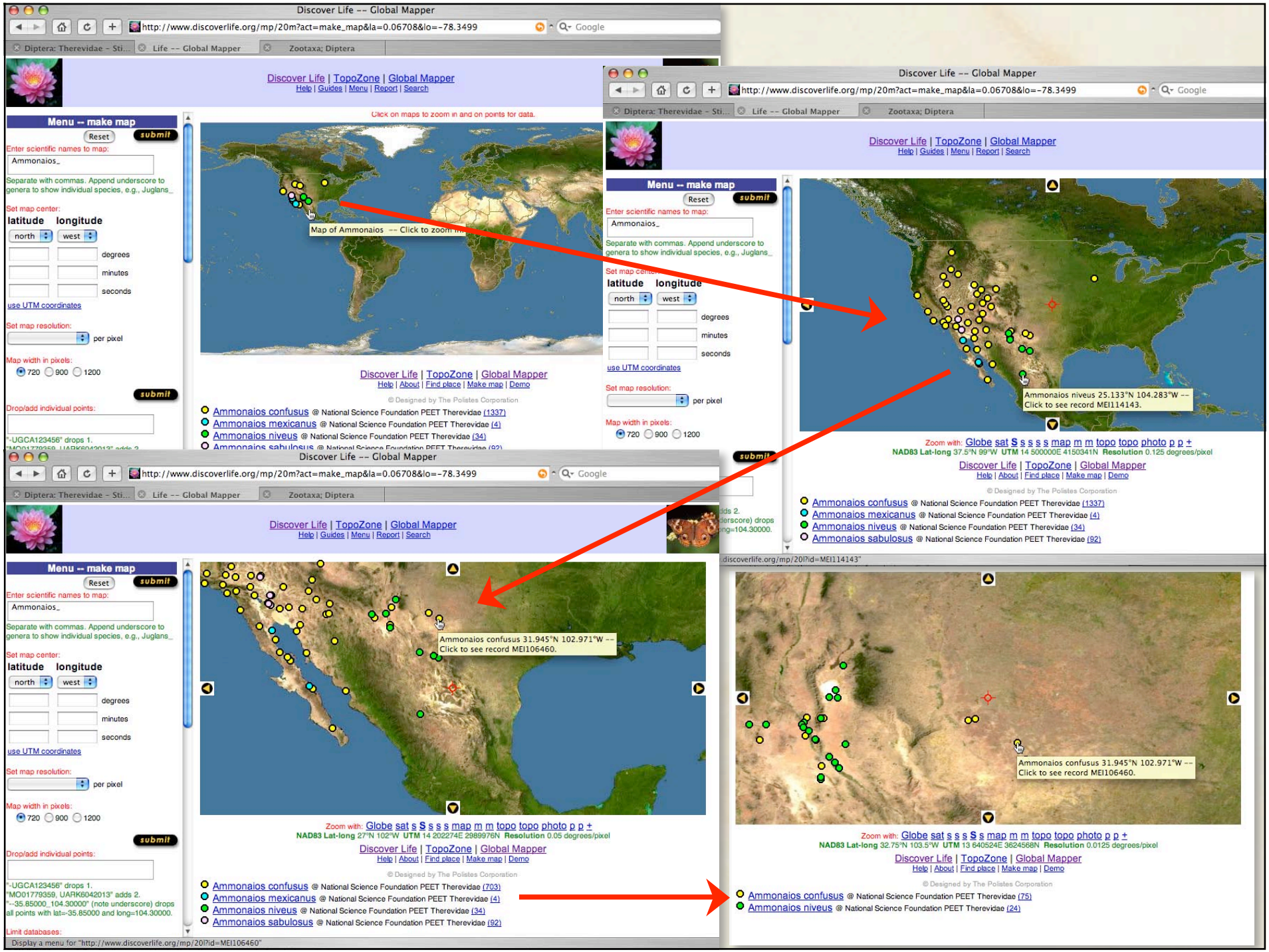
Kinds of Therevidae species

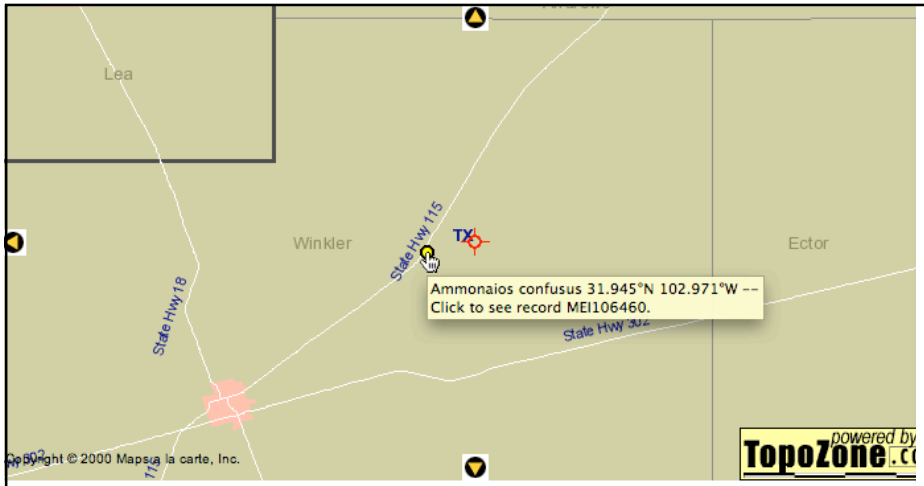
Stiletto Flies of the World

Michael Irwin, Don Webb, Martin Hauser, Kevin Holston, Mark Metz, Steve Gaimari, & Gail Kampmeier
Illinois Natural History Survey, Urbana
&
John Pickering
University of Georgia, Athens

Scientific name -- Other names
Atherimorpha praefica (Philippi, 1865:772) -- Psilocephala macrochaeta Bigot, 1889; Psilocephala pilosula Bigot, 1889; Atherimorpha macrochaeta Bigot, 1889; Atherimorpha pilosula Bigot, 1889
Acantothereva Séguy, 1935:153
Acantothereva punctipennis Lyneborg, 1968:302
Acantothereva rungsi Séguy, 1935:153
Acathrito Lyneborg, 1983:198
Acathrito angolensis Lyneborg, 1989:169
Acathrito iskenderia (Zaitzev, 1971:1111) -- Rueppellia iskenderia Zaitzev, 1971
Acathrito kroeberi (Lindner, 1955:20) -- Rueppellia kroeberi Lindner, 1955; Actorthia kroeberi Lindner, 1955
Acathrito lindneri Lyneborg, 1983:198
Acathrito namibiensis Lyneborg, 1989:171
Acathrito robusta (Krober, 1929:79) -- Rueppellia robusta Kröber, 1929
Acathrito socotrensis Lyneborg, 1989:169
Acatopygia Krober, 1912:117 -- Spatulipalpa Kröber, 1912
Acatopygia olivacea Winterton, 2007:54
Acatopygia ornata (Krober, 1912:221) -- Spatulipalpa ornata Kröber, 1912
Acatopygia paradoxa (Krober, 1912:221) -- Spatulipalpa paradoxa Kröber, 1912
Acatopygia pulchella Krober, 1912:149
Acraspisa Krober, 1912:286 -- Stratiobelonalys Frey, 1934; Acrispisa Mann, 1928; Pseudoloxocera Kröber, 1912
Acraspisa handschini (Frey, 1934:309) -- Stratiobelonalys handschini Frey, 1934
Acraspisa nigrinota Mann, 1929:20
Acraspisa obscuripes Mann, 1929:21
Acraspisa pallipes (Krober, 1912:287) -- Pseudoloxocera pallipes Kröber, 1912

Choose Genus or Species...

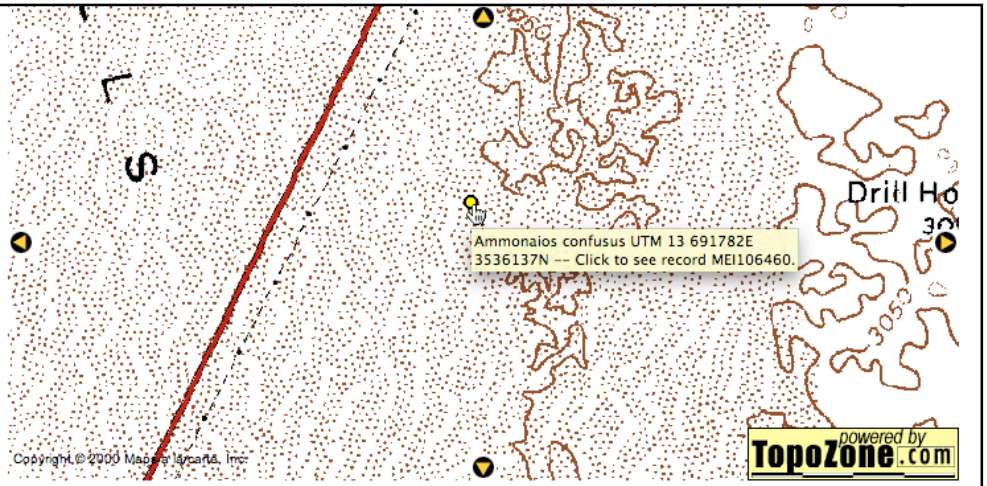

Discover Life -- Global Mapper
http://www.discoverlife.org/mp/20m?act=make_map&la=0.06708&lo=-78.3499
Discover Life | TopoZone | Global Mapper
Help | Guides | Menu | Report | Search
Menu -- make map
Reset
submit
Enter scientific names to map:
Ammonaios_
Separate with commas. Append underscore to genera to show individual species, e.g., Juglans_
Set map center:
latitude longitude
north west
degrees
minutes
seconds
use UTM coordinates
Set map resolution:
per pixel
Map width in pixels:
720 900 1200
Drop/add individual points:
Click on maps to zoom in and on points for data.
Map of Ammonaios -- Click to zoom in
Ammonaios confusus @ National Science Foundation PEET Therevidae (1337)
Ammonaios mexicanus @ National Science Foundation PEET Therevidae (4)
Ammonaios niveus @ National Science Foundation PEET Therevidae (34)
Ammonaios sabulosus @ National Science Foundation PEET Therevidae (92)
Ammonaios niveus 25.133°N 104.283°W -- Click to see record MEI114143.
Zoom with: Globe sat s S s s s map m m topo topo photo p p +
NAD83 Lat-long 37.5°N 99°W UTM 14 500000E 4150341N Resolution 0.125 degrees/pixel
Ammonaios confusus 31.945°N 102.971°W -- Click to see record MEI106460.
Zoom with: Globe sat s S s s s map m m topo topo photo p p +
NAD83 Lat-long 27°N 102°W UTM 14 202274E 2989976N Resolution 0.05 degrees/pixel
Ammonaios confusus @ National Science Foundation PEET Therevidae (703)
Ammonaios mexicanus @ National Science Foundation PEET Therevidae (4)
Ammonaios niveus @ National Science Foundation PEET Therevidae (34)
Ammonaios sabulosus @ National Science Foundation PEET Therevidae (92)
"-UGCA123456" drops 1.
"MO01779359, UARK6042013" adds 2.
"--35.85000_104.30000" (note underscore) drops all points with lat=-35.85000 and long=104.30000.
Limit databases:
Zoom with: Globe sat s S s s s map m m topo topo photo p p +
NAD83 Lat-long 32.75°N 103.5°W UTM 13 640524E 3624568N Resolution 0.0125 degrees/pixel
Ammonaios confusus @ National Science Foundation PEET Therevidae (75)
Ammonaios niveus @ National Science Foundation PEET Therevidae (24)
Display a menu for "http://www.discoverlife.org/mp/20l?id=MEI106460"



Zoom with: Globe sat s s s s s map **M** m topo topo photo p p +
NAD83 Lat-long 31.9511°N 102.9423°W **UTM** 13 694482E 3536864N **Resolution** 0.0008 degrees/pixel

Discover Life | TopoZone | Global Mapper
Help | About | Find place | Make map | Demo

Ammonaios confusus @ National Science Foundation PEET Therevidae (19)



Zoom with: Globe sat s s s s s map m m topo **T** photo p p +
NAD83 Lat-long 31.94432°N 102.97078°W **UTM** 13 691804E 3536061N **Resolution** 1828.8 meters West-East

Discover Life | TopoZone | Global Mapper
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Ammonaios confusus @ National Science Foundation PEET Therevidae (19)

Zoom with: Globe sat s s s s s map m m topo topo photo **P** p +
NAD83 Lat-long 31.94474°N 102.97078°W **UTM** 13 691803E 3536108N **Resolution** 720 meters West-East

Discover Life | TopoZone | Global Mapper
Help | About | Find place | Make map | Demo

Ammonaios confusus @ National Science Foundation PEET Therevidae (19)

Information on record MEI106460

National Science Foundation PEET Therevidae database

University of Illinois — Mandala

COLLECTION MEI106460

WebScientificName	Ammonaios confusus
Author	Hauser and Irwin, 2003
Country	USA
StateProvince	Texas
County	Winkler County
Municipality	Kermit
DecimalLatitude	31.945
DecimalLongitude	-102.971
MAP	latitude_longitude ••• 31.945_-102.971
Collectors	Fitzgerald, S.; Kondratieff, B.; Leatherman, D.
DateBeginCollection	4/25/1998
Label_LocCevSpmID	USA, Texas, Winkler County, NE Kermit, Hwy 115, 25.IV.1998, probably hand collected, S. Fitzgerald, B. Kondratieff, D. Leatherman, [31.945, -102.971]. MEI 106460
More details	Therevidae PEET Project

Click here to report possible errors or send feedback about the above data to gkamp@uiuc.edu

Similar records

MEI 076511 | 106445 | 106446 | 106447 | 106448 | 106449 | 106450 | 106451 | 106452 | 106453 | 106454 | 106455 | 106456 | 106457 | 106458 | 106459 | **106460** | 106461 | 106462 | 106463

Discover Life | Search | Labels | Menu | Retrieve ID

Details...

Information on record MEI106460

National Science Foundation PEET Therevidae database

University of Illinois — Mandala

COLLECTION MEI106460

WebScientificName	Ammonaios confusus
Author	Hauser and Irwin, 2003
Country	USA
StateProvince	Texas
County	Winkler County
Municipality	Kermit
DecimalLatitude	31.945
DecimalLongitude	-102.971
MAP	latitude_longitude ••• 31.945_-102.971
Collectors	Fitzgerald, S.; Kondratieff, B.; Leatherman, D.
DateBeginCollection	4/25/1998
Label_LocCevSpmID	USA, Texas, Winkler County, NE Kermit, Hwy 115, 25.IV.1998, probably hand collected, S. Fitzgerald, B. Kondratieff, D. Leatherman, [31.945, -102.971]. MEI 106460
More details	Therevidae PEET Project

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Similar records

MEI 076511 | 106445 | 106446 | 106447 | 106448 | 106449 | 106450 | 106451 | 106452 | 106453 | 106454 | 106455 | 106456 | 106457 | 106458 | 106459 | 106460 | 106461 | 106462 | 106463

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Therevid PHP: Specimen Detail

http://ant.inhs.uiuc.edu:16080/therevidphp/specimens/details.php?id=75421

Specimen Record Details

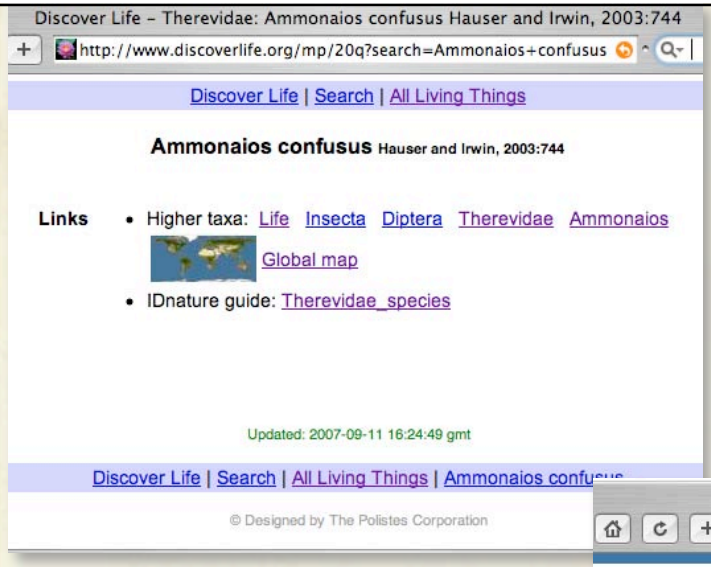
Search Index | Specimen Search

SpecimenID	MEI_106460
Scientific Name Author Year	Ammonaios confusus Hauser & Irwin, 2003
Determination History	specimen determined by: M. Hauser as Ammonaios confusus Hauser & Irwin, 2003 in 2002
Preparation	pinned
Dissection	
Type / Gender / Life Stage	specimen / male / adult
Locality	USA, Texas, Winkler County, NE Kermit, Hwy 115, [31.945, -102.971], 25.IV.1998, probably hand collected, S. Fitzgerald, B. Kondratieff, D. Leatherman
Verbatim Collecting Label	Winkler Co. TX 25 April 1998 S. Fitzgerald B. Kondratieff D. Leatherman Hwy 115, sanddunes NE Kermit
Map Specimen	**Map Specimen** if coordinates available; hit back button on your browser to return
Map (valid) Species	**Map Species** if coordinates available and taxon is valid; hit back button on your browser to return

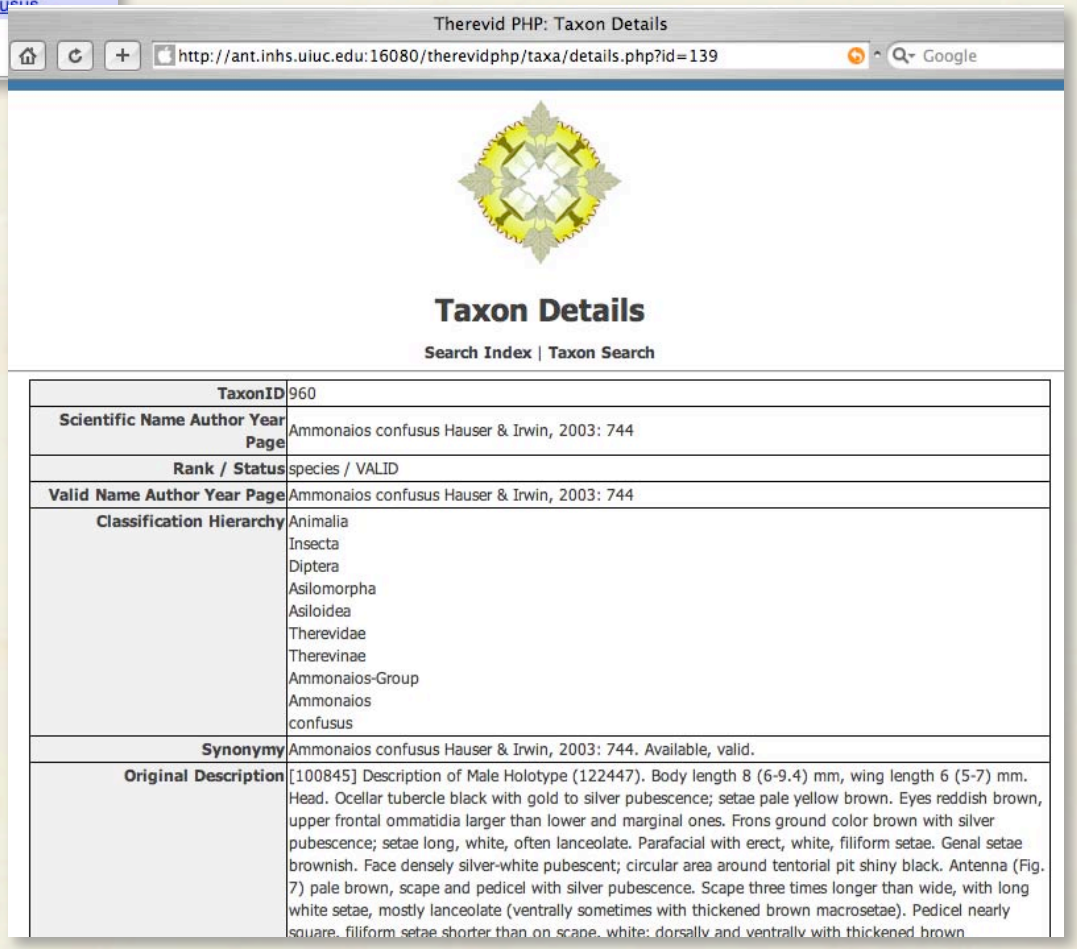
Official project webpage for the ***Therevid PEET Project*** , a Partnerships for Enhancing Expertise in Taxonomy project funded by the National Science Foundation and the Schlinger Foundation. Send Questions & Comments on the database portion of this project to **gkamp@uiuc.edu**. Last updated: August 17, 2007 **Disclaimer & Acknowledgements**

- Now have a direct link back to therevid fly database online

Taxon Details



- Drilling back to Mandala database gives many more details about both valid & invalid taxa & their history...



Taxon Details

- Served from the Therevid Mandala using PHP:

http://ant.inhs.uiuc.edu:16080/therevidphp/

Original Name Citation	Hauser, M. , M. E. Irwin. 2003. The Nearctic Genus Ammonaios Irwin and Lyneborg 1981 (Diptera: Therevidae). Annals of the Entomological Society of America, 96(6): 738-765.
Map Specimens of Taxon	**Click to see map** of specimens of this taxon at DiscoverLife.org. If no points appear on map, there are no available specimens to map; click back button on your browser to return.
Illustrations	Illustration of head (male adult) frontalateral view, rendered in color on a blue background, a photograph photo (digital) by K. M. Algmin. Original digital photograph created with Adobe Photoshop at 300 dpi. Archived on TYPEPHOTOS1 CD-ROM as 122447_HED as psd tif file formats. Illustration represents Specimen# MEI_122447, Ammonaios confusus Hauser & Irwin. 
	Illustration of head, thorax & abdomen (male adult) dorsal view, rendered in color on a blue background, a photograph photo (digital) by K. M. Algmin. Original digital photograph created with Adobe Photoshop at 300 dpi. Archived on TYPEPHOTOS1 CD-ROM as 122447_DOR as psd tif file formats. Illustration represents Specimen# MEI_122447, Ammonaios confusus Hauser & Irwin. 

Therevid PHP: Taxon Details

Illustration of labels, first of two label photos, top to bottom, left to right, represents the highest to lowest labels on the pin. (male adult) rendered in color on a blue background, a photograph photo (digital) by K. M. Algmin. Original digital photograph created with Adobe Photoshop at 300 dpi. Archived on TYPEPHOTOS1 CD-ROM as 122447_LBL1 as psd tif file formats. Illustration represents Specimen# MEI_122447, Ammonaios confusus Hauser & Irwin. Illustration represents the following locality: .

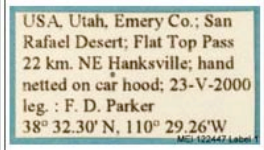
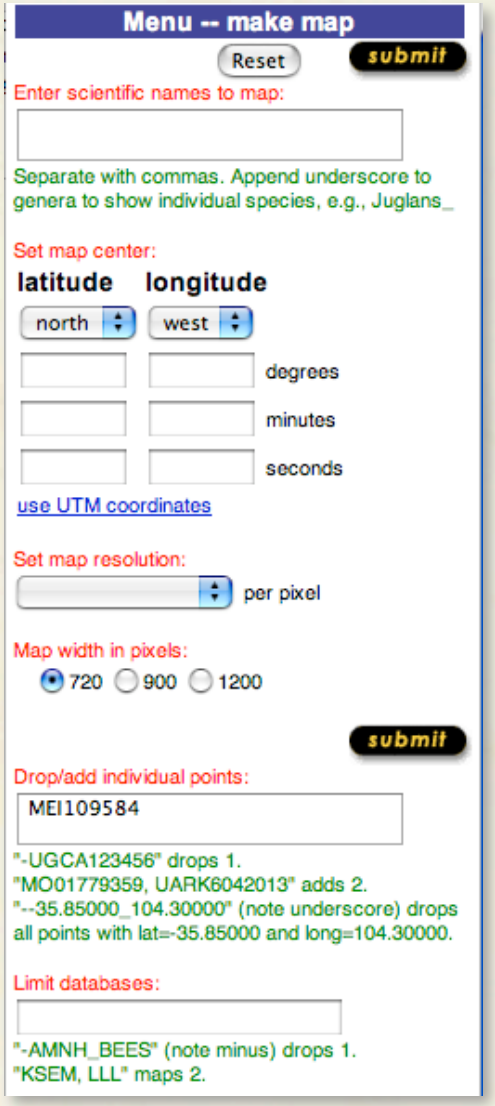


Illustration of labels, second of two label photos, top to bottom, left to right, represents the highest to lowest labels on the pin. (male adult) rendered in color on a blue background, a photograph photo (digital) by K. M. Algmin. Original digital photograph created with Adobe Photoshop at 300 dpi. Archived on TYPEPHOTOS1 CD-ROM as 122447_LBL2 as psd tif file formats. Illustration represents Specimen# MEI_122447, Ammonaios confusus Hauser & Irwin. Illustration represents the following locality: .

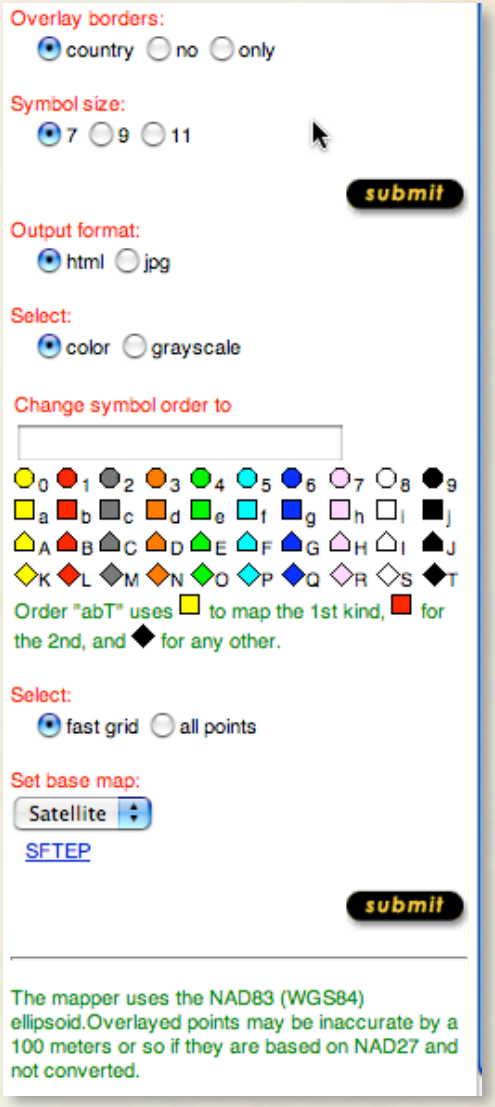
Illustration of habitus, Fig. 1, Drawn on Wild M5/20x oculars, Full detail via digital photograph (male adult) dorsofrontolateral view, rendered in color on a gray background, a computer drawing by J. M. Metz. Copyright held by J. M. Metz. Scanned from the literature created with Adobe Photoshop at 300 dpi. Archived on ARCHIVED13 CD-ROM as 100845_01 as jpg tif file formats. Illustration represents Specimen# MEI_114738, Ammonaios confusus Hauser & Irwin. Illustration may be found on page 741 of Hauser, M. , M. E. Irwin. 2003. The Nearctic Genus Ammonaios Irwin and Lyneborg 1981 (Diptera: Therevidae). Annals of the

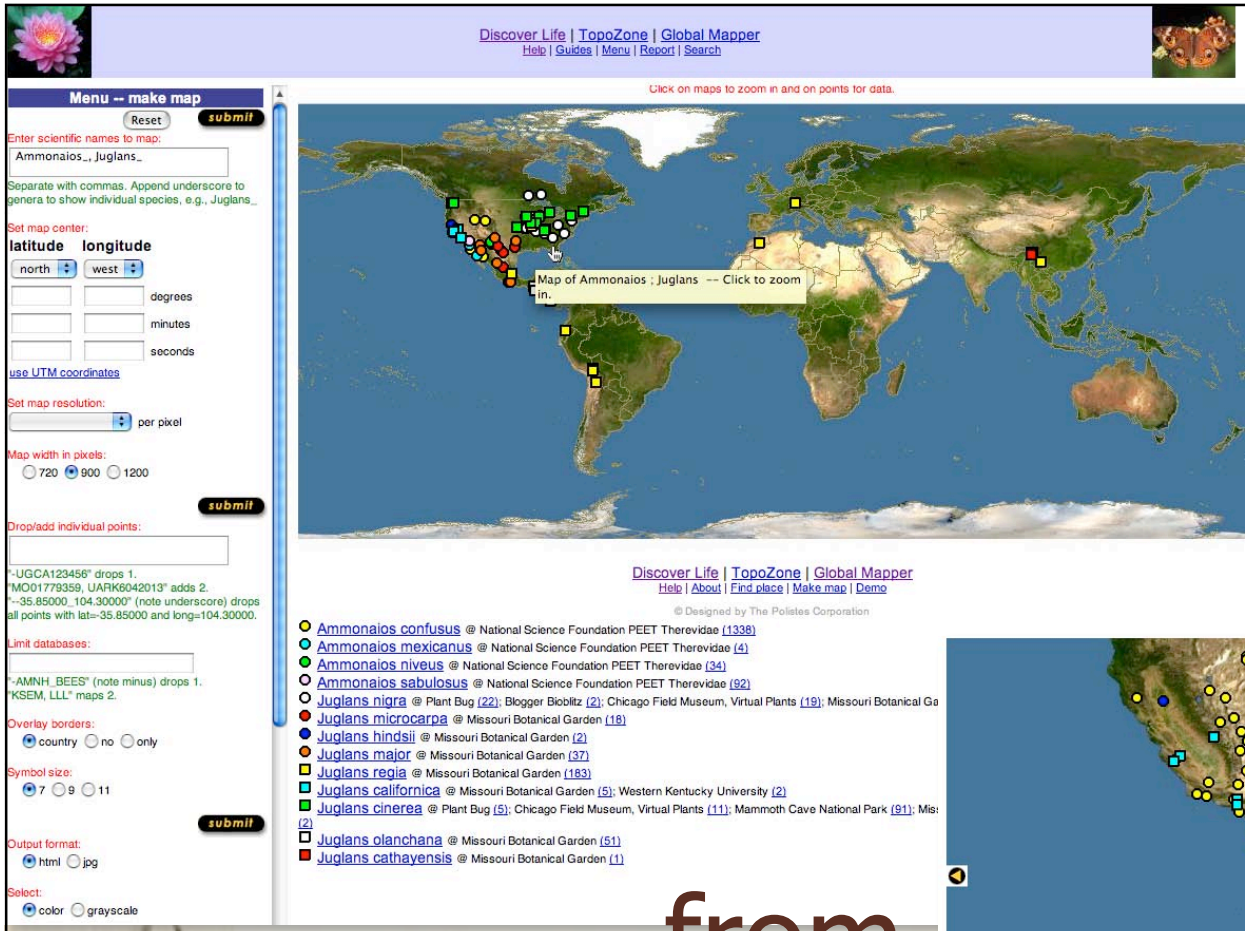
Fig. 1. Habitus of the male of *A. confusus* n. sp.

Customize your own map...

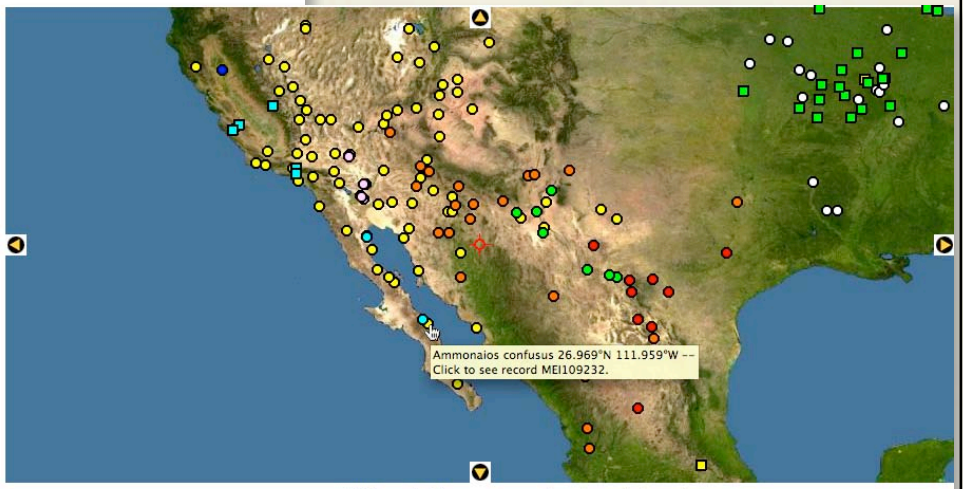


- Map one or more taxa
- Choose symbol size, order
- Set resolution, size, & center of map
- Limit databases mapped
- Output for screen or publication in color or grayscale



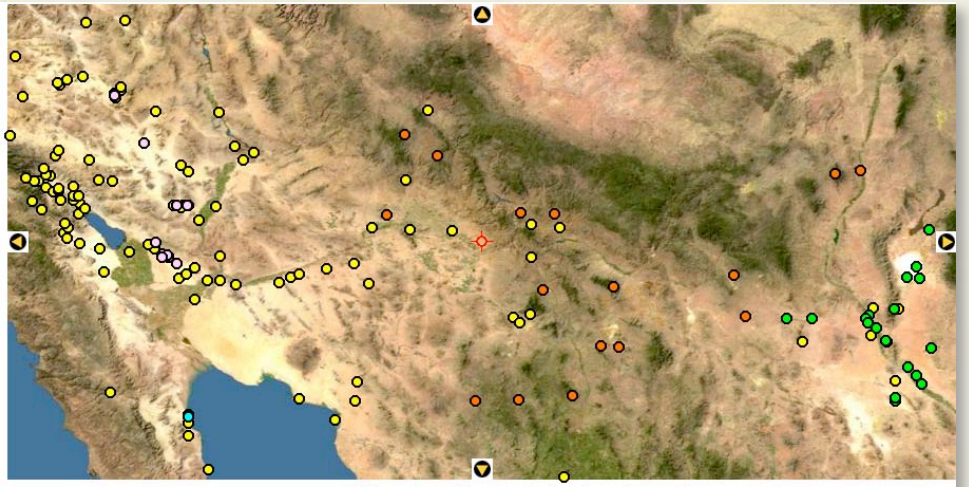


Mapping multiple species…



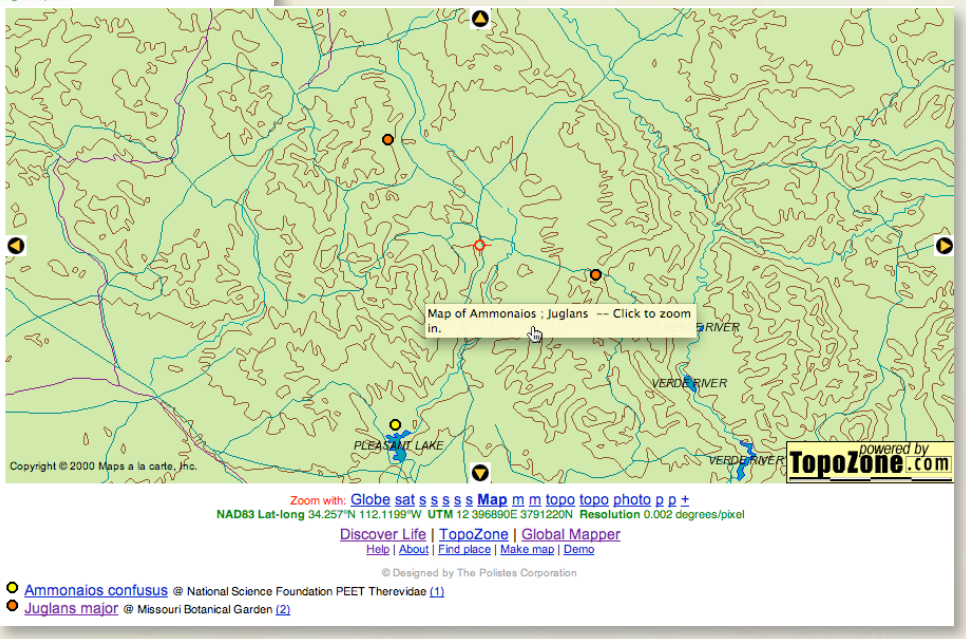
…from multiple data sources

Powerful Data Exploration Tool



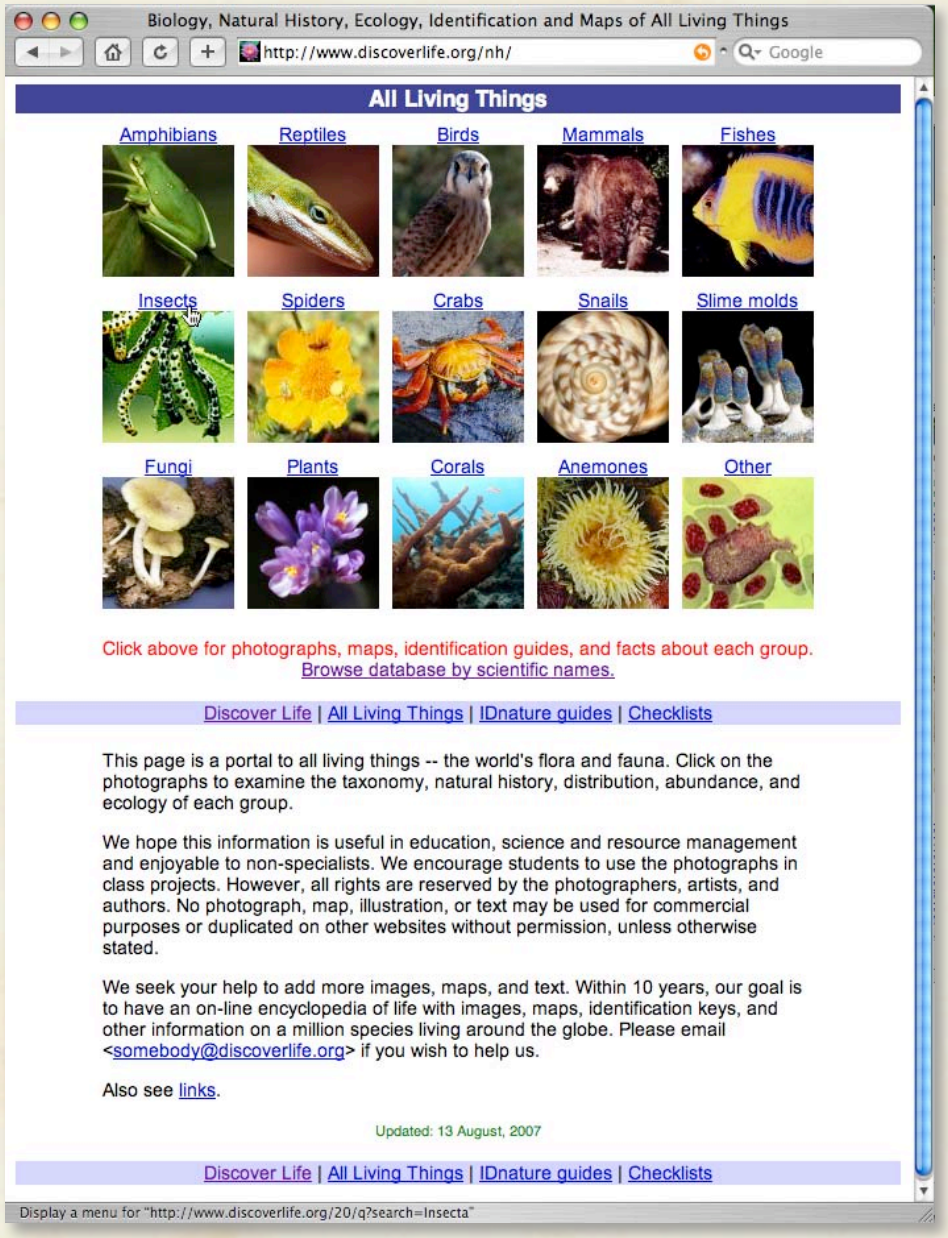
- Wouldn't it be nice if GBIF's datasets could lend additional power to this system?

- Wouldn't it be nice if Discover Life's technology could enhance the user experience with GBIF?

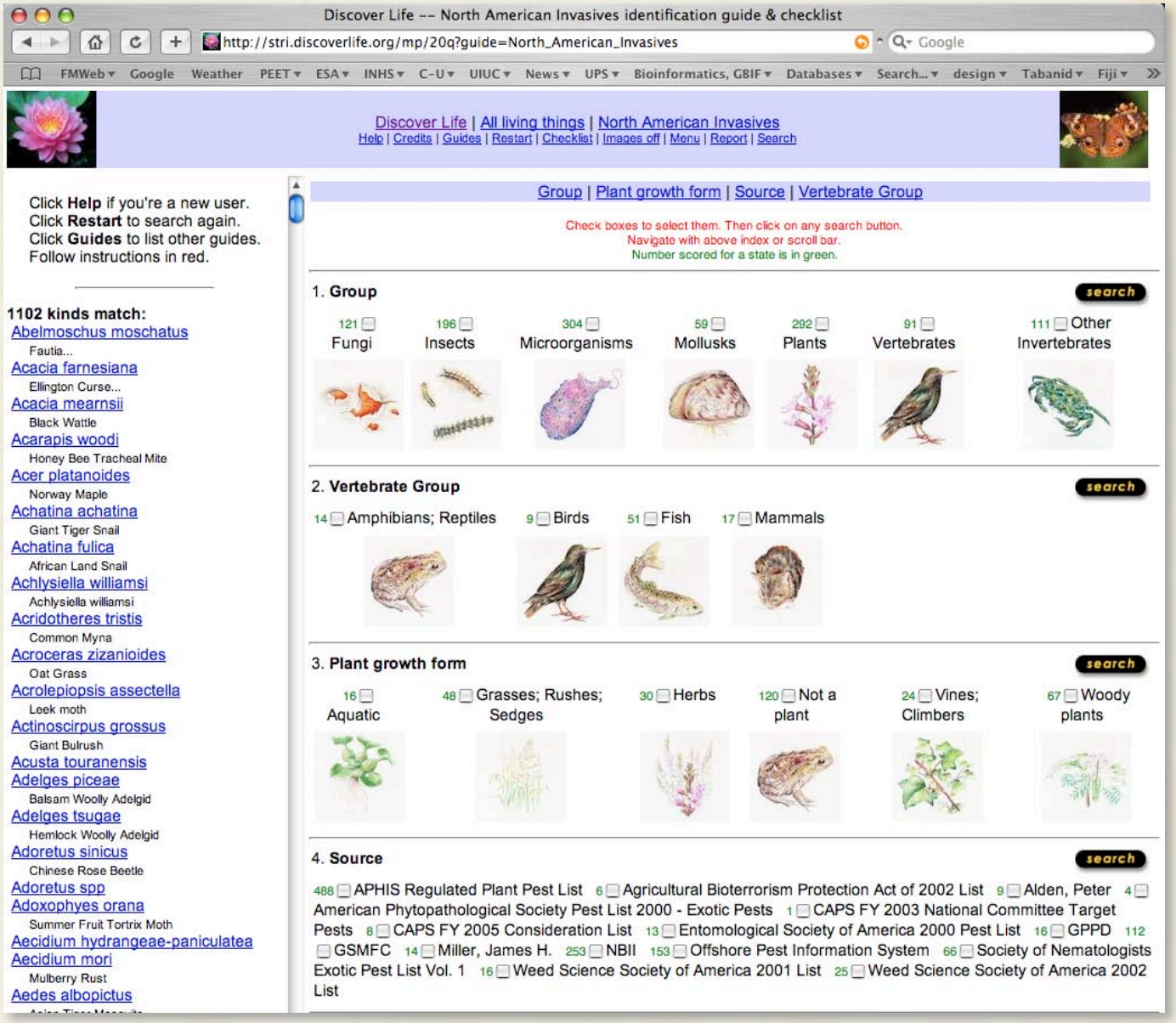


Exploring the Living World

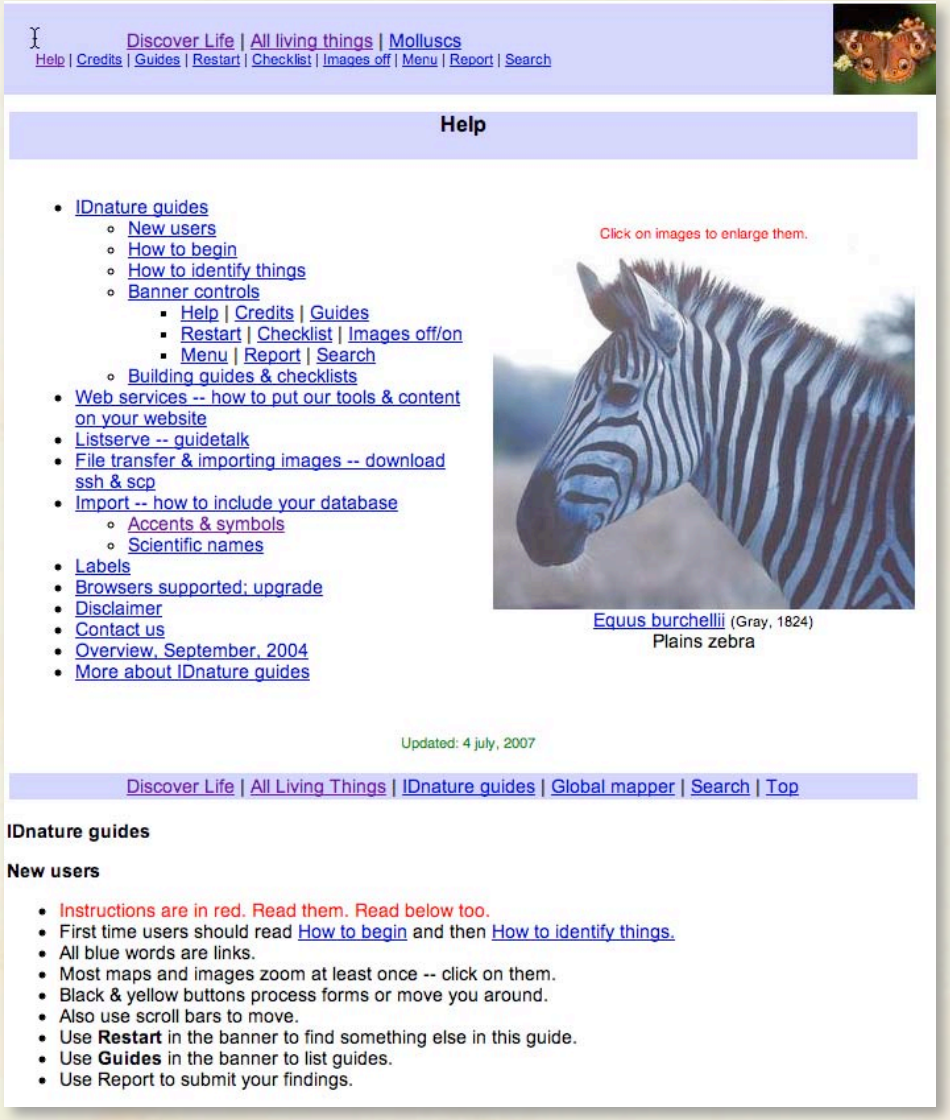
- Portal to user designed, on-line constructed polytomous keys
- Can draw on multiple databases



Keys - Identification Guides



User Help for Navigation & Contributing to Discover Life network



Discover Life - Strengths

- Flexible mapping of multiple species, datasets, on same map
- Points link to specimen records, including similar records
- Partnership with TopoZone provides topographic map layers in addition to global map & satellite views; other layers planned
- Fine manipulation of mapping features for display or publication
- Ability to build polytomous identification guides (keys) for multiple purposes
- Simplified data sharing

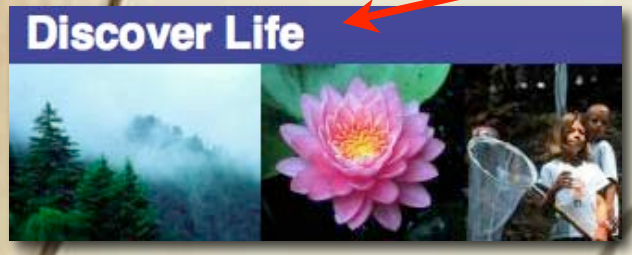
Partnering

- GBIF
  - Has credibility & large stature in the taxonomic community because of its multinational memoranda of understanding & standards-based output
  - Contributions to it are viewed as the gold standard for sharing by funding agencies
  - Sharing model is encumbered by difficult access by smaller users

Partnering

- Discover Life is the energetic ".com" of the biodiversity world
- It can bring valuable technology to the table
  - Provide a place for smaller or less technologically savvy data curators
  - Willing to portal datasets of willing providers to GBIF
  - Mapping tools
  - Key generation tools

As a data user,
As a data provider,
I want to see
Collaboration
& Partnerships…



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