

Digitizing Practices for Invertebrate Collections ... and Leveraging Beyond

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InvertNet Rationale

- vast majority of specimens in U.S. collections are invertebrates
 - primarily insects and related arthropods
 - less than 5% available online
 - only label data usually provided
- most invertebrate biodiversity research is specimen-based
 - all knowledge of many species is embodied in collections
- existing digitization methods are inadequate
 - slow and expensive (\$1+ per specimen)
 - risk of damage to specimens from handling



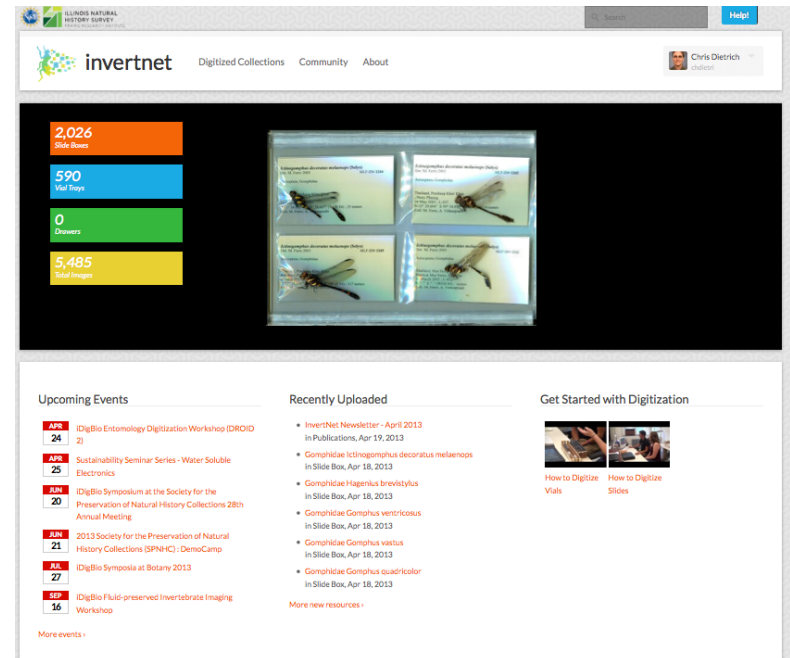
InvertNet Goals

- Digitize all holdings of 22 Midwestern arthropod collections (~50 million specimens)
 - Specimen images and metadata (label info)
 - Drawers, vials, slides
 - Advanced imaging (including 3D)
 - Best quality at reasonable cost (~\$0.10/specimen)
- Provide access to images and other data via online virtual museum
 - browsable/searchable/zoomable web interface
 - link to other data providers (GBIF, iDigBio, etc.)
- Provide platform for research and development of additional tools and resources
 - Data mining and analysis
 - Community building, collaboration, and support
 - Education, outreach, and reference



Accomplishments since July 2011

- Created robust cyberinfrastructure platform based on HUBzero (invertnet.org)
- Implemented efficient workflows for slides and vials using 2D scanning technology
- Curated and staged collections for digitization
- Ingested 12,000+ images and metadata from 11 collaborating institutions representing >200,000 specimens
- Linked InvertNet data repository to iDigBio portal
- Developed and tested three different drawer digitization prototype systems
- Held two training workshops for collaborators (April 2012 and November 2013)
- Participated in numerous workshops, symposia and planning meetings
- Published 2 papers describing our high-throughput digitization approach
- Added two institutions as InvertNet collaborators (U. Hawaii, U. Iowa)
- trained 15 grad students and >30 undergrads



ZooKeys 209: 145–181 (2012)
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www.zookeys.org

RESEARCH ARTICLE

ZooKeys
An International Open Access Journal
of Animal Taxonomy

InvertNet: a new paradigm for digital access to invertebrate collections

Chris Dietrich¹, John Hart², David Raila³, Umberto Ravaiali^{3,4}, Nahil Sobhi⁴, Omar Sobhi⁴, Chris Taylor¹

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Balle et al. *Frontiers in Zoology* 2013, 10:55
<http://www.frontiersinzoology.com/content/10/1/55>

FRONTIERS IN ZOOLOGY

COMMENTARY

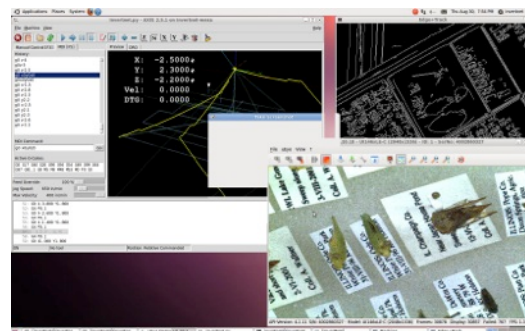
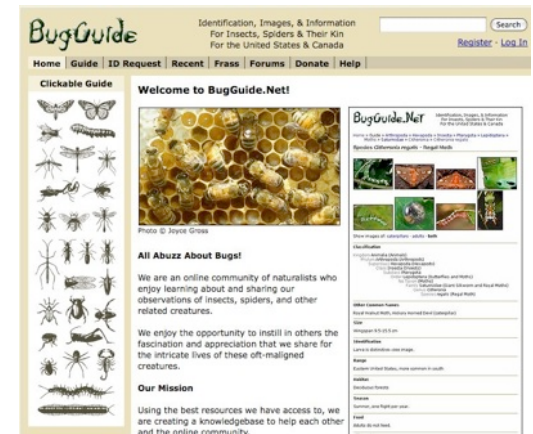
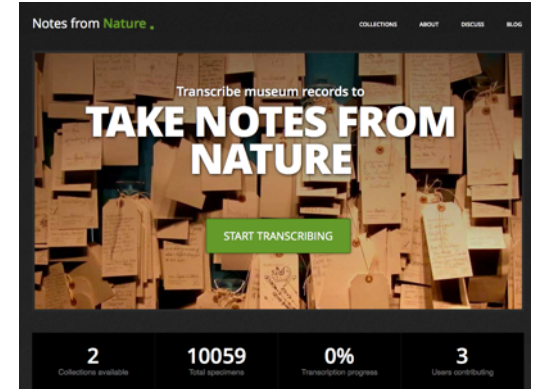
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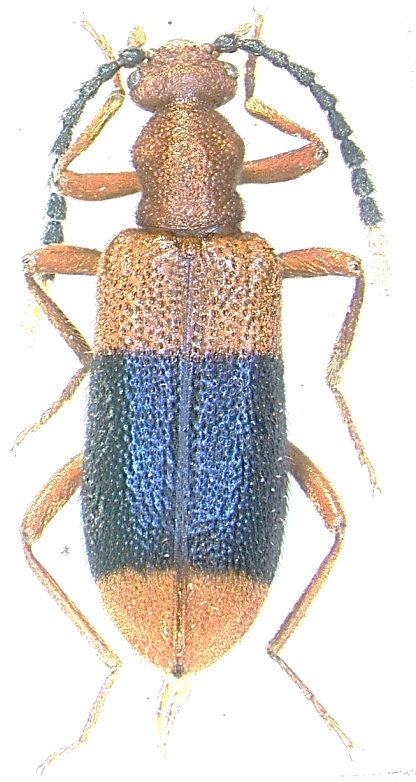
Biodiversity into your hands - A call for a virtual global natural history 'metacollection'

Michael Balle^{1,2*}, Stefan Schmidt¹, Axel Hausmann¹, Emmanuel FA Toussaint^{1,2}, Johannes Bergsten³, Matthew Buffington⁴, Christoph L Häuser⁵, Alexander Kroupa³, Gregor Hagedorn³, Alexander Riede⁶, Andrew Polaszek⁷, Roschon Ubaidillah⁸, Lars Krogmann⁹, Andreas Zwick⁹, Martin Fikáček¹⁰, Jiří Hájek¹⁰, Mariano C Michat¹, Christopher Dietrich¹¹, John La Salle¹³, Beth Mantle¹⁴, Peter Kl. Ng¹⁵ and Donald Hobben¹⁶

Goals for years 3-4

- Capture images of ~80,000 drawers from all collaborating institutions and provide access via InvertNet.org
- Crowdsource label data capture from images of slides, vials and drawers
- Ingest existing specimen-level data from collaborating institutions
- Link to BugGuide
- Develop improved, real-time photo stitcher
- Develop improved 3D reconstruction algorithms that allow virtual tilting of drawer and specimen images via a web interface





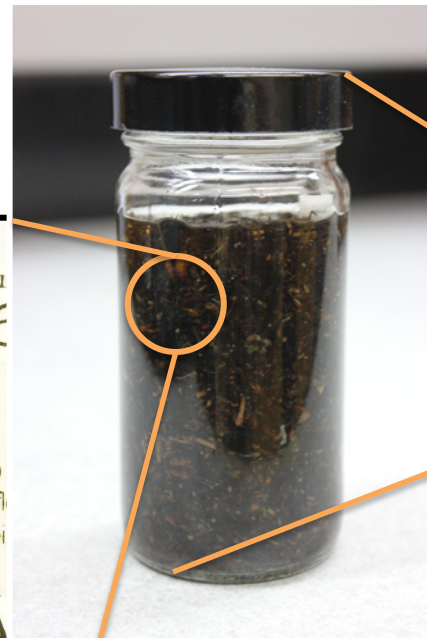
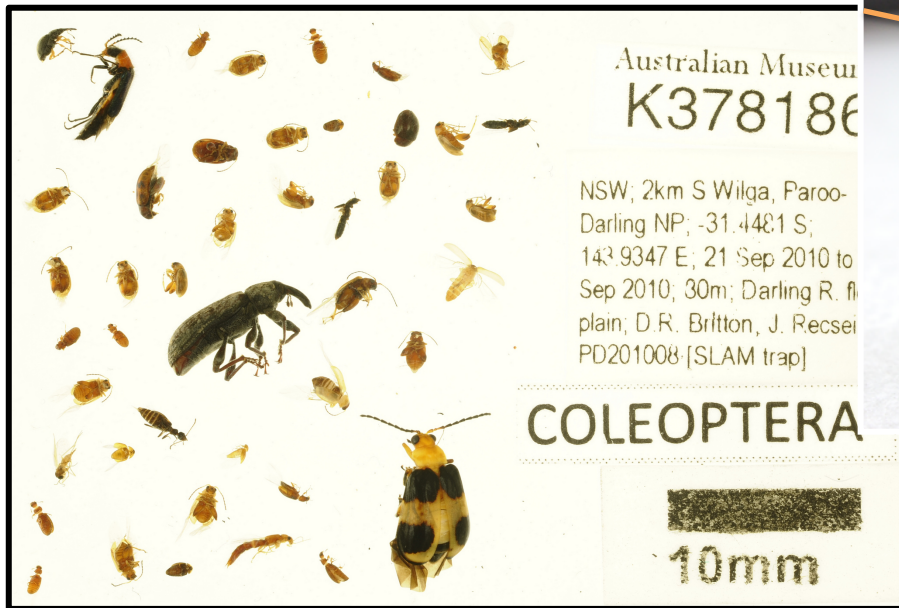
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Leveraging Beyond: “Insect Soup”

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Australian Museum



Leveraging Beyond: “LepNet”*

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* Digitization TCN: Lepidoptera of North America Network:
Documenting Diversity in the Largest Clade of Herbivores

Leveraging Beyond: “Tension Zone TCN”

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