Community approaches to open data at scale

Chris Erdmann
Judy Ruttenberg
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VIVO Conference 2018
June 7, 2018

Metadata 2020: Who, what, when, where, why?

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METADATA 2020

As a researcher…I'm a bit bloody fed up with Data Management - Cameron Neylon

METADATA 2020

What is Metadata 2020?

Metadata 2020 is a **collaboration** that advocates richer, connected, and reusable, open metadata for all research outputs, which will advance scholarly pursuits for the benefit of society.

RICHER

CONNECTED

REUSABLE

COMMUNITY GROUPS

RESEARCHERS
Cameron Neylon, Curtin (Chair), Bethany Drehman, FASEB, Ernesto Priego, University of London, Eva Mendez, UC3M/OSPP, Juan Pablo Alperin, Public Knowledge Project, L.K. Williams, Interfolio...

SERVICE PROVIDER/PLATFORMS AND TOOLS
Marianne Calilhanna, Cenveo Publisher Services (Chair), Adrian-Tudor Pănescu, Figshare, Bob Kasenchak, Access Innovations, Dan Nigloschy, XML workflow solutions architect...

FUNDERS
Ross Mounce, Arcadia Fund

PUBLISHERS
Daniel Shanahan, F1000 (Chair), Fiona Counsell, Taylor & Francis, Christina Gifford, Elsevier, Christina Hoppermann, Springer Nature, Concetta La Spada, Cambridge University Press...

LIBRARIANS
Juliane Schneider, Harvard Catalyst (Chair), Christopher Erdmann, North Carolina State University, Ebe Kartus, University of New England, Eva Mendez, UC3M/OSPP...

DATA PUBLISHERS AND REPOSITORIES
John Chodacki, CDL and DataCite (Chair), Barbara Chen, Modern Language Association, Jennifer Lin, Crossref, Scott Plutchak, University of Alabama at Birmingham (retired)...

Group Work

- Each group has met 5 times
- They have defined their community problem statements, outlining challenges and opportunities
- Ideas that arose from multiple meetings are now resulting in specific **cross-community projects**

Problem Statements, Challenges & Opportunities

Example:

***Researchers** have a major issue with time. Metadata entry upon submission of research takes time, and this metadata is often required to be entered multiple times. Streamlining is needed. Researchers in different fields have different metadata needs and ways of talking about metadata. There is also a lack of knowledge surrounding the importance of complete and accurate metadata, and the value and uses of that metadata upstream in the research product life cycle.*

Projects 1-3

1. **Researcher Communications:** Increase the impact and consistency of communication with researchers about metadata
2. **Metadata Recommendations and Element Mappings:** Shared set of recommended metadata concepts/related mappings
3. **Defining the Terms We Use About Metadata:** Develop a glossary of words associated with metadata, for core concepts and disciplinary areas

Projects 4-6

4. **Incentives for Improving Metadata Quality:** Stories to demonstrate how better metadata will meet researcher goals
5. **Shared Best Practices and Principles:** High level best practices for using metadata across the scholarly communication cycle, to facilitate interoperability, exchange
6. **Metadata Evaluation and Guidance:** Identify and compare existing metadata evaluation tools and mechanisms to inform clear community guidance

In our discussions...

Talks: SHARE & Dryad

Improving the metadata curation pipeline to SHARE

Judy Ruttenberg, Program Director for Strategic Initiatives, ARL

SHARE is a community open-source initiative developing tools and services to connected related, yet distributed, research outputs, enabling new kinds of scholarly discovery. This talk will provide an overview of SHARE's current development priorities to move to distributed, institutionally-based infrastructure supporting local priorities, as well as critical improvements to SHARE's harvesting framework and metadata curation pipeline.

Dryad and the evolution of metadata curation at a generalist data repository

Todd Vision, PI, Dryad

Dryad is a generalist data repository underlying the scientific and medical literature, with data underlying articles from hundreds of journals and authors at hundreds of institutions. In this talk, I will describe how Dryad's workflow for metadata curation has evolved over time and contemplate how institutions and data repositories might better interface with one another and with the world of STM publishing.

Can you help?

- Contribute to Metadata 2020 projects! Email Clare Dean at cdean@metadata2020.org for details, or sign up here.
- Help promote our efforts to the wider community through your organizations, word of mouth, and social media
- Find us on @Metadata2020 Twitter, Facebook, LinkedIn, and at metadata2020.org

Thank you!
Questions?

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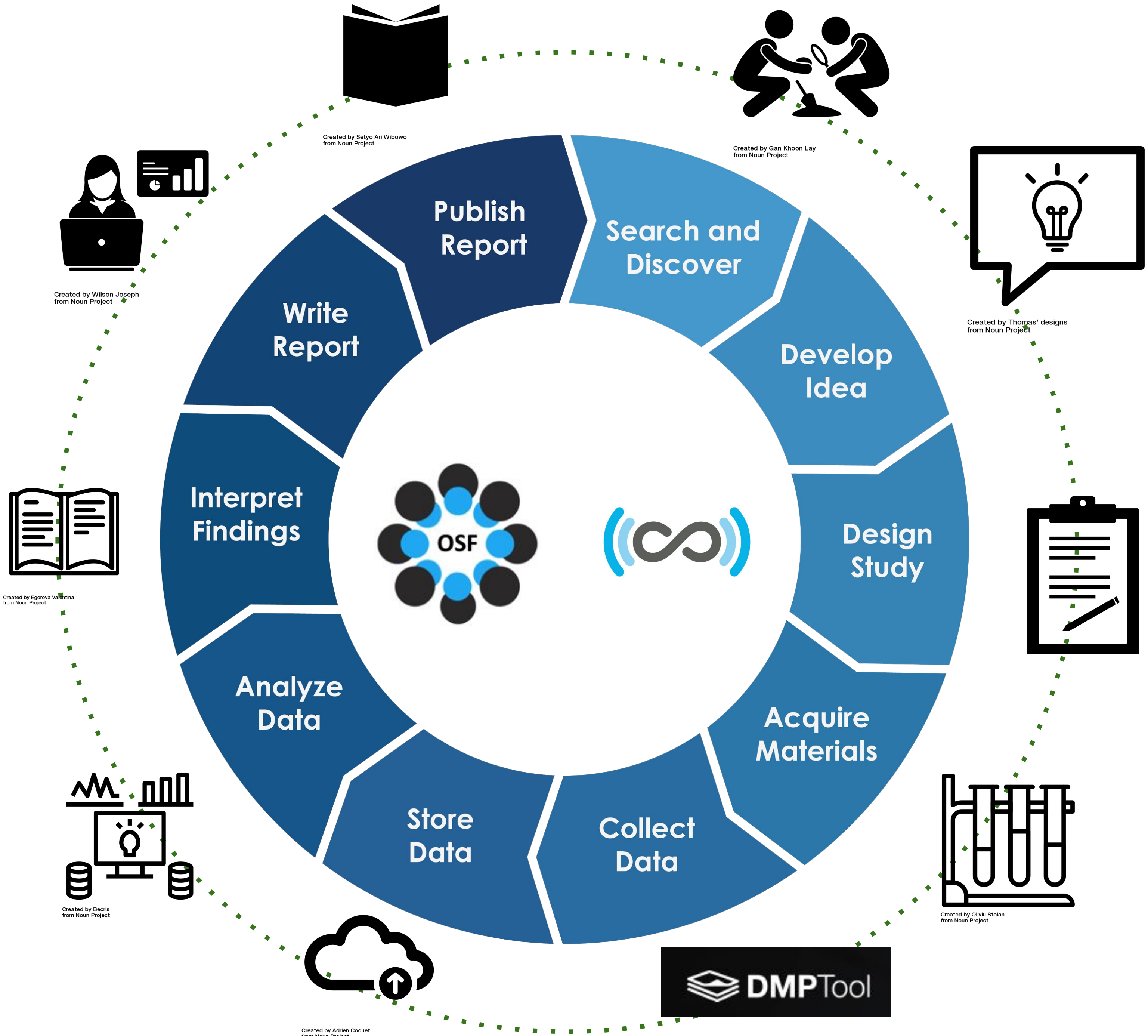
SHARE is a community open-source initiative developing tools and services to connect related, yet distributed, research outputs, enabling new kinds of scholarly discovery.

@SHARE_research

www.share-research.org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Acquire Materials
Collect Data
Store Data
Analyze Data
Interpret Findings
Write Report
Publish Report
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DMPTool
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Created by Gan Khoon Lay from Noun Project
Created by Thomas' designs from Noun Project
Created by Oliviu Stoian from Noun Project
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Created by Becris from Noun Project
Created by Egorova Valentina from Noun Project
Created by Wilson Joseph from Noun Project

Metadata is data

Rich metadata ...

- Facilitates discovery
- Exposes research assets
- Contributes to meta-scholarship and meta-analysis

Links and relationships can be analyzed from this data

Dataset

Harvesting Framework

Aggregator: OSF Preprints

Institutional focus: Dashboard

Lessons learned

Digital Humanities exploration

Dataset

Harvesting Framework

Aggregator: OSF Preprints

Institutional focus: Dashboard

Lessons learned

Digital Humanities exploration

Dataset

Harvesting Framework

Aggregator: OSF Preprints

Institutional focus: Dashboard

Lessons learned

Digital Humanities exploration

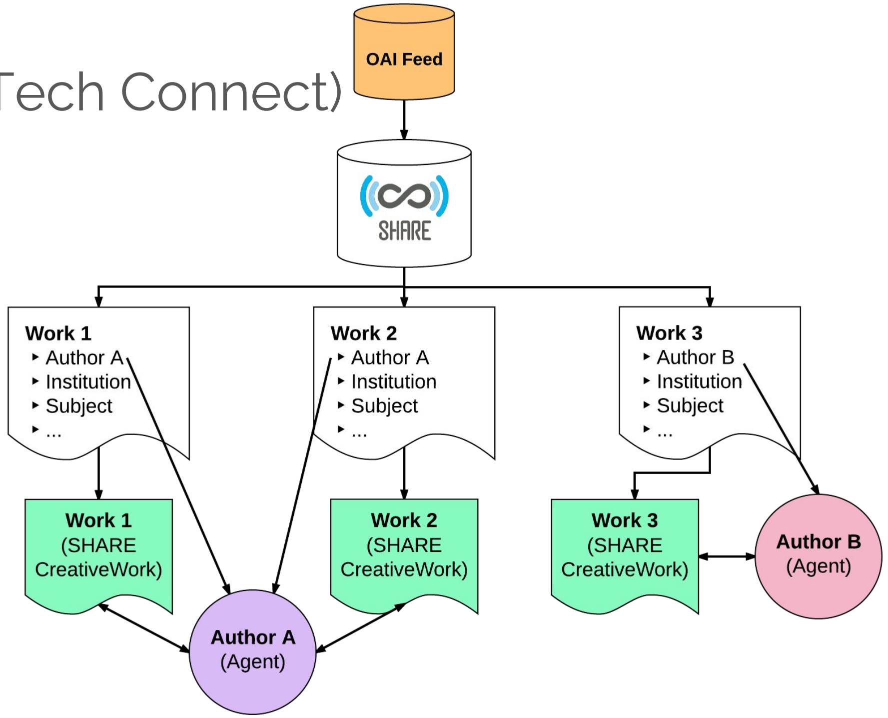
Dataset & Harvesting Framework

168+ data sources

- Registries (e.g. CrossRef, DataCite)
- Disciplinary repositories and preprint services
- Data repositories
- Institutional repositories
- Agency repositories (e.g. DOE SciTech Connect)

55+ million metadata records

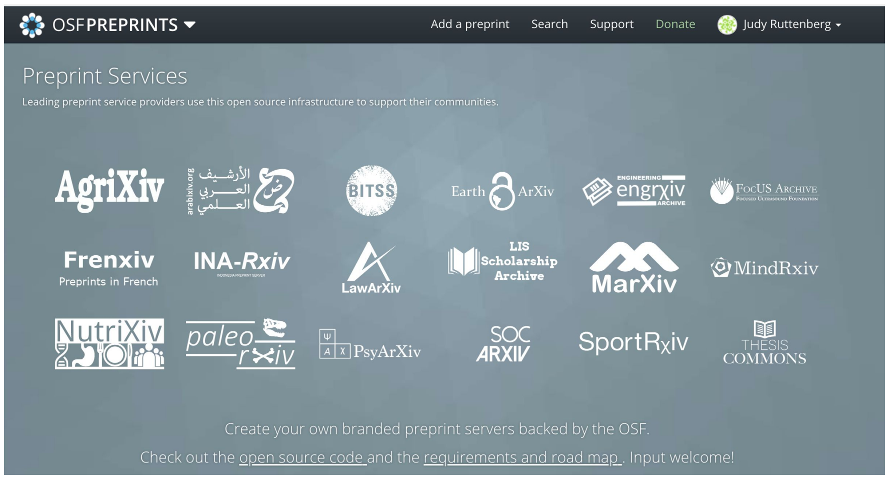
https://share.osf.io/discover

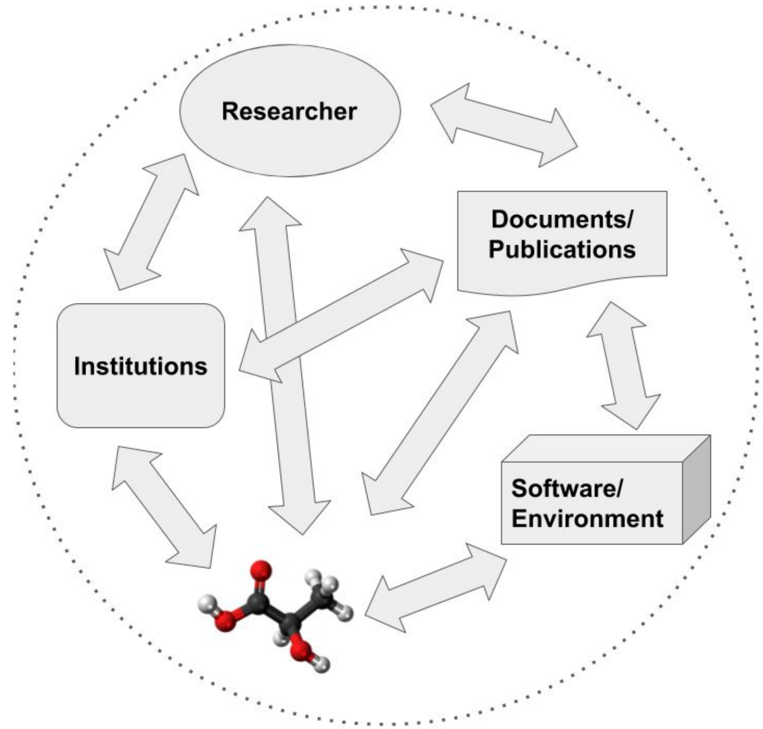


SHARE metadata priorities

- Institutional identifier
- Person identifier
- Source of funding
- Exchange across systems & borders: CC0
- Reference lists
- URI values - mapping to common values making them transferrable

Rich metadata, new discovery



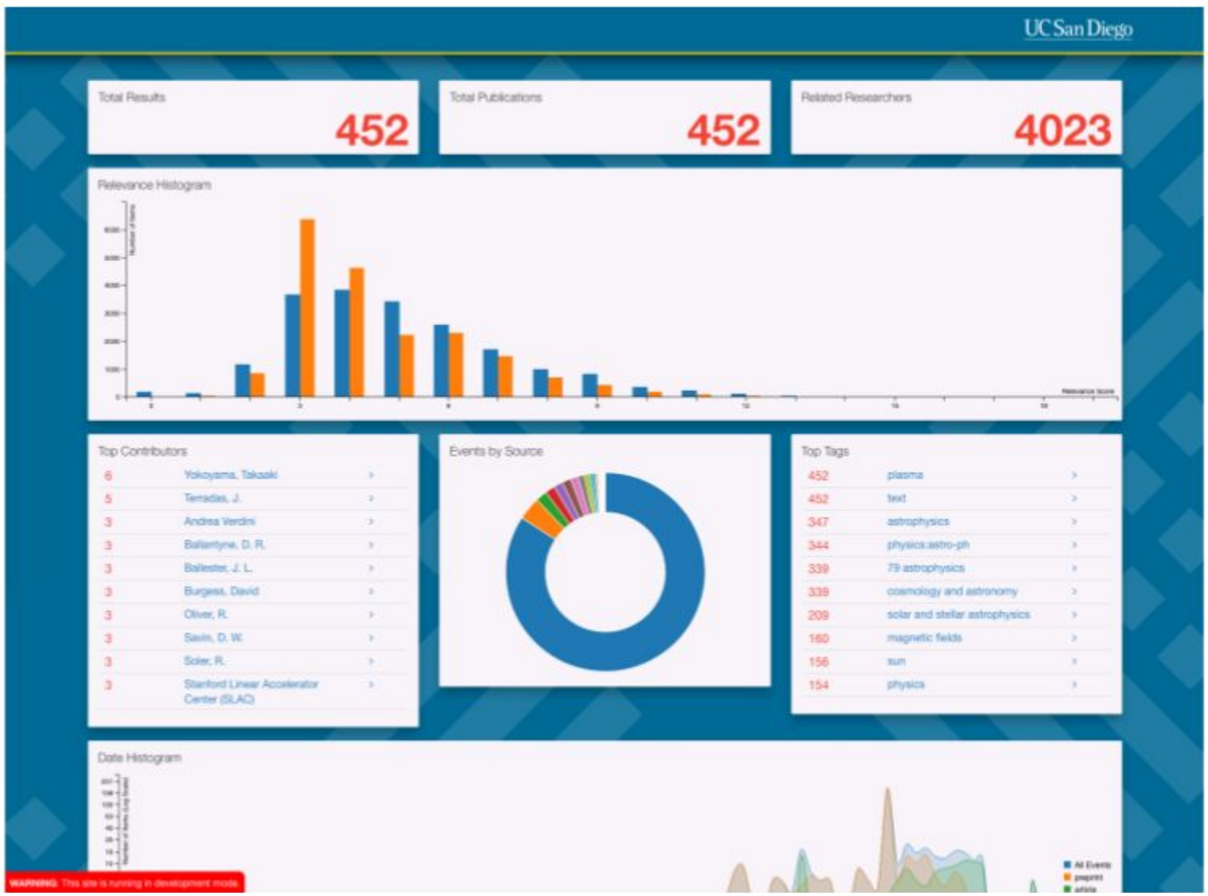


Data Curation Network

A cross-institutional staffing model for curating research data in digital repositories

Rich metadata, rich storytelling

SHARE - Institutional Dashboard



Lessons learned

- Move to distributed infrastructure
- Invest more in relationship mapping among objects in the dataset
- Build on work at the institution level
- Shared service AND reusable solutions

Decentralization of SHARE

Under development:

- Template to make writing harvester code easy, using Node-RED
- Distributed framework for harvesting data
- Editor to clean, remediate, link harvested data

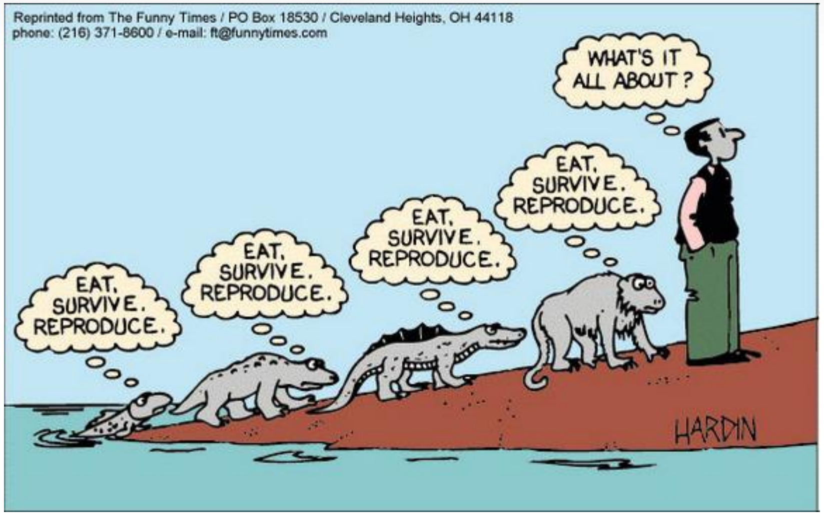
Community, open-source software development to solve local problems

Use case: Research Intelligence

“Aggregation, curation, and utilization of metadata about research activities. [RIMs} … help reliably connect a complex scholarly communications landscape of researchers, affiliations, publications, datasets, grants, projects, and their persistent identifiers.”

OCLC Research Library Partnerships:
https://www.oclc.org/research/themes/research-collections/rim.html

The evolution of metadata at a generalist data repository



Todd Vision
Associate Prof, Department of Biology
Adjunct, School of Information & Library Science
University of North Carolina at Chapel Hill

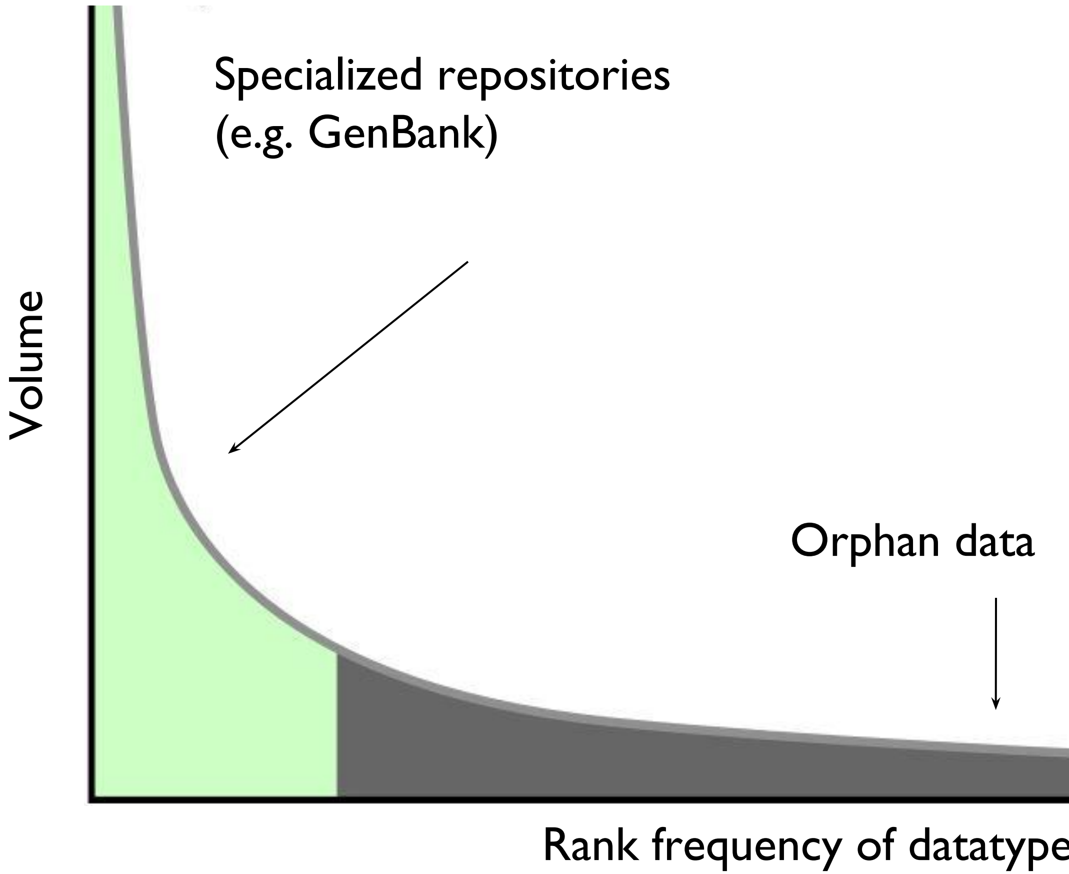
With thanks to
Dryad staff
Jane Greenberg, and the UNC/Drexel Metadata Research Center

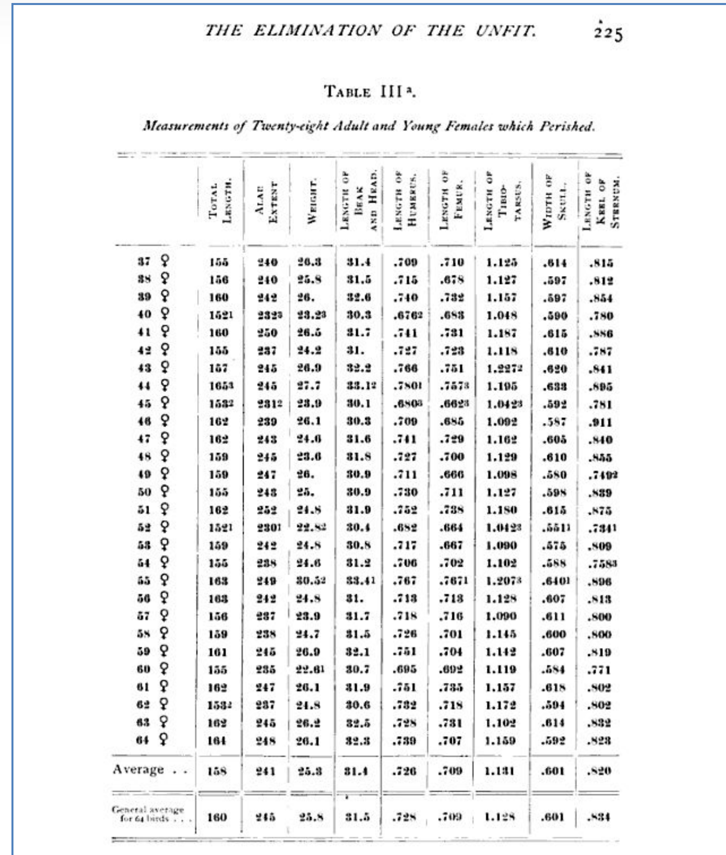
THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

DRYAD

The long tail of orphan data

Bumpus HC (1898) The Elimination of the Unfit as Illustrated by the Introduced Sparrow, *Passer domesticus.* A Fourth Contribution to the Study of Variation. pp. 209-226 in *Biological Lectures from the Marine Biological Laboratory*, Woods Hole, Mass.





THE ELIMINATION OF THE UNFIT. 225

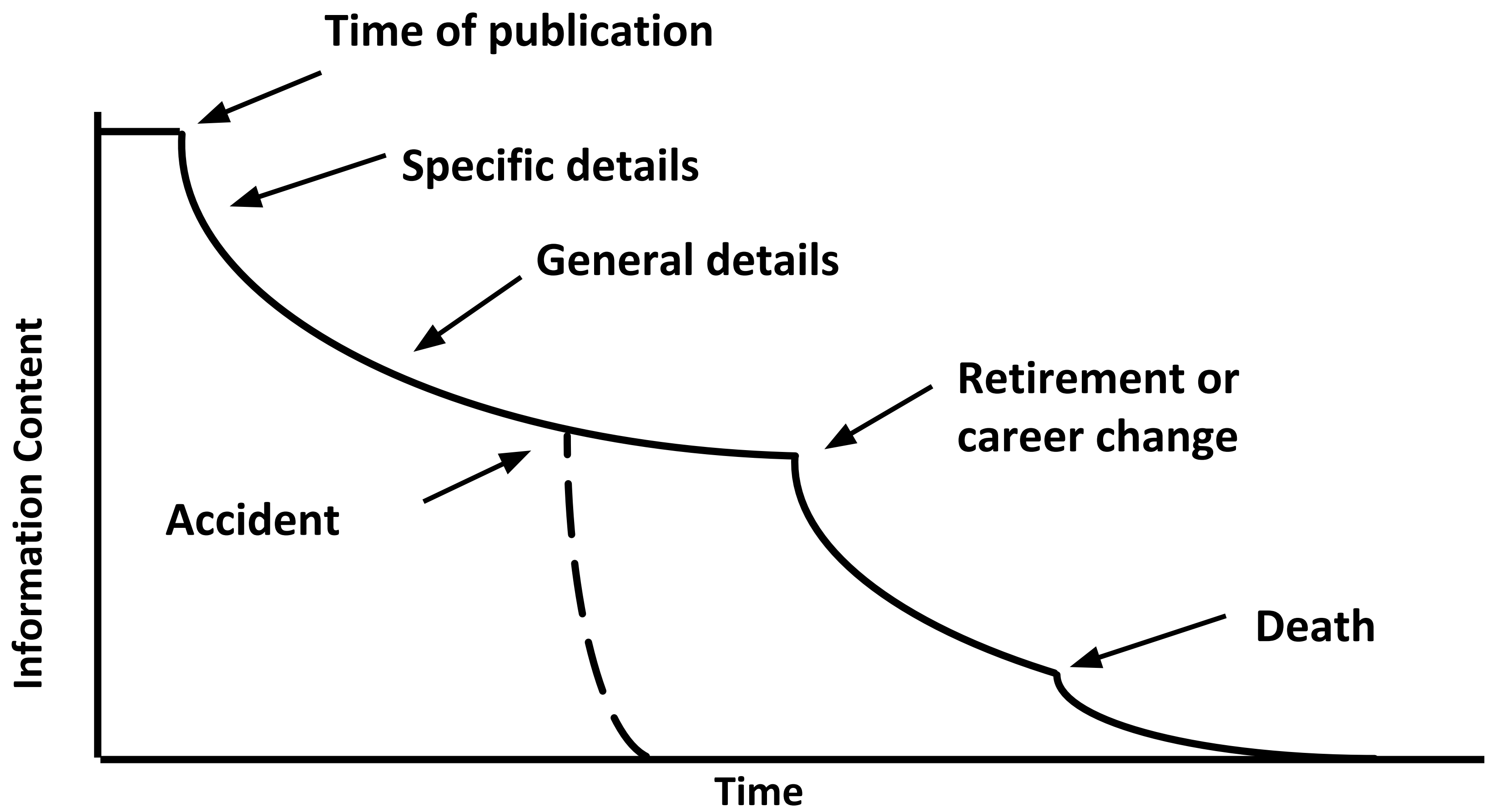
TABLE III a.

Measurements of Twenty-eight Adult and Young Females which Perished.

	Total Length.	Alar Extent	Weight.	Length of Beak and Head.	Length of Humerus.	Length of Femur.	Length of Tibio-tarsus.	Width of Skull.	Length of Keel of Sternum.
37 ♀	155	240	26.3	31.4	.709	.710	1.125	.614	.815
38 ♀	156	240	25.8	31.5	.715	.678	1.127	.597	.812
39 ♀	160	242	26.	32.6	.740	.732	1.157	.597	.854
40 ♀	152[1]	232[3]	23.2[3]	30.3	.676[2]	.683	1.048	.590	.780
41 ♀	160	250	26.5	31.7	.741	.731	1.187	.615	.886
42 ♀	155	237	24.2	31.	.727	.723	1.118	.610	.787
43 ♀	157	245	26.9	32.2	.766	.751	1.227[2]	.620	.841
44 ♀	165[3]	245	27.7	33.1[2]	.780[1]	.757[3]	1.195	.633	.895
45 ♀	153[2]	231[2]	23.9	30.1	.680[3]	.662[3]	1.042[3]	.592	.781
46 ♀	162	239	26.1	30.3	.709	.685	1.092	.587	.911
47 ♀	162	243	24.6	31.6	.741	.729	1.162	.605	.840
48 ♀	159	245	23.6	31.8	.727	.700	1.129	.610	.855
49 ♀	159	247	26.	30.9	.711	.666	1.098	.580	.749[2]
50 ♀	155	243	25.	30.9	.730	.711	1.127	.598	.839
51 ♀	162	252	24.8	31.9	.752	.738	1.180	.615	.875
52 ♀	152[1]	230[1]	22.8[2]	30.4	.682	.664	1.042[3]	.551[1]	.734[1]
53 ♀	159	242	24.8	30.8	.717	.667	1.090	.575	.809
54 ♀	155	238	24.6	31.2	.706	.702	1.102	.588	.758[3]
55 ♀	163	249	30.5[2]	33.4[1]	.767	.767[1]	1.207[3]	.640[1]	.896
56 ♀	163	242	24.8	31.	.713	.713	1.128	.607	.813
57 ♀	156	237	23.9	31.7	.718	.716	1.090	.611	.800
58 ♀	159	238	24.7	31.5	.726	.701	1.145	.600	.800
59 ♀	161	245	26.9	32.1	.751	.704	1.142	.607	.819
60 ♀	155	235	22.6[1]	30.7	.695	.692	1.119	.584	.771
61 ♀	162	247	26.1	31.9	.751	.735	1.157	.618	.802
62 ♀	153[2]	237	24.8	30.6	.732	.718	1.172	.594	.802
63 ♀	162	245	26.2	32.5	.728	.731	1.102	.614	.832
64 ♀	164	248	26.1	32.3	.739	.707	1.159	.592	.823
Average . .	158	241	25.3	31.4	.726	.709	1.131	.601	.820
General average for 64 birds . . .	160	245	25.8	31.5	.728	.709	1.128	.601	.834

After Heidorn (2008) http://hdl.handle.net/2142/9127

Data and metadata entropy



Michener, W. K., J. W. Brunt, J. Helly, T. B. Kirchner, and S. G. Stafford. 1997. Non-geospatial metadata for the ecological sciences. Ecological Applications 7:330-342.

Joint Data Archiving Policy

Data are important products of the scientific enterprise, and they should be preserved and usable for decades in the future.

As a condition for publication, data supporting the results in the article should be deposited in an appropriate public archive.

Authors may elect to embargo access to the data for a period up to a year after publication.

Exceptions may be granted at the discretion of the editor, especially for sensitive information.

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Isaac IO, Munir I, al-Rashida M, Ali SA, Shafiq Z, Islam M, Ludwig R, Ayub K, Khan KM, Hameed A (2018) Data from: Novel acridine-based thiosemicarbazones as "turn-on" chemosensors for selective recognition of fluoride anion: a spectroscopic and theoretical study. *Royal Society Open Science* https://doi.org/10.5061/dryad.9nq2kc4

Steiner FM, Csősz S, Markó B, Gamisch A, Rinnhofer L, Folterbauer C, Hammerle S, Stauffer C, Arthofer W, Schlick-steiner BC (2018) Data from: Turning one into five: integrative taxonomy uncovers complex evolution of cryptic species in the harvester ant Messor "structor". *Molecular Phylogenetics and Evolution* https://doi.org/10.5061/dryad.mj43d20.2

Mardoum WM, Gorczyca SM, Regan KE, Wu T, Robertson-Anderson RM (2018) Data from: Crowding induces entropically-driven changes to DNA dynamics that depend on crowder structure and ionic conditions. *Frontiers in Physics* https://doi.org/10.5061/dryad.77g469g

Roley SS, Duncan DS, Liang D, Garoutte A, Jackson RD, Tiedje JM, Robertson GP (2018) Data from: Associative nitrogen fixation (ANF) in switchgrass (Panicum virgatum) across a nitrogen input gradient. *PLOS ONE* https://doi.org/10.5061/dryad.60bn81v

Trierweiler AM, Winter K, Hedin LO (2018) Data from: Rising CO2 accelerates phosphorus and molybdenum limitation of N2-fixation in young tropical trees. *Plant and Soil* https://doi.org/10.5061/dryad.07nd0hc

Förster D, Bull J, Lenz D, Autenrieth M, Paijmans J, Kraus R, Nowak C, Bayerl H,

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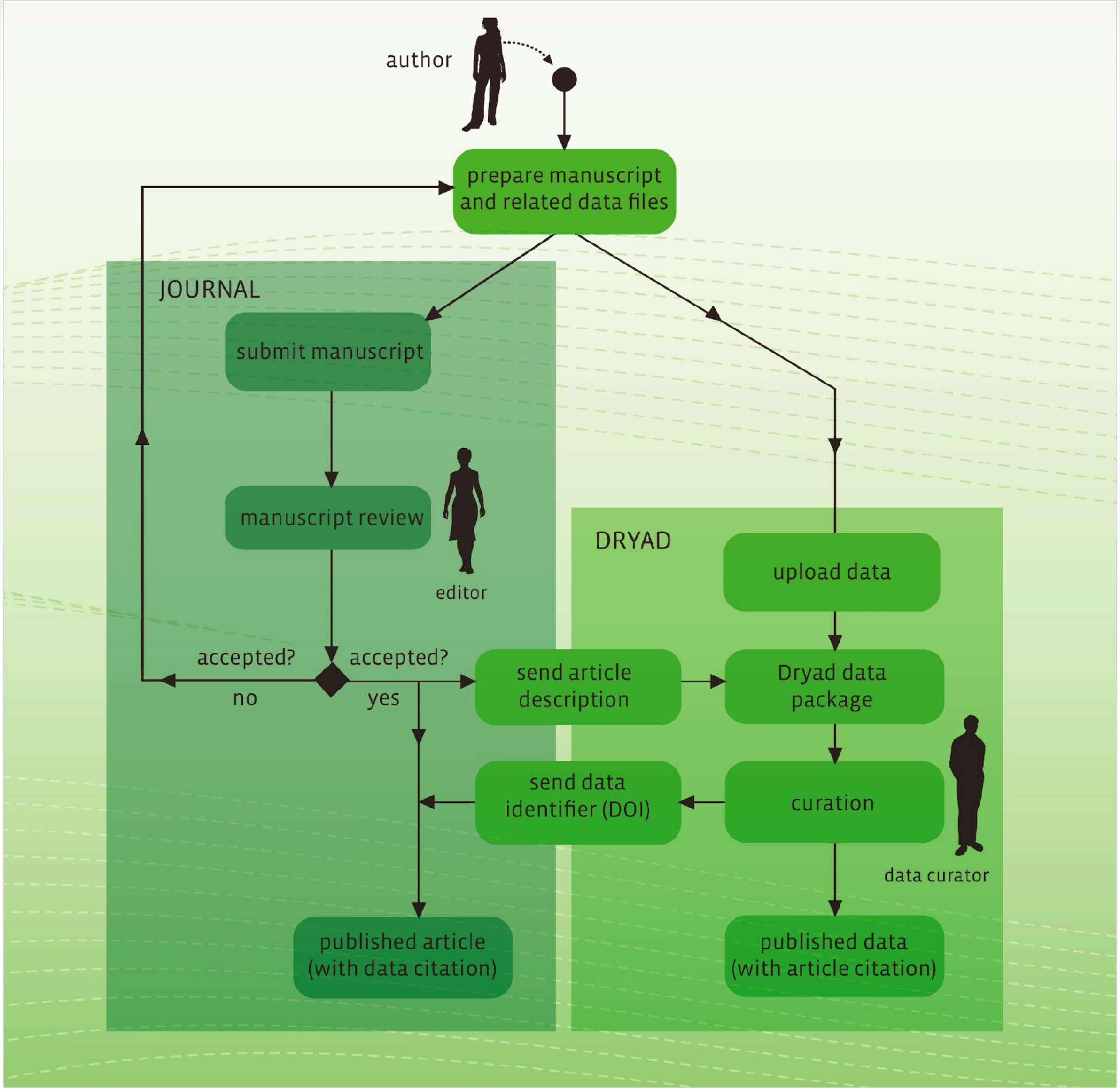
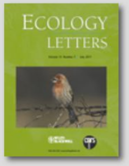


A data "package"

Data from: Towards a worldwide wood economics spectrum



Zanne AE, Lopez-Gonzalez G, Coomes DA, Ilic J, Jansen S, Lewis SL, Miller RB, Swenson NG, Wiemann MC, Chave J

Date Published: February 4, 2009

DOI: https://doi.org/10.5061/dryad.234

Files in this package

Title	**Global Wood Density Database**
Downloaded	22239 times
Description	Please direct all correspondence to G. Lopez-Gonzalez <G.Lopez-Gonzalez@leeds.ac.uk>
Download	GlobalWoodDensityDatabase.xls (2.047 Mb)
Details	View File Details

When using this data, please cite the original publication:

Chave J, Coomes DA, Jansen S, Lewis SL, Swenson NG, Zanne AE (2009) Towards a worldwide wood economics spectrum. Ecology Letters 12(4): 351-366. https://doi.org/10.1111/j.1461-0248.2009.01285.x

Additionally, please cite the Dryad data package:

Zanne AE, Lopez-Gonzalez G, Coomes DA, Ilic J, Jansen S, Lewis SL, Miller RB, Swenson NG, Wiemann MC, Chave J (2009) Data from: Towards a worldwide wood economics spectrum. Dryad Digital Repository. https://doi.org/10.5061/dryad.234

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Keywords evolution, functional ecology, plant economics, trade-offs, wood

Abstract

Wood performs several essential functions in plants, including mechanically supporting aboveground tissue, storing water and other resources, and transporting sap. Woody tissues are likely to face physiological, structural and defensive trade-offs. How a plant optimizes among these competing functions can have major ecological implications, which have been under-appreciated by ecologists compared to the focus they have given to leaf function. To draw together our current understanding of wood function, we identify and collate data on the major wood functional traits, including the largest wood density database to date (8412 taxa), mechanical strength measures and anatomical features, as well as clade-specific features such as secondary chemistry. We then show how wood traits are related to one another, highlighting functional trade-offs, and to ecological and demographic plant features (growth form, growth rate, latitude, ecological setting). We suggest that, similar to the manifold that tree species leaf traits cluster around the 'leaf economics spectrum', a similar 'wood economics spectrum' may be defined. We then discuss the biogeography, evolution and biogeochemistry of the spectrum, and conclude by pointing out the major gaps in our current knowledge of wood functional traits.

DRYAD

Supplementary documentation

ReadMe file for Marshalletal2013-JAE-experimentdata.csv

This file contains the dataset of 8,569 patch visits in a field experiment used in the analysis of patch-departure decisions in experimental conditions in Marshall et al. How do foragers decide when to leave a patch? A test of alternative models under natural and experimental conditions. Journal of Animal Ecology.

The data was collected by Harry Marshall, Alecia Carter, Alan Cowlishaw, Ailsa Henderson, Matt Holmes, James McKenna, Gordon Pearson and Jonathan Usherwood at Tsaobis Leopard Park, Namibia between May and September 2010. Please contact Harry Marshall with any questions.

Each row describes one food patch visit by one baboon, the characteristics of the food patch, focal baboon and its social relationships with other patch occupants.

COLUMN HEADINGS
- The headings described below correspond to the response variable (first group), fixed effects (second group) and random effects (third group) used in the analyses.
- All fixed effects (second group of headings) have been standardised.

duration: length of time (seconds) a baboon visited a patch. Denoted 'patch residency time' or 'PRT' in the paper.

food.density: the patch's initial food density (g per m^2).
patch.depletion: estimated patch depletion (cumulative number of seconds the patch had been visited by any baboon).
satiation: focal forager's estimated satiation (cumulative number of seconds the baboon had visited any patch).
patch.occ: number of other baboons occupying the patch.
patch.occ.sq: number of other other baboons occupying the patch ^2.
focal.rank: focal forager's rank.
focal.social.capital: focal forager's mean social capital with other troop members.
focal.relatedness: focal forager's mean relatedness coefficient with other troop members.
mean.rank.difference: mean rank difference between forager and patch occupants.
mean.social.capital: focal forager's mean social capital with patch occupants.
mean.relatedness: focal forager's mean relatedness coefficient with patch occupants.
previous.duration: time (seconds) spent in patch visited previously.
mean.patch.food.content: mean initial food content of patches (g).
inter.patch.distance: distance between each patch.

focal: unique focal forager ID.
patch: unique patch ID.
exp.day: unique experiment day ID (in the form '<troop ID> <day number>'.
troop: unique baboon troop ID.
index: unique observation-level ID.

Interoperability

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Todd J Vision
0000-0002-6133-2581

Country: US

Keywords: plant biology, genome evolution, bioinformatics, scholarly communication

Websites:
Research group website

Other IDs:
Scopus Author ID: 6603368605

Genome-scale phylogenetics: Inferring the plant tree of life from 18,896 gene trees: Systematic Biology 2011

DOI: 10.1093/sysbio/syq072

http://www.scopus.com/inward/record.url?eid=2-s2.0-79951569533&partnerID=MN8TOARS

Burleigh, J.G. and Bansal, M.S. and Eulenstein, O. and Hartmann, S. and Wehe, A. and Vision, T.J., (2011). "Genome-scale phylogenetics: Inferring the plant tree of life from 18,896 gene trees", Systematic Biology, vol. 60, no. 2, pp. 117-125

Data from: Genome-scale phylogenetics: inferring the plant tree of life from 18,896 gene trees 2010

DOI: 10.5061/DRYAD.7881

Burleigh, J. Gordon; Bansal, Mukul S.; Eulenstein, Oliver; Hartmann, Stefanie; Wehe, André; Vision, Todd J.; , (2010). "Data from: Genome-scale phylogenetics: inferring the plant tree of life from 18,896 gene trees"

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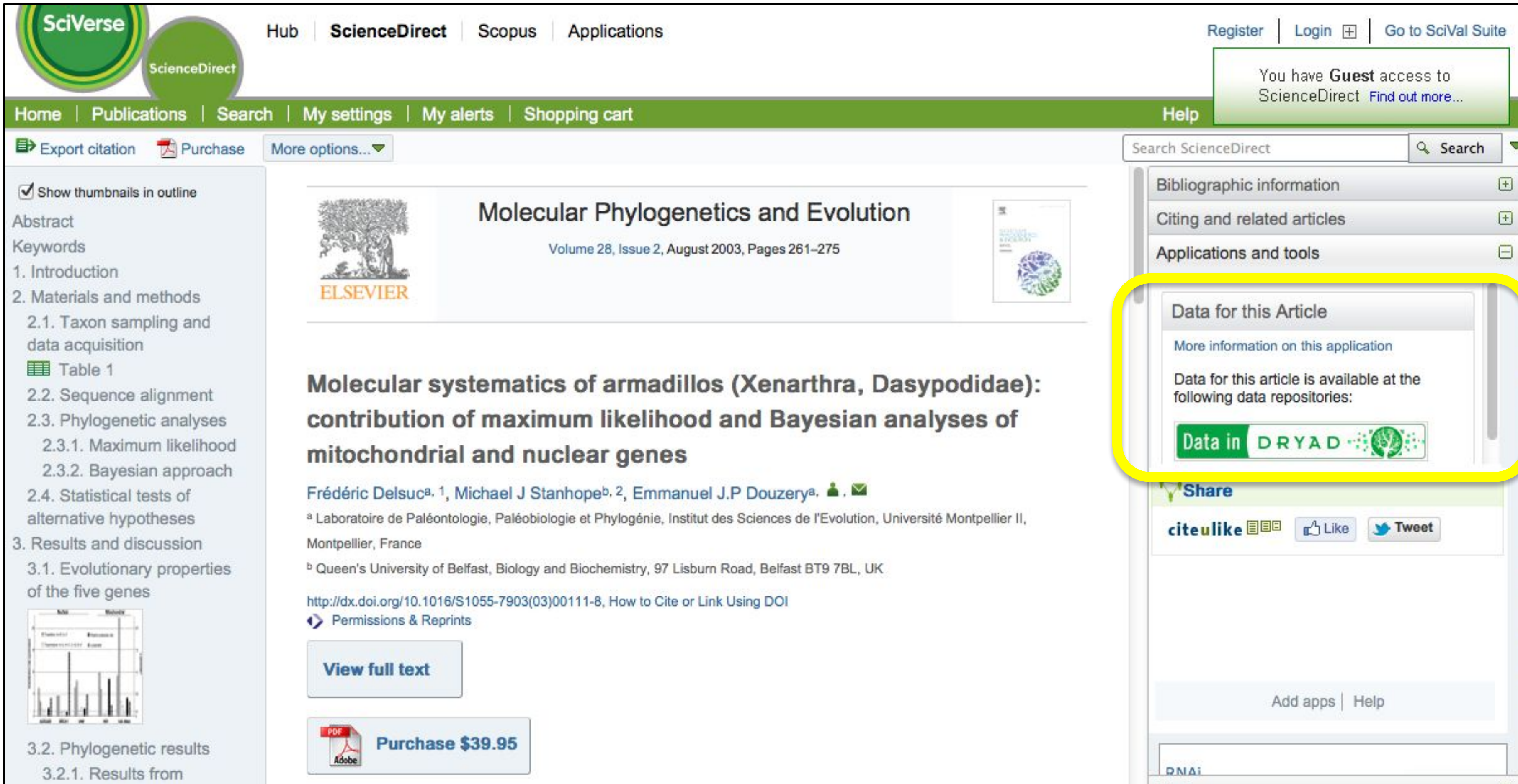
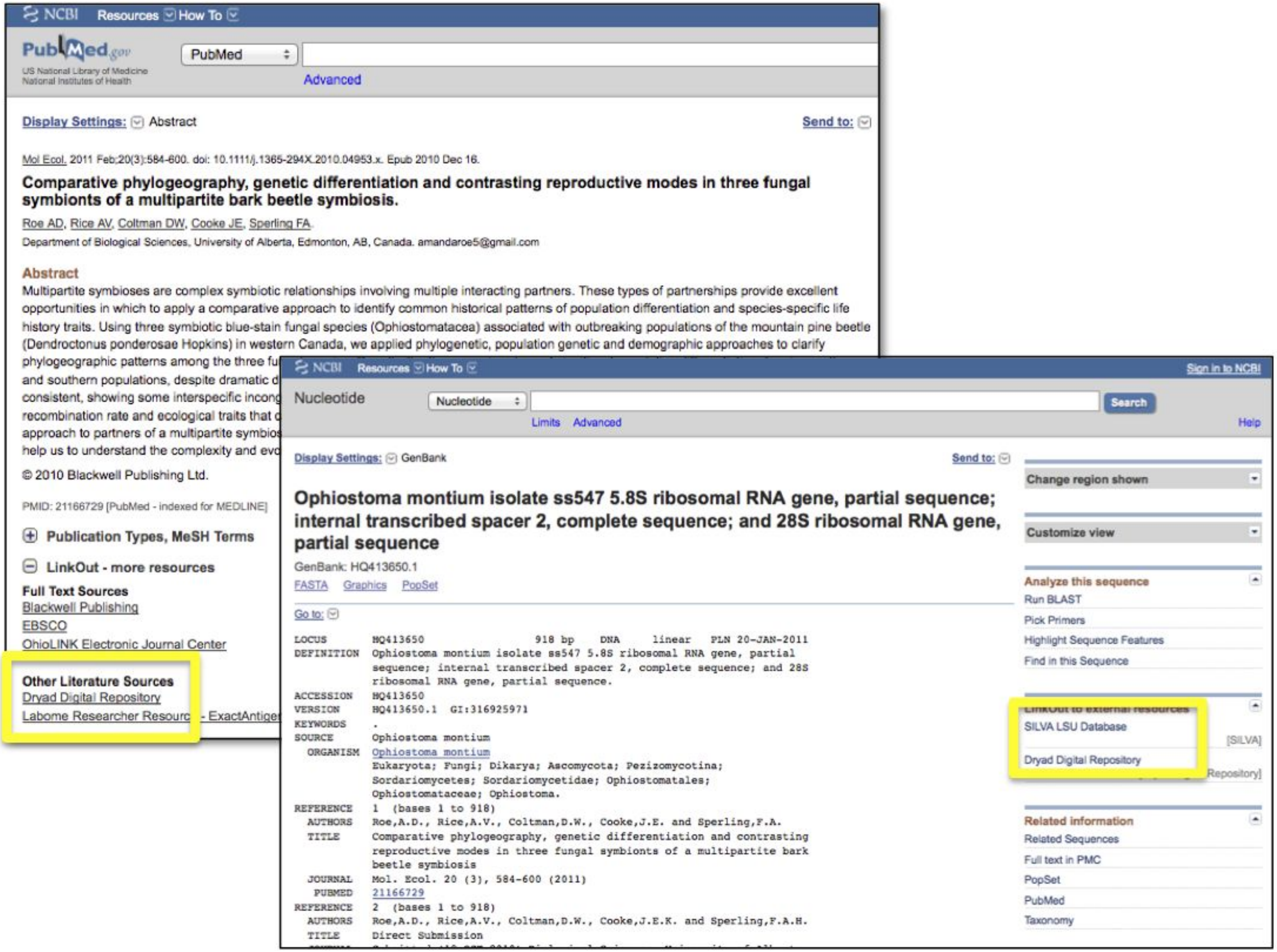


Interoperability



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Mol Ecol. 2011 Feb;20(3):584-600. doi: 10.1111/j.1365-294X.2010.04953.x. Epub 2010 Dec 16.

Comparative phylogeography, genetic differentiation and contrasting reproductive modes in three fungal symbionts of a multipartite bark beetle symbiosis.

Roe AD, Rice AV, Coltman DW, Cooke JE, Sperling FA.

Department of Biological Sciences, University of Alberta, Edmonton, AB, Canada. amandaroe5@gmail.com

Abstract

Multipartite symbioses are complex symbiotic relationships involving multiple interacting partners. These types of partnerships provide excellent opportunities in which to apply a comparative approach to identify common historical patterns of population differentiation and species-specific life history traits. Using three symbiotic blue-stain fungal species (Ophiostomatacea) associated with outbreaking populations of the mountain pine beetle (Dendroctonus ponderosae Hopkins) in western Canada, we applied phylogenetic, population genetic and demographic approaches to clarify phylogeographic patterns among the three fu
and southern populations, despite dramatic d
consistent, showing some interspecific incong
recombination rate and ecological traits that c
approach to partners of a multipartite symbios
help us to understand the complexity and evo

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PMID: 21166729 [PubMed - indexed for MEDLINE]

Publication Types, MeSH Terms

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Ophiostoma montium isolate ss547 5.8S ribosomal RNA gene, partial sequence; internal transcribed spacer 2, complete sequence; and 28S ribosomal RNA gene, partial sequence

GenBank: HQ413650.1

FASTA Graphics PopSet

Go to:

```
LOCUS       HQ413650                 918 bp    DNA     linear   PLN 20-JAN-2011
DEFINITION  Ophiostoma montium isolate ss547 5.8S ribosomal RNA gene, partial
            sequence; internal transcribed spacer 2, complete sequence; and 28S
            ribosomal RNA gene, partial sequence.
ACCESSION   HQ413650
VERSION     HQ413650.1  GI:316925971
KEYWORDS    .
SOURCE      Ophiostoma montium
  ORGANISM  Ophiostoma montium
            Eukaryota; Fungi; Dikarya; Ascomycota; Pezizomycotina;
            Sordariomycetes; Sordariomycetidae; Ophiostomatales;
            Ophiostomataceae; Ophiostoma.
REFERENCE   1  (bases 1 to 918)
  AUTHORS   Roe,A.D., Rice,A.V., Coltman,D.W., Cooke,J.E. and Sperling,F.A.
  TITLE     Comparative phylogeography, genetic differentiation and contrasting
            reproductive modes in three fungal symbionts of a multipartite bark
            beetle symbiosis
  JOURNAL   Mol. Ecol. 20 (3), 584-600 (2011)
   PUBMED   21166729
REFERENCE   2  (bases 1 to 918)
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Ecological Monographs, 82(2), 2012, pp. 221–228

Novel forests maintain ecosystem processes after the decline of native tree species

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Abstract. The positive relationship between species diversity (richness and evenness) and critical ecosystem functions, such as productivity, carbon storage, and nutrient cycling, is often used to predict the consequences of extinction. At regional scales, however, plant species richness is mostly increasing rather than decreasing because successful plant species introductions far outnumber extinctions. If these regional increases in richness lead to local

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Plant Ecology, Evolution and Systematics

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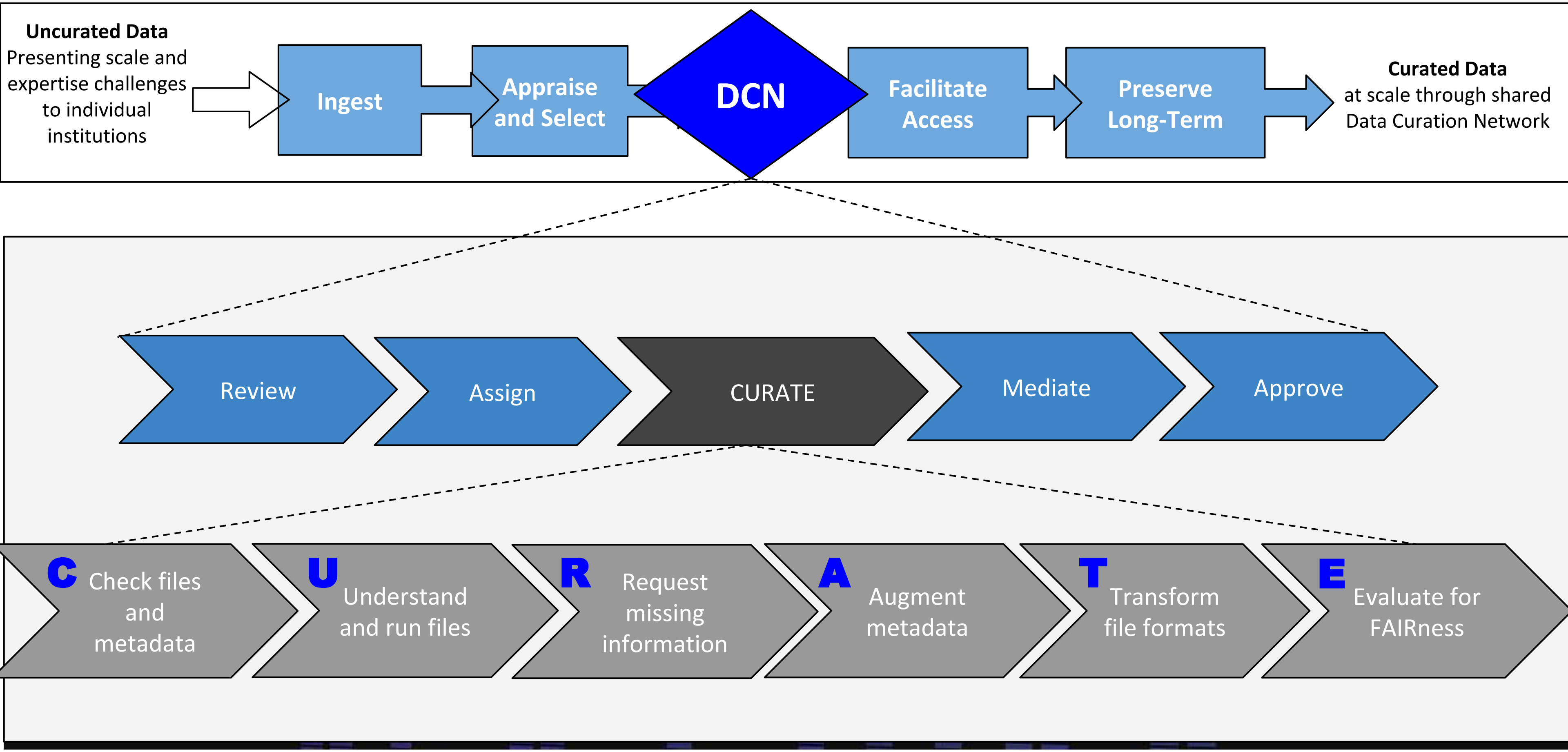

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- Questions
  - How to address policy differences?
  - What do researchers actually need help with?
  - Will researchers care if curation is distributed?
  - Can issues of trust and quality control be solved?
  - What skills and workflows are needed?

Lisa Johnston et al. (2017) Data Curation Network: A Cross-Institutional Staffing Model for Curating Research Data
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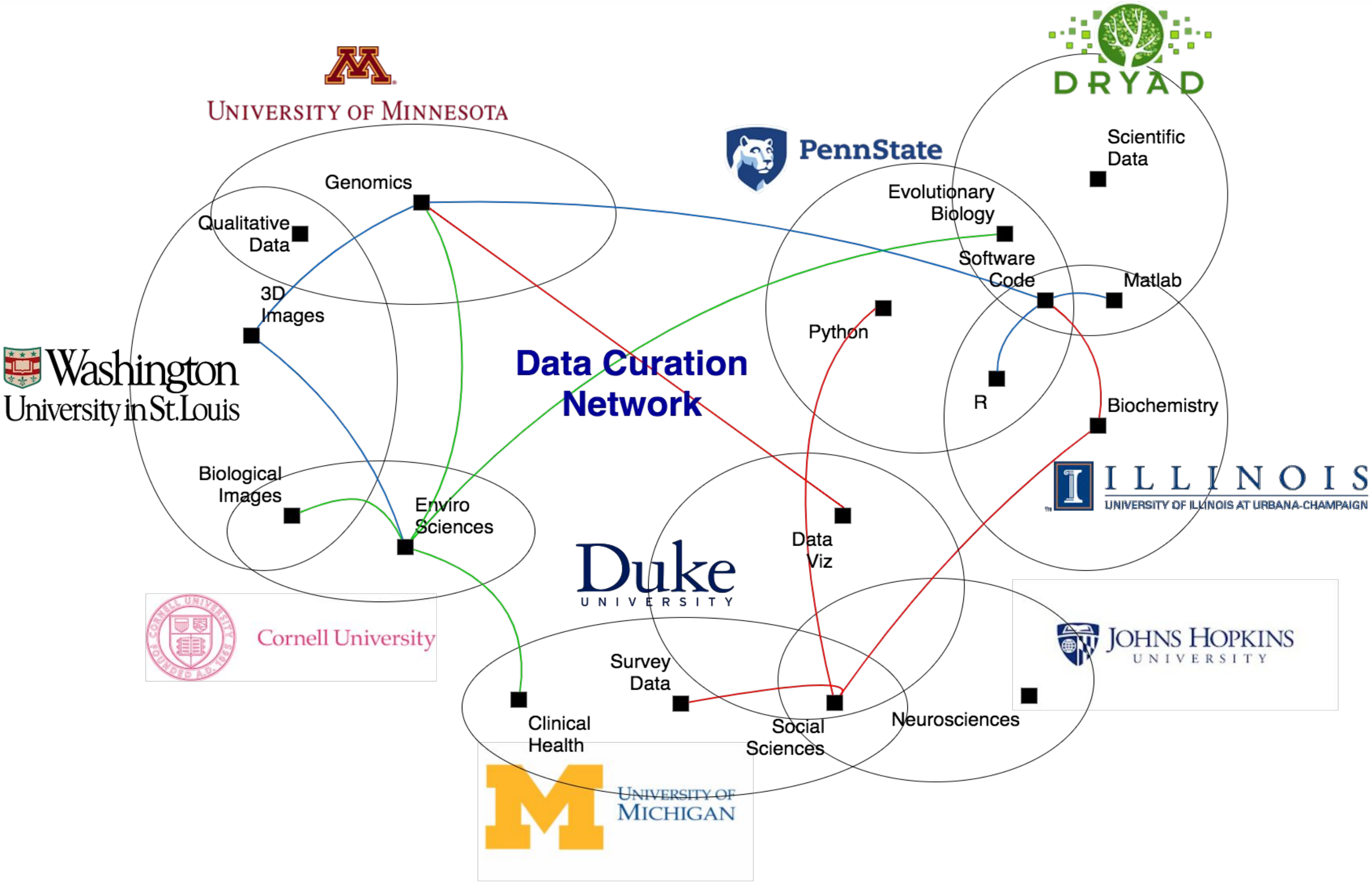

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Analysis Scripts and Data for SAMPL5 Distribution Coefficients Submission Analysis and Reference Calculations,

Bannan, Caitlin C
Burley, Kalistyn H
Chiu, Michael
Gilson, Michael K
Mobley, David L
Publication date: June 18, 2016
Publisher: UC Irvine
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