

Linking GBIF and OpenTree

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Case study: What are the evolutionary relationships of the species found at the UC Merced Vernal Pools



Reserve

Get data from Global Biodiversity Information Facility

Get data Share Tools Inside GBIF

CBIF | Global Biodiversity Information Facility

Free and open access to biodiversity data

OCCURRENCES SPECIES DATASETS PUBLISHERS RESOURCES

WHAT IS GBIF? ABOUT GBIF NETHERLANDS

Occurrence records 1,350,018,387 Datasets 47,040 Publishing Institutions 1,529 Peer-reviewed papers using data 3,957

 News WhereNext wins 2019 GBIF Ebbe Nielsen Challenge 23 October 2019

 Data use Using open data to indicate progress toward targets on conserving genetic divers... 15 October 2019

 Event biodiversity_next 21 - 25 October 2019

 News Award winner uses machine learning, data mining to identify collectors and duplicate herbarium specimens 9 October 2019

Get data Share Tools Inside GBIF

Occurrences

SEARCH OCCURRENCES | 6,800 WITH COORDINATES

Simple Advanced

License

Scientific name

Search

Explore Major groups

Animalia 6,703

Plantae 97

Basis of record

Location

including coordinates

POLYGON((-120.45565 37.35309, -120.36587 37.35309, -120.36587 37.35309, -120.45565 37.35309, -120.45565 37.35309))

Year

Month

Dataset

Country or area

United States of America

Issues and flags

Media type

Publisher

Institution code

Collection code

TABLE GALLERY MAP TAXONOMY METRICS DOWNLOAD

© OpenStreetMap contributors, © OpenMapTiles, GBIF

6,909 records in GBIF

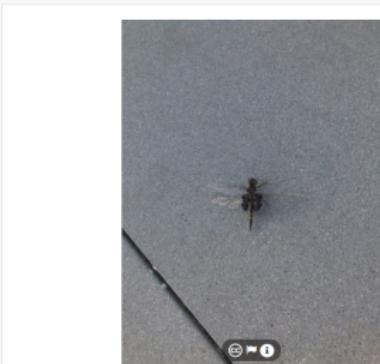
The screenshot shows the GBIF Occurrences search results page. At the top, there are navigation links: Get data, Share, Tools, Inside GBIF, and a search bar with a magnifying glass icon. On the right, there are icons for user profile, login, and other site functions. Below the header, the title "Occurrences" is displayed with a dropdown arrow. A search bar shows the query "SEARCH OCCURRENCES | 6,909 RESULTS". To the left is a sidebar with a "Search all fields" input and various filters: Simple (selected), Advanced, License, Scientific name (with a checked checkbox for Arthropoda), Basis of record, Location, including coordinates (with a checked checkbox for POLYGON[[120.45565 37.35309, 120.36587 37...]), Year, Month, Dataset, Country or area (with a checked checkbox for United States of America), Issues and flags, Media type, Publisher, Institution code, Collection code, Catalog number, and Type status. The main content area displays a table with 6,909 rows of occurrence data, each containing columns for Scientific name, Country or area, Coordinates, Month & year, Basis of record, Dataset, Kingdom, and Phylum.

Scientific name	Country or area	Coordinates	Month & year	Basis of record	Dataset	Kingdom	Phylum
<i>Coris alba</i> Gray, 1823	United States of America	37.4N, 120.4W	2019 January	Human observation	Naturalist Research-grade Observations	Animalia	Chordata
<i>Branta canadensis</i> (Linnaeus, 1758)	United States of America	37.4N, 120.4W	2019 January	Human observation	Naturalist Research-grade Observations	Animalia	Chordata
<i>Branta canadensis</i> (Linnaeus, 1758)	United States of America	37.4N, 120.4W	2019 January	Human observation	Naturalist Research-grade Observations	Animalia	Chordata
<i>Tringa melanoleuca</i> (Gmelin, 1789)	United States of America	37.4N, 120.4W	2019 January	Human observation	Naturalist Research-grade Observations	Animalia	Chordata
<i>Pseudeurostopodus alvarezi</i> (Jaramillo, Mackay & Rich., 2002)	United States of America	37.4N, 120.4W	2019 January	Human observation	Naturalist Research-grade Observations	Animalia	Chordata
<i>Larus delawarensis</i> Ord, 1815	United States of America	37.4N, 120.4W	2019 January	Human observation	Naturalist Research-grade Observations	Animalia	Chordata
<i>Ardea herodias</i> Linnaeus, 1758	United States of America	37.4N, 120.4W	2019 February	Human observation	Naturalist Research-grade Observations	Animalia	Chordata
<i>Calyptrata anna</i> (Lesson, 1829)	United States of America	37.4N, 120.4W	2019 February	Human observation	Naturalist Research-grade Observations	Animalia	Chordata
<i>Sialia sialis</i> (Linnaeus, 1758)	United States of America	37.4N, 120.4W	2019 February	Human observation	Naturalist Research-grade Observations	Animalia	Chordata
<i>Euphagus cyanocephalus</i> (Wagler, 1829)	United States of America	37.4N, 120.4W	2019 February	Human observation	Naturalist Research-grade Observations	Animalia	Chordata
<i>Zonotrichia leucophrys</i> (J. F. Forster, 1772)	United States of America	37.4N, 120.4W	2019 February	Human observation	Naturalist Research-grade Observations	Animalia	Chordata
<i>Sayornis saya</i> (Bonaparte, 1823)	United States of America	37.4N, 120.4W	2019 February	Human observation	Naturalist Research-grade Observations	Animalia	Chordata
<i>Pelecanus erythrorhynchos</i> Gmelin, 1789	United States of America	37.4N, 120.4W	2019 February	Human observation	Naturalist Research-grade Observations	Animalia	Chordata
<i>Ardea herodias</i> Linnaeus, 1758	United States of America	37.4N, 120.4W	2019 February	Human observation	Naturalist Research-grade Observations	Animalia	Chordata
<i>Sayornis nigricans</i> (Swainson, 1827)	United States of America	37.4N, 120.4W	2019 February	Human observation	Naturalist Research-grade Observations	Animalia	Chordata
<i>Ardea alba</i> Linnaeus, 1758	United States of America	37.4N, 120.4W	2019 February	Human observation	Naturalist Research-grade Observations	Animalia	Chordata
<i>Branta canadensis</i> (Linnaeus, 1758)	United States of America	37.4N, 120.4W	2019 March	Human observation	Naturalist Research-grade Observations	Animalia	Chordata

GBIF.org (17 October 2019) GBIF Occurrence Download
<https://doi.org/10.15468/dl.9bigak> #CiteTheDoi!



Black Saddlebags (*Tramea lacerata*) Research Grade



lunasare
19 observations



Observed:
Sep 10, 2019 8:39 AM PDT

Submitted:
Sep 10, 2019 10:27 AM PDT



Activity



lunasare suggested an ID

ID Withdrawn 1mo



joshualincoln suggested an ID

Improving 1mo

Black Saddlebags
Tramea lacerata

Community Taxon

What's this?

Black Saddlebags (*Tramea lacerata*)

Cumulative IDs: 3 of 3



Agree

About

Projects (1)



kathyclaypolebiggs suggested an ID

1mo



Black Saddlebags

Tramea lacerata



kathyclaypolebiggs commented

1mo



So glad for this submission as it upgrades a prior sight only record for the species in Merced County! Could you please also submit this to Odonata Central where we record all such records. <https://www.odonatacentral.org>



lunasare suggested an ID

1mo



Black Saddlebags

Tramea lacerata



kathyclaypolebiggs commented

1mo



September 10, 2019

Merced County

iNatalist

University of California, Merced, Merced

!! Black Saddlebags *Tramea lacerata* -photograph updates prior sight only record CA Chart



Open Tree taxonomy: **Tramea lacerata**

The current taxonomy version is [ott3.1 \(click for more information\)](#). See the OTT documentation for [an explanation of the taxon flags used](#) below, e.g., extinct

Taxon details

species [Tramea lacerata](#) ncbi:126233 (gbif:1428475, irmng:10341497) sibling_higher (OTT id 340907)

[View this taxon in the current synthetic tree](#)

Lineage

[life](#) > [cellular organisms](#) > [Eukaryota](#) > [Opisthokonta](#) > [Holozoa](#) > [Metazoa](#) > [Eumetazoa](#) > [Bilateria](#) > [Protostomia](#) > [Ecdysozoa](#) > [Panarthropoda](#) > [Arthropoda](#) > [Mandibulata](#) > [Pancrustacea](#) > [Hexapoda](#) > [Insecta](#) > [Dicondylia](#) > [Pterygota](#) > [Palaeoptera](#) > [Odonata](#) > [Epiprocta](#) > [Anisoptera](#) > [Cavilabiata](#) > [Libellulidae](#) > [Tramea](#)

Can access taxon information directly from the Open Tree API's

```
~$ curl -X POST https://api.opentreeoflife.org/v3/taxonomy/taxon_info -H 'content-type:application/json' -d '{"source_id":"gbif:1428475"}'  
[  
  "flags": [  
    "sibling_higher"  
  ],  
  "is_suppressed": false,  
  "is_suppressed_from_synth": false,  
  "name": "Tramea lacerata",  
  "ott_id": 340907,  
  "rank": "species",  
  "source": "ott3.1draft2",  
  "synonyms": [],  
  "tax_sources": [  
    "ncbi:126233",  
    "gbif:1428475",  
    "irmng:10341497"  
  ],  
  "unique_name": "Tramea lacerata"
```

API documentation at <https://github.com/OpenTreeOfLife/germinator/wiki/Open-Tree-of-Life-Web-APIs>

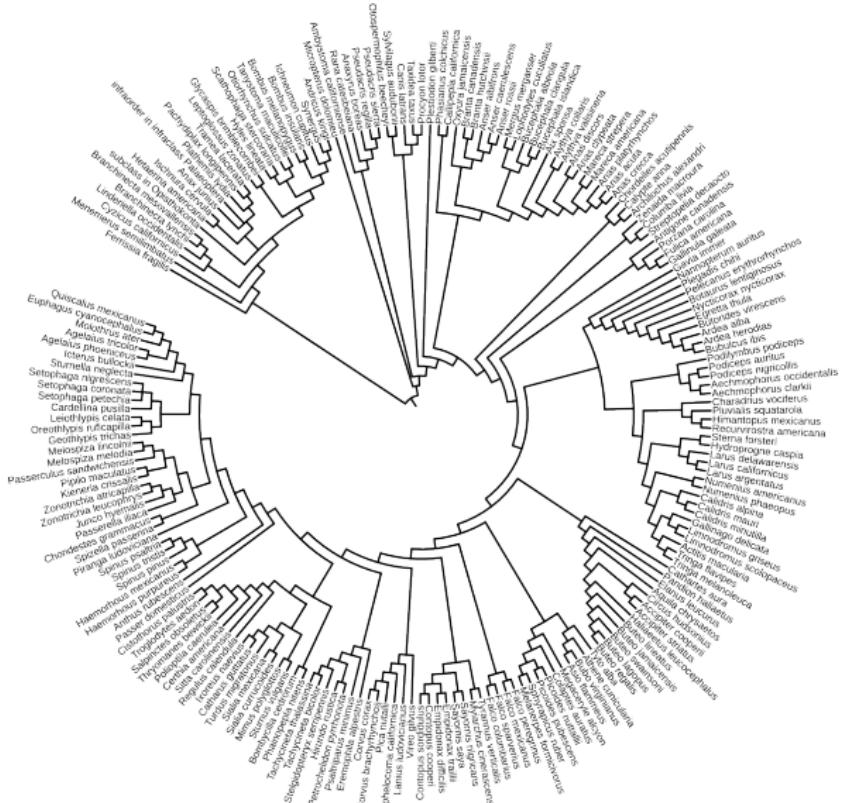
Use the GBIF ids to get a synthetic tree for all species in the reserve



Python code on Github,

https://github.com/McTavishLab/biodiversity_next

Animals of the vernal pools (6,708 records of 205 species)



Tree vis via <https://itol.embl.de>, phylogenies from 34 studies

Automatic download of references for phylogenetic inferences used in induced subtree (34 studies went into the animal tree).

Cho, S., Zwick A., Regier J., Mitter C., Cummings M.P., Yao J., Du Z., Zhao H., Kawahara A.Y., Weller S.J., Davis D.R., Baixeras J., Brown J.W., & Parr C. 2011. Can deliberately incomplete gene sample augmentation improve a phylogeny estimate for the advanced moths and butterflies (Hexapoda: Lepidoptera)?. *Systematic Biology* 60 (6): 782-796.
<http://dx.doi.org/10.1093/sysbio/syr079>

Hedtke, S.M., Patiny S., & Danforth B. 2013. The bee tree of life: a supermatrix approach to apoid phylogeny and biogeography. *BMC Evolutionary Biology* 13: 138.
<http://dx.doi.org/10.1186/1471-2148-13-138>

Meredith, R.W., Janecka J., Gatesy J., Ryder O.A., Fisher C., Teeling E., Goodbla A., Eizirik E., Simao T., Stadler T., Rabosky D., Honeycutt R., Flynn J., Ingram C., Steiner C., Williams T., Robinson T., Herrick A., Westerman M., Ayoub N., Springer M., & Murphy W. 2011. Impacts of the Cretaceous Terrestrial Revolution and KPg Extinction on Mammal Diversification. *Science* 334 (6055): 521-524.
<http://dx.doi.org/10.1126/science.1211028>

Yuchi Zheng, John J. Wiens, 2016, 'Combining phylogenomic and supermatrix approaches, and a time-calibrated phylogeny for squamate reptiles (lizards and snakes) based on 52 genes and 4162 species', *Molecular Phylogenetics and Evolution*, vol. 94, pp. 537-547
<http://dx.doi.org/10.1016/j.ympev.2015.10.009>

Wright, April M., Kathleen M. Lyons, Matthew C. Brandley, David M. Hillis. 2015. Which came first: The lizard or the egg? Robustness in phylogenetic reconstruction of ancestral states. *Journal of Experimental Zoology Part B: Molecular and Developmental Evolution* 324 (6): 504-516
<http://dx.doi.org/10.1002/jez.b.22642>

Potential for biodiversity loss

SPECIES | ACCEPTED

Branchinecta mesovallensis Belk & Fugate, 2000

Published in: Belk, D.; Fugate, M. (2000). Two New Branchinecta (Crustacea: Anostraca) from the Southwestern United States. *The Southwestern Naturalist*. 45(2): 111-117.
source: Catalogue of Life

Mid-valley fairy shrimp In English

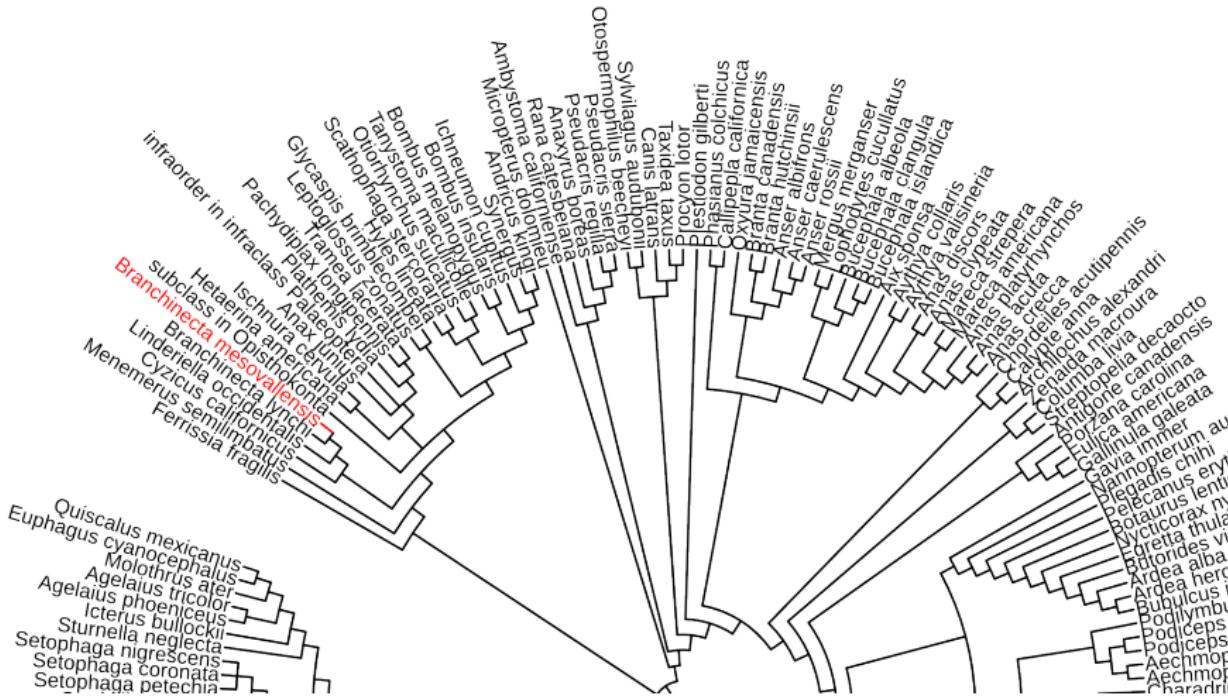
OVERVIEW METRICS REFERENCE TAXON 88

161 OCCURRENCES

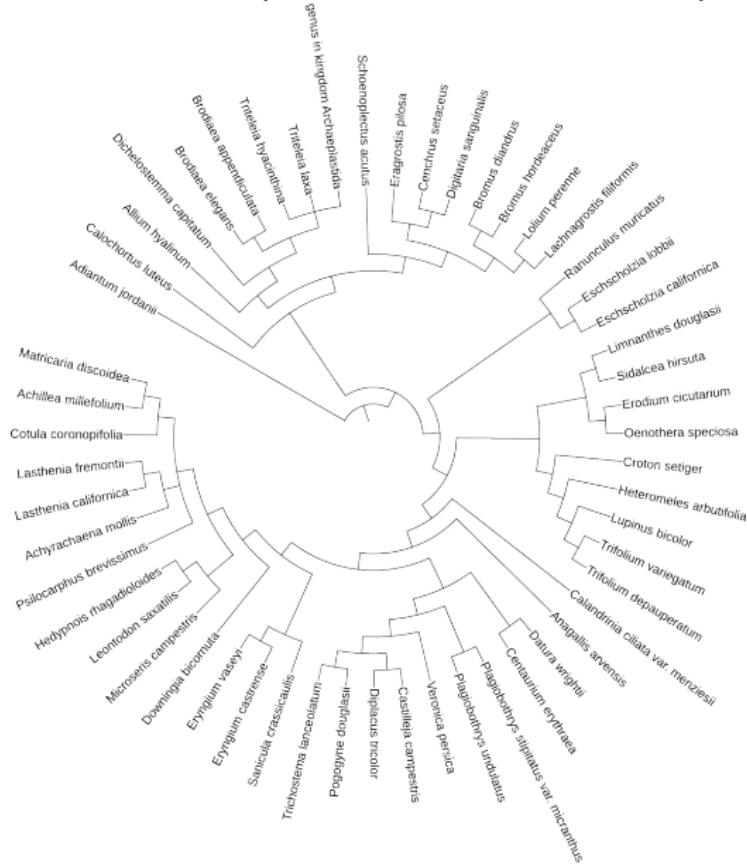
5 GEOFENCED RECORDS



IUCN STATUS



Plants of the vernal pools (100 records of 61 species)



67 studies inform the relationships in the plant tree

Miao Sun, Douglas E. Soltis, Pamela S. Soltis, Xinyu Zhu, J. Gordon Burleigh, Zhiduan Chen, 2015, 'Deep phylogenetic incongruence in the angiosperm clade Rosidae', *Molecular Phylogenetics and Evolution*, vol. 83, pp. 156-166
<http://dx.doi.org/10.1016/j.ympev.2014.11.003>

Magallon, Susana, Sandra Gomez-Acevedo, Luna L. Sanchez-Reyes, Tania Hernandez-Hernandez. 2015. A metacalibrated time-tree documents the early rise of flowering plant phylogenetic diversity. *New Phytologist* 207 (2): 437-453
<http://dx.doi.org/10.1111/nph.13264>

Sun, Yanxia, Michael J. Moore, Shoujun Zhang, Pamela S. Soltis, Douglas E. Soltis, Tingting Zhao, Aiping Meng, Xiaodong Li, Jianqiang Li, Hengchang Wang. 2016. Phylogenomic and structural analyses of 18 complete plastomes across nearly all families of early-diverging eudicots, including an angiosperm-wide analysis of IR gene content evolution. *Molecular Phylogenetics and Evolution* 96: 93-101
<http://dx.doi.org/10.1016/j.ympev.2015.12.006>

Zhang S., Soltis D., Li D., Yang Y., & Yi T. 2011. Multi-gene analysis provides a well-supported phylogeny of Rosales. *Molecular Phylogenetics and Evolution*, 60(1): 21-8.
<http://dx.doi.org/10.1016/j.ympev.2011.04.008>

Wang, Hengchang, Michael J. Moore, Pamela S. Soltis, Charles D. Bell, Samuel F. Brockington, Roolse Alexandre, Charles C. Davis, Maribeth Latvis, Steven R. Manchester, and Douglas E. Soltis. 2009. Rosid radiation and the rapid rise of angiosperm-dominated forests. *Proceedings of the National Academy of Sciences* 106, no. 10 (March 10): 3853 -3858. doi:10.1073/pnas.0813376106.
<http://dx.doi.org/10.1073/pnas.0813376106>

Potential for biodiversity loss

Calochortus luteus Douglas ex Lindl.

source: Catalogue of Life

Yellow mariposa lily In English

OVERVIEW

METRICS

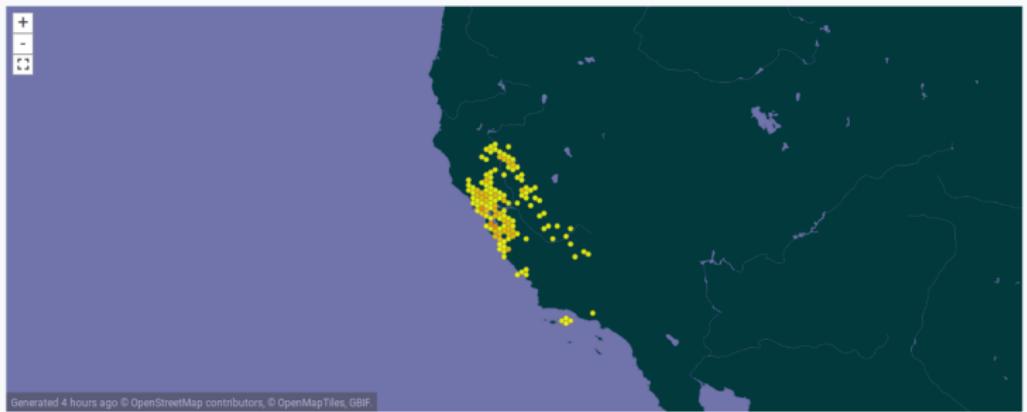
REFERENCE TAXON

1,436 OCCURRENCES

882 OCCURRENCES WITH IMAGES



983 GEOFERENCED RECORDS



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