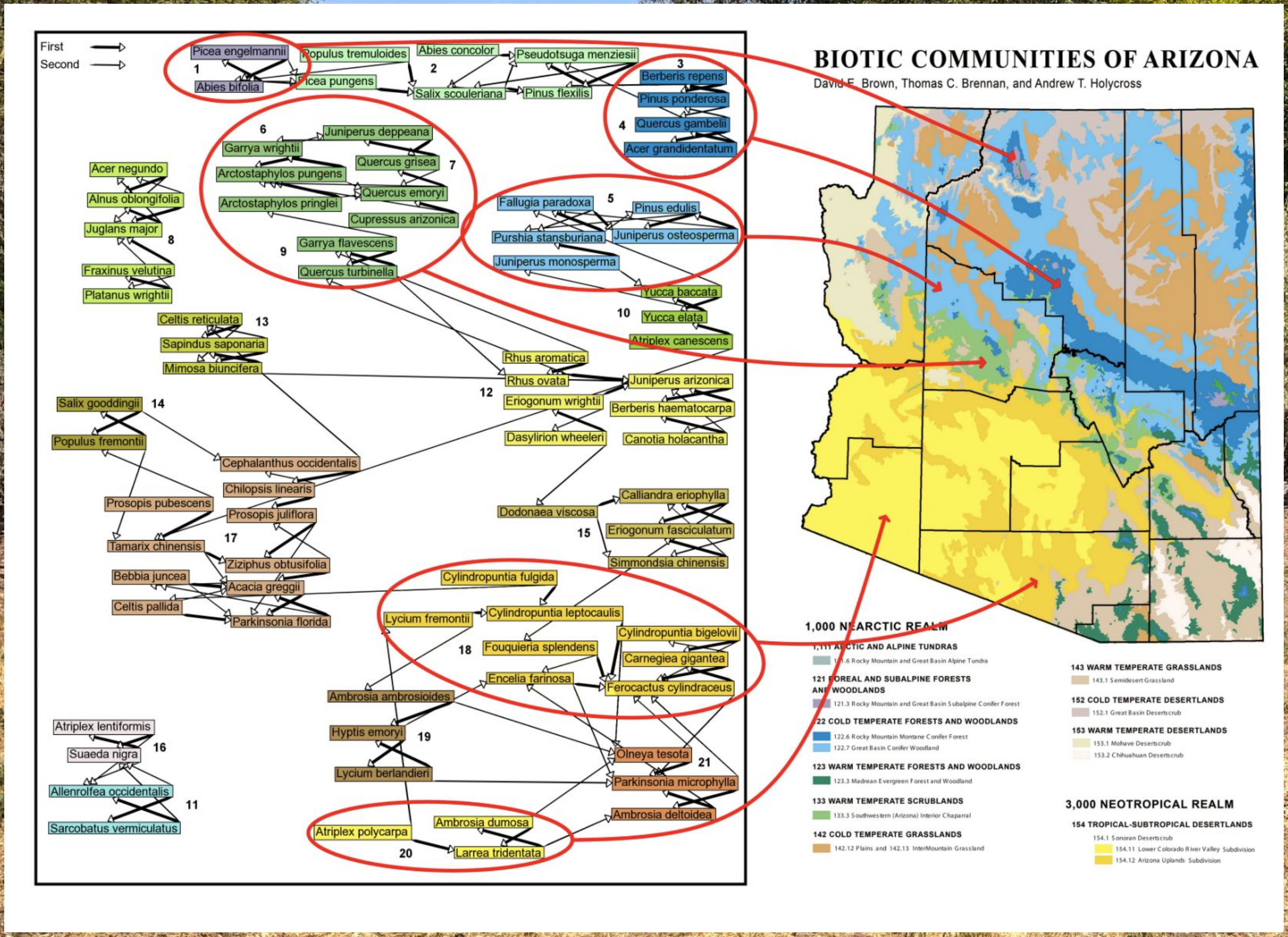
interacts with

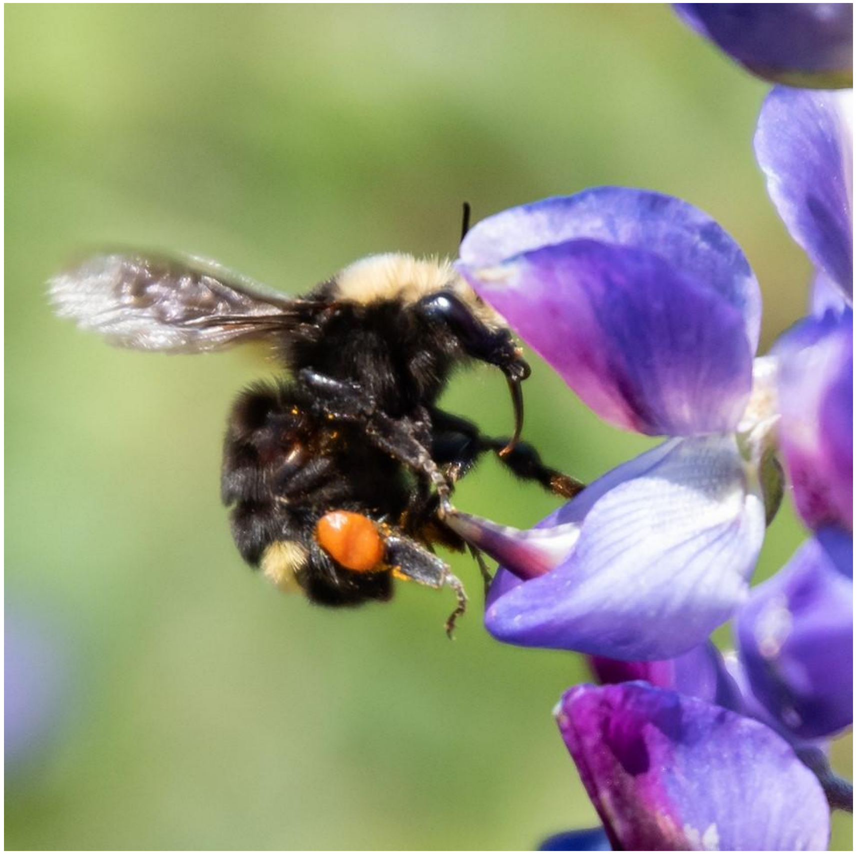
Katja Seltmann & Jorrit Poelen
Cheadle Center for Biodiversity and Ecological Restoration, University of California, Santa Barbara
Digital Data, June 8, 2021
seltmann@ucsb.edu

Image: Carlo Calderon

Phytosociological data



Leslie R. Landrum, Daryl Lafferty. 2015. PROXIMITY and CORRELATION: Two new computer programs for mining phytosociological information held in herbarium databases using central Arizona as a test case. Taxon



A biotic interaction

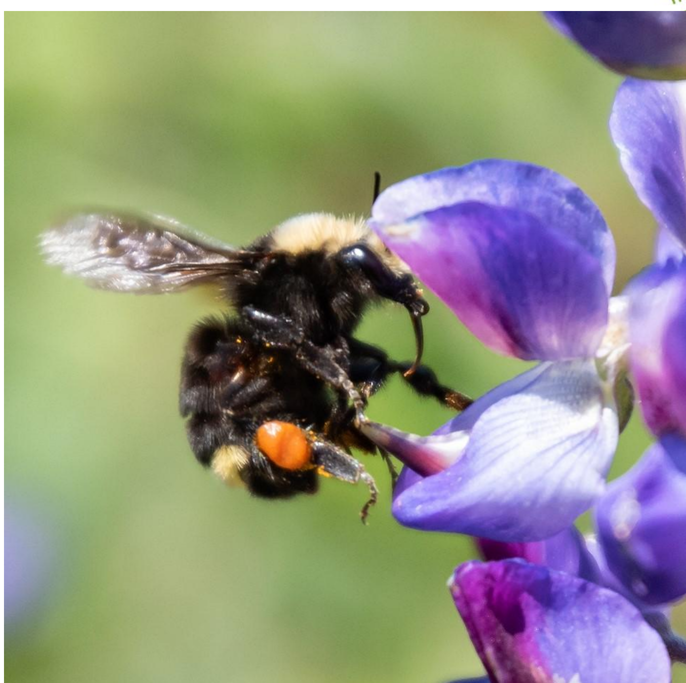
Source → Relationship → *Target*

Bombus vosnesenskii → *Lupinus succulentus*

We know a lot because we have 2 taxon names and a relationship

What we have..

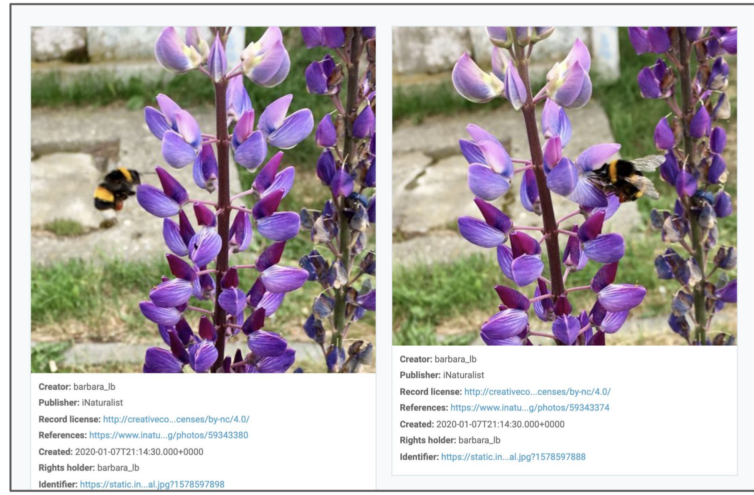
“visits flowers of”
“collected on flowers of”
“carries pollen from”
“pollinates”



What we want is a graph of Bombus vosnesenskii interactions

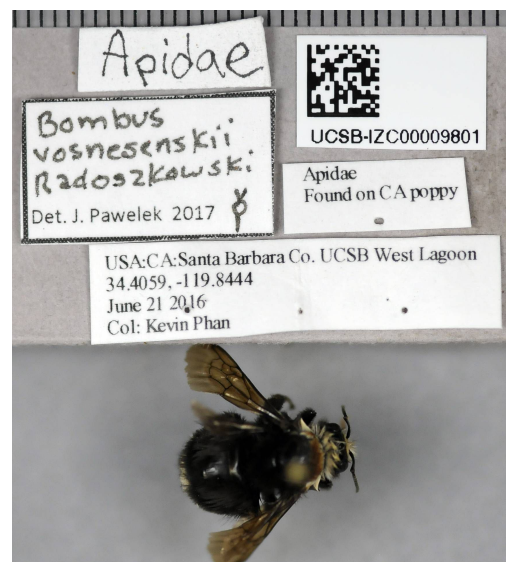
Literature and Reports

Human Observations



https://www.gbif.org/occurrence/2550024372

Natural History Specimens



Unstructured data

Creator: barbara_lb
Publisher: iNaturalist
Record license: http://creativeco...censes/by-nc/4.0/
References: https://www.inatu...g/photos/59343380
Created: 2020-01-07T21:14:30.000+0000
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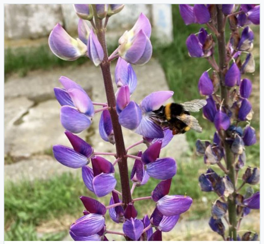

Creator: barbara_lb
Publisher: iNaturalist
Record license: http://creativeco...censes/by-nc/4.0/
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Created: 2020-01-07T21:14:30.000+0000
Rights holder: barbara_lb
Identifier: https://static.in...al.jpg?1578597888

Kansas Entomological Society

Vol. 48 July, 1975 Number 3

THE BIOLOGY OF PERDITA NUDA AND DESCRIPTIONS OF ITS IMMATURE FORMS AND THOSE OF ITS SPHECODES PARASITE (HYMENOPTERA: APOIDEA)

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ABSTRACT

The biology of *Perdita nula* Ckll. is described in detail and compared with biologies of other known *Perdita* species. The parasitic halictine bee, *Sphecodes Sphecodes* sp. [(near *fragariae* Ckll.)], is associated with *Perdita nuda,* and its biology is described. Important findings include: (1) host and parasite larvae can remain in diapause for 35 months; (2) not all *P. nuda* larvae pupate during any particular year; (3) *Sphecodes* larvae mimic the host larvae in feeding and overwintering positions; (4) *Sphecodes* larvae diapause as predefecated forms. Also, movement of the *Perdita* egg during embryogenesis is explained.

The larvae and pupae of *P. nuda* and *Sphecodes* sp. are described and compared with known forms. Species of known *Perdita* larvae are nearly indistinguishable, but those of *Sphecodes* spp. are easily separated. However, species of both taxa are distinguishable on the basis of pupal characteristics.

NESTING HABITAT

Perdita nuda Ckll. was found nesting on a low hill adjacent to Bear River, 3 miles northwest of Preston, Franklin County, Idaho, in August 1970. This particular hill was formed by sedimentation of the river and was composed mostly of river bottom gravel that was interrupted periodically by narrow veins of coarse-to-fine-grained sand. One pocket of sand (9 m wide, 22 m long, and at least 2.5 m deep) situated on the crest of the hill was completely devoid of plants, but it supported two disjunct nesting populations of *P. nuda*. Site A (a gregarious nesting site 2 m^2 restricted to the southern edge of the sandy niche) was established on a 30° inclined surface that had an easterly exposure. Nests were closely congregated (2 nests/10 cm^2) on a surface composed of numerous gravel particles mixed with sand. Site B (a nesting site restricted to the northern edge of the area) was established on a horizontal surface composed of sand only. It was approximately one-third the size of site A, and nests were less congregated (0.7 nests/10 cm^2).

Received for publication October 29, 1974.

Reusable/structured interaction data

sourceTaxonName	sourceFamilyName	interactionTypeName	targetBodyPartName	targetTaxonName	targetFamilyNa	country	stateProvir	county	verbatimLocality	referenceCitation
Lasioglossum titusi	Halictidae	collected on flowers	flower	Malacothrix implicata	Asteraceae	United States	California	Santa Barbara	San Miguel Island	Miller, Scott & Davis, W.. (1985). Insects Associated With the Flo
Dialictus megastictun	Halictidae	collected on flowers	flower	Malacothrix incana	Asteraceae	United States	California	Santa Barbara	San Miguel Island	Miller, Scott & Davis, W.. (1985). Insects Associated With the Flo
Dialictus megastictun	Halictidae	collected on flowers	flower	Malacothrix implicata	Asteraceae	United States	California	Santa Barbara	San Miguel Island	Miller, Scott & Davis, W.. (1985). Insects Associated With the Flo
Dialictus megastictun	Halictidae	collected on flowers	flower	Malacothrix implicata	Asteraceae	United States	California	Santa Barbara	San Miguel Island	Miller, Scott & Davis, W.. (1985). Insects Associated With the Flo
Dialictus pilosicaudus	Halictidae	collected on flowers	flower	Malacothrix implicata	Asteraceae	United States	California	Santa Barbara	San Miguel Island	Miller, Scott & Davis, W.. (1985). Insects Associated With the Flo
Dialictus cabrilli	Halictidae	collected on flowers	flower	Malacothrix implicata	Asteraceae	United States	California	Santa Barbara	San Miguel Island	Miller, Scott & Davis, W.. (1985). Insects Associated With the Flo
Dialictus miguelensis	Halictidae	collected on flowers	flower	Malacothrix incana	Asteraceae	United States	California	Santa Barbara	San Miguel Island	Miller, Scott & Davis, W.. (1985). Insects Associated With the Flo
Dialictus perichlarus	Halictidae	collected on flowers	flower	Malacothrix incana	Asteraceae	United States	California	Santa Barbara	San Miguel Island	Miller, Scott & Davis, W.. (1985). Insects Associated With the Flo
Dialictus perichlarus	Halictidae	collected on flowers	flower	Malacothrix implicata	Asteraceae	United States	California	Santa Barbara	San Miguel Island	Miller, Scott & Davis, W.. (1985). Insects Associated With the Flo
Anthidium palliventre	Megachilidae	collected on flowers	flower	Malacothrix incana x implicata	Asteraceae	United States	California	Santa Barbara	San Miguel Island	Miller, Scott & Davis, W.. (1985). Insects Associated With the Flo
Hypochrotaenia form	Apidae	collected on flowers	flower	Malacothrix incana	Asteraceae	United States	California	Ventura	San Nicolas Island;	Miller, Scott & Davis, W.. (1985). Insects Associated With the Flo
Agapostemon texanu	Halictidae	collected on flowers	flower	Malacothrix incana	Asteraceae	United States	California	Ventura	San Nicolas Island;	Miller, Scott & Davis, W.. (1985). Insects Associated With the Flo
Agapostemon texanu	Halictidae	collected on flowers	flower	Malacothrix incana x polycepl	Asteraceae	United States	California	Ventura	San Nicolas Island;	Miller, Scott & Davis, W.. (1985). Insects Associated With the Flo
Dialictus megastictun	Halictidae	collected on flowers	flower	Malacothrix incana	Asteraceae	United States	California	Ventura	San Nicolas Island;	Miller, Scott & Davis, W.. (1985). Insects Associated With the Flo
Dialictus megastictun	Halictidae	collected on flowers	flower	Malacothrix incana x polycepl	Asteraceae	United States	California	Ventura	San Nicolas Island;	Miller, Scott & Davis, W.. (1985). Insects Associated With the Flo
Evylaeus kincaidii	Halictidae	collected on flowers	flower	Malacothrix incana	Asteraceae	United States	California	Ventura	San Nicolas Island;	Miller, Scott & Davis, W.. (1985). Insects Associated With the Flo
Evylaeus kincaidii	Halictidae	collected on flowers	flower	Malacothrix incana x polycepl	Asteraceae	United States	California	Ventura	San Nicolas Island;	Miller, Scott & Davis, W.. (1985). Insects Associated With the Flo
Agapostemon sericeu	Halictidae	parasitized by	nest	Nomada articulata	Apidae	United States	New York	Tompkins	Ithaca; Cornell Unive	Eickwort, G. C. (1981). Aspects of the Nesting Biology of Five N
Agapostemon sericeu	Halictidae	nest containing	nest	Sphecodes persimilis	Halictidae	United States	New York	Westchester	Lewisboro	Eickwort, G. C. (1981). Aspects of the Nesting Biology of Five N
Agapostemon sericeu	Halictidae	burrow usurpation by	nest	Andrena imitatrix	Andrenidae	United States	New York	Tompkins	Ithaca; Cornell Unive	Eickwort, G. C. (1981). Aspects of the Nesting Biology of Five N
Sancassania	Acaridae	feeding on mold in nest	nest	Agapostemon sericeus	Halictidae	United States	New York	Tompkins	Ithaca; Cornell Unive	Eickwort, G. C. (1981). Aspects of the Nesting Biology of Five N
Agapostemon angelic	Halictidae	burrow usurpation by	nest	Agapostemon cockerelli	Halictidae	United States	Arizona	Cochise	19 km southwest of	Eickwort, G. C. (1981). Aspects of the Nesting Biology of Five N
Agapostemon angelic	Halictidae	burrow usurpation by	nest	Agapostemon cockerelli	Halictidae	United States	Arizona	Cochise	19 km southwest of	Eickwort, G. C. (1981). Aspects of the Nesting Biology of Five N
Agapostemon texanu	Halictidae	parasitized by	nest	Nomada formula	Apidae	United States	California	Contra Costa	San Pablo Reservoi	Eickwort, G. C. (1981). Aspects of the Nesting Biology of Five N
Agapostemon texanu	Halictidae	nesting within nest aggre	nest	Halictus farinosus	Halictidae	United States	California	Yolo	Davis; University of	Eickwort, G. C. (1981). Aspects of the Nesting Biology of Five N
Agapostemon angelic	Halictidae	nesting on outskirts of a	nest	Diadasia australis	Apidae	United States	Colorado			Eickwort, G. C. (1981). Aspects of the Nesting Biology of Five N
Parapygmephorus (S	Pygmephoridae	parasitizing	thorax and metasoma	Agapostemon angelicus	Halictidae	United States	Arizona	Cocconino	San Francisco Mour	Eickwort, G. C. (1981). Aspects of the Nesting Biology of Five N
Bombus	Apidae	visits flowers of	flower	Aptenia cordifolia	Aizoaceae	United States of	California	Alameda	Residential neighbor	Frankie, G. W., Thorp, R. W., Schindler, M., Hernandez, J., Ertte
Apis mellifera	Apidae	visits flowers of	flower	Aptenia cordifolia	Aizoaceae	United States of	California	Alameda	Residential neighbor	Frankie, G. W., Thorp, R. W., Schindler, M., Hernandez, J., Ertte
Coelioxys	Megachilidae	visits flowers of	flower	Aptenia cordifolia	Aizoaceae	United States of	California	Alameda	Residential neighbor	Frankie, G. W., Thorp, R. W., Schindler, M., Hernandez, J., Ertte

Understandable by people and computers

GloBI

Jorrit H. Poelen, James D. Simons, Chris J. Mungall (2014).vGlobal biotic interactions: An open infrastructure to share and analyze species-interaction datasets.Ecological Informatics.

GloBI Interaction Record

Vosnesensky Bumble Bee
(Bombus vosnesenskii)

ITIS

visits

Hollowleaf Annual Lupine
(Lupinus succulentus)

ITIS

Supported by:

Andrea Kreuzhage. 2020. Bombus vosnesenskii nectar / pollen delivering plant Lupinus succulentus. iNaturalist.org. Accessed at <https://www.inaturalist.org/observations/40296280> on 06 Jun 2021. Provider: http://iNaturalist.org is a place where you can record what you see in nature, meet other nature lovers, and learn about the natural world. Accessed via <https://github.com/globalbioticinteractions/inaturalist/archive/1706a6dc719a6033d6cea1bebf438fee9871fd43.zip> at 2021-06-04T23:17:43.507Z. review ✓ discuss...

Chris. 2016. Bombus vosnesenskii eating Lupinus succulentus. iNaturalist.org. Accessed at <https://www.inaturalist.org/observations/5516245> on 06 Jun 2021. Provider: http://iNaturalist.org is a place where you can record what you see in nature, meet other nature lovers, and learn about the natural world. Accessed via <https://github.com/globalbioticinteractions/inaturalist/archive/1706a6dc719a6033d6cea1bebf438fee9871fd43.zip> at 2021-06-04T23:17:43.507Z. review ✓ discuss...

Refuted by:

None.

GloBI

Vosnesensky Bumble Bee
(Bombus vosnesenskii)

visits

Hollowleaf Annual Lupine
(Lupinus succulentus)

Free text mapped to Relations Ontology term

Citation 1: "visits flowers of"

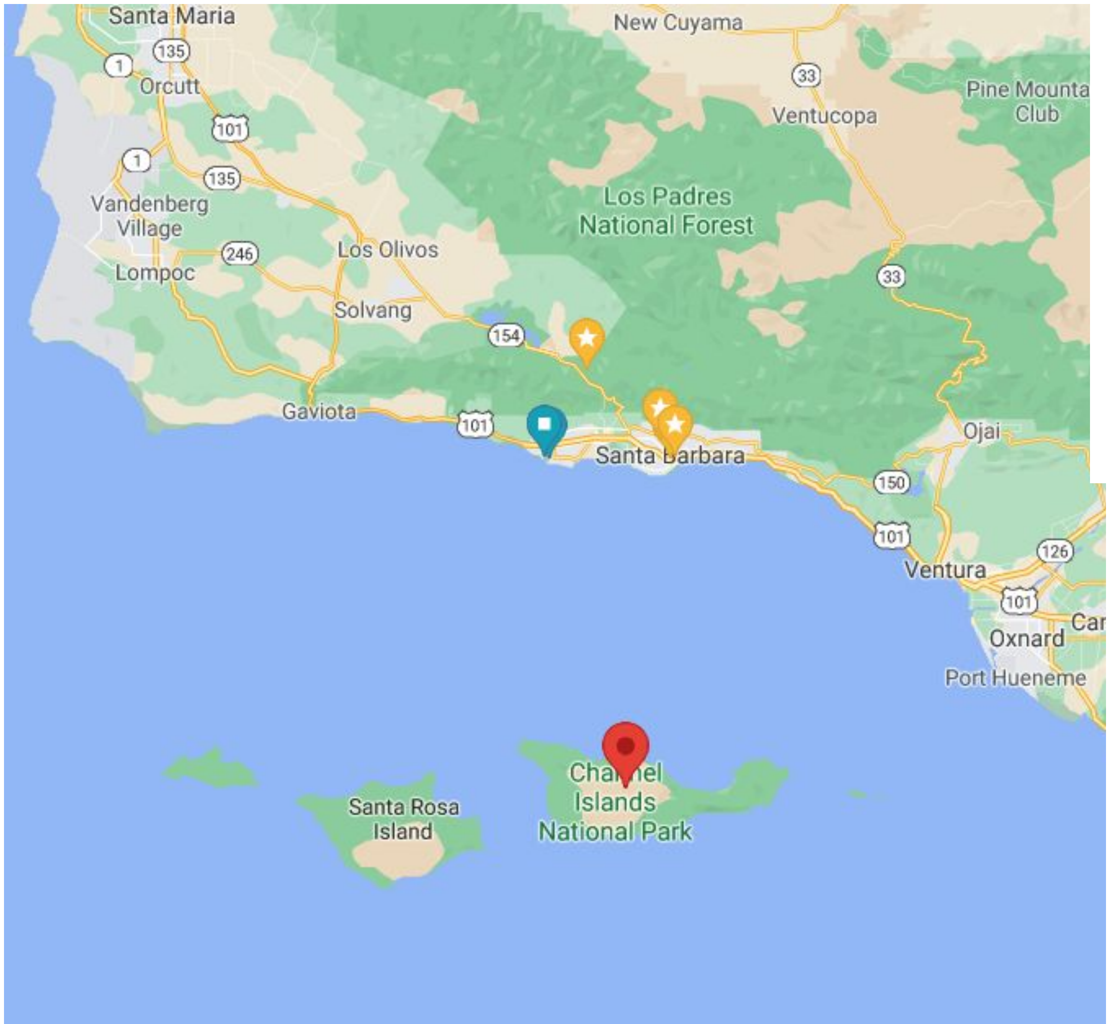
Citation 2: "collected on flowers of"

Term IRI: http://purl.obolibrary.org/obo/RO_0002618

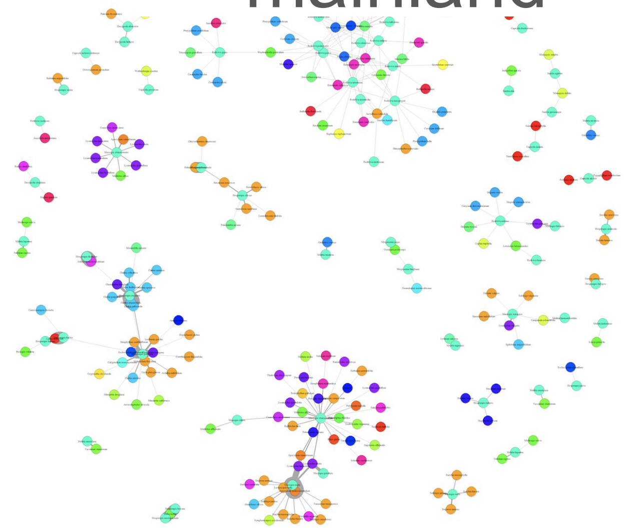
Property Hierarchy

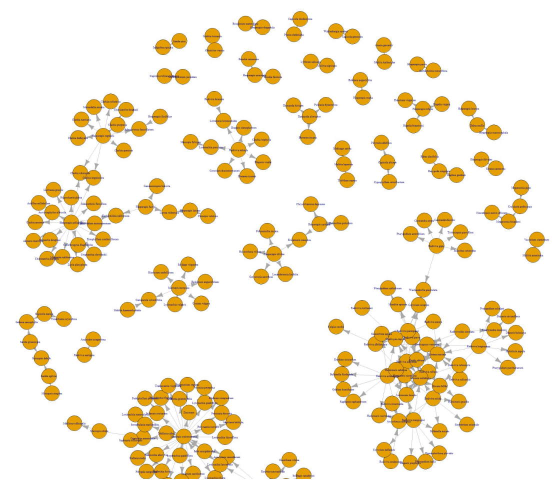
topObjectProperty
- + ecologically related to
  - + biotically interacts with
    - + participates in a biotic-biotic interaction with
      - + trophically interacts with
      - + symbiotically interacts with
      - - is vector for
      - - has vector
      - - allelopath of
      - + visited by
      - - kills
      - - is killed by
      - - visits
        - - visits flowers of
        - - lays eggs in
        - - lays eggs on

Island and mainland bee-plant networks



mainland

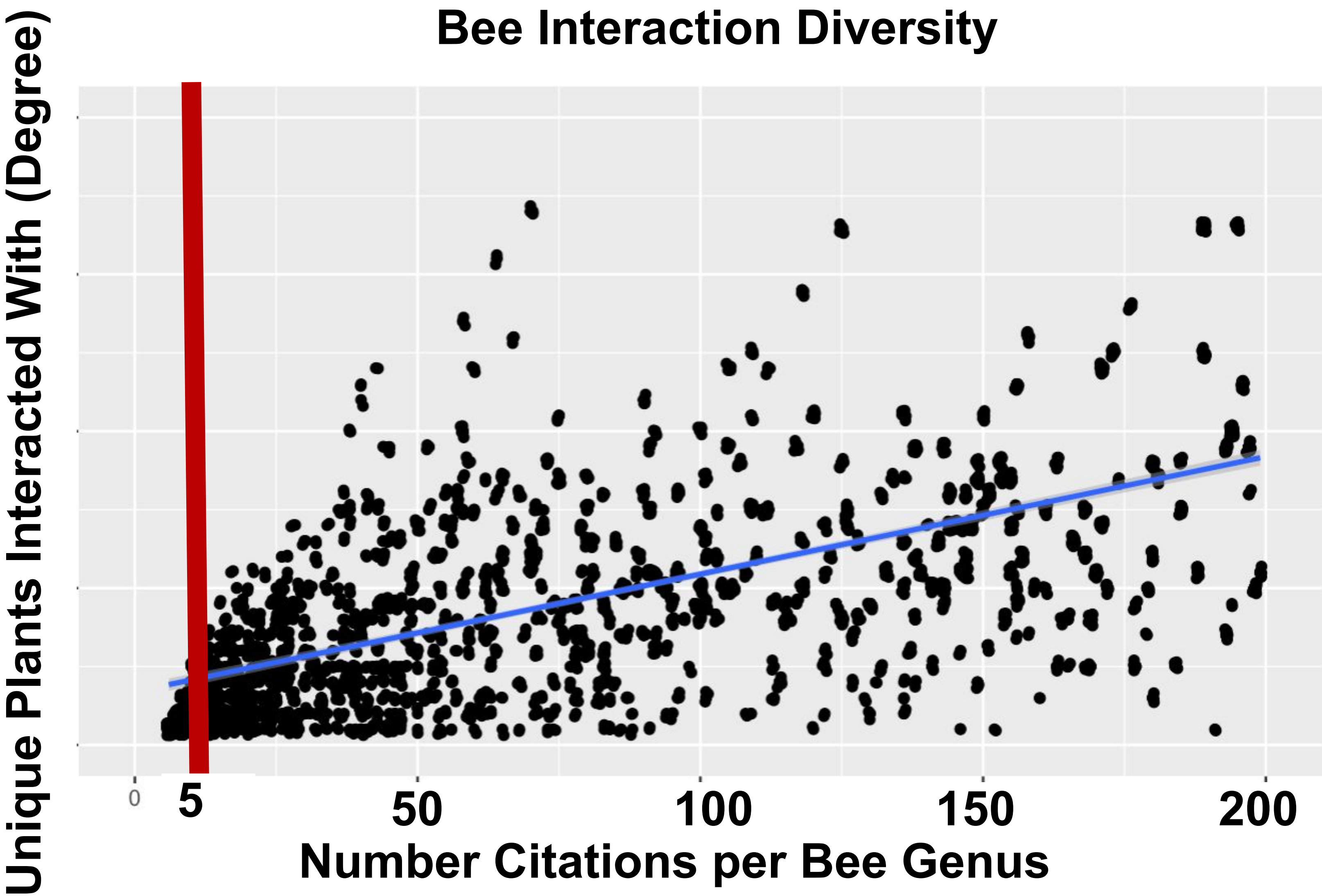




island

Seltmann, K.C., Dewey, D., and McLaren, L. (2021) Anthophila of Santa Cruz Island

Are the networks complete and can we be confident in the results?



Nicholas R. Bachelder, Angel Chen, Mitchell K. Rapaport, Samantha J. Solomon, Zoe Fang, Michelle J. Lee, Joshua Bang and Katja C. Seltmann, Ecological Society of America, Abstract #93972

Checklists & Expert datasets

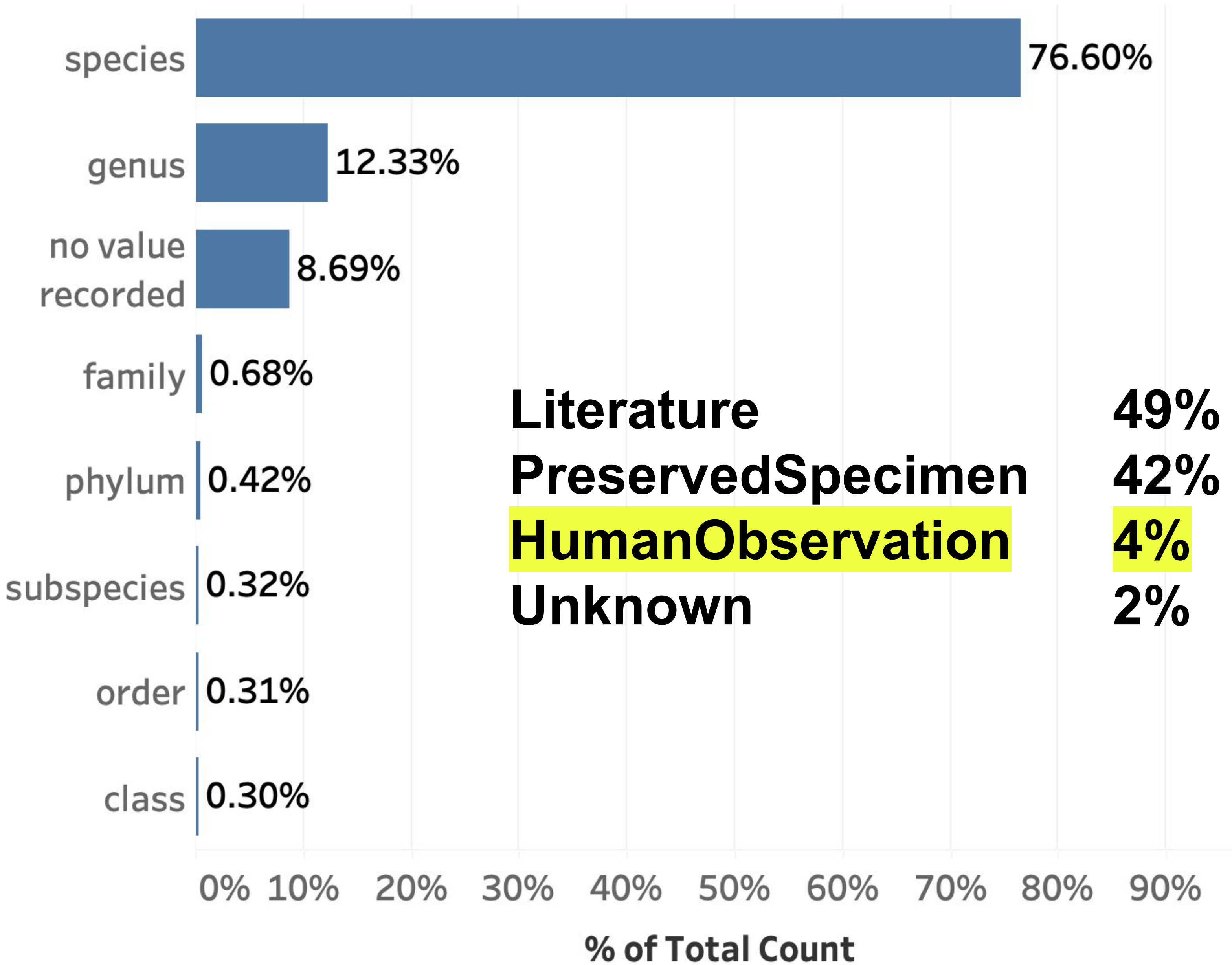
Large numbers of occurrence records

Large numbers of interaction records

Repeated Testing/Resampling

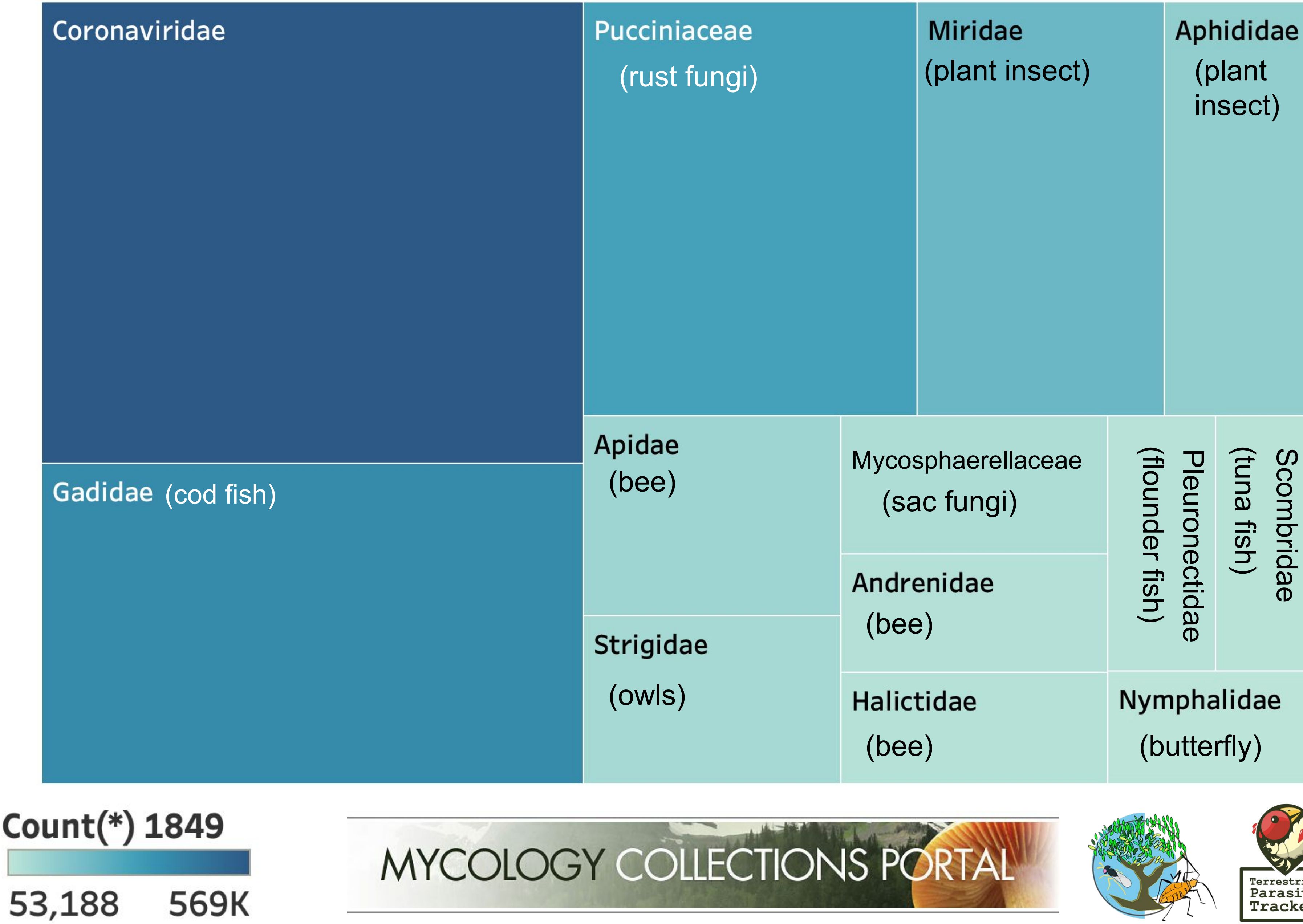
Based on investigations by Michelle J. Lee (UCSB), Graziella Vittoria DiRenzo (USGS), Chengyi Diao (UCSB), Katja Seltmann

GloBI Data



Literature	**49%**
PreservedSpecimen	**42%**
HumanObservation	**4%**
Unknown	**2%**

GloBI Data



MYCOLOGY COLLECTIONS PORTAL

Terrestrial Parasite Tracker

But what about owls??

Image: Carlos Delgado

PUBLIC DOMAIN

UC SANTA BARBARA

Please join us for

Connecting the world of biodiversity data

TDWG 2021

Uniting people, processes, and tools

SYM16: Eat or be eaten: Don't miss out on interaction data

Organizers: José Augusto Salim, University of São Paulo, São Paulo, Brazil; Maarten Trekels, Meise Botanic Garden, Meise, Flanders, Belgium

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Integrated Digitized Biocollections

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CAP TCN
CA PHENOLOGY
CAPTURING CALIFORNIA'S FLOWERS

Terrestrial Parasite Tracker