Extending Anthophila research through image and trait digitization (Big-Bee)

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ADBC Summit, September 21, 2021
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PUBLIC DOMAIN

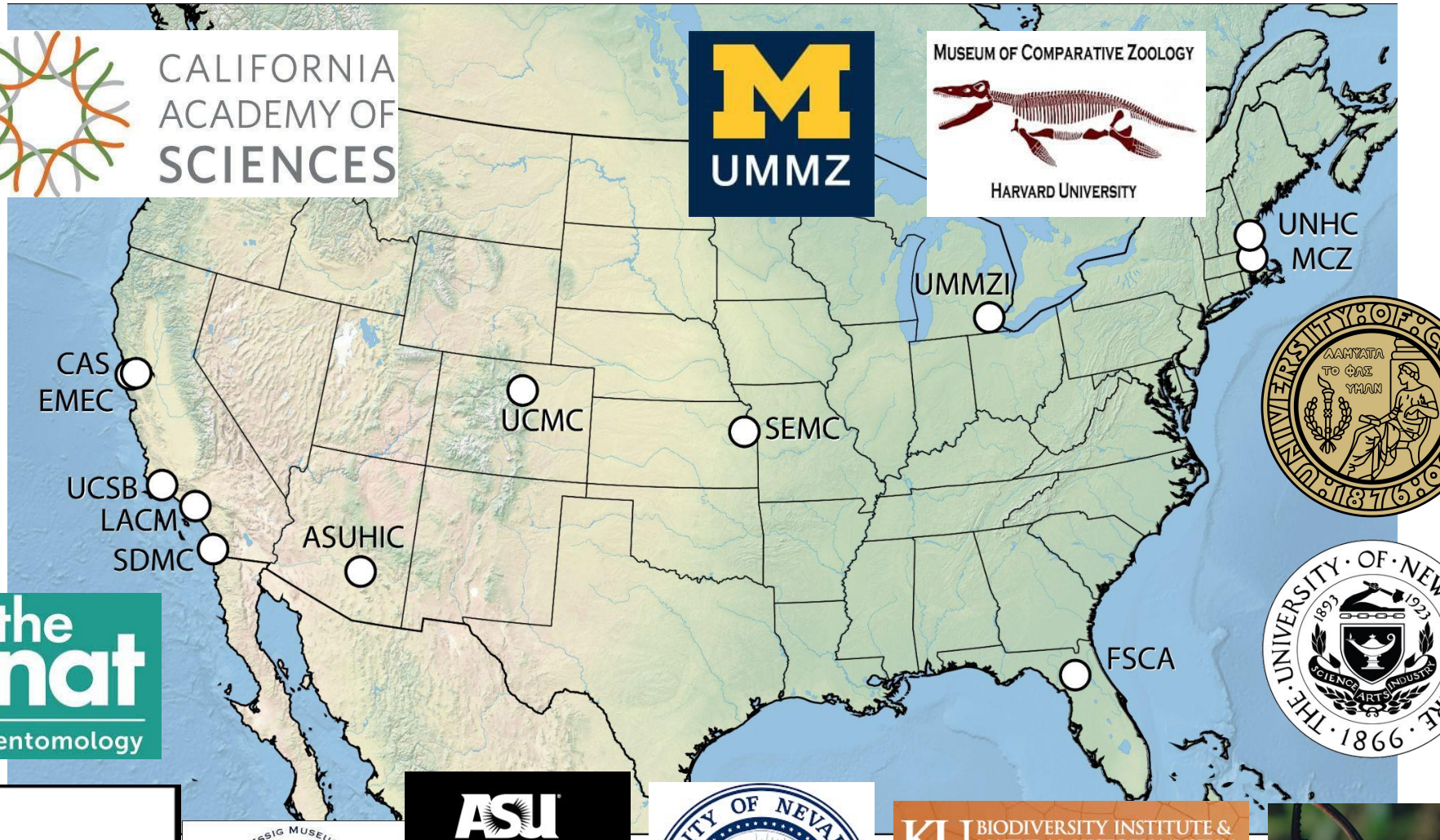
NSF iDigBio Integrated Digitized Biocollections

CCBER UC SANTA BARBARA

What is Big-Bee?

Project Start Date: September 15, 2021
Project Period: 3 years

UC SANTA BARBARA



CALIFORNIA ACADEMY OF SCIENCES

UMMZ

MUSEUM OF COMPARATIVE ZOOLOGY
HARVARD UNIVERSITY

UNIVERSITY OF COLORADO 1876

the nat entomology

THE UNIVERSITY OF NEW HAMPSHIRE 1866

NATURAL HISTORY MUSEUM
LOS ANGELES COUNTY

ESSIG MUSEUM OF ENTOMOLOGY

ASU Biodiversity Knowledge Integration Center
Arizona State University

UNIVERSITY OF NEVADA RENO 1874

KU BIODIVERSITY INSTITUTE & NATURAL HISTORY MUSEUM
The University of Kansas

FLORIDA STATE COLLECTION OF ARTHROPODS

Focal Taxa

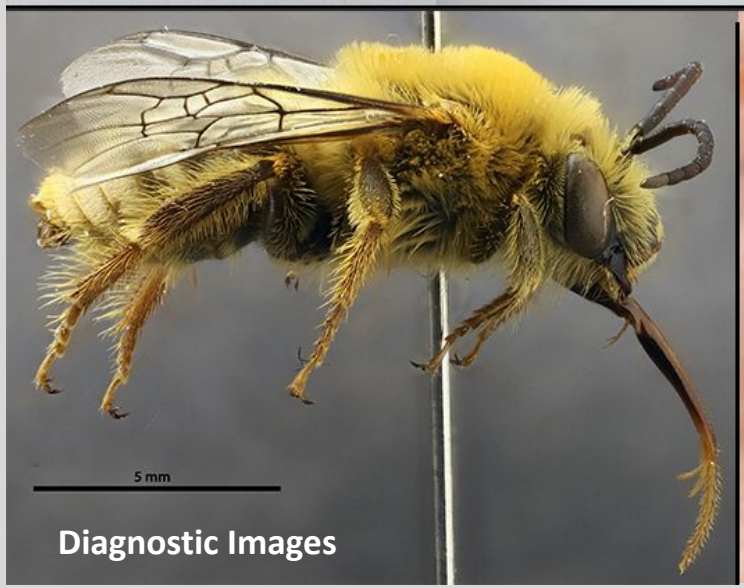
Family		Genus	Species in ITIS
Apidae		Bombus, Peponapis, Xenoglossa, Xylocopa	678
Megachilidae	Osmiini	Osmia, Afroheriades, Ashmeadiella, Atoposmia, Chelostoma, Haetosmia, Heriades, Hofferia, Hoplitis, Hoplosmia, Noteriades, Ochreriades, Othinosmia, Protosmia, Pseudoheriades, Stenoheriades, Stenosmia, Wainia, Xeroheriades	1087
	Megachilini	Megachile	1522
Melittidae		Dasypoda, Samba, Capicola, Eremaphanta, Hesperapis, Ceratomonia, Meganomia, Pseudophilanthus, Uromonia, Afrodasypoda, Macropis, Promelitta, Melitta, Rediviva, Redivivoides	206
Andrenidae		Andrena	1556
Colletidae		Colletes	460
		Total species	**5509**

Digitization Goals

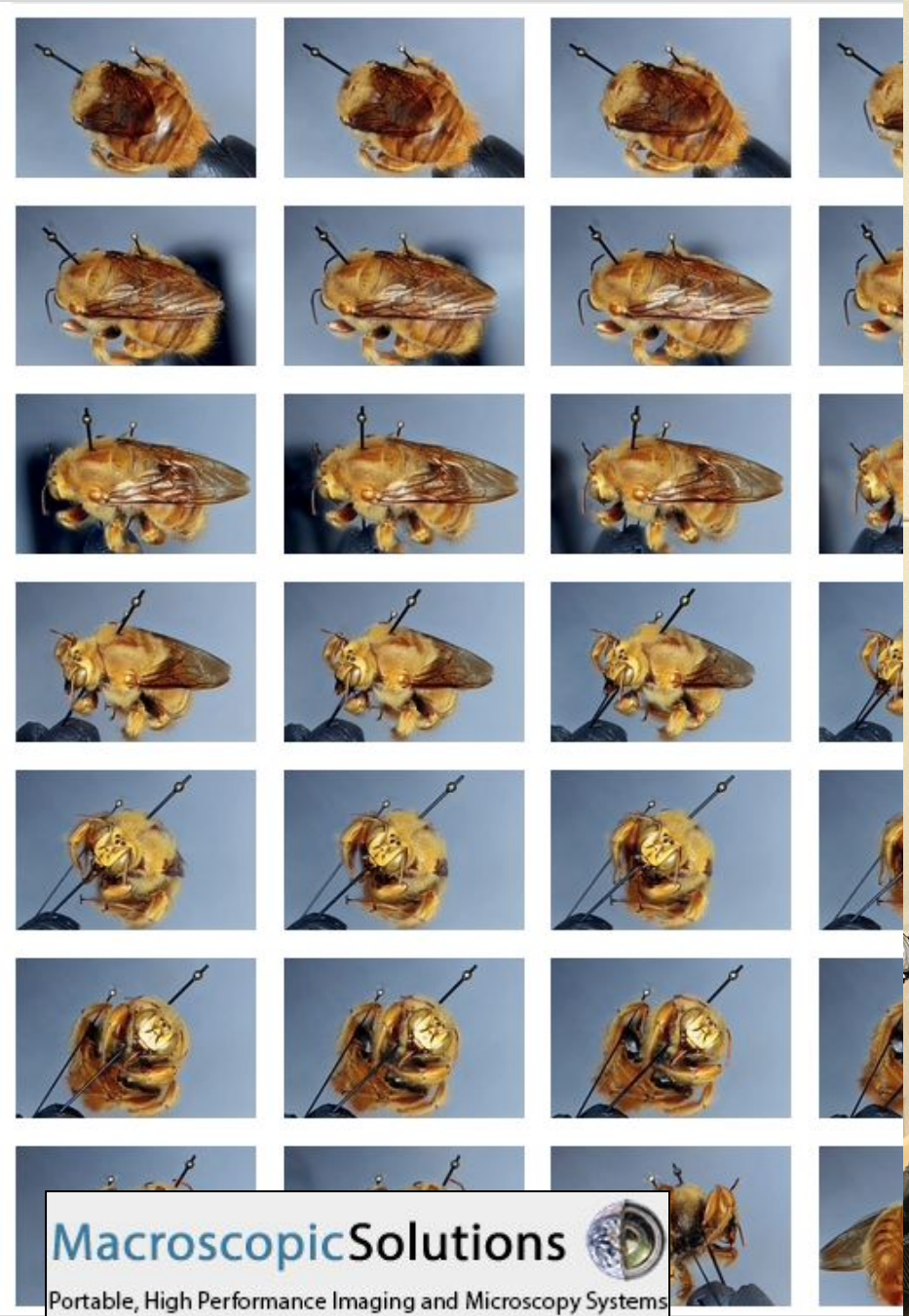
Digitizing institution	Digitized specimens	Focus-stacked images	3D image suites	Additional Images
Arizona State University (ASUHIC)	10,000	0	0	
California Academy of Sciences (CAS)	142,325	5,474	500	
Florida State Collection of Arthropods (FSCA)	90,495	5,294	500	
Harvard University (MCZ)	52,324	6,492	500	
Karlsruhe Institute of Technology (KIT)	2000	0	0	2,000 (microCT)
Natural History Museum of Los Angeles County (LACM)	72,681	6,543	500	
San Diego Natural History Museum (SDMC)	14,224	797	3,000	
University of California-Berkeley (EMEC)	69,297	9,892	100	
University of California, Santa Barbara (UCSB)	8,697	5,092	4,000	
University of Colorado (UCMC)	62,677	10,160	100	
University of Kansas (SEMC)	9,495	28,185	100	
University of Michigan Museum of Zoology (UMMZI)	27,815	15,198	500	
University of New Hampshire Collection of Insects and Arthropods (UNHC)	6,783	12850	500	1,000 (CLSM)
USGS Native Bee Inventory and Monitoring Lab (USGS BIML)	4000	4,000	0	
Total:	**572,813**	**109,977**	**10,300**	**3,000**

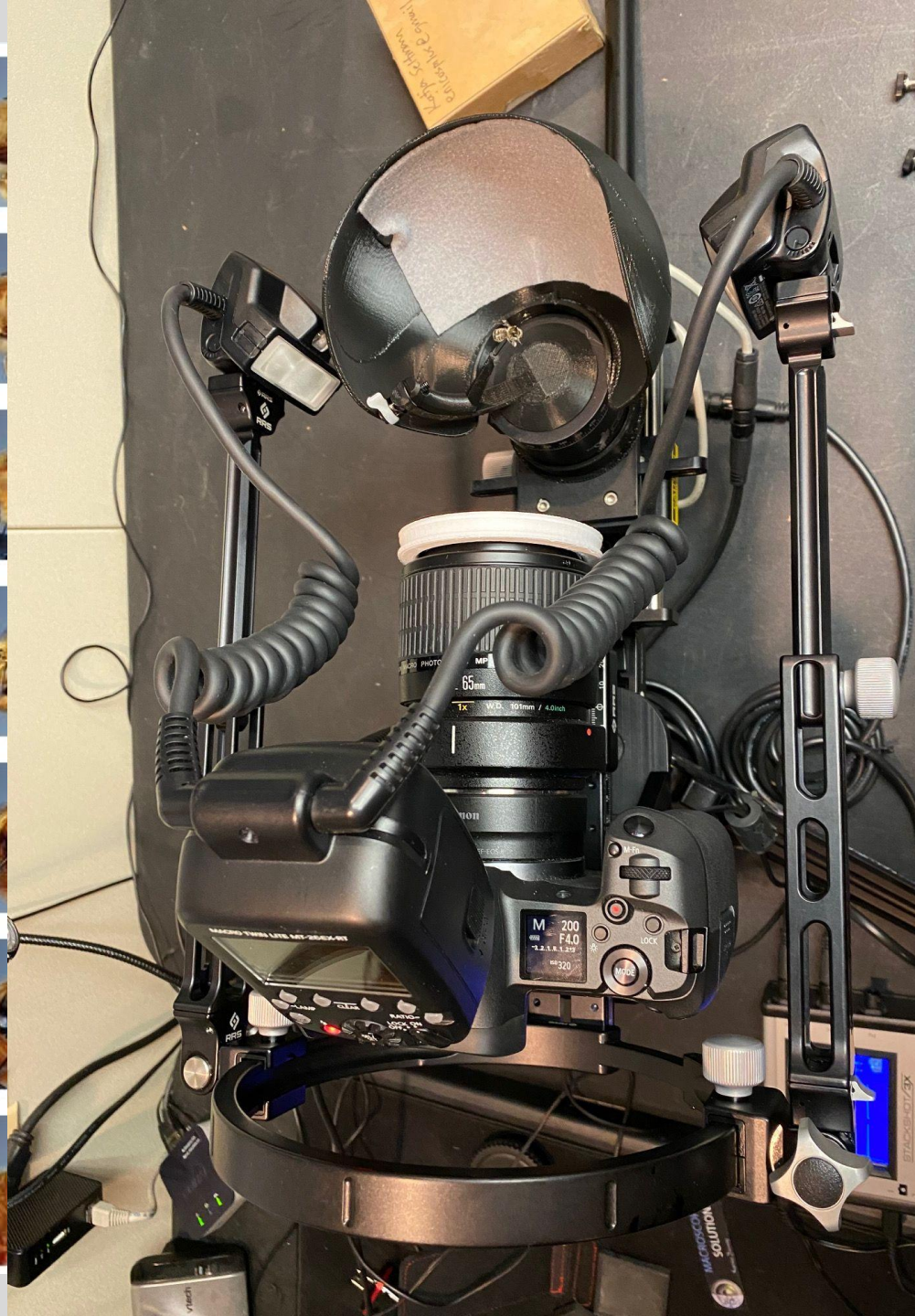
3D image suites

Label with Specimen Images



Diagnostic Images


MacroscopicSolutions
Portable, High Performance Imaging and Microscopy Systems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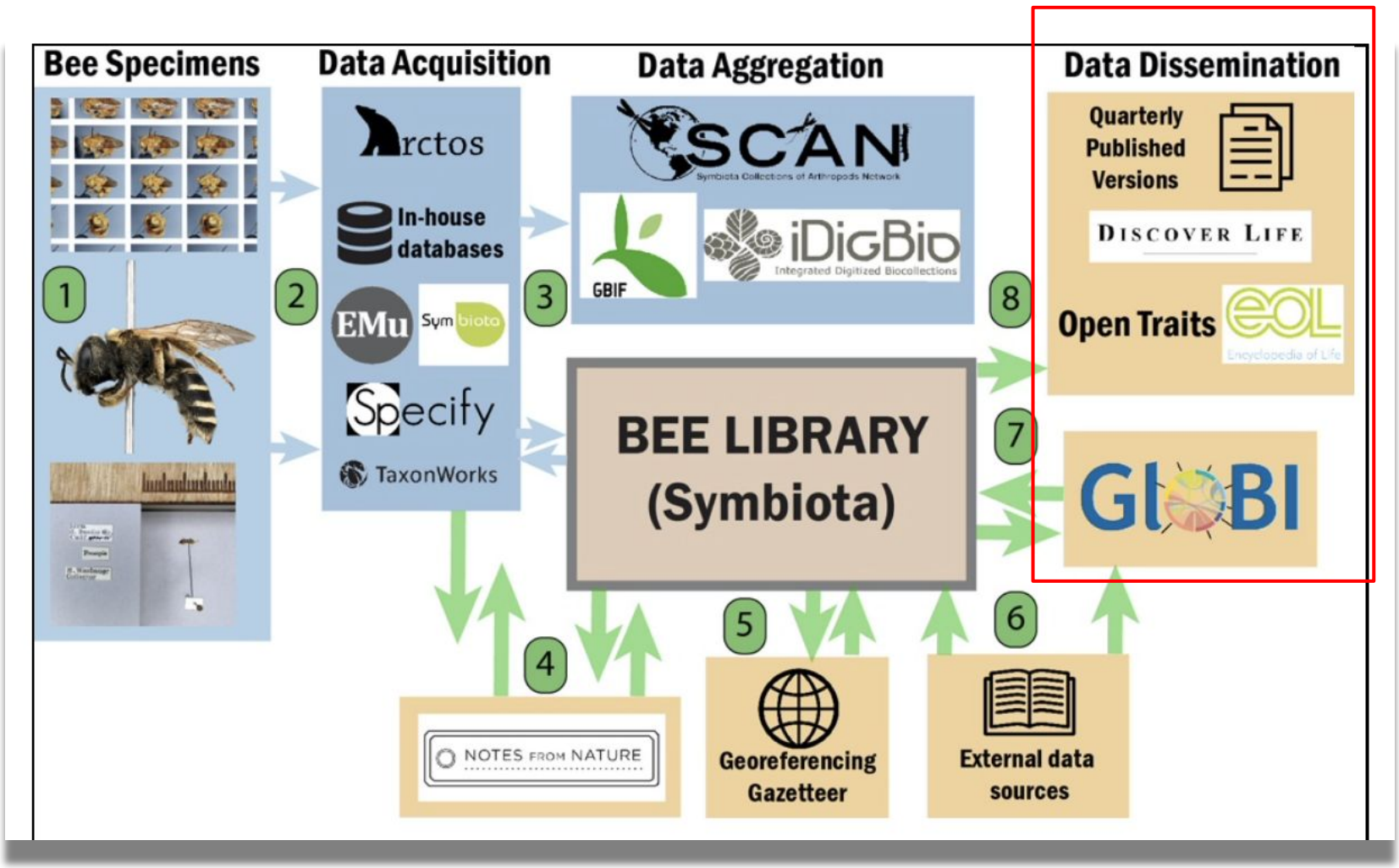
Trait Digitization

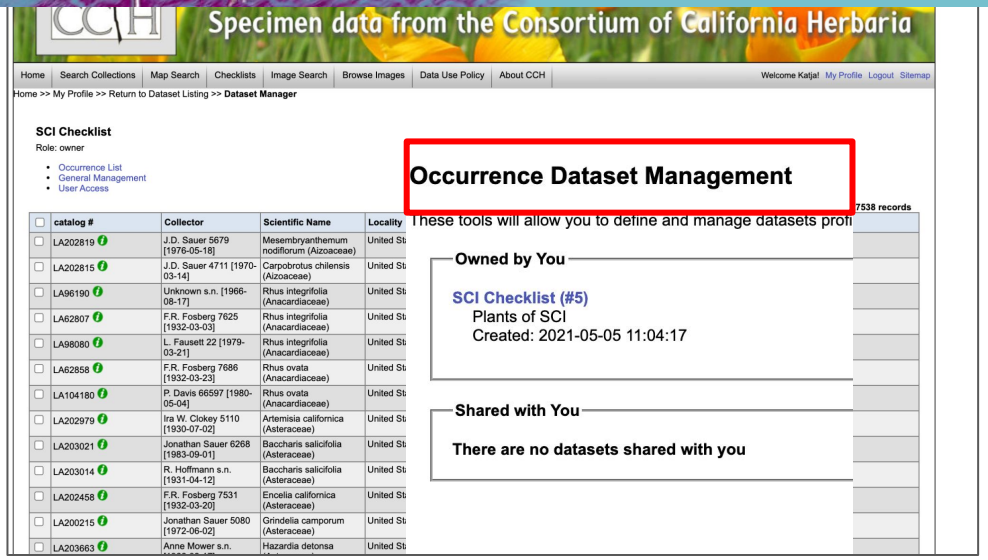
- **Biotic Associations**
  (parasites, pathogens, floral specialization)
- **Body size, color, hairiness**
- **Nesting Biology**
- **Phenology**
  (seasonality, flight period)

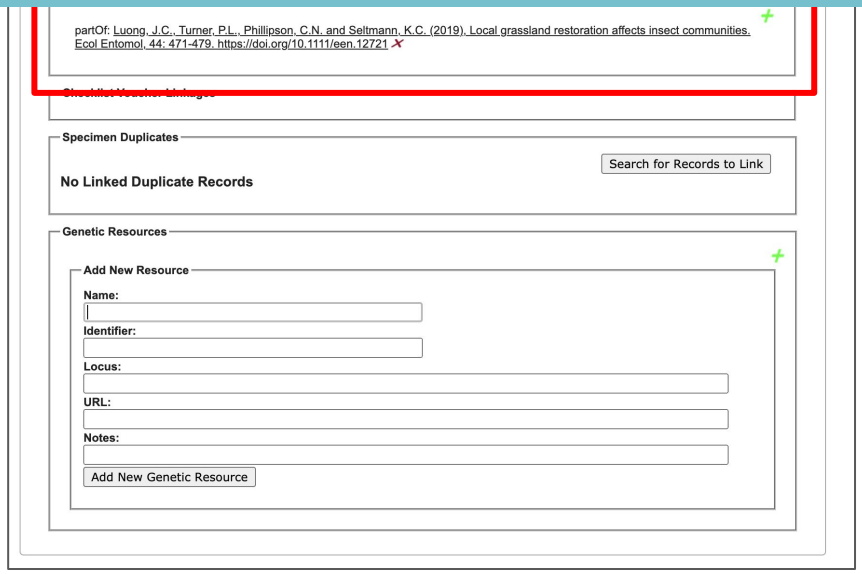
Biodiversity Data Science (a dataset approach)

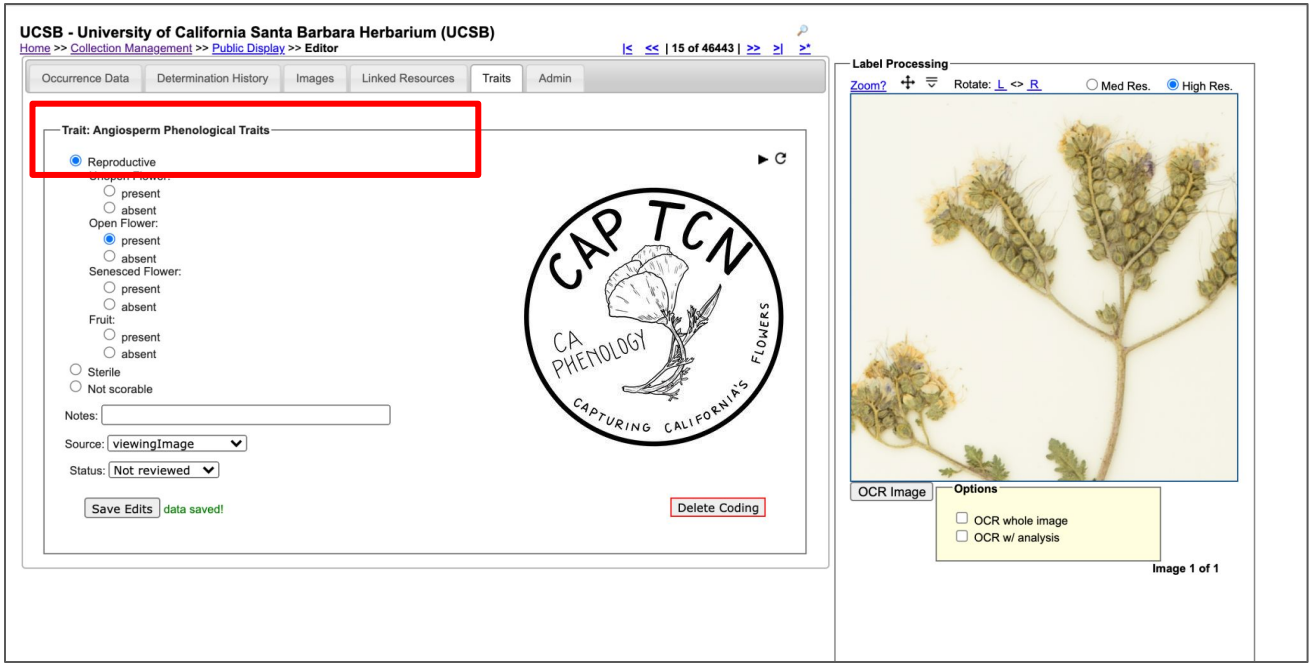


big-bee.net

Trait and Specimen Datasets







Bee Library for Supporting Dataset Creation and Trait Digitization (Symbiota-Light)

Notes From Nature

Label transcription
Measurement Tool for **Intertegular Span**

Image Datasets

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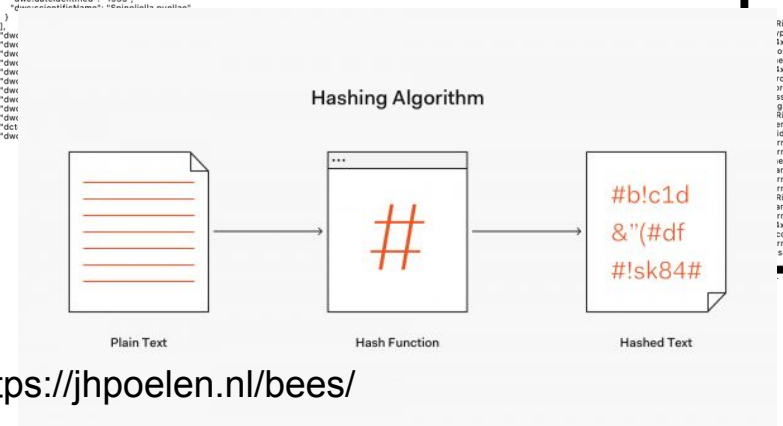

https://jhpoelen.nl/bees/

Biotic Interaction Datasets

TPT Collections Status

Click on badges to browse/download indexed records or inspect automated reviews.

edit collection list

BPBM / BYU / CAS / CUAC / FMNH / INHS / MSU / MPM / HWML / OSAL / PSUC / PU / TAMUIC / BRTC / ANSP / USNM / USNM / UCSB / UHIM / UMMZ / UMSP / UNHC / MSB / MSB / UTAH / WIRC / UWSP / VB / YPM /

status	institution/collection	platform	contact
review, GloBI, config, issues 2 open, names	BPBM / Bishop Museum / J. Linsley Gressitt Center for Research in Entomology	Specify	Jim Boone, Neal Evenhuis
review, GloBI, config, issues 1 open, names	BYU / Brigham Young University Arthropod Museum BYUC / Monte L. Bean Museum of Life Science Museum Insects and Arachnids	SymbiSCAN	Michael Whiting
review, GloBI, config, issues 3 open, names	CAS / California Academy of Sciences / Entomology Collection	Institutional	Chris Grinter, Michelle Trautwein
review, GloBI	CUAC / Clemson University / Clemson University Arthropod		

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Review of [g

Review of [
  - 14022 interaction(s)
  - 48 note(s)
  - 14024 info(s)
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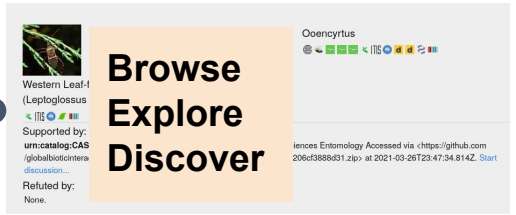
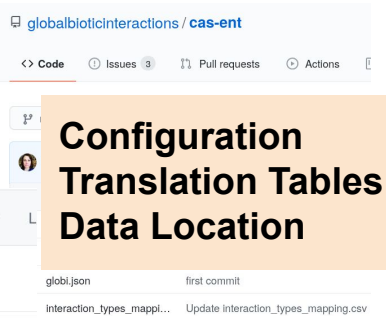
Review Notes
Indexed Interactions Tables
Indexed Names Tables

review
GloBI
config
issues 3 open
names



Browse
Explore
Discover



Configuration
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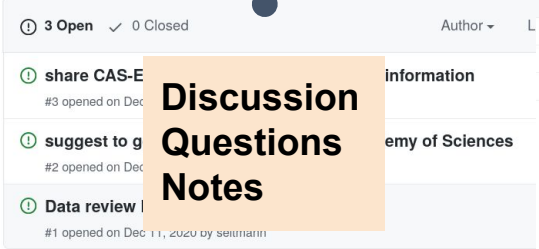


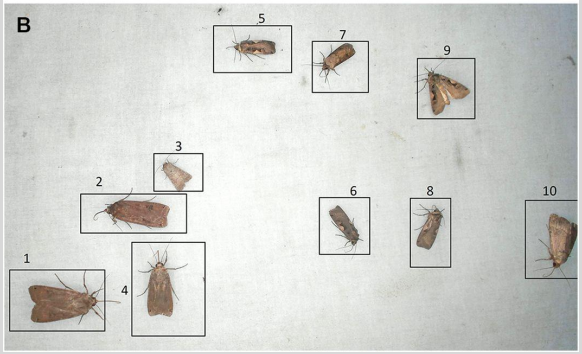
Discussion
Questions
Notes

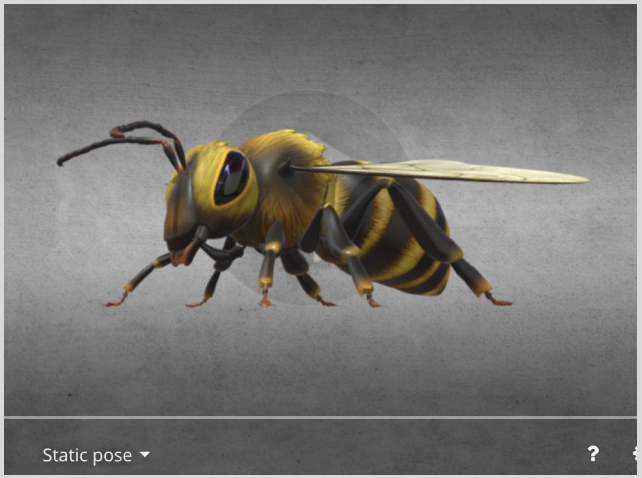
Terrestrial Parasite Tracker

GloBI

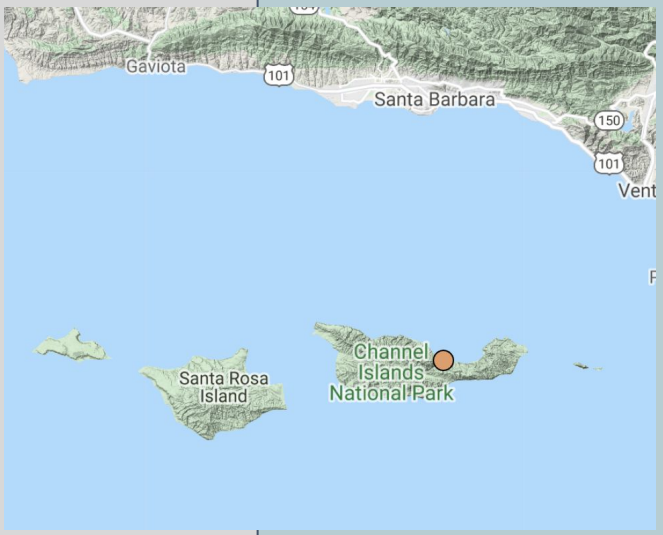
https://globalbioticinteractions.org/bigbee

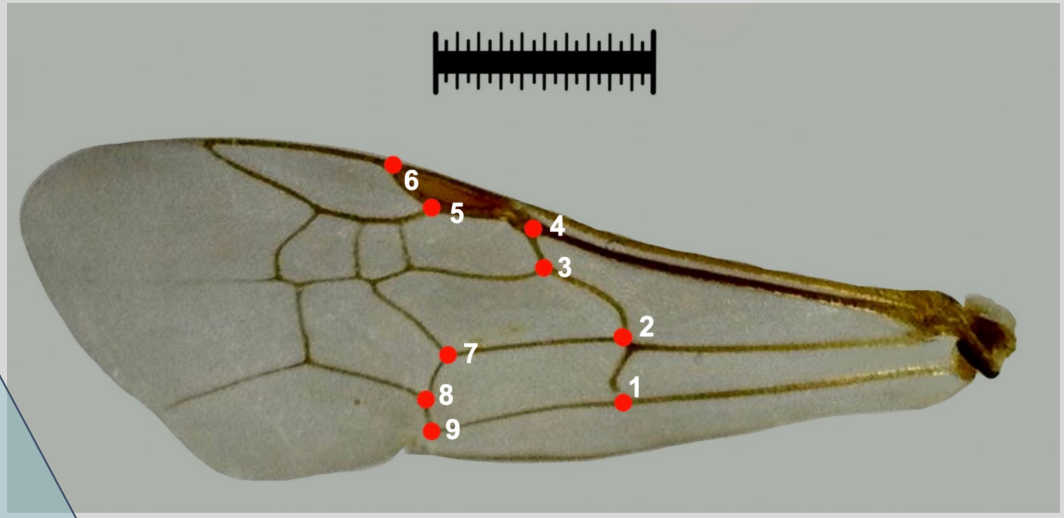
Broader Impacts - Computer Science

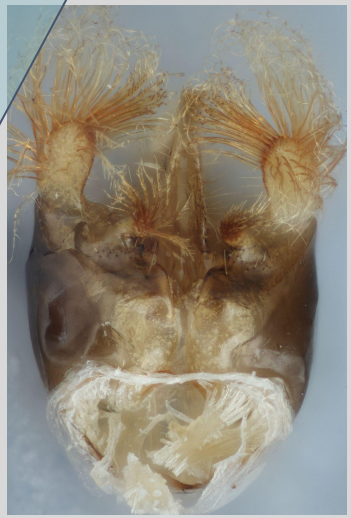




Broader Impacts - Identification Resources







Broader Impacts - Broad participation & training

USGS
science for a changing world

KIT
Karlsruher Institut für Technologie

US National Native Bee Monitoring RCN

Thank you!

PUBLIC DOMAIN

big-bee.net

NSF

iDigBio
Integrated Digitized Biocollections

University of Colorado 1876

The University of New Hampshire 1866 1893 1923 Science Arts Industry

Museum of Comparative Zoology
Harvard University

the nat
entomology

Natural History Museum
Los Angeles County

ASU
Biodiversity Knowledge Integration Center
Arizona State University

California Academy of Sciences

CCBER

UMMZ

MacroscopicSolutions
Portable, High Performance Imaging and Microscopy Systems

KU Biodiversity Institute & Natural History Museum
The University of Kansas

Florida State Collection of Arthropods

GloBI

Essig Museum of Entomology

University of Nevada Reno
Omnia Pro Patria
1874

UC Santa Barbara