

Arctos for Zoos and Museums: Bridging the gap with the multidimensional extended specimen concept

Michelle S. Koo¹

Emily Braker², Mariel Campbell³, Andrew Doll⁴, Lindsey Frederick⁵

Elizabeth Wommack⁶

1 Museum of Vertebrate Zoology, University of California Berkeley, CA

2 University of Colorado Museum of Natural History, Boulder, CO

3 Museum of Southwestern Biology, University of New Mexico

4 Denver Museum of Nature & Science, Denver, CO

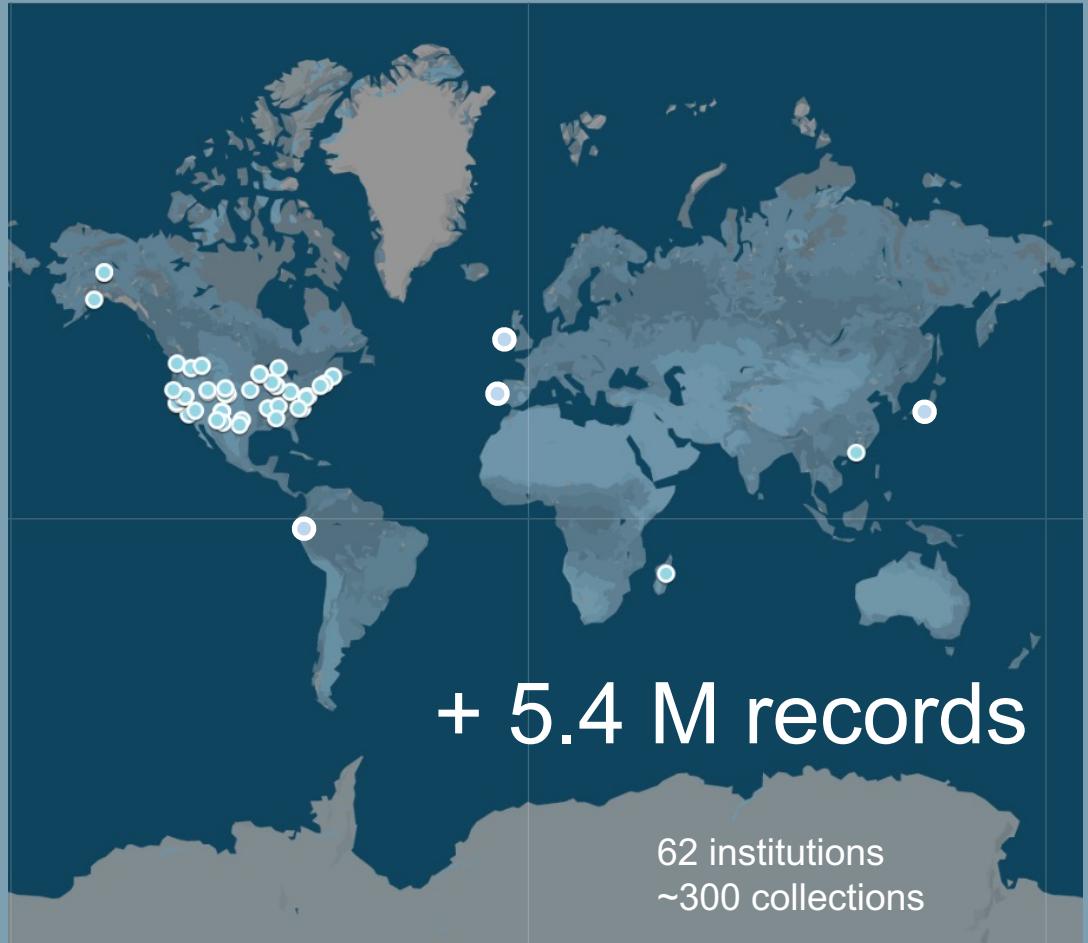
5 New Mexico Museum of Natural History & Science, Albuquerque, NM

6 University of Wyoming, Laramie, WY

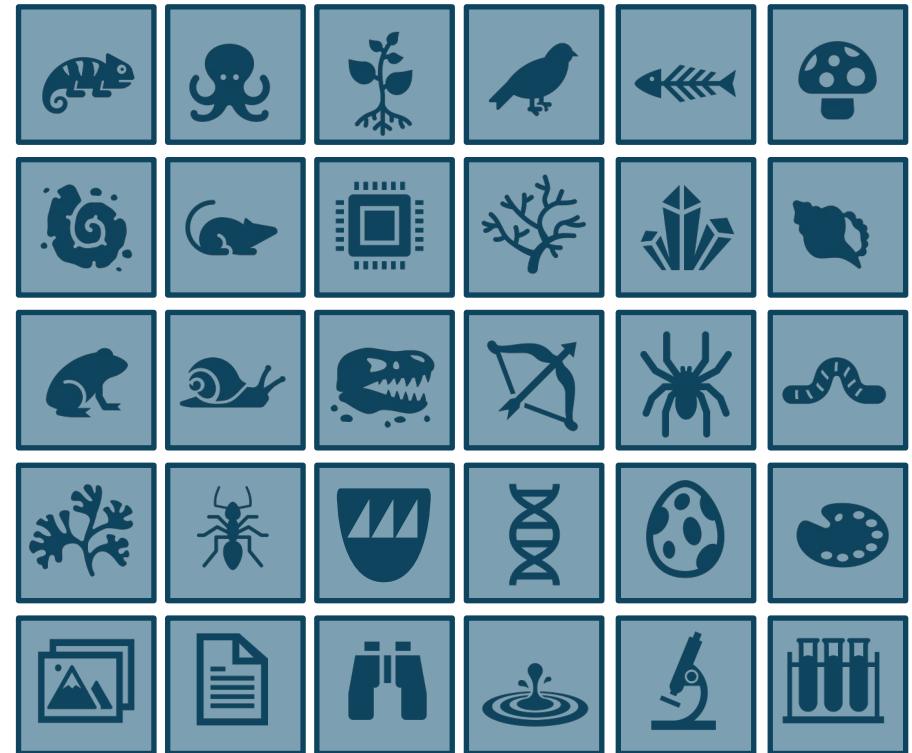
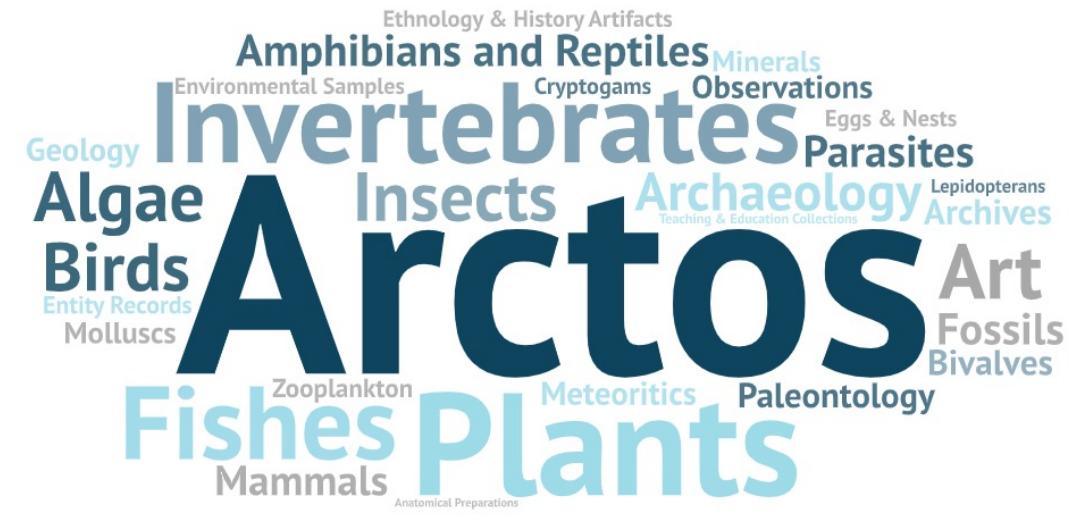


Website: <https://arctosdb.org>
Search: <https://arctos.database.museum>

Arctos Collections



- 885K media
- >36K GenBank links
- 571K georeferences
- >37K citations|3842 pubs



Arctos Collaborative Collection Management Solution

Search ▾ Tools Directory Join ▾ Help ▾ Log In or Create Account

Bird Collection ▾ MUSEUM OF VERTEBRATE ZOOLOGY ▾

License: CC BY ▾ Terms: MVZ Terms of Use ▾ Collection Details ▾ Loan Policy ▾

MVZ:Bird:191215 Spheniscus magellanicus

Parts: skeleton; skin, study; tissue (frozen)
San Francisco Zoo
United States, California, San Francisco County
4 Sep 2015 (2015-09-04)
Record Type: PreservedSpecimen

Comment or Report Bad Data

Identification Agents Attributes Locality Identifiers Parts

Identifications

[1] Spheniscus magellanicus (1)
Animalia, Chordata, Aves, Sphenisciformes, Spheniscidae, Spheniscus, Spheniscus magellanicus
Identified by San Francisco Zoo (1)
Remarks: Former nature_of_id: expert.

Attribute	Value	Determiner	Method	Date	Remark
identification confidence	high				
nature of identification	features				

Agents

Role	Agent	Remark
collector	San Francisco Zoo (1)	
preparation	Theresa L. Wong (1)	

Identifiers and Relationships full/split view ▾

Identifiers

Identifier	IssuedBy	Type	More	AssignedBy	Remarks
288	Theresa L. Wong (1)	preparator number	search	legacy	
291031	San Francisco Zoo (1)	identifier	search	Christopher J. Conroy (1)@2024-11-12	
MIG12-29927506	San Francisco Zoo (1)	GAN	search	Christopher J. Conroy (1)@2024-11-12	

Catalog Record/Curatorial
Record Identifier: <https://arctos.database.museum/guid/MVZ:Bird:191215> copy
Remarks: San Francisco Zoo #291031. Captive born 31 May 1991. Animal was necropsied before received - head detached from body, all organs removed, sternum detached. Specimen report filed with accession donation form.

Transactions

Accession MVZ:Bird 15294
Loan MVZ:Bird 2022.9267.Bird Projects
UC Berkeley Teaching: IB 174 Ornithology - Spring 2022

Loan MVZ:Bird 2022.9190.Bird Projects
Thickness of the feather layer in penguins

Record Attributes

Attribute	Value	Determiner	Date	Method	Remark
age	adult	Theresa L. Wong (1)	2015-11-25		
fat deposition	heavy fat	Theresa L. Wong (1)	2015-11-25		
molt condition	no tail or body molt	Theresa L. Wong (1)	2015-11-25		
reproductive data	not recorded	Theresa L. Wong (1)	2015-11-25		
sex	male	San Francisco Zoo (1)	2015-09-14		
verbatim preservation date	25 Nov 2015	Theresa L. Wong (1)	2015-11-25		
weight	4115 g	Theresa L. Wong (1)	2015-11-25		

Attribute	Value	Determiner	Date	Method	Remark
age	adult	Theresa L. Wong (1)	2015-11-25		
fat deposition	heavy fat	Theresa L. Wong (1)	2015-11-25		
molt condition	no tail or body molt	Theresa L. Wong (1)	2015-11-25		
reproductive data	not recorded	Theresa L. Wong (1)	2015-11-25		
sex	male	San Francisco Zoo (1)	2015-09-14		
verbatim preservation date	25 Nov 2015	Theresa L. Wong (1)	2015-11-25		
weight	4115 g	Theresa L. Wong (1)	2015-11-25		

Place and Time Map it in BerkeleyMapper!

highlight linked components

Event Type: collection Assigned by San Francisco Zoo (1) on 2015-09-04
Verification Status: accepted
Collecting Source: captive
Event Dates: 2015-09-04 Verbatim Date: 4 Sep 2015
Higher Geography: United States, California, San Francisco County (1)
Specific Locality: San Francisco Zoo (1)
Verbatim Locality: San Francisco Zoo, San Francisco, San Francisco County, California (1)

Coordinates: 37.733218 / -122.504478 As Entered Coordinates: 37.733218/-122.504478 Datum World Geodetic System 1984 Primary Spatial Data: point-radius Georeference Protocol: GeoLocate

Locality Attribute Value Determiner Method Date Remark georeference source Google Earth

Parts full view ▾

Part Name	Condition	Disposition	Qty	Remarks	Attributes	PartID
skeleton	partial; good	in collection	1	Original part name: skeleton, partial		https://arctos.database.museum/guid/MVZ:Bird:191215/PID28265024 (not stable)
skin, study	good	in collection	1			https://arctos.database.museum/guid/MVZ:Bird:191215/PID28265023 (not stable)
tissue	unchecked	in collection	1	Muscle.	Attribute Value Date Dtr. Mth. Rmk. preservation frozen 2021-07-01 Added from original part tissue (frozen).	https://arctos.database.museum/guid/MVZ:Bird:191215/PID28265025 (not stable)
tissue	unchecked	in collection	1	Muscle.	Attribute Value Date Dtr. Mth. Rmk. preservation frozen 2021-07-01 Added from original part tissue (frozen).	https://arctos.database.museum/guid/MVZ:Bird:191215/PID28265026 (not stable)
tissue	unchecked	in collection	1	Muscle.	Attribute Value Date Dtr. Mth. Rmk. preservation frozen 2021-07-01 Added from original part tissue (frozen).	https://arctos.database.museum/guid/MVZ:Bird:191215/PID28265027 (not stable)
tissue	unchecked	in collection	1	Muscle.	Attribute Value Date Dtr. Mth. Rmk. preservation frozen 2021-07-01 Added from original part tissue (frozen).	https://arctos.database.museum/guid/MVZ:Bird:191215/PID28265028 (not stable)

Links
GBIF Occurrence [\(1\)](#) iDigBio Occurrence [\(1\)](#)

Donate [Report a bug or request support](#) [Acknowledge of Harmful Content](#)

Arctos Select Language Powered by Google Translate
Arctos Consortium is a fiscally sponsored project of Community Initiatives, a US 501(c)(3) nonprofit organization. Alternate Contacts

Shared Data Environment

Community-sourced values and vocabularies



AGENTS



PLACES



TAXONOMY



CODE TABLES

Collection	Roles	Decades	States
KWP:Ento	collector (224)	1960 (2) 1970 (174) 1980 (48)	Alaska (163) Magadan Oblast (41) Northwest Territories (13) Nunavut (7)
MVZ:Bird	collector (80)	1950 (2) 1960 (77) 1970 (1)	Alaska (80)
MVZ:Herp	collector (6)	1950 (2) 1960 (4)	Alaska (2) Hokkaido Prefecture (4)
MVZ:Mamm	collector (80)	1950 (13) 1960 (24) 1970 (42) 1980 (1)	Alaska (32) Washington (48)
UAM:Bird	collector (14) preparator (4)	1950 (3) 1960 (14) 1980 (1)	Alaska (18)
UAMObs:Ento	collector (34)	1950 (28) 1960 (6)	Alaska (34)
UAMb:Herb	collector (1)	1970 (1)	Alaska (1)
UCM:Mamm	collector (11)	1950 (11)	Alaska (11)
alive	▼	1907-02-24	correspondence in CHAS archives with Frank C. Baker
died	▼	1919-03-22	Obituary, Science, May 23, 1919 written by W.J. Holland, Carnegie Museum

Agent profile library to fill low-data gaps; discovery & deduplication tools



Opt-in to already-georeferenced localities

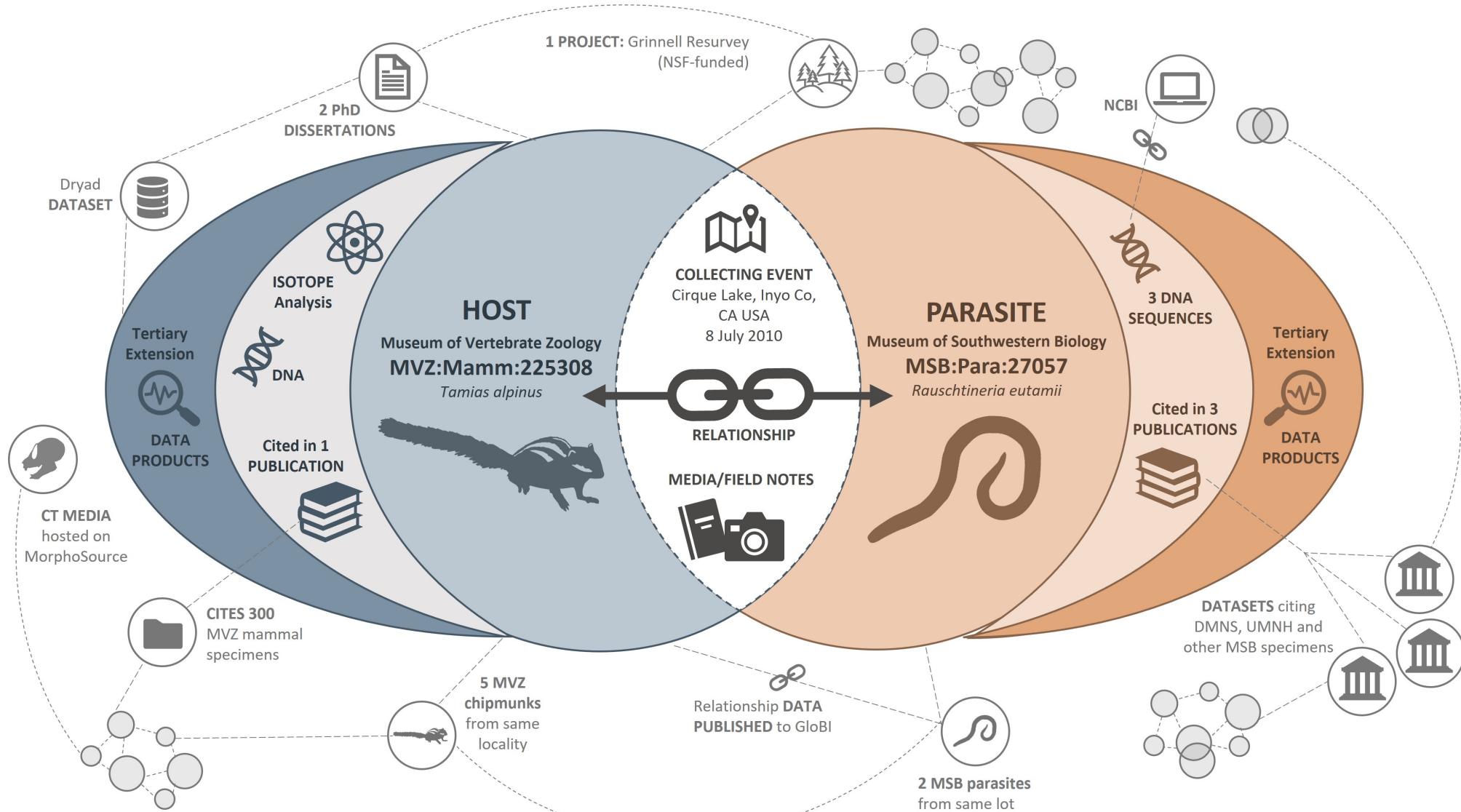
Source
Arctos
AntWiki (via Arctos)
Arctos Culture
Arctos Ichnology
Arctos Plants
Arctos Rocks
Current Reptile Classification
Dana 8 (via Arctos)
Getty AAT (via Arctos)
Heys CIM (via Arctos)
Nickel-Strunz 10 (via Arctos)
Nomenclature 4.0 (via Arctos)
TPT (via Arctos)
UAM Art
WoRMS (via Arctos)

Shared local classification trees or webservice sources

AGE_CLASS	Collection	Documentation
1st instar	Ento Para	The developmental stage of an arthropod between hatching and first molt.
2nd instar	Ento Para	The developmental stage of an arthropod between first and second molt.
3rd instar	Ento Para	The developmental stage of an arthropod between second and third molt.
4th instar	Ento Para	The developmental stage of an arthropod between third and fourth molt.
5th instar	Ento Para	The developmental stage of an arthropod between fourth and fifth molt.
Amph ES Ento Fish Herp Host Inv Para	larva	The active immature form of an insect, especially one that differs greatly from adult and forms the stage between egg and pupa, e.g. a caterpillar or grub. Immature form of other animals that undergo some metamorphosis, e.g. a t
microfilariae	Para	Specialized larval forms which occur in parasites transmitted by arthropods.
CHRONOSTRAT_SYSTEM_PERIOD	Documentation	Metadata
Cambrian	Wikipedia	Includes: Ediacaran Includes: Wullian maximum age (Mya): 541
Carboniferous	Wikipedia	Includes: Paleozoic Included in: Phanerozoic Includes: Bashkirian Includes: Carboniferous
Cretaceous	Wikipedia	Includes: Mesozoic Included in: Phanerozoic Includes: Albian Includes: Aptian
Devonian	Wikipedia	Includes: Paleozoic Included in: Phanerozoic Includes: Devonian Includes: Eifelian

Standardized controlled vocabularies and definitions (e.g., Wikipedia, Macrostrat, Geolex)

Arctos and the Extended Specimen: Biotic Relationships between records



The Extended Specimen Network:

“A powerful new source of knowledge to address national priorities”



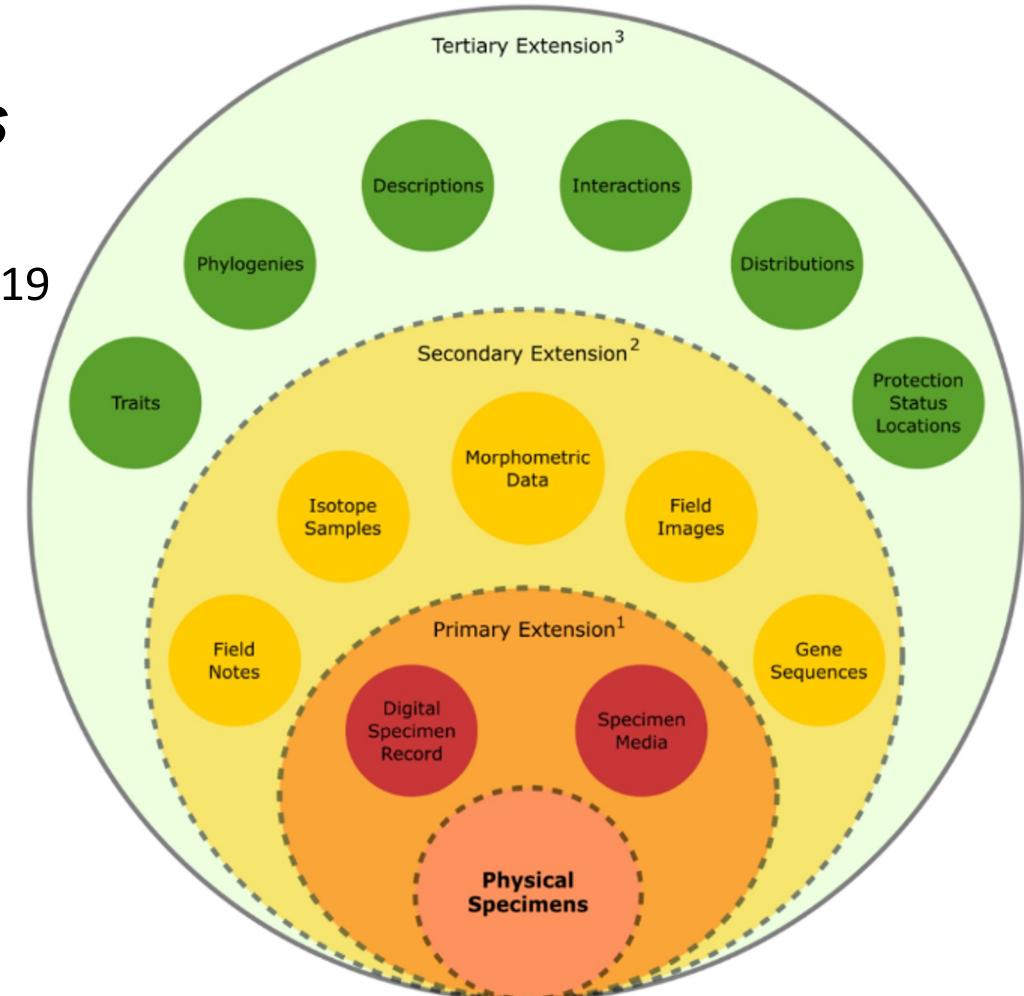
From

Extending U.S. Biodiversity Collections to Promote Research and Education

Thiers et al. 2019

**Extended specimen =
physical specimen**

- + physical specimen data
- + molecular data
- + phenotypic data
- + environmental data



Thiers et al. 2019, Fig 1

Arctos Extended Specimen Components



Molecular Data

MSB:Mamm:92435
Napaeozapus insignis



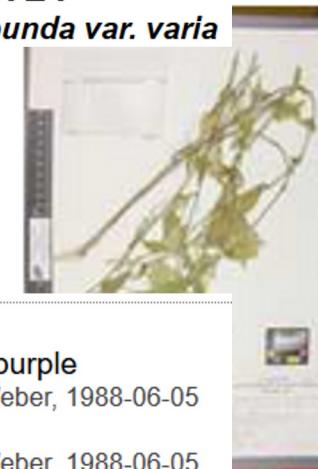
Identifiers

GenBank: [KF440700](#)

- Tissues samples; data publicly available
- Tissue derivatives linked to specimen

Phenotypic/Trait Data

UTEP:Herb:44724
Hypoestes floribunda var. varia



Attributes

colors: Flowers purple
Joseph Zvonko Weber, 1988-06-05
height: 1 m
Joseph Zvonko Weber, 1988-06-05

- Digitized traits, morphology
- Standardization
- Linked to specimen

Ecological & Behavior Data

DMNS:Mamm:11189
Tamias umbrinus montanus

Relationships
(host of) [DMNS:Para:46](#)
(host of) [DMNS:Para:47](#)

DMNS:Para:46
Nematoda

Relationships
(collected with) [DMNS:Para:47](#)
(parasite of) [DMNS:Mamm:11189](#)

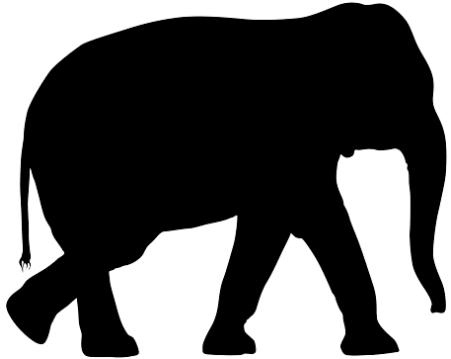
MVZ:Bird:155273
Empidonax occidentalis occidentalis



- Biotic associates and their data linked to the specimen
- Standardization
- Media (eg. video, audio recordings) on habitat, behavior sometimes linked to physical specimen

Zoo Point of View

Albert



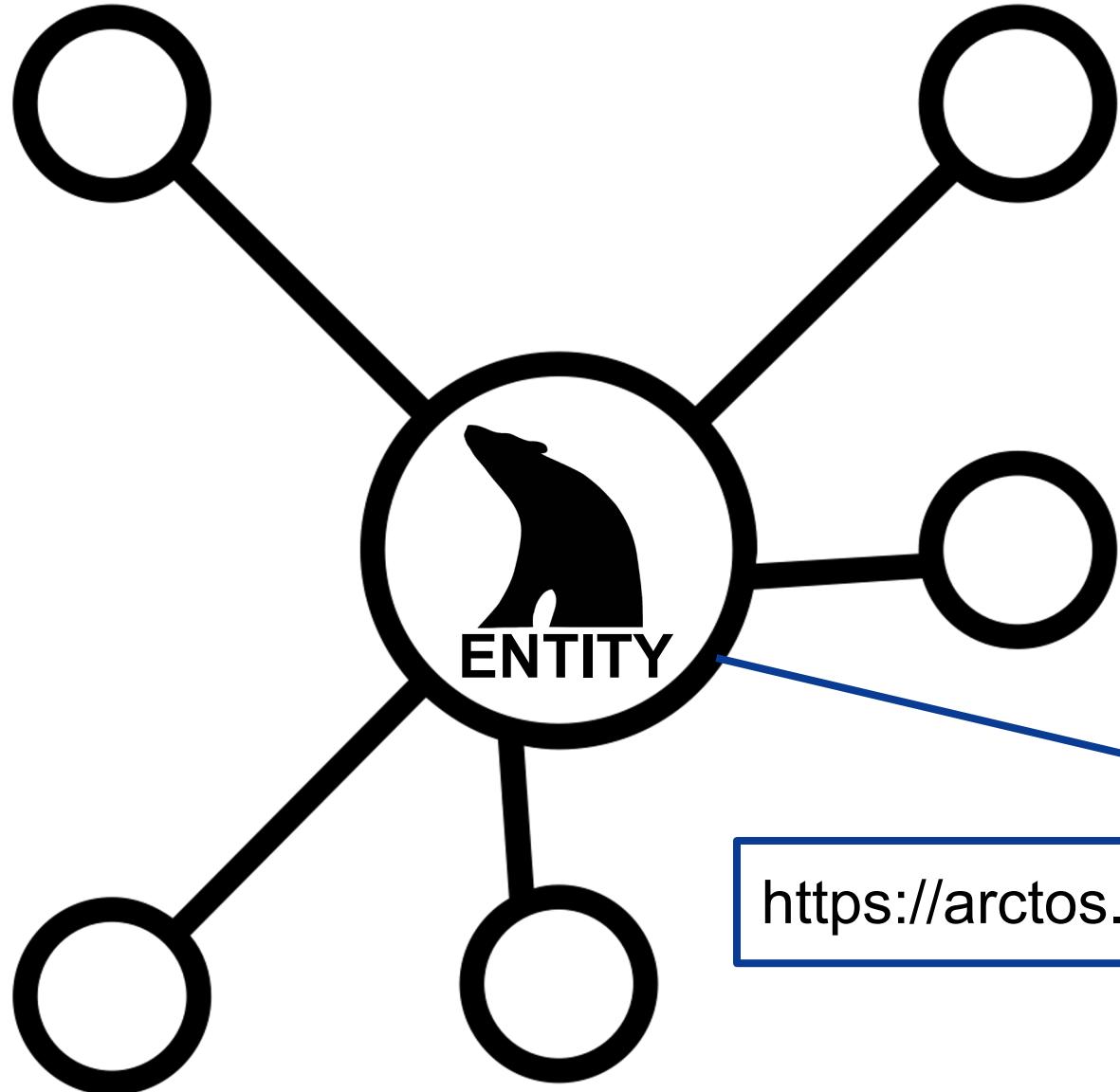
- Event (measurements)
- Event (blood sample)
- Event (biopsy)
- Event (blood sample)
- Event (sample)
- Event (measurements)
- etc

Museum Point of View

253 records for each sample of tissue

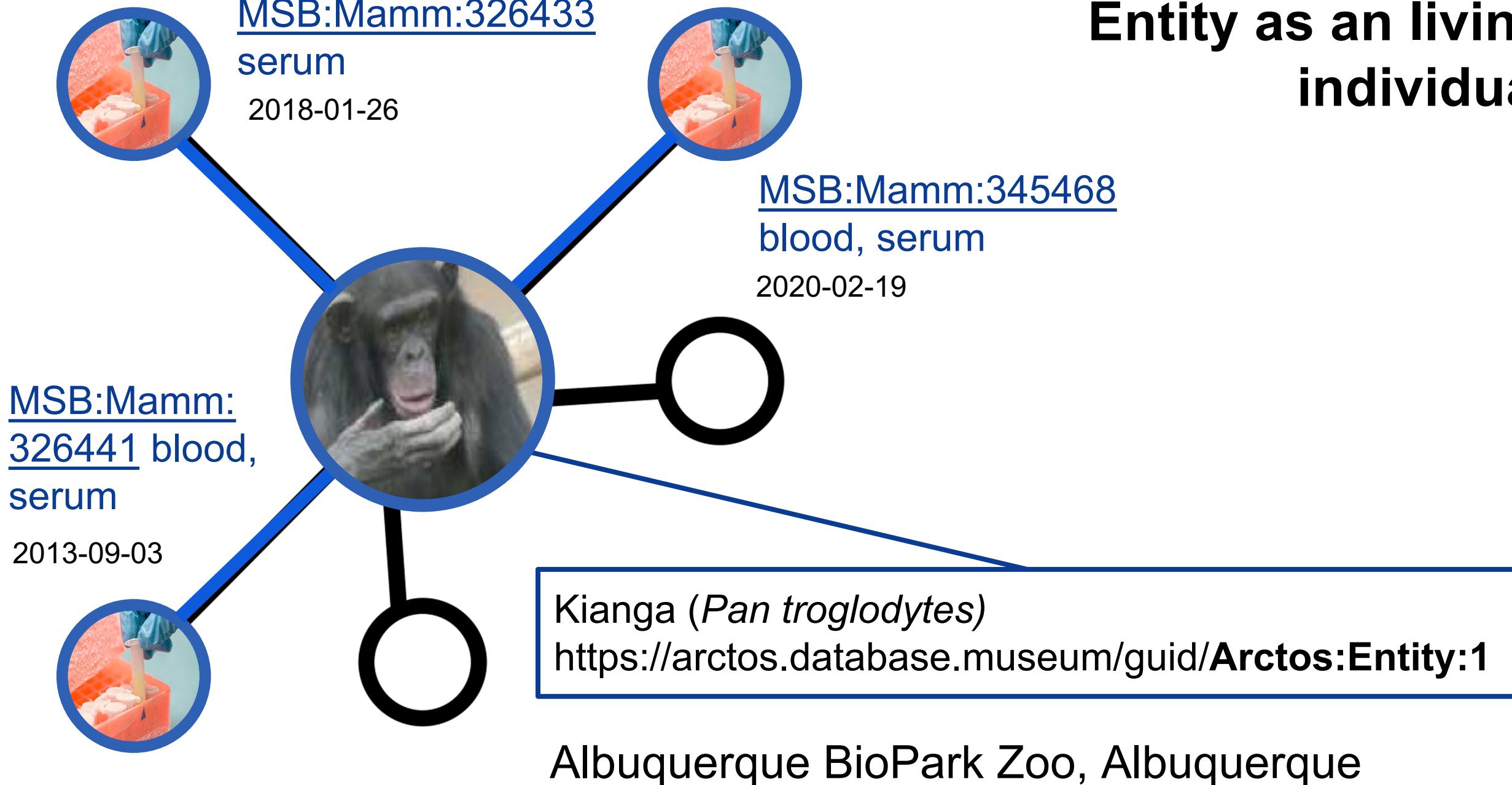
GUID	map	Identification	Date	Geography	Locality	Collectors	Identifiers	Parts
MSB:Mamm:337154	show	Elephas maximus	2009-12-03	United States, New Mexico, Bernalillo County	Albuquerque BioPark Zoo, Albuquerque	ABQ BioPark	Albuquerque Biopark Zoo Local ID=M03031, GAN=14348174, identifier=Albert, Organism ID=https://arctos.database.museum /guid/Arctos:Entity:138	serum (frozen)
MSB:Mamm:337228	show	Elephas maximus	2013-06-10	United States, New Mexico, Bernalillo County	Albuquerque BioPark Zoo, Albuquerque	ABQ BioPark	Albuquerque Biopark Zoo Local ID=M03031, GAN=14348174, identifier=Albert, Organism ID=https://arctos.database.museum /guid/Arctos:Entity:138	serum (frozen)
MSB:Mamm:335091	show	Elephas maximus	2018-03-30	United States, New Mexico, Bernalillo County	Albuquerque BioPark Zoo, Albuquerque	ABQ BioPark	Albuquerque Biopark Zoo Local ID=M03031, GAN=14348174, identifier=Albert, Organism ID=https://arctos.database.museum /guid/Arctos:Entity:138	serum (frozen)
MSB:Mamm:335092	show	Elephas maximus	2019-07-31	United States, New Mexico, Bernalillo County	Albuquerque BioPark Zoo, Albuquerque	ABQ BioPark	Albuquerque Biopark Zoo Local ID=M03031, GAN=14348174, identifier=Albert, Organism ID=https://arctos.database.museum /guid/Arctos:Entity:138	serum (frozen)
MSB:Mamm:335093	show	Elephas maximus	2019-08-14	United States, New Mexico, Bernalillo County	Albuquerque BioPark Zoo, Albuquerque	ABQ BioPark	Albuquerque Biopark Zoo Local ID=M03031, GAN=14348174, identifier=Albert, Organism ID=https://arctos.database.museum /guid/Arctos:Entity:138	blood (EDTA)
MSB:Mamm:335135	show	Elephas maximus	2018-05-11	United States, New Mexico, Bernalillo County	Albuquerque BioPark Zoo, Albuquerque	ABQ BioPark	Albuquerque Biopark Zoo Local ID=M03031, GAN=14348174, identifier=Albert, Organism ID=https://arctos.database.museum /guid/Arctos:Entity:138	blood (frozen)
MSB:Mamm:335136	show	Elephas maximus	2016-09-29	United States, New Mexico, Bernalillo County	Albuquerque BioPark Zoo, Albuquerque	ABQ BioPark	Albuquerque Biopark Zoo Local ID=M03031, GAN=14348174, identifier=Albert, Organism ID=https://arctos.database.museum /guid/Arctos:Entity:138	serum (frozen)
MSB:Mamm:335137	show	Elephas maximus	2010-08-19	United States, New Mexico, Bernalillo County	Albuquerque BioPark Zoo, Albuquerque	ABQ BioPark	Albuquerque Biopark Zoo Local ID=M03031, GAN=14348174, identifier=Albert, Organism ID=https://arctos.database.museum /guid/Arctos:Entity:138	serum (frozen)
MSB:Mamm:335138	show	Elephas maximus	2018-07-06	United States, New Mexico, Bernalillo County	Albuquerque BioPark Zoo, Albuquerque	ABQ BioPark	Albuquerque Biopark Zoo Local ID=M03031, GAN=14348174, identifier=Albert, Organism ID=https://arctos.database.museum /guid/Arctos:Entity:138	blood (EDTA)
MSB:Mamm:335139	show	Elephas maximus	2018-07-06	United States, New Mexico, Bernalillo County	Albuquerque BioPark Zoo, Albuquerque	ABQ BioPark	Albuquerque Biopark Zoo Local ID=M03031, GAN=14348174, identifier=Albert, Organism ID=https://arctos.database.museum /guid/Arctos:Entity:138	serum (frozen)
MSB:Mamm:335140	show	Elephas maximus	2018-07-06	United States, New Mexico, Bernalillo County	Albuquerque BioPark Zoo, Albuquerque	ABQ BioPark	Albuquerque Biopark Zoo Local ID=M03031, GAN=14348174, identifier=Albert, Organism ID=https://arctos.database.museum /guid/Arctos:Entity:138	serum (frozen)
MSB:Mamm:335141	show	Elephas maximus	2018-07-06	United States, New Mexico, Bernalillo County	Albuquerque BioPark Zoo, Albuquerque	ABQ BioPark	Albuquerque Biopark Zoo Local ID=M03031, GAN=14348174, identifier=Albert, Organism ID=https://arctos.database.museum /guid/Arctos:Entity:138	serum (frozen)
MSB:Mamm:335142	show	Elephas maximus	2018-07-06	United States, New Mexico, Bernalillo County	Albuquerque BioPark Zoo, Albuquerque	ABQ BioPark	Albuquerque Biopark Zoo Local ID=M03031, GAN=14348174, identifier=Albert, Organism ID=https://arctos.database.museum /guid/Arctos:Entity:138	serum (frozen)
MSB:Mamm:335143	show	Elephas maximus	2018-08-09	United States, New Mexico, Bernalillo County	Albuquerque BioPark Zoo, Albuquerque	ABQ BioPark	Albuquerque Biopark Zoo Local ID=M03031, GAN=14348174, identifier=Albert, Organism ID=https://arctos.database.museum /guid/Arctos:Entity:138	blood (EDTA)
MSB:Mamm:335144	show	Elephas maximus	2018-08-09	United States, New Mexico, Bernalillo County	Albuquerque BioPark Zoo, Albuquerque	ABQ BioPark	Albuquerque Biopark Zoo Local ID=M03031, GAN=14348174, identifier=Albert, Organism ID=https://arctos.database.museum /guid/Arctos:Entity:138	serum (frozen)
MSB:Mamm:335145	show	Elephas maximus	2018-09-07	United States, New Mexico, Bernalillo County	Albuquerque BioPark Zoo, Albuquerque	ABQ BioPark	Albuquerque Biopark Zoo Local ID=M03031, GAN=14348174, identifier=Albert, Organism ID=https://arctos.database.museum /guid/Arctos:Entity:138	blood (EDTA)
MSB:Mamm:335146	show	Elephas maximus	2018-09-07	United States, New Mexico, Bernalillo County	Albuquerque BioPark Zoo, Albuquerque	ABQ BioPark	Albuquerque Biopark Zoo Local ID=M03031, GAN=14348174, identifier=Albert, Organism ID=https://arctos.database.museum /guid/Arctos:Entity:138	serum (frozen)

What is an Arctos Entity? (and how can it help?)

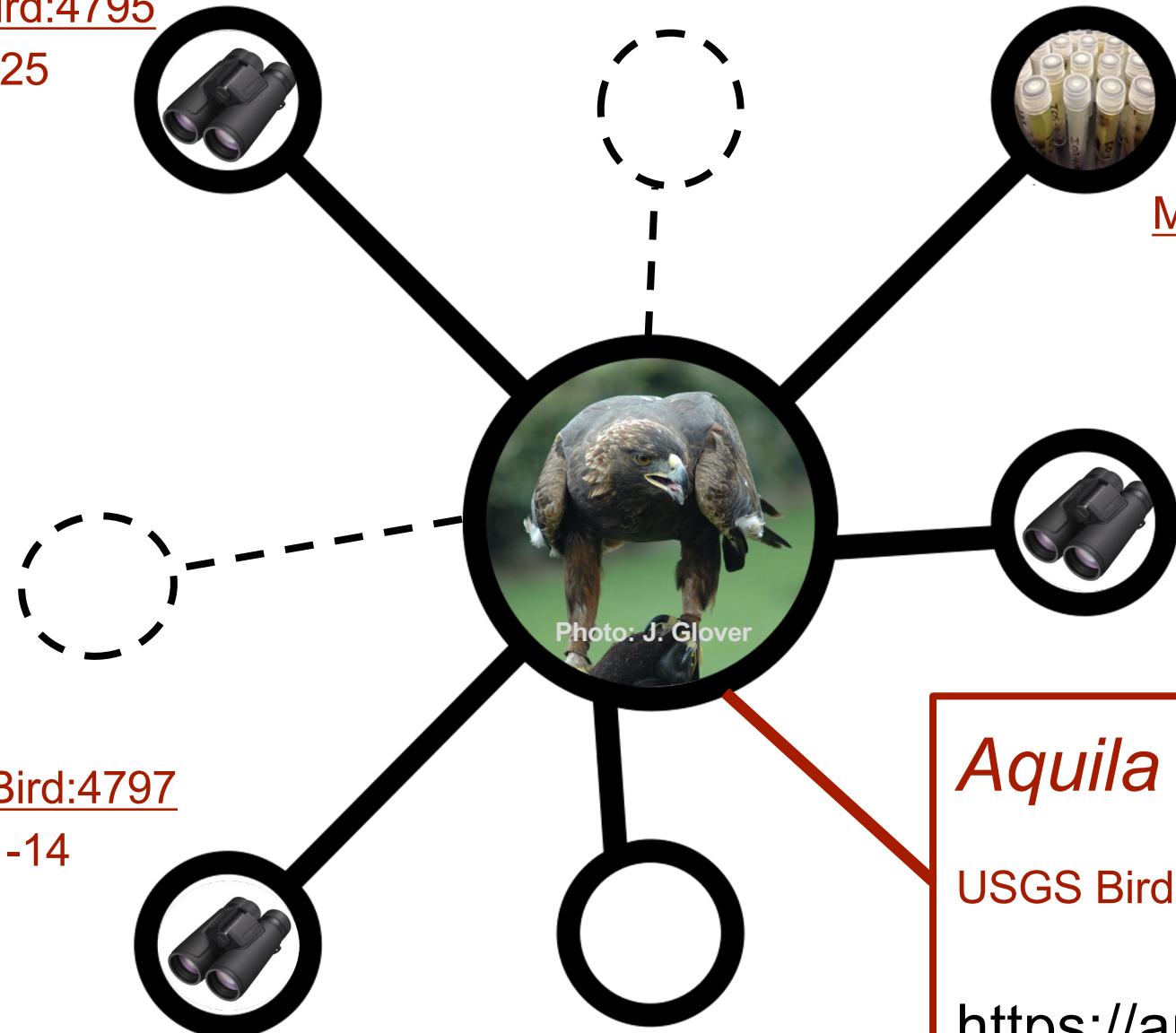


<https://arctos.database.museum/guid/Arctos:Entity:1>

Entity as an living individual



MVZObs:Bird:4795
2014-09-25



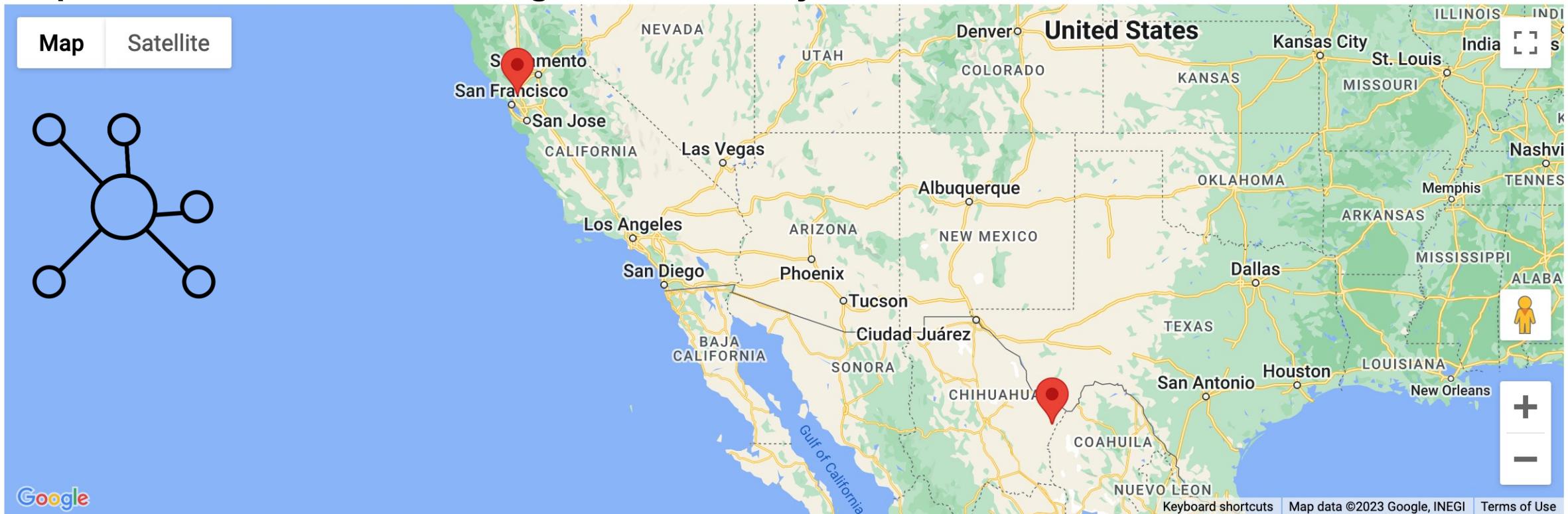
Entity as an living individual

MVZ:Bird:193219
2013-06-10

MVZObs:Bird:4796
2015-11-14

MVZObs:Bird:4797
2015-11-14

Aquila chrysaetos canadensis
USGS Bird Banding Laboratory (BBL)=0709-03041
<https://arctos.database.museum/guid/>
Arctos:Entity:19



Entity Components Summary [See Entity in Results](#) [See Components in Results](#)

GUID	map	Identification	Date	Geography	Locality	Collectors	Identifiers	Parts
MVZ:Bird:193216	show	Aquila chrysaetos canadensis	2014-01-11	United States, California, Contra Costa County	Carquinez Strait Regional Shoreline, Crockett Hills	Douglas A. Bell	identifier=East Bay Regional Park District: EBRPD-025, Organism ID= https://arctos.database.museum/guid/Arctos:Entity:16 , USGS Bird Banding Laboratory (BBL)=0709-02244	blood (Longmire's lysis buffer)
MVZObs:Bird:4792	show	Aquila chrysaetos canadensis	2017-10-25	Mexico, Chihuahua	3.91 mi NE La Laguna del Prieto	Douglas A. Bell	identifier=East Bay Regional Park District: EBRPD-025, Organism ID= https://arctos.database.museum/guid/Arctos:Entity:16 , USGS Bird Banding Laboratory (BBL)=0709-02244	

Arctos Projects:

Shareable, data-driven web pages to contextualize records



Shareable,
persistent URL

Project Title with
linked people and
organizations

HTML-enabled
text to describe
project, study or
add customized
links

Data-driven links
enabled by
acquisition or loan
activities

Screenshot of the Arctos project page for the "U.S. Fish & Wildlife Service Mexican Wolf Recovery Program". The page includes a header with the Arctos logo, navigation links for Search, Tools Directory, Join, Help, Log In or Create Account, and Login or Create Account. The main title is "U.S. Fish & Wildlife Service Mexican Wolf Recovery Program" with the date "2000-01-01 ongoing". Below the title are sections for "United States Fish and Wildlife Service: Project Coordinator", "United States Fish and Wildlife Service Mexican Wolf Recovery Program: Project Coordinator", and "Maggie Dwire: Co-PI". A note states "Remarks: Assistant Coordinator for Mexican Wolf Recovery Program".

U.S. Fish & Wildlife Service Mexican Wolf Recovery Program

2000-01-01 ongoing

United States Fish and Wildlife Service: Project Coordinator
United States Fish and Wildlife Service Mexican Wolf Recovery Program: Project Coordinator
Maggie Dwire: Co-PI
Remarks: Assistant Coordinator for Mexican Wolf Recovery Program

Description



The Museum of Southwestern Biology is a designated repository for the USFWS Mexican Wolf (*Canis lupus baileyi*) Recovery Program based in Albuquerque, New Mexico. Carcasses, blood and tissue samples collected nationwide by captive breeding programs and state and federal agencies are deposited and loaned through Museum of Southwest Biology under USFWS Endangered Species Sub permit PT-676811. See the USFWS Mexican Wolf Recovery Program Project page at <https://www.fws.gov/southwest/es/mexicanwolf/>.

Photo of MSB:Mamm:259087, Mexican wolf studbook number: 190

Catalog Records Used

- 3 DGR:Mamm catalog records [BerkeleyMapper]
- 179 MSB:Mamm catalog records [BerkeleyMapper]
- 182 total catalog records [BerkeleyMapper]

Catalog Records Contributed

- 7 DGR:Mamm Catalog Records [BerkeleyMapper]
- 1190 MSB:Mamm Catalog Records [BerkeleyMapper]
- 3 MSBObs:Mamm Catalog Records [BerkeleyMapper]
- 1200 total catalog records [BerkeleyMapper]

Projects contributing records

1 projects contributed catalog records used by this project.

- U.S. Fish & Wildlife Service Mexican Wolf Recovery Program

Projects using contributed catalog records

13 Projects used catalog records contributed by this project. Those projects produced 0 publications which include 0 citations.

BIOL 203L - Ecology and Evolution

This project produced no publications.

Data-driven links
can also include
media (images,
video, etc) and
other projects

Arctos Projects:

Shareable, data-driven web pages to contextualize records



Zoo and
Museum
partners!

ABQ BioPark / Museum of Southwestern Biology Specimen Repository Agreement

2018-07-19 ongoing

Gwen A. Dragoo: Project Coordinator
Christopher C. Witt: Project Coordinator
Joseph A. Cook: Project Coordinator
Michael J. Andersen: Project Coordinator
Mariel L. Campbell: Co-PI
Jonathan L. Dunnum: Co-PI
Andrew B. Johnson: Co-PI
Emily S. DeArmon: Co-PI
J. Tomasz Giermakowski: Co-PI
Serina S. Brady: Research Associate
ABQ BioPark: Sponsor
Blaque Armijo: Undergraduate Student
Remarks: Student volunteer DGR
Jonathan M. Armijo: Undergraduate Student
Remarks: Student volunteer DGR
Osa Day: Secondary School Student
Remarks: High School Intern DGR
Sofi Zamora: Secondary School Student
Remarks: High School Senior Internship DGR

Description


Kienda, ABQ BioPark Zoo, photo by Jaimie Ohr

The purpose of this Memorandum of Understanding (MOU) is to establish principles of cooperation and coordination between the Albuquerque Biopark Zoo (ABQ BioPark) and The University of New Mexico's Museum of Southwestern Biology (MSB) in regard to creating a permanent archival resource for vertebrate zoo specimens. Since the 1980s, the MSB and the ABQ BioPark have collaborated to archive over samples and data from over 4000 specimens. We aim to link research and information functions of vertebrates maintained by the ABQ Biopark to the archival collections of the MSB where they are deposited in the MSB either in part (e.g., frozen tissues, blood, and sera from endangered species) or in their entirety (skin, skeleton, detailed life and medical history). This formal partnership provides for a mutually productive program in the areas of museum and zoo science and supports the role of scientific collections in a manner that best serves the interests of both parties and the people of New Mexico.

Data are downloaded by the MSB with permission from the Species 360 Zoological Information Management ZIMS (<https://zims.species360.org>) database for upload to the multi-institutional Arctos Collection Management System (<https://arctos.database.museum/>) and for dissemination to global biodiversity data aggregators to facilitate discoverability. Arctos links to multiple reference identifiers, including the global animal number (GAN) that enables individual-based queries on each independent record across zoos and collections in order track relationships between individual specimen samples, original metadata, and newly generated data from subsequent uses of samples through loans and publications. The zoo benefits by reducing costs associated with maintaining an independent on-site archive, while the museum is able to provide taxonomically diverse specimens for research and education.

Catalog Records Contributed

- 178 Arctos:Entity Catalog Records [BerkeleyMapper]
- 4673 MSB:Mamm Catalog Records [BerkeleyMapper]
- 9 MSB:Bird Catalog Records [BerkeleyMapper]
- 4860 total catalog records [BerkeleyMapper]

Projects using contributed catalog records

10 Projects used catalog records contributed by this project. Those projects produced 0 publications which include 0 citations.

Assessing Long-Term Stress in Great Apes: Allostatic Load in Chimpanzees (*Pan troglodytes*) and Bonobos (*Pan paniscus*)
This project produced no publications.

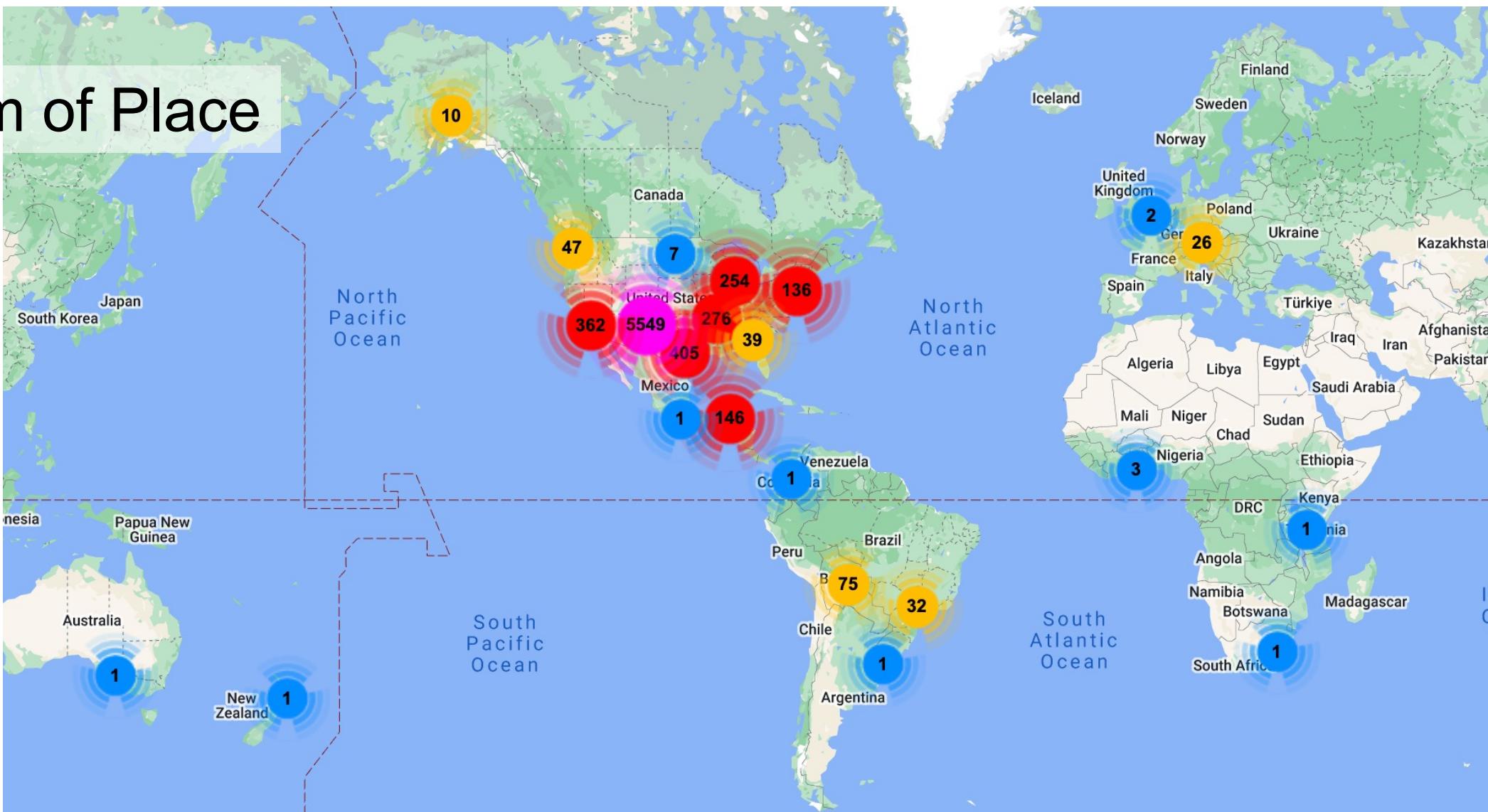
DNA methylation as epigenetic predictors of maximum lifespan and other life history traits in mammals
This project produced no publications.



Impact! Linked projects and pubs using records generated from this agreement

Let's talk about non-database challenges

The Problem of Place



Let's talk about non-database challenges



The Problem of Place

- Recognize the value of zoo data
- But first, we must see/understand the data!
- Better query tools, better data management?
- But first, we need to understand researcher needs
- More partnerships between zoos and museums
- But first, we need to organize and meet
(And that's what we're doing this week!)



The Arctos Ecosystem:

Arctos is both a collection management software AND a *community*



Thanks to Workshop organizers for this great opportunity!