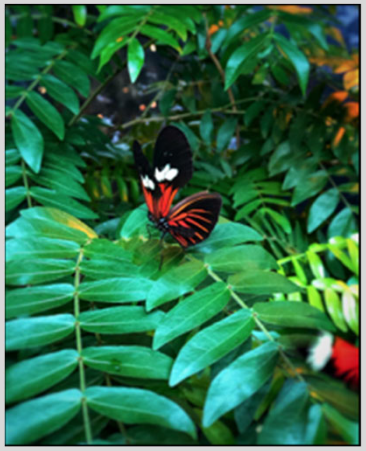
Jennifer M. Zaspel
Associate Curator and Head of Zoology Milwaukee Public Museum
Director Puelicher Butterfly Wing
Adjunct Associate Professor Purdue University





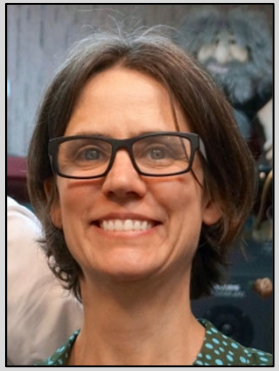

- **Project Title:** Collaborative Research: Digitization TCN: Digitizing collections to trace parasite-host associations and predict the spread of vector-borne disease
- **PIs:** Jen Zaspel & Stephen Cameron
- **Project Start Date:** September 1st 2019
- **Project Period:** 3 years
- **Participating Institutions:** 27
- **Co-PIs/Leads on Subs:** 34 (*12/17)
- **Participants:** 57+

Stephen Cameron, TPT Co-Lead

MILWAUKEE PUBLIC MUSEUM

Neil Cobb, NAU

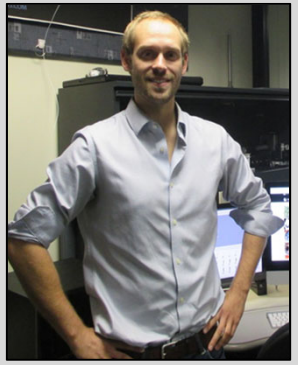
Rob Guralnick, UF



Katja Seltmann, UCSB

Julie Allen, UNR

Jorrit Poelen, GloBI



Mark Smith, MS LLC

André Poremski, Fg

Anna Monfils, BLUE

Alyssa Caywood, MPM

Chris Tyrell, MPM

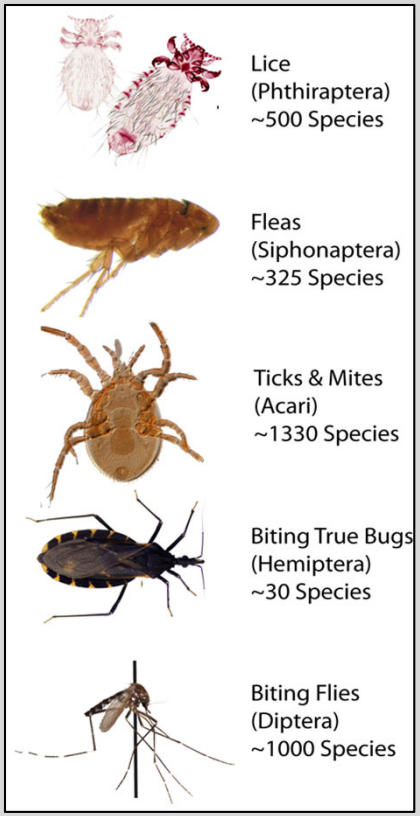
Julia Colby, MPM

Barb Thiers, NYBG

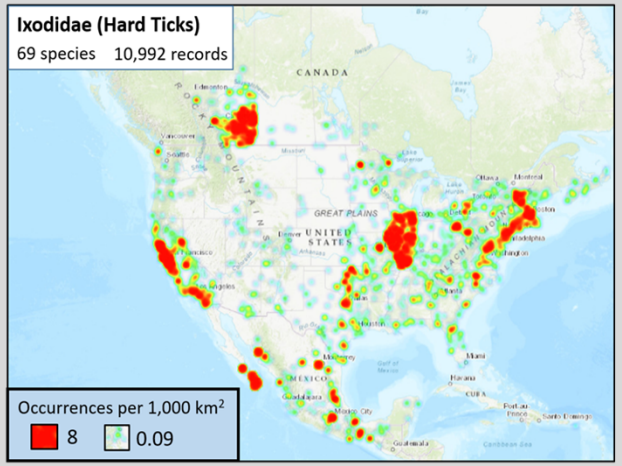
Matt Yoder, TaxonWorks

PARASITE TRACKER

DOCUMENTING ARTHROPOD VERTEBRATE PARASITES



- Parasitic arthropods inflict an enormous burden on the health of their hosts either directly, or through virulent pathogens that they vector
- Significant impact on livestock, which threatens agriculture and food security
- Although parasites represent a substantial proportion of organismal diversity, their data are not readily accessible
- Arthropod parasite data are underrepresented among digitized specimen data



Occurrence records for Ixodidae available on *Symbiota Collections of Arthropods Network* (SCAN). Numbers are representative of all arthropod parasite groups in North America: low numbers, large gaps, and few collections that have contributed data to date. Heat maps are depicting areas with a maximum number of occurrences of 8 (red) and a minimum of 0.09 per 1,000 km^2.

PROJECT GOALS

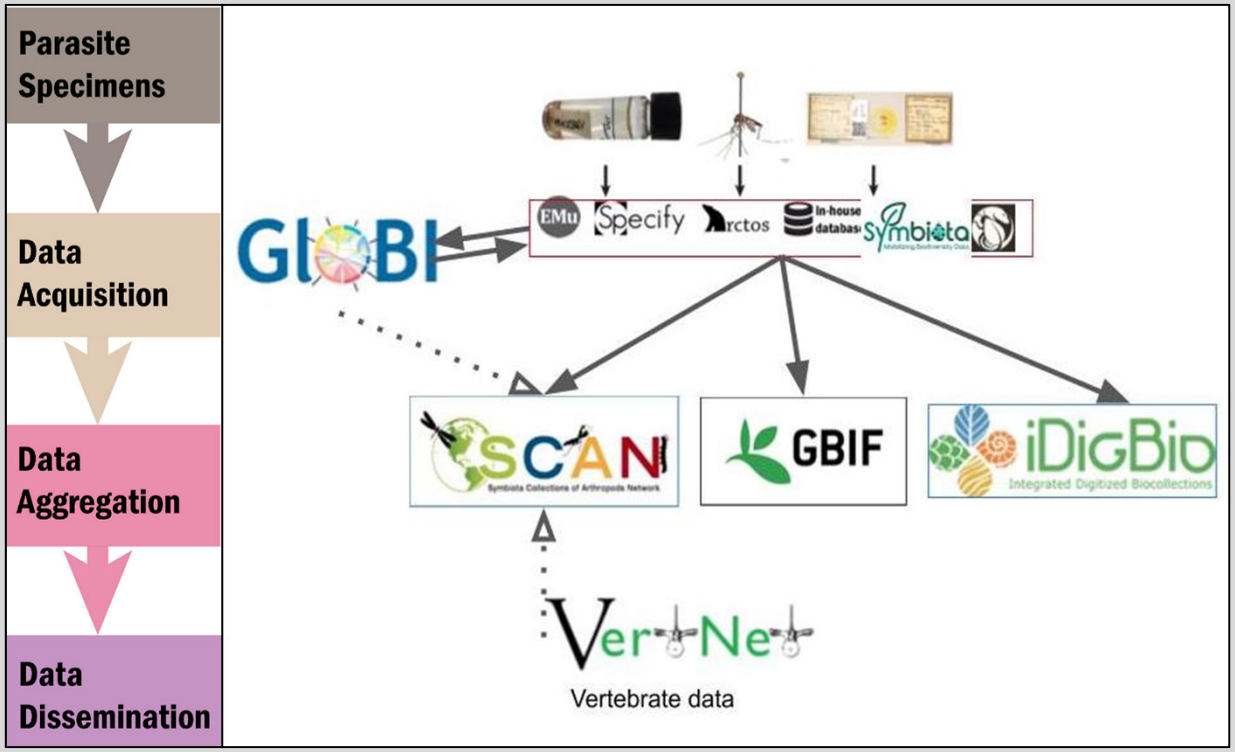
- The Terrestrial Parasite Tracker (TPT) Network will aggregate arthropod parasite collections to build an easily accessible, comprehensive database of parasite-host associations and vector distributions

- Our network will provide needed baseline information for research and management of the ecological interactions among parasites, pathogens, and their hosts in North America (including the U.S. & territories)

- We will work together to digitally provide information on parasite collections by providing research-ready data and images from **1.2+** million parasite specimens, which will be accessible to scientists, educators, wildlife managers, and policy makers worldwide

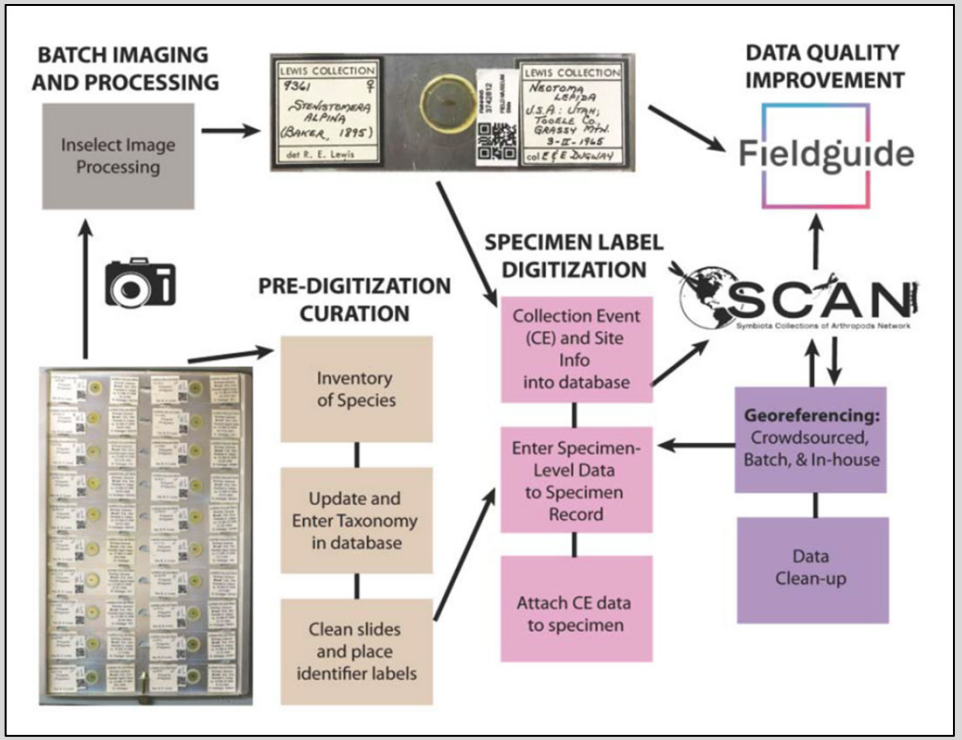
Specimen Digitization

- Transcribe and georeference label data from **1.2+** million arthropod parasite specimens from 22 collections across North America (U.S. and territories) including ~55,000 specimens from biotic-association collections



Specimen Digitization

- Produce **140,000+** High Throughput (HTP) scans of fluid-stored and **450,000+** HTP scans of slide-mounted parasite specimens

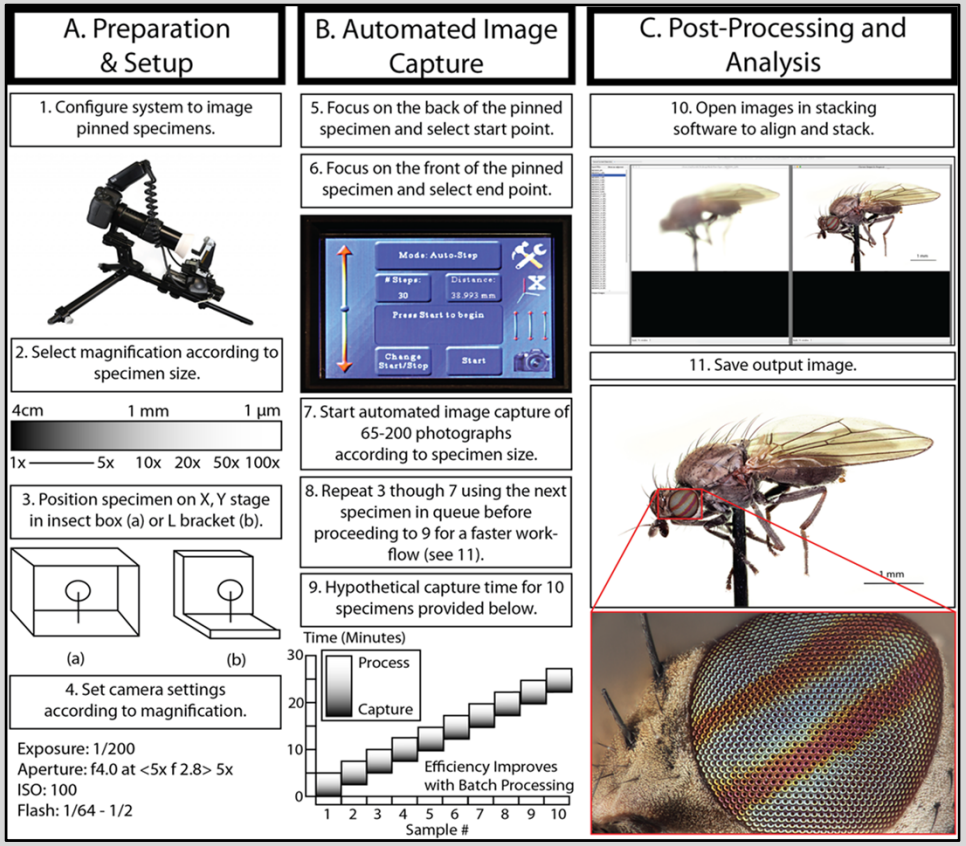


PARASITE TRACKER

DOCUMENTING ARTHROPOD VERTEBRATE PARASITES

Specimen Digitization

- Produce **20,000+** research-grade images of pinned specimen for exemplar parasite species and **200,000+** research-grade images of slide-mounted microparasite specimens



Notes from Nature

- Transcribe the label data into digital format using a community science approach
- Labels are ingested to Notes from Nature and transcribed label data is returned to the museum providers
- Notes from Nature hosted on Zooniverse has transcribed over 2.5 million specimens


Notes from Nature

Transcribe museum records!

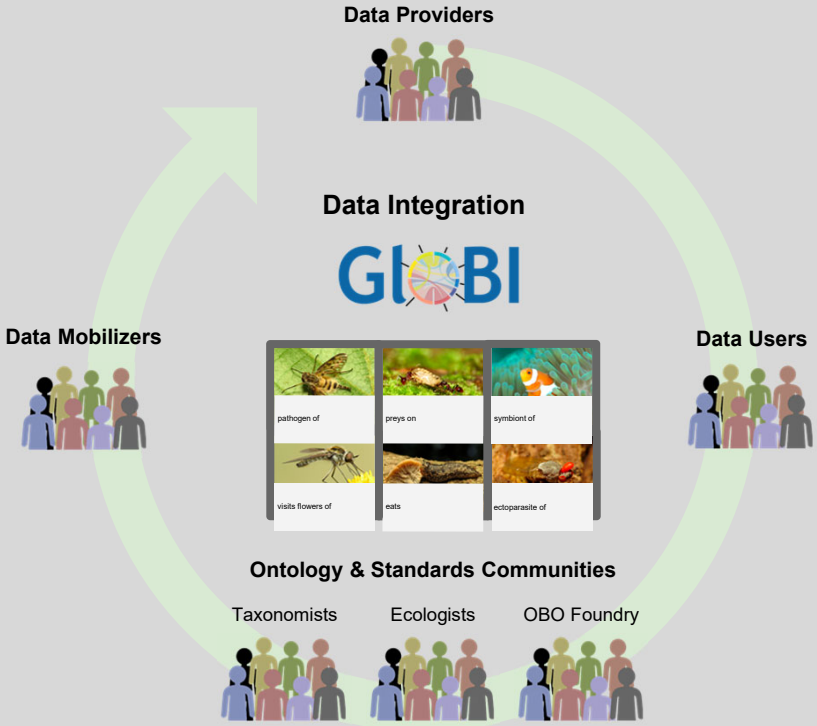
ZOONIVERSE
REAL SCIENCE ONLINE

Data Integration

TPT will generate approx. 500,000 biotic association records database maintained by Global Biotic Interactions (GloBI).

GloBI is a data integration tool that indexes existing species interaction datasets.

GloBI helps data mobilizers (e.g., citizen scientists, archivists, digitizers) to connect to data providers



Derived from: Poelen, Jorrit; Schulz, Katja; Hammock, Jennifer (2016): Pragmatic, scalable aggregation of organismal interaction data. figshare.

Broader Impacts

- Build interdisciplinary bridges between relevant research communities through facilitation of training workshops, sharing of workflows and data
- Engage the public in the importance of natural history collections and educate broad audiences of their use in addressing societal issues
- Curriculum enhancements for educators at multiple levels

FIELD MUSEUM

MILWAUKEE PUBLIC MUSEUM

THE BRAIN SCOOP

CBER

BLUE
Biodiversity Literacy in Undergraduate Education

Thank You!

NSF

MacroscopicSolutions
Portable, High Performance Imaging and Microscopy Systems

GEORGIA SOUTHERN UNIVERSITY

LepNet
Lepidoptera of North America Network

SCAN
Symbiota Collections of Arthropods Network

InvertNet

BIODIVERSITY COLLECTIONS NETWORK

PURDUE

WRBU
WALTER REED BIOSYSTEMATICS UNIT
Know the vector, know the threat

iDigBio
Integrated Digitized Biocollections

NSC ALLIANCE

VectorNet

VectorBase
Bioinformatics Resource for
Invertebrate Vectors of Human Pathogens