

Digitization Progress at the University of Hawaii Insect Museum

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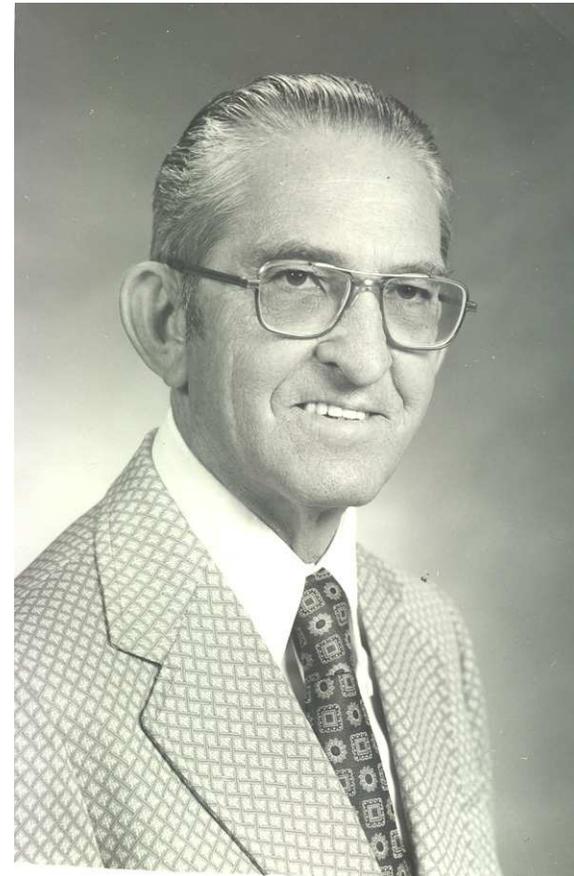
Background of the UHIM

- Originated in 1908 as a teaching collection, the same year the University was founded
- Basis for seminal research program on evolution and speciation of *Drosophilidae*
- 2nd largest US holdings of Hawaiian insects
 - Bishop Museum is largest
 - USNM & British Museum have extensive Hawaiian insect collections
- Use & support has been inconsistent



UHIM Systematists

- Elmo Hardy
(professor 1936?-2001)
- J.W. Beardsley
(professor 1963-1991)
- Dick Tsuda
(Research associate,
1977-present)
- Dan Rubinoff (professor
and director 2002-
present)



Elmo Hardy

Mission

- Improve land management in Hawaii by documenting and preserving a record of native and introduced terrestrial arthropods
- Serve the broader community by preserving, archiving, and expanding the collection to make a thorough representation of the Hawaiian and Pacific Island insect biodiversity
- Conduct scientific research unit on insect systematics, evolution and conservation
- Provide a resource for education about the function and importance of natural history collections

Collection Facility

- 2 imaging stations
- 4 microscope stations
- 3 staff desk/office
- Modular multi-purpose work area
- Wireless & wired internet
- Pinned collection
 - Cabinets on compactor
 - 1536 drawer capacity, with room to grow



Overview of Holdings

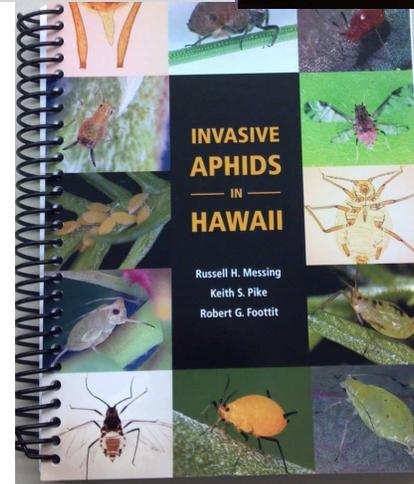
- Currently approx. 250,000 specimens
- Actively adding specimens
 - E.g. UV light trapping bycatch
- 54 holotypes, more to come as taxonomic work continues
- Extensive record of invasive species arrivals and native species extinctions

Size, taxonomic breadth, and specimen value of the UHIM by arthropod order (June 2009)

Order	Number of curated specimens	Total number of species	Native species	Non-Native species	Species with types	Holotypes	Plesiotypes	Allotypes	Paratypes
Diptera	142762	1871	944	927	731	1		2	10052
Lepidoptera	19966	319	160	159	35	52			537
Hymenoptera	19750	492	124	368	7				64
Coleoptera	15162	684	258	426	12				47
Acari	11725	127	112	15	5	1			20
Hemiptera	9241	387	196	191	20	0	1	0	84
Neuroptera	831	31	25	6					
Orthopteroids	804	60	3	57					
Odonata	469	22	15	7					
Psocoptera	445	22	6	16					
Thysanoptera	298	20	0	20					
Trichoptera	203	3		3					
Other orders	79	8	1	7					
TOTAL	221735	4046	1844	2202	810	54	1	2	10804

UHIM Strengths: Hawaiian & Pacific Insect Diversity

- Diptera: Tephritidae & Drosophilidae
- Macrolepidoptera
 - Noctuidae
 - Geometridae
 - Sphingidae
 - Butterflies
- Microlepidoptera
 - Cosmopterygidae
 - Tortricidae
- Aphids
- Mites



Current & Recent Research

- Systematics
 - Lepidoptera
 - *Hyposmocoma* (Cosmopterygidae)
 - *Omiodes* (Crambidae)
 - Hawaiian Noctuidae
 - *Eupithecia* (Geometridae)
 - Diptera: *Bactrocera*, Dacine fruit flies
 - Hemiptera: *Nyssius* (weiku bug)
- Biodiversity & Conservation
 - *Vanessa tameameha* Kamehameha butterfly
 - *Scotorythra* Koa moth outbreak
 - Hawaiian *Drosophila*
 - Tephritid ecology in Asia & Pacific

UHIM Digitization Project

- Currently digitizing all specimens in collection
 - Imaging specimens and labels
 - Transcription of label data
- Funding: NSF and Hawaii DLNR
- Project is part of [InvertNet](#) efforts in conjunction with midwestern collections



invertnet

Drosophilidae of Hawaii Database

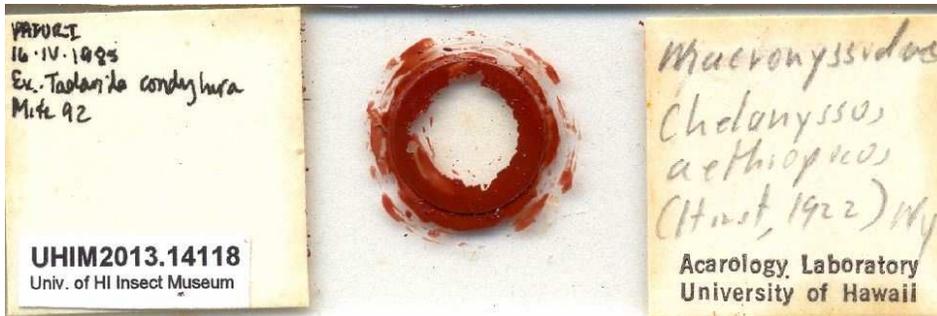
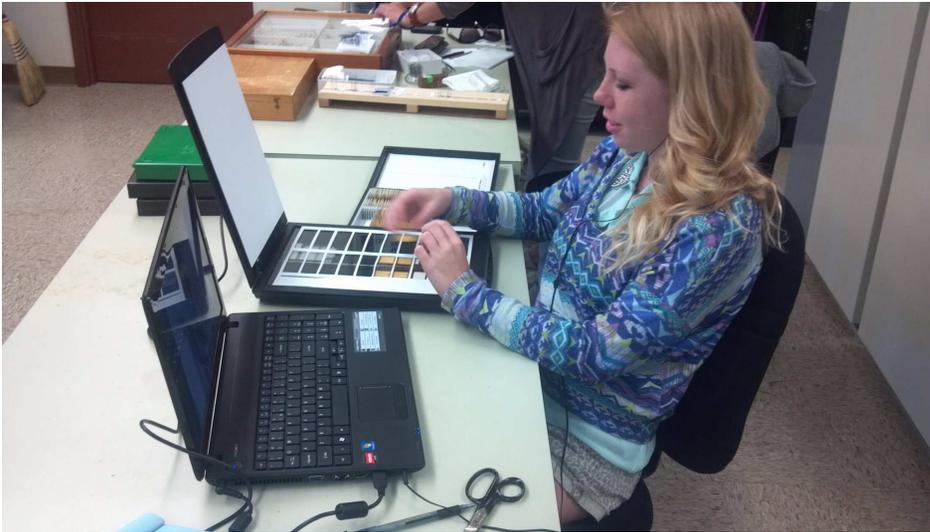
- <http://www.herbarium.hawaii.edu/drosophila/>



Hawai'i Department of Land & Natural Resources Database

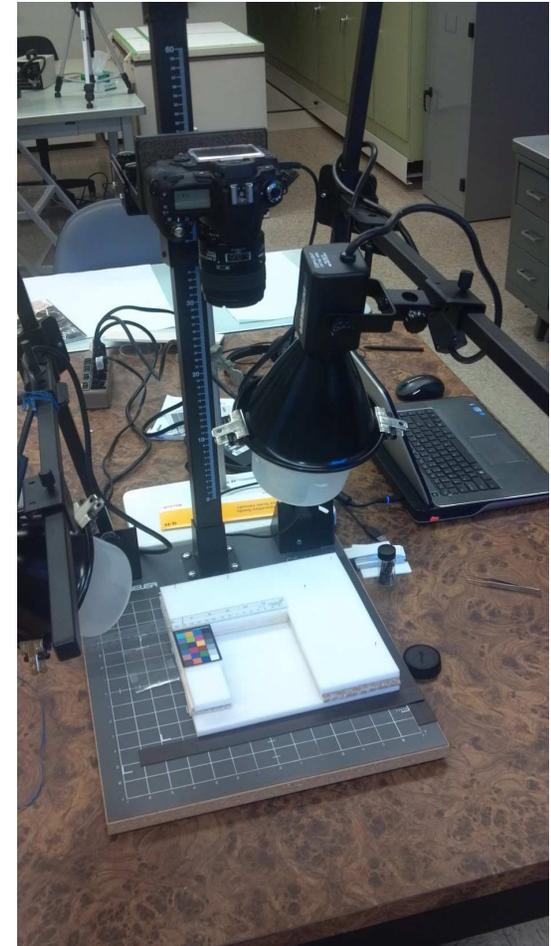
- Transcribe relevant UHIM records for integration into a spatially-hierarchical, geo-referenced database
- Only for Hawai'i collection records
- Methods
 - Funding for 2 student workers and one part time postdoc
 - Direct transcription of label data into spreadsheet
- Progress: 33,028 pinned specimens transcribed since June 2012

UHIM Digitization Project



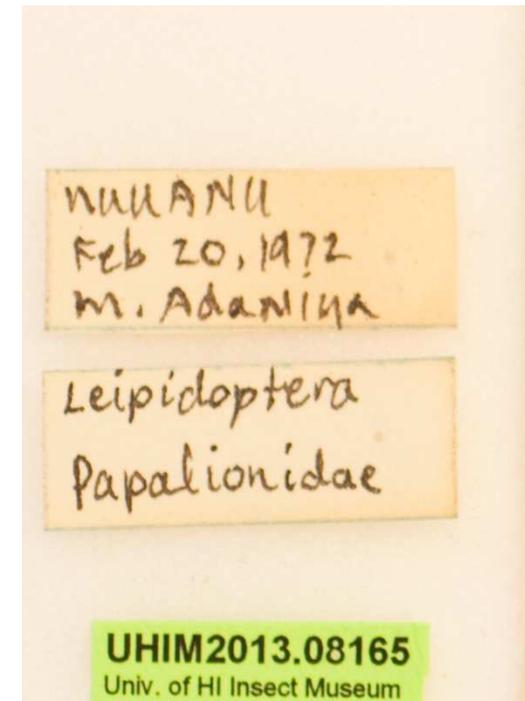
UHIM Digitization Project

- Emphasis on *label imaging* to allow automated/ remote transcription
- Single specimen photography



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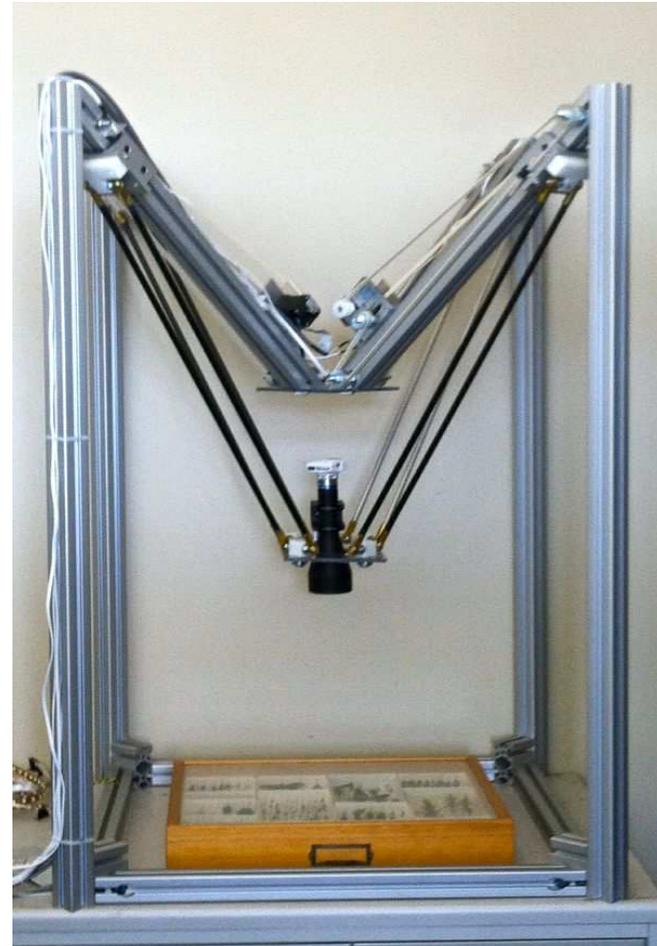


UHIM Digitization Project: Progress

- 33,000 pinned specimens transcribed for HDLNR
- Approx. 19,000 slides scanned (600 dpi)
 - Aphids (all introduced pests; identified to species)
 - Hawaiian mites (mostly identified to species)
 - UID labeled, scanned, uploaded to InvertNet (tagged with keywords)
- Approx. 60 drawers photographed as individual specimens
 - large specimens: Lepidoptera, Coleoptera, Hemiptera

UHIM Digitization- Future Work

- InvertNet whole drawer imaging robot
 - Is it reliable?
 - Can we REALLY see labels?
 - Does anyone have experience with it?
 - Has anyone seen images of the output?
- Vial collection: small; specimens need to be moved to new vials
- Labels into a database
 - Crowdsourcing?



Web & Social Media Presence

- Goals
 - connect with local citizens and spread awareness of the UHIM mission
 - Update followers on research
 - Conduit for crowdsourcing efforts between citizen scientists and UHIM staff



Web: ctahr.hawaii.edu/insectmuseum/

Facebook: facebook.com/UHInsectmuseum

Blog: uhawaiiinsectmuseum.wordpress.com/

Flickr: flickr.com/photos/uhmuseum/

Mahalo! Undergraduate Students



Kristen Jamieson



Tiara Stark



Nicolette Smith

Mahalo!

- Gil Nelson and iDigBio
- Chris Dietrich and InvertNet
- NSF
- UH College of Tropical Agriculture and Human Resources
- Dan Rubinoff (UHIM Director)
- UHIM Staff: Will Haines, Luc Leblanc, Mike San Jose, Andersonn Prestes

