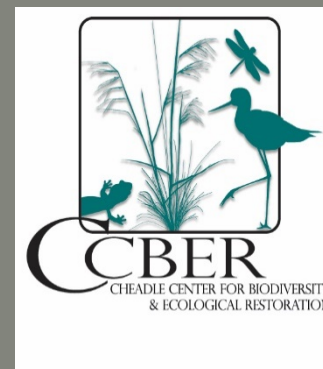




Getting Started: Digitizing Multiple Collections at UCSB

Laurie Hannah, CCBER Affiliate
SPNHC Meeting, May 21, 2015



A Sample of CCBER Collections



700 Diatoms

Insects

Core samples and
microfossils

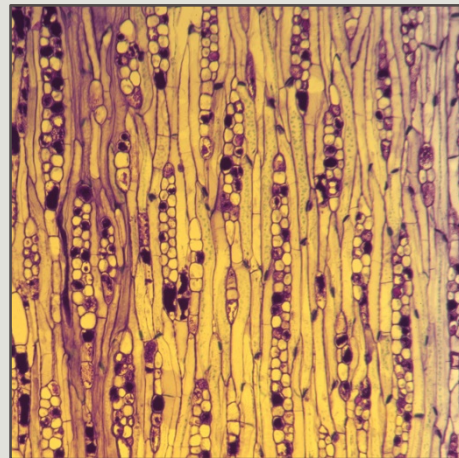
Herbarium sheets

Photographs

Field notes



7,500 Algae



64,000 Plant Anatomical Slides
and Images



32,000 Vertebrates

Digitization Projects Initiated at CCBER

- **The Katherine Esau Digital Archive Project** -- Library Services and Technology Act (LSTA) (2008-2009)
- **Cheadle Plant Anatomy Collection** (internally funded) (2009-2010)
- **Compact Storage and Curation of Higher Plant and Algae Specimens** -- NSF BRC grant 2010-2012.
- **Vertebrate Collections Management Project** -- IMLS MFA (2011-2013)
- **Digitization of the UCSB Vascular Plant Collection** -- IMLS MFA (2013-2014)

Katherine Esau Digital Archive

Electron and light microscope slides;
photographic images, papers

Challenges

- No previous experience with large scale digitization
- No collection manager
- No equipment or funding to get started
- How to serve digital objects to wide audience?



Katherine Esau Digital Archive

Strategies and Results

- Fit project to funding source (LSTA)
- Created pilot digitization project
- Grant paid for scanning in-house vs. outsourcing
- Only photos digitized
- Targeted widest audience for collection (K-12, academic)

Katherine Esau Digital Archive project 2008-2009

- Digitized ~ 375 images
- Images served by Calif. Digital Library and DPLA
- Web pages with biographical info. and plant anatomy materials
- K-8 curriculum

What Are the Differences Between a TEM and a Light Microscope?

Although TEMs and light microscopes operate on the same basic principles, there are several differences between the two. The main difference is that TEMs use electrons rather than light in order to magnify images. The power of the light microscope is limited by the wavelength of light and can magnify something up to 2,000 times. Electron microscopes, on the other hand, can produce much more highly magnified images because the beam of electrons has a smaller wavelength which creates images of higher resolution. (Resolution is the degree of sharpness of an image.) Figure 2 compares the magnification of a light microscope to that of a TEM.

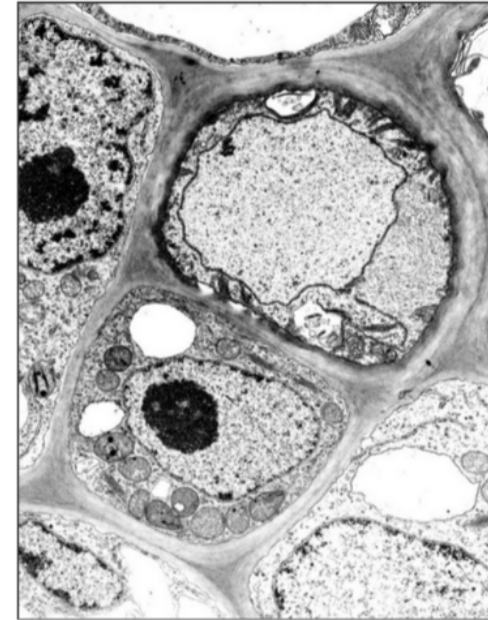
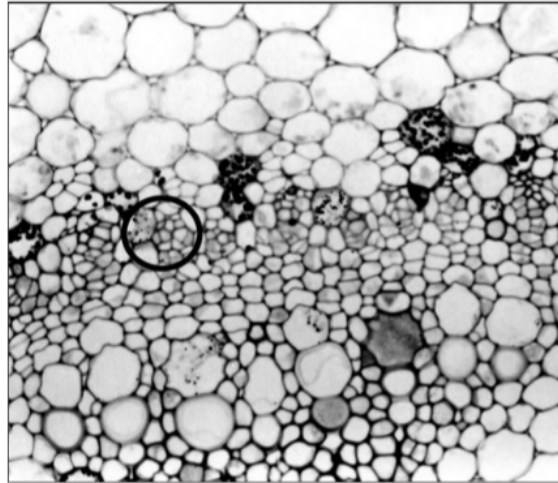


Fig. 2 [left] Cotton stem; area in the circle is the phloem tissue. Light microscope x250. Photo by K. Esau. [right] Enlarged image of cotton phloem tissue showing a sieve element (top cell) and a companion cell (bottom cell), TEM x8,000. Photo by J. Thorsch.

Images and Metadata Served Through Calisphere and Digital Public Library of America

Calisphere Search Results x

content.cdlib.org/search?facet=type-tab&relation=calisphere.universityofcalifornia.edu&style=cui&keyword=esau&x=0&y=0&startDoc=26

calisphere University of California

browse a-z about contact us

Calisphere > Search Results

377 results for: "esau"

364 images 13 texts 0 websites

26 - 50 of 364 images view as slideshow

display: 25 90

previous page 1 2 3 4 5 next page search within results

At Markleeville Stem Leaf Leaf Fruit

Plant embryo [Sugar beet plants, Ranch 3, Spreckels] Leaf Leaf Leaf

magnetic knife holder x A-Line Multi-Light Pen x Laurelhurst Bin Pendant x Teri Turan - contempo x Knobs and Pulls - By P x "katherine esau" - Search x

dp.la/search?q=katherine+esau&subject%5B%5D=Plants&subject%5B%5D=Cells+%28Biology%29&utf8=✓

DPLA DIGITAL PUBLIC LIBRARY OF AMERICA

Home Exhibitions Map Timeline Bookshelf Apps

View: katherine esau

Save Share

Search Results

Your search for katherine esau returned 107 results.

Refined by: Plants Cells (Biology)

Items per page: 10 Sort by: Relevance 1 2 3 ... 10 11

Refine

By Format image 107

Contributing Institution

IMAGE

Stem

Esau, Katherine, 1898-1997

Cross section of the phloem, or food conducting tissue, from the stem of an Echium plant taken with an electron microscope.

View Object

9:08 AM 5/11/2015

Cheadle Plant Anatomy Collection

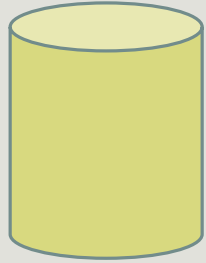
Fluid preserved specimens, herbarium sheets, slides and photographs

Challenges

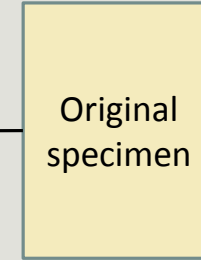
- Complex data schema/structure
- How best to represent multiple relationships in Specify
- Data entry only; still have slides to image and derivative images
- Link to Vascular Plant Collection



Fluid Plant Specimen



Herbarium Sheet



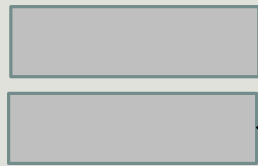
Original specimen

Catalog Number: 102242
Collector number: M32
Prep Types: slides and sheets

Catalog number: 23578
Collector Number: M32
Prep type: Sheet

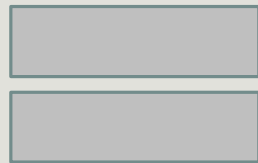
Slide Preparations

X-sect. Root



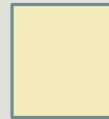
100123-100130

Maceration
Roots



100131-100135

23578



Vascular Plant Collection in Specify

Plant Anatomy Collection in Specify

Sample Specify Record

Specify 6.5.05

File Edit Data System Tabs Help

Welcome Data Trees Reports Interactions Statistics Query Workbench SGR Plugins Lifemapper Attachments

100385

Create/Update

Collection Object

Catalog Num... 100385 Accession: Alt Cat Num...

Cataloger: Hannah, Laurie Cataloged Da... 01/01/2011 Cultivated:

Collector Number: MS33

GUID: f7cbeeb4-1a5d-11e3-b49f-5

Ocr:

Determinations

Taxon: *Yucca brevifolia* Current

Qualifier: Addendum:

Preferred Tax... *Yucca brevifolia* Name Usage:

Determined D... Determiner: Type Status: None

Remarks:

Collecting Information

Collecting Trip: Locality:

Start Date: End Date: Verbatim Da... 05/11/1955

Locality and Habitat Notes: seedlings, Coll. greenhouse no. 11, Rancho Santa Ana Botanic Garden

Collectors

Last Name	First Name	Remarks
Cheadle	Vernon I.	

Preparations

Prep Type	Is On Loan	Preparation Attachments	Count	Prepared By	Storage	Remarks
Fluid	No		1			
Maceration	No		22			feeder roots ...

Attributes

Phenology:

Specimen Description:

Maceration - 22

Prep Type: Maceration Prepared Da... Full Date MM/DD/YYYY Is On Loan Show Loans 0

Count: 22 Prepared By: Storage:

Remarks: feeder roots 111561-111565, large roots 111566-111569, stem 111570-111579, leaf 111580-111582

Eurychora
Restia complanatus, R.Br. CA-413
 FAA Pl 2012 Restionaceae

Roots, rhizomes, stems with leaf sheaths, infl. axis with flowers.

Collected; Lake Dobson, Fields National Park
 Hobart

2-10-60 (with Bill Jackson) 102242^{ab}
 44228
 20499

Macerations:

Root - 5 139, 117-139, 121
 Rhizome - 5 139, 122-139, 126
 Stem - 5 139, 127-139, 131
 Leaf Sheath - 4 139, 132-139, 135
 Inflorescence Axis - 5 139, 136-139, 140

Cheadle Plant Anatomy Collection

Strategies and Results

- Used available endowment funds
- Leveraged staff with collections experience
- Specify = free, open source
- Bottles 66% completely databased with 25,415 associated microscope slides
- Project can continue using current imaging workflow for vascular plants

Vertebrate Collections Management Project

Challenges

- No collections manager
- Data missing or incomplete, not normalized, from multiple sources
- Curation of collection needed
- Infestations



Williams. S. et al. 1996. APPLYING MCGINLEY'S MODEL FOR COLLECTION ASSESSMENT TO COLLECTIONS OF RECENT VERTEBRATES. Collection Forum. 12(1):21-35

What level of processing are the specimens at?

Level 1—Acquisition and Accession

At this stage, the potential exists for loss of specimens, specimen parts, and/or associated data.

- A) Do specimens have associated data and a collector number?
- B) Are specimens at risk for mechanical, chemical, and/or biological damage?
- C) Does UCSB have legal ownership of the accession as a whole? Are copies of permits available?

Level 2—Stabilization

At this stage, specimens are stabilized for preservation and protection, and associated records are compiled and organized

- D) Have specimens been either prepared or frozen?
- E) Do unprepared specimens have a pre-prep number?
- F) Is associated data correct and complete?
- G) Do we need to eliminate or replace inappropriate materials? (e.g. packing or improper fluids)

Level 3—Cataloging

At this stage, specimens are catalogued and provisionally available for use.

- H) Do specimens have a UCSB catalog number?
- I) Are associated parts of specimens marked with the catalog number?
- J) Have all extraneous materials been removed? (e.g. string, debris, staples, etc.)
- K) Has a catalog record been created (card or online)?

Level 4—Labeling and Housing

At this stage, specimens are properly housed and labeled.

- L) Are specimen parts correctly and completely labeled? (e.g. attachment of tags on specimens, bones labeled with catalog number. This applies to multiple lots in one container.)
- M) Are specimen parts associated with the rest of their collection? (i.e. cross referenced)
- N) Are specimens stored in appropriate containers? (e.g. standardized boxes or vials)
- O) Are containers properly labeled?

A	B	W	X	Y	Z	AC	AD	AE	AF	AG	AH	AI	AJ
Herp collection													
		U	V	W	X	Comments							
Unit 1	Ambystomatidae, Dicamptodontidae, Amphiumidae, Chryso					Ants inside door of room; all shelves on south wall need vacuuming; hazardous materials throughout							
c		1	1	1	1	F-#27842 lacks data; L lots need data tags; O-R Need UCSB # and fluid yr. on LL							
d		0	1	1	0	F-L 1 lot #6107 inc. data; O-R UCSB # on LL; U bolt loose on shelf; X need new fluid							
e	Plethodontidae	1	1	1	0	L mult. Ser. In 1 jar; O-R UCSB and fluid yr. on LL; Q need county reorg.; S jars overstuffed; X new fluid							
Unit 2						Move additional canisters out of the way of the shelf							
b	Plethodontidae	1	1	1	0	F 2 jars missing data; L mult ser. In 1 jar; O-R UCSB and fluid yr. on LL; S jars overstuffed; X new fluid							
c	Rhyacotritonidae	1	1	1	0	F some missing data; L mult ser.; O-R UCSB # and fluid yr on LL; S 1 jar overstuffed; X new fluid							
d	Ascaphidae, Bombina	1	1	1	0	J remove paper; L missing SL in lots; O-R UCSB # and fluid yr.; Q work table blocking retrieval; S over							
e	Pelobatidae	1	1	1	0	L mult ser in 1 jar; O-R UCSB and fluid yr. on LL and shelf not labeled ; Q ethanol cans blocking retrieval							
Unit 3													
b	Bufo	1	1	1	0	L mult ser Bufo boreas (SB); O-R UCSB# and fluid yr; S overcrowding in jars; X new fluid							
c		1	1	1	0	O-R LL lot#, UCSB#; S Bufo boreas (Vent.) overstuffed; X fluid							
d	Bufo	1	1	1	0	O-R LL lot#, UCSB#; Q cans blocking; S overstuffed; X 8 bad lids, fluid; Y needs review							
e	Hylidae, Microhylidae	1	1	1	0	L mult ser Pseudacris regilla; O-R UCSB# and fluid yr.; Q hard to reach; S overstuffed							

Vertebrate Collection Management Project 2011- 2013

- 1.5 years
- 17 students participated
- 31,000 herpetological, ornithological, and mammalian specimens databased
- 522 gallons ethanol replaced



Vertebrate Collections Management Project

Strategies and Results

- Summer collection assessment -> IMLS grant narrative
- Solidified and firmly established curatorial internship
- Increased student recruitment—17 students participated
- Convinced donor to fund 3-yr full time collections manager position

Lessons Learned and Key Strategies

- Design manageable projects that can be finished on time.
 - PROs: Less stress, build on accomplishments; CONs: Digitizing entire collection may take years.
- Be creative with funding.
 - Piggyback on a TCN
 - Digitize more than one type of material
 - Look for funders beyond science



Acknowledgment and Thanks

Funding for this presentation was partially provided by **iDigBio** and the **Cheadle Center for Biodiversity and Ecological Restoration (CCBER)**, University of California, Santa Barbara.

Additional thanks go to:

1) the support staff at **Specify**. We could not have completed any projects without your help.

2) the folks at **iDigBio** who have worked with the collections community to create an outstanding array of models, workflows, training opportunities, and communication platforms to support all of us in our digitization efforts.