Scanning Microscope Slides

EMEC45834 Cimex lectularius.jpg

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Essig Museum of Entomology
University of California, Berkeley

California Arthropod Diversity Online

Museum of Entomology Collections

matches: 2050

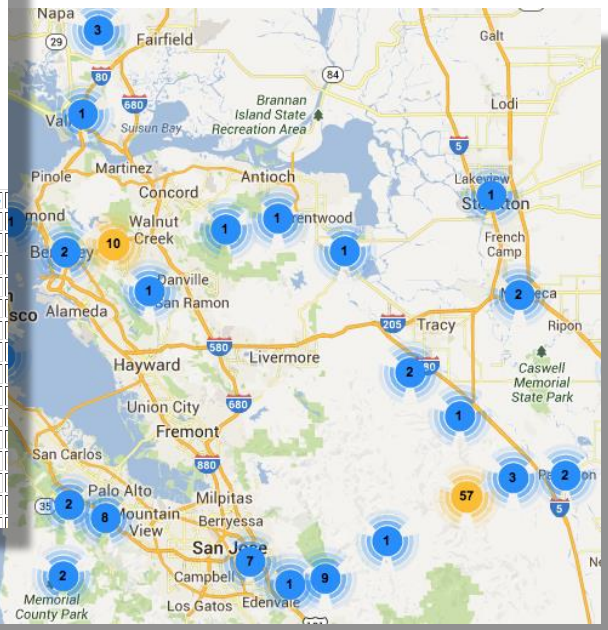
your results (tab-delimited text file, max 2050 lines, file size = 1115.5 K)
Windows users: 1) Add a .txt extension to save file, or 2) tell your browser to open the file in Excel.)

georeferenced records on a map

T FROM eme WHERE ScientificName like "%Libellula%" ORDER BY Family,ScientificName

to see the full specimen record

	Order	Family	Genus Species ssp	Collector	Year	State/Province
	Odonata	Libellulidae	Libellula auripennis	Jerry A. Powell	1951	Florida
	Odonata	Libellulidae	Libellula auripennis		1939	Texas
	Odonata	Libellulidae	Libellula axilena	Jerry A. Powell	1951	Louisiana
	Odonata	Libellulidae	Libellula comanche	John W. MacSwain	1947	California
	Odonata	Libellulidae	Libellula comanche	John W. MacSwain & Ray F. Smith	1951	California
	Odonata	Libellulidae	Libellula comanche	John W. MacSwain	1947	California
	Odonata	Libellulidae	Libellula comanche	John W. MacSwain & William F. Barr	1947	California
	Odonata	Libellulidae	Libellula comanche	John W. MacSwain & William F. Barr	1947	California
	Odonata	Libellulidae	Libellula comanche	John W. MacSwain & William F. Barr	1947	California
	Odonata	Libellulidae	Libellula comanche	John W. MacSwain	1947	California
	Odonata	Libellulidae	Libellula comanche	John W. MacSwain & William F. Barr	1947	California
EMEC81906	Odonata	Libellulidae	Libellula comanche	John M. Burns	1957	California
EMEC81907	Odonata	Libellulidae	Libellula comanche	John M. Burns	1957	California
EMEC81908	Odonata	Libellulidae	Libellula comanche	John M. Burns	1957	California
EMEC81910	Odonata	Libellulidae	Libellula comanche	Catherine A. Toschi	1963	Arizona



CalBug

NSF - ADBC grant

Collaboration among the eight major entomology collections in California

Essig Museum of Entomology, UC Berkeley

California Academy of Sciences

California State Collection of Arthropods

Bohart Museum, UC Davis

Entomology Research Museum, UC Riverside

San Diego Natural History Museum

Santa Barbara Museum of Natural History

LA County Museum

BOHART MUSEUM OF ENTOMOLOGY

Natural History Museum of Los Angeles County

Santa Barbara Museum of Natural History

CALIFORNIA ACADEMY OF SCIENCES

SAN DIEGO NATURAL HISTORY MUSEUM

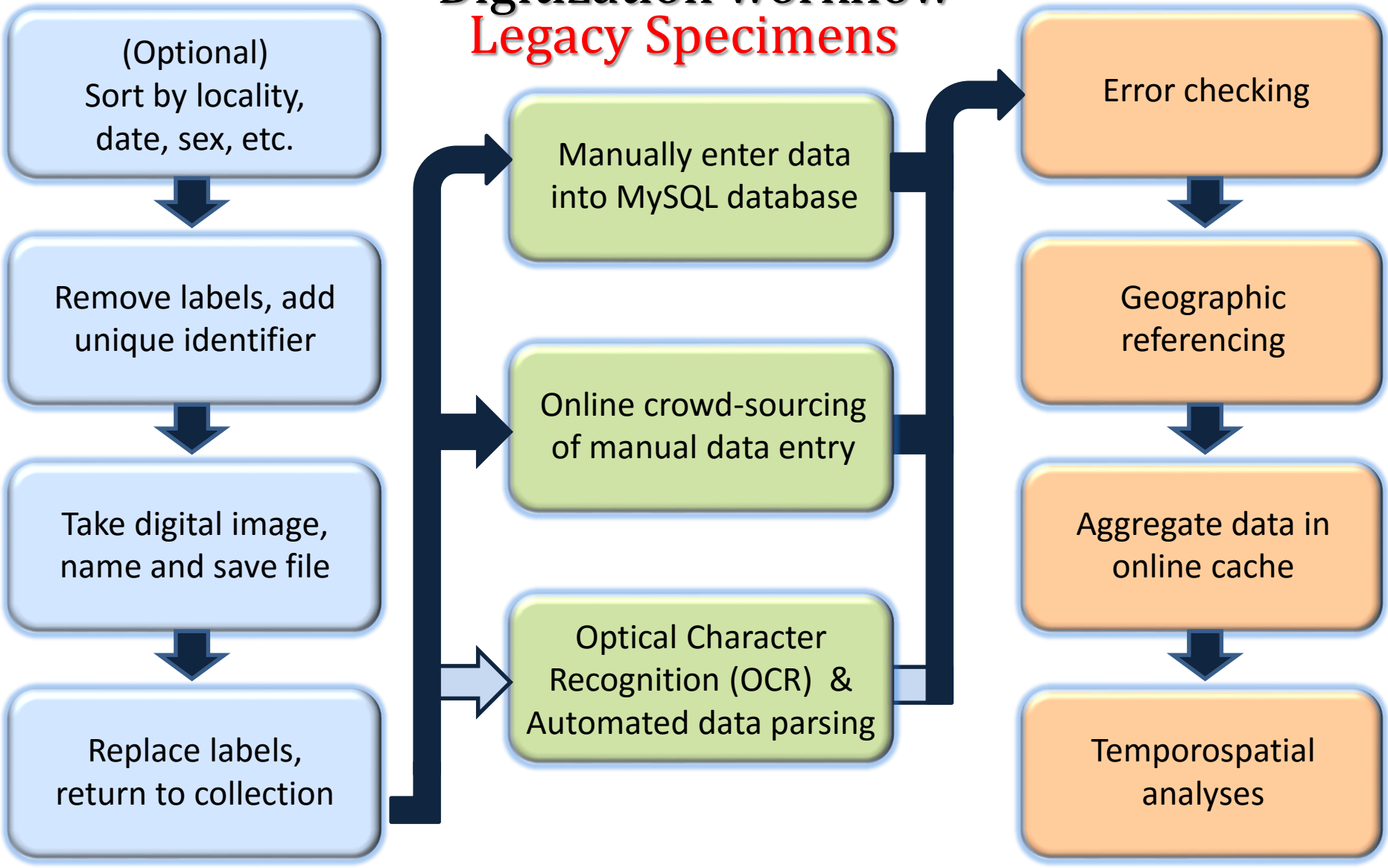
cdfa CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

Why Image Labels?

- Magnify difficult to read labels
- Verbatim archive of label data
  - Essential for proofing data
  - Useful for taxonomists interested in label data
- Data capture can be done remotely
- Potential for Optical Character Recognition (OCR)

EMEC332214 Aetheca wagneri.jpg

Digitization workflow
Legacy Specimens



Digital camera tethered to computer

Paracotalpa ursina

Slide Scanning

EMEC332214 Aetheca wagneri.jpg

How to batch scan slides

Equipment

- ✓ Flat bed scanner
- ✓ Jig for arranging slides
- ✓ Unique ID labels

Software

- ✓ Scanner software
- ✓ Photoshop
- ✓ IrfanView

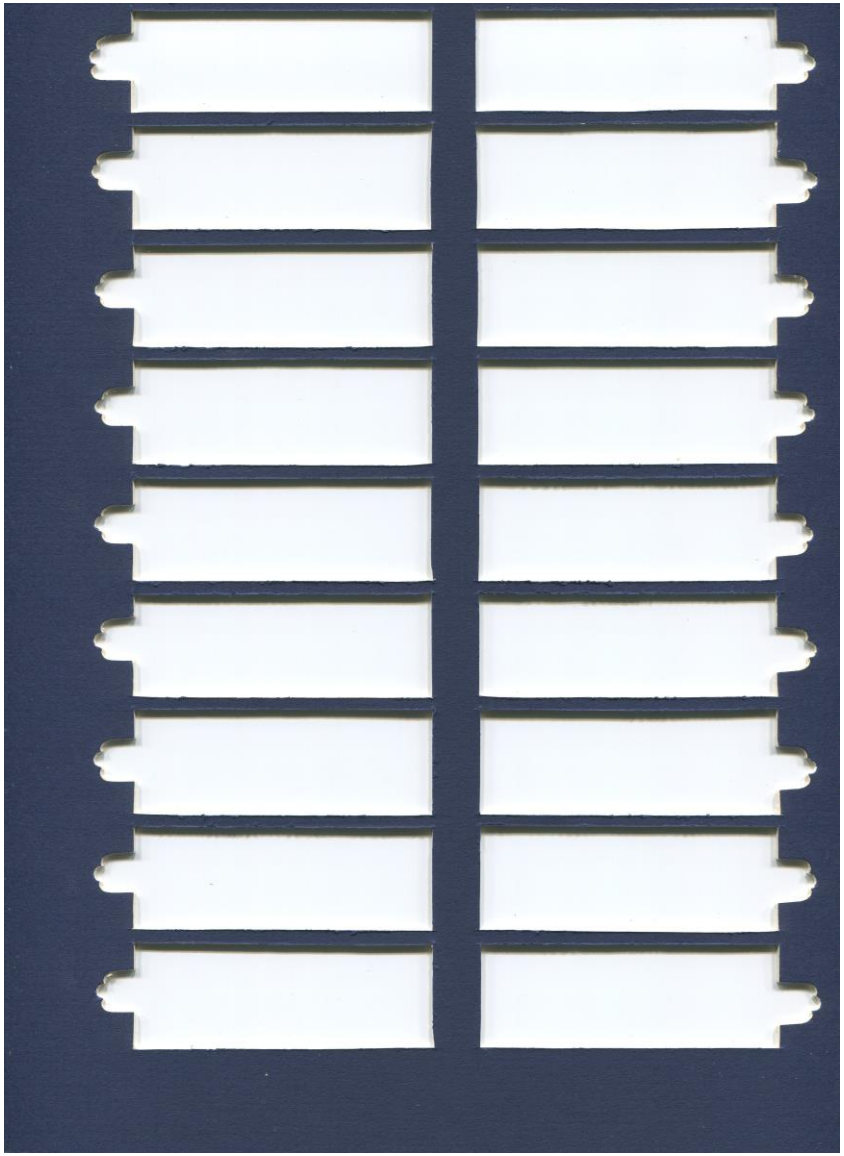
Process

1. Sort slides (optional)
2. Lay slides on scanner bed
3. Add unique ID labels
4. Scan slide set (at 400 DPI)
5. Open scan in Photoshop
6. Use an "Action" to
   Divide scan -> individual slides
7. "Save for Web"
8. Rename with IrfanView

Equipment

- Any flatbed scanner will do
- Use software that comes with the scanner
- Create a jig (we use matting for framing)

Jig cut from mat board



Jig filled with Aphid slides

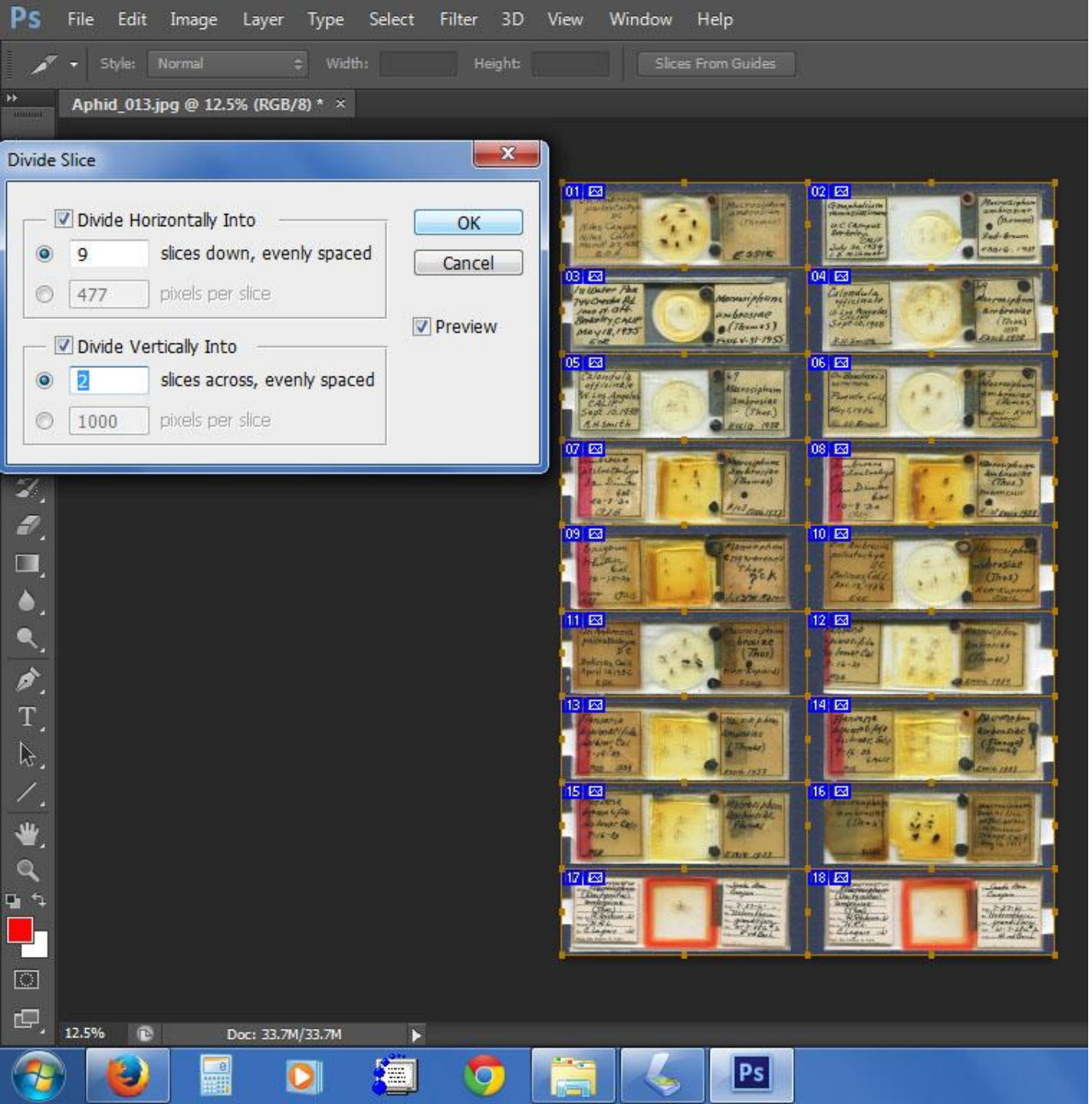
Use the

Crop Tool

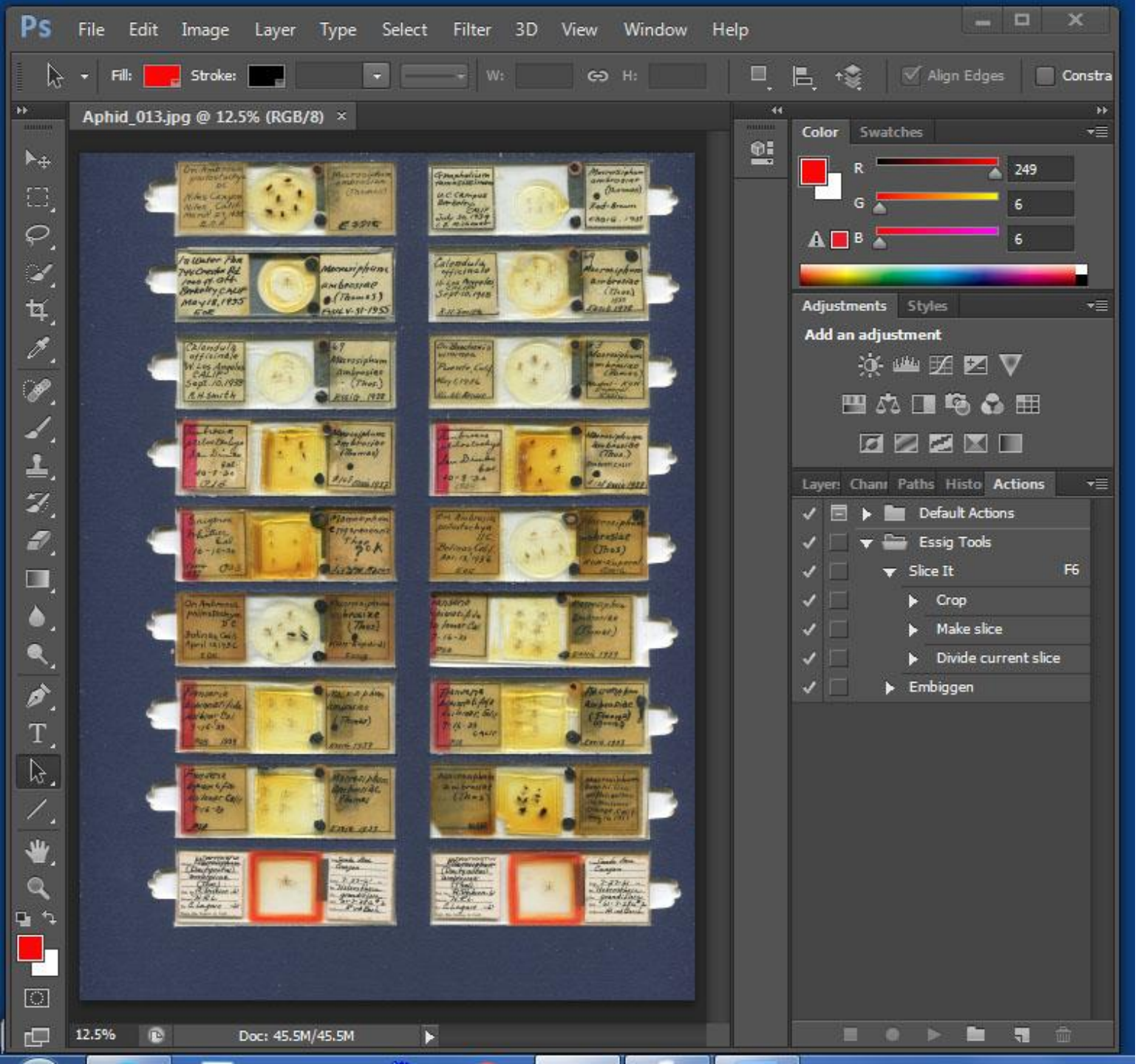
And

Slice Tool

To define the individual slides



This scan has already been cropped and is now being divided into 18 equal rectangles



Save the
- Crop
- Make Slice
- Divide Slice
Steps as an "Action"

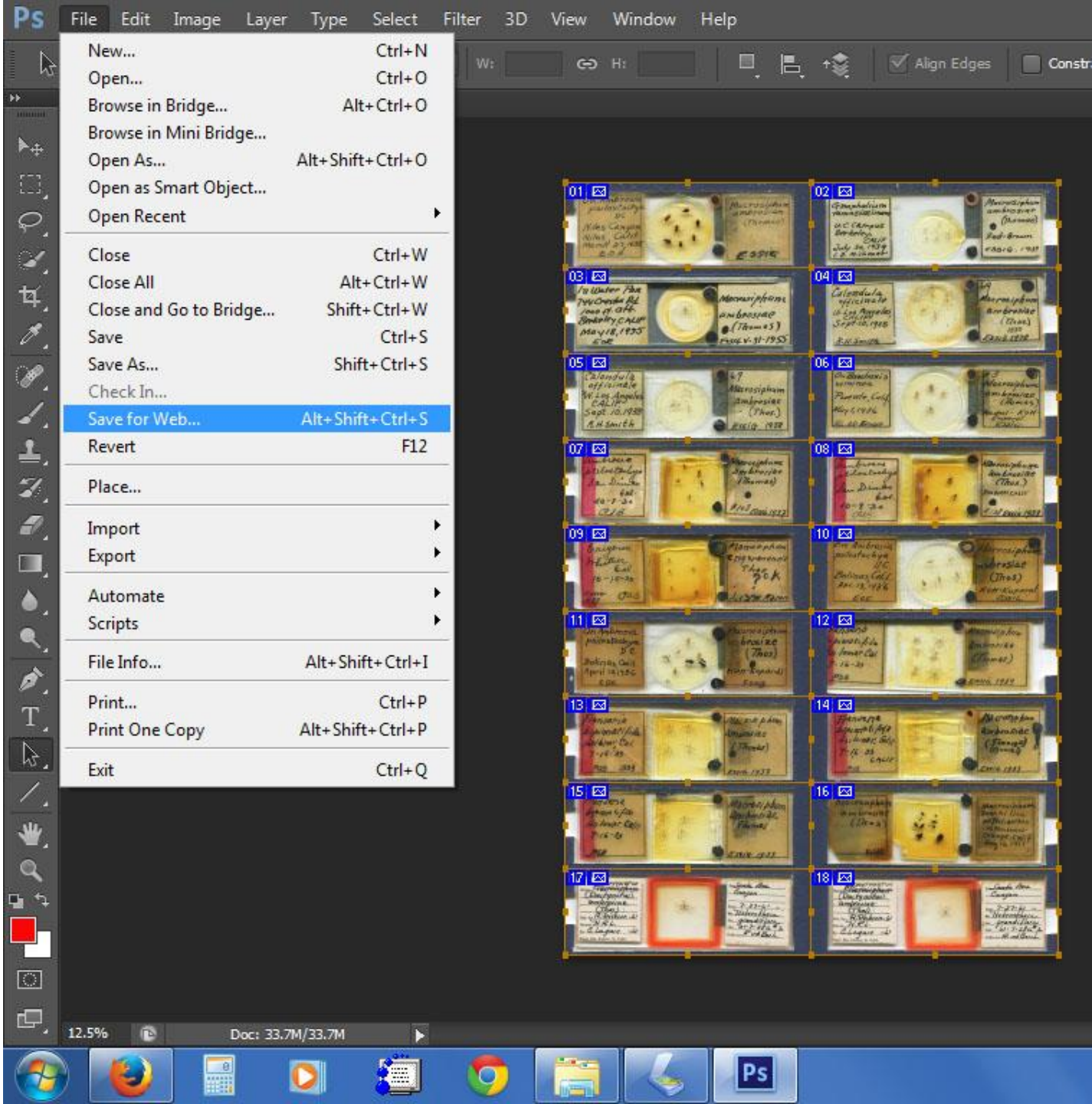
I named my Action "Slice It"

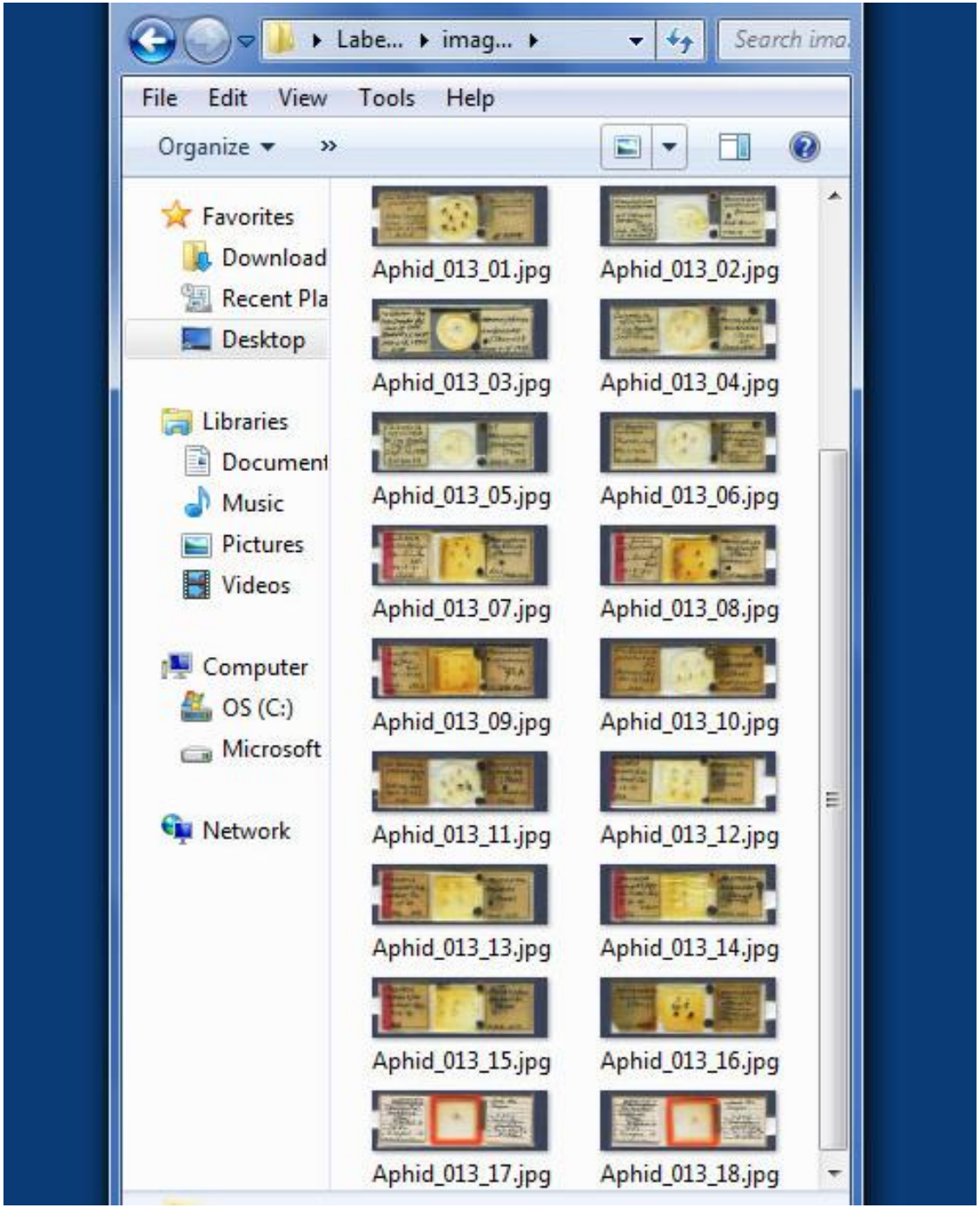
Just "play" the Action for each scan.

Process takes as long as it takes to click the mouse.

Choose the "Save for Web" option in the File menu

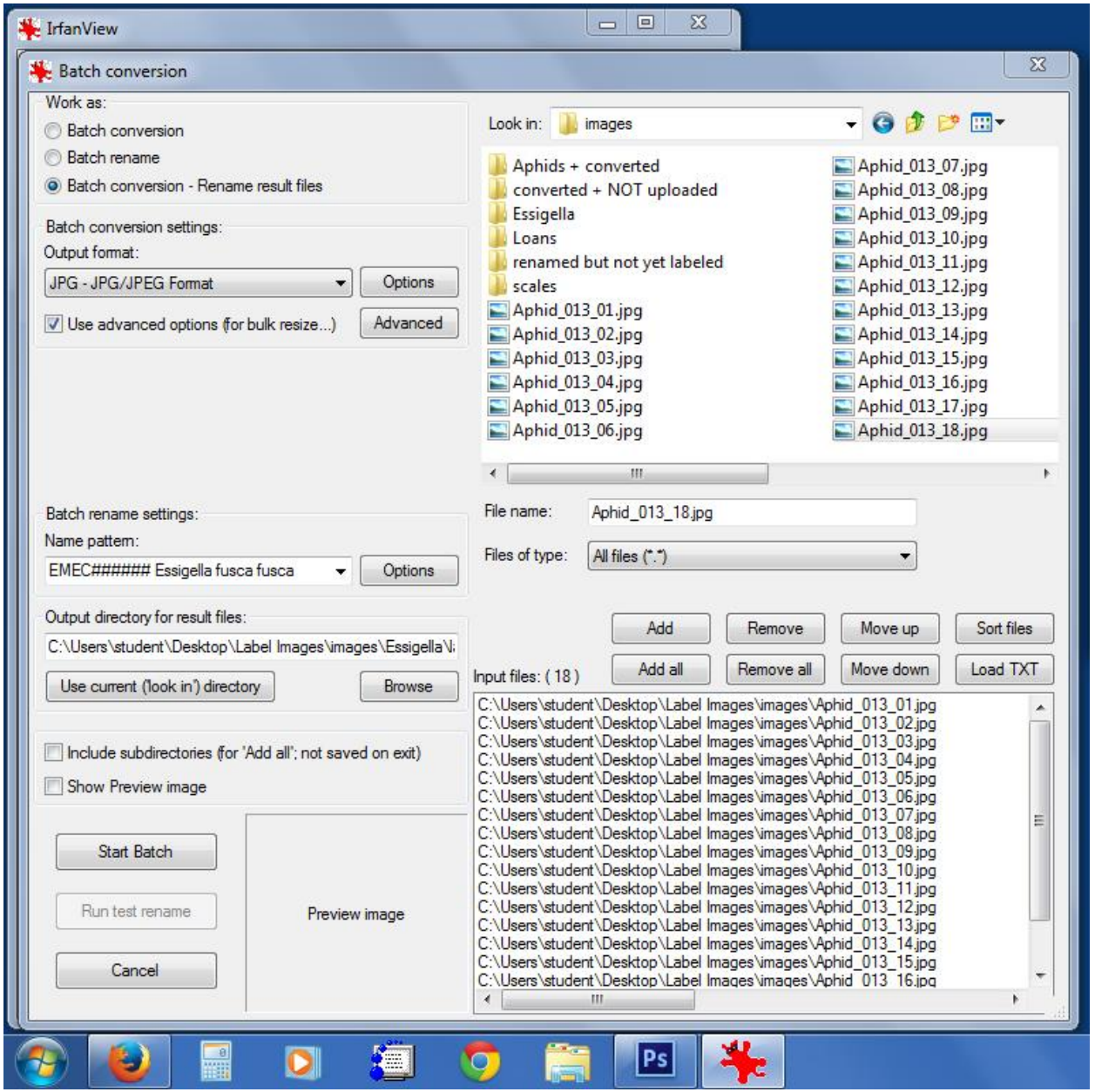
Aside:
This feature was created for faster loading of large images on web sites by cutting them into smaller pieces to be loaded simultaneously.





The result of the “Save for Web” option is 18 individual files ending in _01, _02, _03, etc.

The next step is to rename each of the individual files with the unique ID, genus, and species. We use IrfanView software by creating a pattern to batch process all the files at once.



Provide filename template

Select files

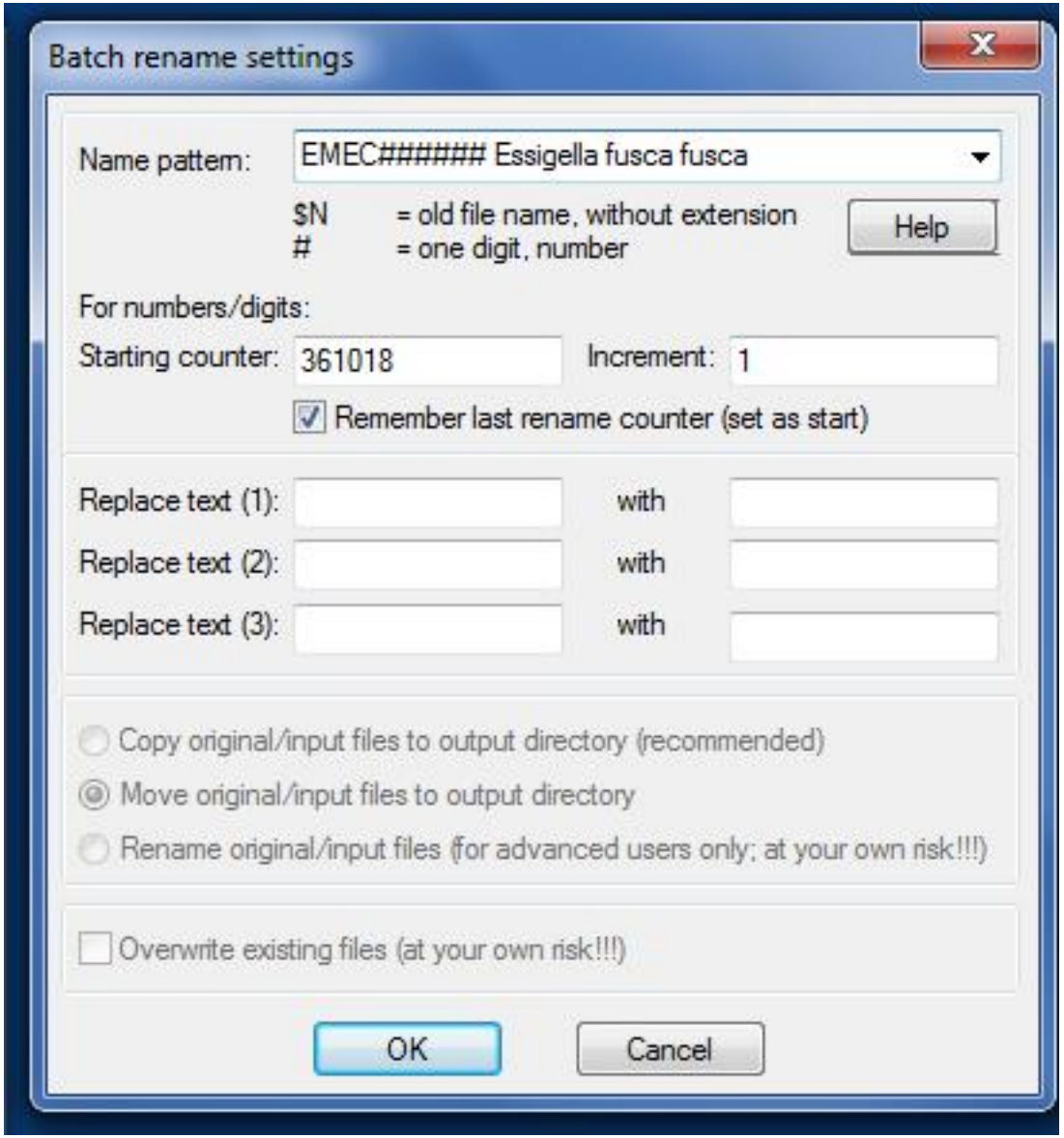
Batch file renaming with IrfanView

Process one species at a time!

Create name pattern

Use # symbol for digits

Provide the starting number



Aphid_013_01.jpg

Aphid_013_02.jpg

Aphid_013_03.jpg

Aphid_013_04.jpg

Aphid_013_05.jpg

Aphid_013_06.jpg

Aphid_013_07.jpg

Aphid_013_08.jpg

Aphid_013_09.jpg

Aphid_013_10.jpg

Aphid_013_11.jpg

Aphid_013_12.jpg

Aphid_013_13.jpg

Aphid_013_14.jpg

Aphid_013_15.jpg

Aphid_013_16.jpg

Aphid_013_17.jpg

Aphid_013_18.jpg

EMEC361018
Essigella fusca
fusca.jpg

EMEC361019
Essigella fusca
fusca.jpg

EMEC361020
Essigella fusca
fusca.jpg

EMEC361021
Essigella fusca
fusca.jpg

EMEC361022
Essigella fusca
fusca.jpg

EMEC361023
Essigella fusca
fusca.jpg

EMEC361024
Essigella fusca
fusca.jpg

EMEC361025
Essigella fusca
fusca.jpg

EMEC361026
Essigella fusca
fusca.jpg

EMEC361027
Essigella fusca
fusca.jpg

EMEC361028
Essigella fusca
fusca.jpg

EMEC361029
Essigella fusca
fusca.jpg

EMEC361030
Essigella fusca
fusca.jpg

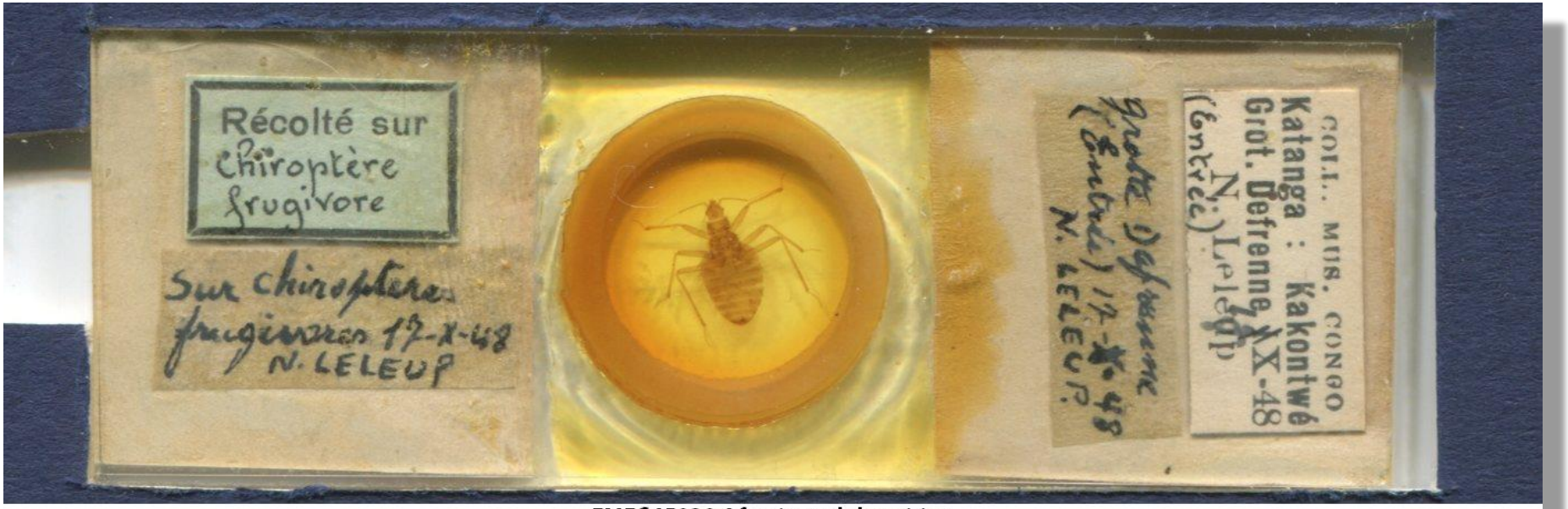
EMEC361031
Essigella fusca
fusca.jpg

EMEC361032
Essigella fusca
fusca.jpg

EMEC361033
Essigella fusca
fusca.jpg

EMEC361034
Essigella fusca
fusca.jpg

EMEC361035
Essigella fusca
fusca.jpg



EMEC45020 Afrocimex leleupi.jpg

We also use IrfanView to overlay the unique ID, genus, and species on the bottom of the image, since the unique ID is on the back of the slide and therefore not visible in the scan.

Create Record Stub

- Upload image file to server
- Create new record from image file
- Use filename to populate
  - Catalog Number
  - Genus
  - Species
- Automatically add
  - Higher taxonomy
  - Holding institution
  - Data entry person & date

Essig Museum of Entomology Collections

Back to: Essig Museum of Entomology Collections

Number of match

next 200

Query: SELECT * FR

EMEC45000 Afrocimex leleupi.jpg

Collection ID / Spe				
EMEC45000				
EMEC45001				
EMEC45002				
EMEC45003				
EMEC45004				
EMEC45005				
EMEC45006	Afrocimex leleupi	EMEC45006 Afrocimex leleupi.jpg	2012-11-21	no [ADD]
EMEC45007	Afrocimex leleupi	EMEC45007 Afrocimex leleupi.jpg	2012-11-21	no [ADD]
EMEC45008	Afrocimex leleupi	EMEC45008 Afrocimex leleupi.jpg	2012-11-21	no [ADD]
EMEC45009	Afrocimex leleupi	EMEC45009 Afrocimex leleupi.jpg	2012-11-21	no [ADD]
EMEC45010	Afrocimex leleupi	EMEC45010 Afrocimex leleupi.jpg	2012-11-21	no [ADD]
EMEC45011	Afrocimex leleupi	EMEC45011 Afrocimex leleupi.jpg	2012-11-21	no [ADD]
EMEC45012	Afrocimex leleupi	EMEC45012 Afrocimex leleupi.jpg	2012-11-21	no [ADD]
EMEC45013	Afrocimex leleupi	EMEC45013 Afrocimex leleupi.jpg	2012-11-21	no [ADD]
EMEC45014	Afrocimex leleupi	EMEC45014 Afrocimex leleupi.jpg	2012-11-21	no [ADD]
EMEC45015	Afrocimex leleupi	EMEC45015 Afrocimex leleupi.jpg	2012-11-21	no [ADD]
EMEC45016	Afrocimex leleupi	EMEC45016 Afrocimex leleupi.jpg	2012-11-21	no [ADD]
EMEC45017	Afrocimex leleupi	EMEC45017 Afrocimex leleupi.jpg	2012-11-21	no [ADD]
EMEC45018	Afrocimex leleupi	EMEC45018 Afrocimex leleupi.jpg	2012-11-21	no [ADD]
EMEC45019	Afrocimex leleupi	EMEC45019 Afrocimex leleupi.jpg	2012-11-21	no [ADD]
EMEC45020	Afrocimex leleupi	EMEC45020 Afrocimex leleupi.jpg	2012-11-21	no [ADD]
EMEC45020	Afrocimex leleupi	EMEC45020.1 Afrocimex leleupi.jpg	2012-11-21	no [ADD]
EMEC45021	Afrocimex leleupi	EMEC45021 Afrocimex leleupi.jpg	2012-11-21	no [ADD]
EMEC45022	Afrocimex leleupi	EMEC45022 Afrocimex leleupi.jpg	2012-11-21	no [ADD]
EMEC45023	Afrocimex leleupi	EMEC45023 Afrocimex leleupi.jpg	2012-11-21	no [ADD]
EMEC45024	Afrocimex leleupi	EMEC45024 Afrocimex leleupi.jpg	2012-11-21	no [ADD]
EMEC45025	Afrocimex leleupi	EMEC45025 Afrocimex leleupi.jpg	2012-11-21	no [ADD]

Label

EMEC45000 Afrocimex leleupi.jpg

Catalog ID Num * EMEC 45000

Holding Institution *

Essig Museum of Entomology

Individual Count *

Basis of Record * PreservedSpecimen

Other Catalog Nums

Related Catalog Item

Collection Code

Collecting Event ID

Project Name

Parent Record

Loan Number

Date First Entered 2016-04-04 recheck ☐

Entered By Peter T. Oboyski

Higher taxonomy will be automatically added

ColloquialName

Kingdom Animalia

Phylum Arthropoda

Class unselected

Subclass

Order

Suborder

Superfamily

Family

Subfamily

Tribe

Subtribe

Genus Afrocimex

Subgenus

Species leleupi

Subspecies

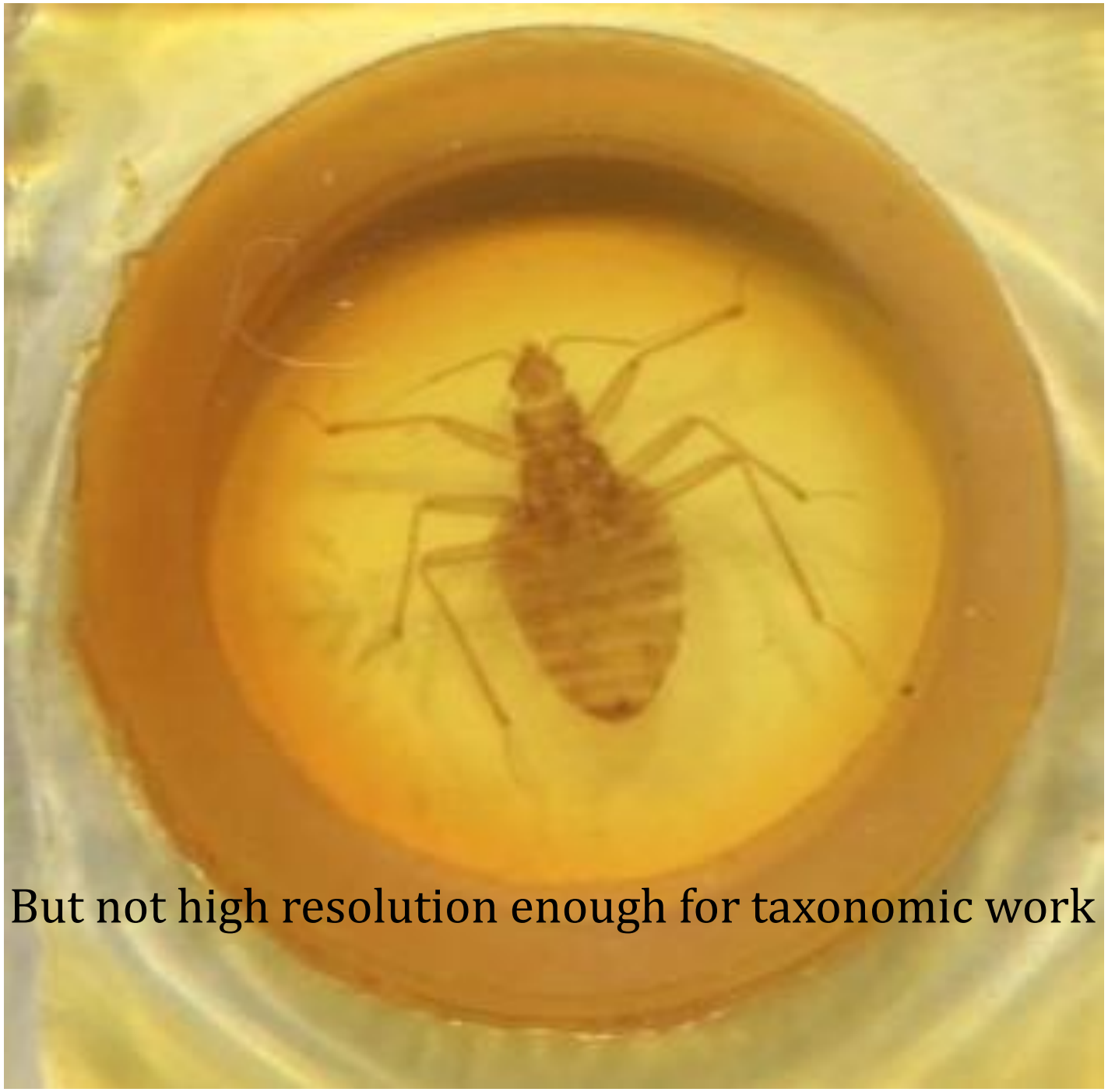
Certainty unselected

IdentifiedBy

Date Ident yyyy mm dd

Previous ID

400 DPI
Provides high enough resolution for difficult to read labels while keeping file size relatively small


But not high resolution enough for taxonomic work

Slide Scanning Speed

Our students average 135 to 170 slides scanned, processed, and renamed per hour.

The slowest step in the process was cutting out and sticking on the Unique ID labels. We now have pre-printed, easy-peel labels.

This does not include the actual databasing (ie. Transcribing the data from the images into our database)

Slide Scanning Cost

Scanner: $50 - $80

Jig (mat board): $2 - $10

Photoshop: $300 - $500 depending on version

- Photoshop freely available at some institutions
- freeware alternatives available [*GIMP*, *Image Cut*]

IrfanView: free

Inselect

An innovative tool for automating digitisation of natural history collections

Laurence Livermore
Vladimir Blagoderov, Lawrence Hudson
Benjamin Price, Hillery Warner and Vincent Smith

Natural History Museum, London

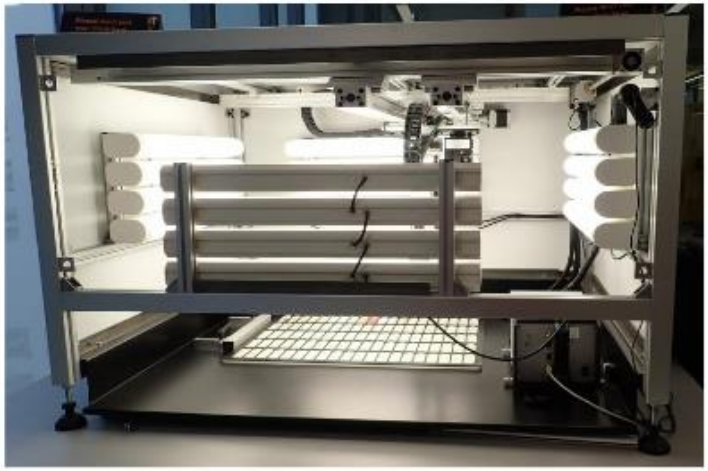
NATURAL HISTORY MUSEUM

- Developed at British Museum Natural History
- Integration of image processing, file management, and record stub creation
- Free, open-source software (on Github)

Inselect (from iDigBio presentation)

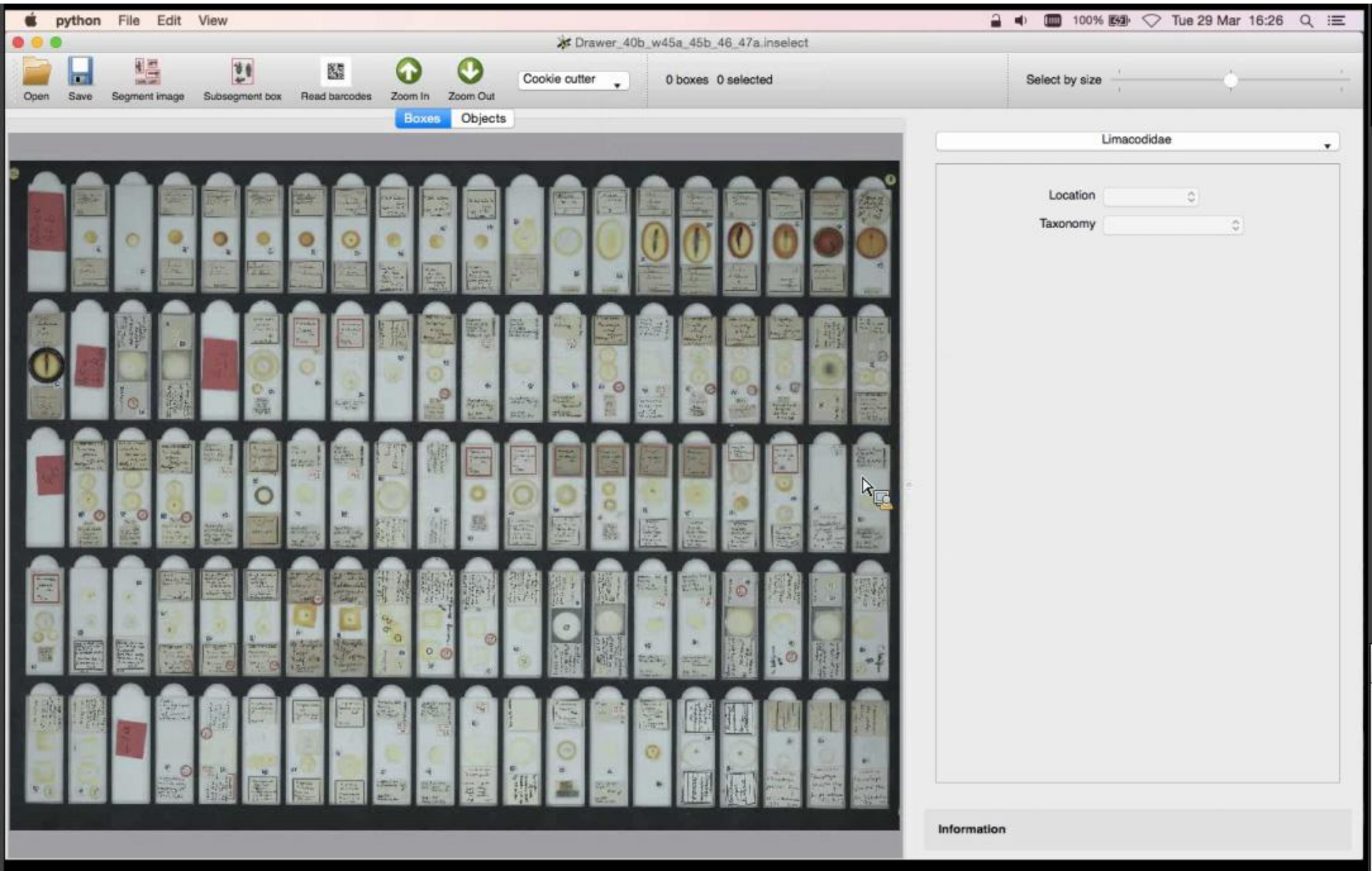
Slide scanning

- Slides transferred to slide templates (100 slides per template)
- Labelled with self-adhesive data matrix barcodes

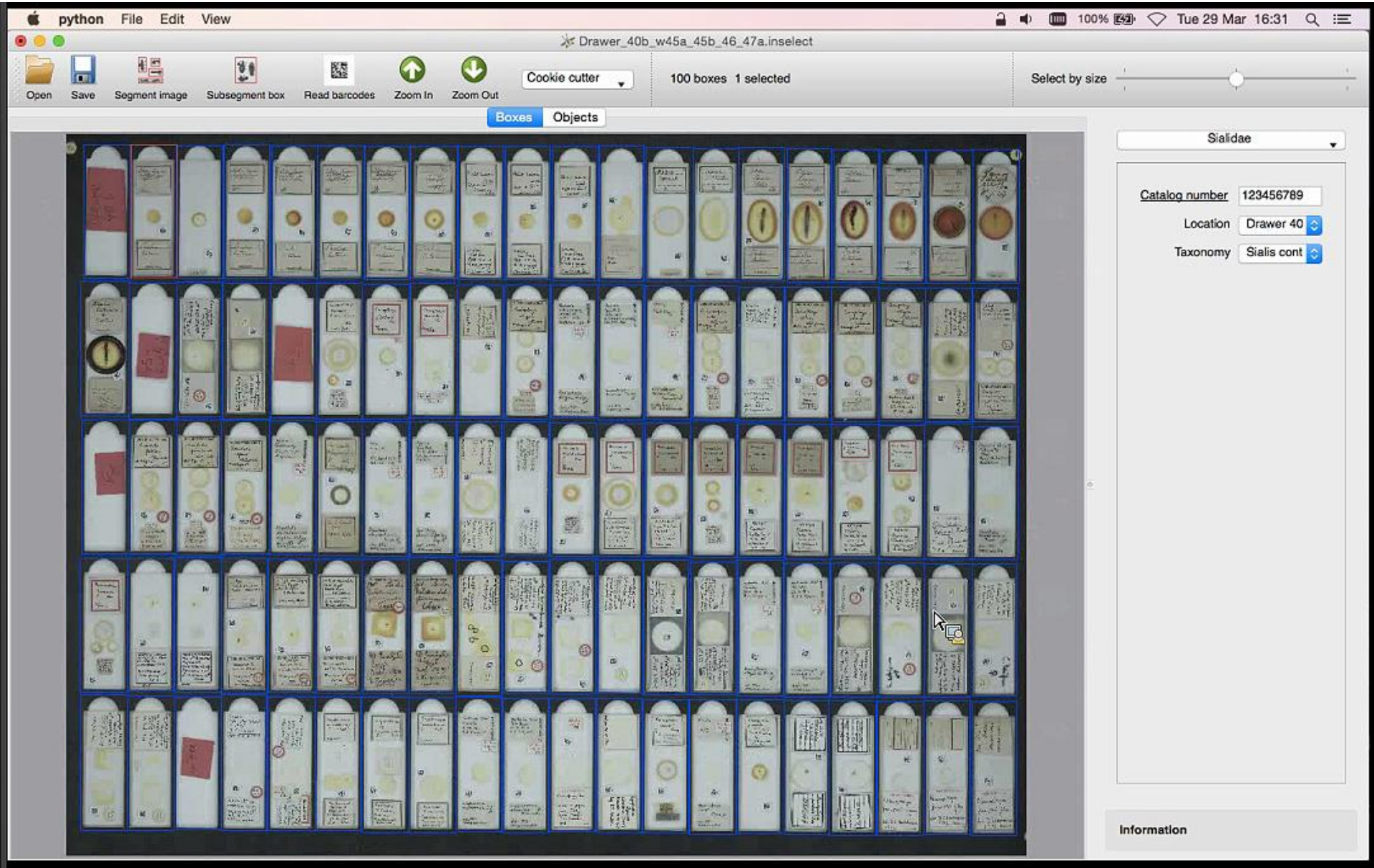


- Imaged with SatScan
- Up to 18 templates scanned a day

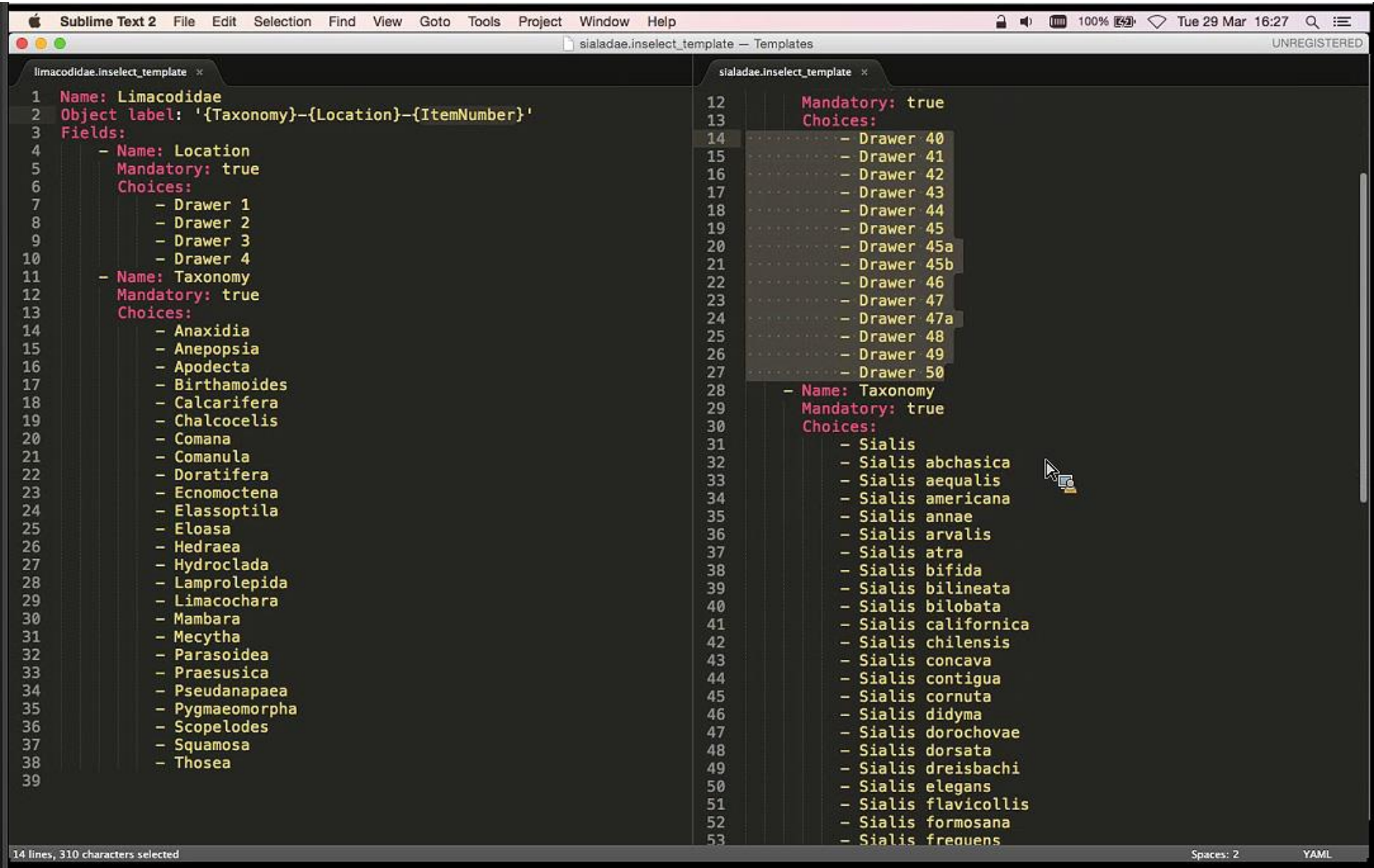
Inselect – imported image



Inselect – divided image, basic metadata



Inselect – setting metadata options



High resolution (taxonomic quality)

100 slide capacity

whole-slide image for label data

high resolution of specimen area

Olympus VS120-SL microscope slide scanner

Key components for slide processing

- Easy peel, strong adhesive, catalog # labels
- Jig (form) for consistent, uniform placement of slides for scanning/imaging
- Software to split image into individual slides, and save them as individual files
- Software to rename files and/or add metadata

Other resources

Oboyski - iDigBio presentation on slide scanning

https://www.idigbio.org/wiki/index.php/File:Scanning_Microscope_Slides_Oboyski.pdf

iDigBio Slide Scanning Working Group meetings

https://www.idigbio.org/wiki/index.php/Fluid_Preserved_Arthropds

- Colin Favret
- Gisele Canales

Inselect - image processing software

Paper - http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4658125/

Webinar - http://idigbio.adobeconnect.com/p7qo63aeo4a/

poboyski@berkeley.edu