“Light makes photography. Embrace light. Admire it. Love it. But above all, know light. Know it for all you are worth, and you will know the key to photography.”

George Eastman

“What makes photography a strange invention is that its primary raw materials are light and time.”

John Berger

“Photography is the simplest thing in the world, but it is incredibly complicated to make it really work.”

Martin Parr

Image workflows, protocols, equipment, and techniques

By
Paul Mayer

The Field Museum

Two things to do before you decide to image 10,000 specimens

1. **Why are you taking the photographs?**

2. **Experiment**

"Photography is more than a medium for factual communication of ideas.
It is a creative art."
Ansel Adams

Why are you imaging the specimen?

Research **Education** **Public**

Print Web

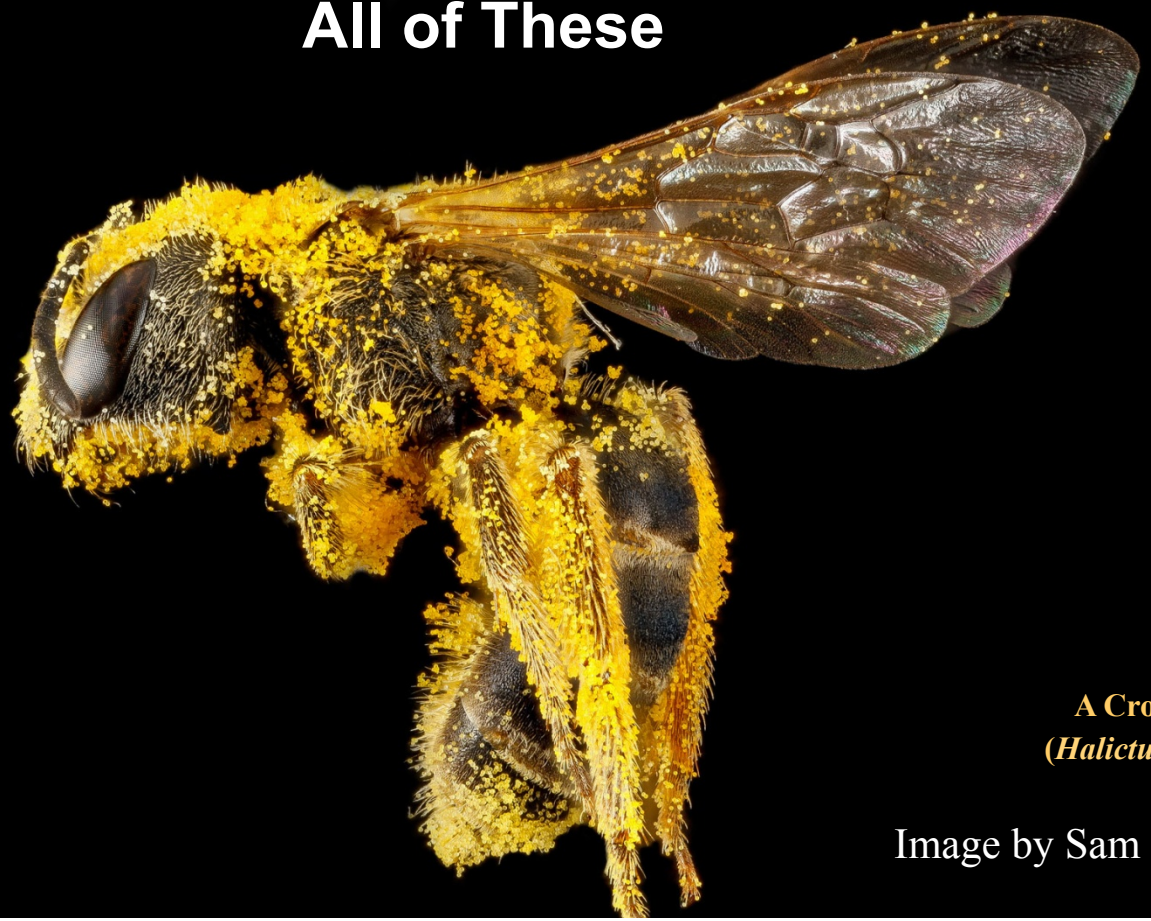
Archive record Exhibition Facebook post

All of These

Inventory

Conservation

Assessment



A Crow Bee
(*Halictus ligatus*)

Image by Sam Droege, USGS

The Camera Body

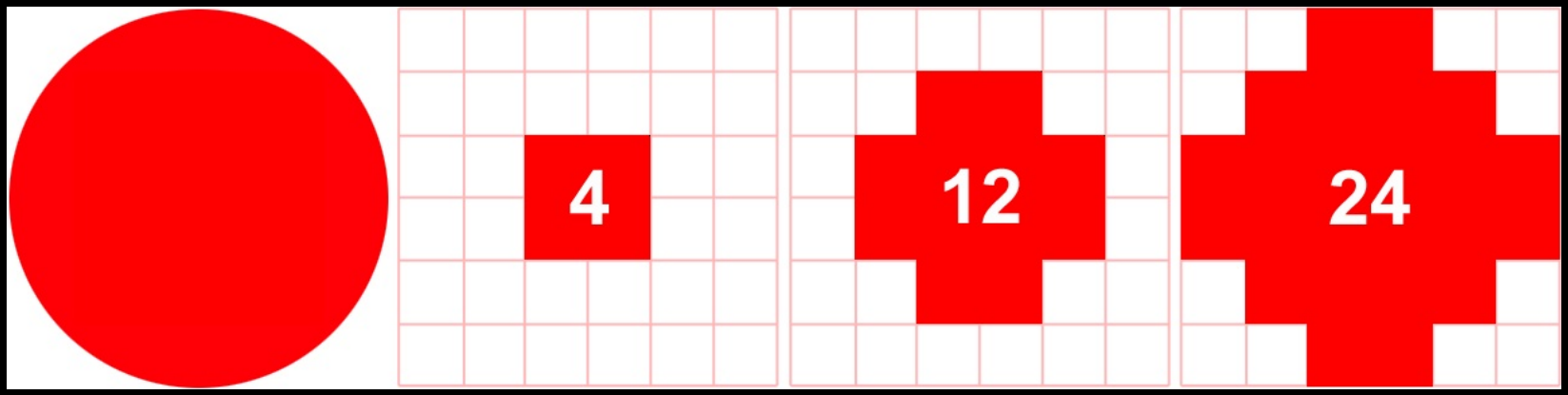
Megapixels
vs
Sensor Size

"Photography is the simplest thing in the world, but it is incredibly complicated to make it really work."

--Martin Parr

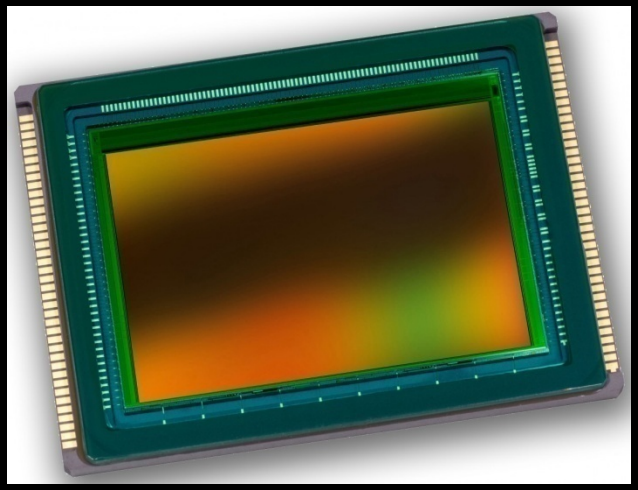
A Crow Bee (*Halictus ligatus*)
Image by Sam Droege, USGS

What is a Pixel?



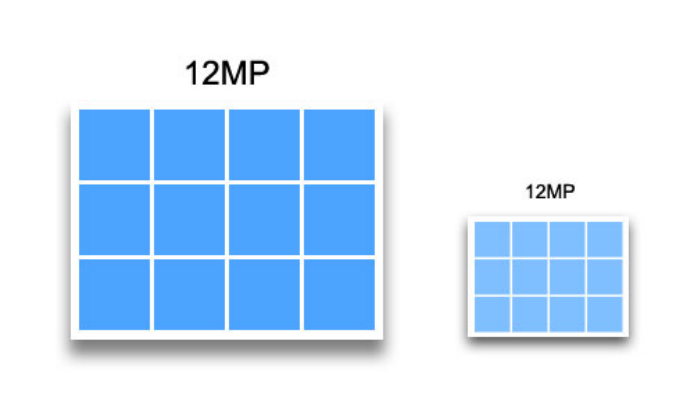
- Digital photographs are actually mosaics of millions of tiny squares called
  “picture elements”—or pixels.
- Pixels are just a number they have no shape or size.
- One million pixels equal one Megapixel
- Sensor size, image format, lens quality, ISO, and megapixels all are important for resolution.
- High megapixel count sensors render high resolution files
- More pixels, more problems
  - Huge files
  - Expensive lenses needed
  - More noise at higher ISO settings

Sensor Size



- The larger the sensor
  - the more light used
  - the more information stored
  - better dynamic range
  - less noise
  - improved low light level performance
  - increase resolution
- Why? Because photosites on larger sensors are general larger than on smaller sensors.
- Needs a larger lens, costs more, crop factor
- Balance between efficiency of sensor technology, lens quality, and image sensor size,

What is a Sensor's Photosite?



- A camera's sensor has millions of small pores or photosites that record photons.
- Photosites on larger sensors are general larger than on smaller sensors.
- When you take a picture, each photosite on the sensor records the amount or brightness of the light striking it.
- The more light that strikes a photosite, the more photons it records and the brighter the pixel it creates.
- In general there are more photosites on a sensor than pixels, but each pixel is formed from on photosite.

Name	Full Frame	APS-C	Four Thirds	1/1.7”	1/2.3”
Area					
Size	36 x 24 mm	23.6 x 15.8 mm	18 x 13.5 mm	7.6 x 5.7 mm	6.1 x 4.6 mm
Relative size	31	13	8.6	1.5	1
Camera type	High End DSLRs	Entry level DSLRs Midrange DSLRs	Olympus DSLRs Large Compacts	High End Compacts	Low-mid Compacts
Examples	 Nikon D700	 Canon D500	 Olympus E-420	 Canon G11	 Nikon S640
	 Canon D5 MK II	 Nikon D40x	 Panasonic GF-1	 Nikon P6000	 Canon SX120

The Crop Factor

Full Frame sensor vs APS-C sensor

- Crop factor is 1.6x
- Advantages for APS-C
  - Uses center of lens, less distortion
  - Depth of field better on cropped sensor because with full frame you need to be closer.
  - Wide angle lens vs macro

Canon EOS 5D Mark III, Full Frame Sensor, 22.3 Megapixels Mark III ISO =100 from DP Review

Canon Powershot SX260, 1/2.3" (6.1 x 4.6 mm) Sensor, 12.1 megapixels, ISO =100 from DP Review

Canon Powershot G7 X, 1 inch (13.2 X 8.8mm) Sensor, 21 Megapixels, ISO =125 from DP Review

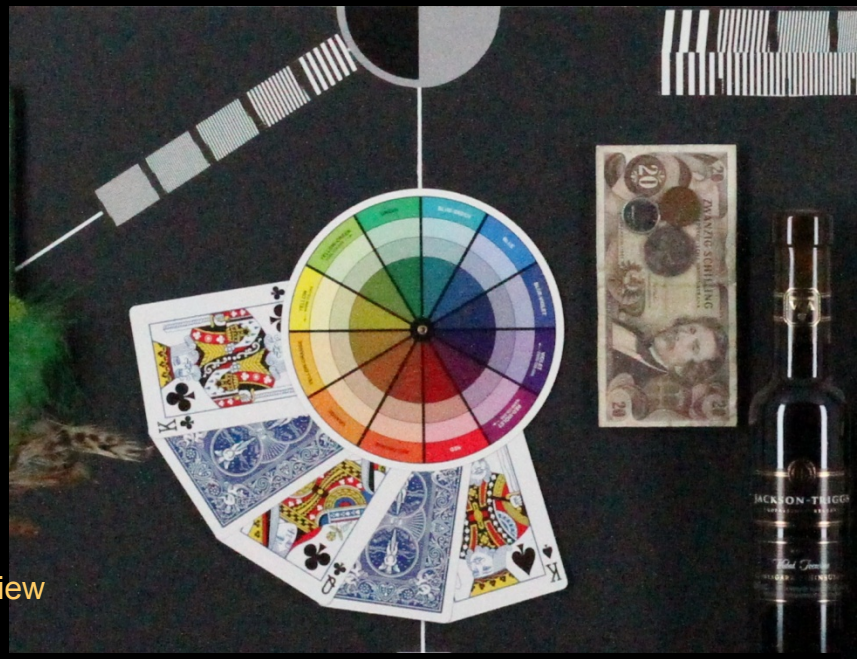
Canon EOS 5D Mark III, Full Frame Sensor, 22.3 Megapixels Mark III ISO =100, from DP Review

Canon EOS 5D Mark III, 22.3 megapixels ISO =100

Canon EOS 7D, 18 megapixels, ISO =100

Canon EOS 5D Mark III, ISO =12800

From DP Review



Canon EOS 7D, ISO =12800

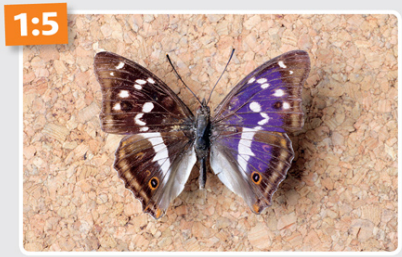
Macro Lens

- 1:1 ratio or larger
- No Zoom
- Fixed Focal Lengths
  50mm, 60mm,
  100mm, 180mm

Macro Lenses: how much magnification do you need?

0.2x

At the bottom end, some zoom lenses only give an image on the sensor that is a fifth of life-size, when focused as close as possible.



0.34x

Some kit lenses do rather better, and can produce an image that's one-third of life-size of the object shot at the minimum focus level.

0.5x

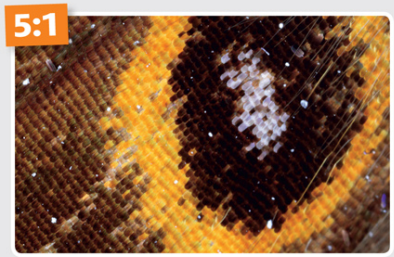
Lenses like the Canon 50mm f/2.5 and Zeiss 100mm f/2 are both 0.5x macro lenses, offering a half-size image.

1.0x

The vast majority of macro lenses produce a life-size image on the sensor when focused as close as possible.

5.0x

Canon's MP-E 65mm gives a bellows-like magnification, giving images on the sensor that are up to five times life-size.



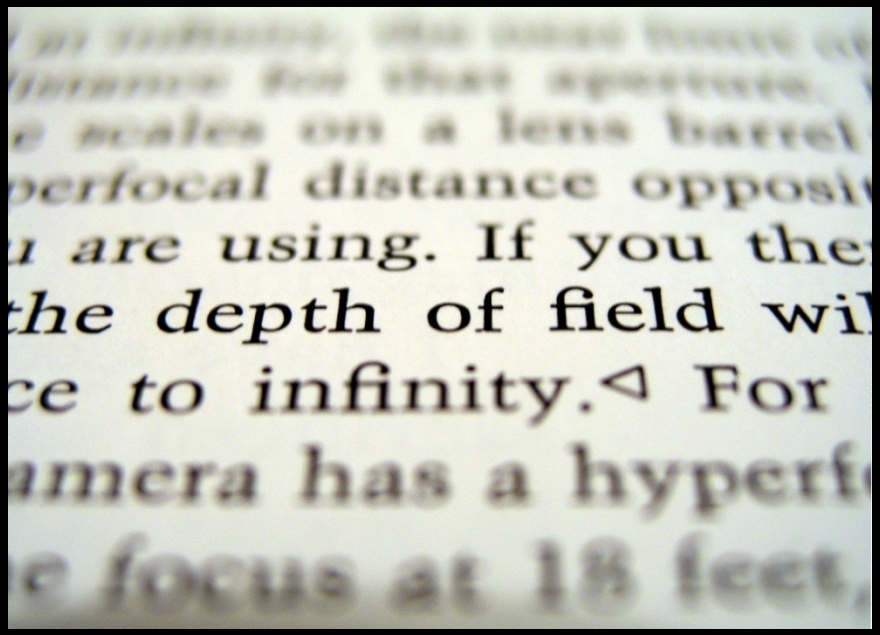
Camera at same distance

100mm, F/16

60mm, F/16

Depth of Field Determined by Three Factors

- Aperture Size
  - Larger the aperture opening the smaller the depth of field
- Distance from Lens
  - Closer the lens to the subject the smaller the depth of field
- Focal Length of Lens
  - The bigger the focal length the smaller the depth of field



Stacked Images

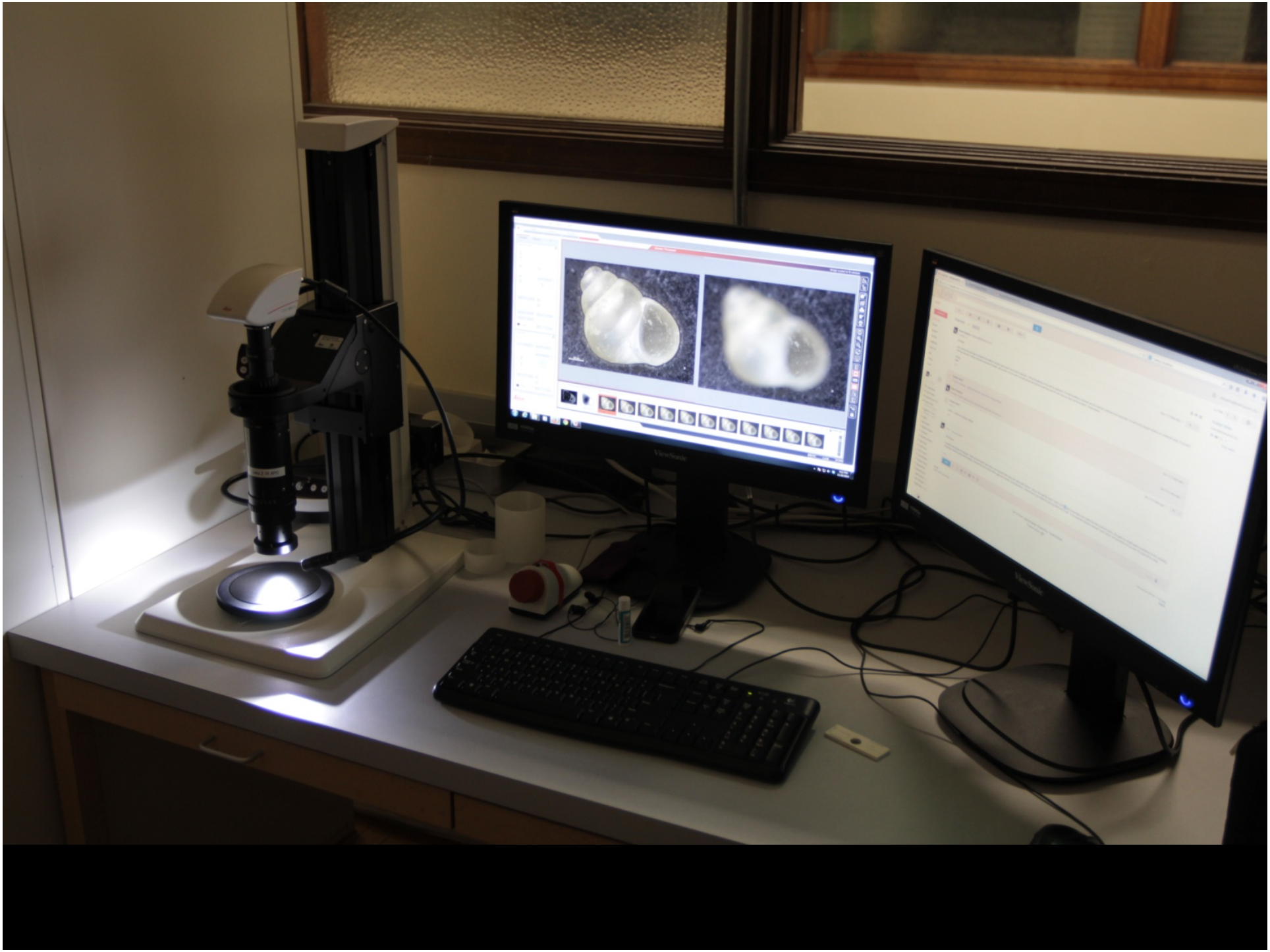
Camera mounted and moves on rails

Small f-stop allows lots of light, but small depth of field

Multiple images (20-100) taking as camera moves through the focus of the highest and lowest parts of the specimen

Images stacked (stitched) together with software
(Helicon Focus)

Final image of entire specimen in focus



Lighting

- Equipment
  - Even lighting
    - Ring Lights
    - Light boxes
    - Diffusers
    - Flash
    - Copy stands
  - Low angle lighting
- Techniques
  - UV lighting
  - Cross Polarized

"Light makes photography. Embrace light. Admire it. Love it. But above all, know light. Know it for all you are worth, and you will know the key to photography."

-- George Eastman --

“The evening was hot, and the thrust of light still flowed up from the western horizon. And without any signal the family gathered by the truck, and the congress, the family government, went into session.

The film of evening light made the red earth lucent, so that its dimensions were deepened, so that a stone, a post, a building had greater depth and more solidity than in the daytime light; and these objects were curiously more individual —a post was more essentially a post, set off from the earth it stood in and the field of corn it stood out against. All plants were individuals, not the mass of crop; and the ragged willow tree was itself, standing free of all other willow trees. The earth contributed a light to the evening. The front of the gray, paintless house, facing the west, was luminous as the moon is. The gray dusty truck, in the yard before the door, stood out magically in this light, in the overdrawn perspective of a stereopticon.”

John Steinbeck Grapes of Wrath
1939, Page 68


High-Angle, ‘High’ Noon Lighting

Low-Angle, Sunrise Lighting

Light Box

Inside the Light Box

Light Box Image of Trilobite

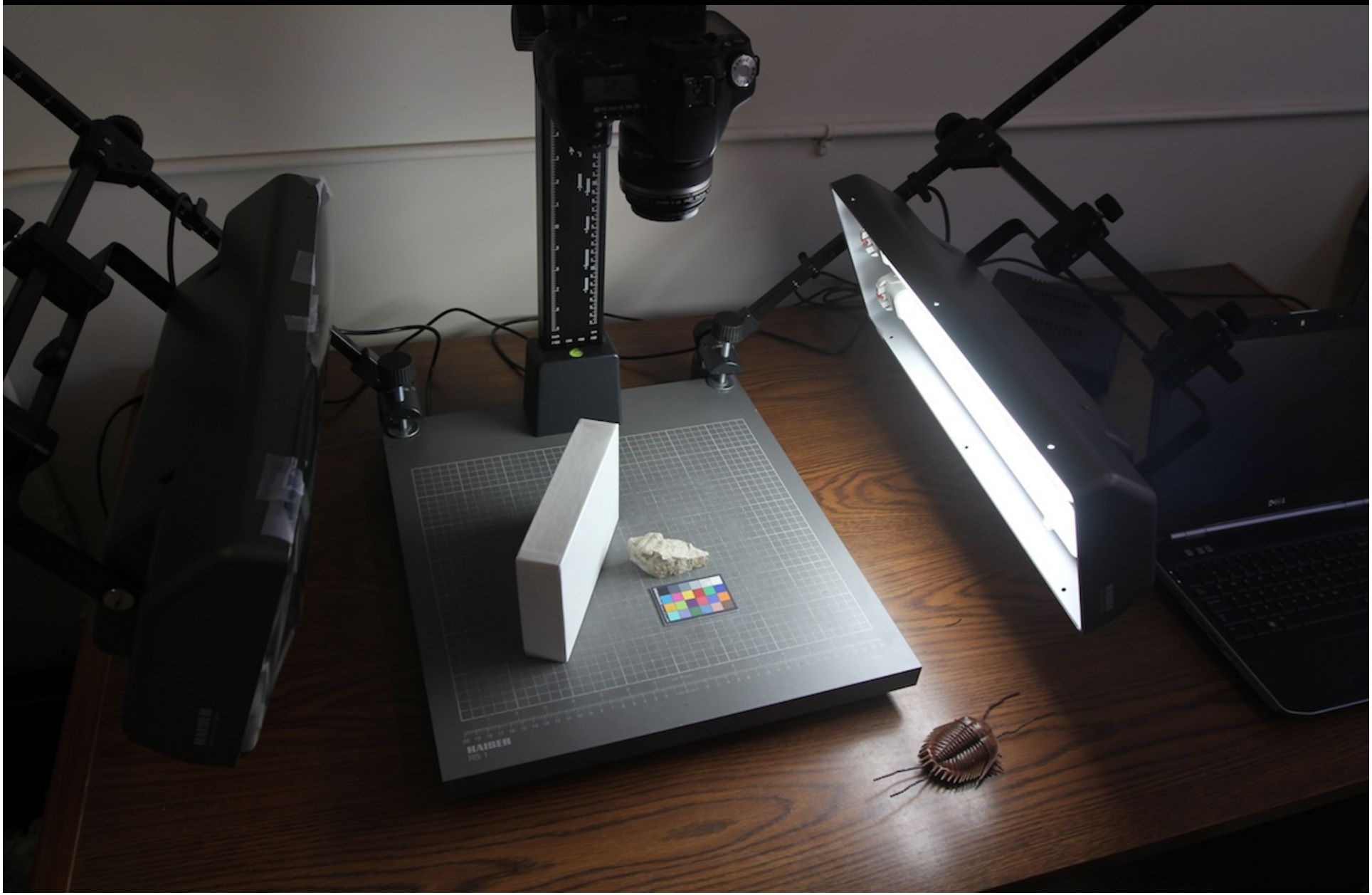
PE 6110
***Calymene celebra* Raymond**
Wenlock, Silurian
Chicago, Illinois

Low-Angle Lighting Setup

Low-Angle Lighting

PE 6110
***Calymene celebra* Raymond**
Wenlock, Silurian
Chicago, Illinois

One-Directional, Low-Angle Lighting Setup



Low-Angle, One-Directional Lighting

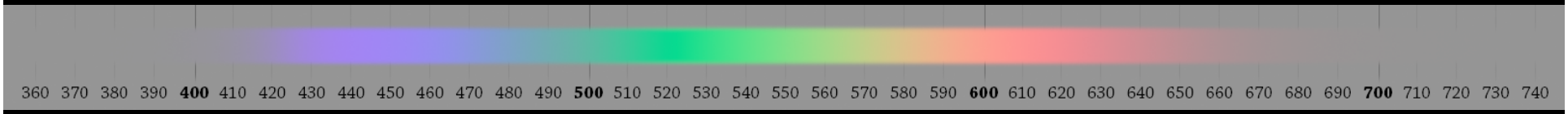
Macrofossil Photography Techniques Designed to Enhance Contrast and Emphasize Detail

- Ultraviolet Lighting
- Low-Angled (Textural) Lighting
- Polarized Lighting
- Color Filters
- Immersion in Water (or Alcohol)

(Lund,1980)

UV Lamps

- Ultraviolet light is electromagnetic radiation with wavelengths betweens 10 nm to 400 nm. Its wavelength is shorter than that of visible light (390 to 700 nm), but longer than X-rays (10 nm to 0.1nm) in the range.



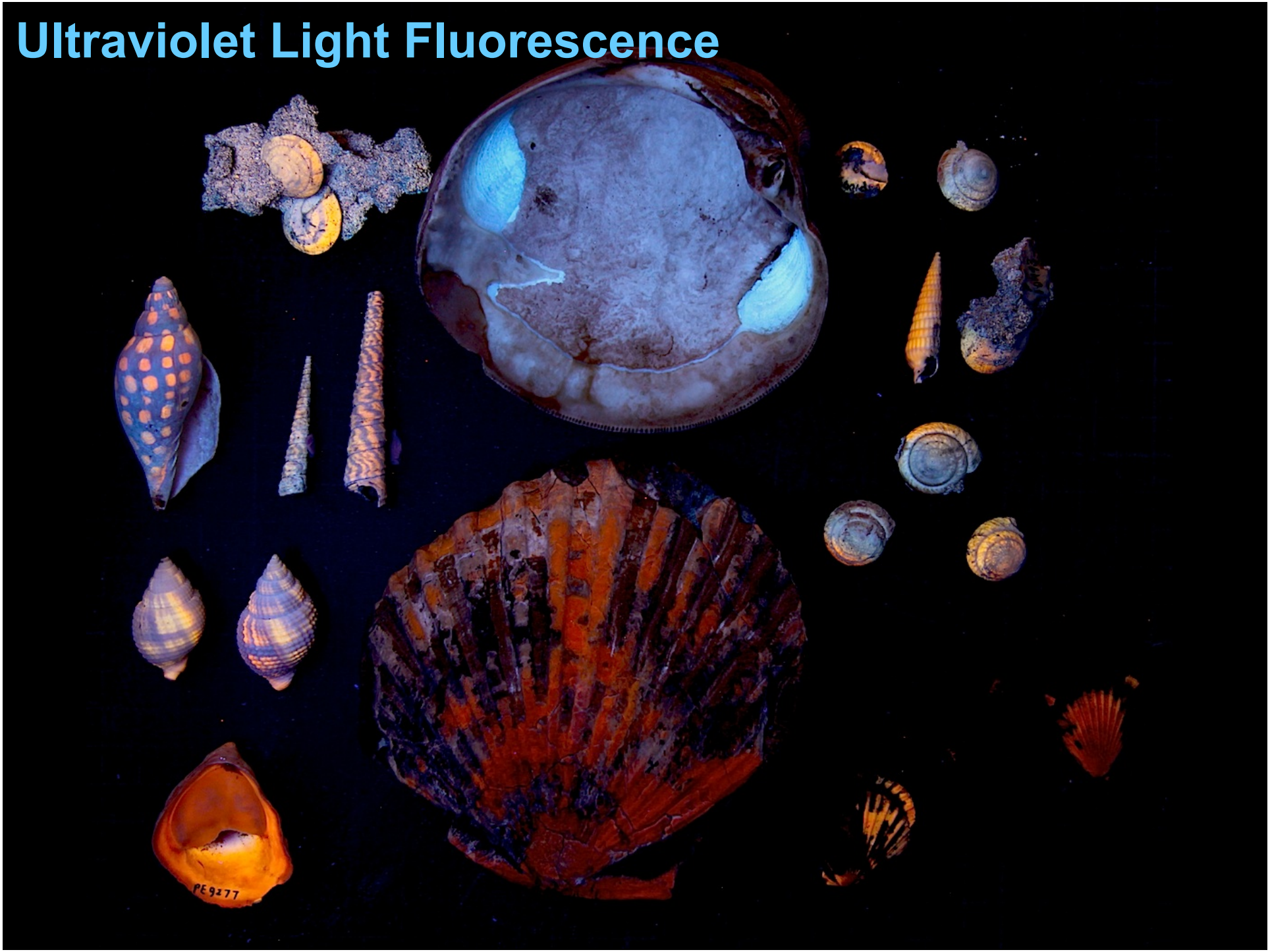
- Artificial Ultraviolet lights are typically divided into three groups:
  - Longwave ultraviolet (UV-A) (Black Lights) 320 - 400 nm
  - Midwave ultraviolet (UV-B) 280 - 320 nm
  - Short wave ultraviolet (UV-C) 100 - 280 nm

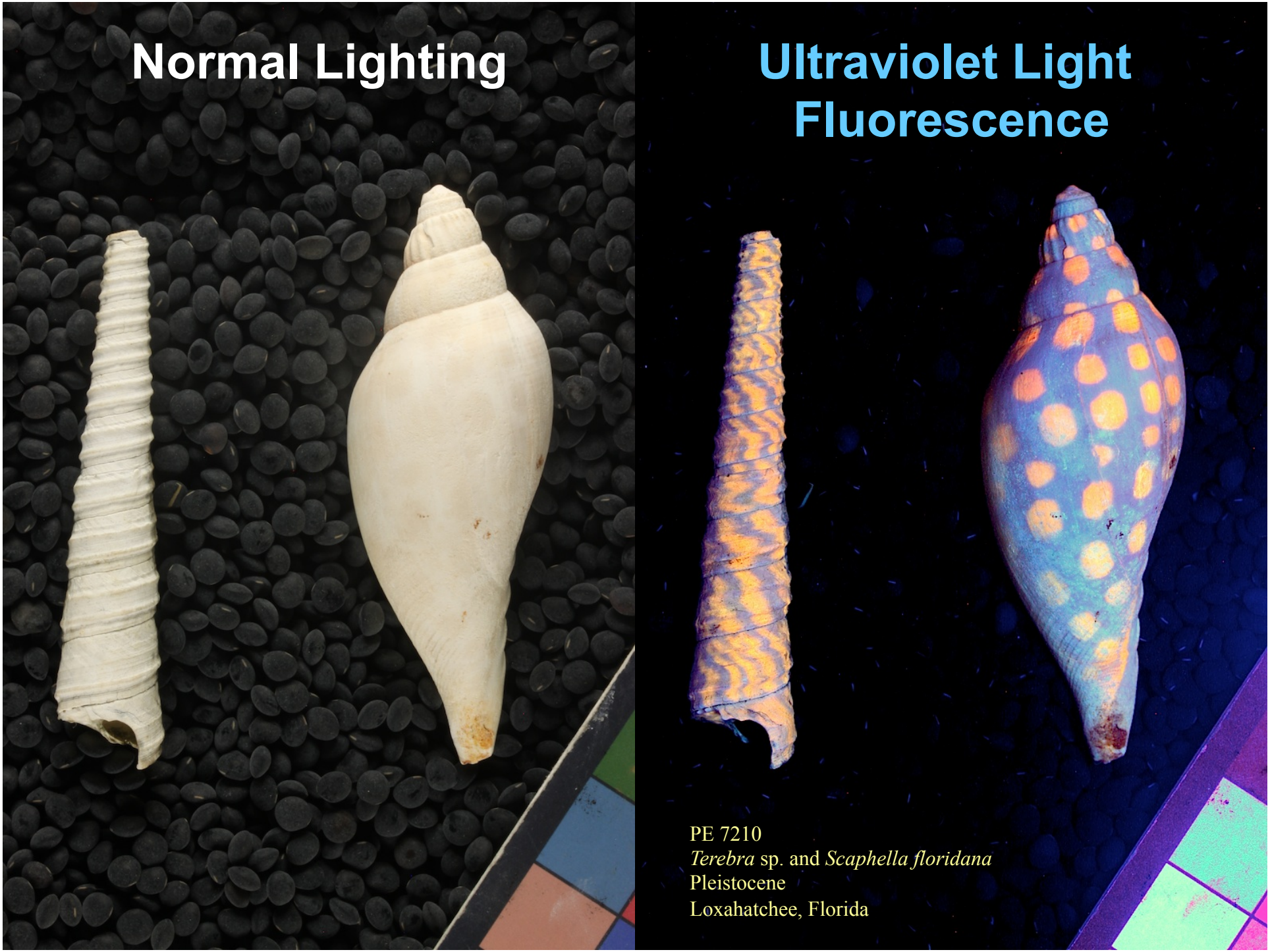
"The use of ultraviolet fluorescence in the study and photographing of fossils has scarcely received the attention it deserves. By its use, it is said, obscure sutures can be traced, determinations of delicate structures can be made and many other applications are possible."

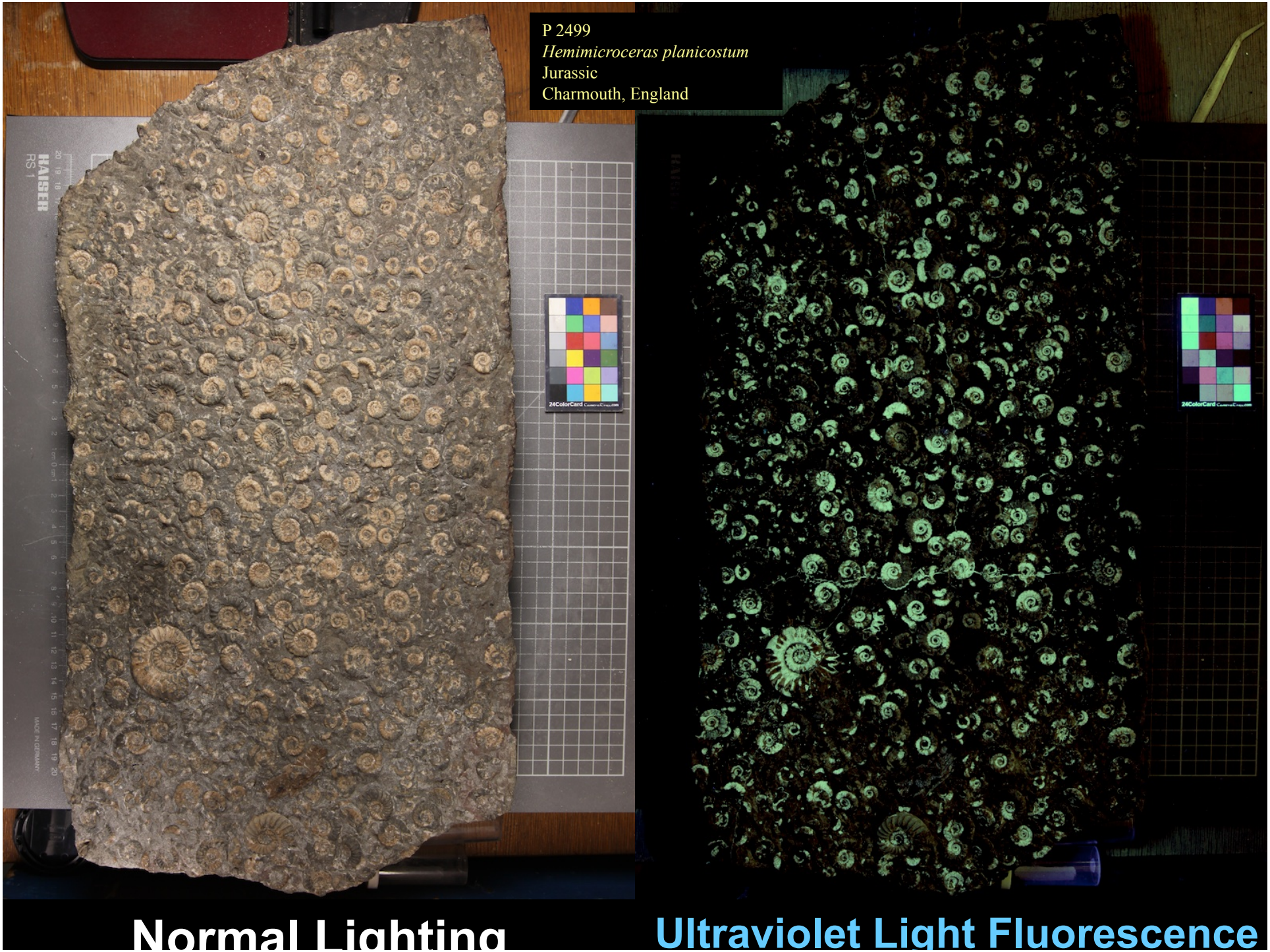
CAMP, C. L. & HANNA, G. D. (1937): Methods in Paleontology. – 151 pp.; Berkeley, California (University of California Press).


Normal Lighting
PE9277

Ultraviolet Light Fluorescence




Normal Lighting
Ultraviolet Light
Fluorescence
PE 7210
Terebra sp. and *Scaphella floridana*
Pleistocene
Loxahatchee, Florida


P 2499
Hemimicroceras planicostum
Jurassic
Charmouth, England
Normal Lighting
Ultraviolet Light Fluorescence

Normal Lighting

Ultraviolet Light Fluorescence

Normal Lighting

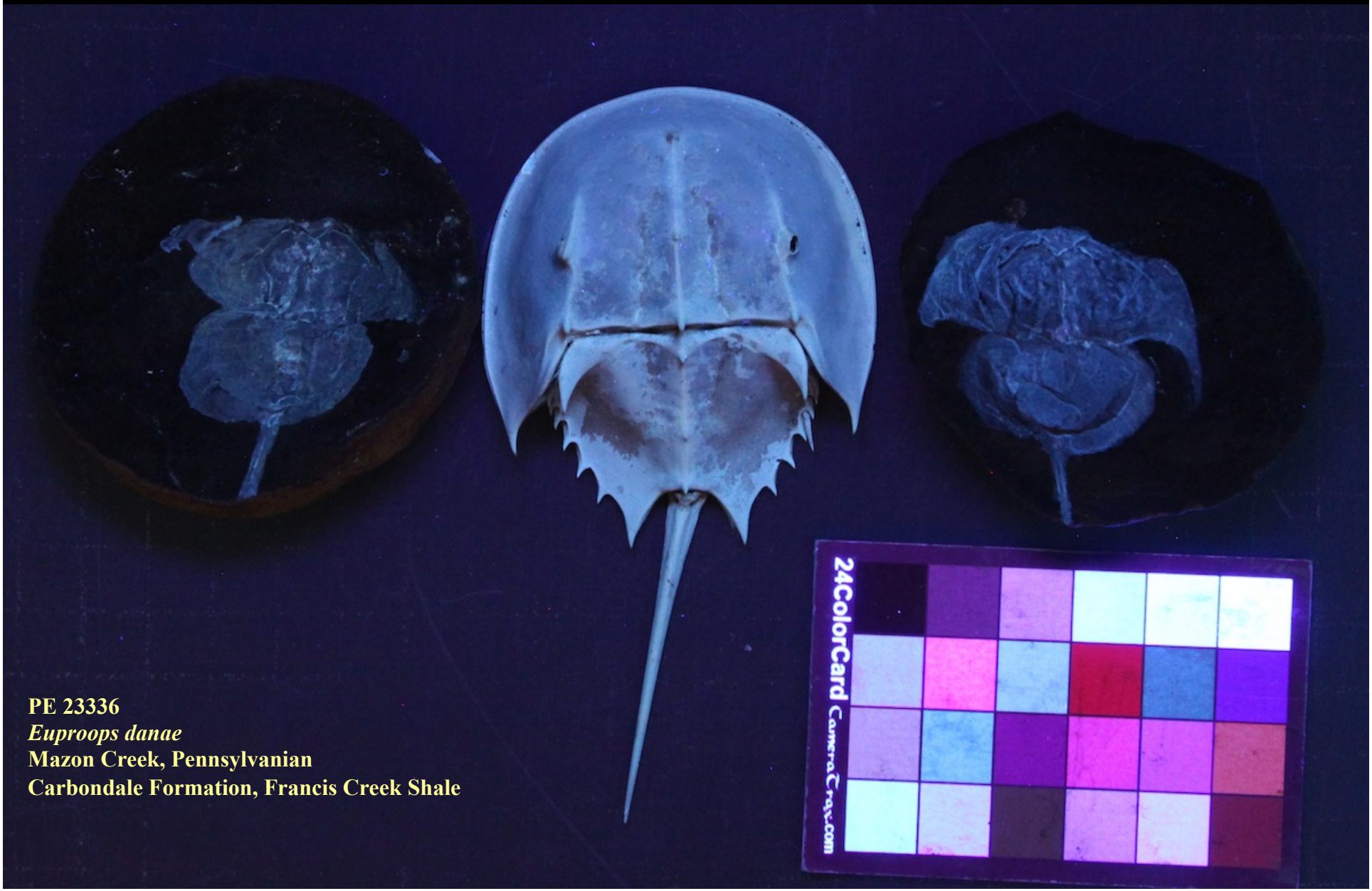
PE 21921
Mamayocaris jaskowskii
Mazon Creek, Pennsylvanian
Carbondale Formation, Francis Creek Shale

Normal Lighting

PE 23336
Euproops danae
Mazon Creek, Pennsylvanian
Carbondale Formation, Francis Creek Shale

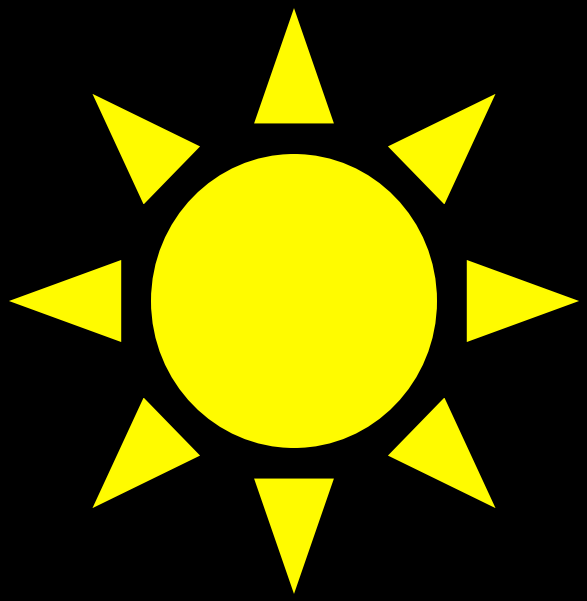
Ultraviolet Light Fluorescence

10 out of 683 specimens of *Euproops danae* fluoresce

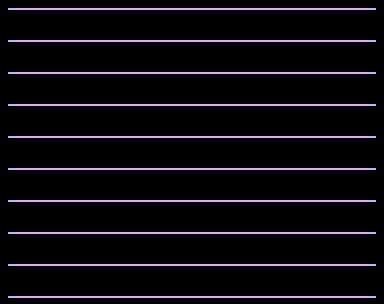


PE 23336
Euproops danae
Mazon Creek, Pennsylvanian
Carbondale Formation, Francis Creek Shale

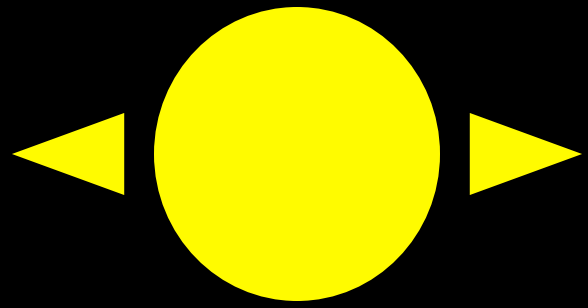
Normal Light



Polarizing Filter

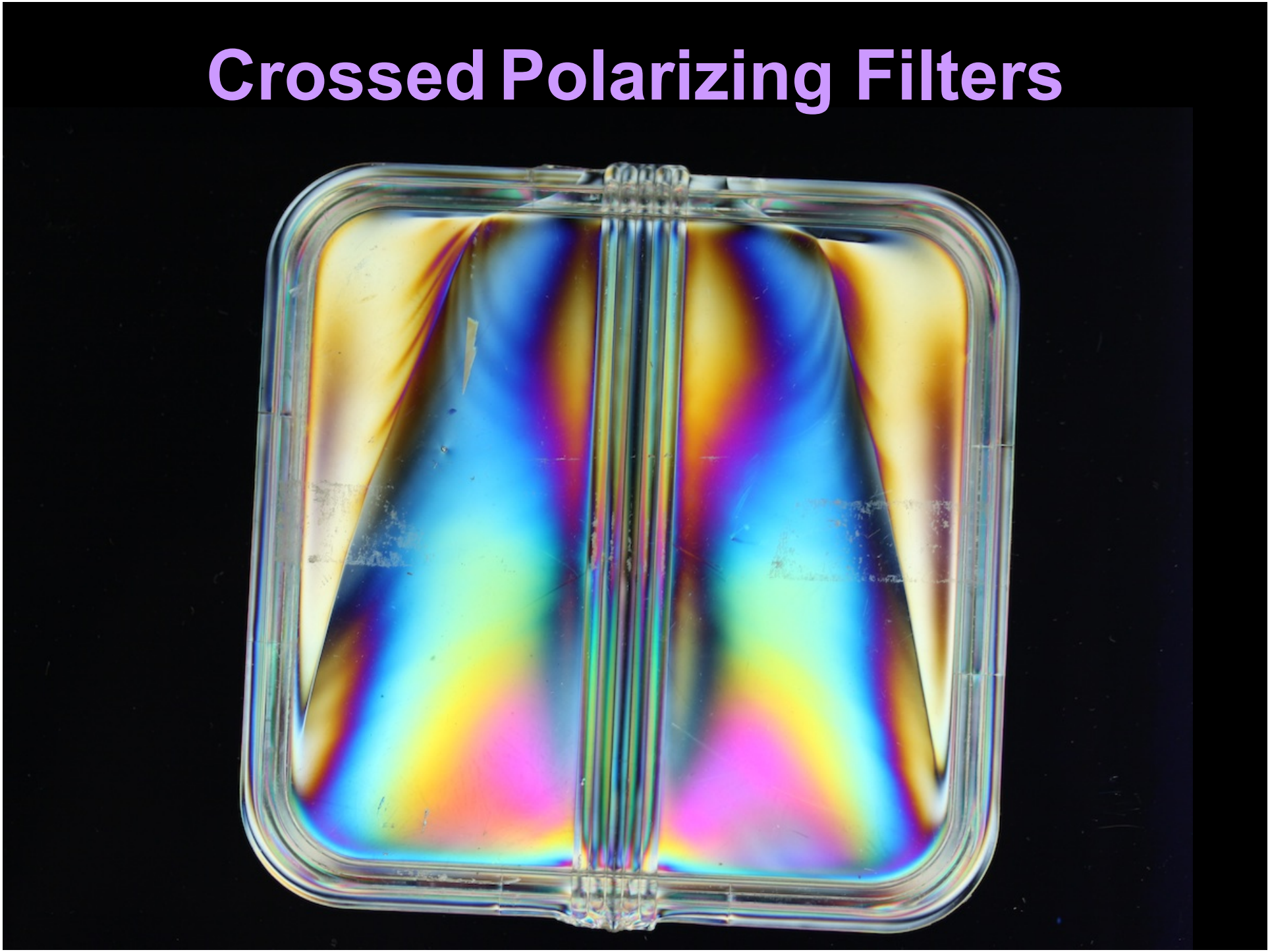


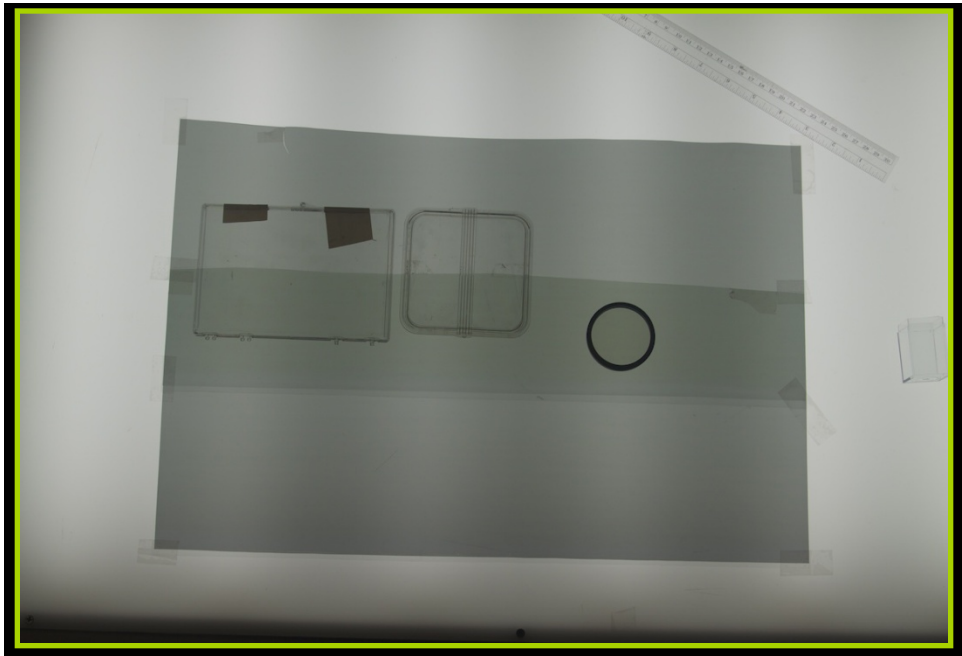
Polarized Light



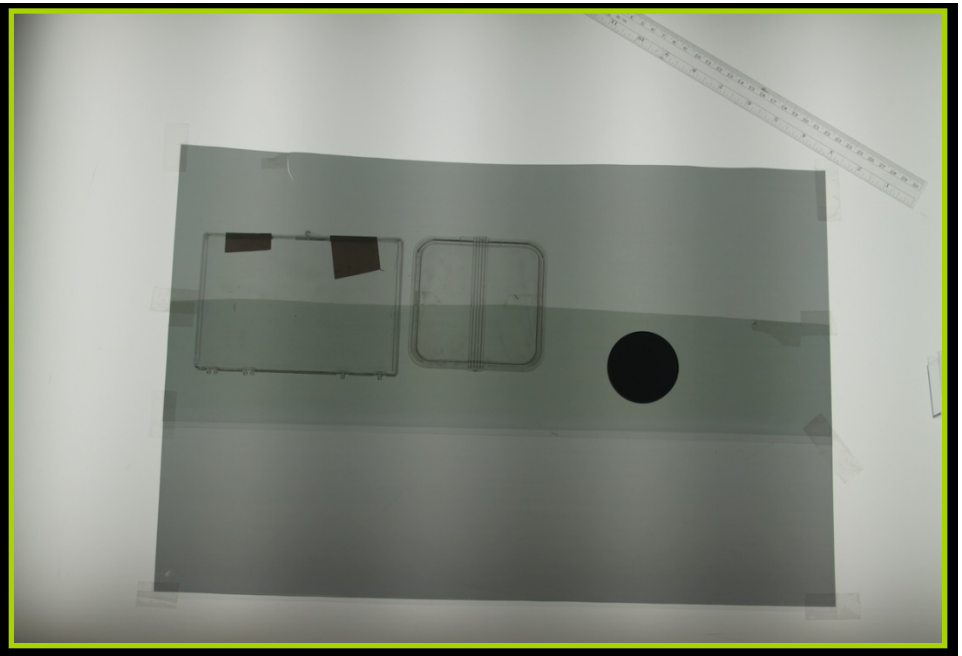
Light from the sun or a light bulb is non-polarized. This means that the waves of light vibrate in all directions perpendicular to the axis of its path. Light is partly polarized when reflected off objects. Light can be completely polarized when it passes through an optical filter, The polarizing filter only allows light waves vibrating in one plane to pass through it.

Crossed Polarizing Filters



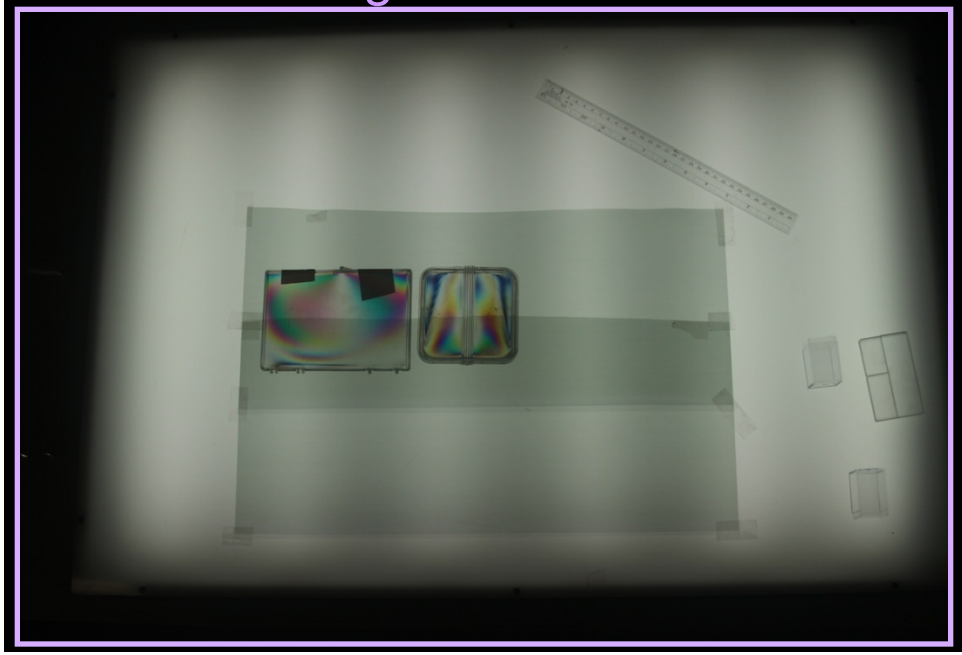


No Polarizing Filter on camera

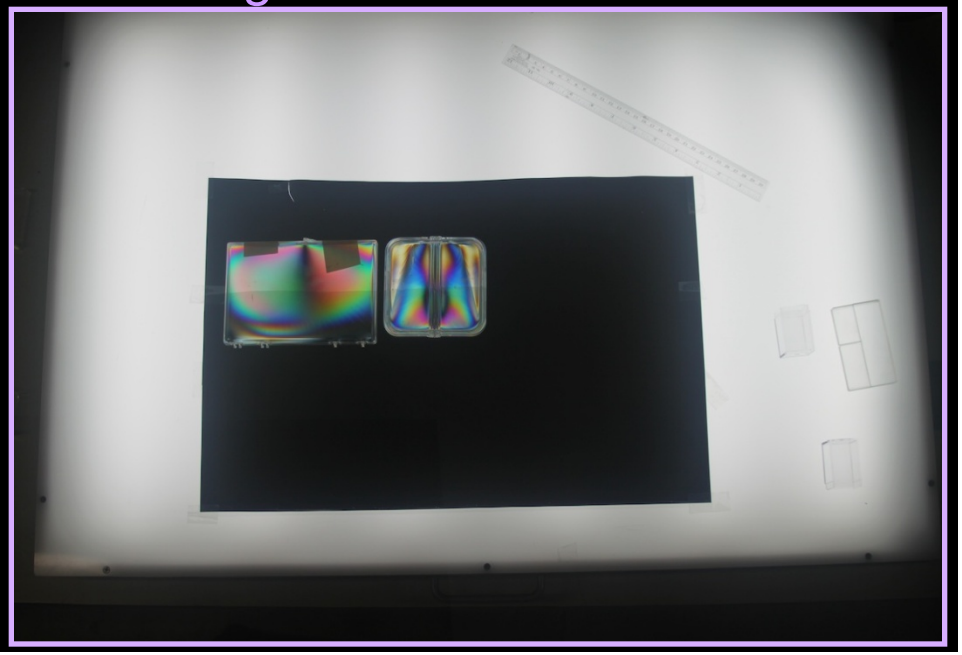


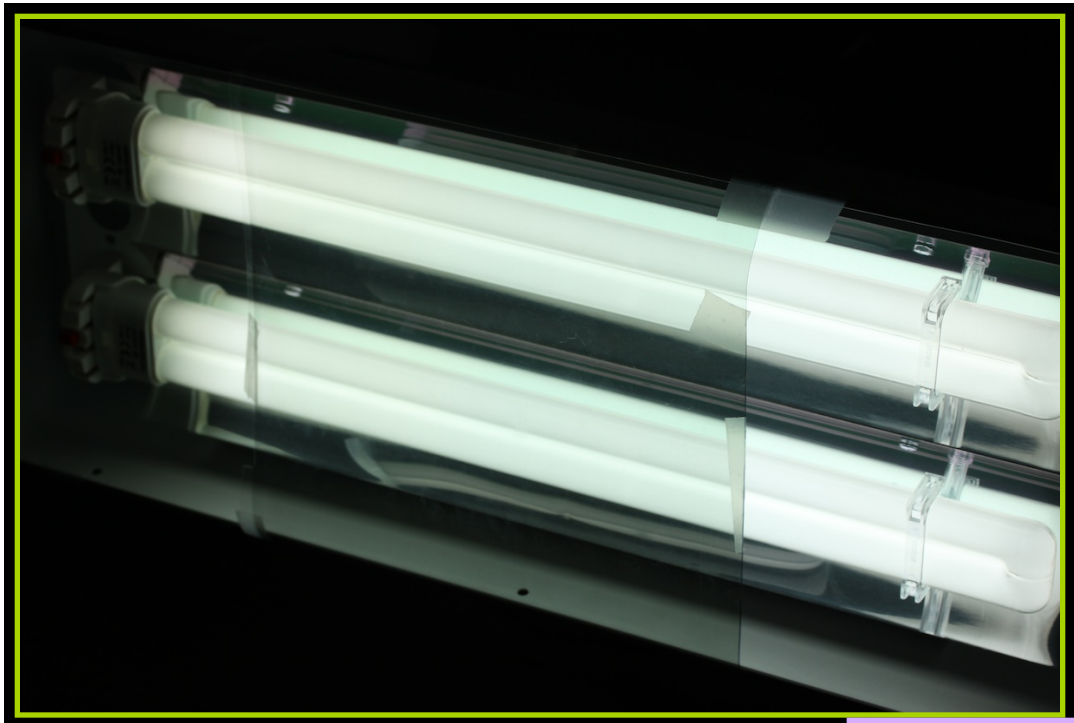
No Polarizing Filter on camera

Polarizing Filter on camera



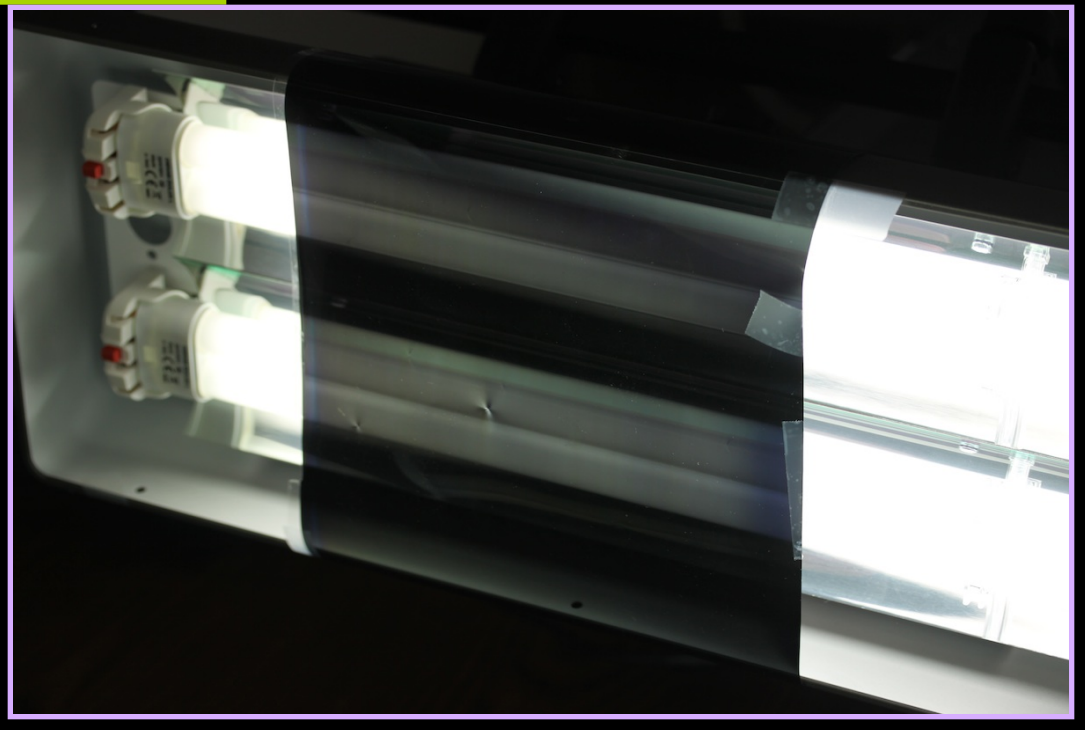
Polarizing Filter on camera turned 90°



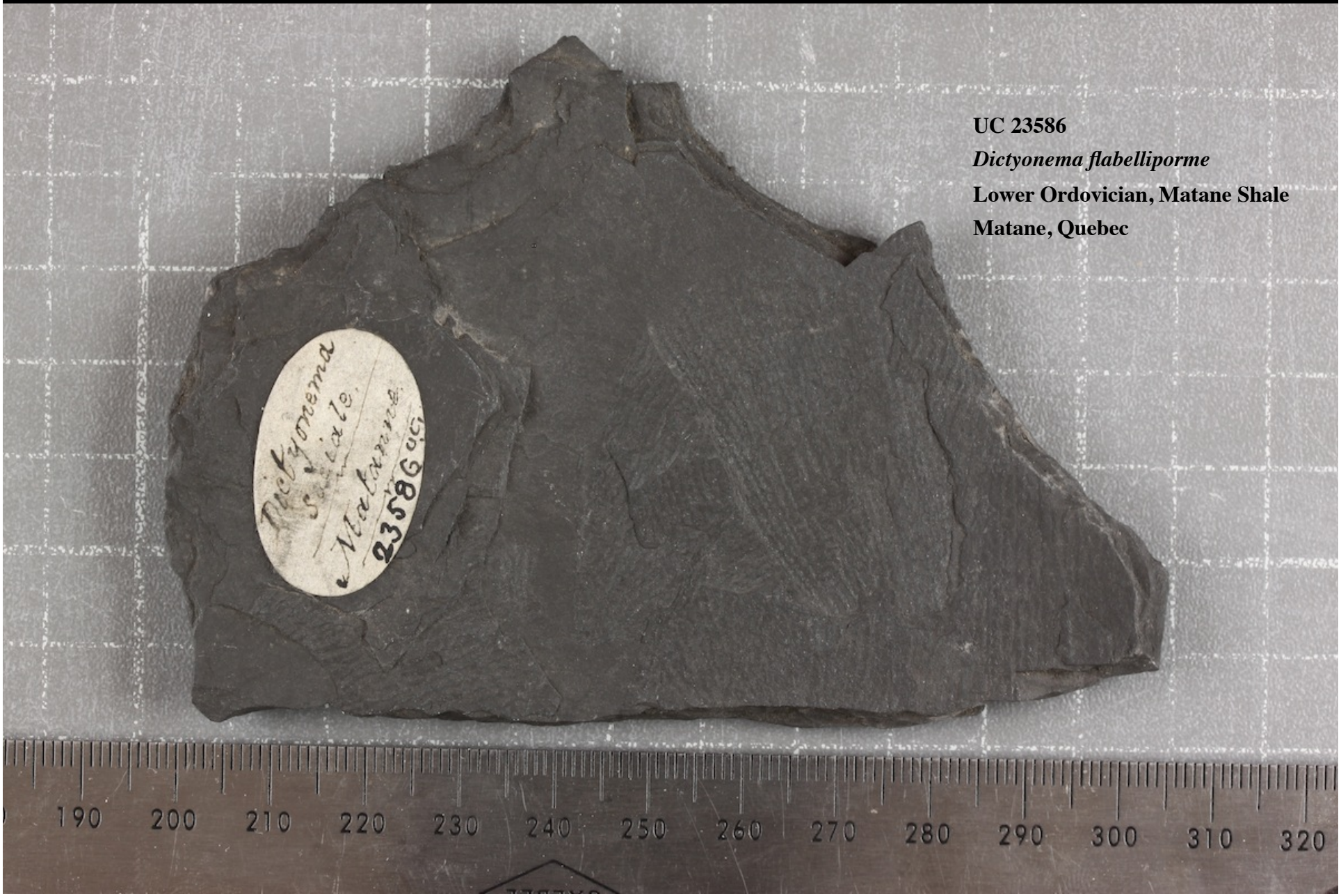


Lights with Aligned Polarizing Filters

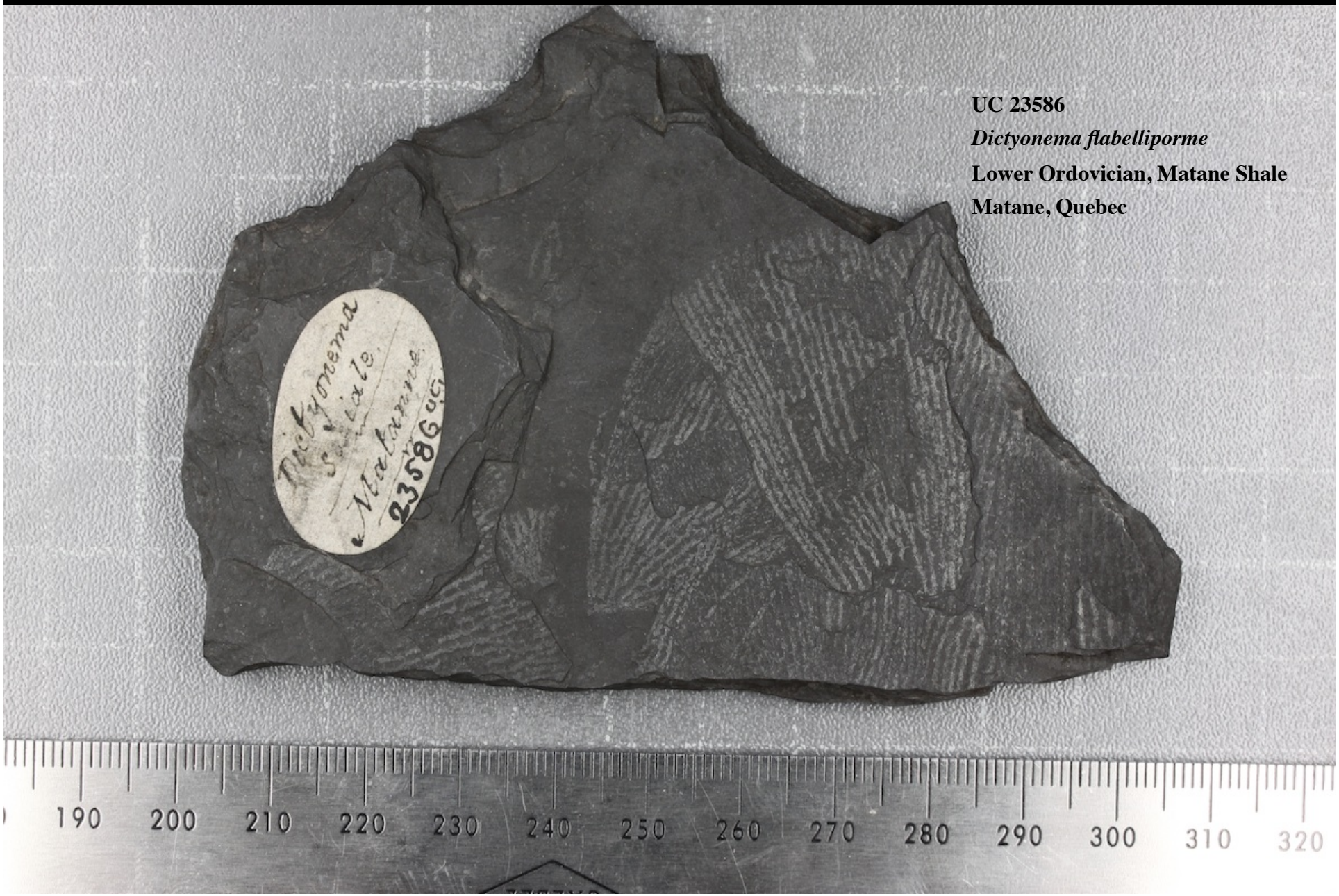
Lights with Crossed Polarizing Filters



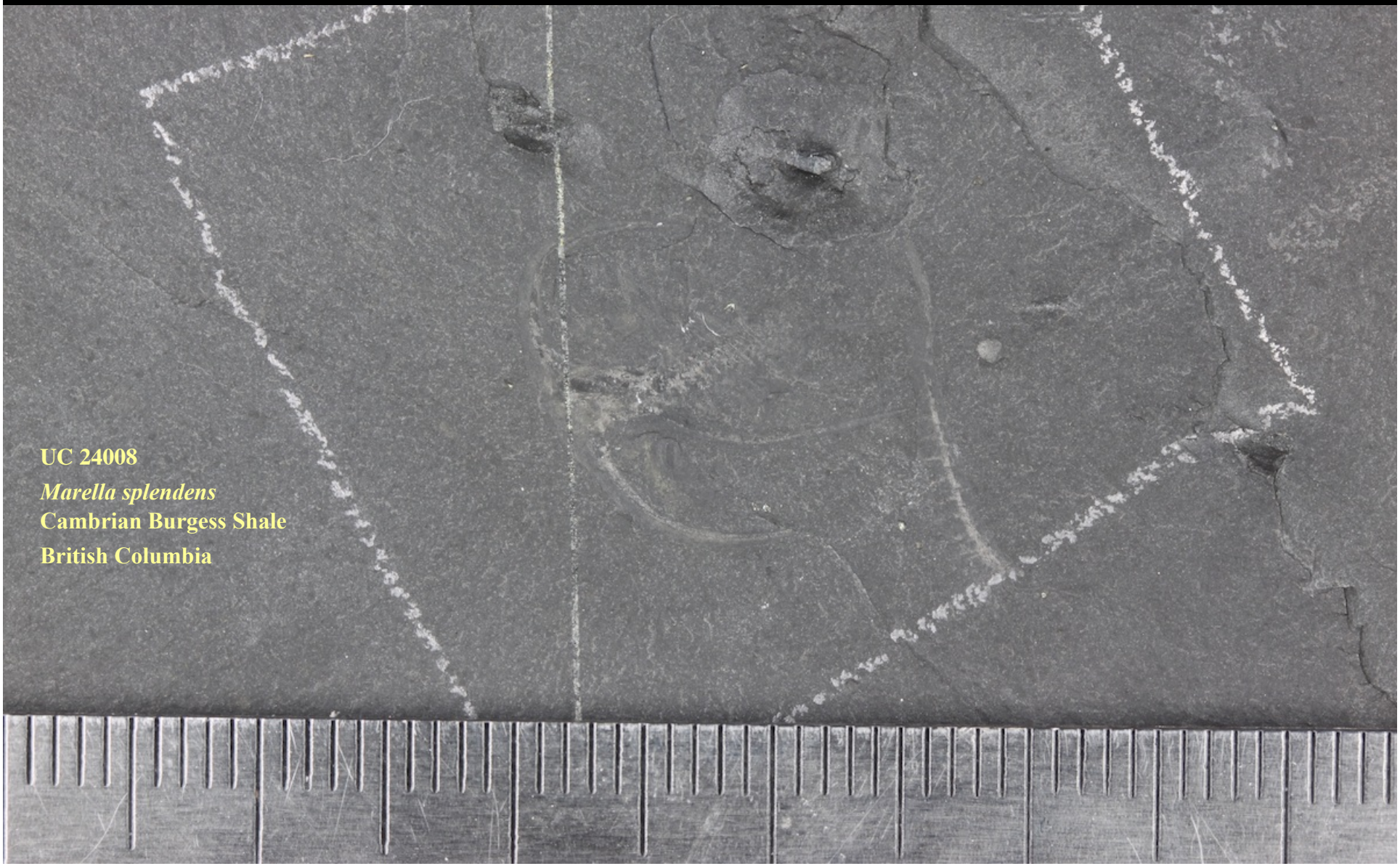
Non-Polarized Light



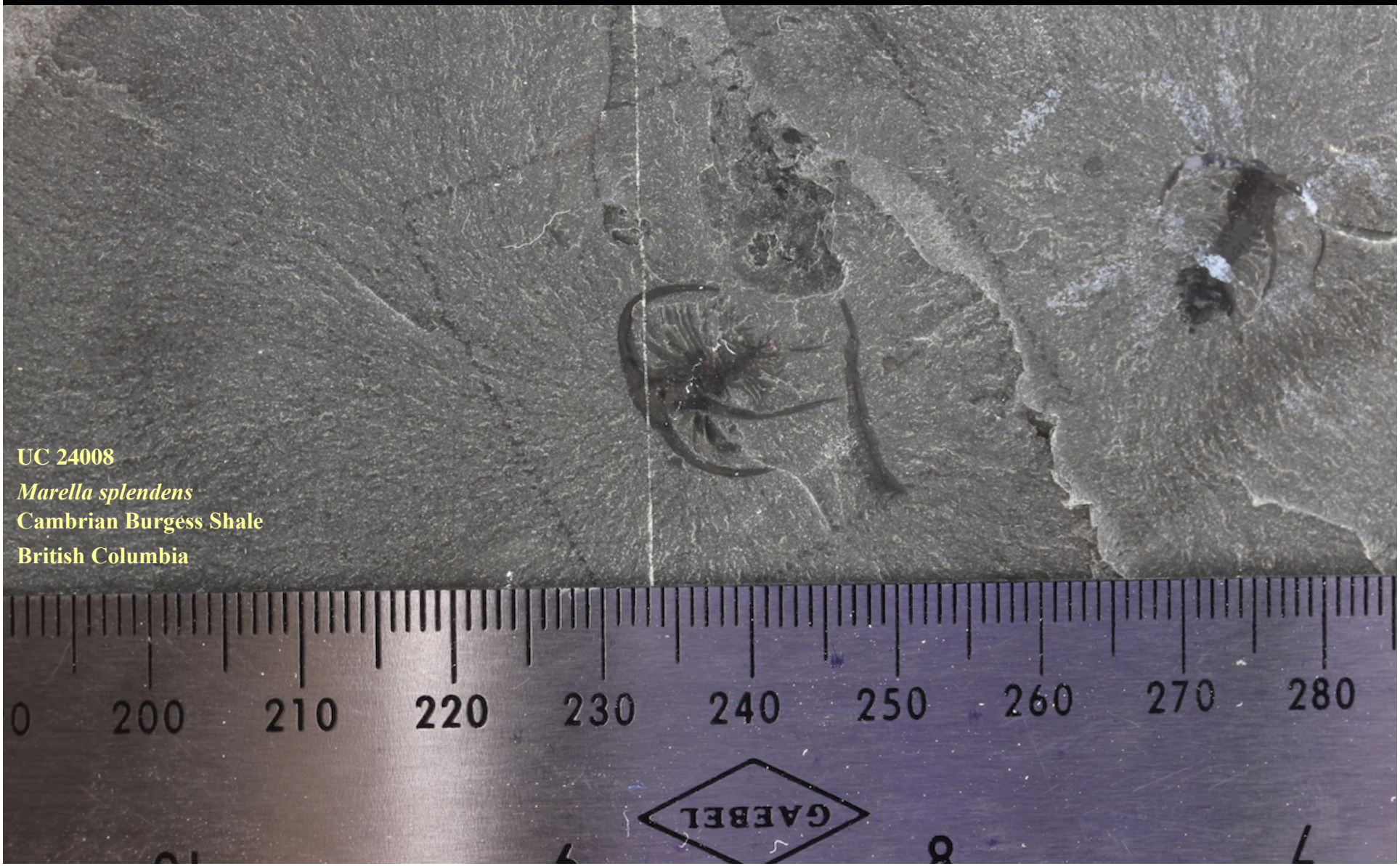
Polarized Light with Crossed Polarizing Filters



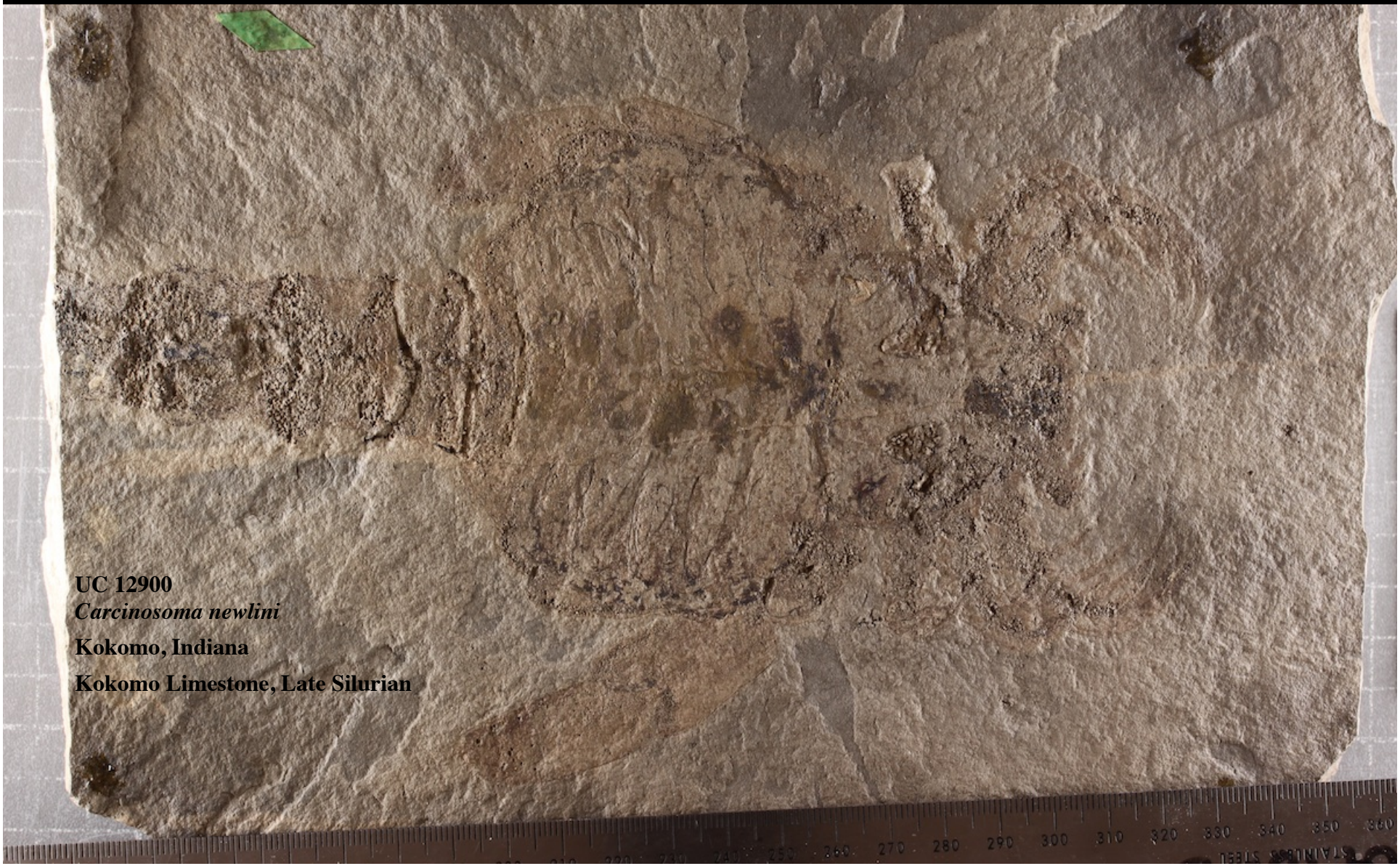
Non-Polarized Light



Polarized Light with Crossed Polarizing Filters



Low-Angle, Non-Polarized Light

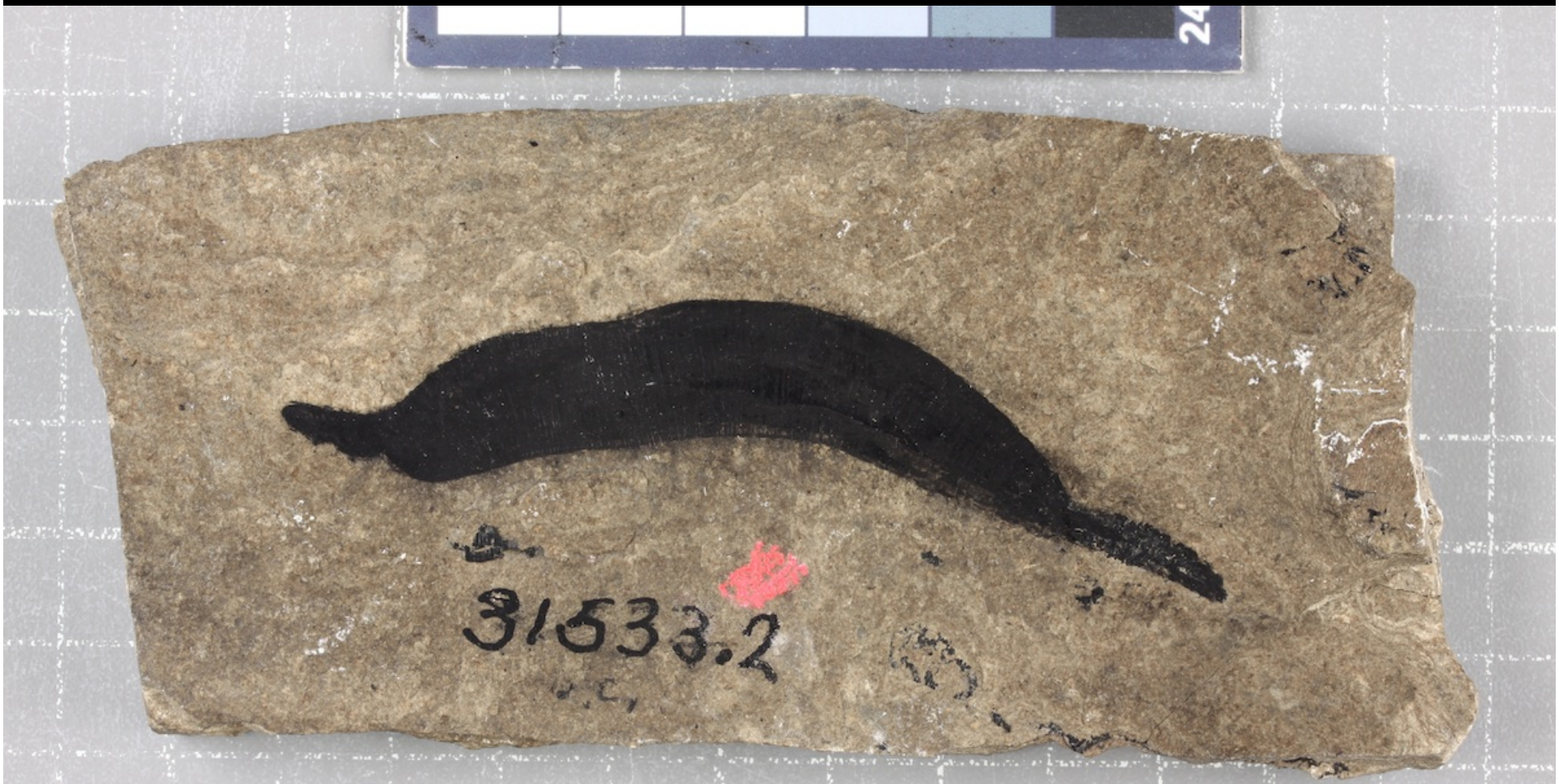


Polarized Light with Crossed Polarizing Filters

One Directional, Low Angle, Non-Polarized Light

UC 31533-2
***Lecthaylus gregarius* Weller**
Racine Dolomite, Silurian
Blue Island, Illinois

Polarized Light with Crossed Polarizing Filters



UC 31533-2

***Lecthaylus gregarius* Weller**

Racine Dolomite, Silurian

Blue Island, Illinois


Non polarized Light
100mm macro lens
F/10, ISO 100
Long-Horned Beetle
Prionus pocularis
Polarized Light
100mm macro lens
F/10, ISO 100

How/Why Does Polarized Lighting Work?

"Polarized light is reflected back directly by the fossil material while the matrix reflects a more chaotic form of light, enabling the second polarizing filter to increase the contrast between the fossil and the matrix."

THE USE OF POLARISED LIGHT IN PHOTOGRAPHY OF MACROFOSSILS
by PHILIP CRABB, 2001,
Palaeontology Volume 44 issue 4

Low-Angle Lighting

PE 22816
Polychaete worm
Rhaphidiophorus hystrix

Pennsylvanian
Mazon Creek

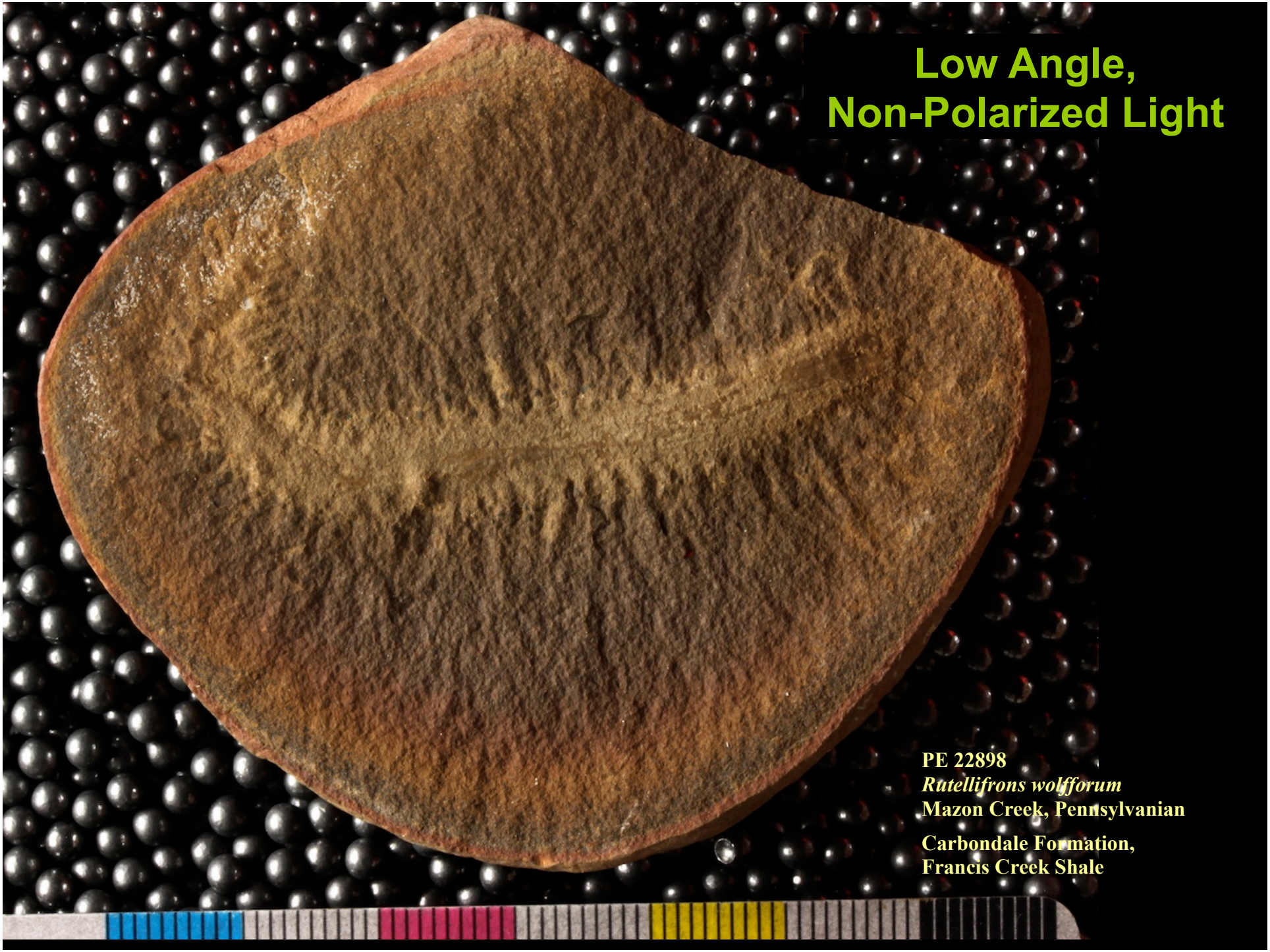
Carbondale Formation
Francis Creek Shale

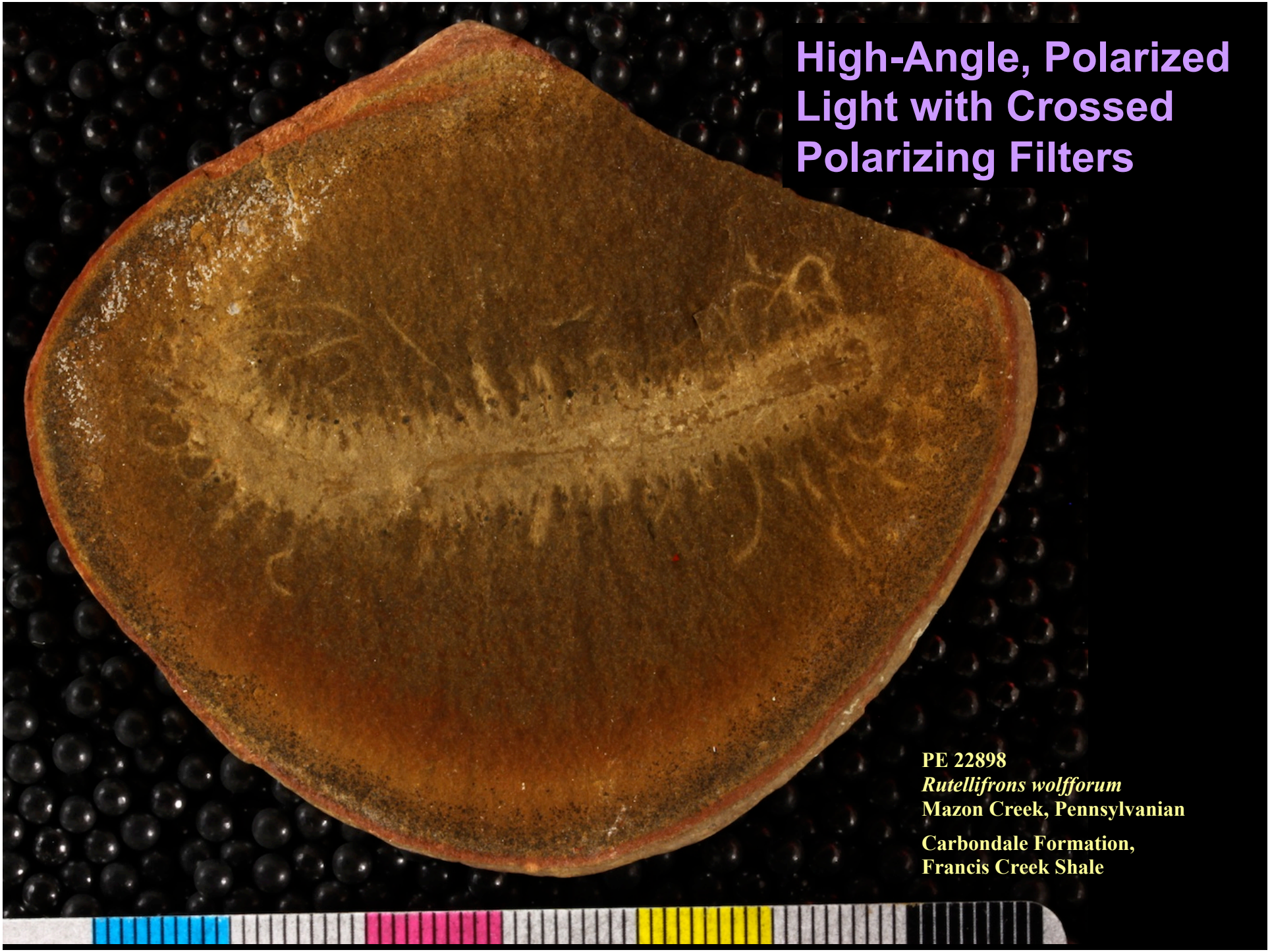
Polarized Light with Crossed Polarizing Filters

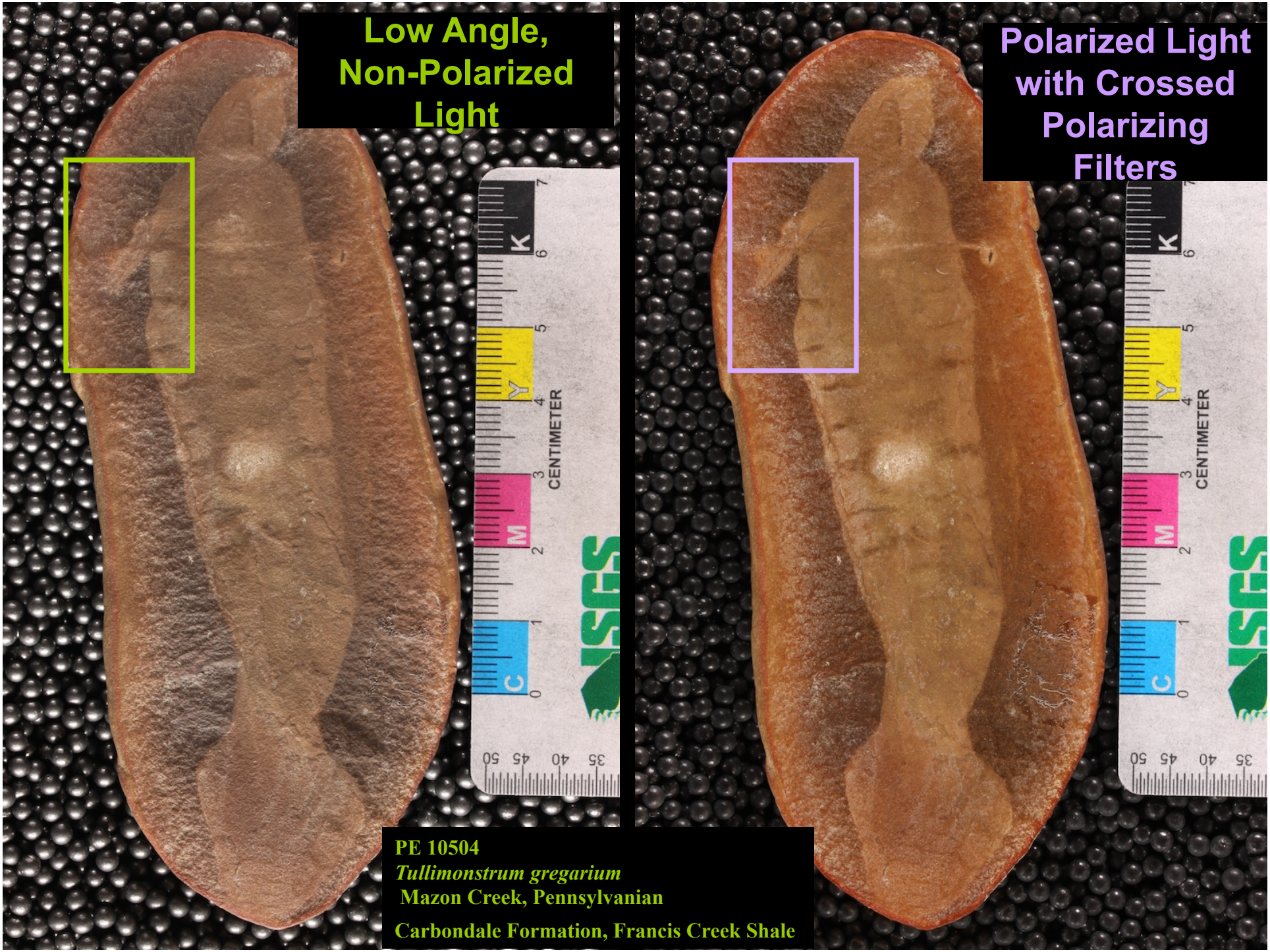
- High Contrast
- Increase saturation
- Reduced reflection
- Flat light

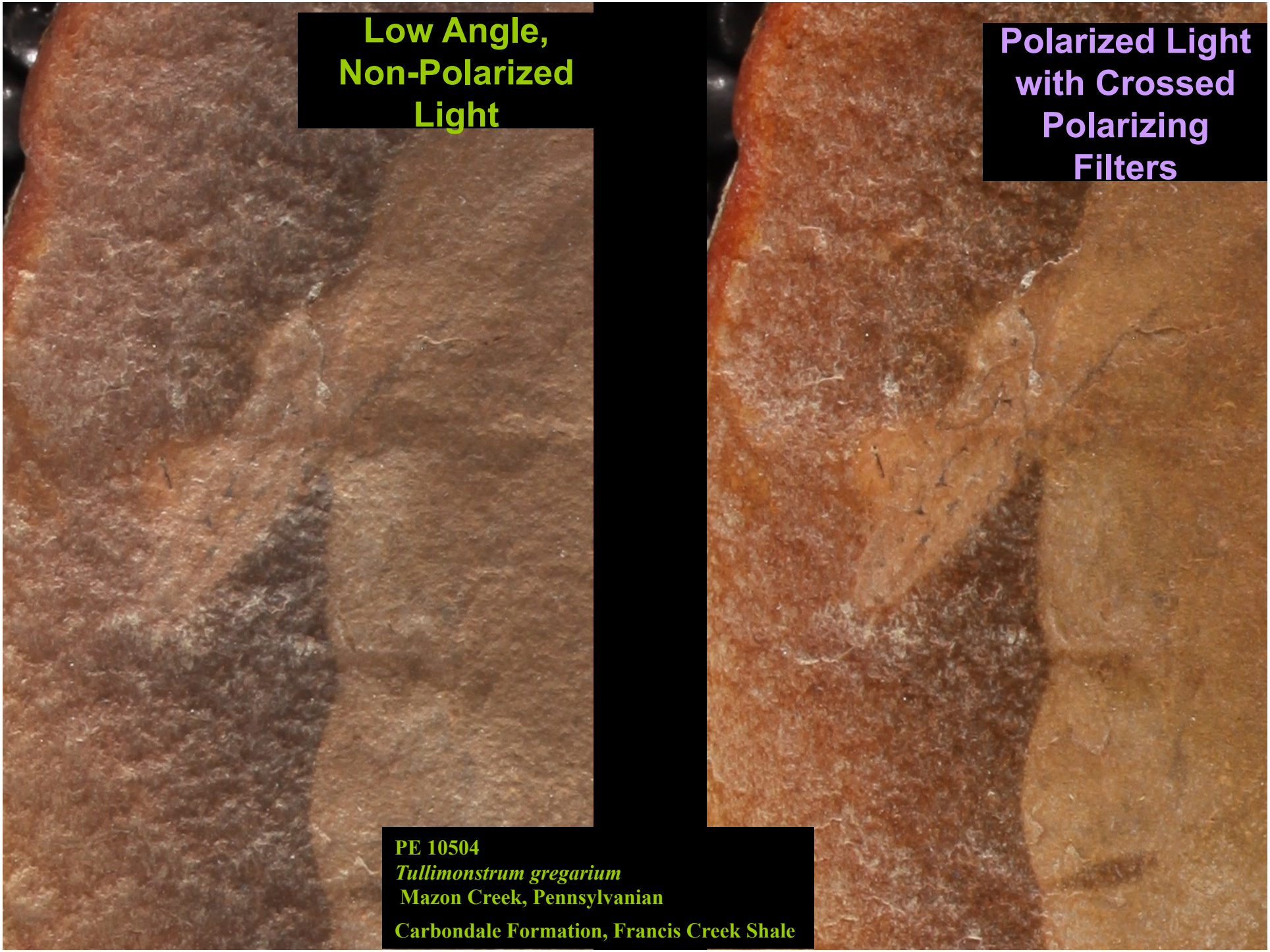
PE 22816
Polychaete worm
Rhaphidiophorus hystrix
Pennsylvanian
Mazon Creek
Carbondale Formation
Francis Creek Shale


Low Angle,
Non-Polarized Light
PE 57188
Eubleptus maculosus
Mazon Creek, Pennsylvanian
Carbondale Formation, Francis Creek Shale
Polarized Light
with Crossed
Polarizing Filters

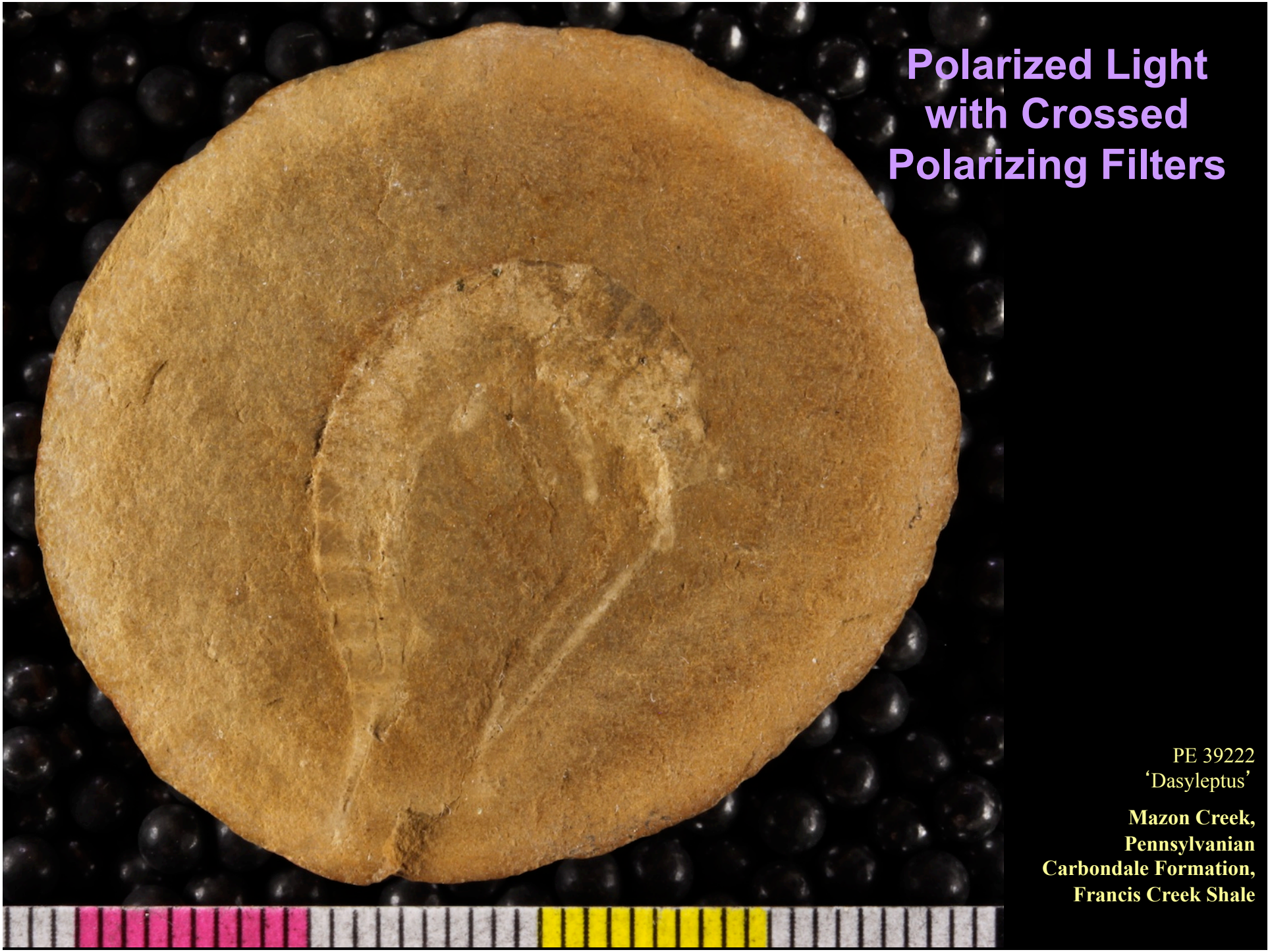

Low Angle,
Non-Polarized Light
PE 22898
Rutellifrons wolfforum
Mazon Creek, Pennsylvanian
Carbondale Formation,
Francis Creek Shale


High-Angle, Polarized Light with Crossed Polarizing Filters
PE 22898
Rutellifrons wolfforum
Mazon Creek, Pennsylvanian
Carbondale Formation,
Francis Creek Shale


Low Angle, Non-Polarized Light
Polarized Light with Crossed Polarizing Filters
CENTIMETER
USGS
PE 10504
Tullimonstrum gregarium
Mazon Creek, Pennsylvanian
Carbondale Formation, Francis Creek Shale


Low Angle, Non-Polarized Light
Polarized Light with Crossed Polarizing Filters
PE 10504
Tullimonstrum gregarium
Mazon Creek, Pennsylvanian
Carbondale Formation, Francis Creek Shale


Low Angle,
Non-Polarized
Light
PE 39222
'Dasyleptus'
Mazon Creek,
Pennsylvanian
Carbondale Formation,
Francis Creek Shale

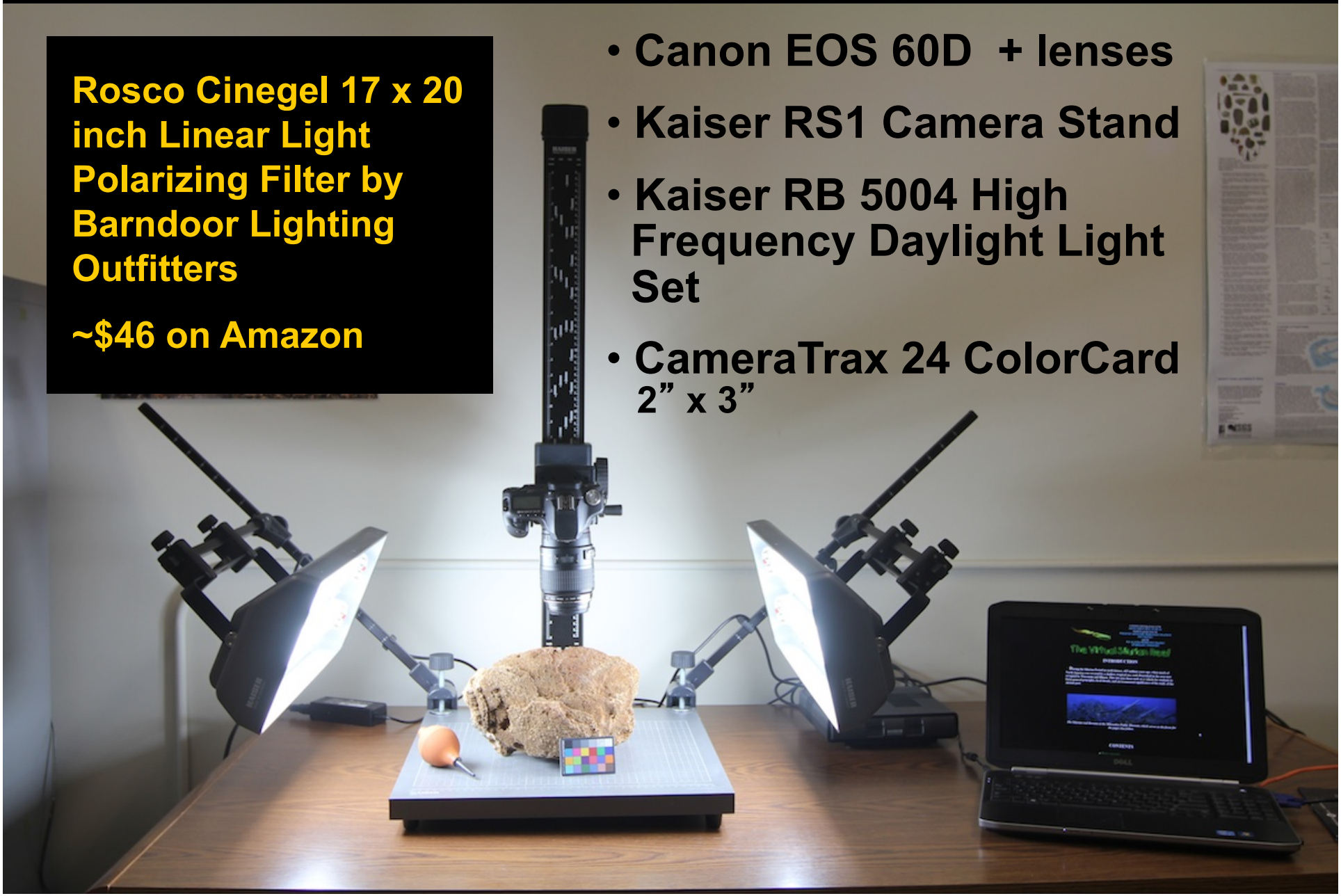

Polarized Light
with Crossed
Polarizing Filters
PE 39222
'Dasyleptus'
Mazon Creek,
Pennsylvanian
Carbondale Formation,
Francis Creek Shale

Summary

**Experiment with lighting,
it makes all the difference.**

- **Ultraviolet lighting may reveal color patterns, adhesives, and fossils and structures normally not visible.**
- **Low-angle lighting highlights topography and textures with shadows.**
- **Polarized lighting increases contrast and saturation, and reduces reflections, but is a flat light.**

My set up



Rosco Cinegel 17 x 20 inch Linear Light Polarizing Filter by Barndoor Lighting Outfitters

~$46 on Amazon

- **Canon EOS 60D + lenses**
- **Kaiser RS1 Camera Stand**
- **Kaiser RB 5004 High Frequency Daylight Light Set**
- **CameraTrax 24 ColorCard 2” x 3”**

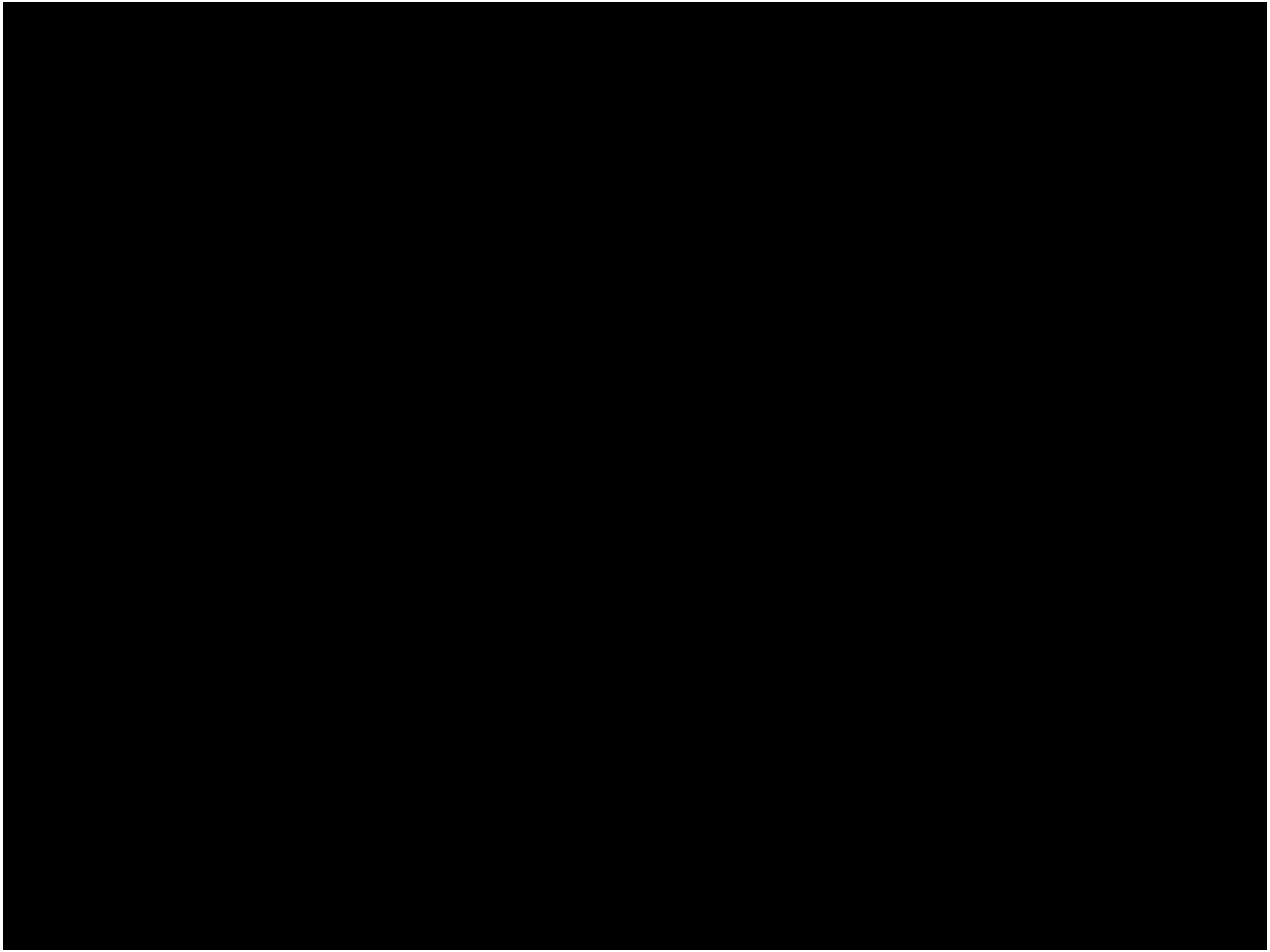
Articles on Polarized Light and Fossil Photography

- Rayner, R.J. 1992. A method of improving contrast in illustrations of coalified fossils. Palaeontologia Africana,49.
- Boyle B. 1992. Fossil detail leaps with double polarization. Professional Photographers of Canada, 22: 10-12.
- Bengtson S. 2000. Teasing Fossils out of shale with Cameras and Computers, Palaeontologia Electronica, 3(1):14pp. http://palaeo-electronica.org/2000_1/fossils/issue1_00.htm

Jean-Bernard Caron Royal Ontario Museum

Video on polarizing light photography and submerged Burgess Shale fossils in water.

http://burgess-shale.rom.on.ca/en/science/fieldwork-collections/labwork-collections/02-photographing-fossils.php



Workflow and Design

IMLS Silurian Reef Project

Goal to digitize 15,000 Silurian specimens in three summers, with three interns per summer and share data with MPM thru online database.

Intern Workflow

Interns selected fossil group, pull 6 drawers from collection, photograph labels, enter label data in KE EMu catalog module, then photograph fossils. Interns record their times for each task

My Workflow

Edit images, batch upload images to KE EMu Multimedia module, then batch connect each Multimedia record to correct KE EMu catalog record.

Data Inspection & Error Detection

Connecting multimedia records to catalog records is perfect time to check for errors. EMu generates error report for unconnected records, and I visual inspect catalog records in a tabular format, and multimedia records one at a time

Digitizing the collection:

Intern workflow

IMLS Silurian Reef Digitization Project

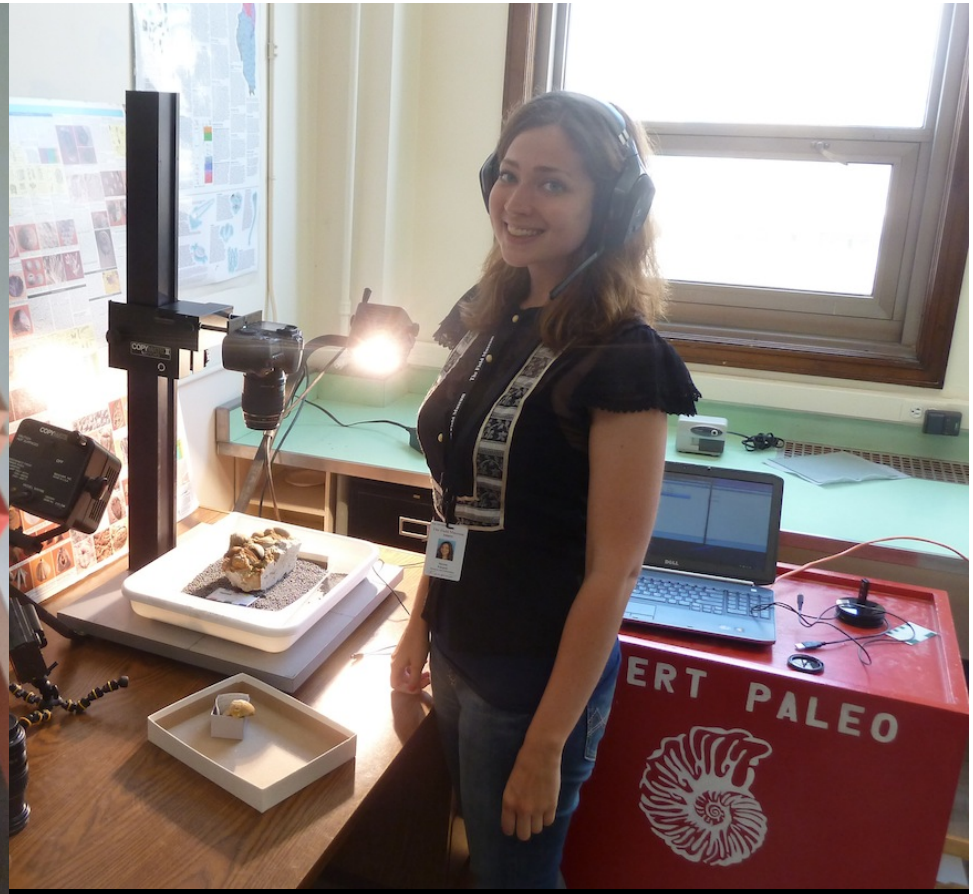
Each intern has a set of fossils that they cycle through the three work stations.

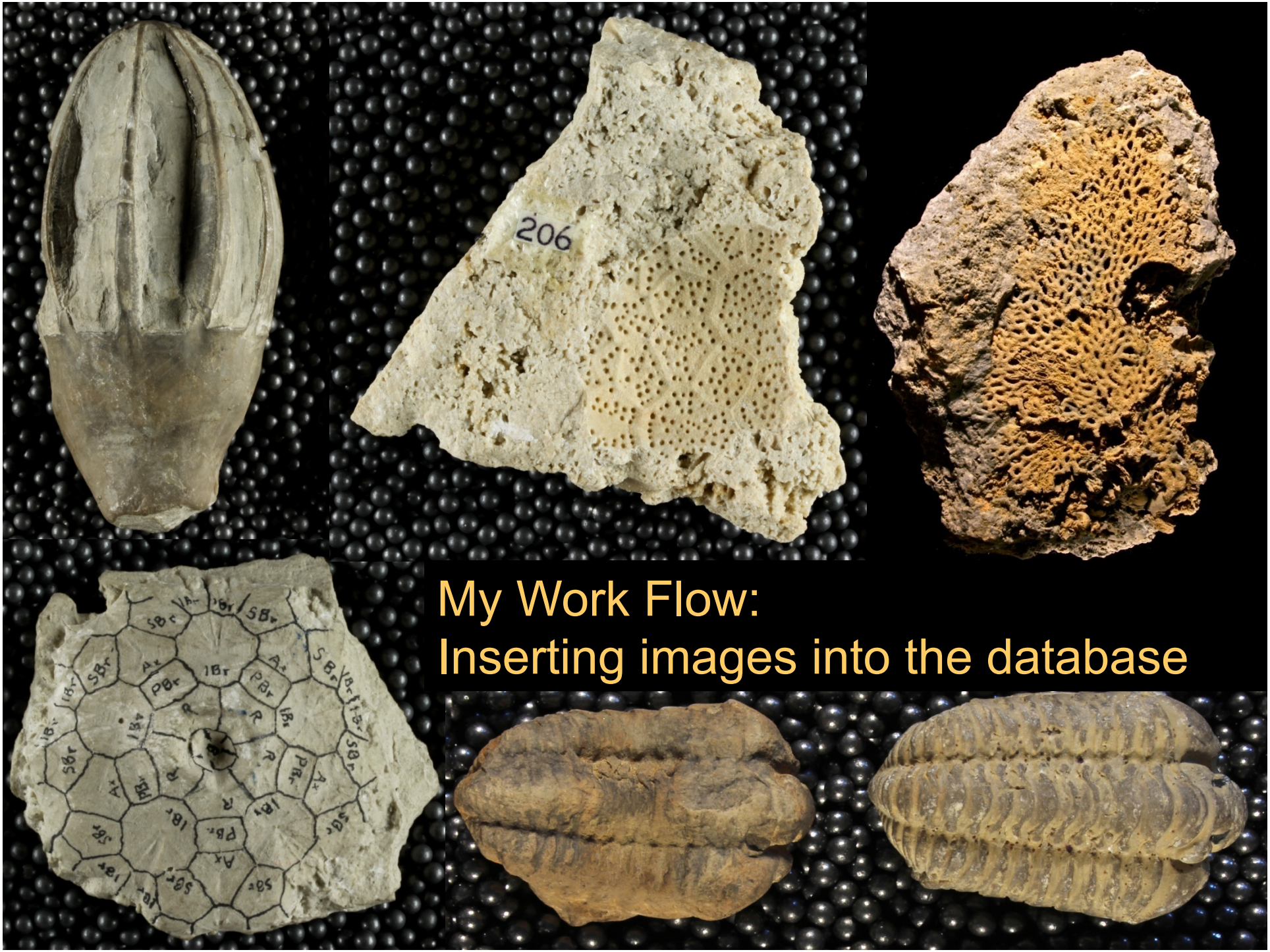
Goal: to digitize 31,000 Silurian reef fossil invertebrates from the FMNH and MPM collections.

2. Fossil Photography Station

3. KE EMu Data Entry Station

1. Label Photography Station


ERT PALEO


206
My Work Flow:
Inserting images into the database

Edit images then batch upload images as .csv file.

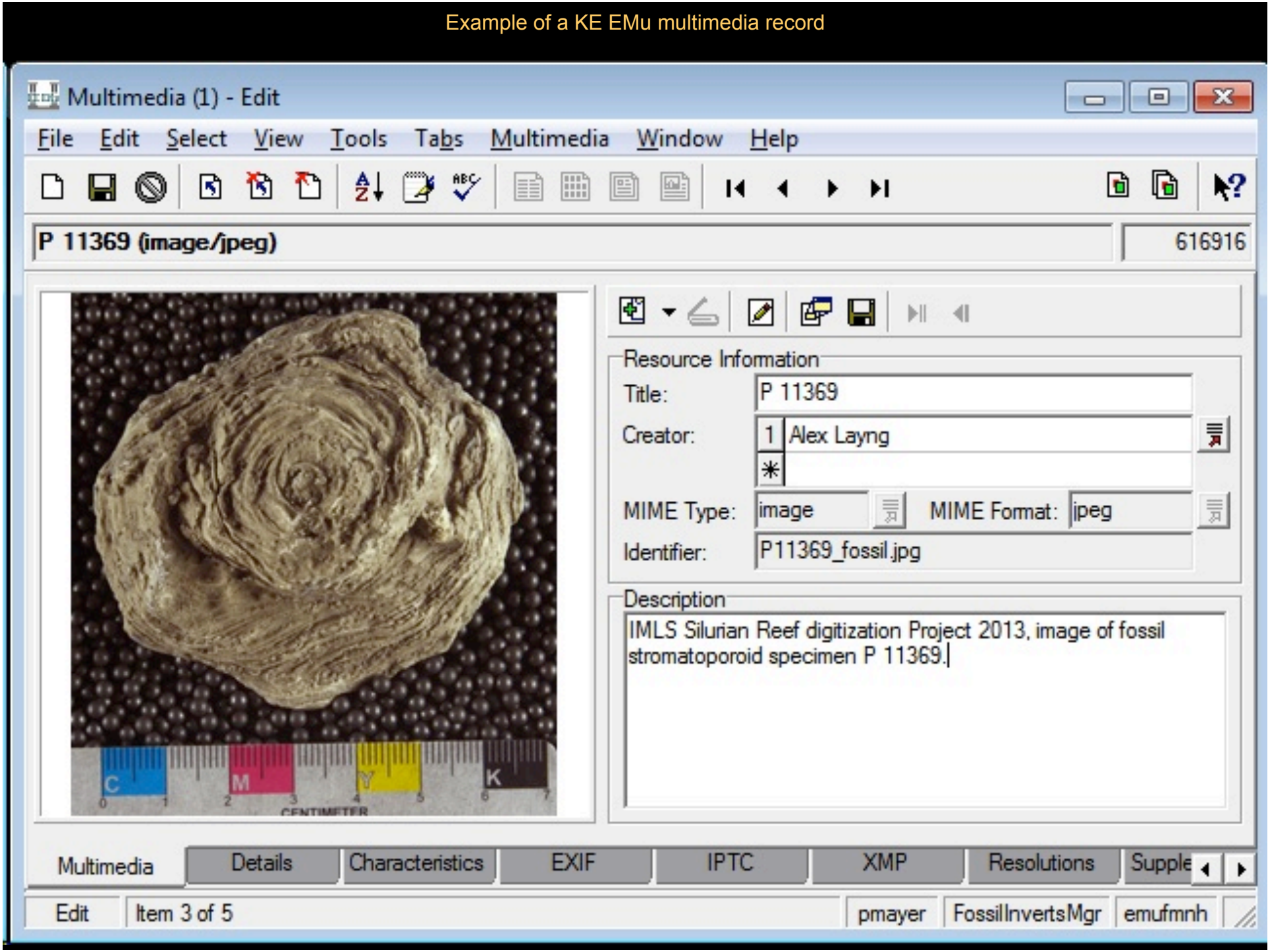
LC_IMLS_Aug26_trilobite2.csv

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	MulTitle	Multimedia	MulDescription	AdmPublishW	AdmPublishW	DetRights	DetDate0	DetSubject_t	DetSubject_t	DetSubject_t	DetSubject_t	DetContribut	DetContributor_tab(2)
2	P 596	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P596_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 596	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
3	P 596	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P596_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 596	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
4	P 1458	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P1458_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 1458	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
5	P 6358	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P6358_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 6358	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
6	P 6358	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P6358_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 6358	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
7	P 6881	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P6881_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 6881	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
8	P 6881	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P6881_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 6881	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
9	P 7546	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P7546_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 7546	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
10	P 7546	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P7546_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 7546	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
11	P 8172	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P8172_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 8172	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
12	P 8172	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P8172_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 8172	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
13	P 8173	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P8173_fossil_2.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 8173	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
14	P 8173	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P8173_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 8173	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
15	P 8173	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P8173_label_2.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 8173	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
16	P 8173	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P8173_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 8173	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
17	P 8174	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P8174_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 8174	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
18	P 8174	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P8174_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 8174	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
19	P 8175	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P8175_fossil_2.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 8175	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
20	P 8175	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P8175_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 8175	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
21	P 8175	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P8175_label_2.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 8175	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
22	P 8175	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P8175_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 8175	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
23	P 8200	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P8200_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 8200	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
24	P 8200	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P8200_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 8200	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
25	P 8631	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P8631_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 8631	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
26	P 8631	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P8631_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 8631	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
27	P 8917	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P8917_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 8917	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
28	P 8917	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P8917_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 8917	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
29	P 9191	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P9191_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 9191	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
30	P 9191	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P9191_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 9191	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
31	P 11520	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P11520_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 11520	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
32	P 11520	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P11520_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 11520	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
33	P 11526	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P11526_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 11526	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
34	P 11526	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P11526_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 11526	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
35	P 11573	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P11573_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 11573	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
36	P 11573	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P11573_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 11573	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
37	P 11574	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P11574_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 11574	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
38	P 11574	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P11574_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 11574	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
39	P 11872	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P11872_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 11872	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
40	P 11872	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P11872_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 11872	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
41	P 11915	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P11915_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 11915	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
42	P 11960	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P11960_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 11960	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
43	P 11960	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P11960_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 11960	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
44	P 16766	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P16766_fossil_2.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 16766	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
45	P 16766	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P16766_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 16766	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
46	P 16766	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P16766_label_2.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 16766	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
47	P 16766	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P16766_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 16766	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
48	P 17594	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P17594_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 17594	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
49	P 17594	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P17594_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 17594	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
50	P 19915	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P19915_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 19915	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
51	P 20658	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P20658_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 20658	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
52	P 20658	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P20658_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 20658	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
53	P 20863	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P20863_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 20863	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
54	P 20863	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P20863_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 20863	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
55	P 20864	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P20864_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 20864	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
56	P 20864	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P20864_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 20864	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
57	P 20865	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P20865_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 20865	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
58	P 20865	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P20865_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 20865	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
59	P 20866	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P20866_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 20866	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
60	P 20866	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P20866_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 20866	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
61	P 20867	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P20867_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 20867	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
62	P 20867	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P20867_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 20867	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
63	P 20869	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P20869_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 20869	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
64	P 20869	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P20869_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 20869	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
65	P 20872	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P20872_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 20872	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
66	P 20872	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P20872_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 20872	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
67	P 20886	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P20886_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 20886	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
68	P 20886	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P20886_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 20886	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
69	P 21208	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P21208_fossil_2.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 21208	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
70	P 21208	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P21208_fossil_3.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 21208	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
71	P 21208	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P21208_fossil_4.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 21208	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
72	P 21208	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P21208_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 21208	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
73	P 21208	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P21208_label_2.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 21208	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
74	P 21208	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P21208_label_3.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 21208	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
75	P 21208	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P21208_label_4.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 21208	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
76	P 21208	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P21208_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 21208	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
77	P 21586	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P21586_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 21586	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
78	P 21586	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P21586_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 21586	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
79	P 22556	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P22556_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 22556	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
80	P 22556	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P22556_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 22556	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
81	P 22733	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P22733_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 22733	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
82	P 22733	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P22733_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 22733	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
83	P 30882	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P30882_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 30882	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
84	P 30882	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\P30882_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen P 30882	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
85	PE 495	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\PE495_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen PE 495	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
86	PE 962	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\PE962_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen PE 962	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
87	PE 962	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\PE962_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen PE 962	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
88	PE 1458	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\PE1458_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen PE 1458	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
89	PE 3004	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\PE3004_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen PE 3004	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
90	PE 3004	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\PE3004_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen PE 3004	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
91	PE 5312	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\PE5312_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen PE 5312	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
92	PE 5312	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\PE5312_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen PE 5312	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
93	PE 6335	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\PE6335_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen PE 6335	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
94	PE 6335	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\PE6335_label_2.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen PE 6335	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
95	PE 6335	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\PE6335_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen PE 6335	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
96	PE 17223	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\PE17223_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen PE 17223	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
97	PE 17223	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\PE17223_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen PE 17223	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
98	PE 24340	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\PE24340_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen PE 24340	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
99	PE 24340	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\PE24340_label.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen PE 24340	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
100	PE 24928	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\PE24928_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen PE 24928	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer
101	PE 28645	\\davinci\Geology\mayer\IMLS_LC\LC_IMLS_Aug26_trilobite-small\PE28645_fossil.JPG	IMLS Silurian Reef Digitization Project, Image of Silurian trilobite, specimen PE 28645	Yes	Yes	© Field Muse	26-Aug-13	Silurian	IMLS	Arthropod	Trilobite	Liza Connolly	P. S. Mayer

LC_IMLS_Aug26_trilobite2.csv

Ready

Example of a KE EMu multimedia record



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1	MulMultiMediaRef	GeoSpecimenNo
2	622709	P 596
3	622710	P 596
4	622711	P 1458
5	622712	P 6358
6	622713	P 6358
7	622714	P 6881
8	622715	P 6881
9	622716	P 7546
10	622717	P 7546
11	622718	P 8172
12	622719	P 8172
13	622720	P 8173
14	622721	P 8173
15	622722	P 8173
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19	622726	P 8175
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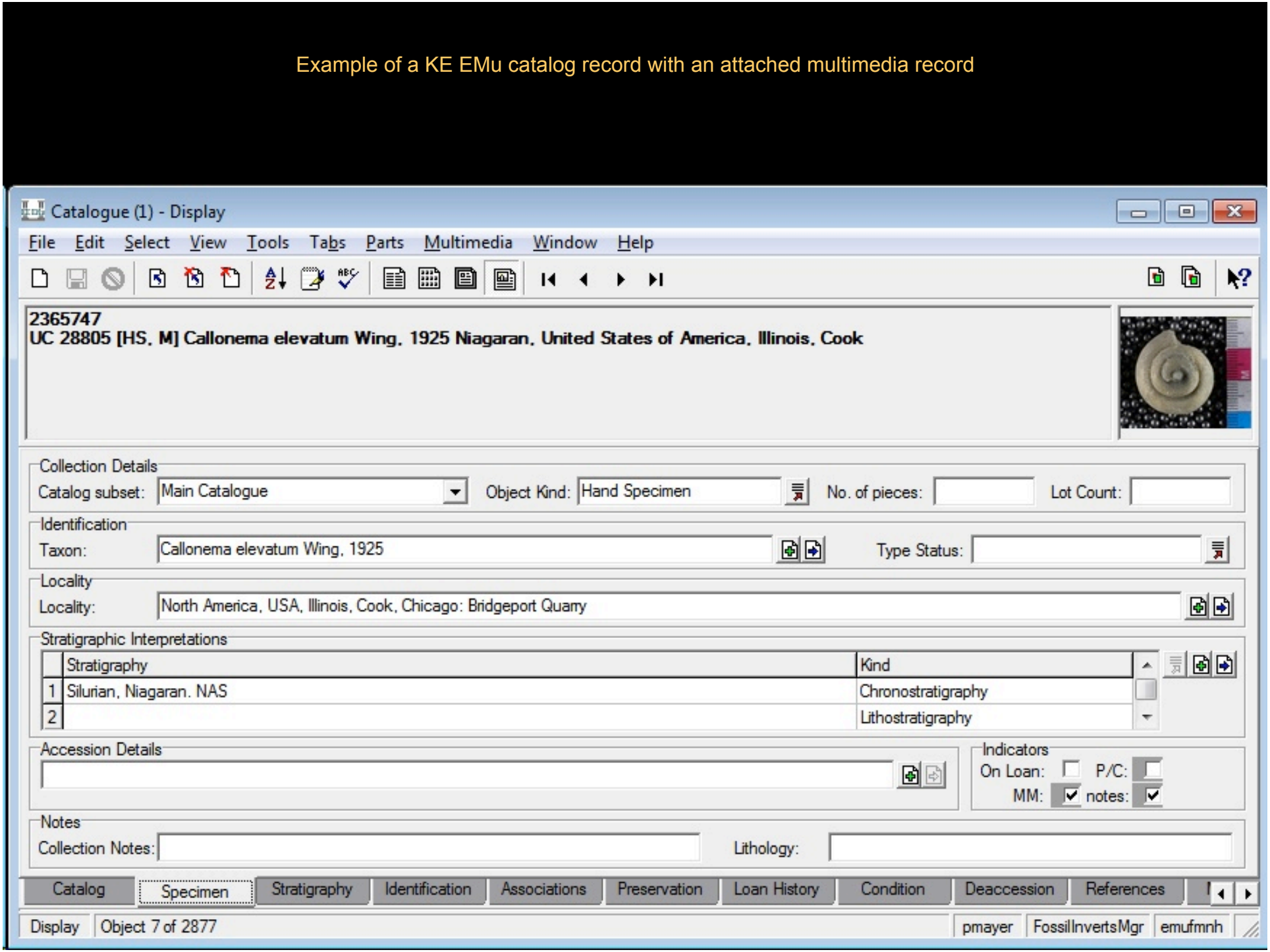
21	622728	P 8175
22	622729	P 8175
23	622730	P 8200
24	622731	P 8200
25	622732	P 8631
26	622733	P 8631
27	622734	P 8917
28	622735	P 8917
29	622736	P 9191
30	622737	P 9191
31	622738	P 11520
32	622739	P 11520
33	622740	P 11526
34	622741	P 11526
35	622742	P 11573
36	622743	P 11573
37	622744	P 11574

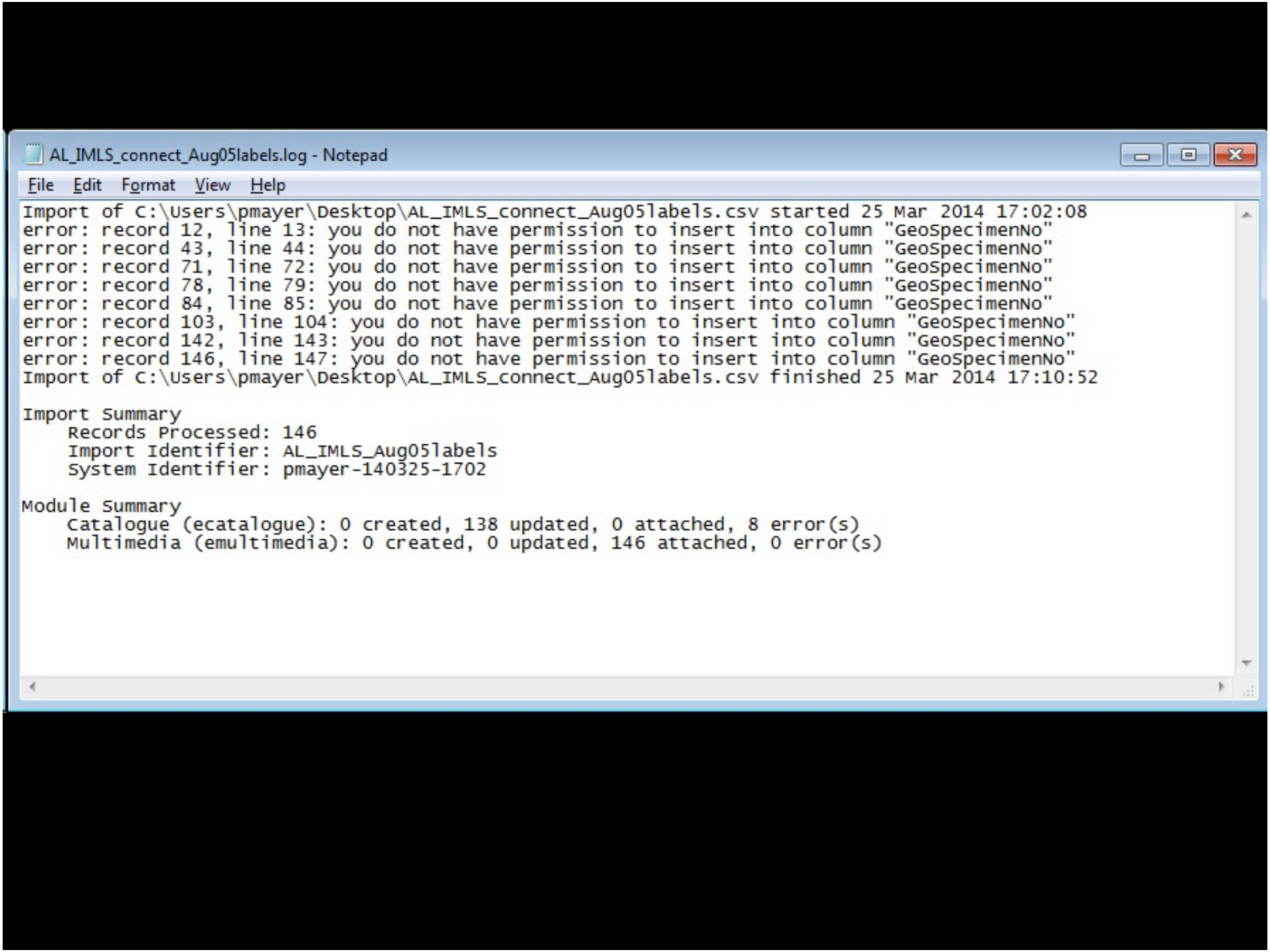
Next step

Upload a second .CSV file with the Multimedia IRN and the specimen's catalog number to the catalog module.

This links the image to the catalog entry.

Example of a KE EMu catalog record with an attached multimedia record




AL_IMLS_connect_Aug05labels.log - Notepad
File Edit Format View Help
Import of C:\Users\pmayer\Desktop\AL_IMLS_connect_Aug05labels.csv started 25 Mar 2014 17:02:08
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error: record 71, line 72: you do not have permission to insert into column "GeoSpecimenNo"
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error: record 103, line 104: you do not have permission to insert into column "GeoSpecimenNo"
error: record 142, line 143: you do not have permission to insert into column "GeoSpecimenNo"
error: record 146, line 147: you do not have permission to insert into column "GeoSpecimenNo"
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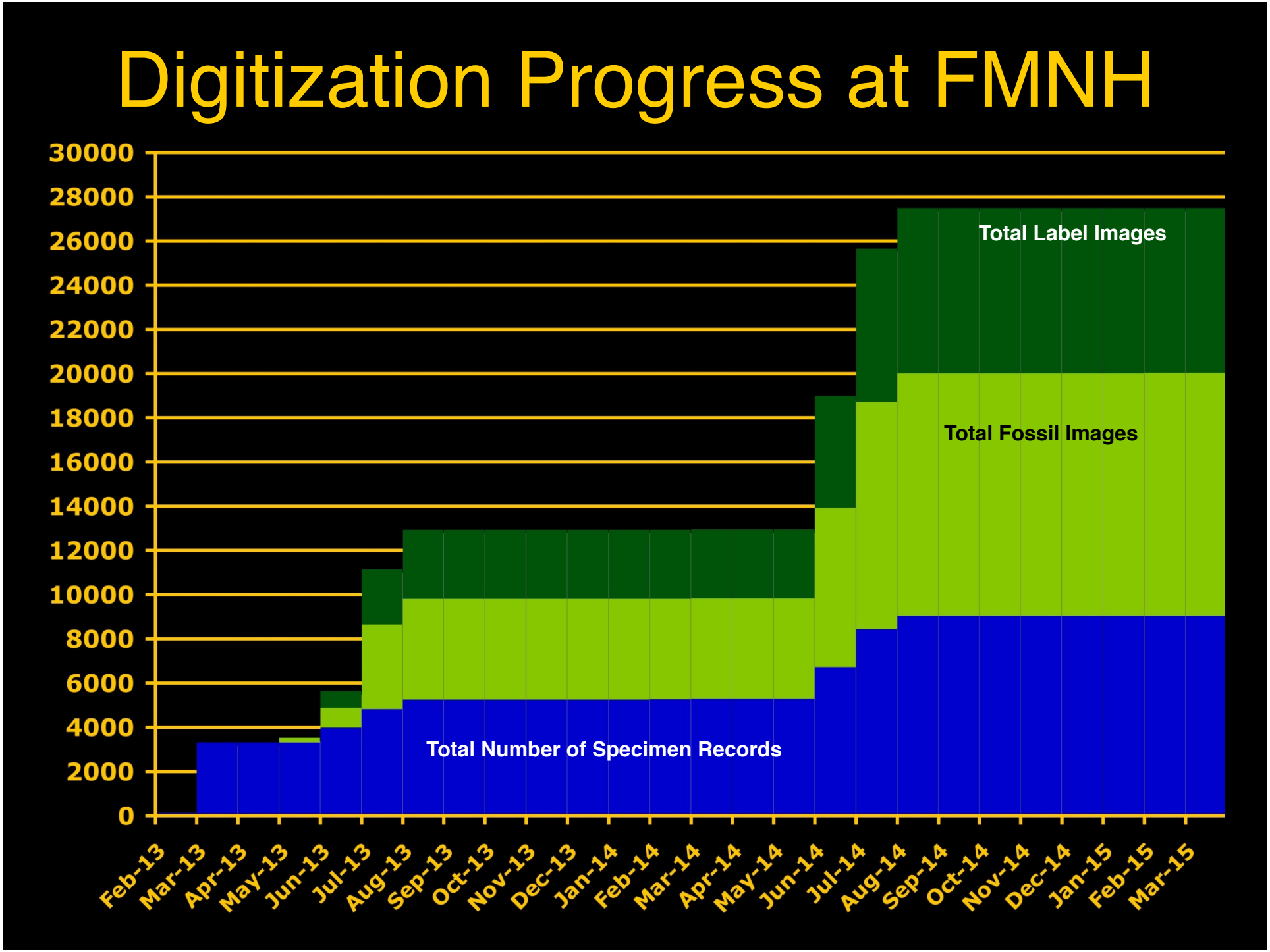
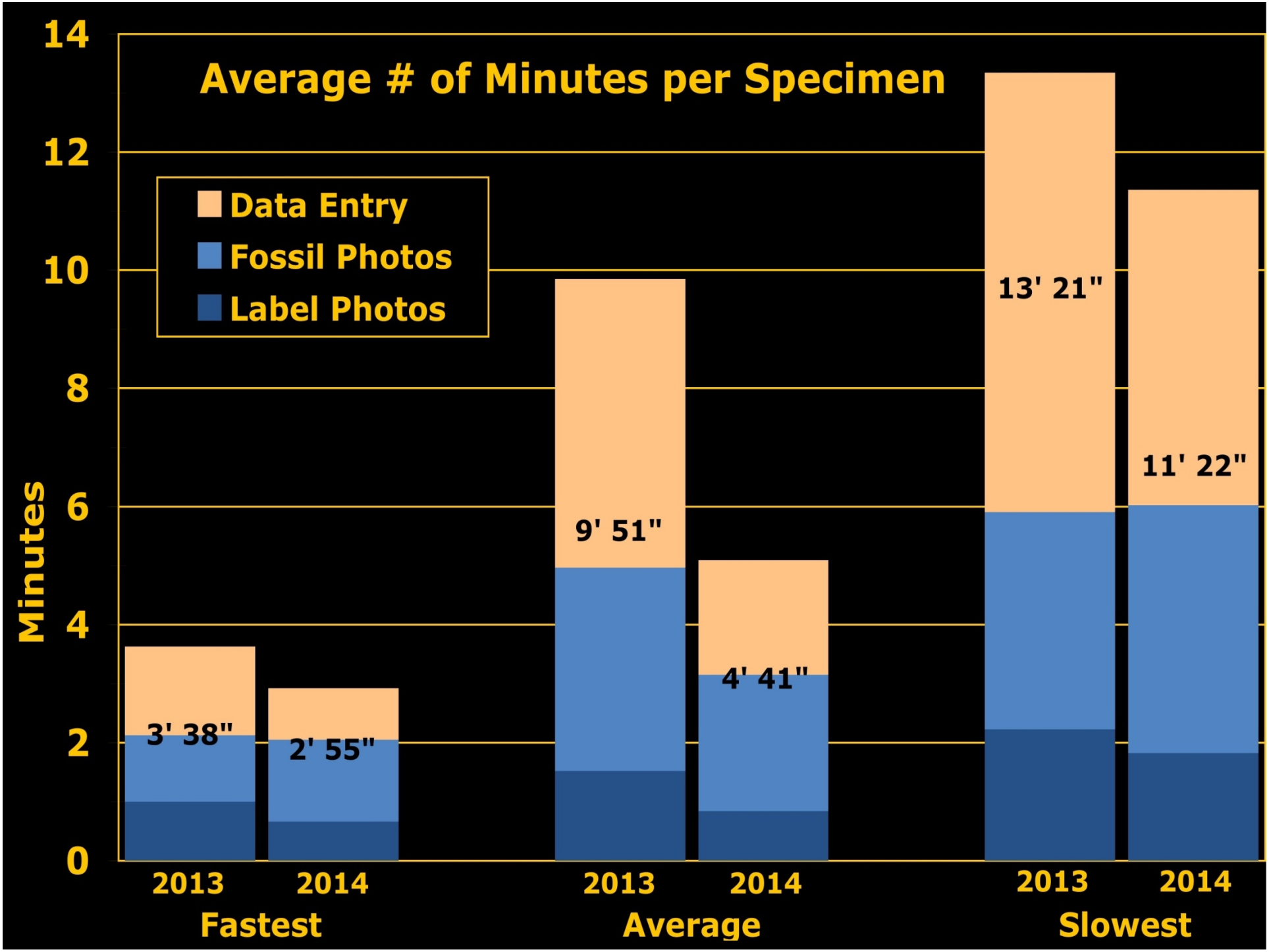
Import Summary
Records Processed: 146
Import Identifier: AL_IMLS_Aug05labels
System Identifier: pmayer-140325-1702
Module Summary
Catalogue (ecatalogue): 0 created, 138 updated, 0 attached, 8 error(s)
Multimedia (emultimedia): 0 created, 0 updated, 146 attached, 0 error(s)

Digitization Progress at FMNH




Average # of Minutes per Specimen
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Fossil Photos
Label Photos
Minutes
14
12
10
8
6
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2
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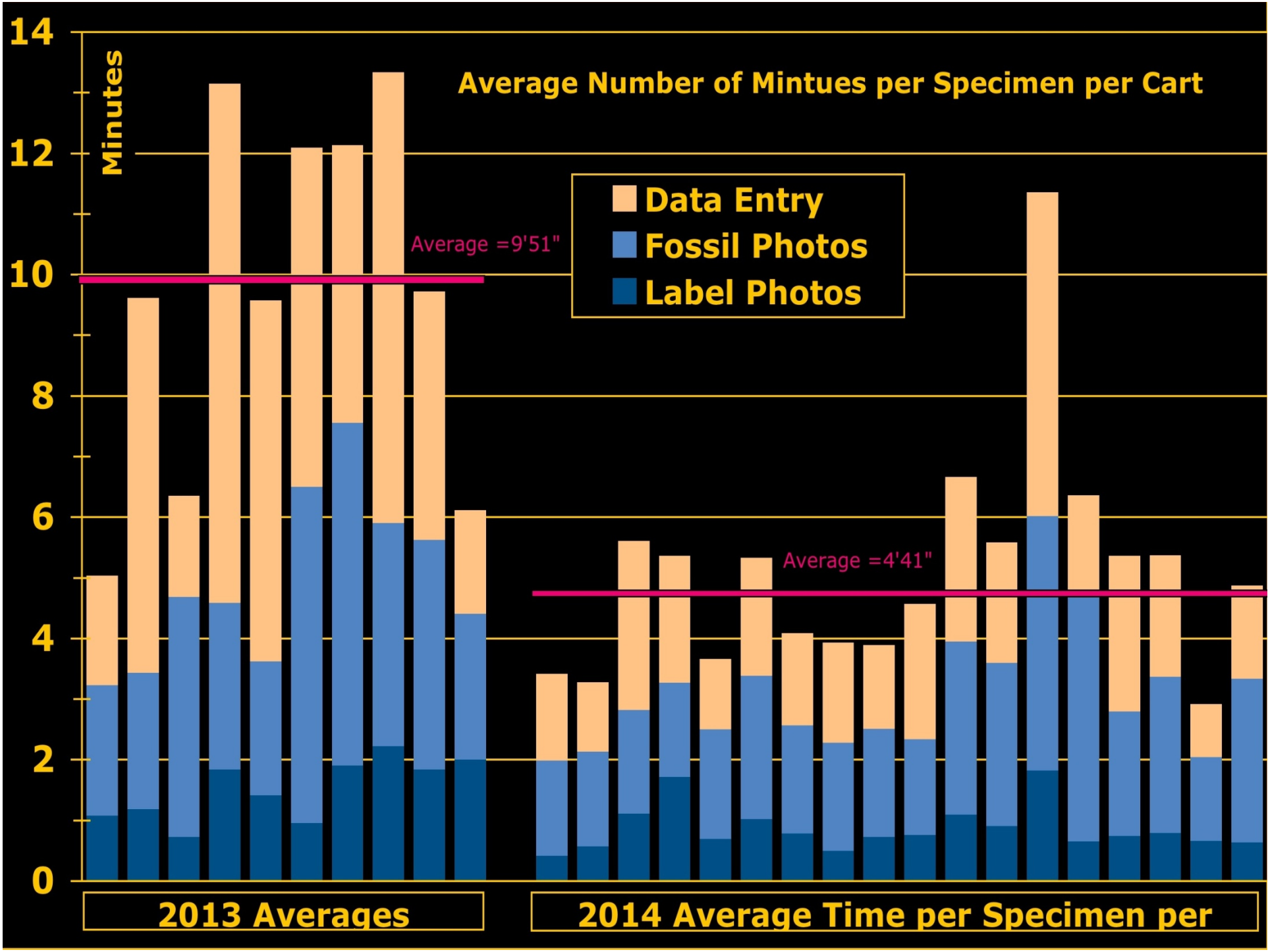
3' 38"
2' 55"
9' 51"
4' 41"
13' 21"
11' 22"
2013
2014
2013
2014
2013
2014
Fastest
Average
Slowest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Minutes
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12
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Fossil Photos
Label Photos
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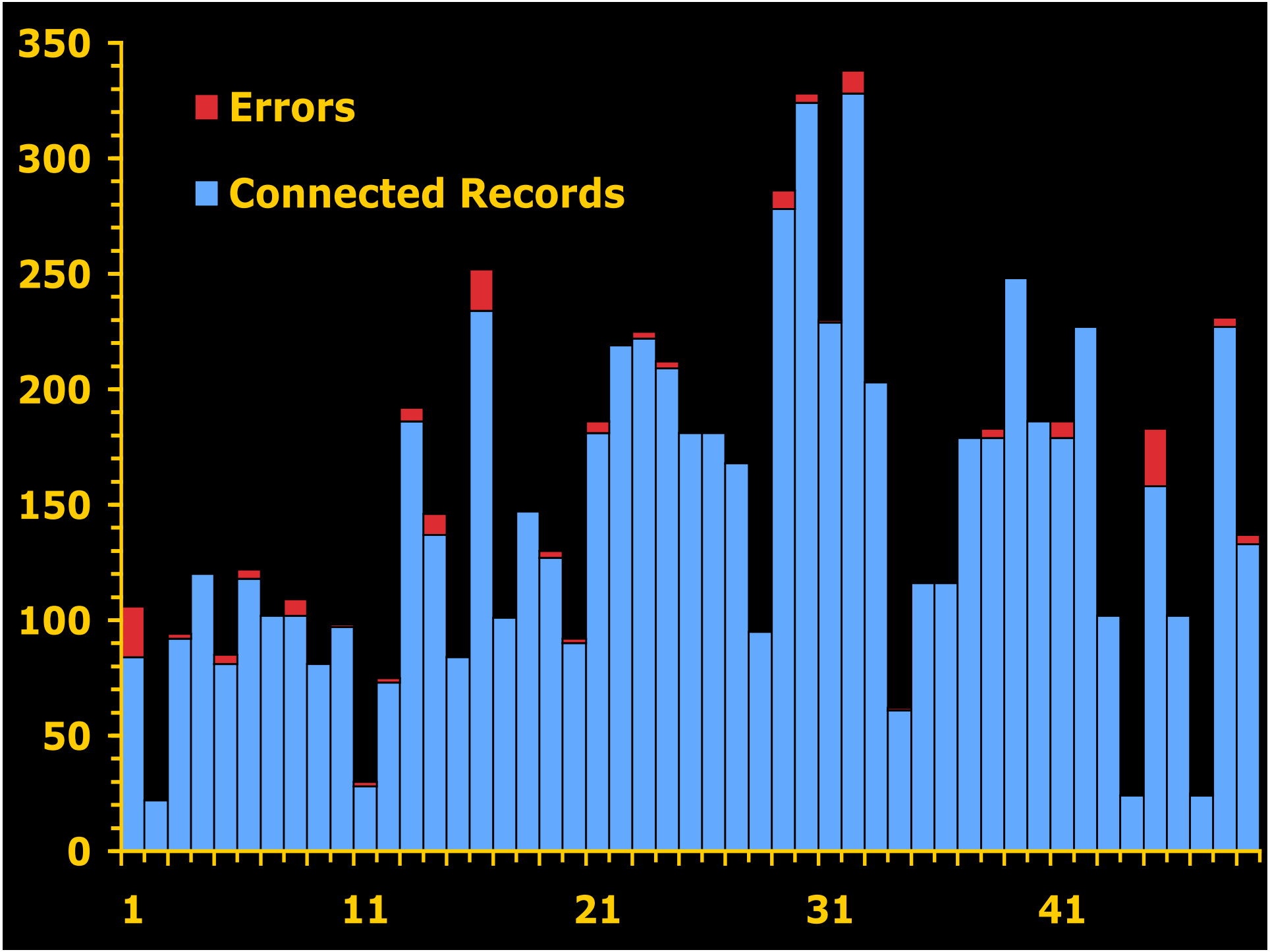
Average =4'41"
2013 Averages
2014 Average Time per Specimen per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Errors
Connected Records
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Acknowledgements

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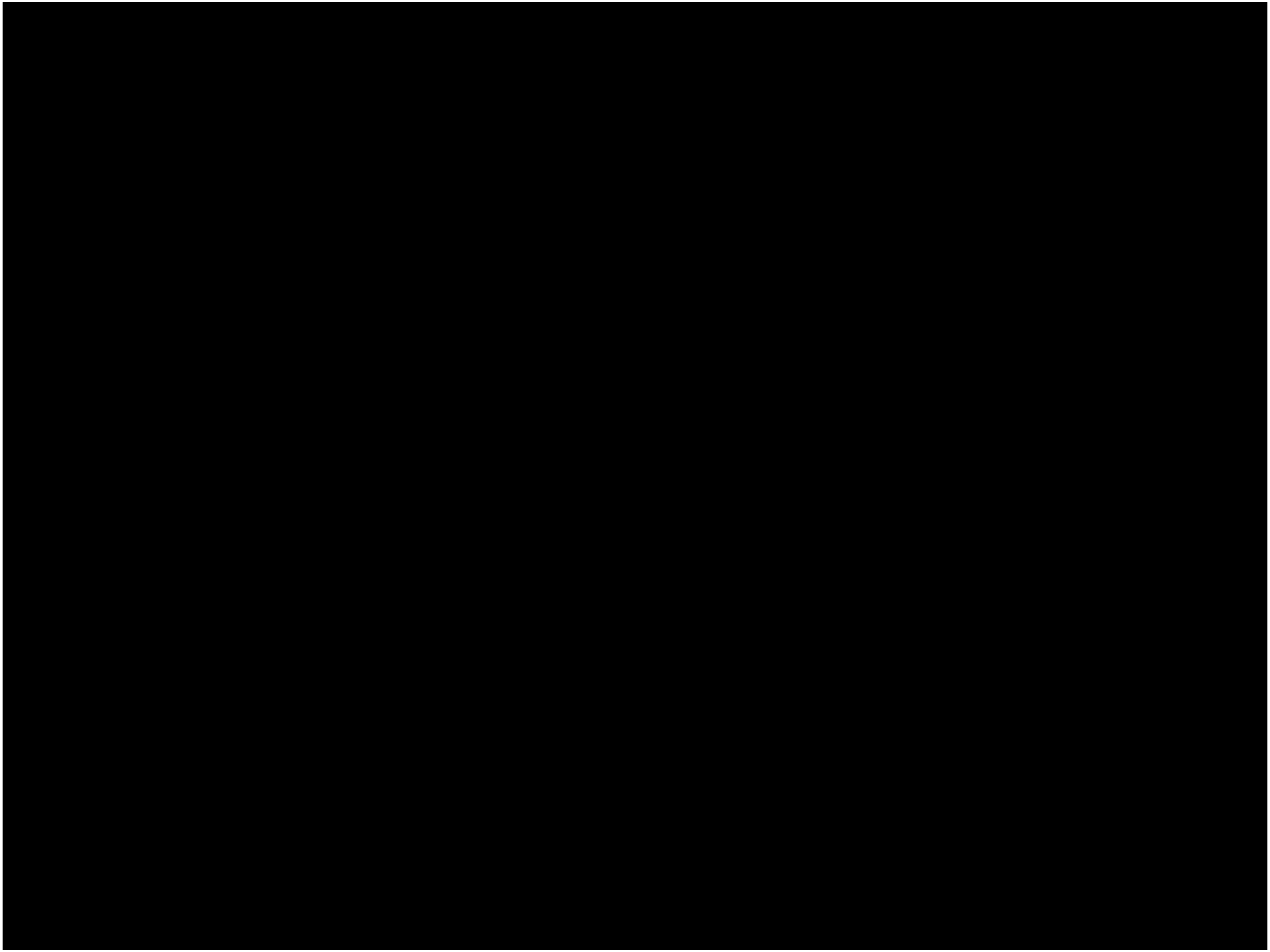
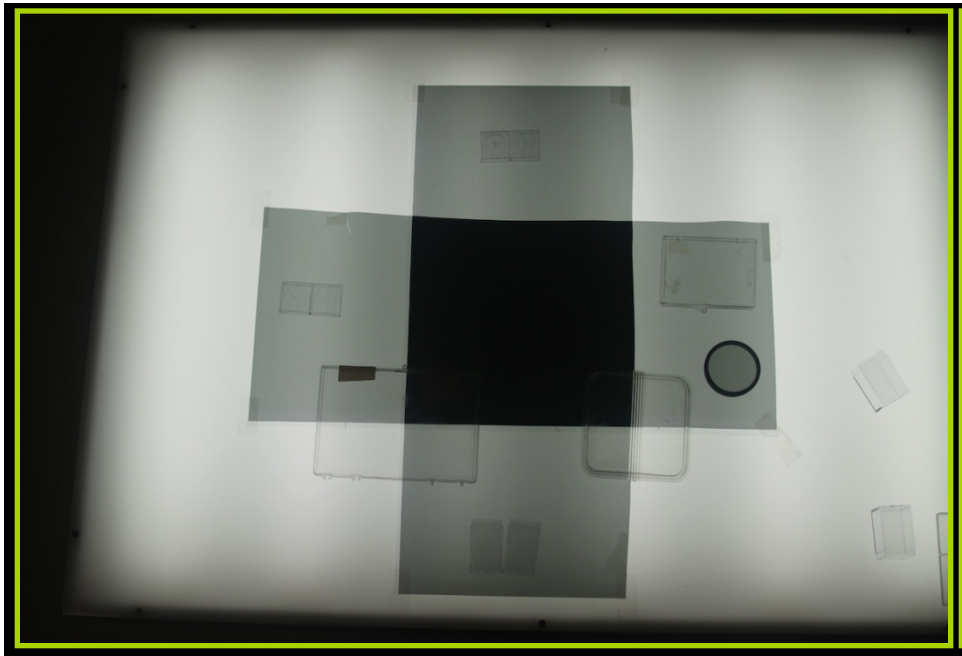
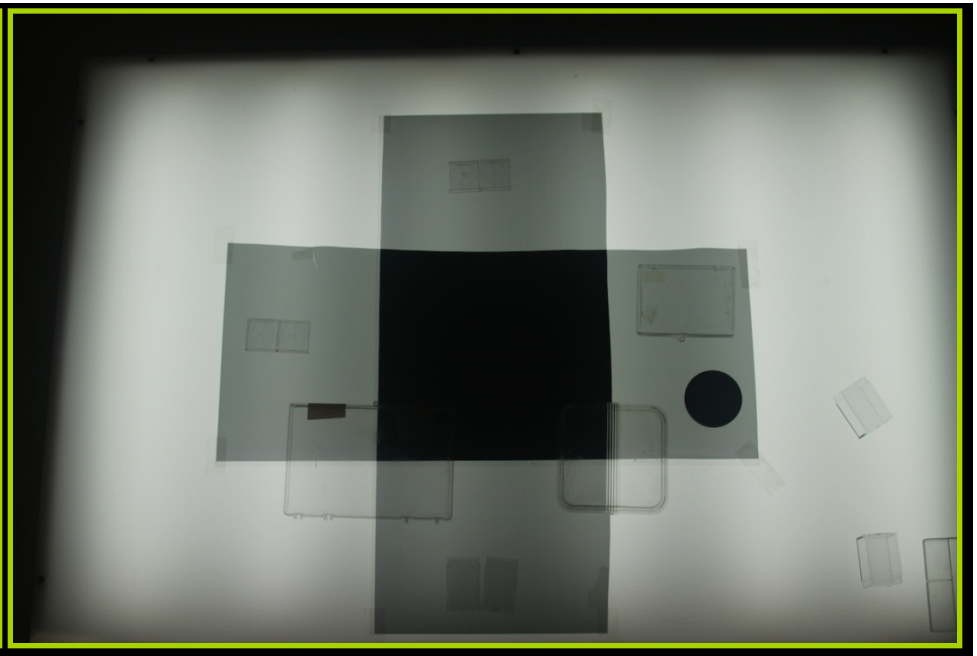


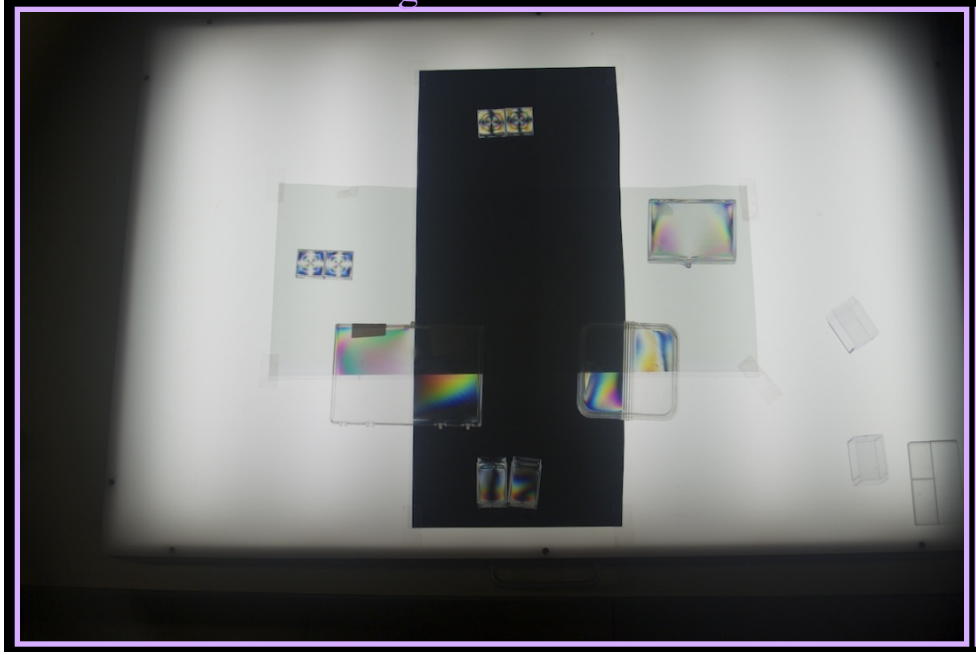


No Polarizing Filter on camera

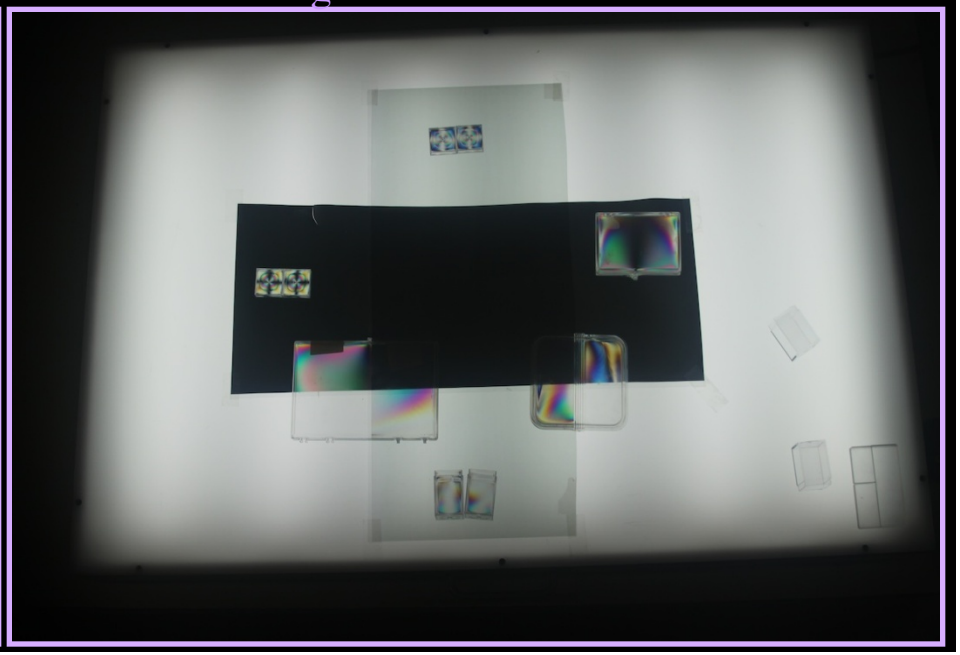


No Polarizing Filter on camera

Polarizing Filter on camera



Polarizing Filter on camera turned 90°




Normal Lighting
Ultraviolet Light Fluorescence

"Photography is more than a medium for factual communication of ideas. It is a creative art."
--Ansel Adams

"Light makes photography. Embrace light. Admire it. Love it. But above all, know light. Know it for all you are worth, and you will know the key to photography." -- George Eastman

"… in photography everything is so ordinary; it takes a lot of looking before you learn to see the extraordinary.
--David Bailey

"What makes photography a strange invention is that its primary raw materials are light and time."
-- John Berger

"In the right light, at the right time, everything is extraordinary."
-- Aaron Rose

"Photography is the simplest thing in the world, but it is incredibly complicated to make it really work."
--Martin Parr