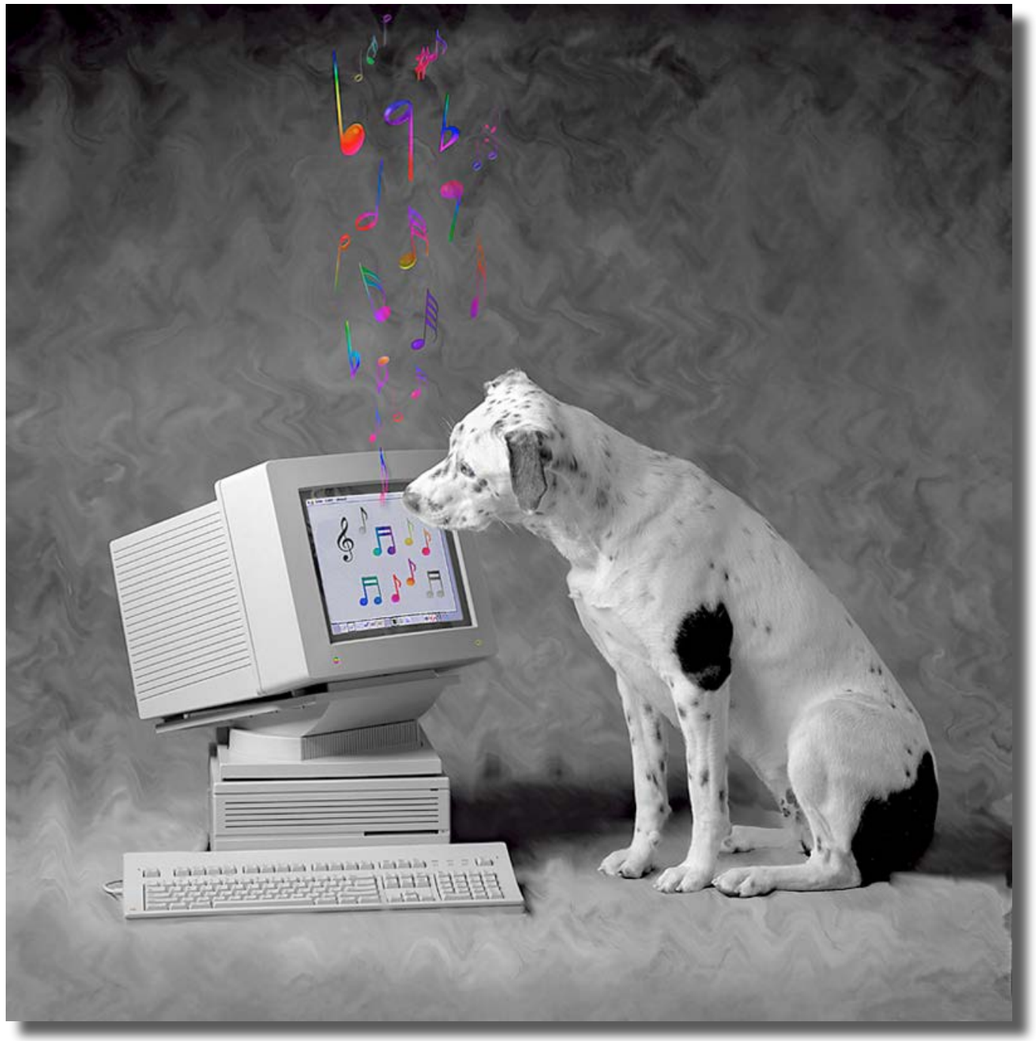
Digital imaging urban legends debunked



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- The Digital Dog
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What I'll cover

- Higher ISO always produces more noise: WRONG

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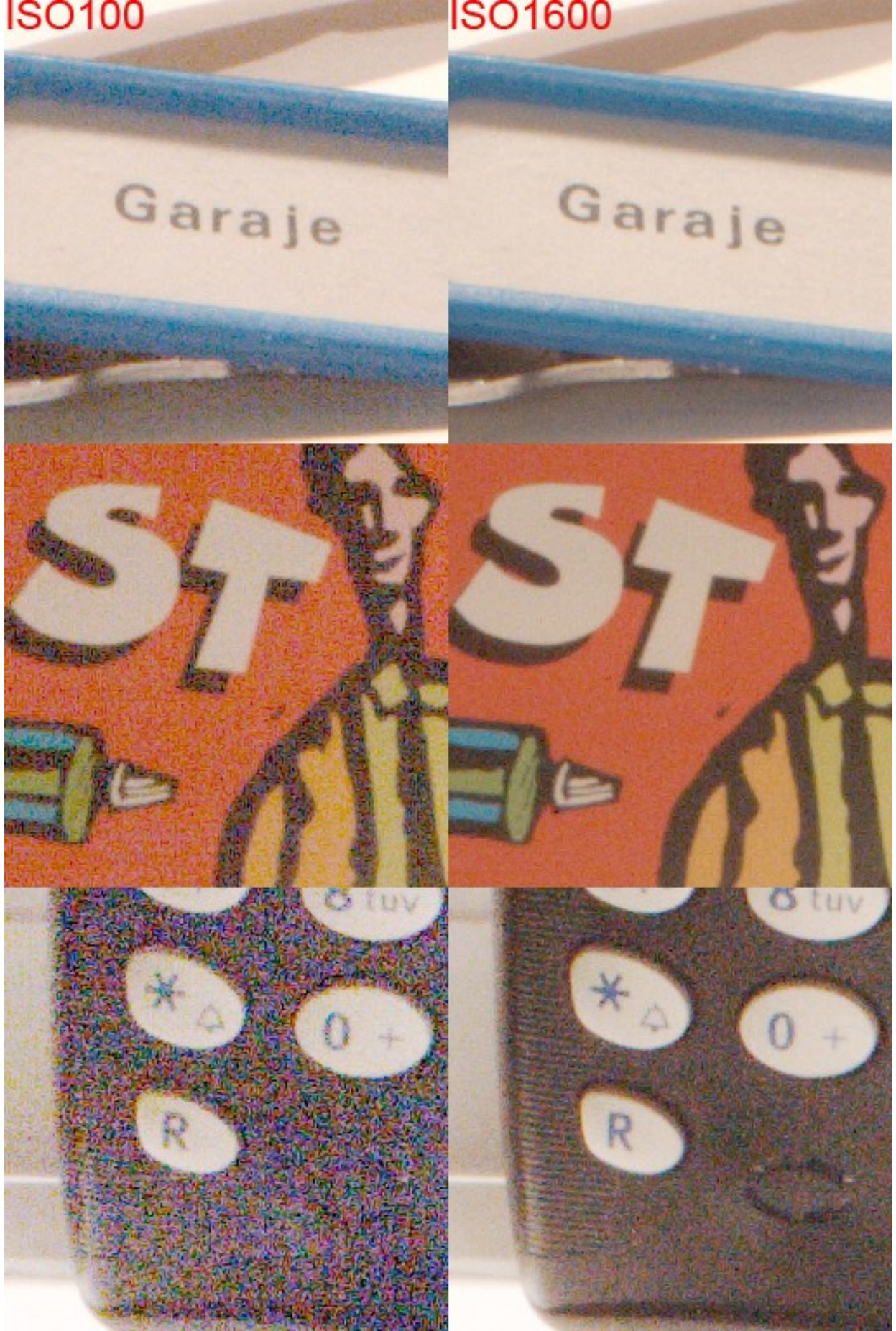
- All output devices are/require 72 PPI or 300 DPI: WRONG
- sRGB is all you'll ever need; printers produce sRGB: WRONG
- Why when shooting raw+JPEG, one isn't properly exposed!


Select
Canon EOS 5D Mark II
1/60 sec at ƒ / 5.6, ISO 100
105 mm (EF24-105mm f/4L IS USM)
Candidate
Canon EOS 5D Mark II
1/60 sec at ƒ / 5.6, ISO 800
105 mm (EF24-105mm f/4L IS USM)


ISO100
ISO1600
Garaje
Garaje
ST
ST
8 tuv
0 +
R
8 tuv
0 +
R

ISO, Exposure and Noise

- Exposure defines the amount of light striking the sensor: aperture and shutter speed <u>alone</u>.

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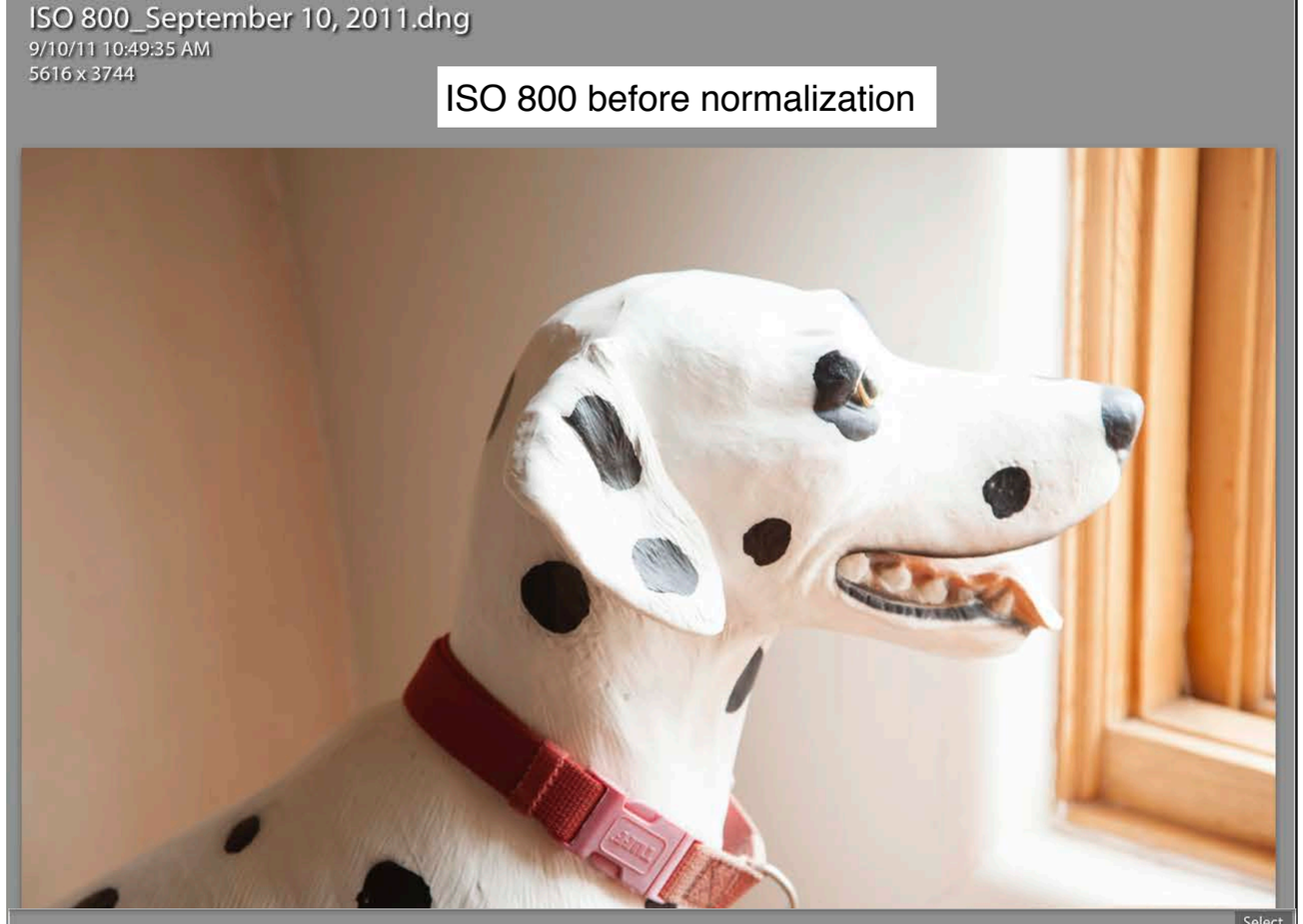
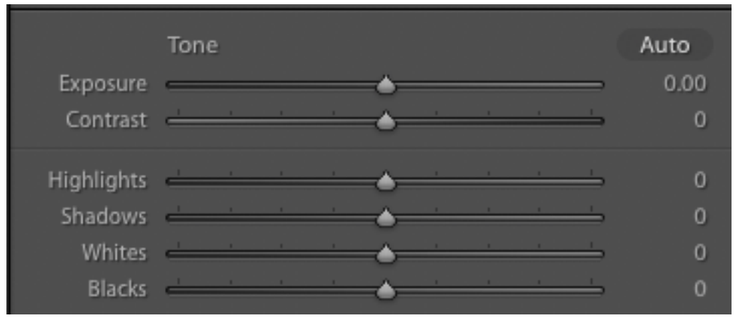
- The ISO setting changes the value of the digital number of a pixel from a given voltage reported for that pixel by the sensor.
- On some cameras, a higher ISO will produce less noise than a lower ISO. ISO is post exposure amplification.

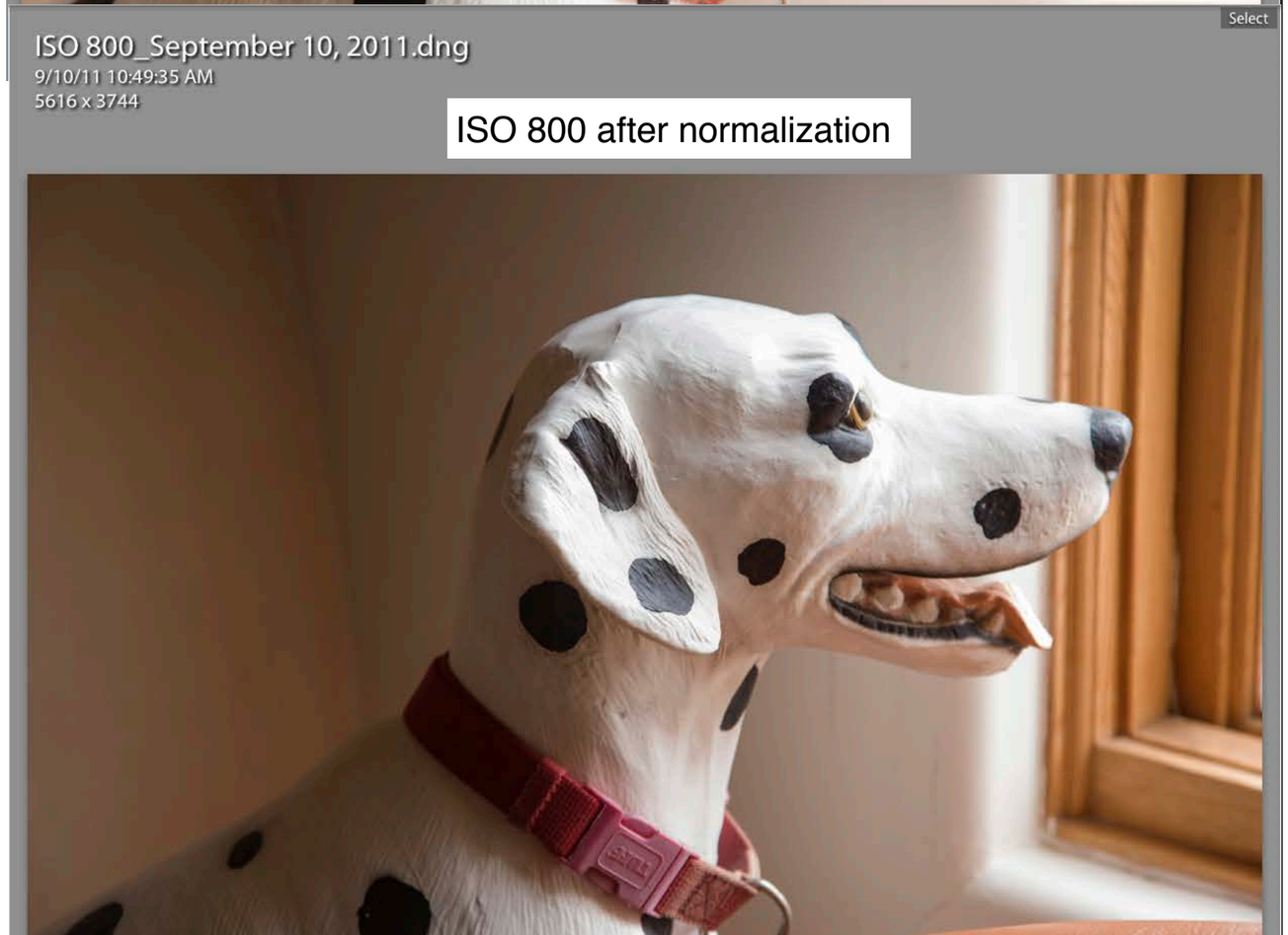
NOT ISO Invariance Camera (Canon)



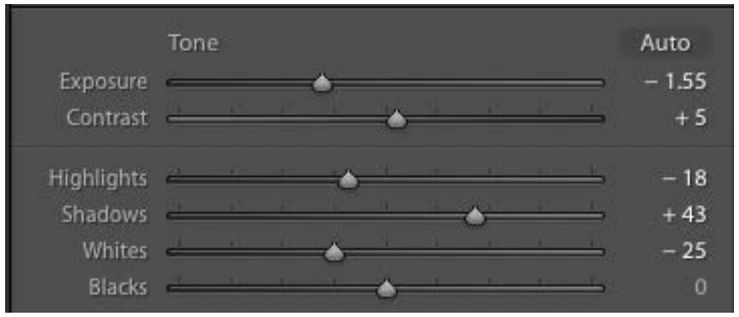
"Default" settings are not appropriate for this capture; they appear to bright!



"Default" settings are more appropriate JPEG capture; they appear to "normal"!



Custom, *normalized* settings for the capture show better rendering,
less noise as exposure was the same, ISO setting did reduces noise!



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- An "*Exposure*" slider in a raw converter is similar; you're not altering exposure but instead the brightness of a pixel value.
- Much of the information online about the so-called exposure triangle is factually incorrect.

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- On ISO Invariance systems, ISO 100 and ISO 3200* (5 stops) can produce the same results in terms of noise. *Depends on the camera models.
- The noise in an image depends on the Signal to Noise Ratio (hence the old ETTR concept; we'll get to that soon).

Resolution Myths

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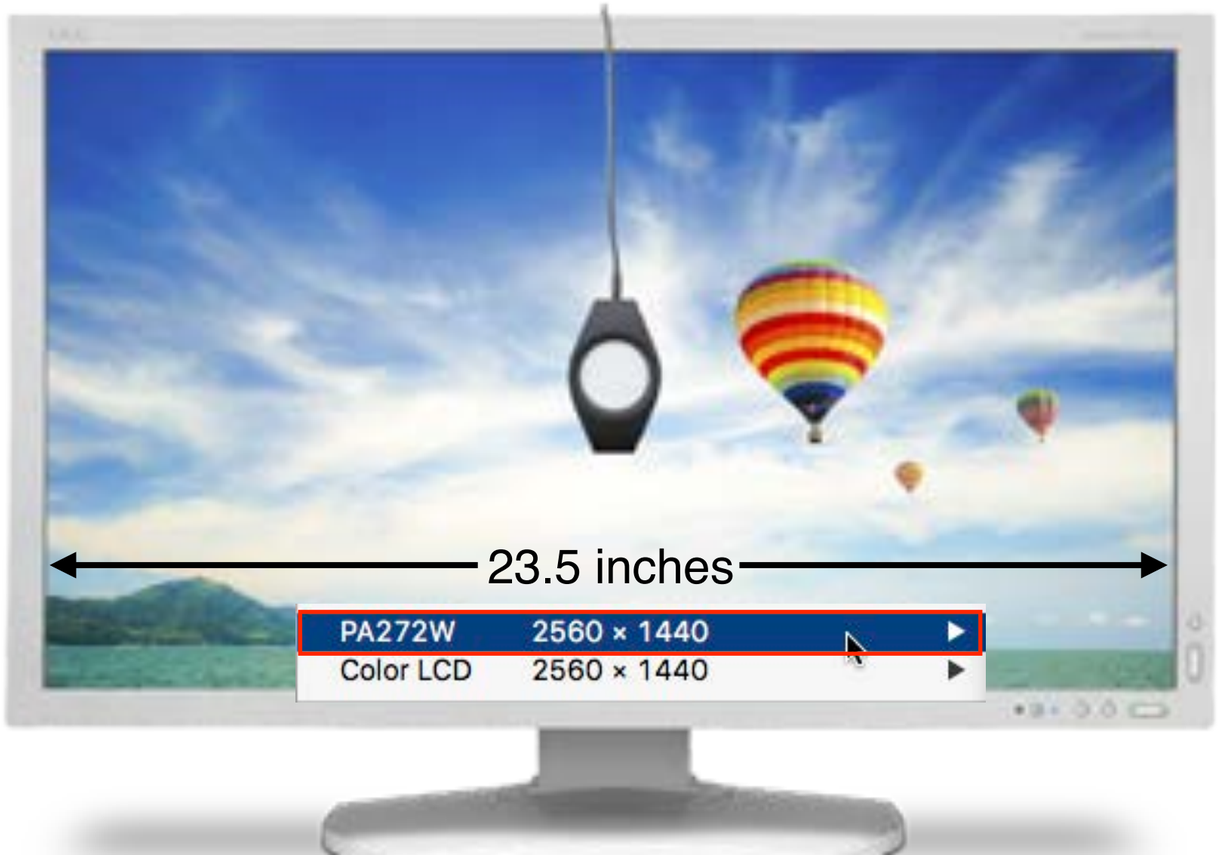

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- The output resolution of printers & the PPI to send varies considerably. From a low of 180 PPI, to much higher (360 PPI+). In this case PPI refers to the **P**ixels **P**er **I**nch, the **resolution tag** you would set, not necessarily the DPI of a printer. An Epson printer can produce 2880 DPI but you would never send 2880PPI to such a device!

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  - At 100% in Photoshop, the two are exactly the same size on-screen. Open them in another application (I opened them in Safari). They are identical in size.
- Figure out the resolution of your display. Make two documents as above but enter that value. Both should be 1” in size on-screen!

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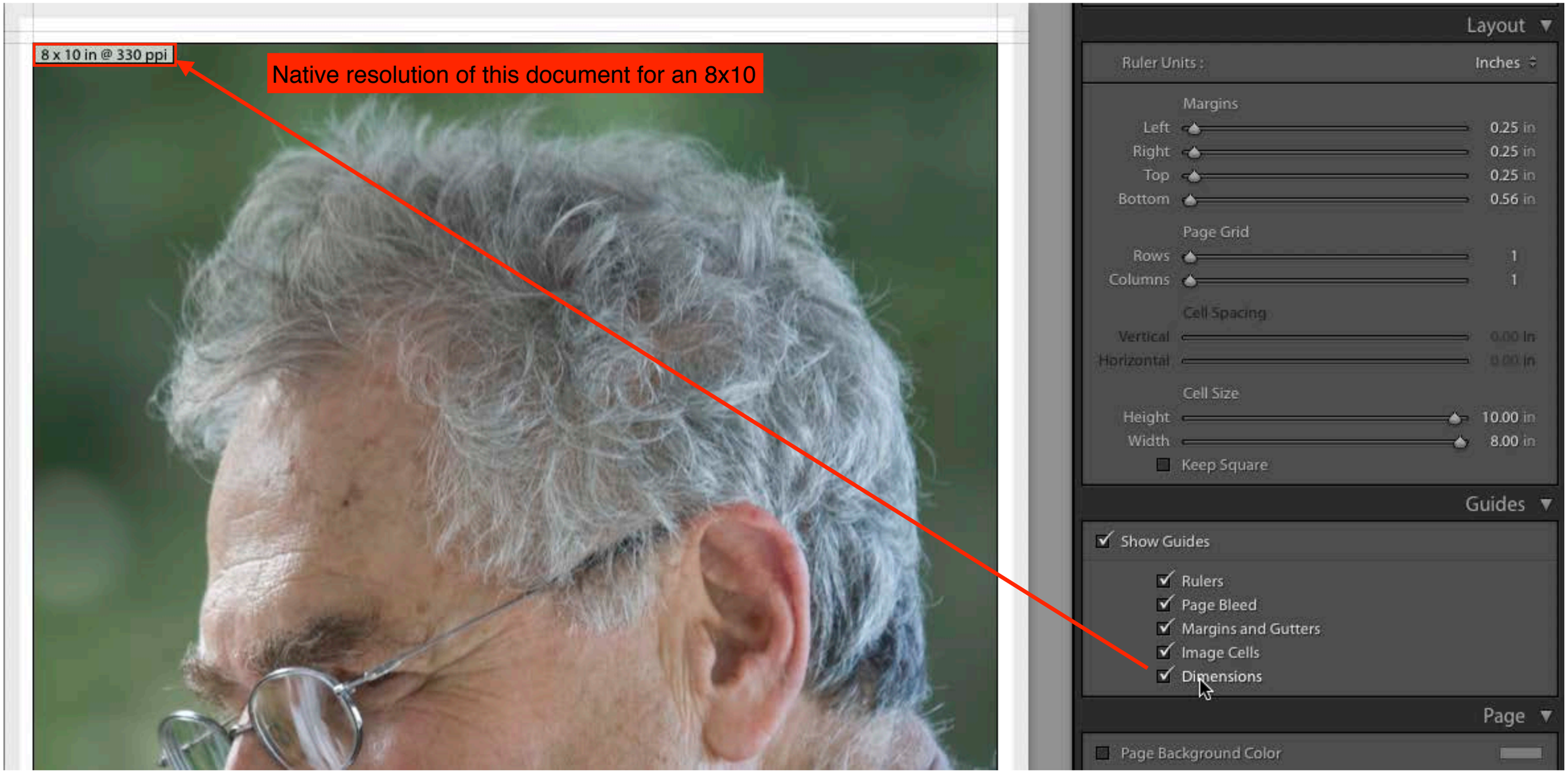
- Windows and Mac's print path does differing interpolation so you may wish to simply resample with Photoshop or easier, Lightroom.

Resolution Myths



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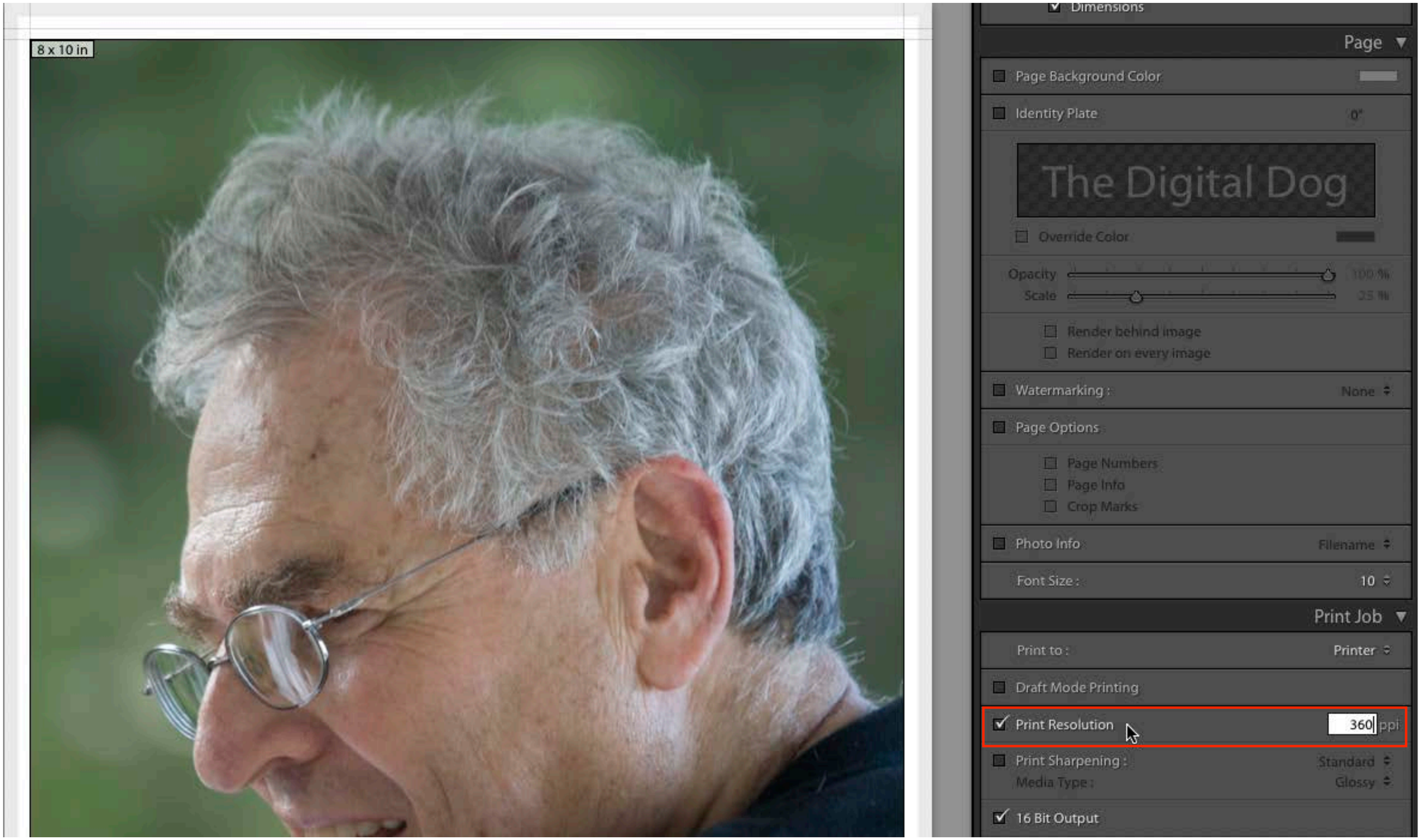

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- Every printer I've examined has a color gamut that exceeds sRGB somewhere in color space.
- sRGB is ideal for posting images to the web and mobile devices (today) and does not guarantee a visual match to anything without color management! IOW, sRGB is not immune to the need for a calibrated and profiled display or color managed apps.

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- You cannot control what other's see of your work on-line. Are they calibrating and profiling their displays, using color managed browsers?
- On a wide gamut display, without color management, sRGB looks wrong while Adobe RGB (1998) doesn't. Hence, you need color management!

No CMS on wide gamut Displays:

sRGB will appear poor while wider gamut working spaces like Adobe RGB (1998) will look acceptable on wide gamut devices.

Raw + JPEG and Exposure

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Raw + JPEG and Exposure

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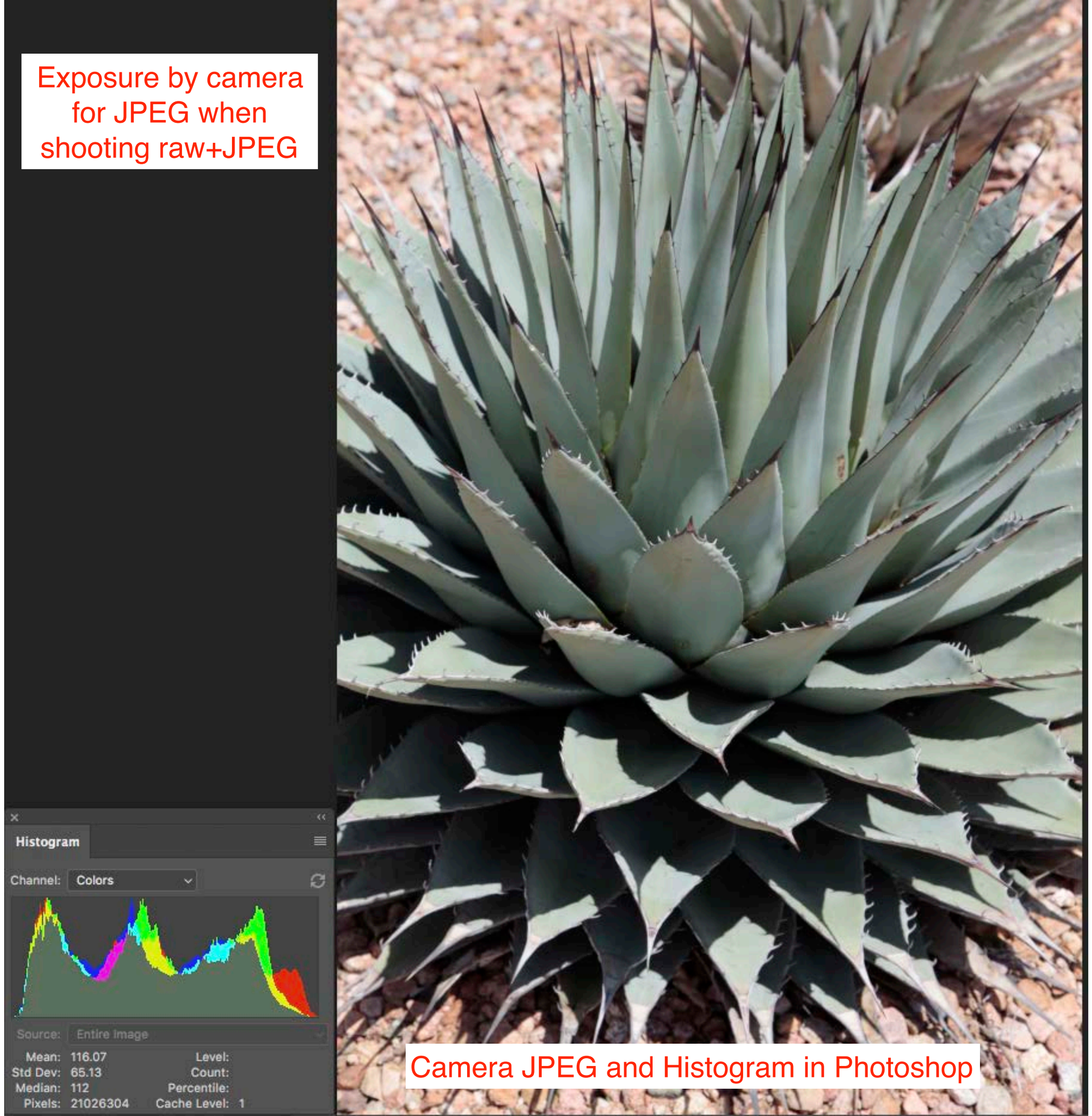
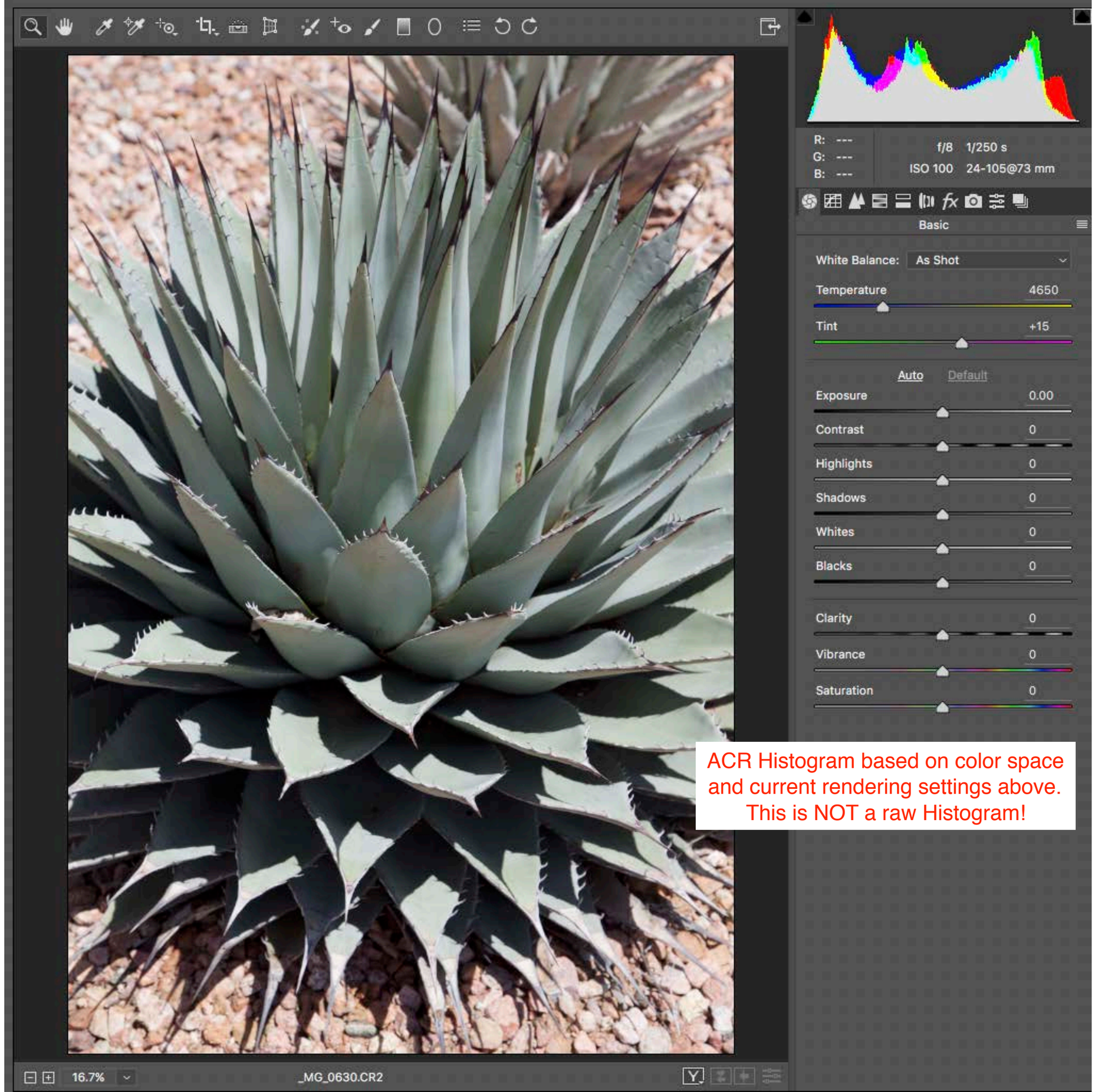
- The camera Histogram shows you the JPEG exposure data, NOT the raw data!

Exposure by camera for JPEG when shooting raw+JPEG



Camera JPEG and Histogram in Photoshop


R: ---
G: ---
B: ---
f/8 1/250 s
ISO 100 24-105@73 mm
Basic
White Balance: As Shot
Temperature 4650
Tint +15
Auto Default
Exposure 0.00
Contrast 0
Highlights 0
Shadows 0
Whites 0
Blacks 0
Clarity 0
Vibrance 0
Saturation 0
ACR Histogram based on color space and current rendering settings above. This is NOT a raw Histogram!
16.7%
_MG_0630.CR2

File: _MG_0630.CR2
Canon EOS 5D Mark II
1/250s f/8.0 @ISO 100
Evaluative
Canon EF 24-105mm f/4L IS
@73.0 mm (35 mm equivalent: 71.2 mm)
EXIF

Image 5634x3753

	Min	Max	Avg	σ
R	1	8820	750.0	730.7
G	12	14736	1553.3	1442.2
B	0	8487	795.9	743.6
G2	4	14736	1551.7	1441.8

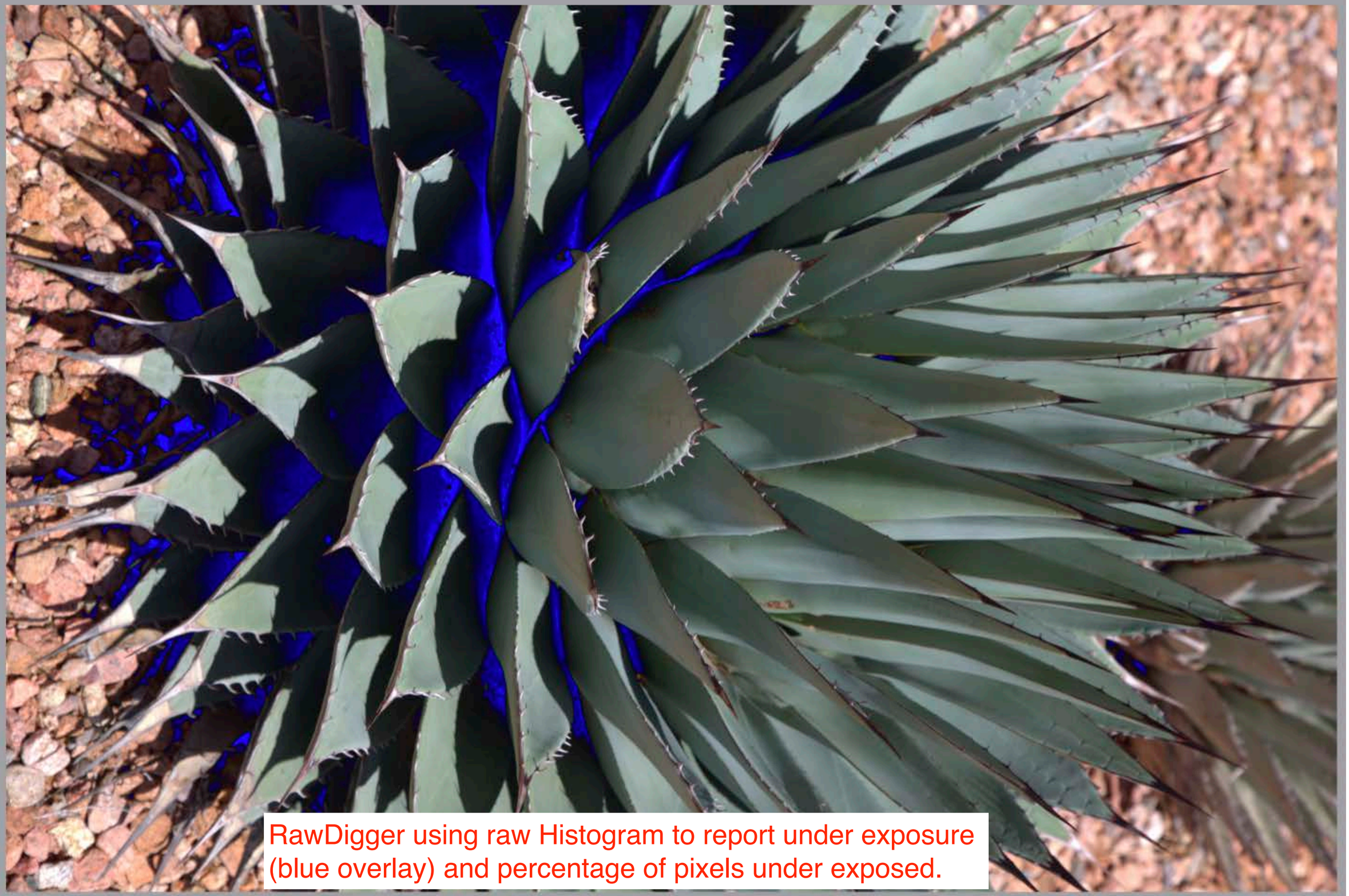
Selection/Sample
Use Shift-Click to start selection
Alt-Click to place sample

5040:4
R: 2639
G: 4356
B: 2058
G2: 4423

Display
RGB render
Raw composite
Raw channel R
OvExp
UnExp

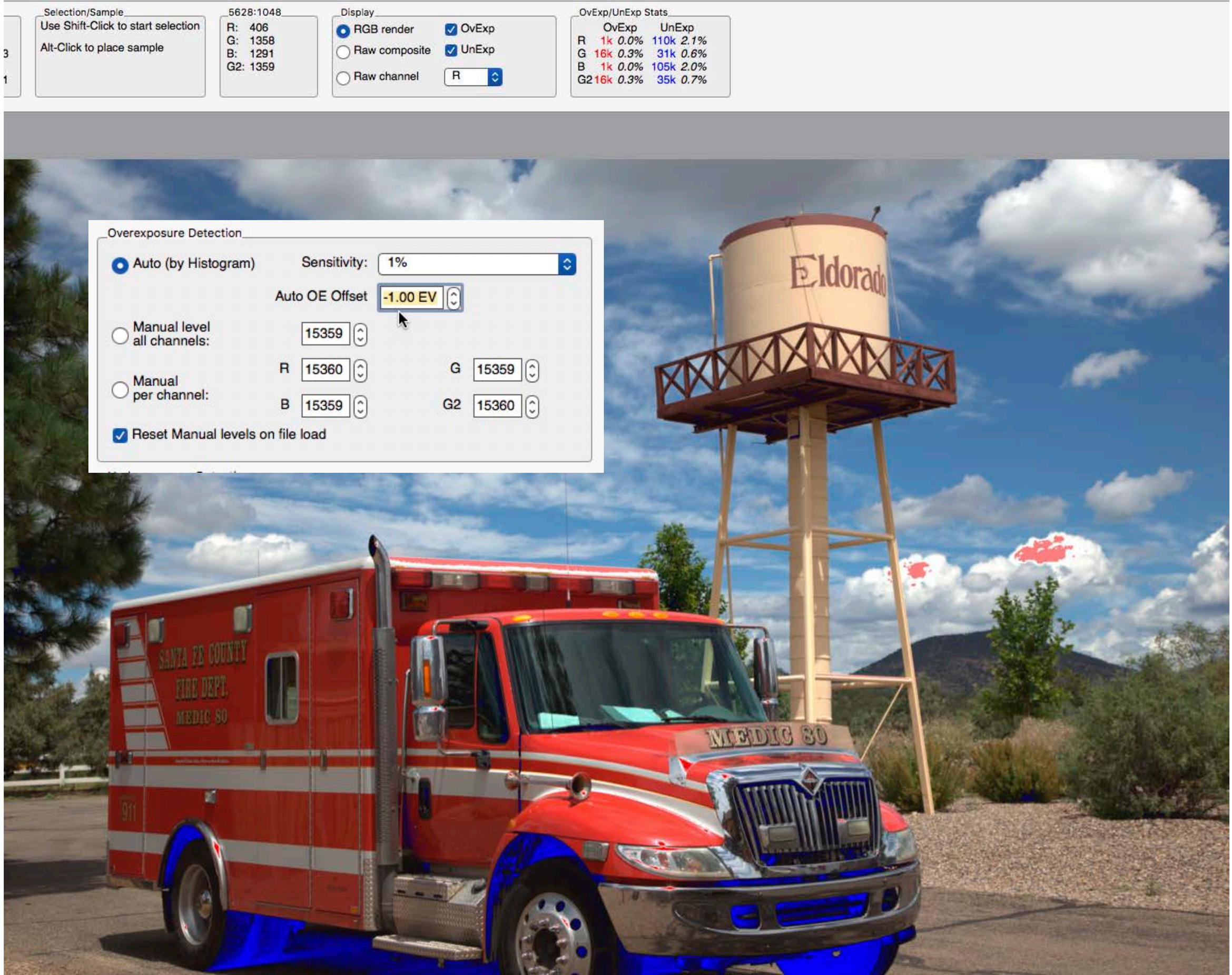
OvExp/UnExp Stats

	OvExp		UnExp	
R	0	0.0%	294k	5.6%
G	0	0.0%	27k	0.5%
B	0	0.0%	179k	3.4%
G2	0	0.0%	27k	0.5%

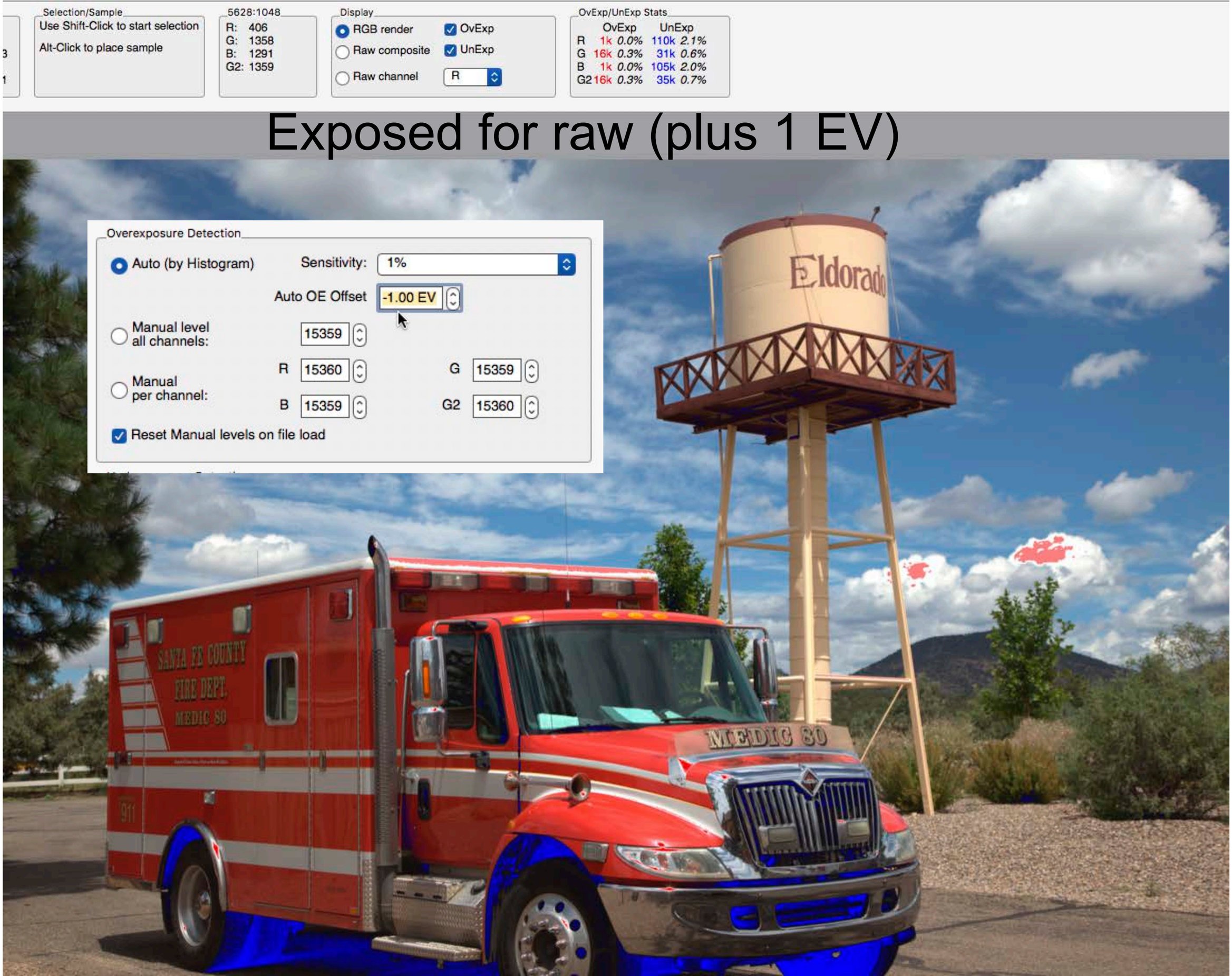


RawDigger using raw Histogram to report under exposure (blue overlay) and percentage of pixels under exposed.


Display
RGB render
Raw composite
Raw channel
R
OvExp
UnExp
OvExp/UnExp Stats
OvExp UnExp
R 428 0.0% 269k 5.1%
G 1k 0.0% 130k 2.5%
B 754 0.0% 331k 6.3%
G2 1k 0.0% 132k 2.5%
Eldorado
SANTA FE COUNTY
FIRE DEPT.
MEDIC 80
911
MEDIC 80


Selection/Sample
Use Shift-Click to start selection
Alt-Click to place sample
5628:1048
R: 406
G: 1358
B: 1291
G2: 1359
Display
RGB render
Raw composite
Raw channel
R
OvExp
UnExp
OvExp/UnExp Stats
OvExp UnExp
R 1k 0.0% 110k 2.1%
G 16k 0.3% 31k 0.6%
B 1k 0.0% 105k 2.0%
G2 16k 0.3% 35k 0.7%
Overexposure Detection
Auto (by Histogram)
Sensitivity: 1%
Auto OE Offset -1.00 EV
Manual level all channels: 15359
Manual per channel:
R 15360
G 15359
B 15359
G2 15360
Reset Manual levels on file load
Eldorado
SANTA FE COUNTY
FIRE DEPT.
MEDIC 80
MEDIC 80

Exposed for raw (plus 1 EV)



Histograms that lie

Camera luminosity histogram shows massive clipping, no clipping in raw!

Histograms that lie

Camera histogram shows clipping, no clipping in raw!
Camera set to + ⅓. Could have easily gone +½ without clipping

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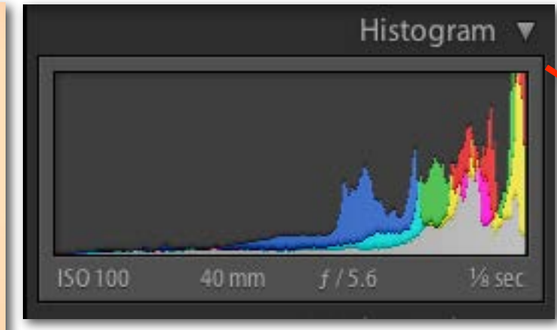
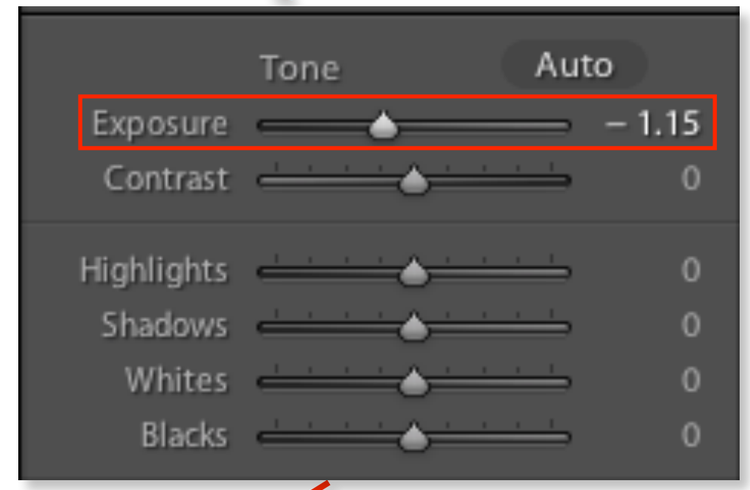
- ETTR still requires one to expose and not blow out highlight data we wish to retain. This is photography 101: expose for the highlights you wish to record.
- Expect the initial rendering in a raw converter to appear too light but by normalizing the tone, highlight data you properly exposed will be seen.

Histogram after Normalization





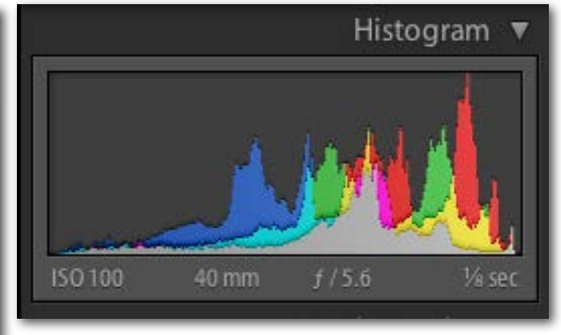


Image is not over exposed! The correct rendering (-1.15 Exposure) is necessary to normalize the rendering. It now looks like the “normal” exposure but with less noise.

With Adobe raw converters, the Exposure slider correlates well with the actual camera exposure. Shooting +1 stop and setting -1 is very close.

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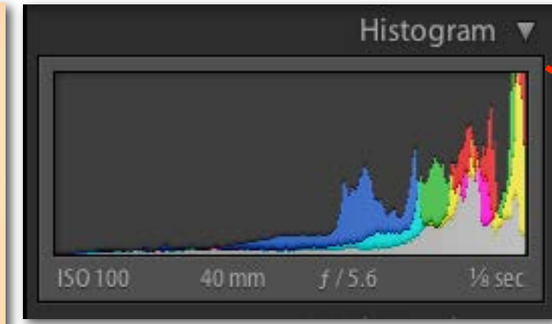

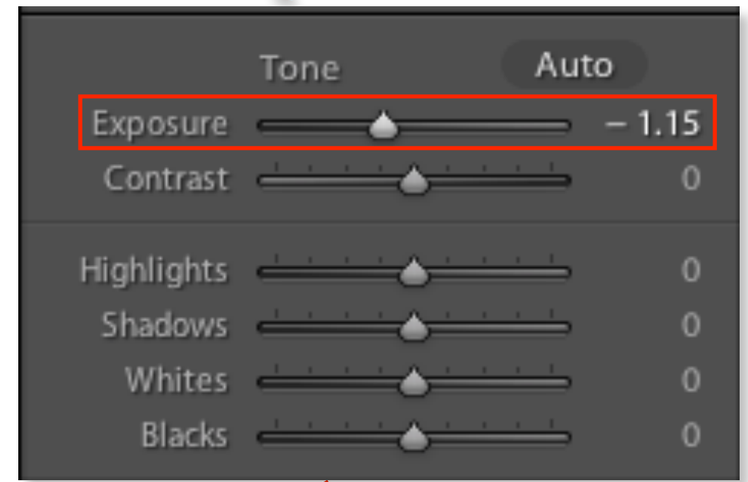

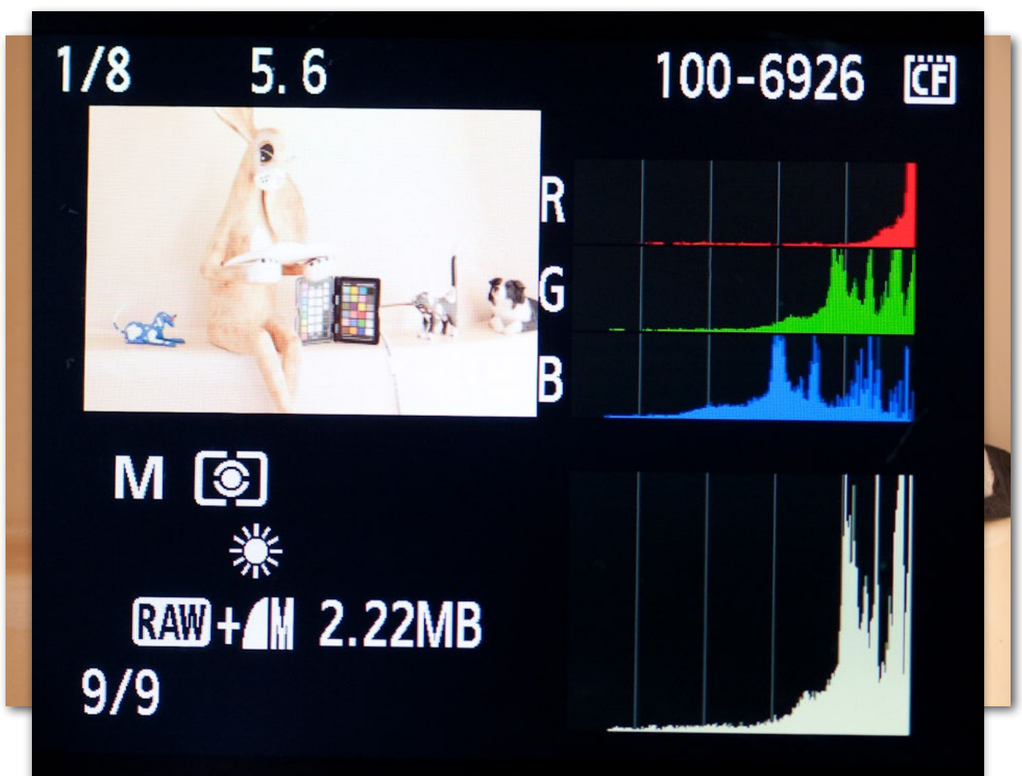

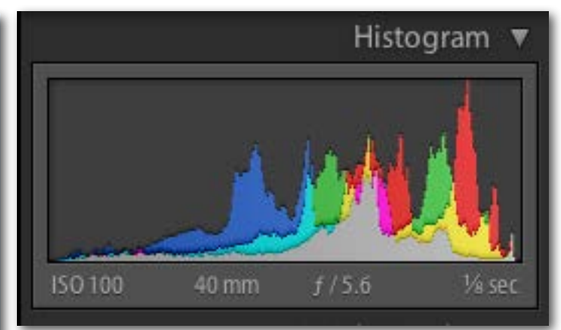

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