Shooting Raw Workshop Topics

- What is Raw?
- Why would you want to shoot Raw?
- What do you do with a Raw data file?
- What is a DNG file and the DNG converter?
- What is a Histogram (From George's Digital Image Processing workshop)
- Adobe CR3 Camera Raw Control Panel Icons vs. Elements 6 or 7
- What can ACR do and How?
  - The Photoshop Elements version of ACR interface
  - Basic And Detail Panels
  - Toolbar
  - White Balance correction
  - Tonal correction
  - Sharpening Controls
  - Noise Controls
  - Multiple Image Raw Processing
- Raw limitations
- Some things to try and references
- Discussion and Questions

What Is Raw?

- In the process of taking a picture
  - The sensor measures light.
  - The camera's computer/processor converts measured light on the sensor into digital values (Raw data).
  - Not shooting Raw? The digital values (Raw data) are processed into a picture, usually a JPEG File which is stored on a memory card. The recorded digital values (Raw data) are then discarded.
  - Shooting Raw? Set camera to record Raw. The digital values (Raw data) are recorded and stored as data (Raw File) on the camera's memory card. Some cameras will create the RAW data plus a converted JPEG file.

Why would you want to shoot Raw?

- More data to manipulate if needed and gives more options for correcting a shot
- Can make the equivalent pre-shot JPEG settings after the shot without any data loss
  - Such as White balance, Contrast, Hue, Saturation, Sharpening
- Can correct exposure, to a limited extent
- Bottom-line it's capable of fixing mistakes and making corrections to a photo that wouldn't be possible with a JPEG photo.

Question

What do you do with a Raw Data file?

Answer

Convert the Raw file to Picture (jpeg, tiff, or psd file) using Raw Processing Software

Examples of Raw processing Software

- Adobe Camera Raw (versions available in Photoshop CS3/CS4, Elements, & Lightroom)
- Proprietary software (comes with camera)
  - Probably gives best automatic/default conversion because its designed for specific Raw data generated by your camera and can usually run in batch mode
  - Some proprietary software isn't too good
  - Its free
  - Only works for one type of Raw file
- Other
  - SILKYPIX, Bibble, DXO, Raw Shooter, Etc.

What can Adobe Camera Raw (ACR) do in general?

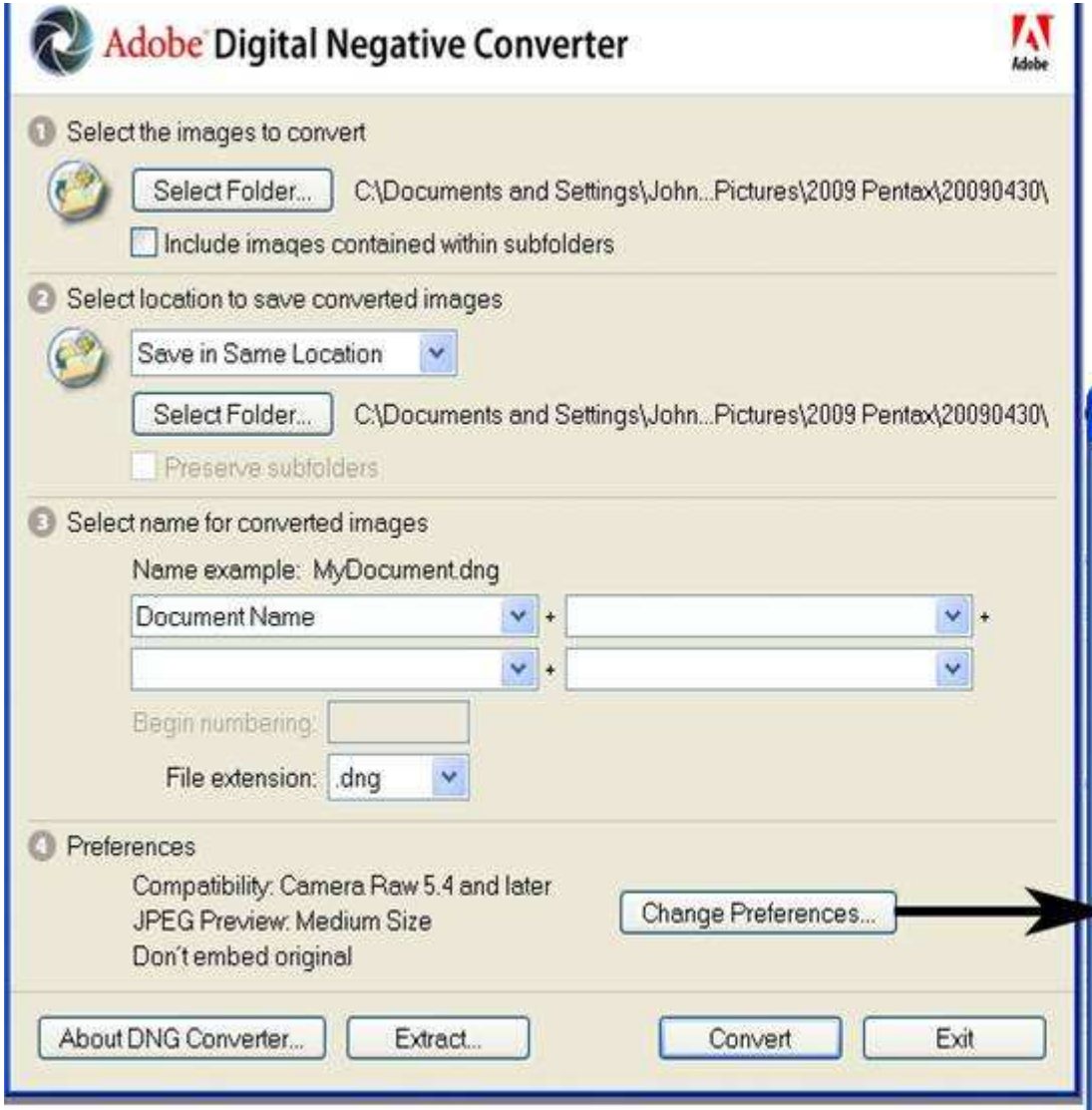
- Makes the Raw data file into a picture file such as JPEGs (8 bit), Tiff or PSD (8 or 16 bit)
- Can modify and correct problems before converting the Raw file to picture (in a non-destructive process)
- When a JPEG, PSD or TIFF is created from a RAW file further processing/photo editing can be done.
  - You have the choice of working with either a 16-bit or 8-bit picture file for Photoshop editing
  - If only Shooting JPEG you would only have the 8-bit file choice

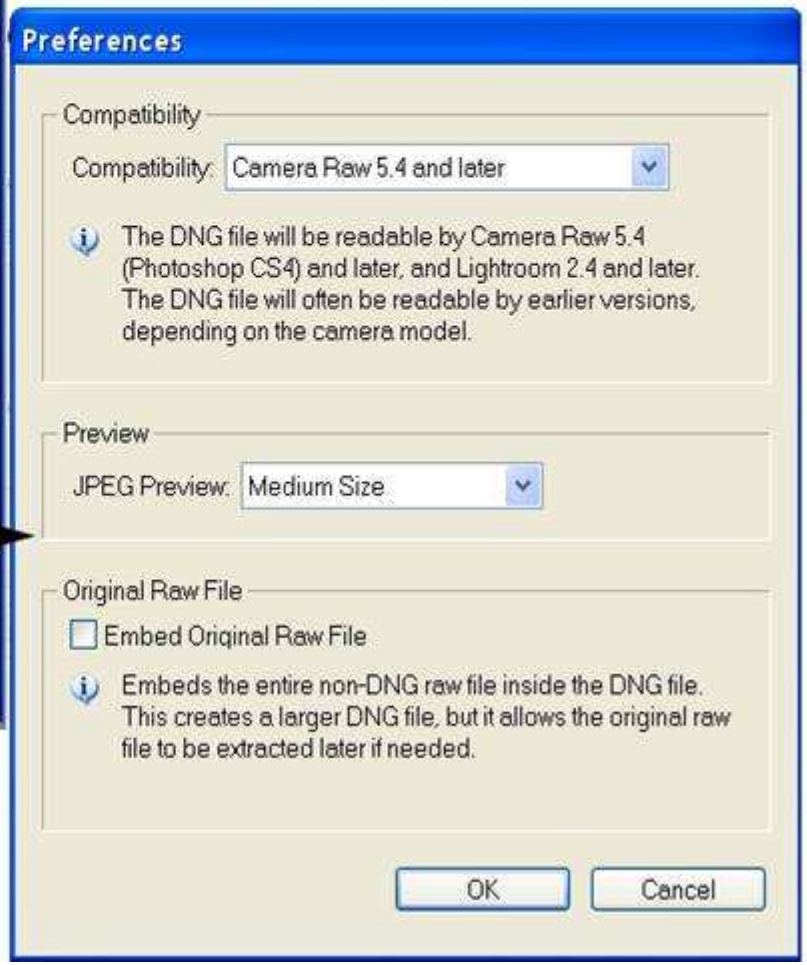
To DNG or not to DNG?

DNG (digital negative) = Adobe's RAW file format (usually generated from your camera's Raw files)

- Advantages
  - Adobe's version of Raw file is DNG, a converter a standalone application can convert each cameras proprietary format to a standard archival Raw DNG format
  - XMP/sidecar files unnecessary
  - The DNG converter can be downloaded at http://www.adobe.com/products/dng/, it's free
  - It's an open format that allows third-party support (some cameras can shot DNG, no conversion required)
- Disadvantages
  - Probably not readable by proprietary software and therefore inconvenient
  - The DNG with-raw-embedded-file size will be larger than if you used a proprietary Raw
  - Requires an additional step

DNG Converter





What is a Histogram?

- Lexical Definition:
  - A bar chart (or graph) representing a frequency distribution; the heights of the bars represent observed frequencies or the number of items counted and the bars, themselves, represent different items.
- Photoshop Definition:
  - A chart that graphically represents the relative distribution of the various tones that make up a digital image. Tones typically range from 0 (completely dark/black) to 255 (completely light/white).

Of What Value is a Histogram?

- Histograms are **ESSENTIAL** for understanding:
  - the current characteristics of an image
  - image strong/weak points
    - over/underexposure
    - contrast
    - color tone/gamut
  - the before/after effects of a correction/filter

Histogram Display Palette

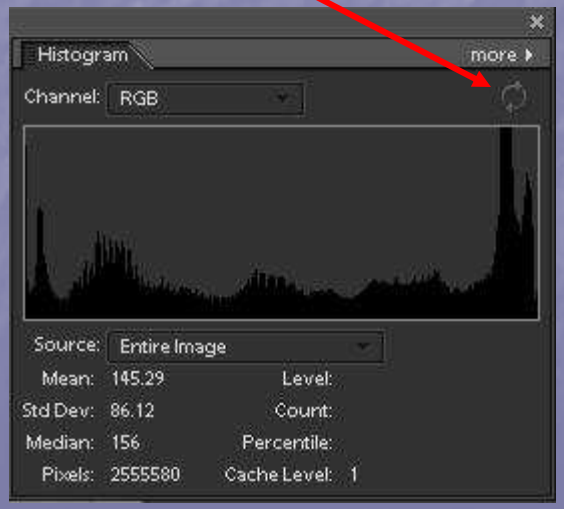
PHOTOSHOP

Window -> Histogram

PHOTOSHOP ELEMENTS

Window -> Histogram

Refresh Icon



Histogram Characteristics

- A Histogram is:
  - Viewable as a composite (RGB) or viewable by channel
  - Displayed as dark-to-light left-to-right
  - Indicative of under/overexposure via ramping on left/right end of graph
  - Indicative of contrast via tonal width**
  - Indicative of banding and image loss
  - A representation of the currently viewable image

** The eye is most sensitive to middle tone values.

Histogram Characteristics

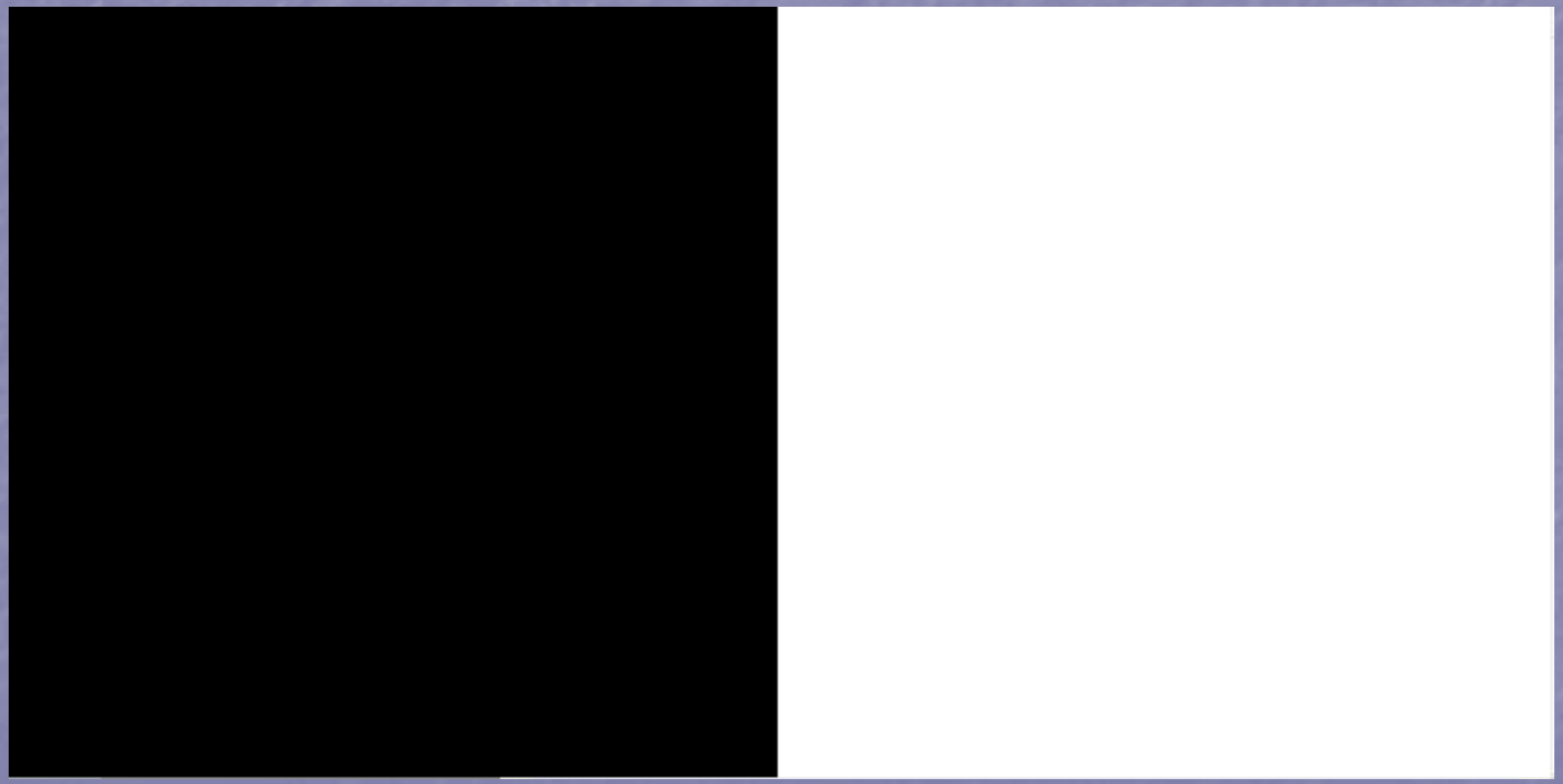
- A Histogram is NOT:
  - Directly associated with specific image pixels*
  - Does not have a "correct" graph shape**

* Except in unusual cases where large areas of an image have a constant tonality.

** Although certain generalizations may be applicable (discussed later)

Histogram Examples

IMAGE

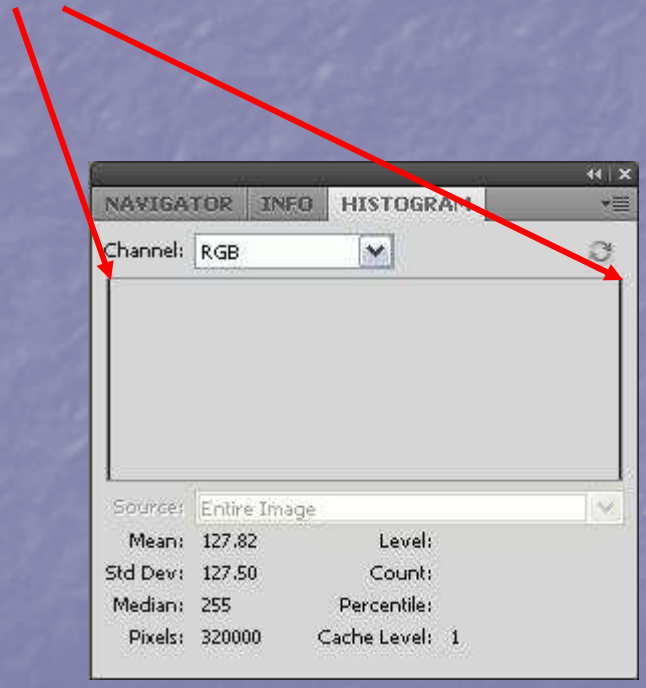


What will the Histogram Look Like?

Histogram Examples

HISTOGRAM

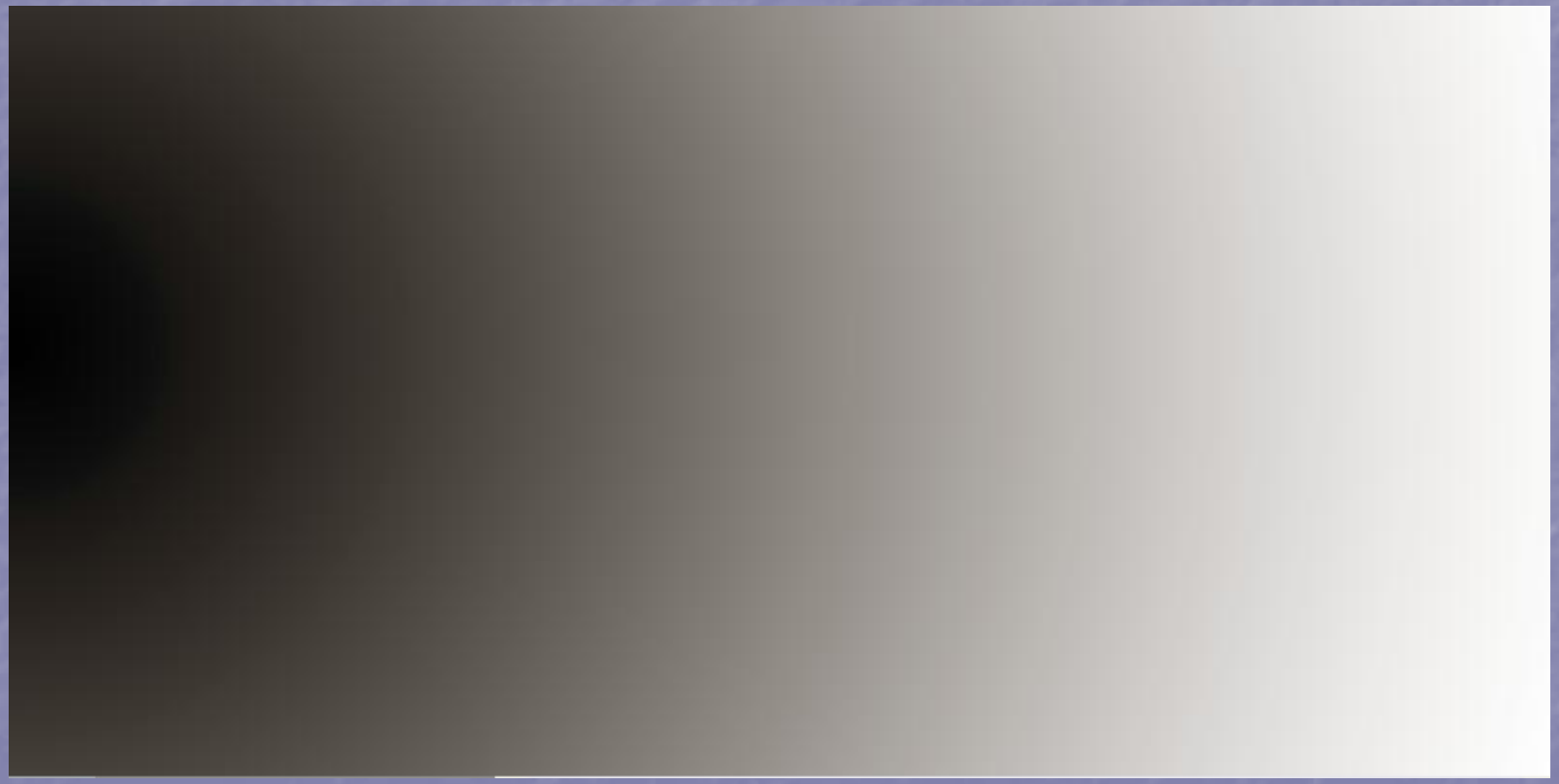
Hard to see, but there are two black bars at the end of this Histogram.



Did you Guess Correctly?

Histogram Examples

IMAGE

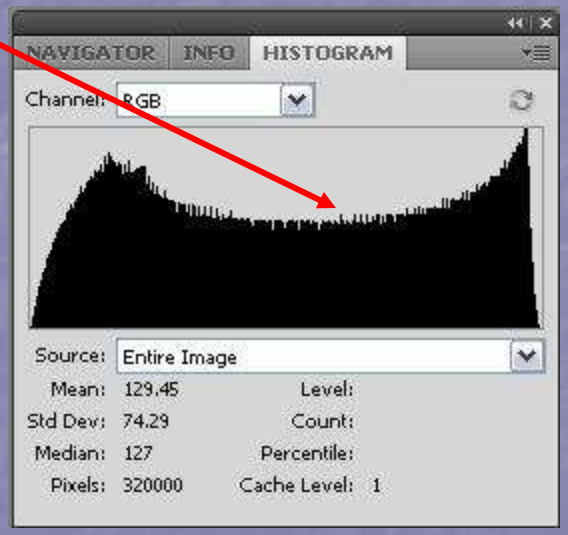


What will the Histogram Look Like?

Histogram Examples

HISTOGRAM

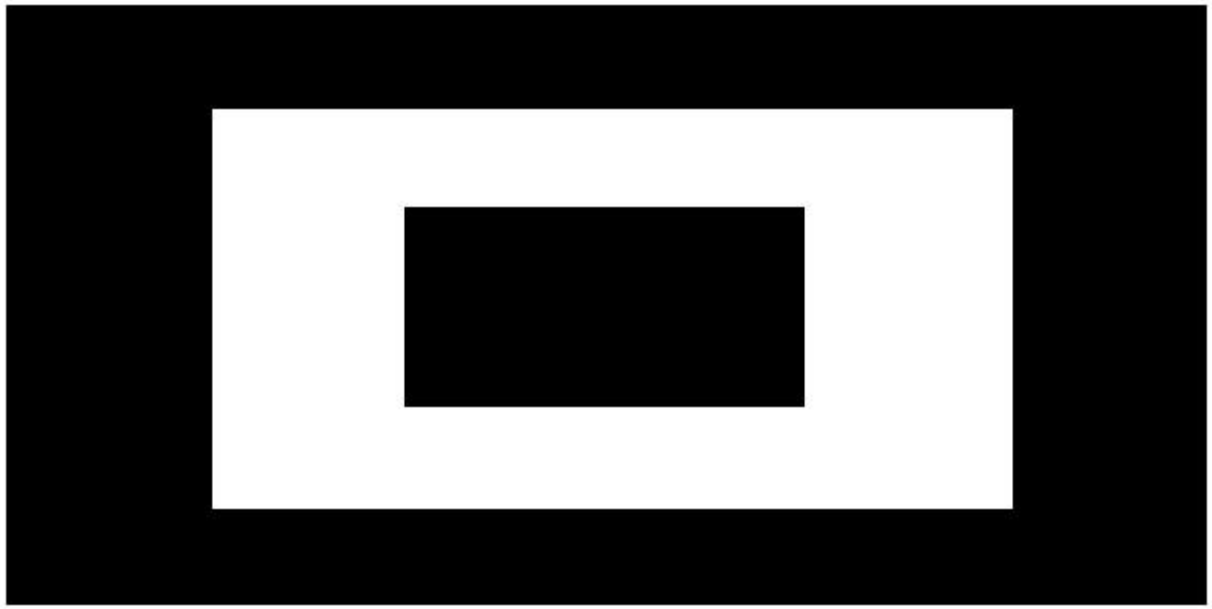
Ideally, this shape would be an inverted pie pan.



Did you Guess Correctly?

Histogram Examples

IMAGE

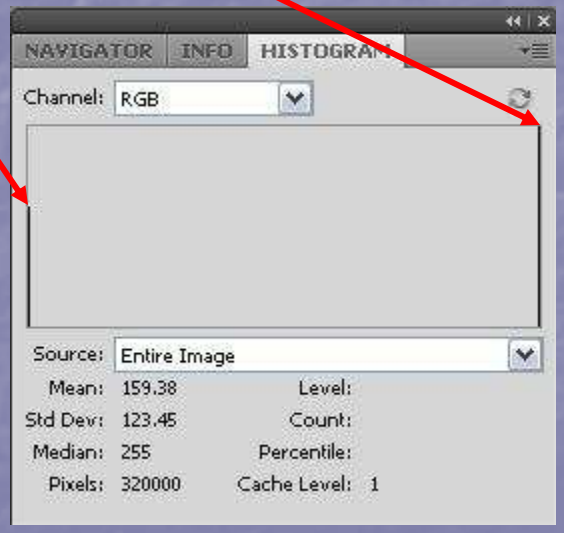


What will the Histogram Look Like?

Histogram Examples

HISTOGRAM

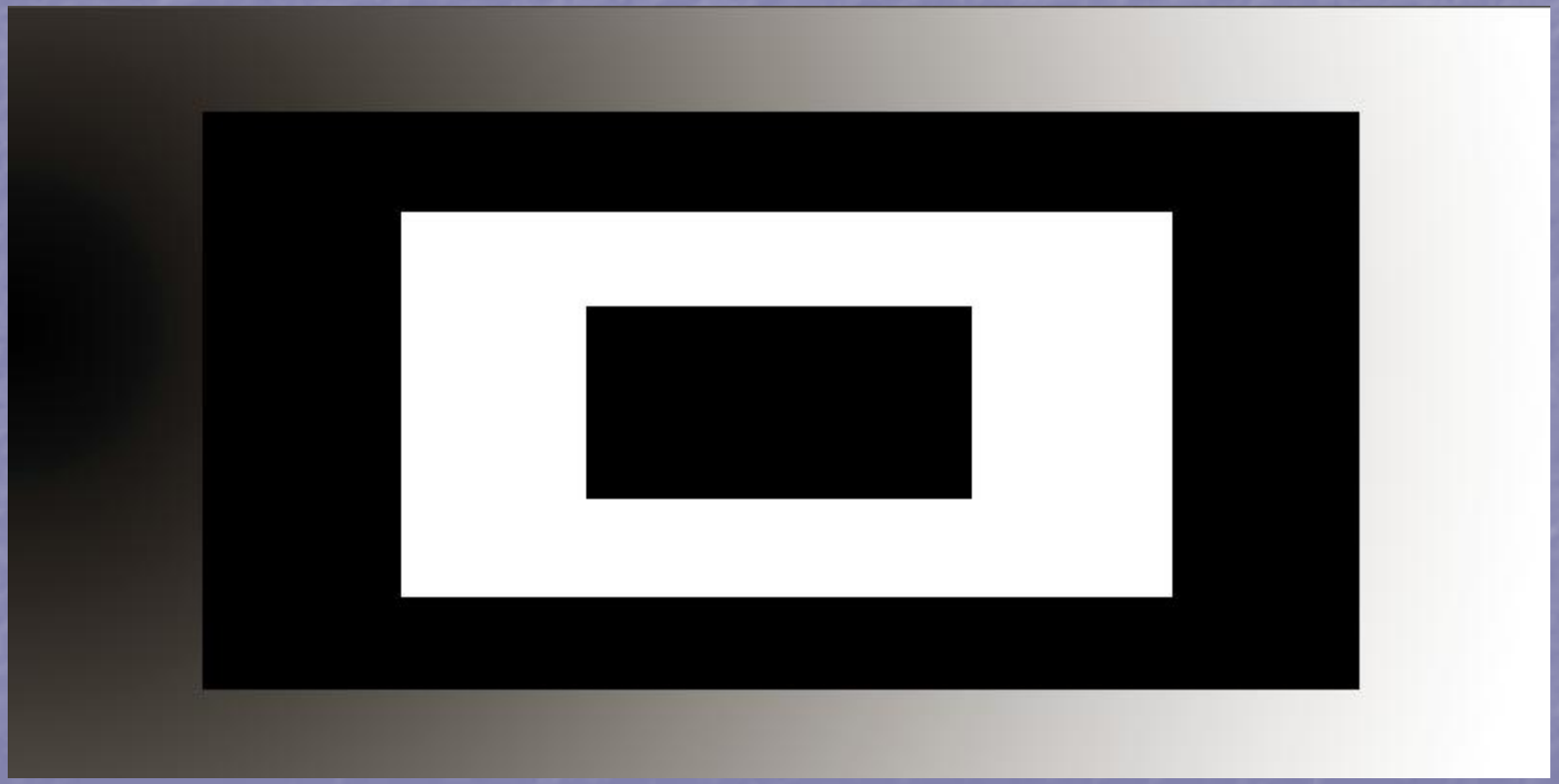
Hard to see, but there are two black bars at the end of this Histogram.



Did you Guess Correctly?

Histogram Examples

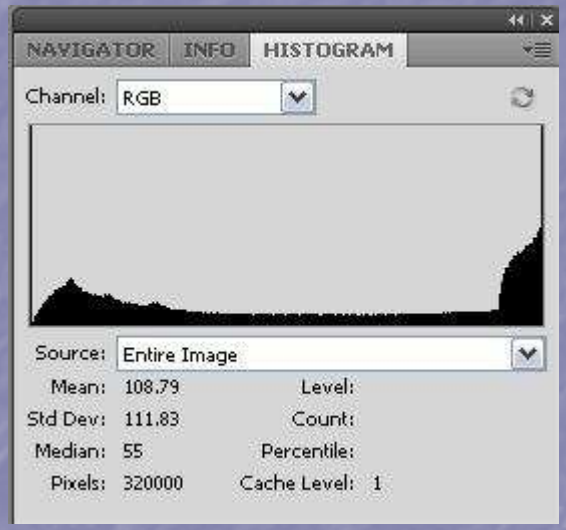
IMAGE



What will the Histogram Look Like?

Histogram Examples

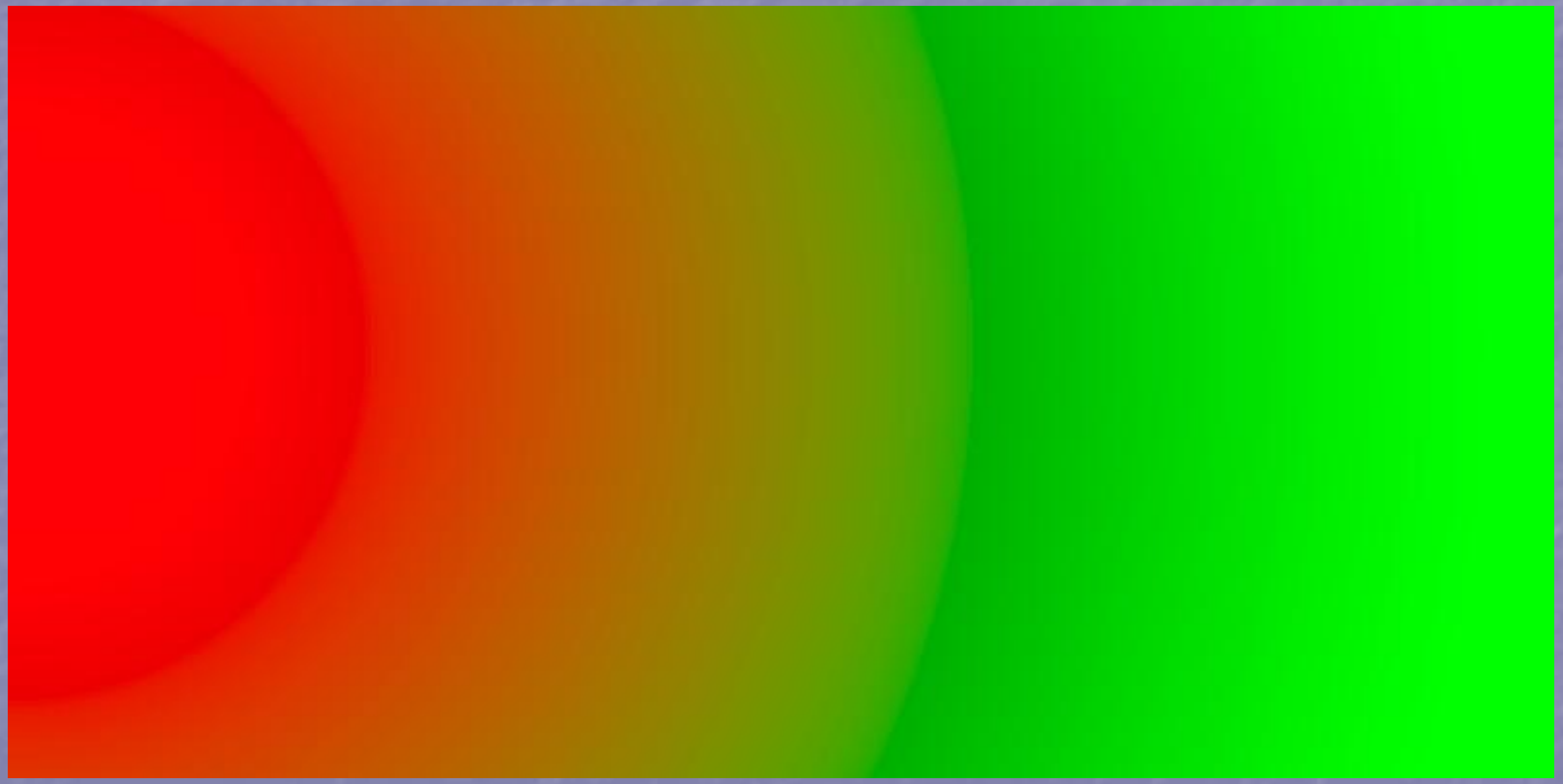
HISTOGRAM



Did you Guess Correctly?

Histogram Examples

IMAGE

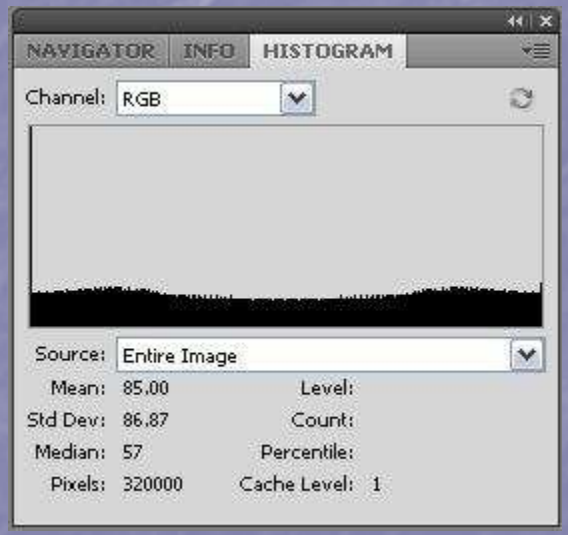


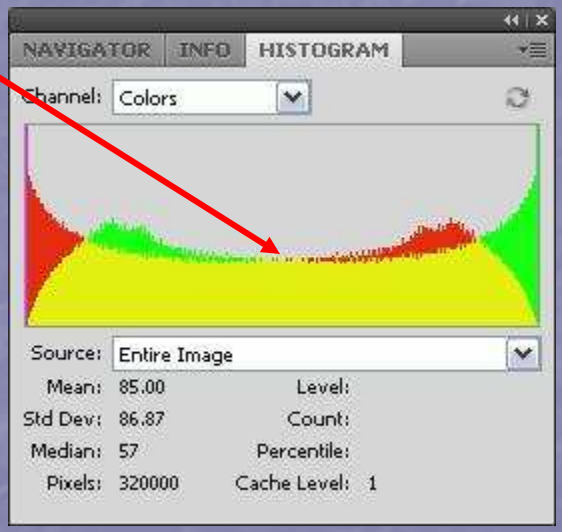
What will the Histogram Look Like?

Histogram Examples

HISTOGRAM

The Colors Histogram shows the real story here. As before, ideally we would have two inverted pie pans. Additionally, the RGB Histogram, to the left, would be a single inverted pie pan.



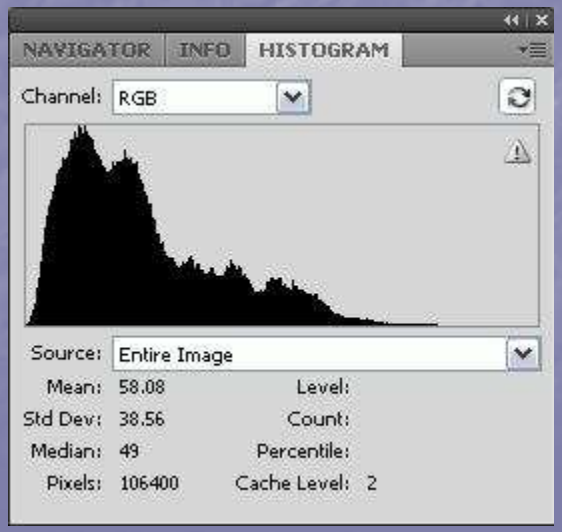


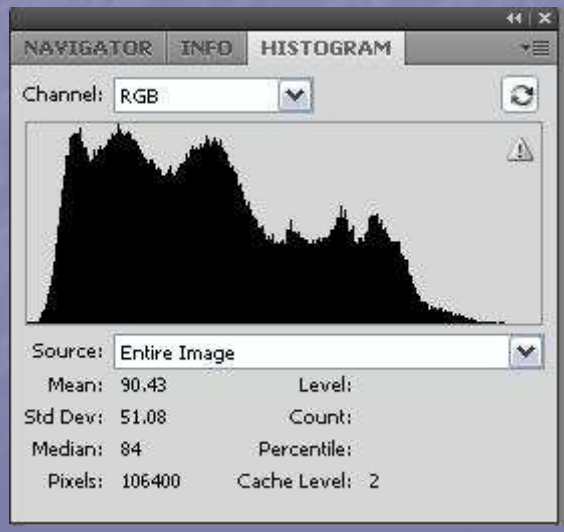
Did you Guess Correctly?

The March of the Histograms

(a.k.a. Under/Overexposure)

IMAGE VS HISTOGRAM



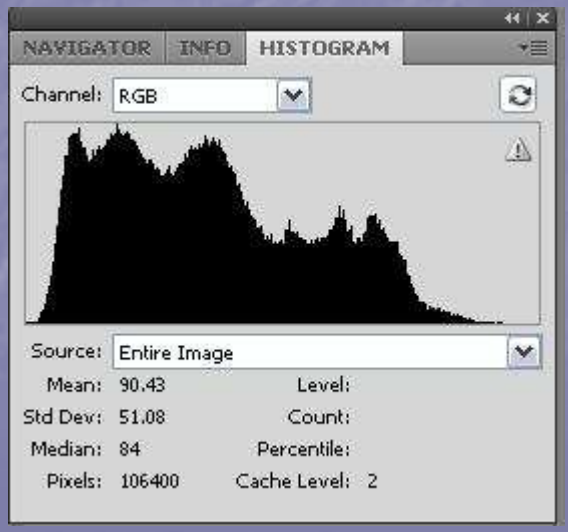


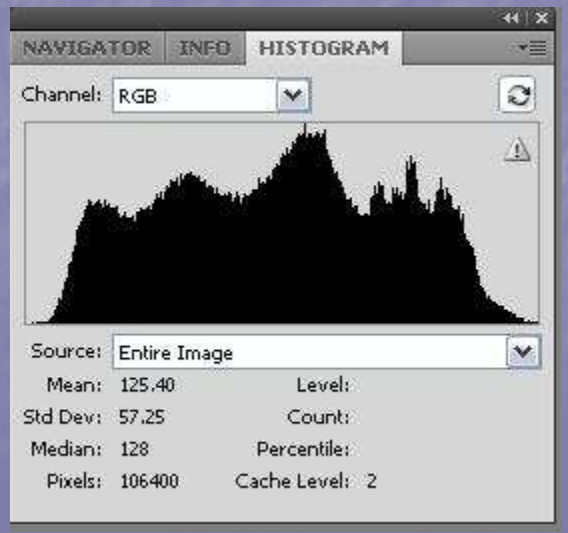
Notice the Histogram Progression to the Right

The March of the Histograms

(a.k.a. Under/Overexposure)

IMAGE VS HISTOGRAM





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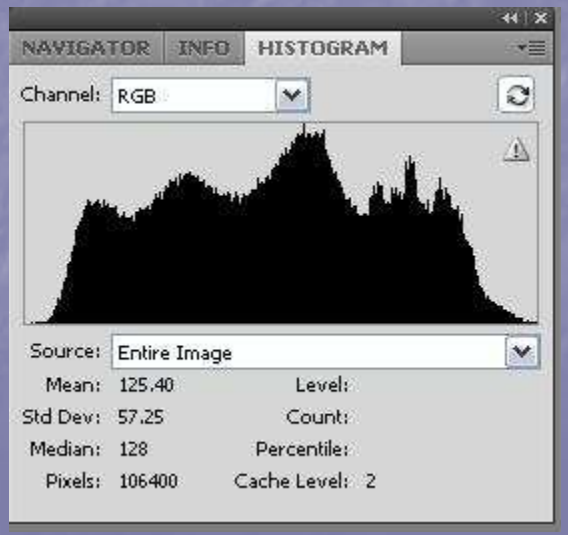
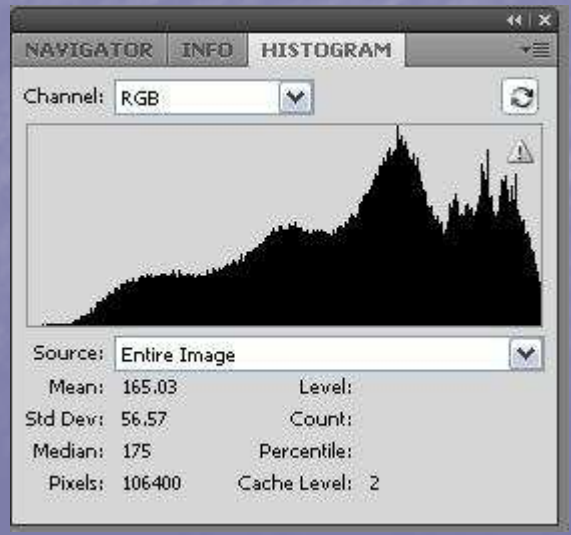
The March of the Histograms

(a.k.a. Under/Overexposure)

IMAGE VS HISTOGRAM



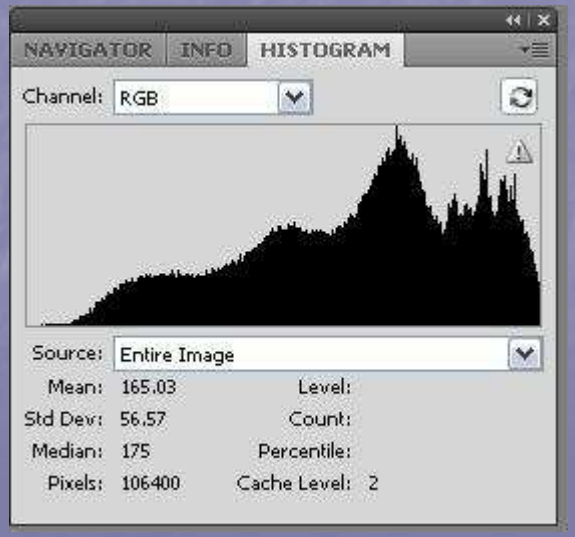


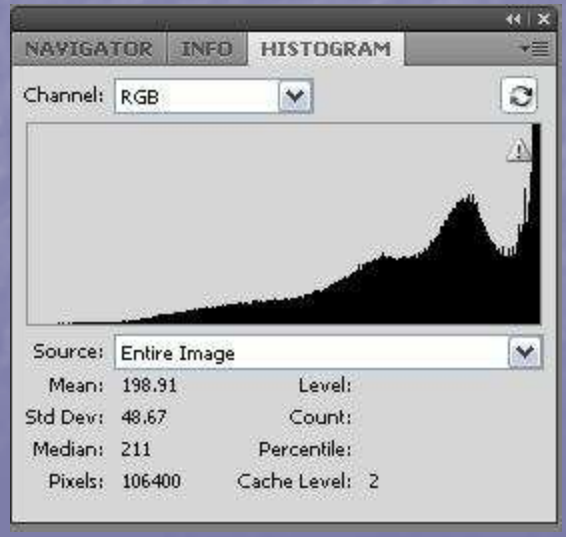
Notice the Histogram Progression to the Right

The March of the Histograms

(a.k.a. Under/Overexposure)

IMAGE VS HISTOGRAM



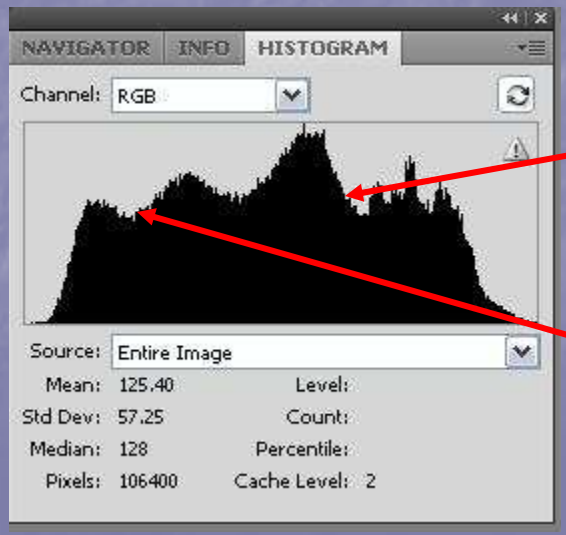


Notice the Histogram Progression to the Right

The Difference of the Histograms

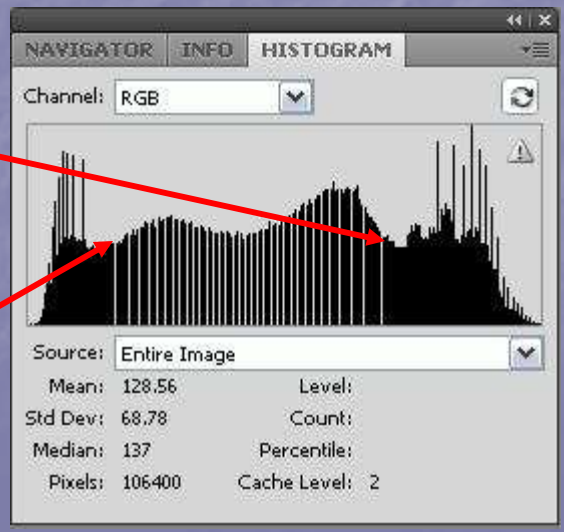
(a.k.a. Contrast)

IMAGE VS HISTOGRAM



End Contrast Enhancement

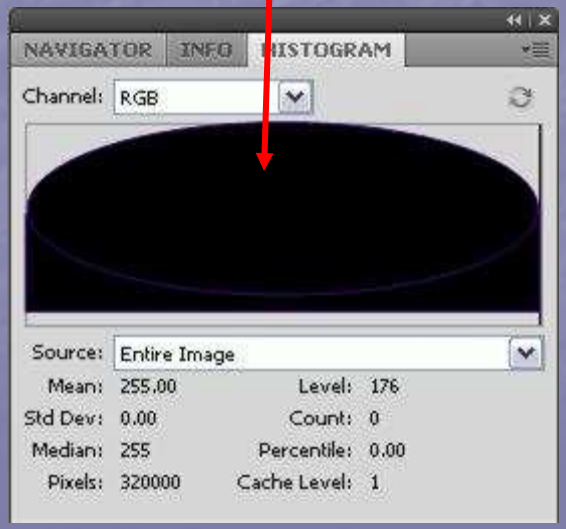
Beginning of Contrast Enhancement



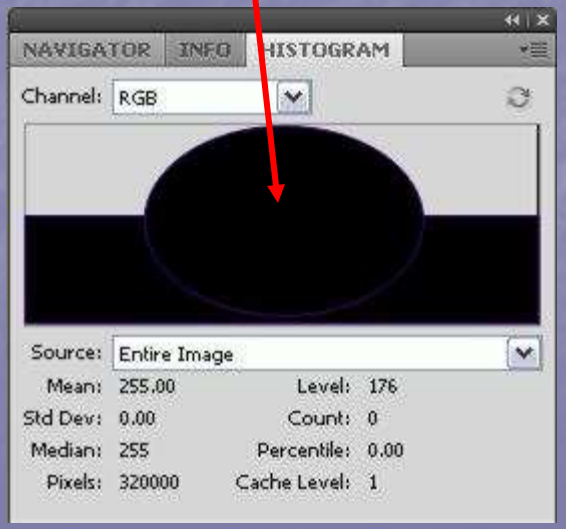
Notice the Histogram Contrast Enhancement

Histogram Generalizations

Having tonal values all the way from low/left to high/right tends to indicate good/maximum contrast



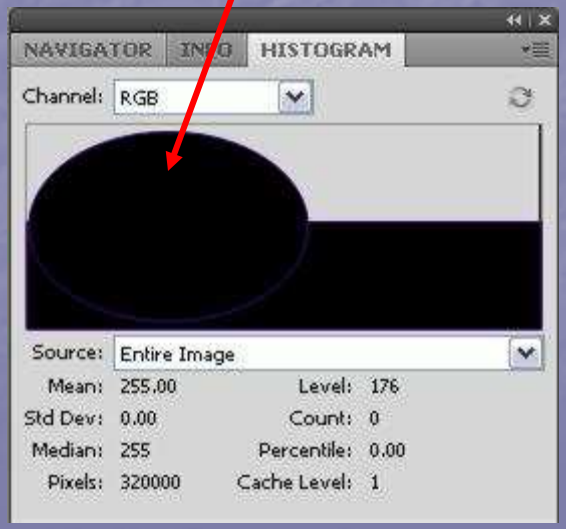
Having a limited range of tonal values indicates a low contrast image (although this may be intended).

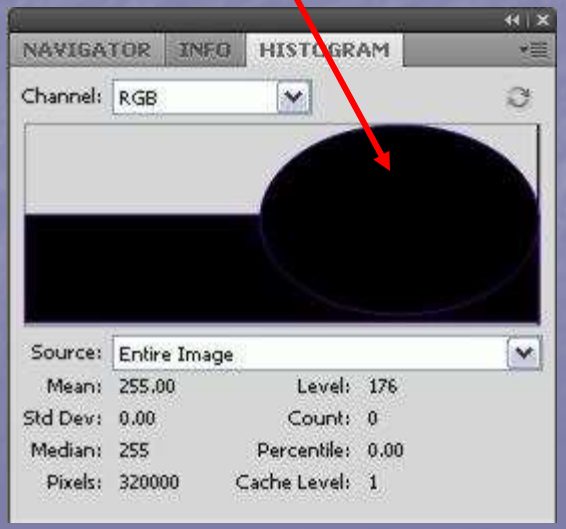


Histogram Generalizations

Having tonal values group to the left indicates a low-key (i.e.: mostly dark) image.

Having tonal values group to the right indicates a high-key (i.e.: mostly light) image.

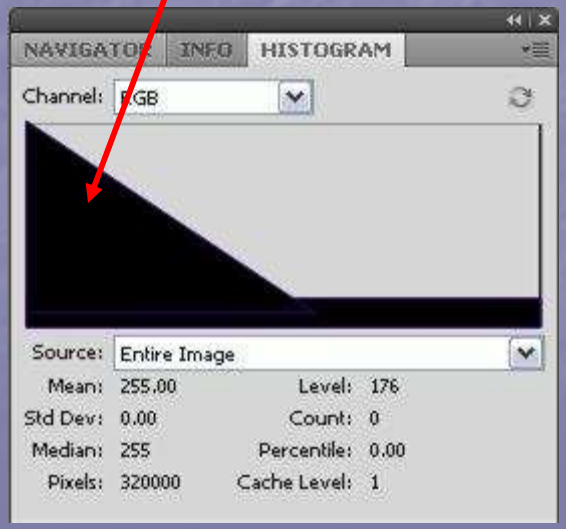


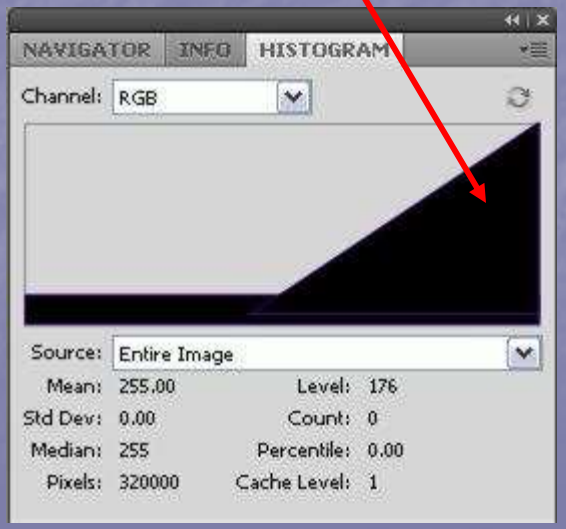


Histogram Generalizations

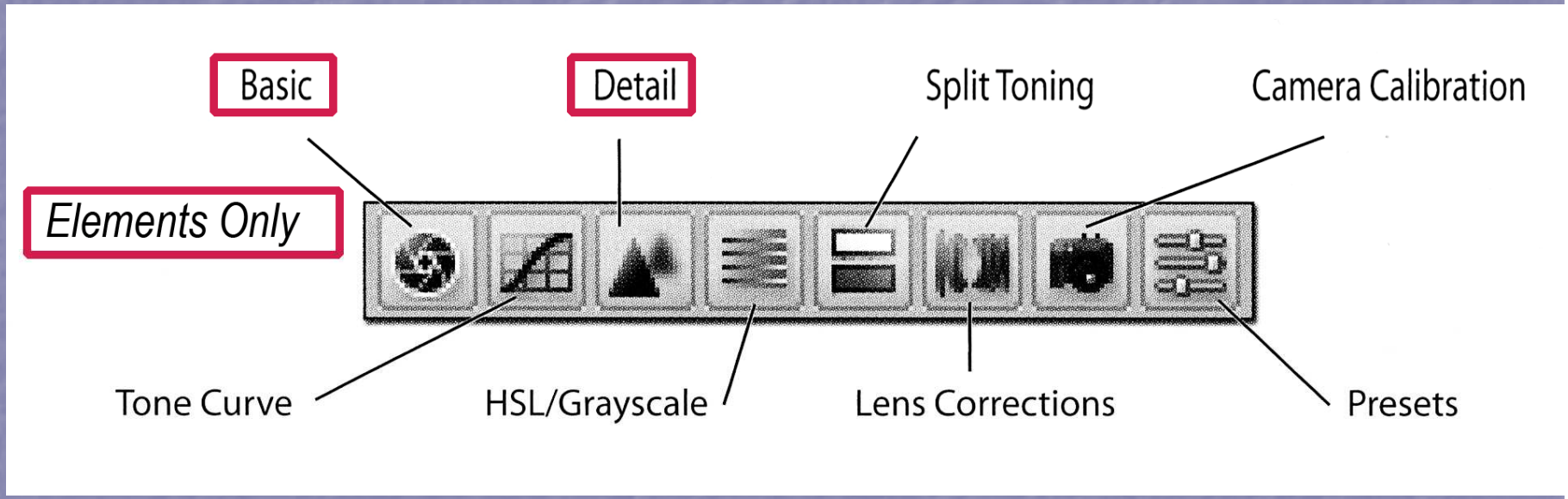
Having tonal values run out on the left indicates an underexposed image.

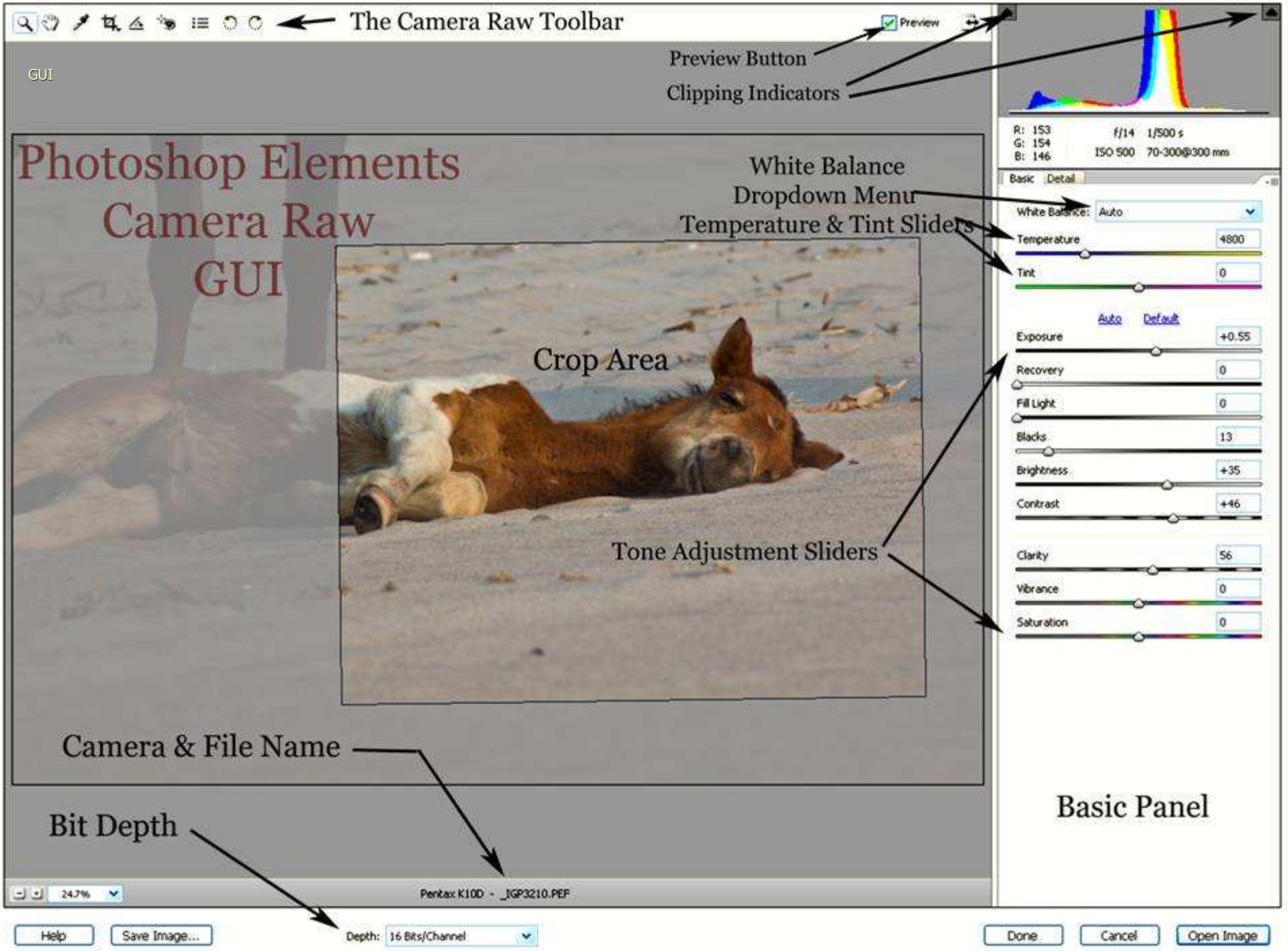
Having tonal values run out on the right indicates an overexposed image.





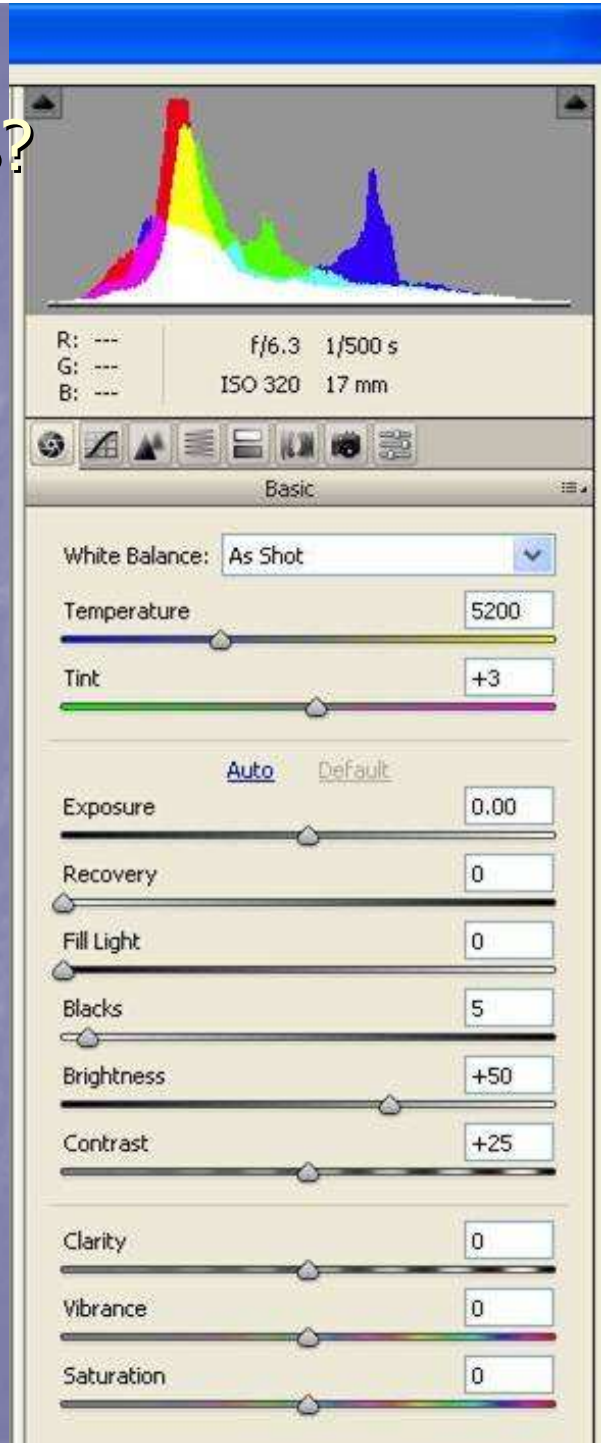
Photoshop CR3 Adobe Camera Raw Control Panel Icons




The Camera Raw Toolbar
Preview
Preview Button
Clipping Indicators
GUI
Photoshop Elements
Camera Raw
GUI
White Balance
Dropdown Menu
Temperature & Tint Sliders
Crop Area
Tone Adjustment Sliders
Camera & File Name
Bit Depth
Basic Panel
R: 153
G: 154
B: 146
f/14 1/500 s
ISO 500 70-300@300 mm
Basic
Detail
White Balance: Auto
Temperature 4800
Tint 0
Auto
Default
Exposure +0.55
Recovery 0
Fill Light 0
Blacks 13
Brightness +35
Contrast +46
Clarity 56
Vibrance 0
Saturation 0
24.7%
Pentax K10D - _IGP3210.PEF
Help
Save Image...
Depth: 16 Bits/Channel
Done
Cancel
Open Image

How do you process camera raw files?
Basic Panel

- Open Raw file with Elements Editor, (Photoshop CS3/CS4 or Bridge)
  - Check bit depth (16 or 8) 16 is preferred (this will be discussed later)
  - Check Resolution (pixel per inch, no resample)
- White balance controls
  - Temperature (blue/yellow color balance)
  - Tint (green/magenta color



How do you process camera raw files? (cont)

Basic Panel

Tone adjustment sliders

- Exposure

  Mainly a white clipping adjustment, large increases in exposure value (more than 0.75 of a stop) will increase shadow noise and posterization

- Recovery

  Highlight Recovery works in conjunction with Exposure

- Fill light

  Brings out detail in shadows and doesn't effect rest of image

- Blacks (shadow clipping)

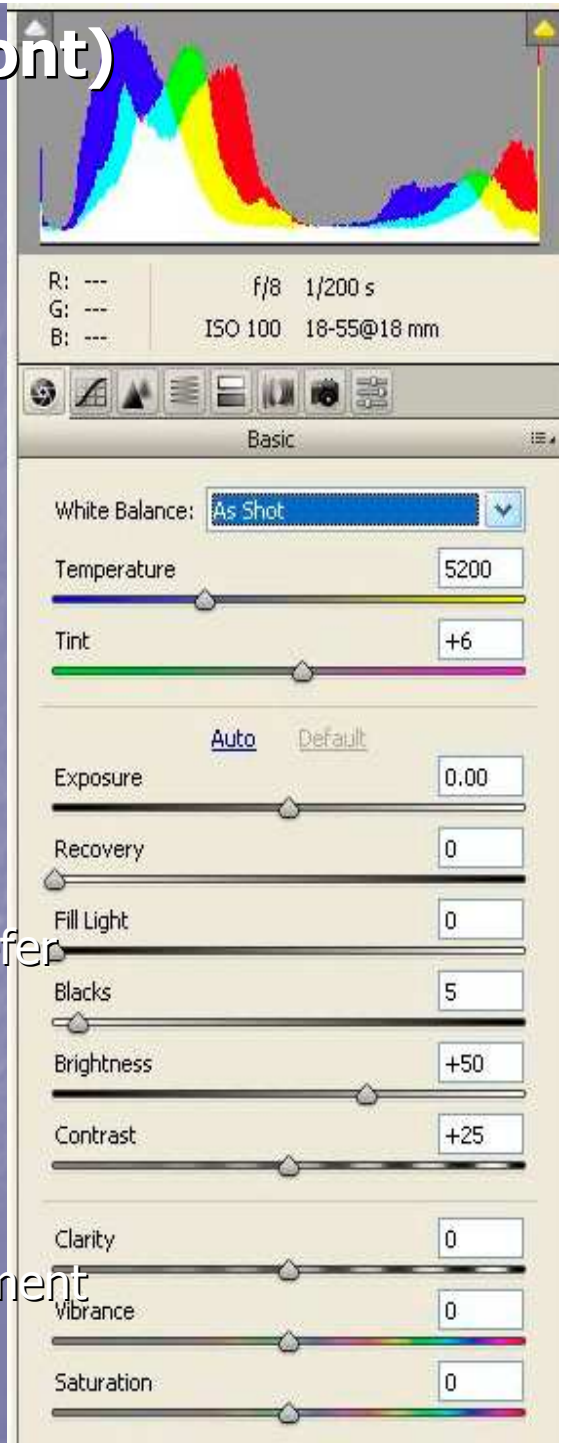
  A Black clipping control (default is 5 but in general I prefer 3 or less)

- Brightness

  Redistributes the midtone values

- Contrast

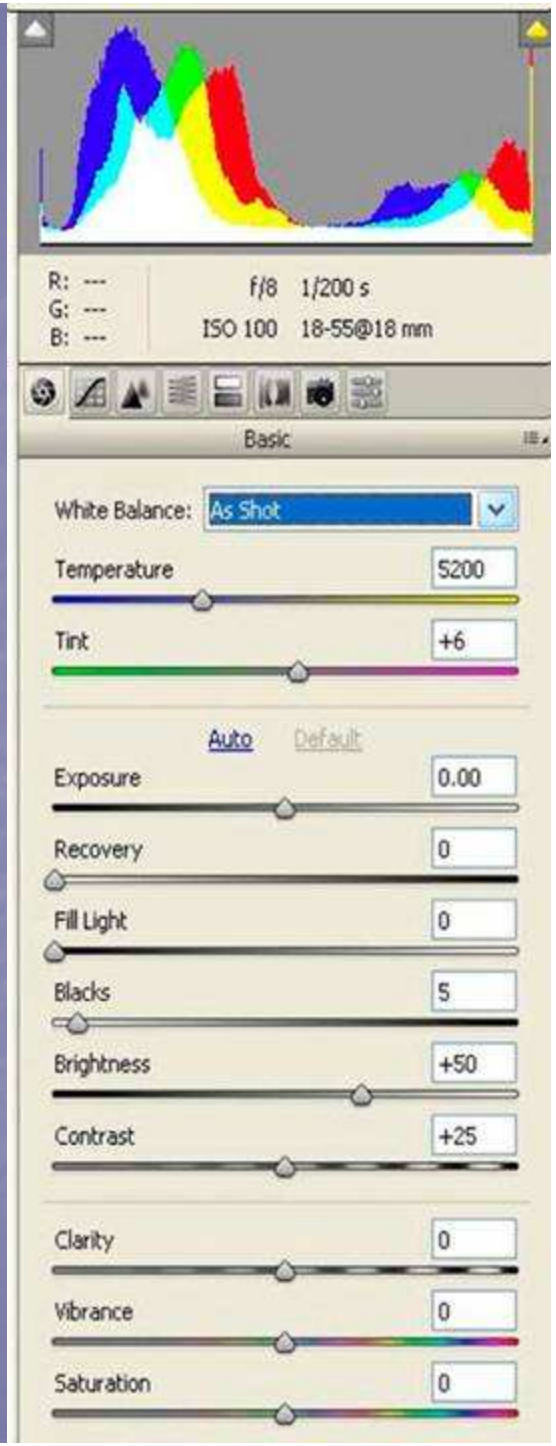
  Different than Photoshop Contrast, uses S curve adjustment

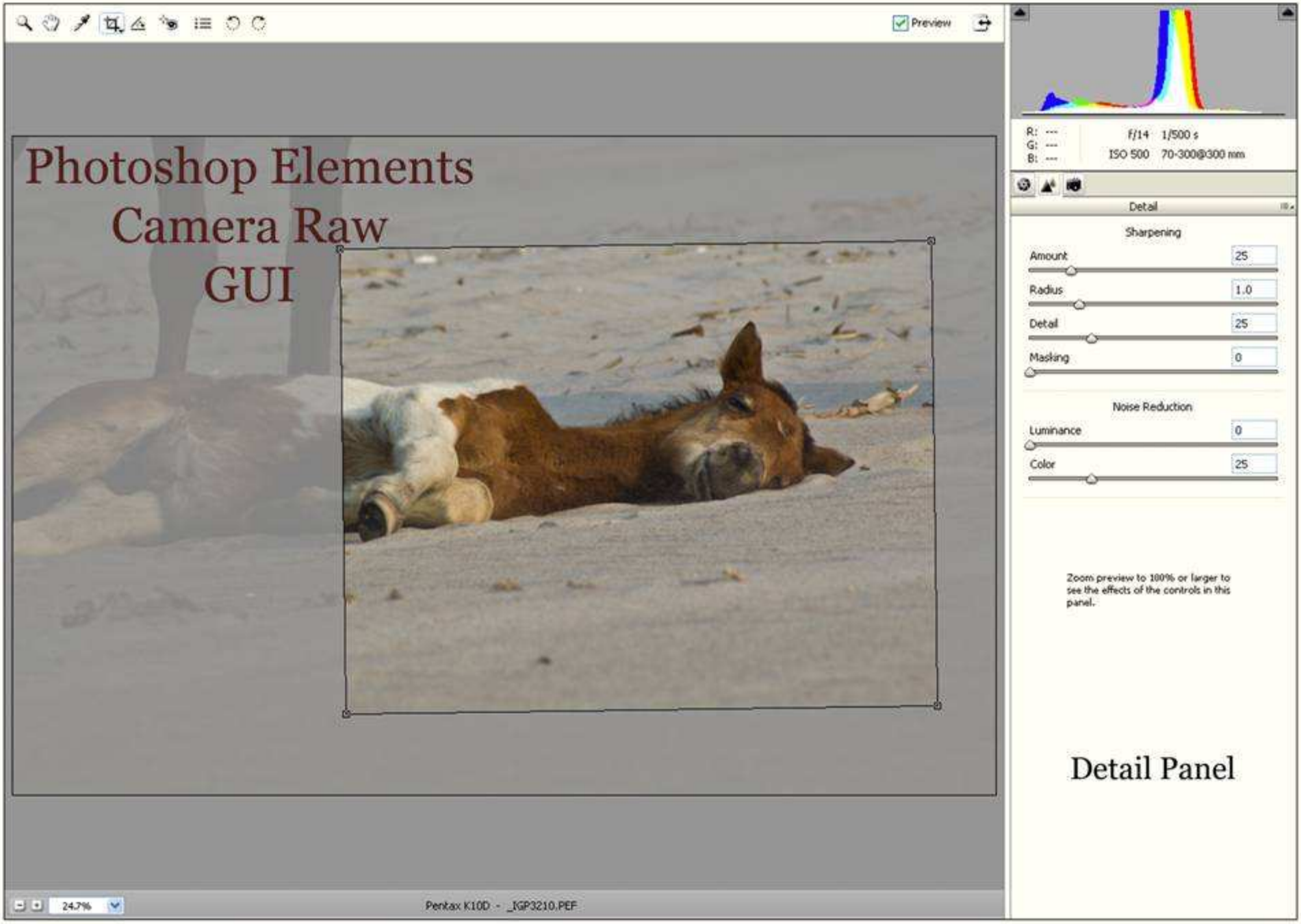


How do you process camera raw files? (cont)
Basic Panel

Presence Values (from Lightroom)

- Clarity
  - Is like a lens cleaning filter and works like Unsharp Mask in Photoshop. I use it on just about every image
- Vibrance
  - Is like saturation only works more on unsaturated colors
- Saturation
  - Is gentler version with finer controls than Hue/Saturation

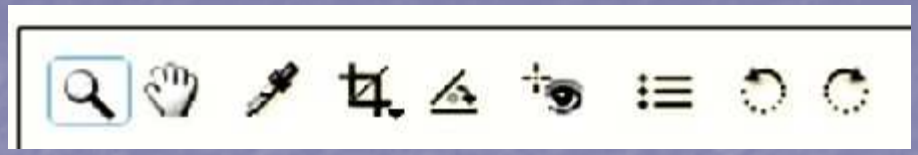



Photoshop Elements
Camera Raw
GUI
Preview
R: ---
G: ---
B: ---
f/14 1/500 s
ISO 500 70-300@300 mm
Detail
Sharpening
Amount 25
Radius 1.0
Detail 25
Masking 0
Noise Reduction
Luminance 0
Color 25
Zoom preview to 100% or larger to see the effects of the controls in this panel.
Detail Panel
24.7%
Pentax K10D - _IGP3210.PEF
Help
Save Image...
Depth: 16 Bits/Channel
Done
Cancel
Open Image

How do you process camera raw files? (cont) *Details Panel*

- Sharpening Controls (zoom to 100% & use preview, halos should be invisible at this Zoom)
  - ***Amount*** 0 to 150
  - ***Radius*** 0.5 to 3 pixels (defines either side of an "edge" the sharpening will be applied) above 1 one has a tendency to make the photo look phony/over sharpened
  - ***Detail*** 0 to 100, depends on how blurred and texture dependent
  - ***Masking*** reduces sharpening in nonedge areas while concentrating on edges, 0 implies sharpening is applied to everything in image equally i.e. no mask
- Noise Reduction Controls (zoom to 200%) Noise is usually caused by high ISO or underexposure)
  - Luminance Noise
  - Color Noise

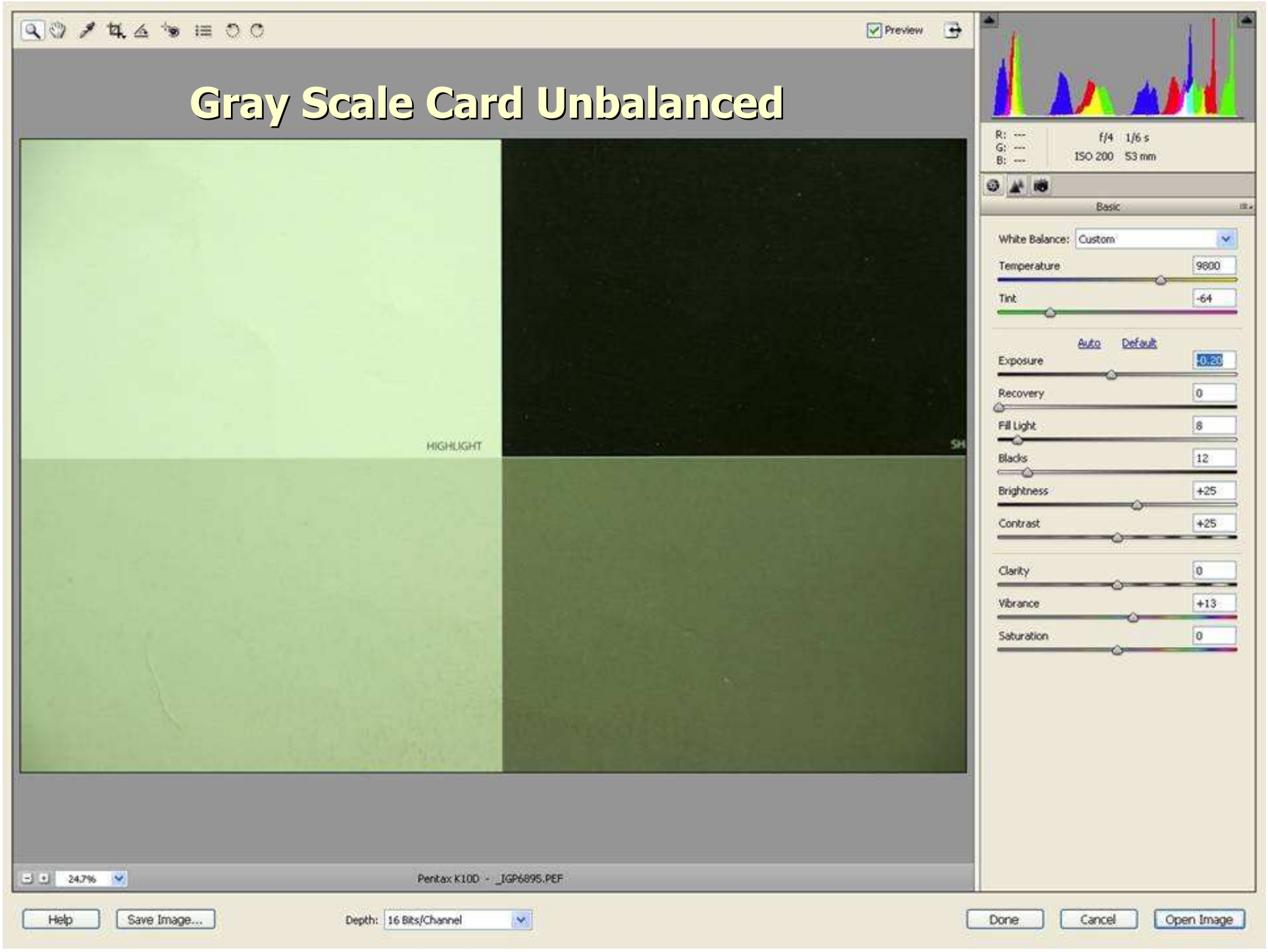
Toolbar

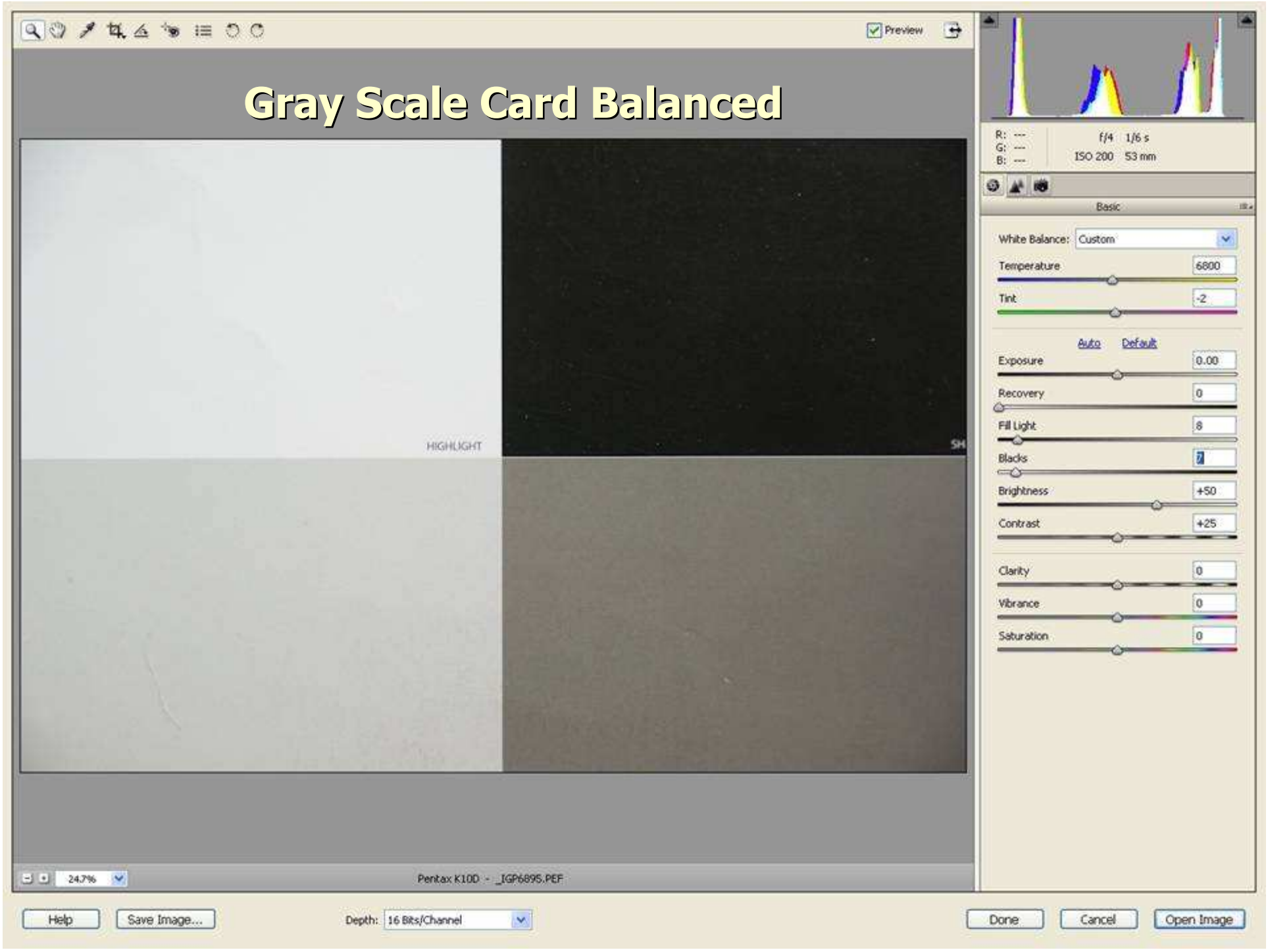


- Zoom (Z)
- Hand (H) or (spacebar)
- White Balance (I) see gray/flat card
- Crop (C) + drop down menu for fixed aspect ratio selection
- Straighten (A)
- Retouch Tool (B) not available in Photoshop Elements
- Redeye Removal (E)
- Open Preference Dialog (Control K)
- Rotate Buttons (L) (R)

READING WHITE BALANCE FROM A HISTOGRAM

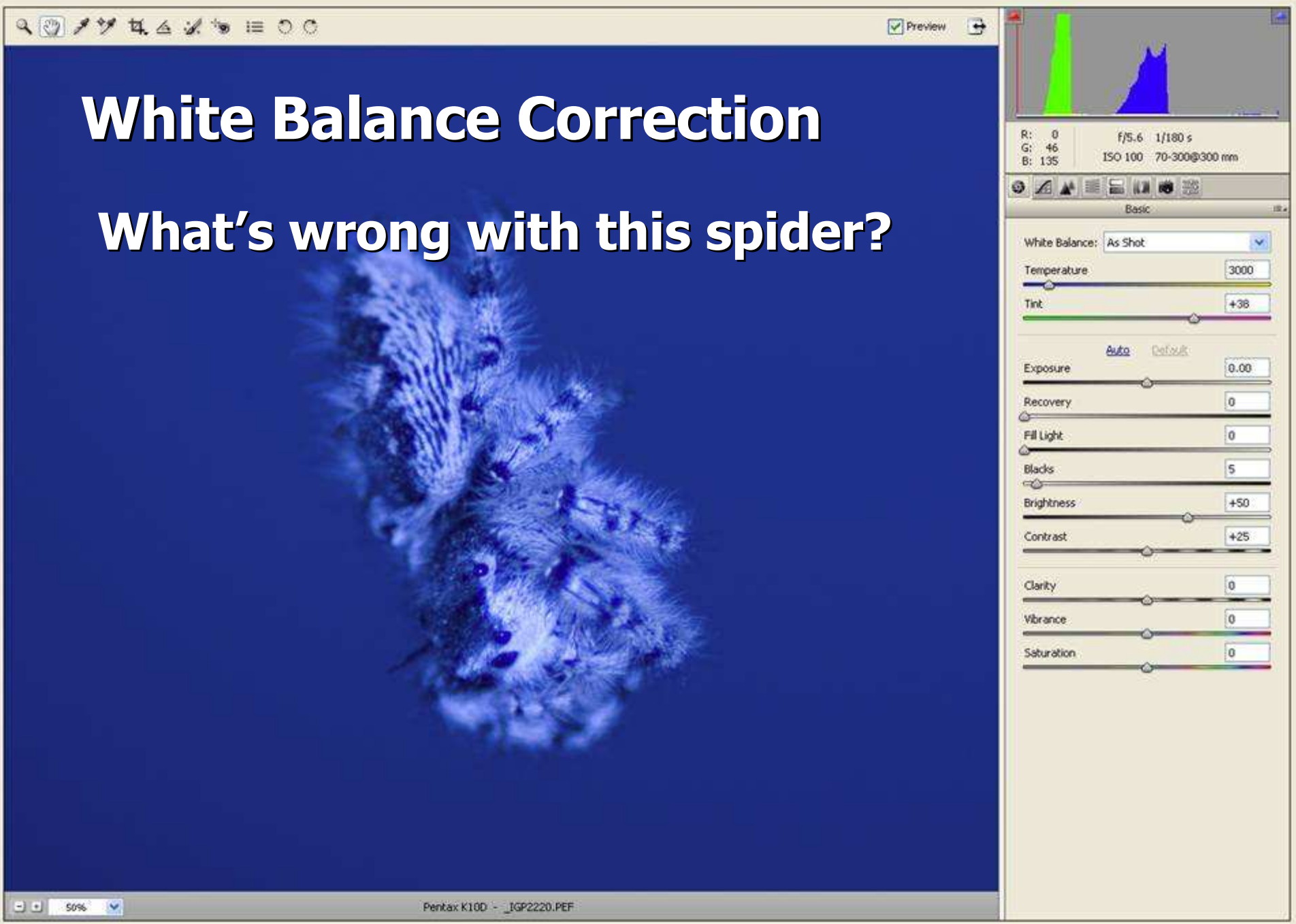
- You use the color histogram in ACR to do this.
- When you shoot a flat card you'll see a spike in each color channel's histogram.
- You're balanced (neutral) if the spike happens in the same place in each channel. If not, you're not balanced. This is easy: if the red channel is too far to the right (too light) you have too much red. You get the picture.
- You don't even need a card. Look at your histograms. If all 3 stop at the same point then your highlights are neutral. If not, your highlights aren't neutral. Obviously if you have sky you'll see the blue channel further off to the right.

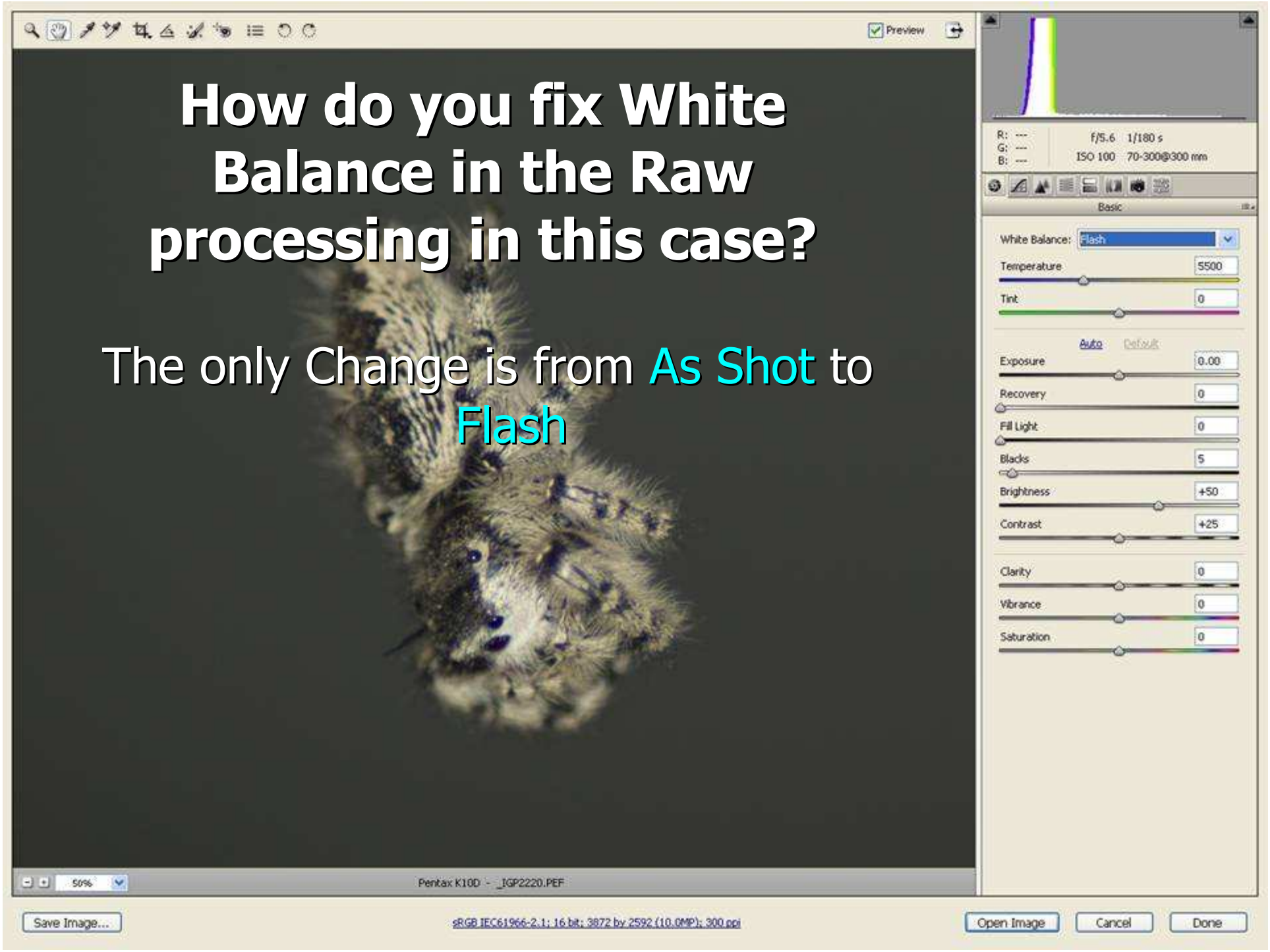

Gray Scale Card Unbalanced
Preview
HIGHLIGHT
SH
24.7%
Pentax K10D - _IGP6895.PEF
R: ---
G: ---
B: ---
f/4 1/6 s
ISO 200 53 mm
Basic
White Balance: Custom
Temperature 9800
Tint -64
Auto Default
Exposure -0.20
Recovery 0
Fill Light 8
Blacks 12
Brightness +25
Contrast +25
Clarity 0
Vibrance +13
Saturation 0
Help
Save Image...
Depth: 16 Bits/Channel
Done
Cancel
Open Image

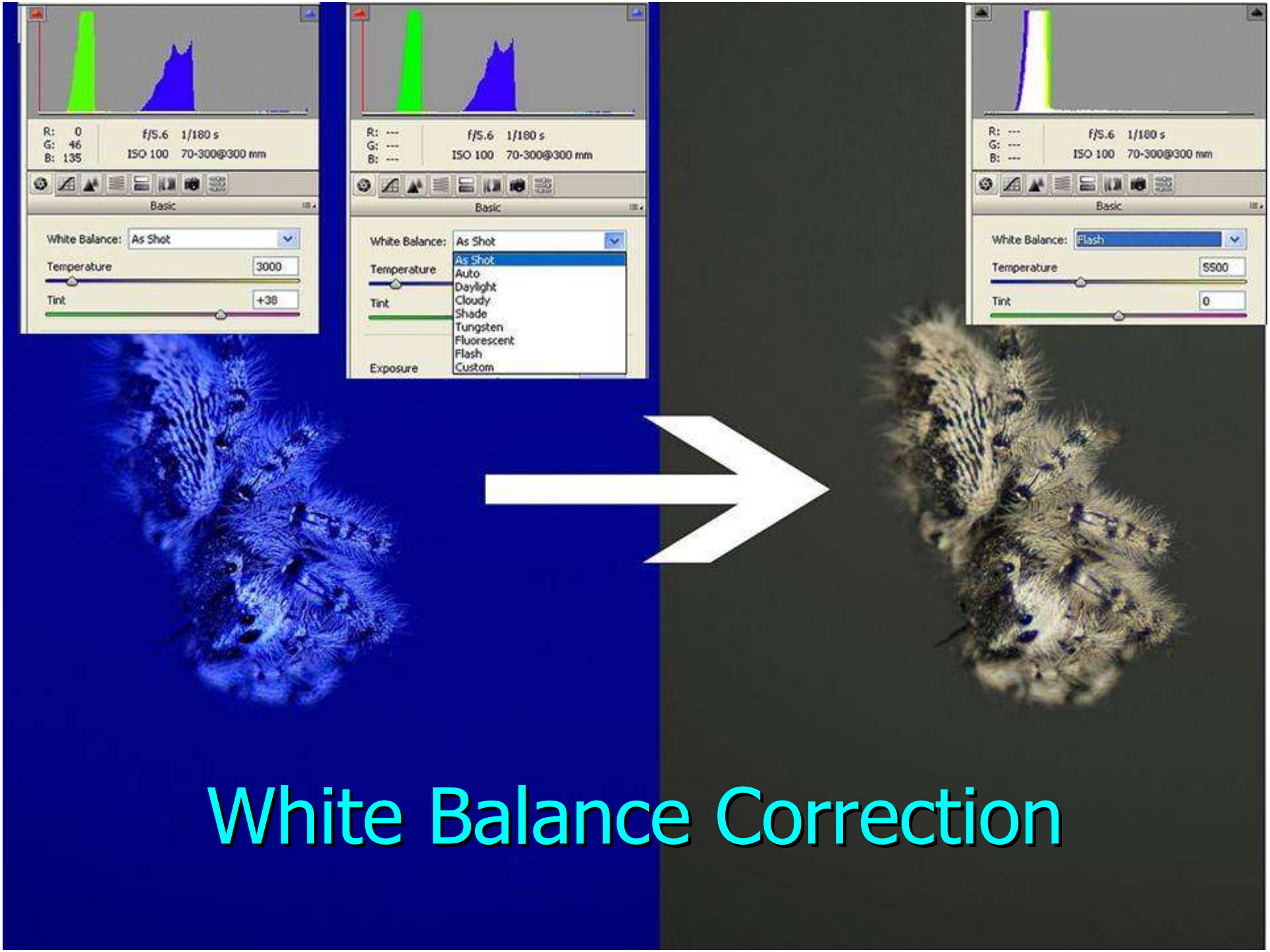

Gray Scale Card Balanced
Preview
HIGHLIGHT
SH
R: ---
G: ---
B: ---
f/4 1/6 s
ISO 200 53 mm
Basic
White Balance: Custom
Temperature 6800
Tint -2
Auto Default
Exposure 0.00
Recovery 0
Fill Light 8
Blacks 7
Brightness +50
Contrast +25
Clarity 0
Vibrance 0
Saturation 0
24.7%
Pentax K10D - _IGP6895.PEF
Help
Save Image...
Depth: 16 Bits/Channel
Done
Cancel
Open Image

White Balance Correction

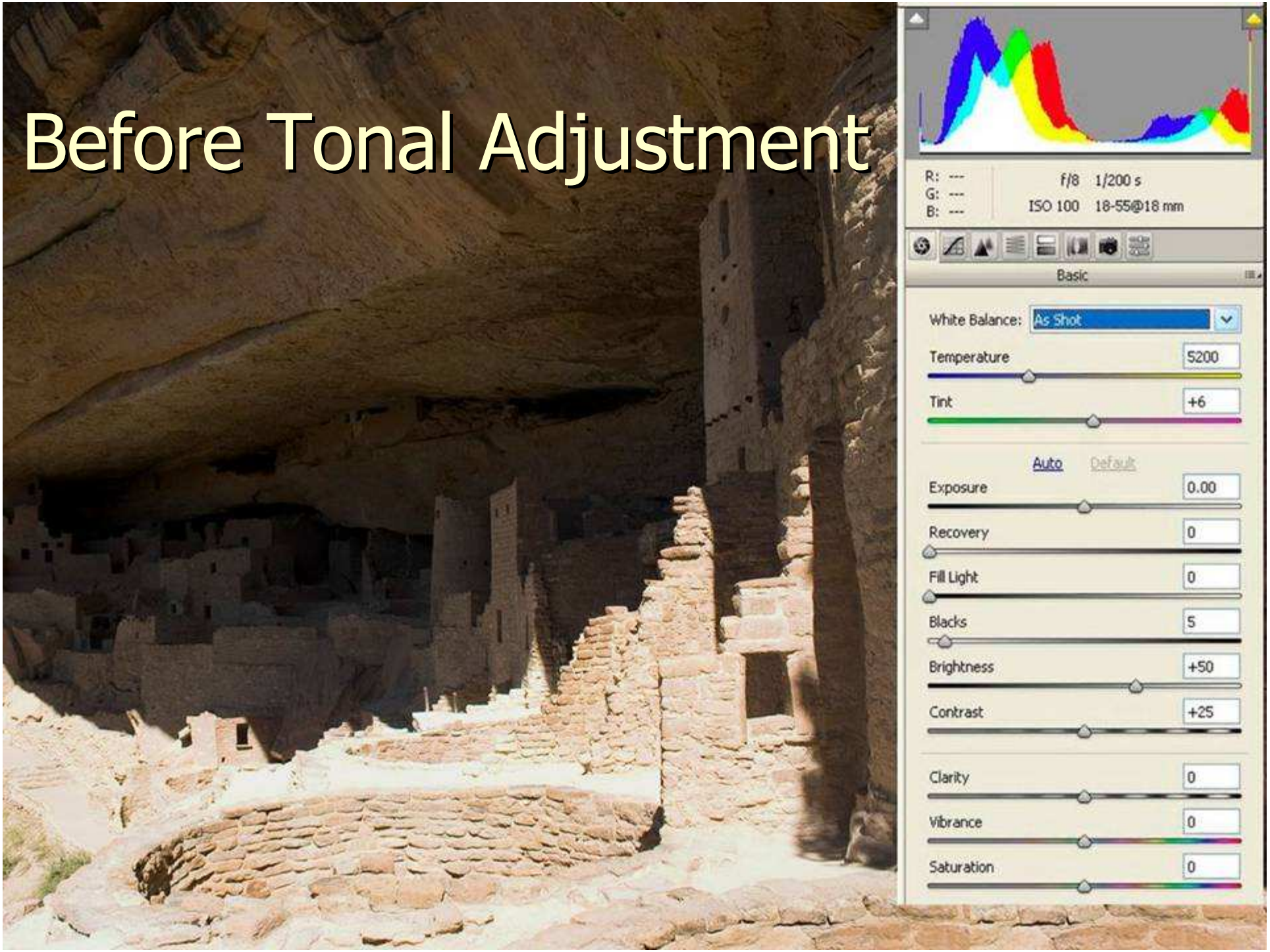
What's wrong with this spider?

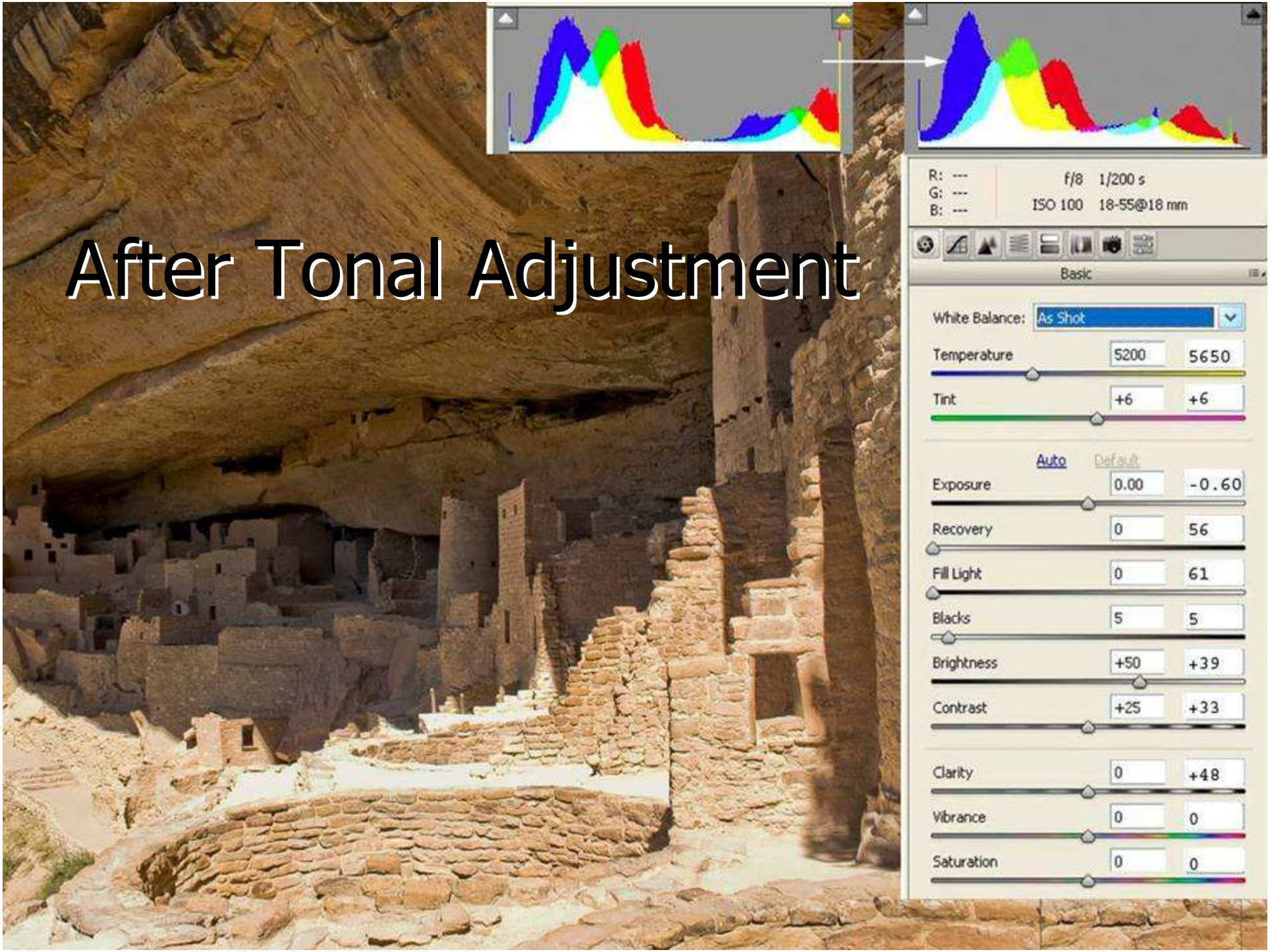


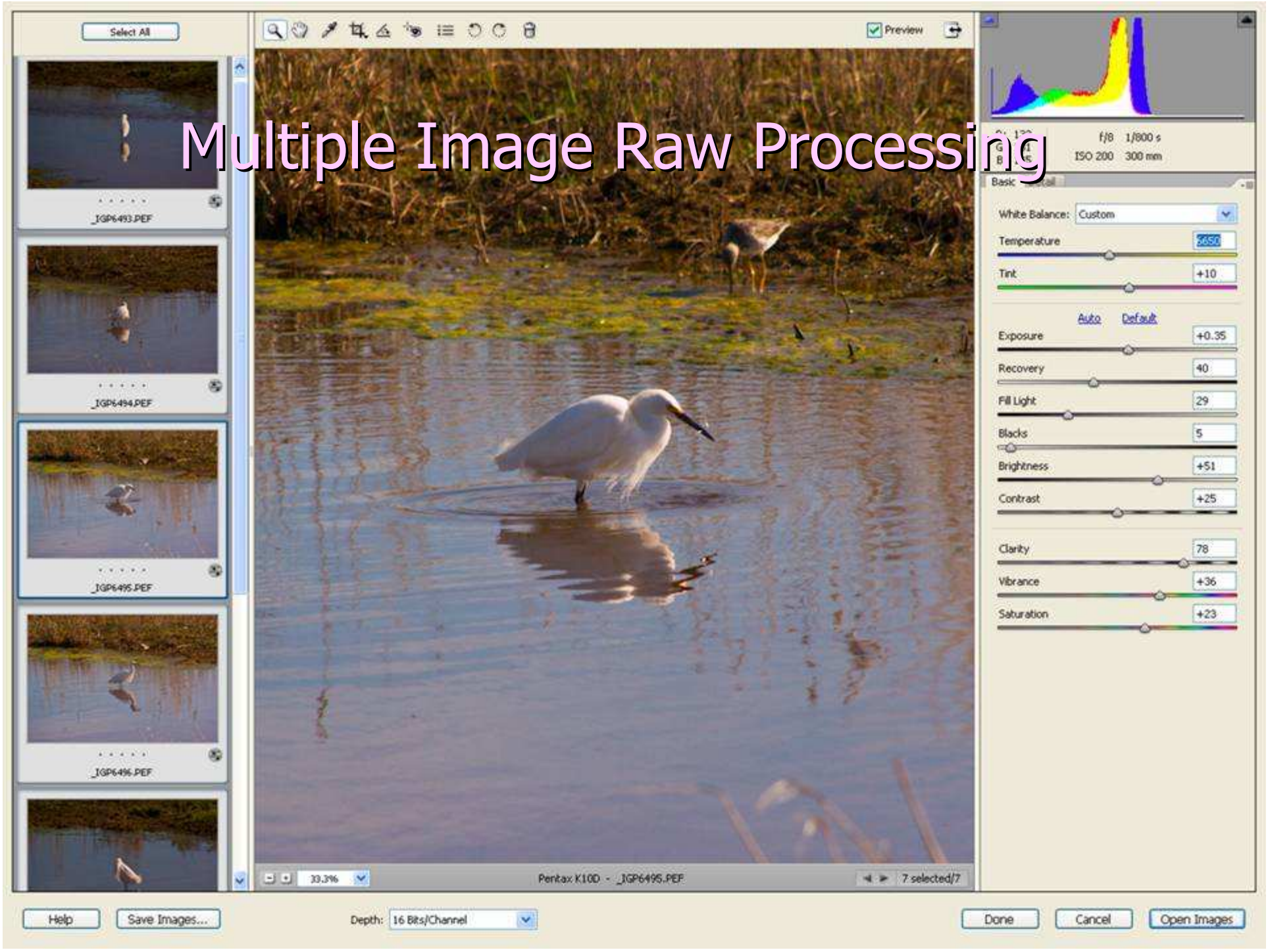

How do you fix White Balance in the Raw processing in this case?
The only Change is from As Shot to Flash
Preview
R: ---
G: ---
B: ---
f/5.6 1/180 s
ISO 100 70-300@300 mm
Basic
White Balance: Flash
Temperature 5500
Tint 0
Auto Default
Exposure 0.00
Recovery 0
Fill Light 0
Blacks 5
Brightness +50
Contrast +25
Clarity 0
Vibrance 0
Saturation 0
50%
Pentax K10D - _IGP2220.PEF
Save Image...
sRGB IEC61966-2.1; 16 bit; 3872 by 2592 (10.0MP); 300 ppi
Open Image
Cancel
Done


R: 0
G: 46
B: 135
f/5.6 1/180 s
ISO 100 70-300@300 mm
Basic
White Balance: As Shot
Temperature 3000
Tint +38
R: ---
G: ---
B: ---
f/5.6 1/180 s
ISO 100 70-300@300 mm
Basic
White Balance: As Shot
Temperature
Tint
Exposure
As Shot
Auto
Daylight
Cloudy
Shade
Tungsten
Fluorescent
Flash
Custom
R: ---
G: ---
B: ---
f/5.6 1/180 s
ISO 100 70-300@300 mm
Basic
White Balance: Flash
Temperature 5500
Tint 0
White Balance Correction

Before Tonal Adjustment




After Tonal Adjustment
R: ---
G: ---
B: ---
f/8 1/200 s
ISO 100 18-55@18 mm
Basic
White Balance: As Shot
Temperature 5200 5650
Tint +6 +6
Auto Default
Exposure 0.00 -0.60
Recovery 0 56
Fill Light 0 61
Blacks 5 5
Brightness +50 +39
Contrast +25 +33
Clarity 0 +48
Vibrance 0 0
Saturation 0 0


Multiple Image Raw Processing
Select All
_IGP6493.PEF
_IGP6494.PEF
_IGP6495.PEF
_IGP6496.PEF
Preview
f/8 1/800 s
ISO 200 300 mm
Basic
White Balance: Custom
Temperature 5650
Tint +10
Auto Default
Exposure +0.35
Recovery 40
Fill Light 29
Blacks 5
Brightness +51
Contrast +25
Clarity 78
Vibrance +36
Saturation +23
33.3%
Pentax K10D - _IGP6495.PEF
7 selected/7
Help
Save Images...
Depth: 16 Bits/Channel
Done
Cancel
Open Images

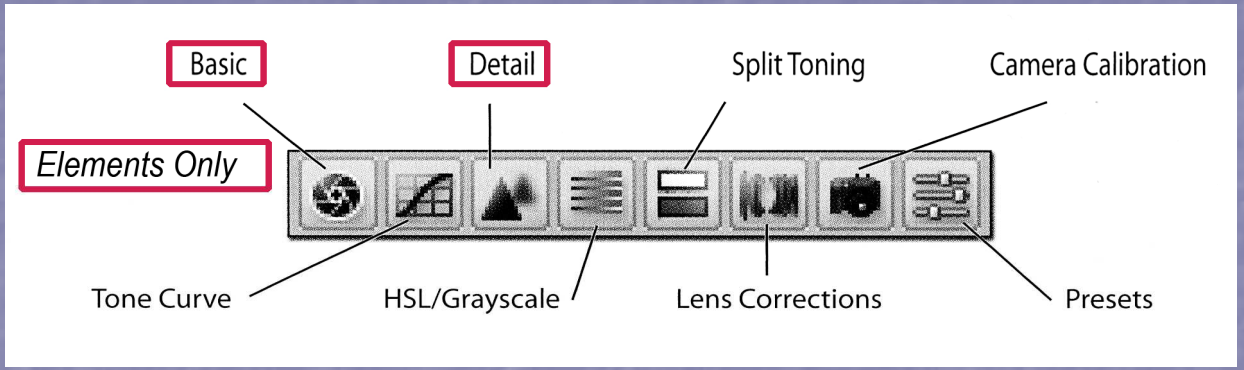
Save Raw Editing

- Done (Makes changes Sidecar file to remember changes, no picture file is created)
- Cancel (does nothing)
- Save Image (DNG Only choice in Elements).. In Photoshop (DNG, Tiff, Jpeg, Psd)
- Open Image (Will open image in Photoshop elements or CS3 or 4 for editing/saving or just saving)

When saving the image why 16 bits and the high bit advantage?

- Any cameras that shoot Raw capture at least 10 bits/pixel up to 1024 tonal values
- Most cameras capture 12 bits or 4096 levels
- An 8 bit/pixel image (a jpeg) only allows 256 tonal values in each channel throwing away a great deal of potentially useful data
- The main advantage of 16 bit images is they offer massively more editing head room
- Downside of 16 bit images
  - Twice the storage space on disc or memory
  - Some editing features won't work (although this is improving with newer editions of Photoshop)

Raw Topics/Panels in CS3 & 4, and Lightroom and not covered in this workshop, but should be considered for further investigation



- Tone Curve (no curves at all in Elements)
- HSL/Grayscale (precise and selective hue/sat non-primary adjustments plus Grayscale controls)
- Split Toning (one tint in highlights and one for shadows)
- Lens Correction (chromatic aberration red/cyan and blue/yellow, plus vignetting)
- Camera Calibration (fine tuning of Adobe's profiles for your cameras)

Raw Downside

- Processing time and inconvenience
- File Size (2 to 4 times Larger)
- Longevity
  - Just about every camera has a proprietary format
  - Will someone be able to read Raw files in 10 years, 100 years?
  - Adobe DNG may be the answer

Some things to Try

- Shoot Raw and try your camera's proprietary software
- Try ACR and adjust the controls to see if you can improve the photos
- Check out
  - *Real World Camera Raw with Adobe Photoshop CS3* by Bruce Fraser and Jeff Schewe
  - *The Adobe Photoshop CS3/CS4 Book for Digital Photographers* by Scott Kelby
  - *The Photoshop Elements 7 Book for Digital Photographers* by Scott Kelby & Matt Kloskowski
- If using Elements Check out the Help Files for Raw