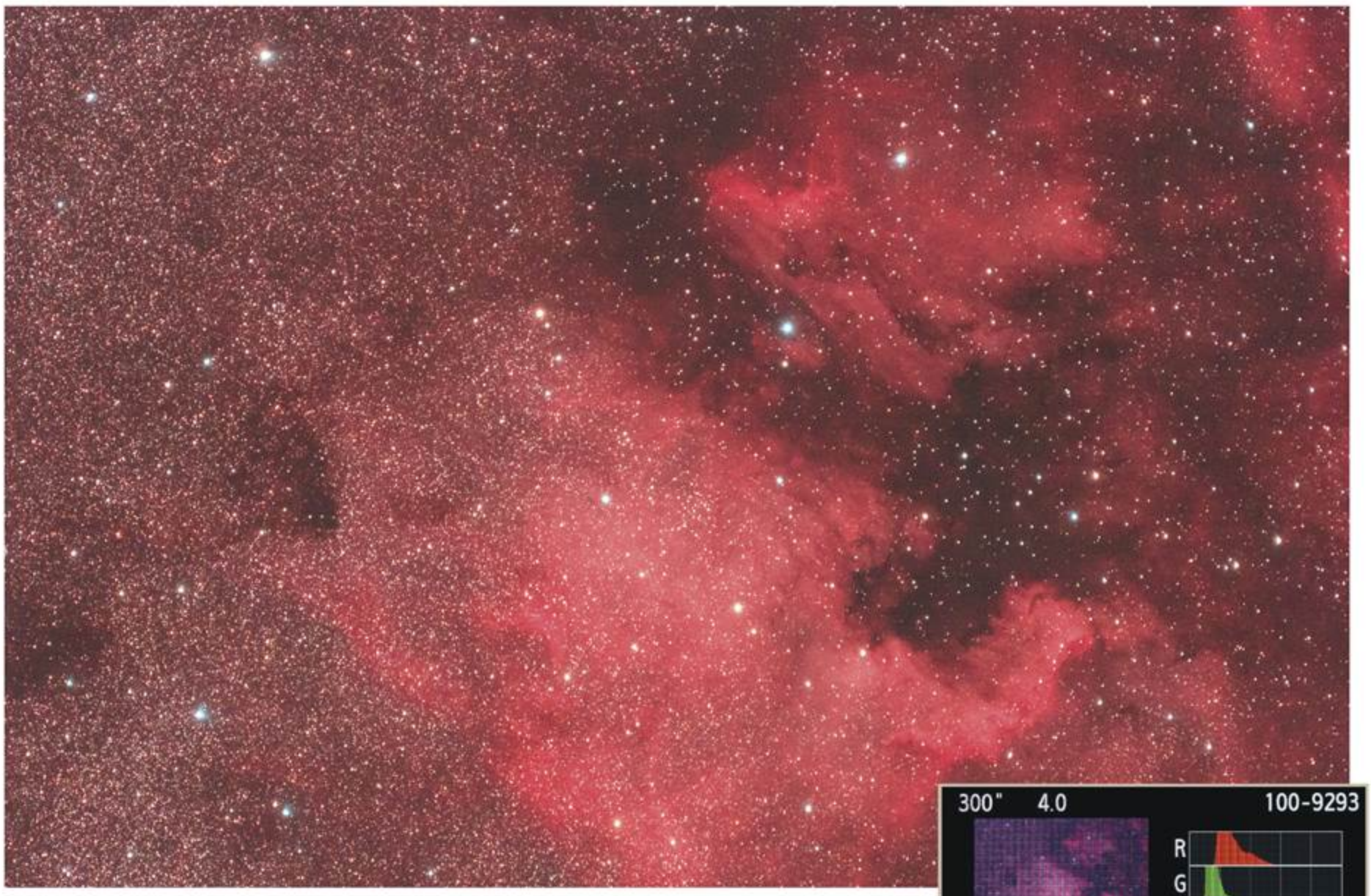
TOOLS AND RULES FOR GETTING THE RIGHT EXPOSURE

Watch your histogram display to get better deep-sky photos Text and photography by Tony Puerzer



NORTH AMERICA NEBULA The author took this image using an astro-modified Canon EOS 60D DSLR camera at ISO 1600 with a Canon 300mm telephoto lens at f/4 and an Astronomik CLS light-pollution filter. The 5-minute exposure provided a great starting point for some light processing in Adobe Photoshop Lightroom. The histogram on the back of the camera, above, shows what a well-exposed, unprocessed deep-sky image should look like. Note that the hump, indicating the tone of the image, is positioned away from the left edge of the graph.

WHEN IT COMES TO MAKING DETAIL-RICH PHOTOS of the night sky, one of the most basic—and important—questions is, how long should the exposure be? You might expect there to be a single correct answer, but because sky conditions and the types of equipment used all play a role, the best way to answer this question is with some experimenting. A good place to start is by making a series of test shots with your camera set to ISO 1600 and your lens wide open. Start with a 30-second exposure, and work your way up to several minutes. But how do you decide which of your test exposures is the best? The key is something called a histogram.

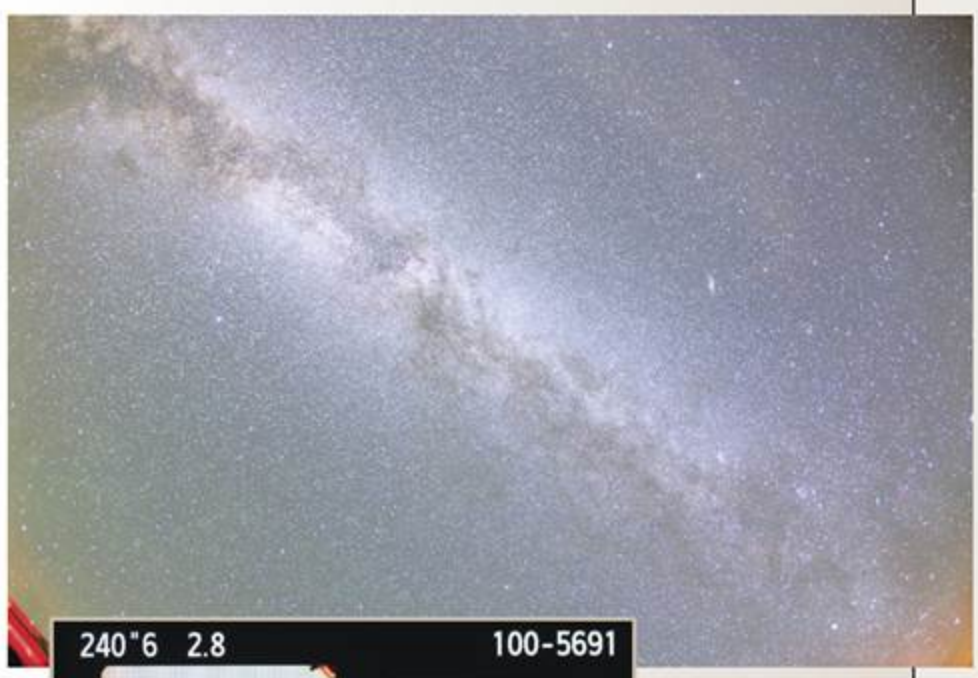
It might be tempting to simply view each image on the camera screen and pick the one that looks about right. Although "chimping" (as it's known) gives you a ballpark sense of which exposures work, your dark-adapted eyes can be tricked by the camera's bright display. As a result, you'll likely end up choosing an image that's badly underexposed. A much better way to evaluate the overall exposure of a digital image is to use the camera's histogram display. (Check your camera's manual for instructions on how to enable this feature.) The histogram graphically shows the number of pixels at each brightness level—

WATCH THE HUMP For deep-sky photography, your exposures should be just long enough that the "hump" in your camera's histogram fully separates from the left side of the display but does not extend beyond the halfway point. The author took this series of test exposures from the Cascade Lookout in British Columbia's E. C. Manning Provincial Park using a Canon EOS 6D at ISO 3200 and a Canon 15mm fish-eye lens at f/2.8.

This 30-second exposure is about two stops underexposed.

This 60-second exposure is about one stop underexposed.

This 120-second exposure is approximately correct for this combination of gear and sky conditions.



This 240-second exposure is about one stop overexposed.

UNWANTED VISITORS One of the main reasons to keep your wide-field deep-sky exposures as short as possible is to reduce the chances of marring your images with streaks from aircraft lights or trails from satellites. This unguided 19-minute photograph (composed of 38 thirty-second exposures stacked together) provided ample opportunity for several aircraft to leave their mark.

from dark on the left to light on the right. Image-editing software usually has a histogram function too. Pay close attention to the part of the graph called the hump. Its position on the graph's horizontal axis is key to obtaining the optimum exposure.

Daytime photographers use a rule of thumb that says "expose to the right." The idea is to choose an exposure that positions the histogram hump as far to the right as possible without bumping against the right edge of the graph, which would indicate blown highlights. While there are good technical reasons for using this approach, it can lead to some serious problems when you're capturing night-sky scenes. Indeed, for astrophotography, you might even say the rule should instead be "expose to the left." What you want to see is a histogram with the hump fully separated from the left edge of the graph but not extending past the midway point.

For wide-field astronomical photographs, the hump usually represents the light of the background sky—often referred to as *sky fog*. If you expose to the right, the resulting picture will have an unattractive washed-out background. Yes, you can dim it down later when you process the image, but what's the point of making an exposure longer than necessary? It simply takes more time and means extra work later. Furthermore, you run the risk of overexposing the bright areas and increasing the likelihood of unwanted visitors—such as airplanes or satellites—leaving unsightly trails across your photo. Longer exposures also make the effects of tracking errors and inaccurate polar alignment more obvious. In other words, the ideal exposure is one that's just long enough to clearly record your subject, be it the Milky Way arching overhead or a close-up view of a deep-sky object.

Getting back to your set of test exposures, look for the one with a histogram hump that's positioned about one-third of the way from the left edge of the graph and doesn't extend much beyond the middle. As shown in the photos on page 17, the hump should also be cleanly separated from that left edge. If you're shooting with your camera in RAW mode (and you should be), an image exposed this way will lend itself well to post-processing and result in a finished photo with a good tonal range. Make a note of the exposure time, ISO and lens aperture. Chances are, these settings will work from the same location most of the time and provide a good starting point should you need to make adjustments.

Remember: For astronomical photographs, keep an eye on the histogram. ✦

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