Text and photography by TONY PUERZER

GET CLOSE WITH A LONG LENS

Recording detailed deep-sky astrophotos requires a boost in focal length

AS FORMER Irish cricketer Alan Lewis once said, "If at first you don't succeed, get a bigger hammer."

Wide-angle lenses are the tool of choice for creating compelling nightscape photos, but if it's deep-sky detail you're after, a telephoto lens excels. Bear in mind, though, that a "bigger hammer" brings challenges as well as advantages.

When it comes to simple shooting, it's hard to beat a wide-angle lens—place your camera on a tripod, and open the shutter. You can take shots of 30 seconds or so without worrying about noticeable star trailing. However, as the focal length of your lens goes up, the Earth's rotation becomes an increasingly significant limitation, restricting exposures to a few seconds or less to preserve pinpoint stars. While short shutter speeds might be sufficient to capture conjunctions of the Moon and planets, photos of galaxies, nebulas and clusters typically require much longer exposures. That means you'll need some way of tracking the stars.

If you own an astronomical telescope on a motorized equatorial mount, you can buy (or make) an inexpensive piggyback adapter that allows your camera to come along for the ride as your scope tracks the stars. Alternatively, assuming your mount has a standard dovetail system, you can simply remove the telescope from the mount and attach your camera via a small aluminum dovetail plate, which can

A TIGHT SQUEEZE Tracking the sky on an iOptron iEQ30 Pro German equatorial mount, an astro-modified Canon EOS 60D DSLR with a Canon EF 300mm f/4L IS USM lens can barely fit the North America and Pelican Nebulas in a single frame. The author made this 6-minute exposure at ISO 1600.

FAMILY PORTRAIT
A couple of the author's favourite lenses for long-focus astrophotography are Canon's EF 85mm f/1.8 USM lens and EF 100mm f/2.8 Macro USM lens. Attached to the camera body is another stellar performer: the Canon EF 300mm f/4L IS USM lens. This trio offers a tremendous range of capabilities.

be purchased from most telescope vendors.

Another route to untrailed stars is to purchase a dedicated, battery-operated, sky-tracking unit. There are a number of different makes and models to choose from, and they tend to be highly portable. (For more about selecting and using a tracker, see my November/December 2016 column "Stop the World…I Want to Take a Photo!")

Either of the above options will allow you to record images for up to a few minutes with a telephoto lens, opening a universe of deep-sky imaging possibilities.

BITS AND PIECES

What should you be looking for in a longer-focal-length lens? I'm a big fan of free. If your camera came with a "kit" zoom lens, try it as a starting point. The main problem here is that inexpensive zooms are fairly slow at the upper end of their focal range—typically, f/5.6 or worse. To successfully record faint targets, optical speed is a key specification. A "fast" lens is one that has a low f-number, which is simply the ratio between the focal length and aperture. For example, a lens of 100mm focal length and an aperture of 50mm is an f/2 optic. Thankfully, you're spared even this basic math since, unlike telescopes, camera lenses are always specified by focal length and maximum aperture.

Unfortunately, high-quality fast lenses aren't cheap. To avoid breaking the bank, look for basic lenses and don't spend extra on features you don't need. A good example is image stabilization, which is a boon for daytime photography, but you'll end up turning it off when photographing stars. Models lacking this feature are generally less pricey. Zoom lenses also tend to be expensive—a couple of fast, fixed-focal-length "prime" lenses (carefully chosen) will cost less and likely perform better. And you can stretch your budget with secondhand lenses—especially older manual-focus models. If you're willing to keep things basic, you'll discover lots of excellent units at a reasonable cost.

FIRST CHOICES

Lenses with a focal length between 35mm and 100mm offer some of the best value on the market today. At the short end of this range, you'll be able to capture entire constellations and the largest deep-sky objects, such as the North America Nebula and Barnard's Loop. As you move up to lenses in the 85-to-100mm range, individual clusters, nebulas and galaxies are within reach. These focal lengths usually lie well within the carrying capacity of portable tracking mounts—a lightweight combination that works perfectly for astrophotographers who travel by air.

Most camera manufacturers make fast prime lenses from 35mm to 50mm focal length at a decent price. This is one of the few categories where you can stick with

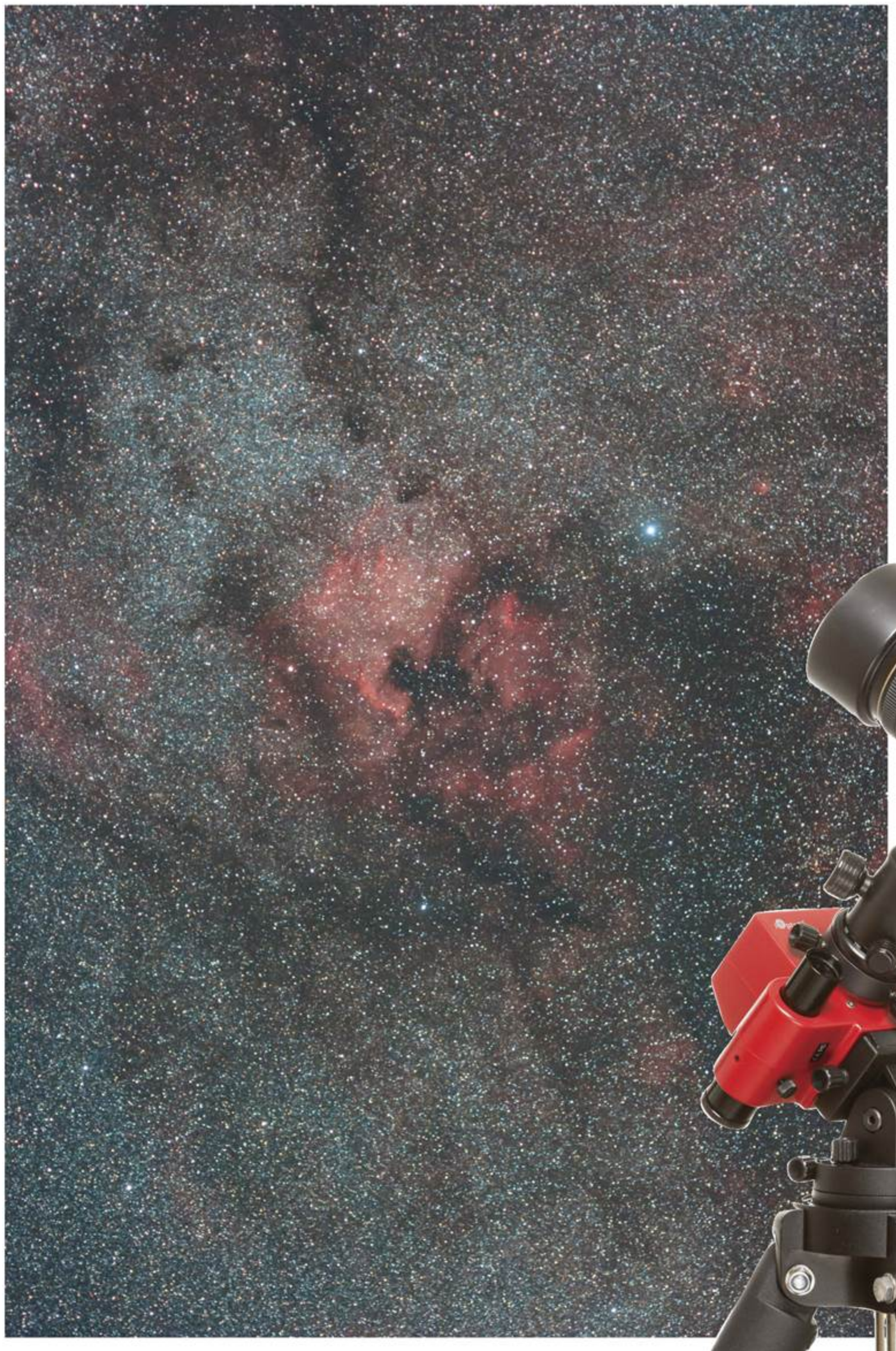
your original camera brand and get a high-quality lens without blowing your budget. Indeed, the Canon EF 50mm f/1.8 STM lens (a.k.a. a "nifty fifty") is the lowest-priced prime lens in their lineup. Nikon also has reasonably priced 35mm and 50mm models. Third-party brands cost even less.

If photographic speed is so important, why not spring for a superfast f/1.4 (or even an f/1.2) prime? True, the specifications are impressive, but such models are best avoided. They're very expensive, and they typically deliver poor off-axis star images—something especially noticeable when used on a full-frame camera. To obtain pinpoint stars, you'll probably need to dial down a stop or two, which completely negates the point of fast optics. You're better off buying an f/1.8 model and pocketing the substantial difference in price.

As you move up into the 80-100mm bracket, you'll encounter a number of excellent options. Prime lenses in this focal length are used extensively in portrait photography, which, like astrophotography, demands sharp, wide-aperture optics. As a Canon user, two of my favourite lenses in this category are the Canon EF 85mm f/1.8 USM and the EF 100mm f/2.8 Macro USM. (Yes, a macro lens can also be great for shooting distant galaxies!) Happily, both models can often be found on the used market at substantial savings.

While most of my recommendations are fixed-focal-length primes, there is one notable exception. Many manufacturers offer extremely high-quality zoom lenses that work from 70mm to 200mm. For example, the Canon EF 70-200mm f/2.8L USM (the version without image stabilization) is excellent for astrophotography. This option isn't cheap, but you can save serious money (and weight) by selecting the f/4 version. In fact, because of its high optical quality and versatility, the f/4 unit is one of my all-time favourites.

SHORT TELEPHOTO The Canon 85mm f/1.8 lens is one of the author's favourite budget-friendly astrophotography options. When mounted on a cropped-sensor camera (such as the astro-modified Canon 60D used here), it offers sky coverage equal to a 136mm lens on a full-frame DSLR. For this 2-minute exposure of the North America Nebula, the camera was set to ISO 3200 with the lens wide open, while an iOptron SkyTracker Pro mount tracked the night sky.



GOING LONG

Prime lenses operating between 135mm and 300mm are some of the most compelling options for astrophotography. They reveal significant detail in many deep-sky targets without needing a heavy-duty mount. Both the Canon EF 135mm f/2L USM lens and the Canon EF 200mm f/2.8L II USM lens are excellent choices. Again, older versions may be available at a hefty discount on the used market.

At the top end of the telephoto range, you'll have to sacrifice some focal ratio to avoid paying astronomically high prices. Instead of f/2.8, think f/4. There are a number of good options. My go-to lens

SKY TRACKER PRO The iOptron SkyTracker Pro, shown here with the author's Canon EOS 60D camera and a 50mm lens, is an ultraportable solution for the travelling astrophotographer.

in this bracket is the Canon EF 300mm f/4L IS USM model. Yes, you'll have to expose longer or bump up the ISO by a stop, but neither adjustment is a deal breaker.

Keep in mind that if your DSLR has an APS-C-sized "cropped" sensor, you'll need to do a little math to figure out the equivalent focal length the lens will yield on your camera. Simply multiply the actual focal length of the lens by your camera's crop factor. In my Canon 60D, the 1.6× crop factor of the sensor means that a 50mm lens provides the same field of view as an 80mm model on my full-frame Canon 6D. For cropped Nikon DSLRs, the conversion factor is 1.5×.

Although using longer lenses presents more challenges than nontracked wide-angle shots, your efforts will be handsomely rewarded with satisfyingly detailed deep-sky images that will impress friends and family—and even readers of this magazine. (Don't forget about our Photo of the Week contest!) ✦

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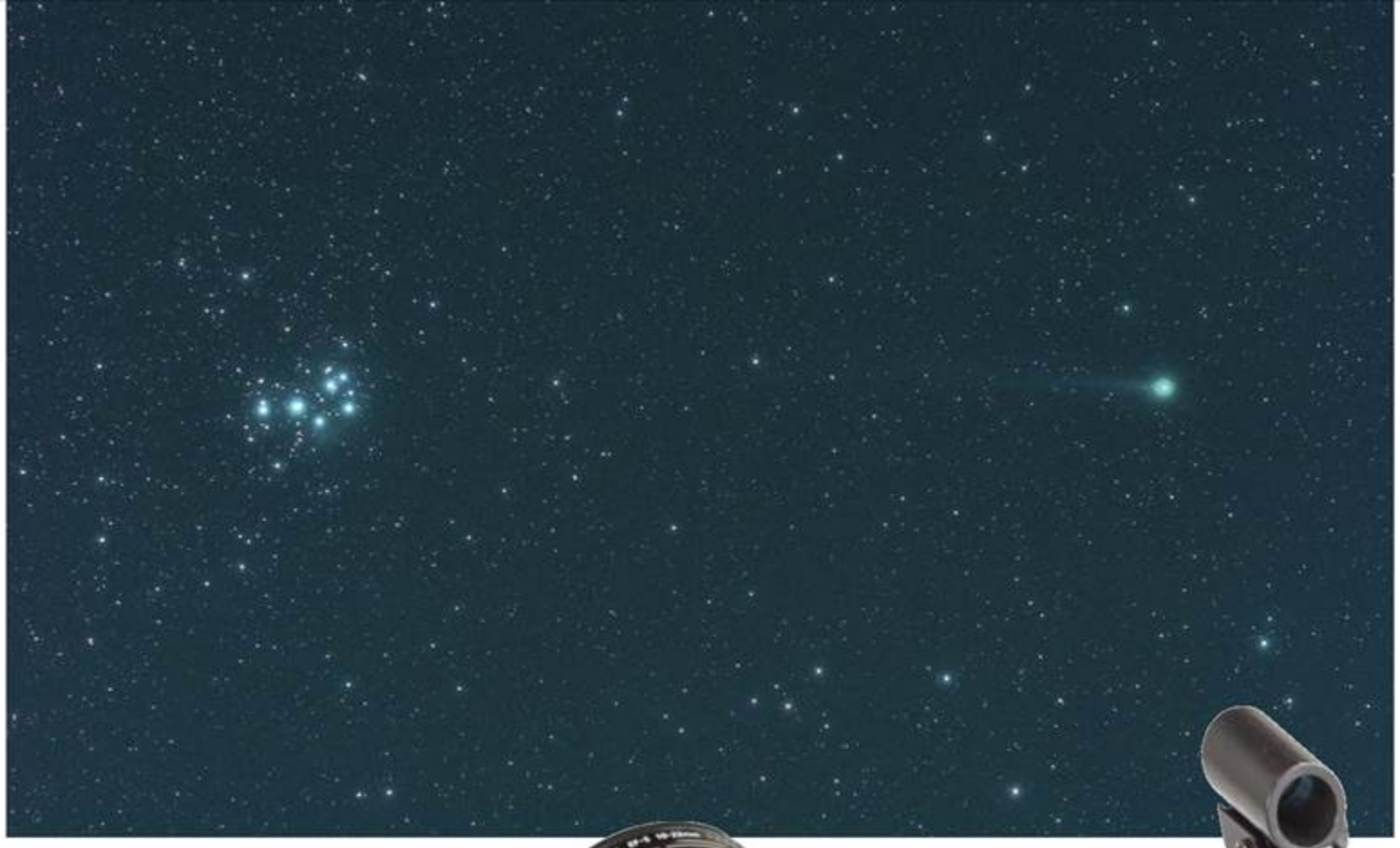

PLEIADES PASSAGE In January 2015, Comet Lovejoy (C/2014 Q2) paired with the Pleiades, above, for a photogenic scene. For this 60-second exposure, the author used a Canon EOS 70D DSLR camera at ISO 1600 with a Canon EF 50mm f/1.4 USM lens set to f/2.8. Right: If your telescope has an equatorial mount, chances are the optical tube assembly can be replaced by a camera via a short dovetail bar. Adding an adapter to mount your finderscope simplifies pointing the camera.