by sue french

Navigating North America

THE NORTH AMERICA NEBULA is one of the most impressive nebulae glowing in our sky. This nebula's remarkable resemblance to the North American continent makes it better known by its common name — bestowed not by a resident of North America, but by German astronomer Max Wolf. In 1890 Wolf became the first person to photograph the North America Nebula, and for many years this remained the only way to fully appreciate its distinctive shape. With today's abundance of short-focal-length telescopes and wide-field eyepieces, we can more readily enjoy this large nebula visually.

Knowing your geography puts you one step ahead in finding your way around this great nebula.

The North America Nebula, **NGC 7000** or Caldwell 20, is certainly easy to locate. Just point your telescope to a spot in the sky about one-quarter of the way from 3.7-magnitude Xi (ξ) Cygni to Deneb. This will put you in the region of the celestial Gulf of Mexico. Be sure to use your lowest-power eyepiece. The nebula spans more than 2°, giving small telescopes a decided advantage. Even with modern eyepieces, large telescopes never show a wide enough field of view and must display the nebula a piece at a time.

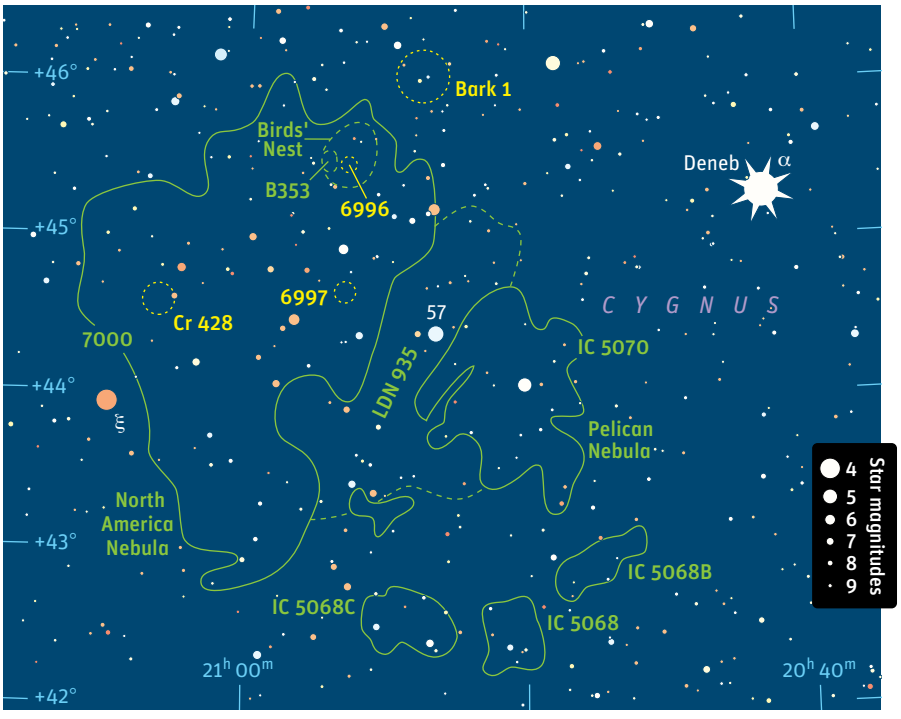
The pencil sketch on the facing page was made from the view through my 4.1-inch (105-millimeter) refractor at 17×. It shows the entire North America Nebula as well as the soft glow of **IC 5070,** the Pelican Nebula, off its East Coast (which lies westward on the sky). I'm often asked if the nebulae really look like this drawing. The answer is *yes* — if you view them the way they were sketched, in the dark with a dim red flashlight. Yet these nebulae aren't difficult to see. I've shared this view with many folks at public star parties. Few have trouble seeing NGC 7000, and most can see IC 5070. A third nebula, shy by nature, occupies much of the field. Do you see it? The Gulf of Mexico and the space between the East Coast and the offshore Pelican are filled by the dark nebula **LDN 935.**

I use a greenish oxygen-III filter to enhance the view at my moderately light-polluted observing site, but a narrowband filter works well too. Folks blessed with darker skies may find a filter unnecessary. Although I didn't try to sketch the wealth of stars that crowd the field, the view is impressive and even contains a few star clusters.

NGC 6997 is the most obvious cluster within the confines of the North America Nebula. To me, it looks as though it's been plunked down on the border between Ohio and West Virginia. Putting 4.8-magnitude 57 Cygni at the western edge of a low-power eyepiece field should bring NGC 6997 into view. My 4.1-inch scope at 17× displays a dusting of very faint stars. At 47×, it's a pretty cluster, rich in faint stars, spanning 10′. Through my 10-inch reflector, I count 40 stars, mostly of magnitude 11 and 12. Many are arranged in two incomplete circles, one inside the other.

Is NGC 6997 actually involved in the North America Nebula? It's difficult to tell because the distances are poorly known. A journal article earlier this year puts NGC 6997 at around 2,500 light-years and adopts a value of approximately 3,300 light-years for the nebula. These figures are higher than those stated in many previous references. If valid, they identify the cluster as a foreground object.

Dave Riddle, an avid deep-sky enthusiast from Georgia, brought the **Birds' Nest** to my attention. It has remained one of my favorite sights in this area ever since. The name comes from a 1927 article in *Popular Astronomy* magazine by Daniel Walter Morehouse. Entitled "A Ring Nebula (Dark) in Cygnus," it discusses an interesting feature visible in photographs of the North America Nebula. Morehouse commented that he had "been referring to this object for a number of years as 'The Birds' Nest' in the 'Hudson Bay' region." With my 4.1-inch scope at 47×, the dark rim of the

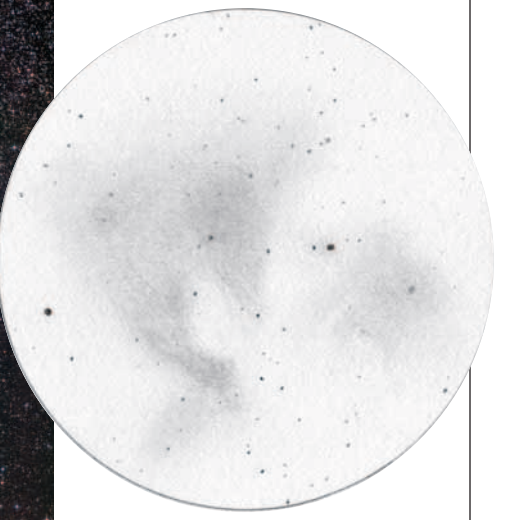


nest is a 23′ oval ring running north-northwest to south-southeast.

The dark nebula **Barnard 353** forms the eastern border of the Birds' Nest, its inkiest section. I count 27 stellar "eggs" filling the interior of the nest. In my 15-inch Newtonian reflector, the center of the nest is crowded with stars. This area, or at least the southern part of it, makes up **NGC 6996,** a concentrated portion of the Milky Way enisled by the dark nebulae surrounding it.

NGC 6997 was discovered by William Herschel and NGC 6996 by his son John, both observing from England two centuries ago. Even though the positions given by father and son were fairly good, the two clusters have frequently been mixed up on atlases and in professional journals. Over the years, such notables as German astronomer Karl Reinmuth, French astronomer Guillaume Bigourdan, and US astronomers Harold Corwin and Brent Archinal have untangled the identifications.

If the Birds' Nest is in Hudson Bay, then **Barkhatova 1** must be somewhere on Baffin Island. A pair of 7th-magni-



Above: For this sketch of a 3.6° field including the North America Nebula, Sue French used a 17× eyepiece on her 4.1-inch Astro-Physics Traveler — the same aperture employed for the digital image at left.

Left: Connecticut amateur Robert Gendler made this mosaic of the North America Nebula and its environs with a Takahashi FSQ-106 f/5 refractor and SBIG STL-11000M CCD camera. North is up, and the field is 5° across. Note the dark oval of the Birds' Nest, 1 to 1½ inches from the top and just left of center. The image combines conventional color frames with others taken in hydrogen-alpha light to bring out fine structure in the nebula's predominantly red emission. For more about the technique, visit www.robgendlerastropics.com.

tude stars conveniently points straight to it, the more distant one golden and the closer one white. At 47×, my 4.1-inch scope shows a pretty dusting of 30 stars, moderately faint to very faint, with the brightest two in the southern part of the cluster. A large oval gap in the eastern side of the group harbors a lone, very faint star. A reddish star sits at the eastern side of Barkhatova 1, and a golden star rests beyond its western border. My 10-inch scope reveals about 60 stars within 20′.

We've visited the East Coast and Canada; now let's move over to northern Idaho, where we find **Collinder 428.** Putting 3.7-magnitude Xi (ξ) Cygni at the southern edge of a low-power eyepiece field should bring this cluster into view. My little refractor displays a dozen faint stars in 12′ with a 7th-magnitude star on the western edge. In my 10-inch reflector, the bright star appears orange and the star count doubles. The cluster looks somewhat like a fragment of the Milky Way isolated by a trapezoid of dark nebulae.

Three challenging patches of nebulosity lie south of the Pelican, roughly where you'd expect to find the northern coast of South America. The central patch is **IC 5068,** faint but definitely visible through my 4.1-inch scope with an O III filter. It looks blocky, with two 9th-magnitude stars in its eastern side: one near the northern corner, the other near the southern. Through my 15-inch scope, the dimensions are about 1/2° north-south and 1/3° east-west. The nebula's brightest star is south of center and shines at 7th magnitude.

Just to the northwest is a swath of nebulosity labeled **IC 5068B** on the software atlas *MegaStar 5.0.* Harold Corwin of the NGC/IC Project (www.ngcic.org) has tentatively identified this as IC 5067. It's just a vague presence in my small scope but fairly bright in the large one. As seen with an O III filter at 57×, it runs southeast to northwest for 3/4° and is one-third as wide. A line of three 7th- through 9th-magnitude stars nearly parallels its northern edge. From east to west, they look blue-white, orange, and yellow when the filter is removed.

A third nebulous mass lies just east of IC 5068, and it is called **IC 5068C** in *MegaStar.* I haven't managed to see this with my small scope, but it's visible in the 15-inch. What size telescope do you need to spot it? IC 5068C is about 25′ across and looks patchy, with a dimmer north-south band west of center. Two 7th-magnitude stars are widely spaced in its southern edge.

When next it's clear and your telescope beckons, why not go out and explore a continent? ✶

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Field of Cygnus's North America Nebula

Object	Type	Magnitude	Size	RA	Dec.	*MSA*	*U2*
NGC 7000	Emission nebula	4	120′ × 100′	20h 58.8m	+44° 20′	1126	32L
IC 5070	Emission nebula	8	60′ × 50′	20h 51.0m	+44° 00′	1126	32L
LDN 935	Dark nebula	—	90′ × 20′	20h 56.8m	+43° 52′	1126	32L
NGC 6997	Open cluster	10	8′	20h 56.5m	+44° 39′	1126	32L
Birds' Nest	Dark neb., starcloud	—	23′ × 18′	20h 56.3m	+45° 32′	1126	32L
Barnard 353	Dark nebula	—	12′ × 6′	20h 57.4m	+45° 29′	1126	32L
NGC 6996	Starcloud	10	5′	20h 56.4m	+45° 28′	1126	32L
Barkhatova 1	Open cluster	—	20′	20h 53.7m	+46° 02′	1106	32L
Collinder 428	Open cluster	8.7	13′	21h 03.2m	+44° 35′	1126	32L
IC 5068	Emission nebula	—	25′	20h 50.3m	+42° 31′	1126	32L
IC 5068B	Emission nebula	—	42′ × 14′	20h 47.3m	+43° 00′	1126	32L
IC 5068C	Emission nebula	—	25′ × 18′	20h 54.2m	+42° 36′	1126	32L

Angular sizes are from recent catalogs; most objects appear somewhat smaller when a telescope is used visually. The right ascension and declination are for equinox 2000.0. The columns headed *MSA* and *U2* give the chart numbers of objects in the *Millennium Star Atlas* and *Uranometria 2000.0,* 2nd edition, respectively.