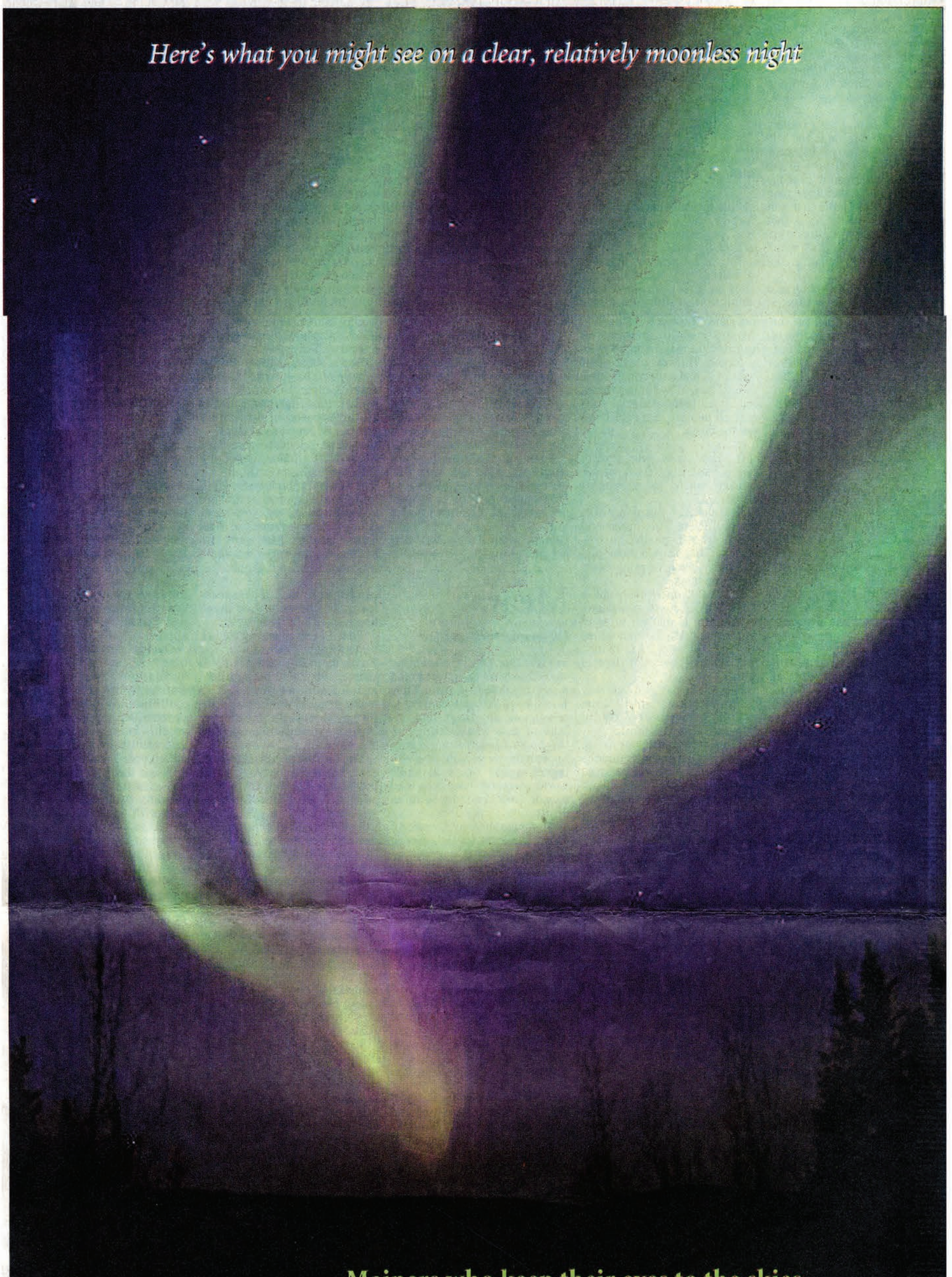

Mainers who keep their eyes to the skies may be treated to the poetry of aurora borealis

night lights

BY BETH PARKS
SPECIAL TO THE NEWS

"What the heck is that, a UFO?" my young passenger exclaimed, pointing to the sky just above the horizon as we headed north on I-95 late one clear autumn evening some years back.

A pale yellow-green light, the shade of a bean sprout just shooting from the soil, danced briefly above the distant line of trees and quickly receded. It rose again, this time fringed along the bottom with violet. Suddenly, a beam of brighter green shot upward.

"It's not a UFO," I replied, excitement creeping into my own voice, "but I bet people are already trying to report it. That's aurora borealis, the northern lights, and you're one of the lucky few here in Maine to see them."

Fortunately, our chances of seeing the northern lights this year are excellent because we are near the peak of an 11-year auroral cycle. Keep your eyes on the night skies and look for what can only be described as poetry in motion.

Here's what you might see on a clear, relatively moonless night, away from the artificial lights of town.

Shortly after dark a diffuse white or green glow appears along the northern horizon. The glowing arc becomes a more distinct band that stretches from west to east, flowing and undulating like a curtain hanging in a gentle breeze. The curtain may begin to twist and fold, swirl and eddy, and then explode with flickering, flashing colors that chase each other across the night sky.

Sometimes spotlightlike streamers and sheaves of quivering rays shoot upward before the whole display softens back into a cloudlike patch and vanishes without a trace. If you're lucky, the pattern will repeat itself later in the night. You may wonder if the glow you see is really the northern lights, or simply a cloud. Here's a tip. You can see stars through an aurora, but a cloud will

See Aurora, Page E2

JAN CURTIS PHOTO

Aurora borealis may initially emerge as a diffuse white or green glow that appears along the northern horizon. The glowing arc becomes a more distinct band that flows and undulates like a curtain blowing in a gentle breeze.

Aurora

Continued from Page E1

appear as a silhouette. You may also confuse a faint auroral arc with the starry stream of the Milky Way.

How the aurora appears to you will depend on your position on the ground relative to its position in the sky. In Maine, we generally see the aurora from the side, much as if we were an audience looking directly at a stage curtain. If the aurora were to move above us, we would be able to see multiple folds as if a set of curtains was hanging overhead.

The most dramatic auroral display, and one that we probably won't see here, is called a corona. A corona is an optical illusion that occurs when we view the northern lights from directly beneath it. It would appear as a sunburst, with rays seeming to come from a single point and shooting out in all directions.

The aurora is a solar-powered light show, nature's own neon sign high above the Earth, and here's how it happens.

Electrically charged particles from the outermost layer of the sun flow out into space in all directions. Called the solar wind, this plasma travels the 93 million miles to Earth in about two to four days.

Think of the Earth as a big ball of clay with a bar magnet imbedded in it. If you've ever sprinkled iron filings on a bar magnet covered with a piece of paper, you know that the filings line up along the lines of force drawn between the north and south poles. The same thing happens around the Earth.

The Earth's magnetic field tends to prevent the charged particles, or ions, from entering the atmosphere. Most of the ions simply flow around the Earth like water around a rock in a stream. However, some of the particles get trapped in eddies and enter the Earth's atmosphere along disrupted magnetic lines somewhere near the north and south poles.

So yes, there are two auroras, or more properly, aurorae. Called aurora borealis and aurora australialis, they take their name from Aurora, Roman goddess of the dawn. Boreal is the Latin word for north and australialis means south, so we have the northern and southern "dawns," or lights.

The vertical rays of each auroral oval line up with the Earth's magnetic field lines. The inner portions of the ovals are dark, as the lights do not occur directly over the poles. If you were able to see the northern and southern lights at the same time, one would appear to be a mirror image of the other.

Auroral light is produced when ions strike gas atoms in the Earth's atmosphere. It is sort of like a giant pinball machine in which the targets light up when speeding balls hit them. Each gas glows with a different color, so the types of gas in the atmosphere determine the colors you see.

The green at the bottom of auroras comes from oxygen at about 60 miles above the Earth. The red at the top of the displays, as well as the rare all-red auroras, comes from oxygen at elevations between 180-240 miles. Oxygen glows in two different colors because the atmosphere is more dense at the lower elevation and less dense at the higher one.

Blue light comes from ionized nitrogen molecules, while the purplish-red and violet lights that glow along the curtain's lower border are produced by nitrogen molecules that carry no electrical charge. Various hues and shades arise when the basic colors blend together within the dancing array.

The auroral movement is an illusion, the kind you get when lights blinking in sequence seem to form letters that race across the face of an electrical sign and disappear around its edge.

The earth's magnetic field influences the discharges of auroral light in a way that simply mimics motion.

Earth isn't the only planet in our solar system to have auroras, by the way. Jupiter, Saturn and Uranus all have pale red auroras because of hydrogen in their outer layers.

To put the elevations of Earth's auroras in perspective, it would take you an hour to drive a car at 60 miles per hour from this planet's surface to reach the bottom of the lights. That's about 10 times higher than a jet aircraft flies. It would take you another three hours to reach the top of the rays. That's more than half the altitude at which the space shuttle usually orbits.

If you were traveling high above the Earth, auroras would appear as broken oval crowns of light around the north and south poles, with the earth rotating slowly beneath them.

The crowns would look a little lopsided because they roughly circle the Earth's magnetic poles. These are the poles we can find with a compass, not the geographical poles around which the Earth rotates.

The auroral oval in the Northern Hemisphere passes through Alaska, northern Canada, southern Greenland, the northern coast of Norway and off the arctic coast of Siberia.

If you lived near the auroral oval, you would be able to see the northern lights almost every cloudless night from autumn to spring. They wouldn't be visible in the summer, though, because round-the-clock sunlight would blot them out.

You might catch a glimpse of the northern lights on a nighttime transatlantic flight between the United States and Europe.

We actually see more northern lights on the ground here in the U.S. than our counterparts at the same latitudes in Europe because the north magnetic pole is located near Greenland.

Fortunately, for those of us who live farther south in the United States, the auroral oval sometimes expands. Think of it as a headband that stretches and slips down over your forehead.

Expansions tend to happen more often around the fall equinox in late September and the spring equinox in late March.

If you live near Bangor, auroras normally occur about 33 nights a year. You would have to stay up all night every night to see that many, however, and all of those nights would have to be clear. If people in Boston could get away from the pollution of city lights and all the nights were cloudless, they could probably see the aurora about 10-18 times a year. Folks living in Mexico or the Caribbean might only get to see the northern lights once a century.

In maximum sunspot years, and we're in them now, the auroras become more frequent. When huge explosions called solar flares happen on the surface of the sun, strong auroras tend to occur across the United States a couple of days later. This October has already been a good month for aurora predictions.

While scientific descriptions may glaze your eyes, you can still be mesmerized by the raw beauty of the aurora. Poet Robert W. Service captured their splendor in his "Ballad of the Northern Lights":

And the skies of night were alive with light, with a throbbing thrilling flame;
Amber and rose and violet, opal and gold it came.
It swept the sky like a giant scythe, it quivered back to a wedge;
Argently bright, it cleft the night with a wavy golden edge.

So join the ranks of polar bears and penguins, scientists and poets, and keep your eyes on those night skies. And don't forget to set your alarm clock.

Beth Parks lives in the Gouldsboro village of Corea and works as an educator at the Penobscot County Extension office in Bangor.

Tips and facts

• Visit the University of Alaska Fairbanks Web site for the Geophysical Institute and register for the automatic Aurora Alert e-mails. The address is http://www.gi.alaska.edu/mailman/listinfo/gseaa, and the mailings are safe and secure.

• The most dazzling auroras generally happen between 10 p.m. and 2 a.m., with the best viewing time usually around midnight. Midnight means astronomical midnight, so be sure to adjust for daylight savings time.

• To photograph the aurora, you'll probably have the best luck using a 35mm camera with a fast film of 400 ASA or more. Slide film produces better colors than print film. You'll get the sharpest photos of bright auroras if you use 50-200 ASA, but you'll need to make time exposures using a tripod. Remember that the apparent auroral motion and the Earth's rotation on its axis will produce blurs and star tracks in the longer exposures.

• Forget about using a video camera to film the northern lights. Your best bet is to purchase a professionally filmed video, as most camcorders aren't sensitive enough to capture more than faint, smoky images. You can purchase two superb videos, "The Aurora Explained" and "Aurora," from the Geophysical Institute at the University of Alaska Fairbanks for $20 each, plus $5 postage. Visit www.gi.alaska.edu/pfrr. Click on "Aurora Information" and then on "Aurora Videos" for ordering information. Or contact the Geophysical Institute at 930 Koyukuk Drive, P.O. Box 757320, University of Alaska, Fairbanks, AK 00775-7320. Tel: 907-474-7487 or 907-474-6960. Fax: 907-474-2645.k

• You also might try to hear the lights. Some folks swear they hear a quiet swish or a faint crackling noise when auroral rays or coronas are directly overhead. Although they say the sounds are synchronized with the displays, the noises seem to disappear when the viewers close their eyes. Scientists don't understand why this occurs. The atmosphere where auroras occur is too thin to carry sound and, even if the aurora makes such sounds and they could be carried, it would take several minutes for them to reach the Earth. To date, no one has recorded auroral sounds.

• Before scientists began unraveling the mysteries of the aurora, people used their imaginations to explain what they saw in the sky. Eskimo folklore holds that the aurora are the spirits of the dead playing ball with the skull of a walrus, or torches held by spirits to guide souls into a land of plenty. If you whistle at the lights, one story goes, they will swoop down and get you. Finnish folklore calls the lights "foxfires," claiming they are sparks flying from the fur of foxes running along mountain ridges far to the north.

• Viewers may also misinterpret what they see. A common misconception is that the lights are the result of sunlight reflecting off ice crystals in the atmosphere. Roman soldiers actually marched toward a rare red aurora, thinking it was the fire of a distant battle. Some people living in the Dark Ages thought that blood-red auroras foretold famine or death, or even signaled the end of the world.

• Despite the fantastic stories they spur, and as lovely as they are to watch, auroras also have their downside. Their enormous electrical energy can garble radio and satellite transmissions and interrupt radio and TV broadcasts. They can also interfere with navigation and set up currents in power lines to the extent that they knock out entire system generators. When engineers designed the trans-Alaska oil pipeline, incidentally, they were careful to take the corrosive effects of the aurora into account.