



# *the Heavens*

A DIFFERENT VIEW

Danny Faulkner

*General Editor*

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## ACKNOWLEDGEMENTS

This book would not be possible without the kind contributions of photographs from several people. While I retain copyright of the text and my photographs, the creators of the respective photographs retain the copyrights to their work.

## DEDICATION

To Tom Vail, who, by publishing *Grand Canyon: A Different View*, inspired me to write this book. Furthermore, by making me part of Canyon Ministry's raft trips in the Grand Canyon, Tom made it possible for me to take some of these photos. Thank you very much, my friend.

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I think that astronomy is a special science, a sort of bridging of art and science. Of course, as an astronomer, I may be biased.

The Bible singles out things astronomical to underscore that there must be a Creator.

THE HEAVENS DECLARE THE GLORY OF GOD,  
AND THE SKY ABOVE PROCLAIMS HIS HANDIWORK.

Psalm 19:1

WHEN I LOOK AT YOUR HEAVENS,  
THE WORK OF YOUR FINGERS,  
THE MOON AND THE STARS,  
WHICH YOU HAVE SET IN PLACE,  
WHAT IS MAN THAT YOU ARE MINDFUL OF HIM,  
AND THE SON OF MAN THAT YOU CARE FOR HIM?

Psalm 8:3-4

There is something about the human soul that is in wonder of the heavens above. This contemplation ought to lead us to consider our Creator. More importantly, it should prompt us to ask the big questions about life — who we are, where we came from, and where we are going.

*Thor's Helmet, NCG 2359 (Glen Fountain) ◀*

*Horsehead Nebula (Glen Fountain) ▶*

# Introduction


While this general revelation from the world around us can convince us that there is a God, it is inadequate to tell us all that we need to know. For all we need to know about God, we must turn to His special revelation, the Bible.

FOR WHAT CAN BE KNOWN ABOUT GOD IS PLAIN TO THEM, BECAUSE GOD HAS SHOWN IT TO THEM. FOR HIS INVISIBLE ATTRIBUTES, NAMELY, HIS ETERNAL POWER AND DIVINE NATURE, HAVE BEEN CLEARLY PERCEIVED, EVER SINCE THE CREATION OF THE WORLD, IN THE THINGS THAT HAVE BEEN MADE. SO THEY ARE WITHOUT EXCUSE.

Romans 1:19-20








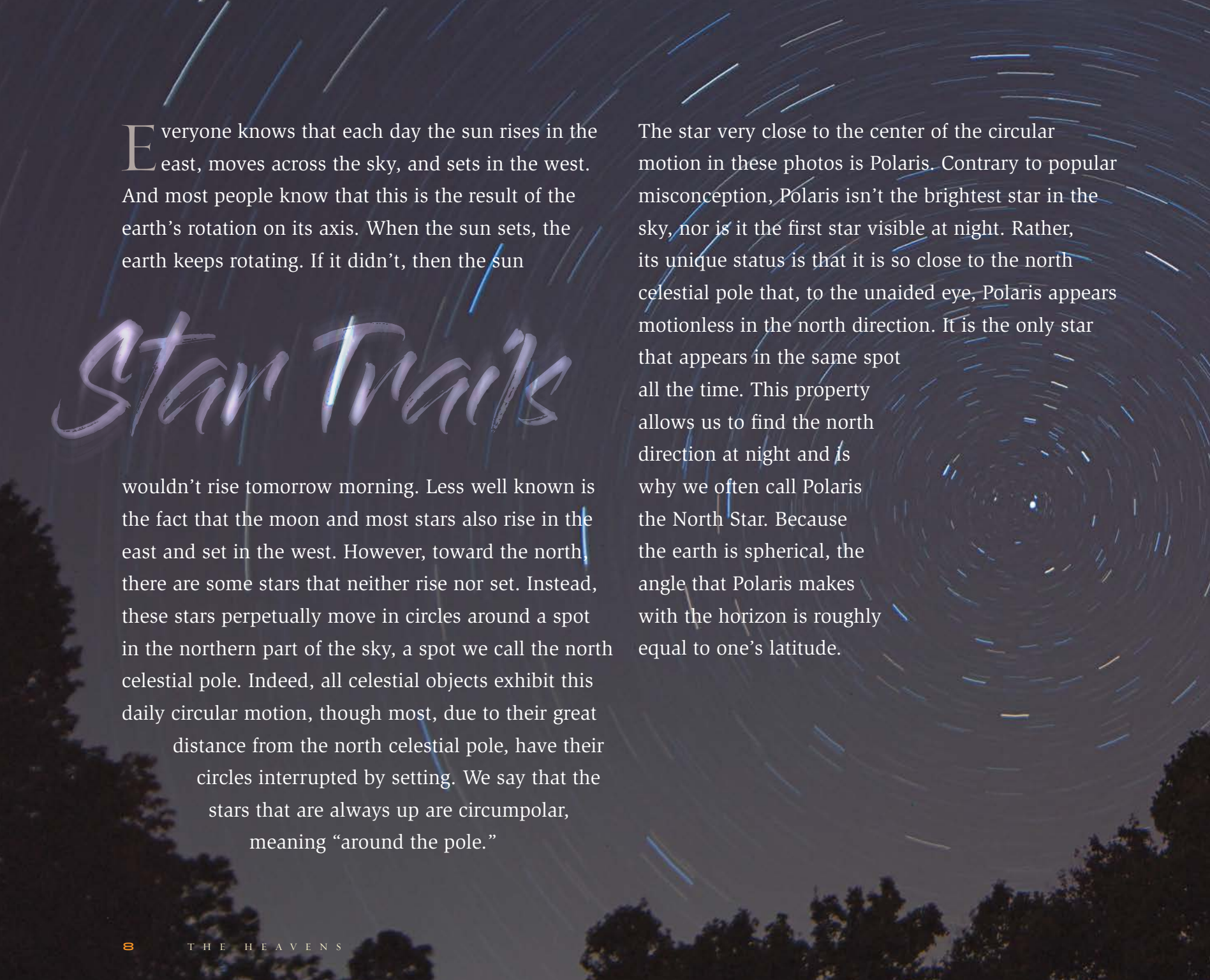
Astrophotography (photography of astronomical bodies) has come a long way. Most astronomical objects are very faint, requiring long exposure times to capture them in photographs. For many years, astrophotos were taken with photographic emulsions (film). Modern electronic cameras are at least 50 times more sensitive than old emulsions. What used to take a minute exposure now can be done in a second. A minute exposure now captures what took an hour in the past. The quality and size of telescopes available to amateurs

have improved tremendously. And then there is Adobe Photoshop and other electronic aids and techniques that can greatly enhance astrophotos. Consequently, amateur astronomers now can take photographs that only professional astronomers could do a few decades ago. There is a downside to this — the eye can collect light for only a tiny fraction of a second. When looking through a telescope, many people expect galaxies and other faint objects to look exactly as what they see in photographs. As a result, most people aren't very



impressed when seeing a faint blob of light through a telescope. It helps to explain that they might be looking at the combined light of hundreds of billions of stars in a galaxy that is many millions of light years away.

In this book I share some of my astrophotos, along with many others that a few amateur astronomers have taken. It is our pleasure to share with you the beauty and wonder of the creation as captured by our work. But, more importantly, it is our desire that these photos draw you closer to our Creator.

A long-exposure photograph of a night sky showing star trails as concentric circles. The trails are most prominent on the right side of the image, where they form a dense, circular pattern. The left side shows more linear trails. A dark silhouette of a tree is visible in the bottom left corner. The overall color palette is dark blue and black, with the star trails appearing as streaks of white and light blue.

Everyone knows that each day the sun rises in the east, moves across the sky, and sets in the west. And most people know that this is the result of the earth's rotation on its axis. When the sun sets, the earth keeps rotating. If it didn't, then the sun

## Star Trails

wouldn't rise tomorrow morning. Less well known is the fact that the moon and most stars also rise in the east and set in the west. However, toward the north, there are some stars that neither rise nor set. Instead, these stars perpetually move in circles around a spot in the northern part of the sky, a spot we call the north celestial pole. Indeed, all celestial objects exhibit this daily circular motion, though most, due to their great distance from the north celestial pole, have their circles interrupted by setting. We say that the stars that are always up are circumpolar, meaning "around the pole."

The star very close to the center of the circular motion in these photos is Polaris. Contrary to popular misconception, Polaris isn't the brightest star in the sky, nor is it the first star visible at night. Rather, its unique status is that it is so close to the north celestial pole that, to the unaided eye, Polaris appears motionless in the north direction. It is the only star that appears in the same spot all the time. This property allows us to find the north direction at night and is why we often call Polaris the North Star. Because the earth is spherical, the angle that Polaris makes with the horizon is roughly equal to one's latitude.



The north celestial pole isn't visible from the earth's Southern Hemisphere. Instead of spinning around the north celestial pole in the northern part of the sky, stars in the Southern Hemisphere appear to spin around the south celestial pole in the southern part of the sky. But, unlike in the Northern Hemisphere, where the stars appear to spin counterclockwise, stars in the Southern Hemisphere appear to spin clockwise. Furthermore, there is no bright star close to the south celestial pole. Therefore, there is no "south star."



- ▲ *Star trails over the Blue Ridge Mountains of North Carolina* (Danny Faulkner)
- ▲ *Star trails* (Jim Bonser)
- ▲ *Star trails over Grand View Camp, Eagar, Arizona* (Danny Faulkner)





AND GOD SAID, "LET THERE BE LIGHTS IN THE EXPANSE OF THE HEAVENS TO SEPARATE THE DAY FROM THE NIGHT. AND LET THEM BE FOR SIGNS AND FOR SEASONS, AND FOR DAYS AND YEARS, AND LET THEM BE LIGHTS IN THE EXPANSE OF THE HEAVENS TO GIVE LIGHT UPON THE EARTH." AND IT WAS SO. AND GOD MADE THE TWO GREAT LIGHTS — THE GREATER LIGHT TO RULE THE DAY AND THE LESSER LIGHT TO RULE THE NIGHT — AND THE STARS.


Genesis 1:14-16

*Star trails over the Creation Museum (Deb Bonser)* ▲

*Star trails over the Ark Encounter (Jim Bonser)* ▲







The Milky Way is a faint band of light extending across the sky. Most people never fully appreciate the Milky Way because city lights usually overwhelm the Milky Way's dim glow. Even the light of the moon hampers the view of the Milky Way. People in the past probably enjoyed the Milky Way far more than we do today. With no artificial lights, the Milky Way would have been prominent on many

## *the Milky Way*

clear, moonless nights. Furthermore, without electricity, there was no TV or lights to keep people occupied inside at night. When not sleeping, people probably were driven outside on warm summer evenings, when the Milky Way is most prominent, at least in the Northern Hemisphere. I enjoy taking photographs of the

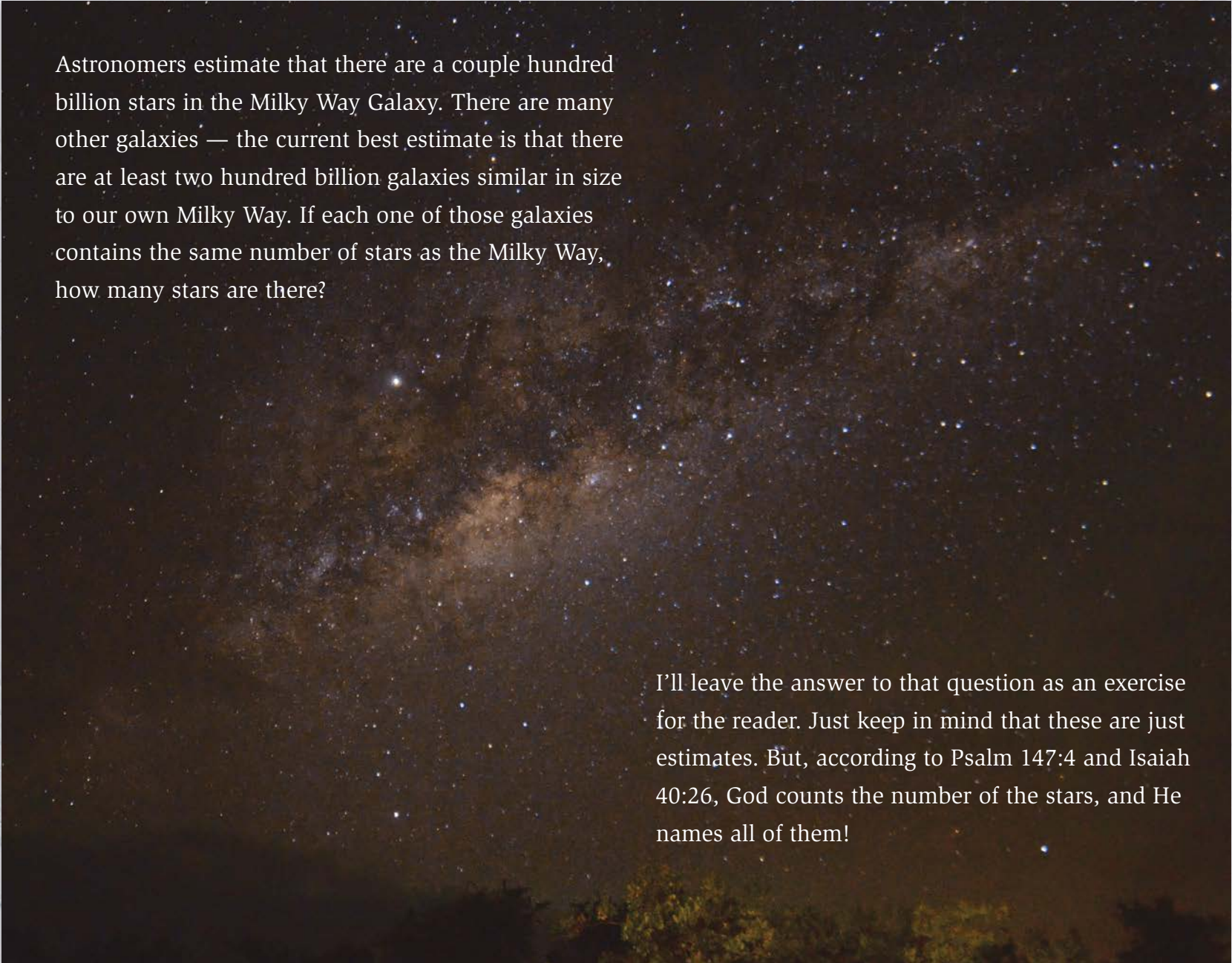


Milky Way in late summer and early autumn, when its most intense part seems to make the best “pose” with objects on the horizon as it sets. Notice the dark lanes in the Milky Way. These are caused by large clouds of dust blocking the view of more distant stars.

The Milky Way is our galaxy, a vast collection of billions of stars held together by gravity. The galaxy is round and flat with a bulge in its center, sort of like an over-easy egg. Coming off the nuclear bulge are graceful spiral arms. The spiral arms contain much dust and gas, along with many bright stars. The sun is located outside of a spiral arm, about halfway from the center to the edge. The diameter of the Milky Way is about 100,000 light years, so the sun is about 25,000 light years from the center. On summer and early autumn evenings in the Northern Hemisphere, the central bulge of the Milky Way is visible.



- Summer Milky Way showing nuclear bulge near trees (Danny Faulkner)
- ◀ View of the summer Milky Way from the Grand Canyon. The bright star is Jupiter. (Danny Faulkner)



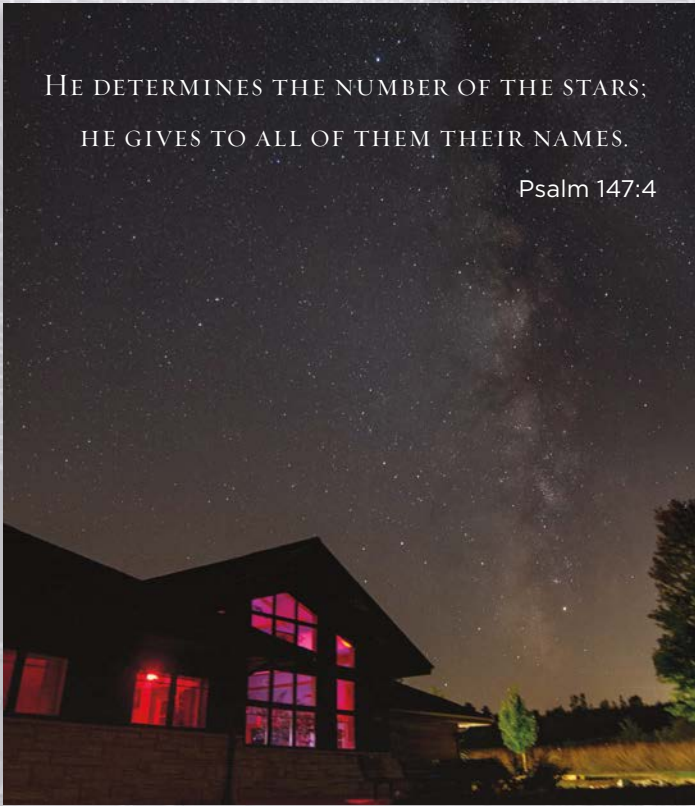
Astronomers estimate that there are a couple hundred billion stars in the Milky Way Galaxy. There are many other galaxies — the current best estimate is that there are at least two hundred billion galaxies similar in size to our own Milky Way. If each one of those galaxies contains the same number of stars as the Milky Way, how many stars are there?

I'll leave the answer to that question as an exercise for the reader. Just keep in mind that these are just estimates. But, according to Psalm 147:4 and Isaiah 40:26, God counts the number of the stars, and He names all of them!



HE DETERMINES THE NUMBER OF THE STARS;  
HE GIVES TO ALL OF THEM THEIR NAMES.

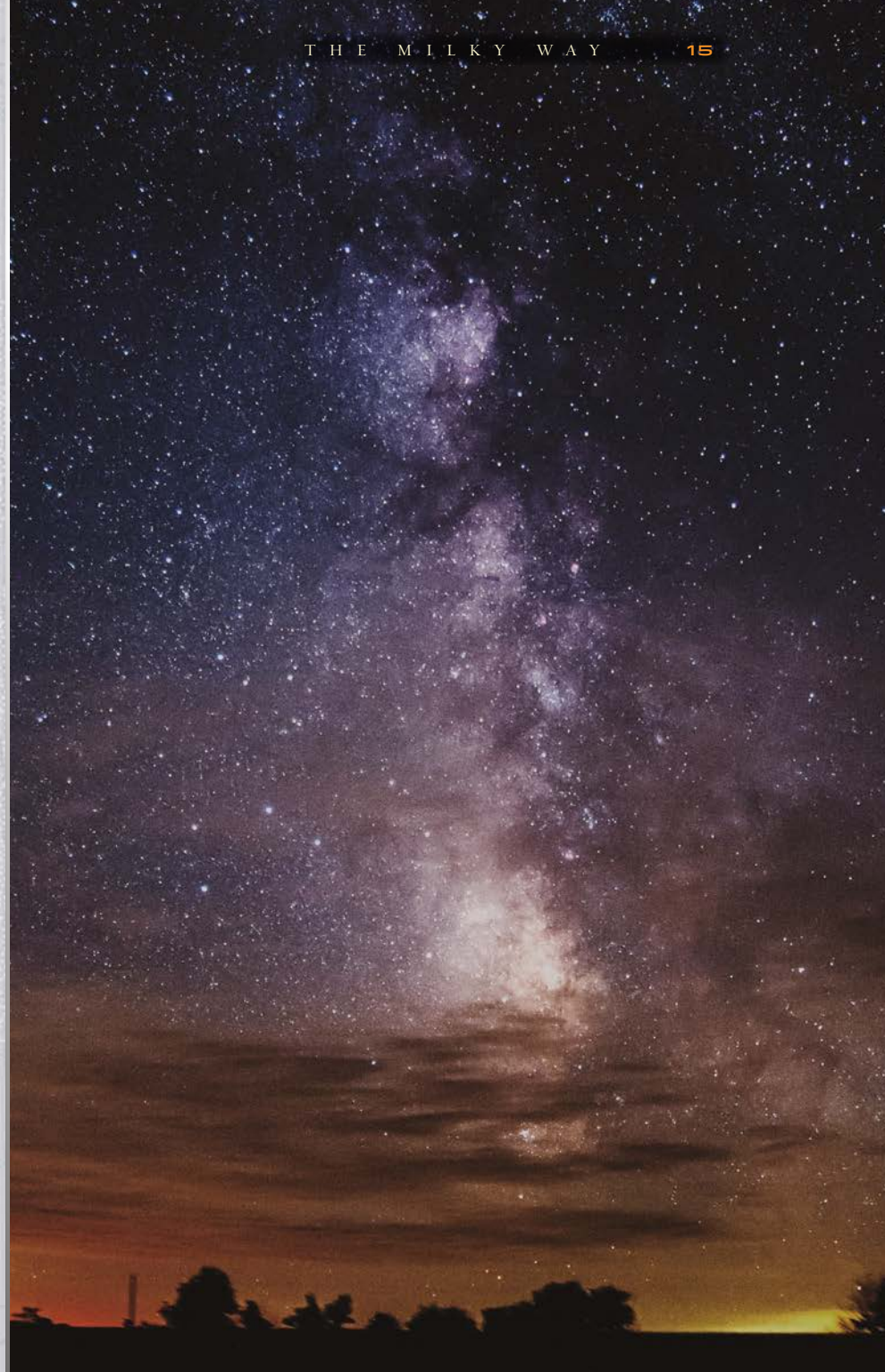
Psalm 147:4



LIFT UP YOUR EYES ON HIGH AND SEE:  
WHO CREATED THESE?  
HE WHO BRINGS OUT THEIR HOST BY  
NUMBER, CALLING THEM ALL BY NAME;  
BY THE GREATNESS OF HIS MIGHT  
AND BECAUSE HE IS STRONG IN POWER,  
NOT ONE IS MISSING.

Isaiah 40:26

- ▲ Milky Way (Jim Bonser)
- ▶ Milky Way (Jim Bonser)
- ◀ Center of the Milky Way with a few clouds (Danny Faulkner)







The Andromeda Galaxy (M31, or NGC 224) is the closest galaxy of any size. On a clear, dark autumn evening, it is easy to spot M31 in the constellation Andromeda. About  $2\frac{1}{2}$  million light years away, the Andromeda Galaxy is thought to be slightly larger than the Milky Way.



- ▲ M31 (Jim Bonser)
- ▲ M31 (Glen Fountain)

# Galaxies

The Andromeda Galaxy also contains more stars than our Milky Way Galaxy does. In either photo, notice the two satellite galaxies — M32 (NGC 221) above the center of M31, and M110 (NGC 205) to the lower left of the center of M31. Smaller satellites of larger galaxies are common.





*The two largest satellite galaxies of the Milky Way. The Large Magellanic Cloud (LMC) is the nebulosity just to the right of center. The Small Magellanic Cloud (SMC) is the smaller nebulosity below and slightly to the right of the LMC, near the trees. The Milky Way is to the left.*  
(Danny Faulkner)



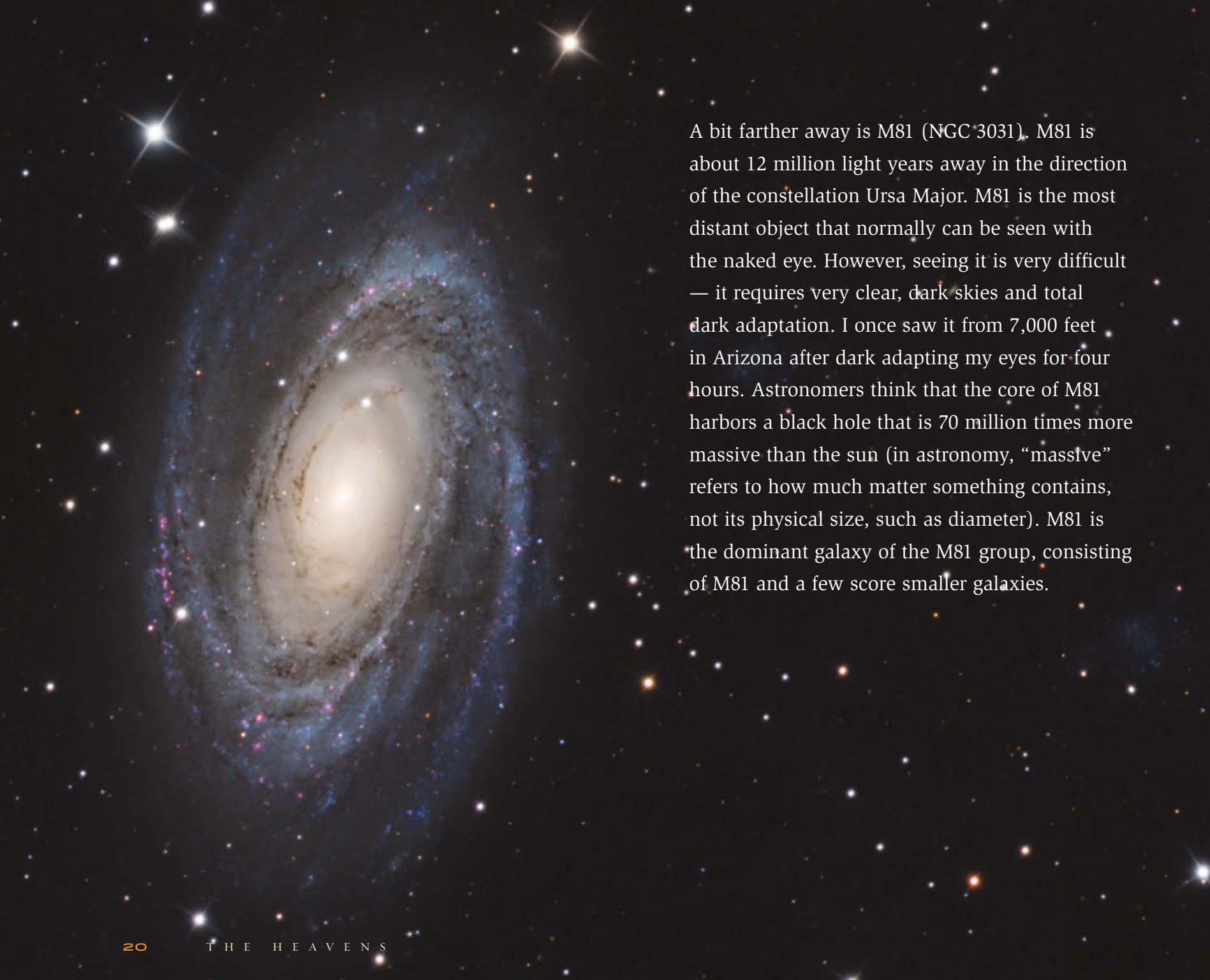
For instance, the Milky Way has two satellite galaxies, the Large Magellanic Cloud (LMC) and the Small Magellanic Cloud (SMC) (NGC 292). However, the LMC and SMC are near the south celestial pole, so they aren't visible from much of the Northern Hemisphere.

M31 is the largest galaxy in the Local Group, a small collection of galaxies consisting of M31, the Milky Way,

M33, and about 50 dwarf galaxies. M33 (NGC 598) is sometimes called the Triangulum Galaxy because of its location in the direction of the constellation Triangulum. M33 is thought to be a little farther away than M31, perhaps as much as three million light years. M33 is quite a bit smaller, fainter, and contains fewer stars than the two other large galaxies in the Local Group.



► M33 (Glen Fountain)



A bit farther away is M81 (NGC 3031). M81 is about 12 million light years away in the direction of the constellation Ursa Major. M81 is the most distant object that normally can be seen with the naked eye. However, seeing it is very difficult — it requires very clear, dark skies and total dark adaptation. I once saw it from 7,000 feet in Arizona after dark adapting my eyes for four hours. Astronomers think that the core of M81 harbors a black hole that is 70 million times more massive than the sun (in astronomy, “massive” refers to how much matter something contains, not its physical size, such as diameter). M81 is the dominant galaxy of the M81 group, consisting of M81 and a few score smaller galaxies.



Much farther out is NGC 2903. It is about 30 million light years away in the direction of the constellation Leo. All the large galaxies that we've seen thus far are spiral galaxies — flat, round distributions of stars with central bulges from which spiral arms gracefully flow outward. However, NGC 2903 sports a modest bar across its nucleus, from which spiral arms are attached. In recent years, astronomers have come to realize that our own Milky Way Galaxy has a small bar across its nucleus as well. However, the dust between us and the galactic center dust prevents us from seeing this bar.



- ▶ NGC 2903, *top* (Glen Fountain)
- ▶ NGC 2903, *bottom* (Jim Bonser)
- ▶ M81 (Glen Fountain)

# The Heavens Declare: A Different View



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