

THE SPACE BOOK

Activities for Experiencing the
Universe and the Night Sky

MARC McCUTCHEON



John Wiley & Sons, Inc.

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THE SPACE BOOK

*Our universe is a
sorry little affair
unless it has in it
something for every
age to investigate. . . .
Nature does not
reveal her mysteries
once and for all.*

Seneca, *Natural Questions*,
Book 7 (first century)

Introduction

Gaze up into the night sky and what do you see? Stars, of course. But what are stars? If you lived in ancient times, you may have believed they were drops of milk, red-hot stones, or heavenly torches in the sky.

Today we know they're gigantic balls of gas, just like our Sun. In fact, stars are just that—suns. They look small to us only because they are so very far away.

Not all stars are alike. Shimmering yellow. Blazing blue. Scintillating red. They may be as small as a city or, in some cases, hundreds of times as large as our own Sun.

Some “dead” stars are actually invisible. On these lifeless cinders, gravity is so powerful that even light is unable to escape.

To the casual observer, the night sky is remarkably deceptive. Sometimes objects that look like stars are not stars at all, but planets. The planets Mars, Venus, Jupiter, and Saturn often look like the brightest “stars” in the sky. But planets are actually much smaller than most stars, and they don't generate their own light like stars do. Instead planets shine because the light from our Sun is reflected off their surfaces, just like our Moon.

Still other starlike objects are neither stars nor planets, but galaxies. Galaxies are gatherings of millions and even billions of suns. To the naked eye or under low resolution through a telescope, they may appear only as dim, fuzzy lights. Peer through a

stronger telescope, however, and you may see something truly spectacular.

And look up there. What's that light moving across the sky? A comet? A meteor? A satellite? An alien spaceship?

In space there is just so much to see and explore, so much to marvel over and wonder about.

The cosmos. The universe. The great beyond. It doesn't matter what we call it. Words will never adequately describe it. For it is a tantalizing and largely unexplored mystery, a treasure box full of surprises and weirdness just waiting for us to open and study it.

It's only possible to understand space a little bit at a time. Thus we'll begin our exploration in our own backyard: the planets and satellites of our solar system. From there we'll venture out into the vast regions of our universe. By the end of our journey, we still won't know all there is to know about space. That's because so much of it is yet to be discovered and explored.

Scientists say it's a place that may go on forever. Forever.

Can you imagine a place that never ends? A place in which you can travel at the speed of a flashlight beam for a billion years and still not arrive anywhere near its edge?

If only one place deserves to be described as awesome, this is it.

Space.

Let's go.



Part I

EXPLORING OUR SOLAR SYSTEM

Pack a big lunch. Put on your spacesuit and helmet. Say goodbye to your family. We're about to take a tour of the universe—starting with our solar system—and we may not be back for a while. The **solar system** is made up of the Sun and all the planets, moons, asteroids, comets, and debris that orbit around it.

Step into our flight deck and strap in. Comfy? You'd better be. You're going to be in this chair for a loooooooooooooonnnnnng time.

The spaceship we'll be riding in today is no ordinary rocket. It's capable of traveling faster than the speed of light. The speed of light is 186,000 miles (300,000 km) per second. No spaceship humans have ever designed can go anywhere near this fast. Nor, say scientists, is such a feat even possible. Yet space is so incredibly vast that anything slower would take an eternity to get us to where we need to go. (Today's fastest spaceships would take 40,000 years to reach the nearest star.) Our ship, then, is powered by a fuel called imagination.