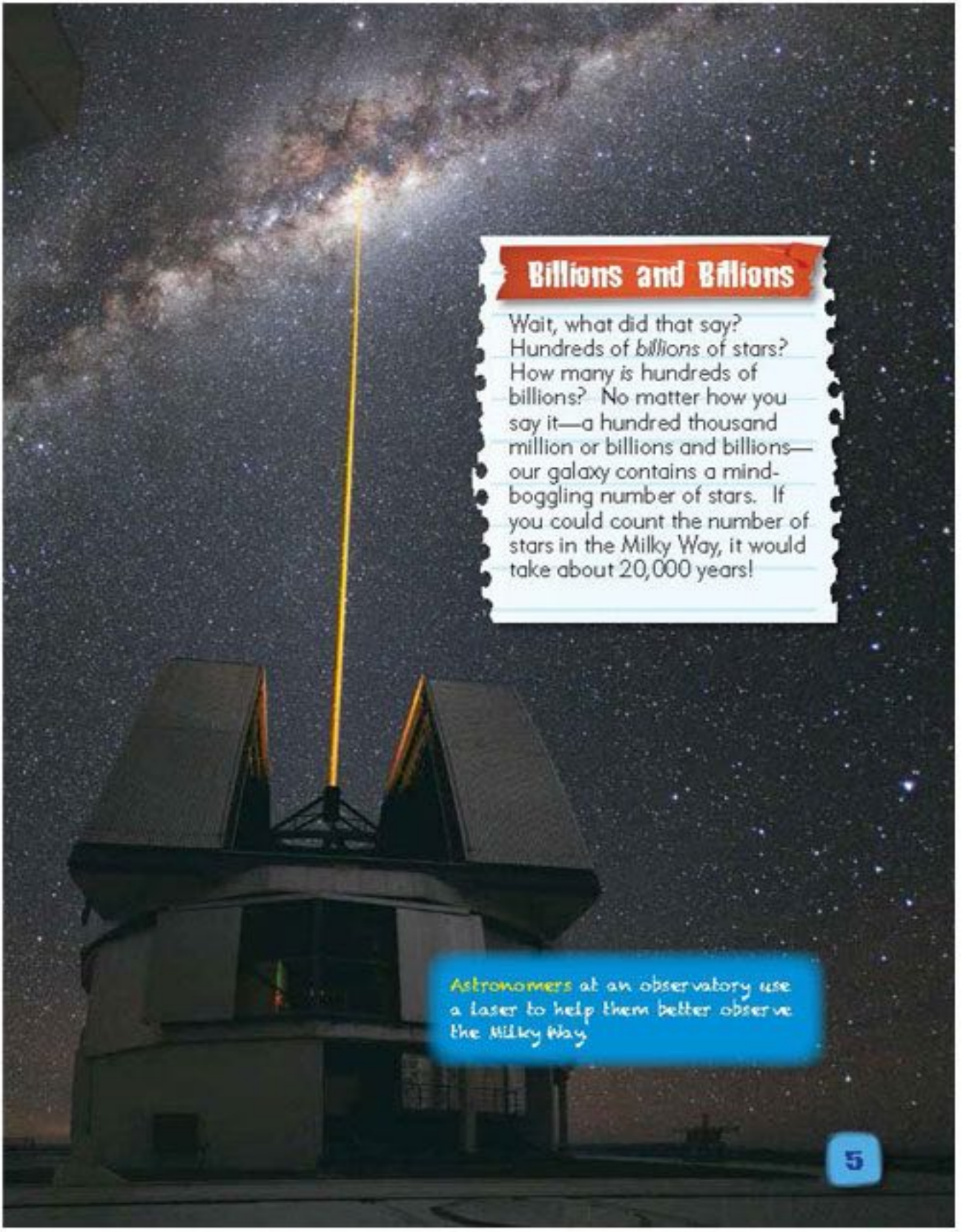
Our Place in Space

Have you ever seen a band of cloudy starlight stretching across the night sky? If you have, then you are lucky! Often, streetlights, car lights, and building lights drown out this beautiful starlight, making it impossible to see. But it's out there. It's made of hundreds of billions of **stars**, swirling in outer space. What is it? It's a **galaxy**. But it's not just any galaxy. It's our galaxy—the Milky Way.

The Milky Way galaxy is our home, our neighborhood in space. The people of ancient Greece thought it looked like spilled milk. So they named that band of starlight *Galaxies Kuklos*, which means "Milky Circle." The word *galaxy* comes from the Greek word, *galactos*, which means "milk." The Romans called it *Via Lactea*, which means "Milky Road," or "Milky Way." No matter how you say it, the Milky Way is an amazing sight. People in every culture have wondered about it throughout time. We now know more about our galaxy than ever before.

Many universities have observatories that you can use during public viewing times. Observatories have large telescopes that offer amazing views of objects in space.



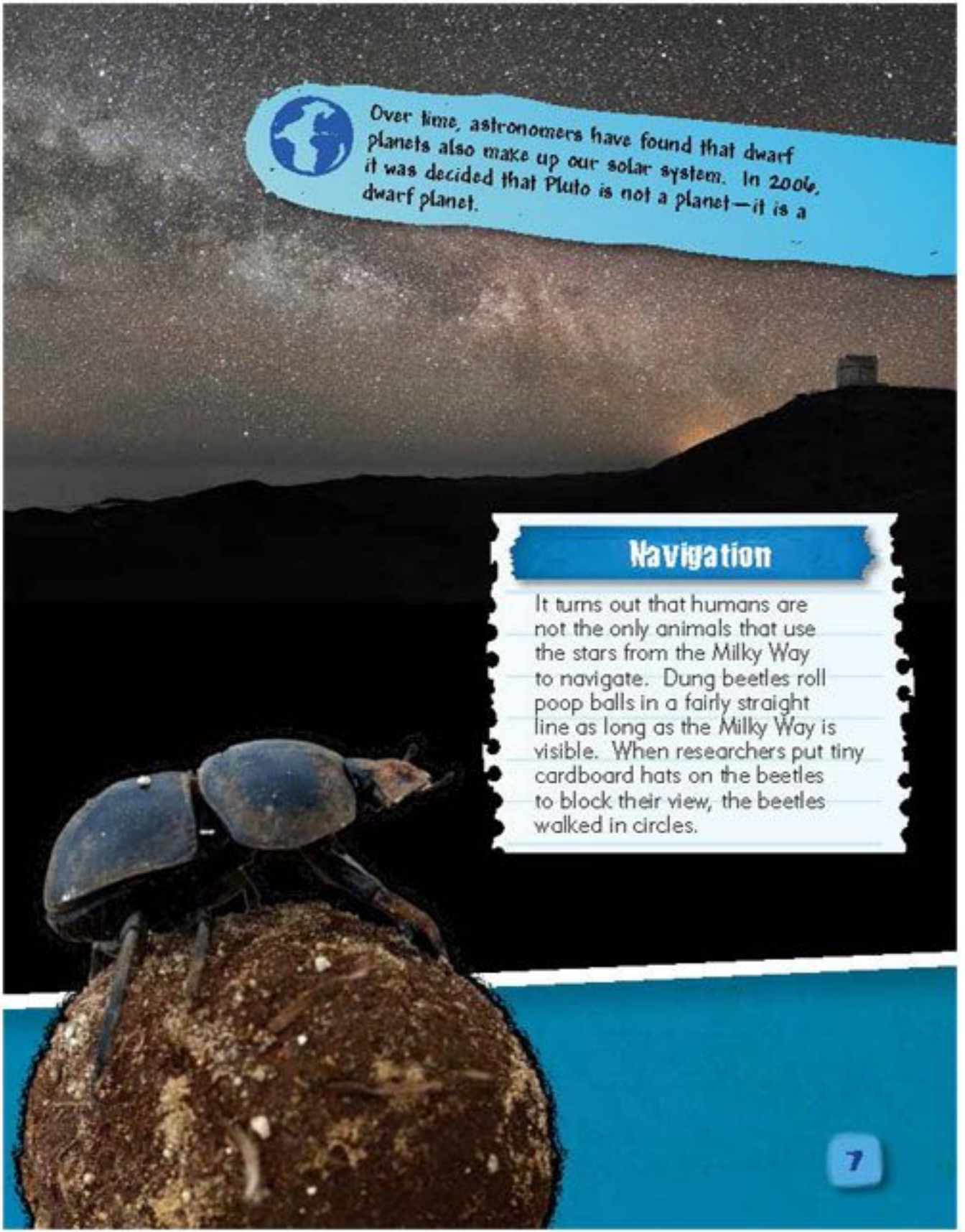
Billions and Billions

Wait, what did that say? Hundreds of *billions* of stars? How many *is* hundreds of billions? No matter how you say it—a hundred thousand million or billions and billions—our galaxy contains a mind-boggling number of stars. If you could count the number of stars in the Milky Way, it would take about 20,000 years!

Astronomers at an observatory use a laser to help them better observe the Milky Way.

It's no wonder people have been mystified by the Milky Way since ancient times. Nothing else in the night sky looks quite like it. The Milky Way galaxy contains over 200 billion stars. But it contains more than just stars. The Milky Way is also made up of gases and dust. The Milky Way contains planets, too. Entire solar **systems**, ours included, swirl around the center of the Milky Way. It's as though we are part of a giant whirlpool of stars, planets, gases, and dust. Our "whirlpool" takes over 200 million years to rotate just one time!

Because we are inside the Milky Way, we can't see the whole thing at once. Any picture that you have seen of the entire Milky Way is either artwork or a picture of another galaxy. When you look up at the Milky Way in the sky, you're only seeing a side of the "whirlpool." Clouds of gases and dust block our view of the center of our galaxy. Special radio telescopes give us information about what is there. Scientists also study similar galaxies to learn more about our own.


Over time, astronomers have found that dwarf planets also make up our solar system. In 2006, it was decided that Pluto is not a planet—it is a dwarf planet.
Navigation
It turns out that humans are not the only animals that use the stars from the Milky Way to navigate. Dung beetles roll poop balls in a fairly straight line as long as the Milky Way is visible. When researchers put tiny cardboard hats on the beetles to block their view, the beetles walked in circles.

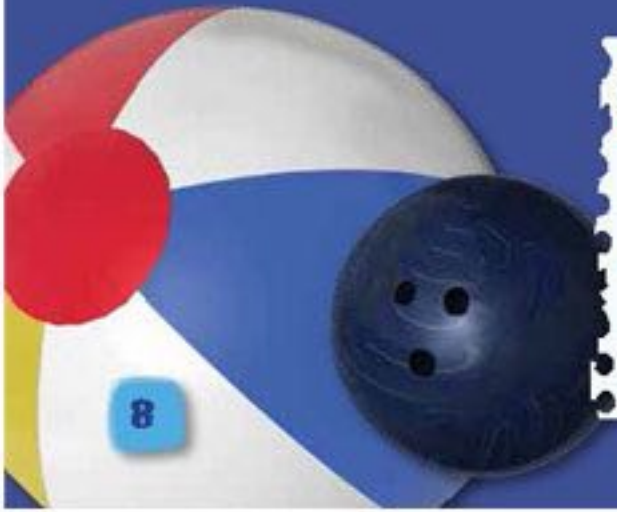
What's a Galaxy?

It may be hard to imagine the true sizes of galaxies, solar systems, and the universe compared to one another. Solar systems, galaxies, and the universe have different **scales**. Scale describes how big or small something is. A solar system is small compared to a galaxy, and a galaxy is small compared to the universe.

A System of Systems

A galaxy is an example of a system. A system is a set of parts that function together. The moon and Earth are parts of our solar system. Our solar system is part of the Milky Way galaxy. The Milky Way galaxy is part of the universe. So, Earth and our moon are a system within a system within a system!

All of these systems are held together by **gravity**. Gravity is the force that pulls two objects toward each other. Gravity depends on **mass**. Mass is how much matter is in something. More massive objects have a stronger pull. Gravity also depends on distance. The closer objects are to each other, the stronger the pull between them. You can think of gravity as an invisible leash. It's as though **orbiting** objects are tied to the center of their orbit. They can move, but only around and around and around. Gravity won't let them float away.



Quick Class on Mass

Mass is not just about size. Think about a bowling ball and a beach ball. The bowling ball has more mass than the beach ball. Both the bowling ball and beach ball are made of matter, but the bowling ball has more.