

## The Universe and the Stars



ON a clear night, we see many stars in the sky. The sky looks like a big bowl covering the earth. The earth also looks like a big room with the heavens for its round roof. But the truth is that the sky is not the roof of the earth. What we see as the heavens is but a wide, wide place which we call space. It is so large that no one has yet measured it. This vast space surrounds the earth.

Within this space we find stars, millions of them. So large is the distance in this space that the star nearest our earth is about twenty-five million million miles away. All this vast space is called the universe.

The earth where we live is but a very tiny thing compared with one of these stars. Have you ever asked yourself where the stars come from? Scientists think that a long time ago in the universe there was nothing but clouds of gas or smoke. After millions of years this gas became thicker, and afterwards it hardened and so became the first stars. This is merely a guess of great scientists. We know, however, that right now there are thousands of clouds in space, probably making stars. These clouds of gas are called *nebulae*. Some of these *nebulae* have no shape. Others are like wheels of vapor. They are continually whirling. Astronomers, or persons who study about stars, believe that this whirling *nebulae* move so fast that as they become harder they also get hotter and hotter until

at last they shine forth as stars. Some of them can be seen with our eyes; but others are invisible because they are very far away from us.

After millions of years, some stars lose their heat and become dead. There must be many, many dead stars. They are black, invisible masses moving in space. One dead star at times collides with another. Just imagine the result of such a collision! The impact is so strong that it produces terrific heat. That heat changes the dead stars into clouds of gas again. And from these clouds new stars are probably formed.

Even if two stars do not collide, a *nebula*, would be formed if they come very near to each other. The friction of the two stars passing so close to each other would be enough to divide them into small fragments, each one of them becoming a new star.

Our sun is a star. This sounds strange perhaps because we do not see the sun at night. The other stars which we see at night are also suns. Many of them are thousands of times larger than our sun.

No one knows exactly how many stars there are. There are perhaps millions of them. We can see only about 4,000 stars with our naked eyes. However, by using an instrument called the telescope, about 1,500,000,000 stars can be seen. But there are very many more which cannot be seen even by a very powerful telescope.

If many of these stars are very much bigger than the sun, then the universe must be very, very large. It is millions of millions of miles. It is beyond our imagination.

The distance between the stars is so great that it is not measured anymore in miles. Instead of saying that a star is so many billions of miles away, astronomers say that the distance from the earth to a star is so many light-years. This means that light takes so many years to reach us from any star. Light travels 186,000 miles per second, or 5,876,068,880,000 miles in a year. That is the distance of one light-year. Thus the light by which we see our nearest star left that star more than four years ago, because our nearest star is twenty-five million million miles away. Other stars are 30,000 light-years away.

The ancient astronomers saw that the big stars were found in groups. These groups are called constellations. They gave these groups the names of their gods and heroes. We still use their names today. Among these constellations are the Great Bear, the Little Bear, Cassiopeia, Pegasus, Andromeda, Perseus, Orion, and the Great Dog. We already learned something about Orion last February. In the next issue we shall study the other constellations.