WATCHERS OF THE SKY

During many thousands of years there have been men who were interested in the things they could see in the sky, who learned about our universe, and taught other people about it.

Ancient peoples had curious ideas about the earth, and they made pictures and maps which seem strange to us now. We shall see some of these very old drawings.

A few of the Greeks believed that the sun, and not the earth, was the center of the solar system, but that knowledge was lost and forgotten for nearly fifteen hundred years. Aristotle, about 350 B.C., drew a diagram of the universe that was believed and used until about 1513 A.D.

Then Copernicus, in Poland, thought that the earth was not the center of the solar system, but that it revolved about the sun, along with the five other planets. He could not prove it, because there were no instruments good enough to measure the movements of planets and stars.

Tycho Brahe, a Dane, about 1600, made many very careful measurements of the movements of Mars, but because he could not prove that the earth revolved about the sun, he still thought it stood still in the center of the system.

John Kepler, a German, after the death of both Copernicus and Tycho, studied their records and proved that Copernicus was right. He worked out the three laws of the motions of the planets that we still use and know are true.

Galileo, an Italian, made and used the first telescope to look into the sky. He saw the mountains on the moon, discovered four moons of Jupiter, and the rings of Saturn.

Isaac Newton, an Englishman, who was more of a mathematician than an astronomer, taught us the law of gravitation and why the planets revolve about the sun.

After the invention of the telescope discoveries come more rapidly. William Herschel, an English astronomer, built a 7 inch telescope, and, in 1781, discovered — by accident — the planet Uranus. Laverrier, a Frenchman, and Adams, an Englishman, both discovered Neptune in 1846.

Tombaugh, an American, discovered Pluto in 1930, by photography. In a picture of the stars, a blur indicated movement, which meant the object was not a star, but another planet.

There are more observatories, more big telescopes, and more well trained astronomers in the United States than in any other country today. One of the best is Dr. Shapley of Harvard University. He has looked out beyond our solar system and our Milky Way, and is teaching us about other galaxies (or milky ways) far beyond all the stars that we can see with our own eyes.

One of the reasons for this lecture is to teach that astronomy, and all science, belongs not to any one nation or time, but has been built up, little by little, by many men, in many countries through the centuries. Also, the subject is not exhausted. There is so much that we do not know now, that is waiting for other scientists to discover in the years that are ahead.
THE PLANETS

There are nine planets which circle around the sun in paths called orbits. Logically, the planets nearer the sun have smaller orbits and travel faster than those farther away.

**Mercury** is closest to the sun, and therefore the most rapidly moving planet. It is also the smallest. A year on Mercury is 88 days of Earth time, which means that Mercury goes around the sun four times while Earth is making one circuit.

Mercury has no atmosphere or water. Since Mercury does not revolve on its axis, there is no day or night. One side of the planet is always toward the sun, so it is always day, and very hot. The other side is always night and very cold.

**Venus** is the nearest planet to the Earth, and is almost the same size as Earth. It has an atmosphere, but the air on Venus would not support life as we know it. The air around Venus is always full of clouds, and it is not possible to see the surface of the planet. A year on Venus is about 7 months of our time, and because it is nearer the sun, it is much hotter than on Earth.

As Venus and Mercury are nearer the sun than Earth, we can see them change phases as the moon does. Sometimes they show only a crescent, grow to a full round, then wane to a crescent again.

**Earth** is the third planet out from the sun. It has atmosphere containing oxygen, which is one of the most important requisites for life.

Earth has one moon, or satellite. Venus and Mercury have none.

The Earth turns on its axis every 24 hours, producing day and night; its trip around the sun takes 365 1/4 days, which is called a year. When we refer to the "Year" of any planet, we speak of the time required for one trip around the sun.

**Mars**, the fourth planet is much smaller than Earth, farther from the sun and therefore colder. It has a very thin atmosphere containing little oxygen. We could not live there if there were any way to go to Mars. Mars is a desert Planet, having no oceans, and very little water. White caps which can be seen around the poles are believed to be thin coats of moisture in the form of snow or frost which disappear in summer.

Mars' year is nearly two of ours, and it has seasons which are twice as long as ours. Mars has two moons, which are very small, and revolve about the planet very rapidly.

Mars is the only planet except Earth where life, as we know it, might exist. Nothing is known about animal life there, but there may be some forms of plants. Some parts of the planet appear green during the summer. They may by places where plants grow—not grass and trees like ours, but perhaps mosses and lichens—plants that could live in a cold desert.

**Planets or Asteroids** occur between the orbits of Mars and Jupiter. These are little planets, many only a mile in diameter. Only one is large enough to be seen without a telescope. About 1500 have been discovered. They may be pieces of a planet that in some way broke into many bits.
JUPITER is five times as far from the sun as the Earth, and 1300 times as large as Earth. It is the giant planet, larger than all the others put together.

Jupiter has an atmosphere made up of two poison gases, Methane and Ammonia, which precludes animal or plant life.

Jupiter is so far from the sun that it gets little heat, and the temperature is about 200 degrees below zero all the time. There are great belts of clouds always in the air above Jupiter, so the surface is never seen.

Jupiter has 11 moons, 4 large and 7 small ones.

SATURN, 700 times as large as Earth, is the most beautiful of all planets when seen through a telescope. Its globe is crossed by cloudbelts, fainter than those around Jupiter, and it has three shining rings. The rings are composed of millions of tiny moons, perhaps only as large as grains of sand or pebbles, each one traveling in its own path. There are so many of them, so close together, that they reflect the sunshine. In addition to the rings, Saturn has 9 moons.

URANUS and NEPTUNE are giant planets beyond Saturn. They are almost the same size, about 60 times as large as Earth. They are covered with methane and ammonia, and are so cold that nothing could possibly live on them. Uranus has 5 moons and Neptune has 2.

PLUTO was discovered in 1930. It is 40 times as far from the sun as Earth, Pluto circles round the sun once in 24 years. Nothing could live on Pluto, because of the cold, and from Pluto the sun would look no larger than any other bright star.