Galileo

By: Navin Sullivan

One May evening in 1609, a carriage rattled briskly through the streets of Padua, in Italy. In it was Galileo Galilei, professor of mathematics, returning from a trip to Venice. While he was there, he had received news from a former pupil named Jacques Badovere- news that had sent him hurrying home.

"A marvelous tube is on sale here," wrote Badovere, who was now living in Paris. "This tube makes distant objects appear close. A man two miles away can be seen distinctly. People call these tubes 'Dutch perspectives' or 'Dutch cylinders'. Some say that they were invented by Hans Lippershey, an obscure maker of eyeglasses in Middleburg, Holland. What is sure is that they employ two lenses, one convex and the other concave."

The carriage turned into the Borgo dei Vignali and stopped outside Galileo's house. Pausing only to glance at his garden, Galileo hurried indoors and went to his study.

"One convex and one concave," he repeated as though in a trance. He drew writing paper toward him, dipped a sharpened quill in the ink, and began to draw.

"Suppose the convex lens is placed in front, to gather the light," he muttered. "Then if the concave lens is placed the right distance behind, it should magnify the gathered light."

He only had to figure the distance and he would be able to make one of these marvelous 'Dutch perspectives' for himself! He had already taken the precaution of bringing a good assortment of eyeglass lenses from Venice.

Telescopes

By: David Macaulay

Telescopes

A telescope gives a close-up view of a distant object, which, in the case of an astronomical telescope viewing a far-off planet or galaxy, is very distant indeed. Most telescopes work in the same basic way, which is to produce a real image of the object inside the telescope tube. The eyepiece lens then views this image in the same way as a magnifying glass. The viewer looks at a very close real image, which therefore appears large. The degree of magnification depends mainly on the power of the eyepiece lens.

Refracting Telescopes

In a refracting telescope, an objective lens forms the real image that is viewed by the eyepiece lens. The image is upside down, but this is not important in astronomy.

Reflecting Telescope

In a reflecting telescope, a large concave primary mirror forms the real image that is then viewed by an eyepiece lens. Usually, a secondary mirror reflects the rays from the primary mirror so that the real image forms beneath the mirror or to the side. This is more convenient for viewing.

Reflecting telescopes are important in astronomy because the primary mirror can be very wide.

The Heavenly Zoo

Retold by: Alison Lurie

From the earliest times people have looked at the night sky and tried to understand what they see there. Long before anyone knew that the stars were great burning globes of gas many million of miles from the earth and from one another, men and women saw the sky as full of magical pictures outlined with points of light.

What shapes ancient people saw in the sky depended on who and where they were. Thus the group of stars that we call the Big Dipper, which is part of the Great Bear, was known to the Egyptians as the Car of Osiris, to the Norse as Odin's Wagon, and in Britain first as King Arthur's Chariot and later as the Plough. Many of the pictures that we see today are very old. The constellation we call the Great Dog was first known as a dog five thousand years ago in Sumeria; Taurus the Bull was already a bull in Babylon and Egypt.

Our ancestors saw all sorts of things in the stars: men and women, gods and demons, rivers and ships. But what they saw most often were beasts, birds, and fish. And for most of these creatures there was a legend of how they came to be there.

The story of the Great Dog is from the Mahabharata, which is written in India. Parts of this collection of stories were written more than two thousand years ago. Once upon a time in India there were five princes who left their kingdom to seek the kingdom of heaven. With them they took only food and drink for the journey: and the prince Yudistira brought his dog Svana.

Circles, Squares, and Daggers

How Native Americans Watched the Skies

By: Elsa Marston

You have probably heard about stargazers of the past such as the ancient Egyptians, the builders of Stonehenge, and the Mayas. Did you know that Native Americans, too, made astronomical observatories- long before Europeans arrived?

The study of these ancient observatories is called archaeastronomy. By combining astronomy with archaeology, we are beginning to understand how people of the past observed the skies.

Archaeoastronomy is a very new field. The Native American observatories have been discovered- or their purposes understood- only recently. Most of the sites have been abandoned centuries ago, and their original uses had been forgotten.

One of the most dramatic observatories likes on a windswept plateau high in the Bighorn Mountains of Wyoming. It is simply a circle of stones that looks something like a wheel, 80 feet across. In fact, it's called the Bighorn Medicine Wheel ("medicine" means holy or supernatural).

In the center of the wheel is a large pile of stones called a cairn. Twenty-eight lines of stones lead like spokes from the "hub" to the rim. Just outside the circle stand six smaller cairns.

Though the wheel had been known for about a hundred years, it was not until the early 1970's that its secret began to come clear. An astronomer, John Eddy, discovered how the wheel "works".

The Mystery of Mars 4

By: Sally Ride and Tam O'Shaughnessy 11

In 1976 Viking 1 and Viking 2 settled softly onto the surface of 24
Mars. They were the first spacecraft from Earth ever to visit the Red 37
Planet. Twenty-one years later, Pathfinder dropped out of the Martian 48
sky to join them. A parachute opened to slow it down, then giant air 62
bags inflated to cushion it during impact. Pathfinder bounced hard 72
more than 15 times before it rolled to a stop on the red Martian soil. 87

Although the Viking and Pathfinder landers arrived at different 96
locations, they landed in similar terrain. Engineers did not want to risk 108
landing these precious spacecraft on the edge of a cliff or the side of a 123
volcano. They guided them to different sites on the gently rolling 134
Martians plains north of the equator. The pictures the spacecraft sent 145
back showed flat, windswept landscaped strewn with gray rocks and 155
covered with fine and red dust. 161

The two Viking landers could not move from their landing sites. 172
They could reach out only a few feet with their robot arms to scoop up 187
small samples of soil. Pathfinder carried the first rover to Mars. The 199
rover, Sojourner, was about the size of a small dog. Sojourner traveled 211
on six rugged wheels at the end of flexible legs. It moved at a snail's 226
pace, but was able to travel several yards from the lander. 237

The little robot geologist dug its wheels into the red Martian dirt, 249
churning up the soil to analyze its texture and clumpiness. It roamed 261
through a garden of nearby rocks, ranging in size from pebbles to 273
boulders, and nuzzled up to several of them. 281

Stars

By: Seymour Simon

Stars are huge balls of hot, glowing gases. Our sun is a star. It is just an ordinary star, not the biggest nor the brightest. But the sun is the star that is nearest to our planet Earth. Earth is part of the sun's family of planets, moons, and comets called the Solar System. All of the other stars that we see in the sky are much further away from Earth. The stars are so far away from us that even through powerful telescopes they look like small points of light.

People long ago gave names to the brighter stars and learned where and when to look for them. They also gave names to the constellations, groups of stars that seem to form patterns in the sky. Usually these constellation were named after gods, heroes, and animals.

Thousands of years ago Orion looked different than it does today. And thousands of years in the future it will look different than it does now. That's because stars move in space. They move very rapidly, ten or more miles per second. But the stars are so far away from us that we do not notice their motion in our lifetimes.

Alpha Centauri is about twenty-five trillion miles away. There are other stars millions of trillions of miles away. These numbers are so big that they are hard to understand. Measuring the distance between the stars in miles is like measuring the distance around the world in inches.

Because of the great distances between stars, scientists measure with the light-year instead of the mile. Light travels at speed of about 186,000 miles every second. A light-year is the distance that light travels in one year: a bit less than six trillion miles.

The Book That Saved the Earth

By: Claire Boiko

Good afternoon. Welcome to our Museum of Ancient History, and to my department- curiosities of the good old, far-off twentieth century. The twentieth century was often called the Era of the Book. In those days, there were books about everything from anteaters to Zulus. Books taught people how to, and when to, and where to, and why to. They illustrated, educated, punctuated and even decorated. But the strangest thing a book ever did was to save the Earth. You haven't heard about the Macronite invasion of 1988? Tsk, tsk. What do they teach children nowadays? Well, you know, the invasion never really happened, because a single book stopped it. What was that book, you ask? A noble encyclopedia. A tome about rockets and missiles? A secret file from outer space? No, it was none of these. Let me turn on the historiscope and show you what happened many, many centuries ago in 1988.

Think-Tank was seated with his arms folded. He has a huge, egged-shaped head, and he wears a long robe decorated with stars and circles. Apprentice Noodle stands beside him at an elaborate switchboard. A sign on an easel reads: Macron Space Control. Great and Mighty Think-Tank, Commander-In-Chief. Bow Low Before Entering.