

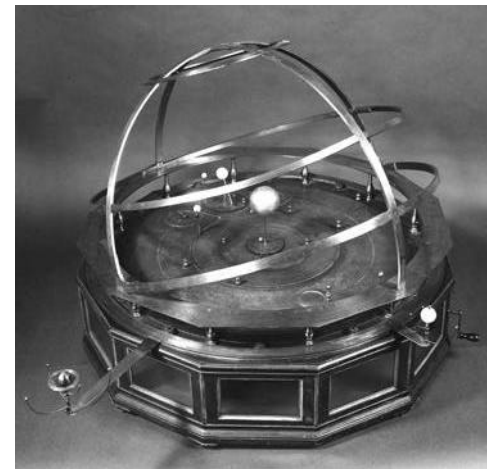
A GEOCENTRIC ORRERY

Last spring, a gentle lady wrote asking about the possibility that the shadow of the moon during a solar eclipse could prove geocentricity. Part of my response was presented in the article "Is the Moon's Shadow Proof of Geocentricity?" which appeared on page 8 of *Biblical Astronomer* number 92. In the sequence of events which transpired over the next month or so, money was donated for a video showing the motions of the "solar system" from a geocentric perspective. "Coincidentally," I received a call from Pastor Paul Norwalt of the Merrimack Baptist Temple, of Merrimack, New Hampshire. During the conversation, he mentioned that he was being led of the Lord to make a geocentric orrery. And that is exactly what he did.

What is an orrery?

An orrery is a mechanical model of the solar system. The orrery developed from model planetaria over the course of some fifty years, though some credit George Graham with its invention about the year 1700. In about 1710, an instrument maker named John Rowley made a copy of Graham's machine for Charles Boyle (d. 1735), the fourth Earl of Orrery. Rowley dubbed the device "The Orrery." Orreries rapidly

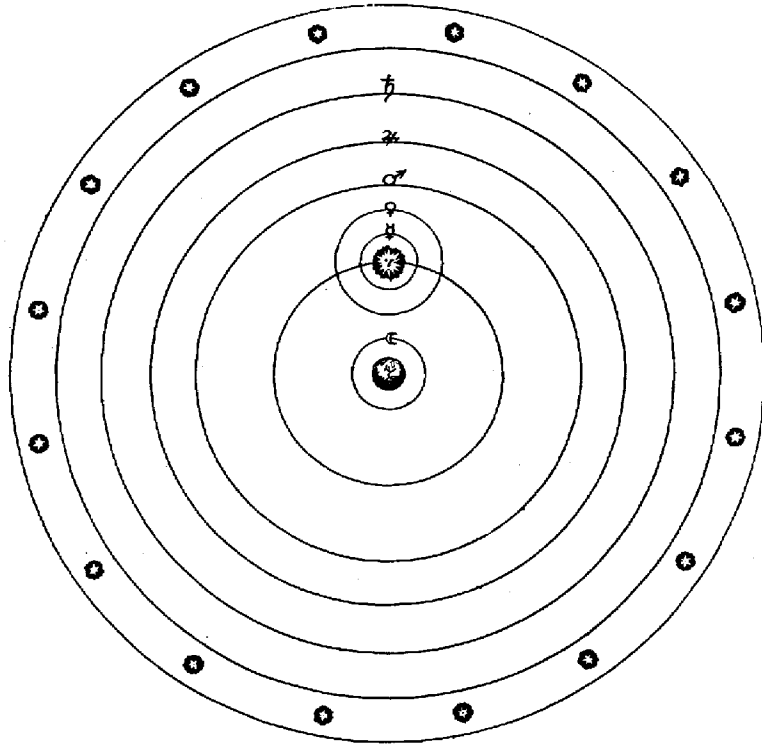
became popular as both a teaching aid and as an opulent piece of furniture.



At left, an early orrery dating from about 1750; made by Benjamin Cole and now owned by St. Andrews University in Scotland.

Typically orreries are heliocentric and may run to scale time-wise, as the above model, or may shorten periods to speed up the action. What is unusual about the new Tychonic orrery is that it is a geocentric orrery not based on the Ptolemaic model (see below) which is the second-most common form of orrery. This orrery is based on the model of the motion of the cosmos envisioned by the Danish ob-

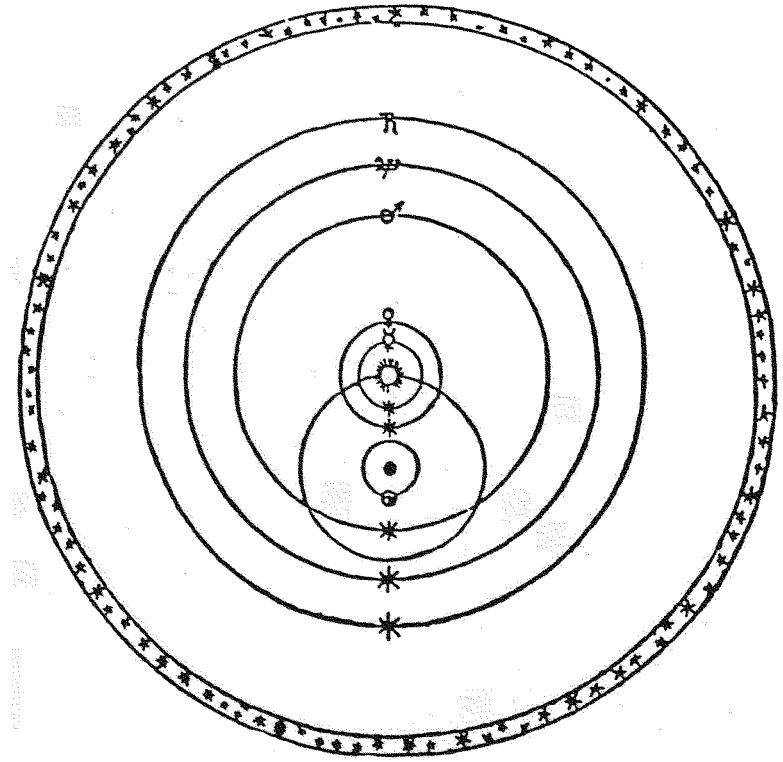
servational astronomer Tycho Brahe. Brahe's model has all the planets orbiting the sun except for the earth. The sun circles the earth, carrying the planets with it (see next page).



Above: The model of the planetary system according to Claudius Ptolemy: an early geocentric model.

The Tychonic orrery

After developing several animations, plans, and a stopover in Cleveland, Pastor Norwalt felt ready to proceed. A last minute check about the directions in which the various motions should go, and the orrery was finished. Arrangements were made to unveil the orrery at an afternoon presentation at the Merrimack Baptist Temple on Saturday, October 21, 2000. As Pastor Norwalt scoured the area for parts and advice, many people became intrigued and wanted to see it work; so many that two sessions were deemed necessary. The first was on Saturday afternoon, the second in the evening. The evening session drew attendees from as far away as Pittsburgh.



The modified Tychonic Model

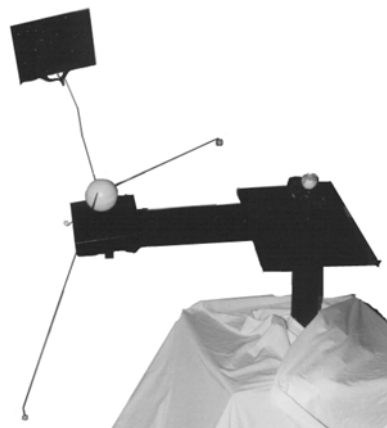
The earth, sun, and planets are painted with fluorescent paints. The church made a backdrop with fluorescent stars and hooked up a couple of black lights. That was most effective at night when all that could be seen were the Sun, Mercury, Venus, Earth, Mars, and stars. Against the backdrop, which acted as stars placed at infinite distance, the audience had no trouble seeing the retrograde motion of Mars (an outer planet).

A color photo, with the background removed (because it was black on black,) graces the front cover of this issue. The next couple of figures show the model in various stages of its motion. For example, the first picture on the next page shows the position of the sun and earth about February. In this picture, also with background and base removed by photo editing, the sun is in the foreground with Mercury underneath it and silhouetted on the planetary gear-drive box. The rod leaving the photo to the lower right holds Venus. Earth is at the upper

The Geocentric Orrery

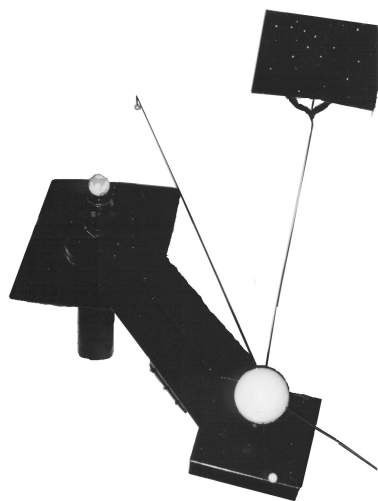
left, with Mars above it and to the right. The black rectangle at upper right represents the stars. As can be seen in the other photos, it maintains its orientation (here parallel to the edges of the platform holding the earth) throughout the year. The first day of winter was when the sun-arm, representing the firmament, was directly below the earth and parallel to the sides of the earth's platform. At that time the "star card" was directly behind the earth, as was Mars.

In the photo below, it is September 21st and Mars has moved to the lower left. Mercury is visible just to the left of the sun, left of the box, and Venus is to the right of the sun. Earth is at right, sticking out just above the platform. Note that the star card's arm is still parallel to the edges of the earth's platform.

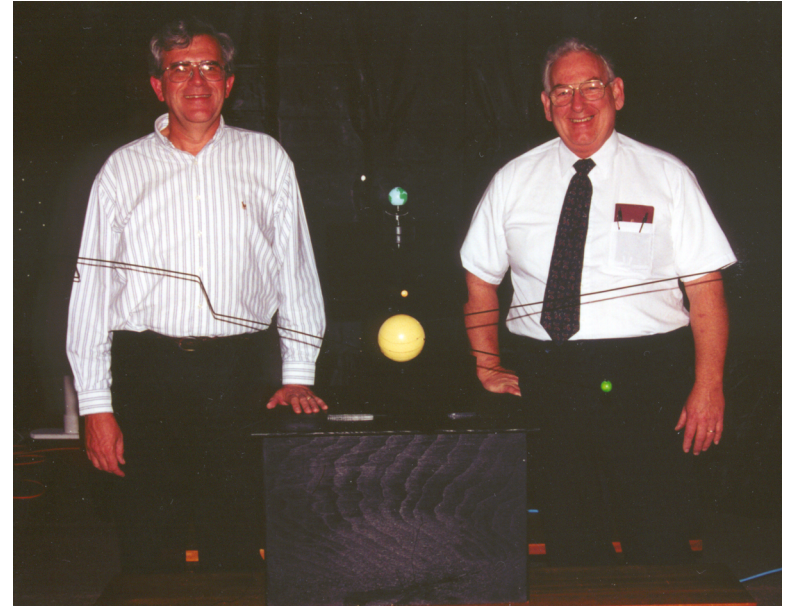


up on videotape.

Besides showing the motion of the sun, moon, and planets, the geocentric orrery also shows the rotational motion of the heaven about the earth. In this case, the black shaft holding up the earth-platform, which is sticking up out of the sheet in the above photo, rotates clockwise. Each day in the orrery is more than five seconds, and each year is 90 days. The month is such that the moon turns fourteen times in a year. Compared with the real system, there are, of course, 365.25 days in a year and thirteen lunar months in a year. As it is, though, it takes



almost 9 minutes to see a year. Making the periods to scale would make a year last almost forty minutes. Nevertheless, the ratios of the planetary periods one to another and to the earth are correct.



Left to right: yours truly and Pastor Norwalt with the Tychonic orrery.

After using the orrery for videotaping geocentric phenomena such as the seasons, the orrery will be used for presentations, exhibits, and demonstrations.

"A work of art."

That's what one engineer said to the orrery, and it truly is. Rugged yet lightweight, and capable of demonstrating every observable phenomenon held up as proof falsely so called by the heliocentrists, the Tychonic orrery is a wonder to behold in full motion. People spend hours just watching it. "I never could visualize the motions of the geocentric system," said several at the dedication, "but now I understand it clearly."

Thank you, Pastor Norwalt; and thank you, Mrs. Norwalt, for the artwork, the painting of the earth in particular. Thank you, too, Merrimack Baptist Temple. Your efforts, labors, and sacrifices have indeed produced a work of art.