

Grabbing the Horns of Venus

Did Galileo pirate a major piece of evidence for the Copernican solar system?

By WRAY HERBERT

On December 11, 1610, the Italian astronomer Galileo Galilei sent this cryptic message to a friend in Prague: "The mother of love emulates the figures of Cynthia." The recipient, Giuliano d'Medici, no doubt recognized the message immediately for what it was — a cypher intended to announce, but at the same time disguise, an important scientific finding. It was the standard seventeenth century procedure for a scientist to document that he was first with particular research results.

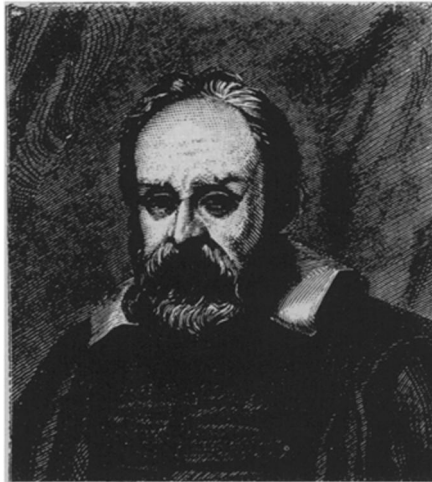
What Galileo was so eager to copyright was the first hard evidence that the earth revolved around the sun—an idea so radical that it led two decades later to his arrest and trial by the Inquisition in Rome. Decoded, Galileo's cypher stated that the planet Venus appears in phases like those of the moon — changing from full to gibbous to crescent, or horned, depending on its position relative to the sun. The so-called horns of Venus, if verified, would show that Venus orbited the sun rather than the earth — thus flatly contradicting the well-established Ptolemaic view of the heavens.

The results were verified, of course, and together with other evidence the horns of Venus ultimately proved the validity of the Copernican solar system and fixed Galileo's name in the history of science. Today, however, the priority of Galileo's theory is being challenged. According to Richard S. Westfall, a historian at Indiana University in Bloomington, Galileo may very well have cribbed the idea of observing Venus's phases from a former student. And if he did so, Westfall suggests, it was for a very earthly reason: to secure a job within a patronage system with a strict publish-or-perish policy. At least one Galileo scholar has dismissed Westfall's view as speculation unsupported by the historical record.

Speaking recently at the meeting of the History of Science Society in Norwalk, Conn., Westfall reviewed the events in Galileo's life from the summer of 1609, when he first heard of the telescope, to December of 1610, when he sent off his cypher on the horns of Venus. In 1609, Galileo was an obscure professor of mathematics at the University of Padua; he was untenured and in need of a wealthy patron. Accordingly, he had spent the past several years wooing Cosimo d'Medici, the Grand Duke of Tuscany, and when he acquired a telescope in 1609, Westfall suggests, Galileo was too preoccupied with the practical matter of advancing his career to

think about the arrangement of the solar system.

The only record of Galileo's early astronomical observations is the *Sidereus nuncius*, or *Starry Messenger*, which Galileo rushed into print in March 1610. With its publication, he guaranteed priority for the most important discovery that his thirty power scope had yielded: Four previously unknown moons of Jupiter. As part of his campaign to win the patronage of Cosimo, he named the satellites the Medicean Stars, presented the Duke with the actual telescope he had used for the observations, and volunteered to instruct him in its use. His efforts were successful: By September, Galileo was on his way to Florence to enter the Duke's service.



In a brief span, Galileo had become the most desirable "client" in Italy, but according to Westfall, he now faced a new dilemma: how to stay on top. The patronage system carried no guarantees, Westfall notes; Galileo required more discoveries to impress his employer. This was Galileo's situation, when, on Dec. 5, 1610, Benedetto Castelli, a former student of Galileo's, sat down in Brescia to write his mentor: If Copernicus was correct, he wrote, Venus should sometimes appear "horned" and sometimes not. Castelli owned no telescope, and he wanted to know if Galileo had observed such phases.

Galileo did not reply to Castelli until the end of December, but on December 11 he did send off his cypher announcing the horns of Venus. Had he received Castelli's letter before he composed the cypher? Based on an analysis of the letters and cyphers, it is impossible to know for certain, Westfall says, but additional historical evidence indicates that he probably had. Mail routinely made the trip in five days, he notes, so to deny the arrival of the

letter one must ignore the "enormous coincidence" of the cypher dated precisely when the letter would be expected to arrive.

Furthermore, Westfall says, when Galileo did finally write Castelli, he claimed that he had been watching Venus for three months. But there is no evidence of such observations, Westfall argues, and considerable evidence to cast doubt on the claims. In mid-November, Galileo had written a friend, saying explicitly that he had no new discoveries to report; but had he been watching Venus since October, he would have seen Venus in its full phase—a phase that was incompatible with the Ptolemaic system. If he did notice the planet's shape and realize its significance, he didn't mention it—a fact that does not jibe with the excitement he showed later. Galileo understood instantly the importance of Castelli's idea, Westfall suggests, and so composed the cypher immediately. Then he spent the next few weeks observing Venus during a critical part of its orbit, gathering the first evidence in support of his claim.

The reason Galileo hadn't observed Venus, Westfall believes, is that he was intent on studying the moons of Jupiter, and while Jupiter was visible at night, Venus could only be seen in the pre-dawn sky. The man who would ultimately be credited with proving the Copernican view had not yet worked out a program of observations designed to settle that issue, Westfall argues; in short, he used his telescope "primarily as an instrument of patronage, not as an instrument of astronomy."

Not everyone is ready to accept Westfall's argument. According to University of Toronto historian Stillman Drake, a biographer of Galileo, Westfall's work is representative of a scholarly trend to deny Galileo credit for anything that someone else might have suggested. Galileo said that he had been observing Venus since October, when Venus first became visible, and there is nothing in the historical record to indicate that he was lying. Westfall's scenario, Drake says, is inconsistent with the kind of person Galileo was. "You show me any astronomer who has got a new instrument that others haven't got, and he's looked at everything he can find. And there's one planet, the most brilliant of all, that he can't see. Well, when the thing comes into sight, he doesn't put off observing it for three months, waiting for some bright student to tell him he ought to take a look. It doesn't make sense. That's not how astronomers behave." □