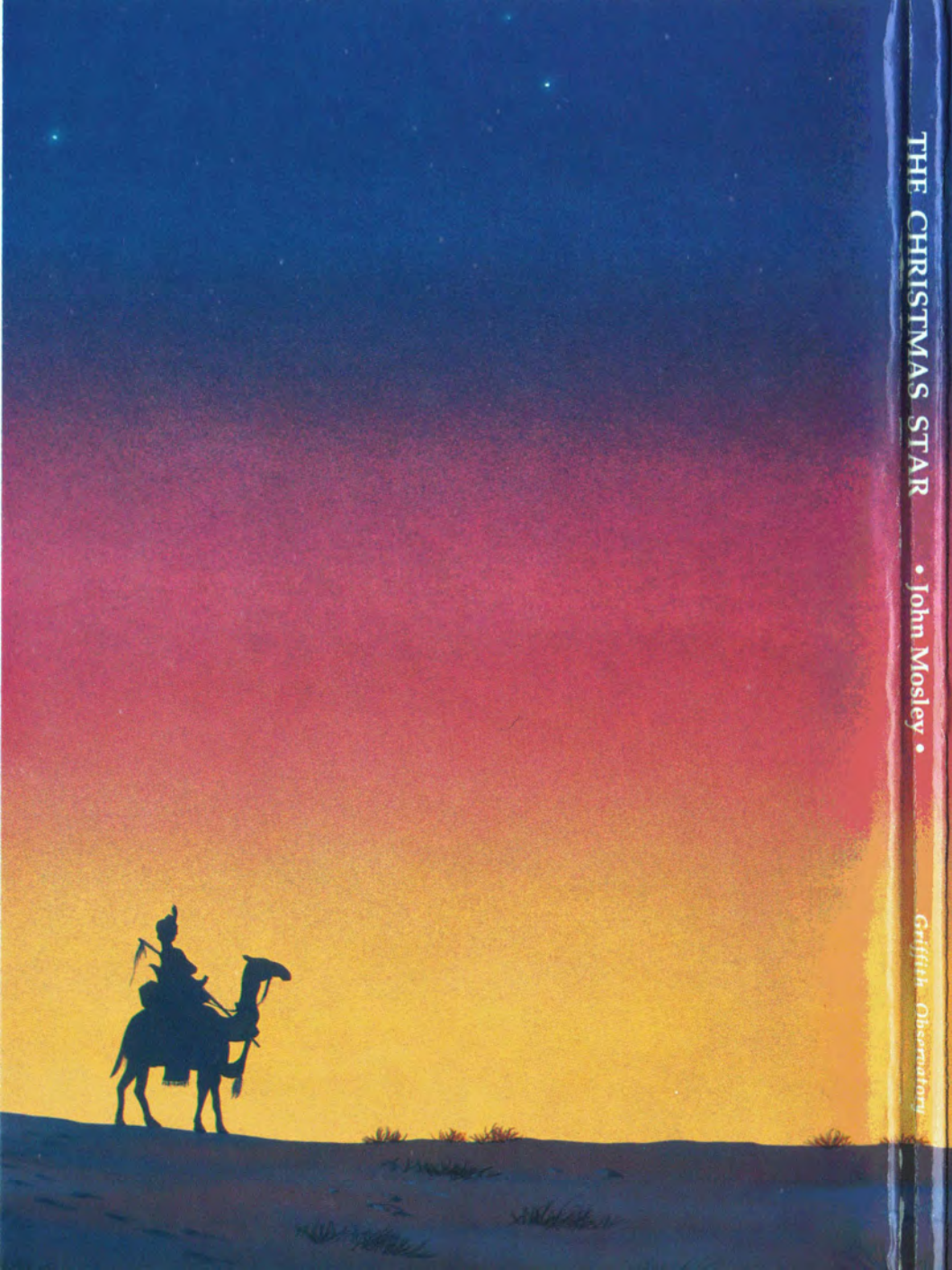
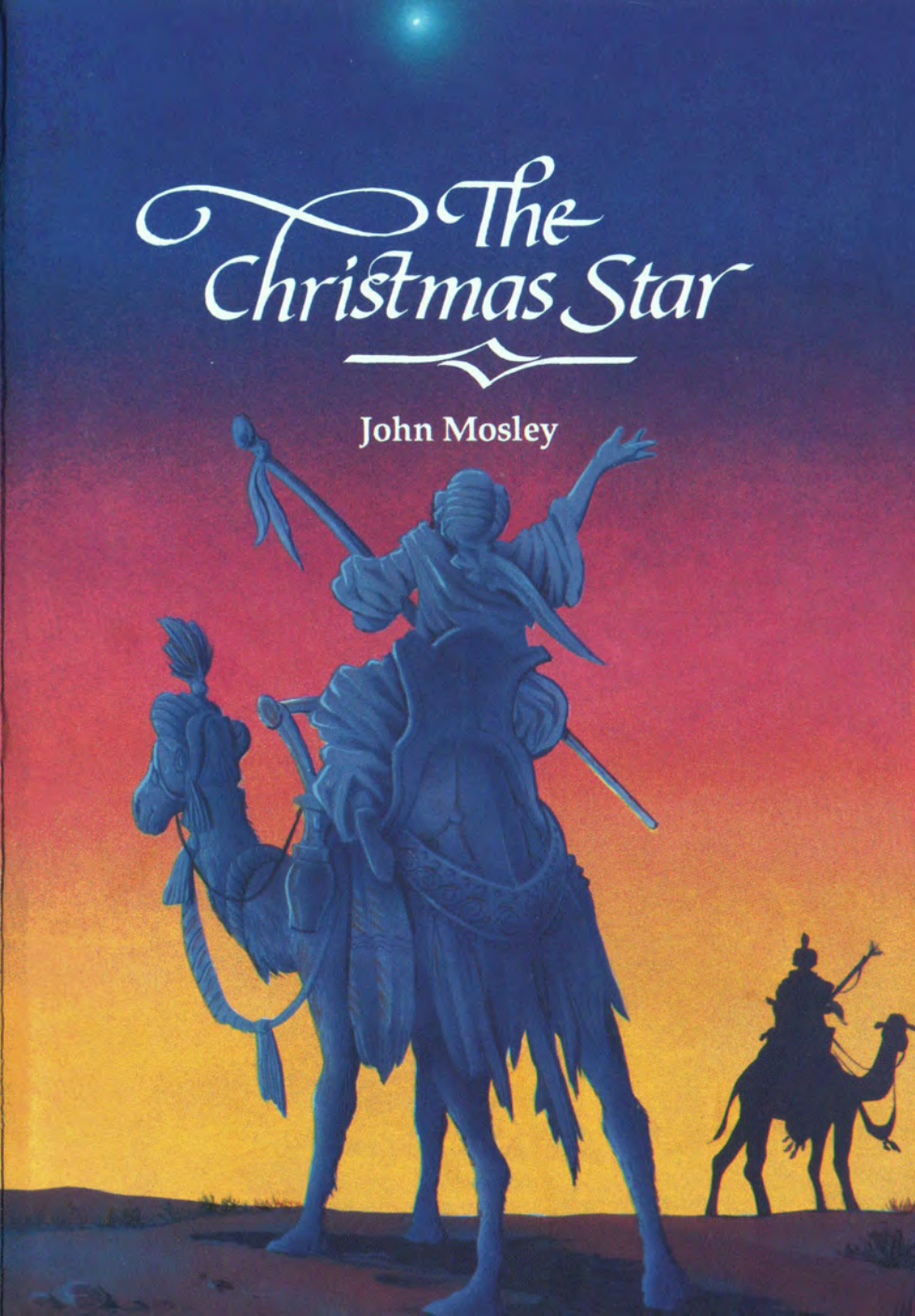


THE CHRISTMAS STAR • John Mosley • Griffith Observatory

# The Christmas Star

John Mosley



# The Christmas Star

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Page 4: The title page of Matthew, *The Bible*, King James version, second edition, 1613.

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# THE GOSPEL ACCORDING to S. Matthew.

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1 The genealogie of Christ from Abraham to Ioseph. 18 He was conceiued by the holy Ghost, and borne of the Virgin Mary when shee was espoused to Ioseph. 19 The Angel satisfieth the misdeeming thoughts of Ioseph, and interpreteth the names of Christ.

THe Booke of the * generation of Iesus Christ, the sonne of Dauid, the sonne of Abraham.

2 * Abraham begate Isaac, and * Isaac begate Iacob, and * Iacob begat Iudas and his brethren.

3 And * Iudas begate Phares and Zara of Thamar, and * Phares begate Esrom, and Esrom begate Aram.

4 And Aram begate Aminadab, and Aminadab begate Naasson, and Naasson begate Salmon.

5 And Salmon begate Boos of Rachab, and Boos begate Obed of Ruth, and Obed begate Iesse.

6 And * Iesse begate Dauid the King, and * Dauid the King begat Solomon of her that had beene the wife of Urias.

7 And * Solomon begate Roboam, and Roboam begate Abia, and Abia begate Asa.

8 And Asa begate Iosaphat, and Iosaphat begate Ioram, and Ioram begate Ozias.

9 And Ozias begat Ioatham, and Ioatham begate Achas, and Achas begate Ezekias.

10 And * Ezekias begat Manasses, and Manasses begate Amon, and Amon begate Iosias.

11 And ‖ Iosias begate Iechonias and his brethren, about the time they were caried away to Babylon.

12 And after they were brought to Babylon, * Iechonias begate Salathiel, and Salathiel begate Zorobabel.

13 And Zorobabel begate Abiud, and Abiud begate Eliakim, and Eliakim begate Azor.

14 And Azor begat Sadoc, and Sadoc begat Achim, and Achim begate Eliud.

15 And Eliud begate Eleazar, and Eleazar begate Matthan, and Matthan begate Iacob.

16 And Iacob begate Ioseph the husband of Mary, of whom was borne Iesus who is called Christ.

17 So all the generations from Abraham to Dauid, are fourteene generations: and from Dauid vntill the carying away into Babylon, are fourteene generations: and from the caryinga way into Babylon vnto Christ are fourteene generations.

18 ¶ Now the * birth of Iesus Christ was on this wise: when as his mother Mary was espoused to Ioseph (before they came together) she was found with child of the holy Ghost.

19 Then Ioseph her husband being a iust man, and not willing to make her a publique example, was minded to put her away priuily.

20 But while he thought on these things, behold, the Angel of the Lord appeared vnto him in a dreame, saying, Ioseph thou sonne of Dauid, feare not to take vnto thee Mary thy wife: for that which is conceiued in her, is of the holy Ghost:

21 And she shall bring forth a sonne, * and thou shalt call his Name Iesus: for he shall saue his people from their sins.

22 (Now all this was done, that it might be fulfilled which was spoken of the Lord by the Prophet, saying,

23 * Behold, a virgin shall be with child, and shall bring forth a Sonne, and ‖ they shall call his Name Emmanuel, which being interpreted, is, God with vs.)

24 Then Ioseph, being raised from sleepe, did as the Angel of the Lord had bidden him, and tooke vnto him his wife:

25 And knewe her not, till shee had brought forth her first borne Sonne, and hee called his Name Iesus.

## CHAP. II.

1 The Wise men out of the East, are directed to Christ by a Starre. 11 They worship him, and offer their presents. 14 Ioseph fleeth into Egypt, with Iesus his mother. 16 Herod slayeth the children. 20 Himselfe dieth. 23 Christ is brought backe againe into Galilee to Nazareth.

NOw when * Iesus was borne in Bethlehem of Iudea, in the dayes of Herod the king, behold, there came wise men from the East to Hierusalem,

2 Saying, Where is he that is borne king of the Iewes: for we haue seen his Starre in the East, and are come to worship him.

3 When Herod the King had heard these things, hee was troubled, and all Hierusalem with him.

4 And when hee had gathered all the chiefe



* Luke 3. 23.
* Gene. 21. 3.
* Gene. 25. 26.
* Gene. 29. 35.
* Gene 38. 27.
* 1. Chron. 2. 5. ruth. 4. 18.
* 1. Sam. 16. 1. and 17. 12.
* 2. Sam. 12. 24.
* 2. Chro. 3. 10.
* 2. King. 20. 21. 1. chro. 3. 13.
‖ Some read, Iosias begate Iechonias, and Iechonias his brethren.
* 1. Chro. 3. 16, 17.
* Luke 1. 27.
* Luke 1. 31.
* Esai. 7. 14. Or, his Name shall be called.
* Luke 2. 6.



Since the 1940s, most of the planetaria in the Western world have presented a show on the Christmas Star in what has become one of our newer Christmas customs. In that show, they try to identify the star seen by the magi at the time of the birth of Christ. It's an ideal topic for investigation because it's a great mystery. We have just enough information to begin a search, but we cannot come to a definite conclusion. The true identity of the star may never be known. Also, it's an excellent example of how astronomers can assist in the unraveling of cultural mysteries.

*Each year millions of people around the country attend special holiday planetarium shows on the nature of the Christmas Star. (Griffith Observatory, Los Angeles, California, photograph by E. C. Krupp)*

As presented at the Griffith Observatory, the annual Christmas show has three main quests:

1. to decide the date of Christ's birth, so we know when to look,

2. to determine the identity of the "star" that was seen by the magi, and

3. to understand the significance of the date December 25.

We find that no one knows the year in which Christ was born, although the solution may be at hand, and we conclude that the "star" might have been an unusual set of planetary and stellar conjunctions culminating in a spectacular close approach of Jupiter and Venus. We develop an appreciation that what we might think are modern Christmas customs have their origins in ancient sun worship and that many of the symbols of Christmas are shared by cultures around the world.

It's important to state at the beginning that we are making the assumption that the star described in the *New Testament* was an astronomical phenomenon and that we can treat it historically and scientifically. Historians generally agree that the story of the star and the magi is a legend created after the fact to make Christ's birth sound more miraculous. Will Durant, in *Caesar and Christ*, wrote "... the mature mind will not resent this popular poetry." Others claim that the star was a genuine supernatural miracle devised by the Lord especially for the occasion and that its study is outside the bounds of science. There is no real resolution to this fundamental dilemma. We can only approach the project as we would any other historical mystery—such as the identity of King Arthur, Troy, the Sea Peoples, or the true use of the Great Pyramid, Nasca lines, or Stonehenge—and look for a natural explanation. The account cannot be dismissed out of hand, and there is a very real possibility that it has a basis in fact. David Hughes, author of *The Star of Bethlehem*, says, "Matthew's nativity reads like a simple tale well told. It has the ring of



truth." We'll find that there *is* an entirely plausible scientific and historical explanation for the star described in the *New Testament*.

We'll begin by attempting to determine the date of the birth of Christ, for without this date we do not know *when* to look into the sky.

*Many early cultures paid close attention to the sky and incorporated astronomical concepts into their daily lives. Astronomers are important in solving some ancient cultural mysteries. (Stonehenge, England, photograph by E. C. Krupp)*

# PART ONE

# When Was Christ Born?

*There are those who, with an over-busy curiosity, attempt to fix not only the year but the date of our Savior's birth.*

—Clement of Alexandria



Until quite recently, it was commonly thought that Christ was born sometime during the period 7 to 5 B.C. This date is now being revised, and with it the chronology of the Near East during the last years of Herod's reign.

Birth records as we know them are a recent invention, and, except for royalty, they were not kept in the distant past. We certainly have no direct record of the timing of Christ's birth, and determining the date of the Nativity is a knotty problem with which scholars have wrestled since at least the fourth century A.D.

We can take the direct approach and consult the ancient authorities. They lived closer to the time and had access to records now lost. Our current Christian calendar was established by Dionysius Exiguus ("Dennis the Little"), a Scythian monk who worked in Rome in the sixth century. At that time, years were counted consecutively from September 17, 284 A.D., when Diocletian was proclaimed Roman emperor by his troops. The system was "modern" in that the count did not begin again with each new emperor. In 525 A.D., while preparing new Easter tables, Dionysius broke with tradition, declaring, "We have been unwilling to connect our cycle with the name of an impious persecutor, but have chosen rather to note the years from the incarnation of our Lord Jesus Christ." He carefully selected the year we would call 1 B.C. for the birth of Christ, and using the date December 25 (which by his time had become customary), he commenced the Christian Era six days later on January 1, 1 A.D.

It's interesting to note that the early authorities were nearly

unanimous in selecting the years 3 and 2 B.C. for the nativity. It's difficult to know what weight to give their conclusions because we are not entirely sure of which documents they used or of their methods of calculation. The arguments are summarized in a long chapter in *The Handbook of Biblical Chronology* by Jack Finegan. Three ancient chronographers settled upon the year 4 or 3 B.C., seven upon 3 or 2 B.C., two upon 2 or 1 B.C., and one anonymous dissenter upon 1 A.D. None of the thirteen that Finegan cites set Christ's birth prior to 4 B.C.

Table 1

Date of the Nativity According to Early Christian Authorities
*(After Finnegan, p. 229)*

| Number of Authorities | Date |
|---|---|
| 1 | 4 B.C. |
| 1 | 4-3 B.C. |
| 1 | 3 B.C. |
| 7 | 3-2 B.C. |
| 1 | 2 B.C. |
| 1 | 2-1 B.C. |
| 1 | 1 A.D. |

Yet, in most twentieth century books on the subject, it's stated that Christ was probably born in 5 or 6 B.C. Why has this earlier date been commonly accepted for the last century or more?

It's because of the death of Herod the Great. Traditionally, Herod was considered to have died in 4 B.C., and this is for three main reasons:

1) Herod's three sons, who divided the kingdom among themselves, all seem to have begun their reigns in 4 B.C., and this implies that Herod died in that year.



2) Herod died between an eclipse of the moon and the following Passover, and this eclipse is commonly identified as that of March 13, 4 B.C. If so, Herod would have died on about April 1, 4 B.C.

3) Additionally, Joseph and Mary went to Bethlehem as a result of a decree of Caesar Augustus, the first emperor of Rome. If this decree is identified with the tax of 8 B.C., Christ was born in 8 or 7 B.C.

Let's look at each of these three factors.

Herod's will divided his kingdom among his three surviving sons. Coins minted during their reigns show that each son seems to have dated his authority as extending back to 4 B.C. In an important and controversial book *The Birth of Christ Recalculated*, Ernest Martin, of the Foundation for Biblical Research in Pasadena, argues that the situation is not so simple, and he offers the following reconstruction of the events. Herod suffered a grave political demotion in 4 B.C. as the result of a misunderstanding over raiders he sent into Arabia to suppress robbers hiding there. Augustus condemned Herod, removed his title "Caesar's Friend" *(amici Caesaris)*, and relegated him to the lower position of "subject." This loss of status was a serious matter. Its ramifications eventually included Herod's execution of his own son, Antipater, and others in a show of loyalty to Augustus that happened immediately before Herod's death. The execution, however, created a problem in political bookkeeping. Upon his fall from favor with Augustus, Herod had named Antipater as co-regent, but the now discredited (and executed) son's regnal years were no longer valid. Martin suggests that Herod's reign was seen to have officially ended with his disgrace, not death, in 4 B.C., while his succeeding sons appropriated Antipater's regnal years and incorporated them into their own reigns. The details are not clear, but similar situations can be found in history.

Ormond Edwards, in *The Palestine Exploration Fund Quarterly*, has since offered another revision of the date of

Herod's death that produces the same final results. According to Edwards, the impression of co-regencies in 4-1 B.C. is only an illusion created by the interplay of the two calendars in use at the time. The error was originally made by the historian Josephus, who misused the ecclesiastical and civil calendars and later compounded his error. After an involved and esoteric discussion of the different calendars and their interactions, Edwards concludes that Herod died early in 1 B.C.

Martin's main contribution to the resolution of the problem of the nativity is his convincing demonstration that the lunar eclipse that preceded Herod's death could not have been the eclipse of 4 B.C. Josephus tells us in his *The Antiquities of the Jews* that Herod died following a lunar eclipse but prior to the following Passover, and this is one of the few clues in dating the nativity that is not doubted. The dates and times of past eclipses can be calculated with great accuracy, and Table 2 lists all lunar eclipses visible from the Middle East during the

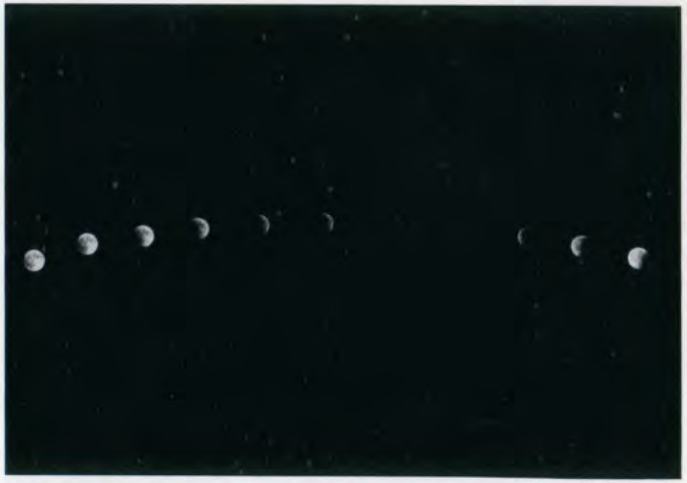
Table 2

Lunar Eclipses
8 B.C. to 1 B.C.

| Date of Eclipse | Type | Next Passover | Months Between |
|---|---|---|---|
| 18 Nov., 8 B.C. | partial | 27 Mar. 7 B.C. | 5 |
| 23 Mar., 5 B.C. | total | 21 Apr., 5 B.C. | 1 |
| 15 Sep., 5 B.C. | total | 11 Apr., 4 B.C. | 7 |
| 13 Mar., 4 B.C. | partial | 11 Apr., 4 B.C. | 1 |
| 9 Jan., 1 B.C. | total | 8 Apr., 1 B.C. | 3 |
| 29 Dec., 1 B.C. | partial | 29 Mar., 1 A.D. | 3 |

The eclipses of 15 September, 5 B.C., and January 9, 1 B.C., extended into the following date.

*Opposite: Herod the Great suffered a slow and agonizing death and did not leave this life gracefully. (Lois Cohen, Griffith Observatory)*



*During a total lunar eclipse, the moon darkens and turns red—an ominous sight for superstitious people. Top: The stages of the lunar eclipse of July 5, 1982, at 15-minute intervals (photograph by George Peirson). Bottom: The same eclipse at maximum (photograph by Bob Webb).*



years 8 to 1 B.C. Because Herod's sons seem to count their reigns as having begun in 4 B.C., historians had concluded that the partial eclipse of March 13, 4 B.C. was the one associated with Herod's death. Martin shows that this is unlikely because too many reliably documented events took place between the eclipse and the following Passover to fit within so short a period as 30 days. Several critics during the past century have made essentially the same argument. Martin drew upon their work, but he deserves credit for working out the chronology in detail[1].

This is the sequence of events between the eclipse and Passover as Josephus recounts it. On the night of the eclipse, two rabbis, who had earlier torn down a golden eagle that Herod had erected over the eastern gate of the temple, were burned alive. Herod, who suffered from dropsy, ulcer, fever, convulsions, and "loathsome breath," fell worse, and his physicians recommended bathing in mineral water. Herod then traveled from Jericho, where he passed the winters, to the baths of Callirrhoe on the Dead Sea for treatment. Despite immersion in a vat of hot mineral oil, his condition worsened, and after several days he returned to Jericho. Knowing that he was near death, he ordered many prominent Jewish elders from all over the kingdom to assemble at his palace. He secretly planned to slaughter them on the day of his death to insure that there would be genuine mourning during his funeral. Messengers were sent out, in due time the elders assembled, and they were locked up in the hippodrome. Herod had previously sent couriers to Rome to ask permission of Augustus to execute Antipater, Herod's son who had been implicated in an earlier rebellion. These couriers returned with official assent, and the execution was carried out immediately. Herod himself died five days later ("like a dog," according to his enemies), and preparations began for an elaborate funeral—the grandest ever, according to Herod's instructions. The royal regalia were brought from Jerusalem and army commanders were summoned from all

[1] This is discussed by Joseph Ciotti in the *Griffith Observer*, December, 1978, pp. 9-11.

parts of the kingdom. Bare-footed officials carried Herod's bier in stately procession on their shoulders 23 miles to the burial site at Herodium, a fortified mountain south of Jerusalem. After the traditional seven days of mourning (which began with the burial, not death, of Herod), the funerary feast was held. Then normal administrative business resumed. The new king, Archelaus, heard public petitions, liberated the Jewish prisoners from the hippodrome, made changes in the ranks of the army, decided several lawsuits, and "did many other things." *Then* the Passover occurred.

The eclipse in March, 4 B.C. was followed by the Passover one lunar month later. It's not possible to compress all that happened into so short a time span. The eclipse-Passover combination of January, 1 B.C., however, allows three months, an adequate amount of time.

There are additional and compelling reasons for rejecting the eclipse of 4 B.C. That eclipse fell amid the holy days of Purim, and to have burned the two patriotic rabbis then would have caused a tremendous popular uproar that would have been political suicide for Herod. The eclipse of 1 B.C. did not fall on a festival day, and the executions may even have been delayed until the night of the eclipse for dramatic purposes. Moreover, despite its portrayal in many planetarium shows, the eclipse of 4 B.C., which took place between 2 and 4 a.m. local time, was **partial** (magnitude 0.37) and would have been difficult to observe.

Martin has also identified the "tax" that sent Joseph and Mary to Bethlehem, and it's not the tax of 8 B.C. so often cited in planetarium shows. It is often said that Joseph and Mary went to Bethlehem to pay their taxes and that, according to an inscription found on the ruined Temple Augusteum in Turkey, this was the empire-wide tax of 8 B.C. In reality, however, this particular tax was levied only on Roman citizens and would not have applied to Joseph and Mary. In a regular taxation, Mary would neither have had to accompany her husband nor have had to leave Nazareth. It is much more likely that this "tax" was actually an enrollment, or census—



an oath of allegiance to Augustus Caesar on the occasion of his Silver Jubilee, when he was awarded the title *Pater Patriae* (Father of the Country) on February 5, 2 B.C. This oath was mentioned by Josephus ("When therefore the whole Jewish nation took an oath to be faithful to Caesar...") and others, and it would have been required of all adults including non-citizens. Being of royal lineage ("of the house of David") *both* Joseph and Mary would have had to go specifically to Bethlehem ("the city of David"). Bethlehem was crowded because others were there for the same purpose. Martin argues that a decree went out requiring all adults to register their allegiance, and that the completed enrollment was presented to Augustus as part of his Jubilee celebrations.

*Caesar Augustus, First Emperor of Rome.*

If this oath were administered in 3 or 2 B.C., and Mary were pregnant with Jesus at that time, then Herod could not have died as early as 4 B.C.

There is an additional problem with the year 4 B.C. that has long puzzled historians. Within two months of Herod's death the Jewish people began a revolt that developed into the most significant conflict in Palestine between 63 B.C. and 66 A.D. The war was so serious that all three of the legions in Syria plus auxiliary forces (20,000 in all) were needed to quell it. Upon its conclusion, 2,000 rebels were crucified, 30,000 Jews were sold into slavery, Archelaus was deposed and the kingship abolished, and Judea was reduced in independence to a province. There is, however, no Roman record that indicates a

Palestinian war between 4 and 1 B.C. By his own account, Augustus was demobilizing the army during a period of peace that lasted from 7 to 2 B.C. The temple of Janus was closed in about 3 B.C., an act that symbolized that peace was now within the Empire. Augustus did not receive any "imperial acclamations" between 8 B.C. and 1 A.D., although one was customarily awarded following a victory on foreign soil. If Herod died in the spring of 4 B.C., and the war was fought and won that summer and fall, an acclamation should have been awarded in 3 B.C.

*According to the biblical account, Joseph and Mary went to Bethlehem for an enrollment, or registration, required of everyone. This was not the tax of 8 B.C., as is often supposed. Ernest Martin identified the enrollment as a loyalty oath to Caesar Augustus on his Silver Jubilee in 2 B.C. (Lois Cohen, Griffith Observatory)*



Martin shows that the rebellion against Archelaus was probably fought in 1 B.C. Inscriptions found in Greece in 1960 show that a major war was fought in the Middle East (probably by Faius Caesar, grandson and heir of Augustus, and by Quintillius Varus, governor of Syria) in 1 B.C. This was after the demobilization of the army had ended and just before Augustus's fifteenth imperial acclamation in 1 A.D. This fits with a later date for Herod's death, but not for a death as early as 4 B.C.

It seems more likely that the eclipse associated with Herod's death was the one of January 9-10, 1 B.C. That eclipse was total, and it lasted from about 11:30 p.m. until 3:00 a.m. Assuming that the sky was free of clouds, it would have been widely seen and noted throughout the Middle East. The Passover followed 90 days later, a comfortable amount of time for all that happened. The history then straightens itself out to yield this scenario:

In 4 B.C., Herod fell from grace. He may have named his youngest son, Antipater, to share his rule.

In 3 B.C., a decree went out ordering all residents of the Empire to swear their allegiance to Caesar. Joseph and Mary took this oath in Bethlehem late in 3 B.C.

In February, 2 B.C., Augustus celebrated his Silver Jubilee. It was a time of peace, and legionnaires were discharged with bonuses.

In Judea, Herod executed the rebellious rabbis on the night of January 9. His health worsening, he journeyed to the mineral baths of the Dead Sea. They failed to improve his deteriorating condition and, after executing his son Antipater, he died. After a stately funeral and week of mourning, Archelaus assumed the kingship and state business resumed. Then the Passover occurred. The great rebellion began at the Passover

and ended later that same year.

In 1 A.D. (the year immediately following 1 B.C.), Augustus was awarded his fifteenth acclamation for crushing the revolt, and Judea was further absorbed into the Empire.

The eclipse of 1 B.C., one of more than 30 that occurred during Herod's reign, was singled out for commemoration by Josephus because the great rebellion traced its roots to the execution of the rabbis on the night of the eclipse.

In this chapter we attempted to determine the date of Christ's birth so that we would know when to look into the sky for the star seen by the magi. We've found that the history of that period is surprisingly obscure, and even specialists disagree on most points. Although it was generally accepted that Herod died in 4 B.C. (and that consequently Christ was born a few years prior), it had always been recognized that such an early date produced serious problems such as the timing of the Jewish rebellion.

Martin has rewritten the history of this period, moving Herod's death forward by four years and in the process cleaning up a slew of nagging problems. Prominent classical historians are taking his work very seriously, and although it will be years before a consensus is reached, an impartial referee[2] would probably conclude that Martin's chronology is correct.

We therefore assume the period 3-2 B.C. for Christ's birth and continue in our quest for the identity of the star by examining the description we have of it and by carefully considering the people who claimed to see it.

[2] None exist.



# PART TWO

# *Who Were the Magi?*

he star itself is described only by Matthew. This is the text of the description as it appears in the familiar King James version of the *Bible*, printed in 1610 (with modern spelling and punctuation):

*Now when Jesus was born in Bethlehem of Judea, in the days of Herod the king, behold, there came wise men from the East to Jerusalem, saying, "Where is he that is born king of the Jews, for we have seen his Star in the East and have come to worship him."*

*When Herod the King had heard these things, he was troubled, and all Jerusalem with him. And when he had gathered all the chief priests and scribes of the people together, he demanded of them where Christ should be born. And they said unto him, "In Bethlehem of Judea, for thus it is written by the prophet."*

*Then Herod, when he had privily called the wise men, inquired of them diligently what time the star appeared. And he sent them to Bethlehem, and said, "Go, and search diligently for the child, and when you have found him, bring me word again, that I may come and worship him also."*

*When they had heard the king they departed, and lo, the star which they saw in the East went before them until it came and stood over where the young child was. When they saw the star, they rejoiced with exceeding great joy.*



In this intriguing but brief account, Matthew gives us two important clues that can help us identify the star. The first is that it was seen over an extended period of time—several months, perhaps—and so it was something that remained in the sky or that reappeared periodically. Second, only the magi, or wise men, saw it. To understand what the star was, then, we should begin by knowing who the magi were, and that takes us back in time more than 2,500 years.

The magi appeared at least six centuries before the birth of Christ, and they were originally one of the six tribes of the Medes. They were a priestly class that adapted and survived several centuries of change. While under the Medes, they were very powerful—occasionally even more powerful than the king himself. They survived the transition of power from Medes to Persians in the middle of the sixth century B.C. and the later emergence and then dominance of Zoroastrianism as the region's main religion. By the time of the Greek historian Herodotus (around 450 B.C.) they had worked themselves into the Zoroastrianism priesthood. Their political power then slowly declined. By the time of the birth of Christ they were simply respected as "wise men" in an age when few people could read or write.

In addition to the conventional duties of priesthood, such as performing ceremonies and coronations, the magi advised the king on divine matters. They specialized in secret lore, and they interpreted dreams, omens, and astronomical events. The word "magi" comes from the same word as "magic," and this suggests their affinity for the dark arts. The form of astrology that is familiar to us today arose in Babylonia, and was certainly used by the magi. Some editions of the Bible translate magi as "astrologers," others as "magicians," still others simply as "wise men."

Where did the magi mentioned by Matthew come from? We cannot be certain, but Babylon is a likely place. There was a large Jewish population remaining in Babylon from the first exile, and those magi were certainly familiar with the old Hebrew prophecies. They surely would have known that it

was commonly expected that a messiah would arise from Judea and redeem Israel. One well-known prophecy in particular, by Daniel, could have led them directly to Jerusalem.

Jerusalem had been destroyed by the Babylonians in the sixth century B.C. Daniel, one of the earlier magi, had prophesied that Jerusalem would one day be rebuilt, and from it would arise a messiah who would rule the world. He was vague on when this would happen, but it was generally understood that it would occur during the first century B.C. or A.D. The prophecy was even known outside of Judea (Nero was apparently advised by his court astrologers to move the capital of the Roman Empire to Jerusalem because that city was destined one day to become the capital of the world), but how widespread knowledge of these prophecies was is in dispute. Herod was not very familiar with them. That's why he consulted his Jewish advisors when approached by the magi.

When the magi saw their sign—the star, whatever it was—they remembered the prophecies, and that was their cue to leave Babylon (or wherever) and go to Jerusalem to search for the newborn king. They went specifically to Jerusalem in order to ask Herod if he knew the whereabouts of the newborn "King of the Jews." After consulting his advisors, Herod sent the magi on to Bethlehem.

Unfortunately, we have *no* information about these specific magi. We don't know their names. We don't even know how many of them there were. And we have equally little information about the star that they saw. This is frustrating not only to historians, but to artists and to anyone else who has tried to visualize the ancient scene. And so through the centuries—for the last 2,000 years—many artists in different cultures in different countries in different eras have portrayed both the magi and the star in a bewildering variety of ways.

Although it is traditional to show three magi and three gifts, the gospel writers do not specify the number of magi. Some early sources mentioned as many as twelve, but their number is generally reckoned as three because of the three gifts they



bore. One is often black because, in later tradition, they were portrayed as kings representing Arabia, Persia, and Africa, the point being that all the known world worshipped the baby Jesus. Their names—Balthazar, Melchior, and Gaspar—date only to the sixth century. The truth is, however, that we have no useful description of these specific magi.

*The Magi apparently thought that Herod already knew about the young Christ, as they asked him where the child had been born. This was news to Herod, who immediately became interested. (Lois Cohen, Griffith Observatory)*

It's important to remember that most modern theologians and historians consider the story of the magi and the star to be a myth invented later to authenticate Christ's birth. If this is the case, the role of astronomy is irrelevant. But the magi *were* interested in astronomical phenomena. They watched the sky, and they watched it carefully. So if the star were something seen in the sky—and after all, it was called a "star"—then perhaps we can identify it.

Knowing that Christ was born "in the days of Herod the King," and believing that the best date for Herod's death was late January, 1 B.C., we can turn to the sky of that era and attempt to identify the star.

In holiday planetarium shows, you'll sit under the sky as it appeared in Herod's time, almost 2,000 years ago. This is not as hard to simulate as it might seem. There are few differences between the winter sky you see from your home town and the sky that Herod saw from his winter palace at Jericho. Most are minor; one is important.

One minor difference is that Jericho is at the latitude of San Diego, California, or Savannah, Georgia, and if your town is far north or south of this latitude, the entire sky will be shifted accordingly. For most of the United States the shift is less than 10°, an amount that most people would not quickly notice.

Another difference is that there was no north star at the time of the birth of Christ. The star that would one day be called Polaris and that would one day lie above the north pole of the earth did exist, but the earth's axis pointed away from it. No bright star lay near the north celestial pole to guide the magi on their journey. This change happens because the earth slowly wobbles as it spins on its axis. That wobble causes the axis to point in different directions in different eras. This too is relatively minor difference that you would not immediately notice.



Nor have the stars themselves changed. They last for millions or billions of years, and a few thousand years is nothing to the stars, or to the patterns they form—the constellations. Herod perhaps knew the stars and their patterns. The constellations that Herod saw are precisely the same constellations that we see 2,000 years later, and they were already ancient when Herod was alive. Some of them are prehistoric.

The planets, of course, are in different parts of the sky, but they *always* move. No expert in astronomy, no matter how familiar with the sky, could be dropped into a remote time period and identify the year solely upon the movements of the planets without first ploughing through a thick tabulation of planetary positions.

The main difference between the sky that Herod saw and the sky you'll see, especially from Los Angeles, is that Herod *could* see the stars, and from our modern cities we can't, and that's a big difference. It's part of the price we pay for living in brightly lit cities: Along with our security and our sanity, we've lost our view of the night sky. For too many of us, we've lost that view without even realizing what we've given up.

And so our planetarium instruments can easily recreate the sky as seen in ages past. We adjust the latitude, set the axis to its proper orientation, position the planets properly (this is the hard part, and it may take a few hours), set the date and time, and *voilà*—we're under the sky as Herod saw it from Jerusalem, when the wise men told him about a special star.

We are almost ready to identify that star, but before we do we must answer one important question: Why is it that only the magi saw the star? Why didn't Herod see it too? Remember that Herod had to ask the wise men what *they* saw—he "inquired diligently of them." Why?

To solve this problem we need to know how the magi's way of looking at the sky was different from Herod's.

*A planetarium theater transports you to distant lands of long ago. This is the Griffith Observatory theater with its Zeiss Mark IV. (photograph by Bob Webb)*

We know that the Jews, who made up the bulk of the population of Herod's kingdom, were not particularly interested in astronomy. They were interested in God as revealed in the sky, but not so much in the sky itself, and in fact they were actively discouraged from delving too deeply into matters that perhaps should remain mysterious. They did no systematic skywatching, and they didn't pay too much attention to what was happening up above. Consequently, Jewish astronomy was particularly undeveloped.

Herod, and those Jews who were educated in the Greek and Roman tradition, would have been taught that the earth is round and sits at the center of the entire universe. Everything moves around the earth once each day, while at the same time the sun, moon, and planets slowly drift from constellation to constellation. All these motions happen because of



some sort of gearwork or clockwork mechanism that operates according to laws that are not yet perfectly understood but that at least are knowable in principle, and it would just be a matter of time before someone clever enough would figure it all out. And so Herod didn't give the sky much thought either.

The magi, on the other hand, came from an entirely different culture. They came from the area around Babylon and included in their beliefs astrology, a similar form of astrology

*The magi (incorrectly called "kings") were a priestly class who interpreted dreams, omens, and astronomical events for the king. (Lois Cohen, Griffith Observatory)*

to that which has survived even to this day (a testimony to the remarkable durability of superstition). They believed in the magic of the stars. They did not believe that the sun and planets move according to as yet undiscovered laws of motion, but rather that the gods—the many gods—were pushing the planets around and causing them to do things and go places. These were the same gods that meddled with our lives down here on earth. The gods sometimes had it in for us and caused a famine or a plague. And so if it were the same gods that meddled with our lives that controlled the motions of the planets, then perhaps by watching the motions of the planets we could read the minds of the gods and tell what was in store for us below.

The magi looked at the sky in an entirely different way than the Greeks, Romans, or Jews, and that must be why they saw something that Herod and his advisors missed. Armed with this knowledge, let's look into the sky and try to find something sufficiently unusual that it would have started the magi on their long journey.

# PART THREE

# *What Was the Star?*

Through the years, astronomers and others have proposed a variety of objects for the Christmas star. These include various comets, an exploding star, and a conjunction, or grouping, of planets. Although interest today focuses almost entirely on conjunctions, each of the others has its small band of followers who occasionally make the news. For example, when Halley's Comet returned in 1985-86, several people suggested it might, on an earlier passage, have been what guided the magi on their journey.

One especially vociferous group holds that the star was a miracle created especially by the Lord. Such a suggestion cannot be proved or disproved, and it is entirely outside the bounds of science. There's no need to resort to miracles, however, given the actual astronomical events of the time.

Remember that we must first find, from historians, the date of the Nativity. *Then* we look into the sky of that period and try to identify the star. It doesn't work the other way around. The astronomy follows the history. The description of the star is far too vague to use it to determine the date of the Nativity. It is also incorrect to select the most spectacular astronomical event of the decade when Christ might have been born and declare that Christ's birth coincided with it. Although the historians are not yet in agreement, they have far more material to work with than do the astronomers, and the Nativity is primarily an historical problem. Also, astrologers can find something reasonably interesting in the sky in *any* year—comets and conjunctions occur frequently. "If you'll pick a year, I'll find a Christmas Star" is a fair assessment of the actual situation.



## Comets

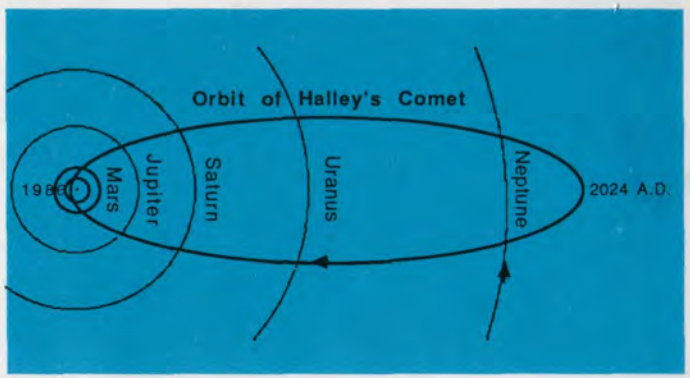
Comets are strange apparitions that come and go without warning (at least to ancient people, who did not understand how they orbit the sun). Comets appear out of nowhere, stay a short while, and then disappear. They seem to violate whatever rules govern the rest of the universe. They break the harmony and predictability of the sky and for that reason were considered omens. To people who watch the sky for signs, comets are important omens.

People sometimes confuse comets with meteors. Comets may look like meteors if you're looking at photographs in a

*Because comets appeared without warning and seemed to violate the rules that governed the rest of the universe, they were regarded as significant omens of change. Halley's Comet, March 22, 1986. (photograph by Bob Webb)*

book, but they're really quite different. Meteors flash over our heads through the earth's atmosphere in seconds and are gone forever, while a comet orbits around the sun and is visible for weeks at a time. A meteor is the light from a small particle burning up in the atmosphere; a comet is a large object in orbit around the sun. Meteors shine because the air around them is so hot it glows; comets shine by reflecting sunlight (and by fluorescence).

Comets travel around the sun, but their orbits take them far from the sun and then near again. That's why they come and go so unexpectedly. We don't see them until they move in close to the sun and the earth.




*Halley's Comet travels on an orbit that brings it near the sun for only a few months of its 76-year orbit. (John Mosley, Griffith Observatory)*

A comet is a chunk of ice—a frozen snowball—only a few miles across. When that snowball is farther from the sun than Mars or Jupiter, it's frozen solid, and it's too small and faint to be seen. As it approaches the sun, it begins to get warm. Sunlight thaws it. The ice does not melt, however, in the vacuum of space, where there are no liquids. The ice evaporates (or sublimes) and turns directly to a gas. Gases are given off and



form a long and beautiful tail. The comet is at its brightest, and its tail at its longest, when the comet is near the sun. As it recedes from the sun, the comet grows cooler, gases are no longer evaporated, the comet grows fainter. Eventually it disappears from sight, not to return again for many years.

Comets follow the same laws of gravity that all other celestial objects obey. As Kepler discovered early in the seventeenth century, the closer an object is to the sun, the faster it travels. Halley's Comet, for instance, when it is beyond Uranus and at the far end of its orbit, travels only a bit faster than a modern fighter plane (2,000 m.p.h.), but it travels at 7 times the speed of the Space Shuttle (122,000 m.p.h.) when closest to the sun. Halley's Comet is visible without a telescope for only about 4 months of its 75½ year-orbit.

So a comet seems to appear out of nowhere, visit the vicinity of the sun for a short time, and then disappear back into the depths of space.

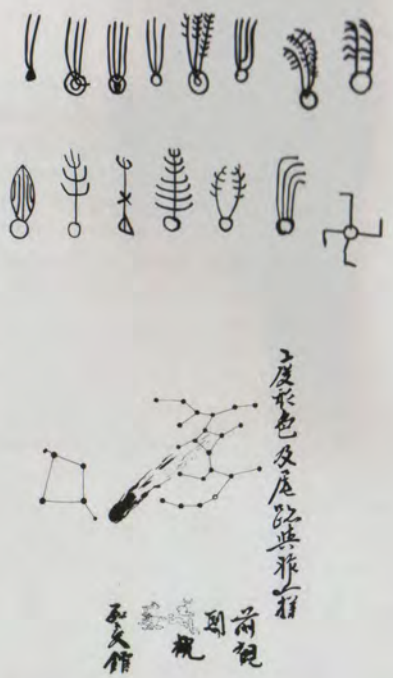
Could such an interesting object as a comet have been the Christmas Star?

We don't think so, for several reasons.

First, we must ask ourselves why it was that Herod and his advisors didn't see it. A bright comet is in the public domain, but whatever it was only the magi saw it. This is a serious problem.

Second, we can ask if there are any records of comets that were seen in this era. The Western world paid very little attention to the sky at this time, and Roman astronomical records are almost non-existent. The Chinese, however, were excellent astronomers who kept accurate records of omens in the sky. Imperial astronomers scanned the sky all night, every night, and noted in the Imperial Archives all that they saw that was out of the ordinary. The emperor was alerted if the omen seemed significant so that he could take appropriate action. These ancient imperial records still survive. From

them, we find that there were several comets seen during the broad period when Christ might have been born. The brightest of these was seen for 56 days in 12 B.C., and it would later be known as Halley's Comet. A tail-less comet appeared near the star Arcturus in 10 B.C. A comet with a tail (it might have been an exploding star surrounded by "rays"—the record is not clear) was seen for 70 days near Capricornus in 5 B.C. Another tail-less comet appeared briefly in Aquila in April, 4 B.C. No other comets are recorded until after the year 1 A.D.



*Oriental records still survive of comets that appeared long ago. Top: Comets on silk from the Han Dynasty. Bottom: A comet seen from Korea, October 28, 1664. (redrawn by Joseph Beniaz, Griffith Observatory, from Han dynasty tomb at Mawangdui, central China)*

Apparently, there were no comets seen in 3 or 2 B.C., the years in which we are most interested. The other comets appear too early. Although Halley's Comet appeared up to ten years before the Nativity according to the best reconstruction of the history, and five years before the Nativity taking the earliest arguable year, it is still suggested from time to time that Halley's was the star seen by the magi. During Halley's last return, a lecturer at the Hebrew University in Jerusalem proposed that Christ was born late in 12 B.C. and that the magi followed Halley's Comet as their star. Authorities are almost unanimous in rejecting this as doing too much violence to the known history of the period.



There's a third reason for thinking that a comet was not the Star of Bethlehem: Although comets have always been regarded as omens, they were almost universally considered to be omens of *evil*. They foretold a disaster—flood, plague, famine, the death of the king—but virtually never *good* news. Comets symbolized disharmony, change, and violation of celestial law. If the magi had seen a comet, it's highly unlikely that they would have thought that the birth of a savior was at hand.

## Exploding Stars

Usually the stars shine quietly and form a permanent background against which change is measured. But, occasionally, a star will flare up or explode. Such an explosion can be spectacular. It's certainly unexpected, and it's precisely the sort of thing that an astrologer would consider a sign from the gods.

The idea that the magi saw an exploding star dates to the famous German astronomer Kepler in the early seventeenth century. It was Kepler, a contemporary of Galileo, who figured out how the planets orbit the sun. Today we say they orbit on Keplerian ellipses and follow Kepler's laws of motion.

*The German mathematician Kepler (1571-1630) worked out the laws of the planetary motion and was the first to suggest that a conjunction of planets was involved in the explanation of the magi's Star. (Lois Cohen, Griffith Observatory)*


*Even well into the European Renaissance, comets were still feared as evil omens. This German broadside warns of the comet of 1577.*



Neither Kepler nor any of his contemporaries had any idea of why a "new star" should appear. Many believed that the stars were distant suns, but they hadn't the foggiest notion of what made a star (or the sun) shine, and even less of why one might explode.

On October 10, 1604, a "new star" appeared in the sky. Kepler observed it carefully until it faded into the sun's glare the following year, and today it is called "Kepler's Star." No exploding star since has shone more brightly.

Kepler believed that there was a connection between the sudden appearance of this new star and a gathering of three planets that was in progress nearby. The planets Mars, Jupiter, and Saturn came into close proximity late in 1604 in a "massing" that had been awaited with great anticipation. Astrologers predicted that the massing would produce a comet, and so, according to Kepler, "Some watched to correct their ephemerides, some for the sake of pleasure, some because of the rarity of the occasion, some to verify their predictions, and others, indeed, to see if there would be a comet as had been expressly predicted by the astrology of the Arabs." No comet was produced, but a new star as bright as Jupiter burst forth between Jupiter and Saturn, which themselves were only 9° apart. Kepler assumed that the star was somehow produced by the planets.

Kepler, a bit of a mystic, suggested that a similar miraculous "new star" had been seen by the magi. He calculated that a massing of Mars, Jupiter, and Saturn had occurred in 6 B.C., and speculated that that massing produced a bright star similar to the one that he personally observed. He believed that such a star had been placed over Bethlehem specifically to alert and guide the magi. "I do not doubt but that God would have condescended to cater to the credulity of the Chaldeans," he wrote.

Today we know that there are two separate reasons why a star might explode. They are different in origin, although the effect as seen in the sky is the same—a "new" star appears

where none had been seen before. The most common type happens to binary stars, which are twin stars in orbit around a common center of gravity. If the two stars are relatively close and one expands as it evolves, the expanding star can dump material onto its companion. That companion flares as it receives fresh material onto its surface, and such a flash is called a "nova." The star increases in brightness by up to 100 million times, and it remains bright for a few weeks before fading back to its former obscurity. If the nova is very close, the "new star" can be quite bright. A nova in the constellation Cygnus in 1975 reached second magnitude and was as bright as one of the stars of the Big Dipper.

Only the largest stars explode in what is called a "supernova." Unlike a nova, a supernova explosion happens only once to a given star. There are two ways in which a star can become a supernova. In the first, an old star, called a "white dwarf," reacts when gas from a companion star is dumped on it. In the second type, a giant star's internal pressure gets out of balance, the core temperature rises out of control, and the star explodes. It leaves behind a rapidly expanding shell of debris and, at the center, a neutron star or possibly even a black hole. That neutron star sends out pulses of radiation and so gives itself away to modern astronomers. Such an exploding star was seen in the Large Magellanic Cloud in the southern hemisphere in 1987.

Of course the magi didn't know a thing about pulsars, neutron stars, or nebulae, but might they have seen an exploding star?

Again, by consulting the Chinese records we find that the *hui* comet in 5 B.C. and the *po* comet in 4 B.C. might have been novae, but they're both a year or more too early. There are no exploding stars listed in their annals for the years 3 or 2 B.C. And again, anyone could have seen it, including Herod, who would not have had to ask the magi what they had seen.

Although the suggestion that a nova or supernova was the Star of Bethlehem is an old one that dates back 3½ centuries



*The Crab nebula, in Taurus, is the remains of the outer layers of a star that exploded in 1054 A.D. At brightest, the exploding star could be seen in the daylight. (Palomar Observatory photograph)*

to the time of the great Kepler himself, the idea has few followers today. We should look further.

What else in the sky can do interesting things—the sort of things that would excite a "wise man?"

## Planets, Bright and Pretty

A planet can put on an interesting show if atmospheric conditions are right.

When a bright planet sits near the horizon and shimmers through turbulent layers of atmosphere, it can twinkle wildly, change colors, and do weird things. The planet Venus has been reported as a UFO more often than any other single object in the sky! Two thousand years after Herod, bombers enroute to Japan during World War II would try to shoot it down, and Alabama highway troopers would chase it across the countryside at high speed. The UFO that President Jimmy Carter saw was the planet Venus. Today, when Venus, Mars, or Jupiter shine through shimmering layers of air, observatories and news stations get many calls from anxious people wanting to know what they're seeing.

But this is because we are not accustomed to looking at the sky. In contrast, the magi were competent observers who knew the sky well. They knew which planet was which, and even when a planet was shimmering in the low layers of the atmosphere they would have known what was happening and wouldn't have been fooled.

If the magi followed a planet as their guiding star, it was not because of that planet's physical appearance. The magi's form of astrology placed particular emphasis on the *motions* of the planets and upon their *positions*. The magi were vitally interested in where the planets were in relation to other planets and to the stars and constellations that share the sky with them.



We need look at the planets during the years in question (3 and 2 B.C.) and see if the planets went through any strange motions or formed any interesting patterns. Using his newly found equations of planetary motion, Kepler could calculate where the planets were in 3 B.C., but it was an enormous task. Today, microcomputers can accomplish the task in seconds with a precision Kepler never imagined[3], and planetarium machines can project the ancient skies overhead for all to see as if they had been there.

## Planetary Conjunctions

The planets are not found just anywhere in the sky, and they do not move at random. This is because the solar system is quite flat. As we see them from earth, the planets, sun, and moon move along a line called the *ecliptic*. The sun stays on the ecliptic (and defines it), while the moon and planets do not stray far from it. The planets all orbit the sun in the same direction (counterclockwise as seen from above the sun's north pole) and each moves at a relatively constant speed, but because we too are moving it looks like the planets change speeds and sometimes even move backwards. Each planet travels at a different speed, and so they frequently overtake and pass one another in what we call a *conjunction*. When two planets are in conjunction, it looks like they are close together, but they are actually separated by many millions of miles. They only look close to each other because they are lined up as seen from earth.

If the planets stayed exactly on the ecliptic, each time one planet passed another it would move in front of it. In reality, their paths are tilted slightly to the ecliptic. When they pass

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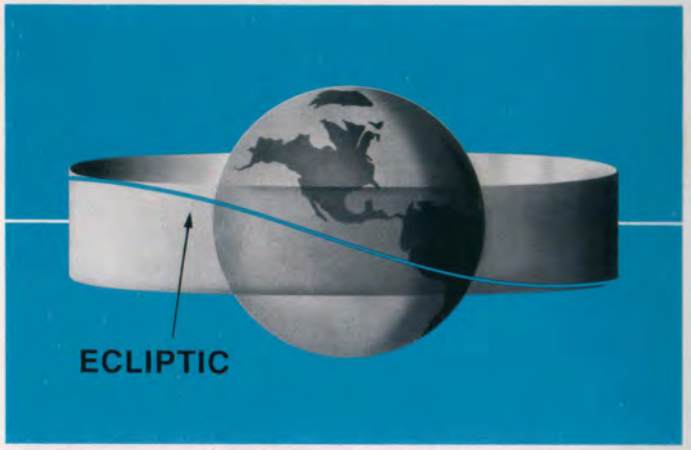
[3] Personal computers can now *calculate* the positions of the planets as they appeared in 3 B.C. with far greater accuracy—1/100 degree—than astronomers could *measure* them in Kepler's day.

in an east-west direction, they frequently miss by several degrees. It's unusual for two planets to pass within less than one degree of each other. In general, the closer the planets are to each other when they pass, the more interesting the conjunction.




*The planets do not stray far from the ecliptic, the apparent yearly path of the sun. The ecliptic defines the plane of the solar system. (Robert Kline, Griffith Observatory)*

If we begin our search for interesting conjunctions in January, 3 B.C., and move forward through time, we find that the year had a quiet start. On May 19, Mercury passed 0.7° north of Saturn, but Mercury moves so fast that it is in conjunction with each planet at least once a year. Such a conjunction, although rather close, would have had no major significance to the magi.

(The circumstances of these conjunctions were recently recalculated to greater accuracy by using planetary position programs developed by Bretagnon and Simon and published in 1986. The major conjunctions are summarized in Table 3.)



Table 3

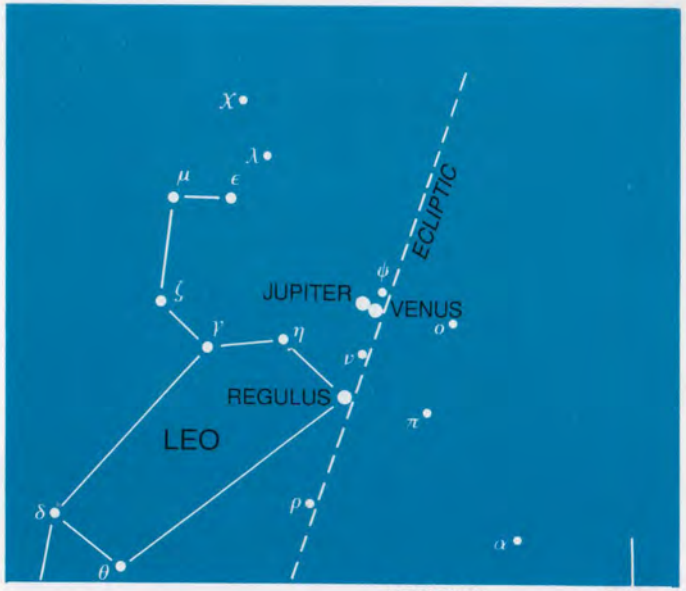
Major Conjunctions
3 and 2 B.C.

| Date | Time | Objects | Separation |
|---|---|---|---|
| 19 May, 3 B.C. | 22:47 | Mercury-Saturn | 0.67° = 40' |
| 12 June, 3 B.C. | 16:06 | Venus-Saturn | 0.12° = 7' |
| 12 Aug., 3 B.C. | 5:20 | Venus-Jupiter | 0.07° = 4.3' |
| 31 Aug., 3 B.C. | 21:03 | Mercury-Venus | 0.36° = 22' |
| 14 Sep., 3 B.C. | 5:05 | Jupiter-Regulus | 0.33° = 20' |
| 17 Feb., 2 B.C. | 15:15 | Jupiter-Regulus | 0.85° = 51' |
| 8 May, 2 B.C. | 16:10 | Jupiter-Regulus | 0.72° = 43' |
| 17 June, 2 B.C. | 17:53 | Jupiter-Venus | 0.01° = 0.5' |
| 26 Aug., 2 B.C. | 15:15 | Mars-Jupiter | 0.10° = 7' |

Dates and times are expressed in Universal Time. Add $2^h\ 58^m$ to convert to Babylon local time. The northernmost planet is listed first. Angular separations are expressed in degrees and arcminutes (1 arcminute equals 1/60th of a degree). The resolving power of the human eye is about 3 arcminutes. I calculated the conjunctions in this booklet using Bretagnon and Simon's *Planetary Programs and Tables from -4000 to +2800* along with a program for Apple II computers (written by Peter Scott for the Griffith Observatory) that calculates angular separations and times of closest approach from a list of positions. Roger Sinnott of *Sky and Telescope* made more elaborate calculations for the June 17 event and found that, at their closest at 8:51 p.m. Babylon time, the two planets were 15° above the western horizon. Using the *Long Ephemeris Tape*, the most accurate ephemeris available, DeYoung and Hilton at the U. S. Naval Observatory found that the centers of the two planets came to within 25 arcseconds of each other as seen from the center of the earth. The major uncertainty in the Jupiter-Regulus conjunctions is in the position of Regulus in 3-2 B.C. Errors in the proper motion of Regulus could shift its position by as much as 1/8th degree and the times of the corresponding conjunctions by up to a day.

Venus moved into the morning sky late in January and, beginning then, rose shortly before the sun. On June 12, the "morning star" passed only 0.12° north of Saturn in a fine conjunction. They were not so close that their light merged, but it would have been a grand sight to see the two planets separated by an amount equal to 1/4 the diameter of the full moon. Even today such a close conjunction would be widely noted.

Jupiter reappeared from behind the sun around August 1. Two weeks later, on August 12, it was involved in a spectacular conjunction as Venus passed 0.07° north of Jupiter. This is exceptionally close, and it's equal to 1/7th the diameter of the full moon. As seen from Babylon, the two bright planets stood side-by-side and almost touching each other, low in the east,




*Venus and Jupiter passed to within 0.07° of each other on the morning of August 12, 3 B.C., in the constellation Leo. The star Regulus is to the right (west). (James Roth, Griffith Observatory)*



as the morning sky was beginning to brighten with the sunrise. Such a close conjunction is exceptionally rare, and it's precisely the sort of thing that would have caused the magi to sit up and take notice.

Not only is it important that this conjunction took place, but *where* it happened is equally important because of the astrology of the event. Although we don't believe in astrology today, of course, the magi did, and that is what's important here. This conjunction took place in the constellation Leo the Lion, near the bright star Regulus. Leo was the tribal sign of Judah, and as such was associated with the destiny of the Jews. (In *Genesis*, we read: "Judah is a lion's whelp..."). To the Babylonian and other astrologers, Jupiter was the king planet, and Regulus was the king star. The Babylonians called Regulus "Sharru," the king. Our name "Regulus" contains the root for "king," as in "regal." Venus was "Ishtar," a female, clearly important if you're anticipating a birth. Venus is still associated with femininity. Astrologically, this was an important conjunction. It was only the first of a series.

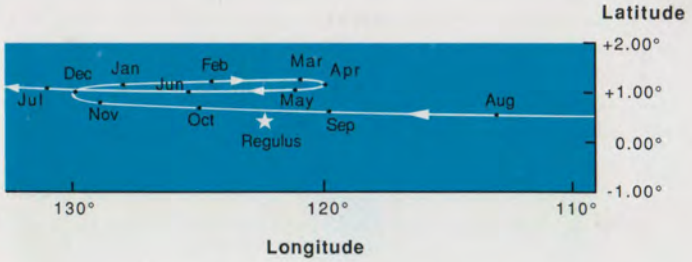
Almost three weeks later, on August 31, Venus and Mercury stood 0.36° apart in yet another very close conjunction. It, however, had little astrological significance as these two planets come into conjunction so frequently.

During this time Jupiter was moving eastward and towards the star Regulus. The symbolism was clear as the king planet approached the king star. They were in conjunction on September 14, when they were 0.3° apart. Jupiter then drifted on past, continuing on in its orbit around the sun.

Such a planet-star conjunction is not exceptionally rare. Jupiter is in conjunction with Regulus every 12 years without fail, although they seldom pass so close, and so this event alone is only somewhat interesting.

What is more interesting is what then happened later that fall and winter. Jupiter appeared to stop against the background of stars, as if it had changed its mind. It then began to

move backwards, and it passed Regulus a *second* time (on February 17, 2 B.C., when they were 0.85° apart).



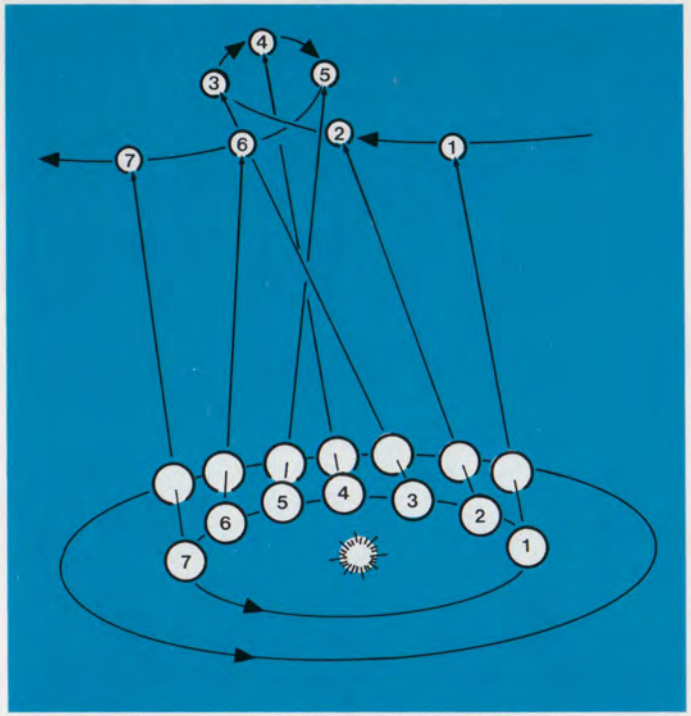

*Jupiter was in conjunction with Regulus on three occasions (a triple conjunction) during an eight-month period during 3 and 2 B.C. Each time, the planet passed less than 1° north of the bright star. The planet's position is marked for the first of each month. (John Mosley and Neil Passey, Griffith Observatory)*

Such mystifying motions were completely inexplicable to the magi, who hadn't the faintest idea of what was happening. We can understand if we look down on the solar system as seen from above. The planets don't back up—they always go around the sun in the same direction—but once a year Jupiter *appears* to back up as seen from the earth. That's because we are moving, too. The earth is moving faster than Jupiter on an inside track. If you draw an imaginary line from the earth to Jupiter, extend it on to the stars, and follow the motions of both planets, you'll see that during most of the year Jupiter appears to move counterclockwise against the background of stars. As we pass Jupiter, Jupiter appears to slow down, stop, and even back up for a few months. Then as we move on and away Jupiter resumes its normal forward counterclockwise motion. You get the same effect when you pass a slower moving car on the freeway—that car appears to move backwards



against the background of distant trees and hills even though you're both going forward.

So Jupiter moved backwards against the stars until it passed Regulus in this second conjunction (February, 2 B.C.). A few weeks later Jupiter paused, stopped once again, and resumed its normal forward motion. The magi knew from experience that Jupiter would have to pass Regulus a third time, and they would have been waiting. This third conjunction took place on May 8, 2 B.C., when the planet and star




*Jupiter appears to move backwards in a loop when the earth, which is traveling faster on an inside orbit, passes by. (James Roth, Griffith Observatory)*

were about 0.7 degree apart.

Such a triple conjunction—three consecutive conjunctions—is much rarer. It happens on the average once every 40 years, but it does not repeat at simple intervals. The last Jupiter-Regulus triple conjunction (prior to the one of 3-2 B.C.) happened in 15-14 B.C. There have been 54 since 3-2 B.C. The last was in 1979-80 but the next will not occur until the year A.D. 2039.

So the magi watched the king planet almost make a loop around the king star, passing it on September 14 of 3 B.C. and February 17 and May 8 of 2 B.C., passing within less than a degree on three separate occasions. This last event happened when Jupiter and Regulus were in the western sky, near the horizon shortly after sunset.

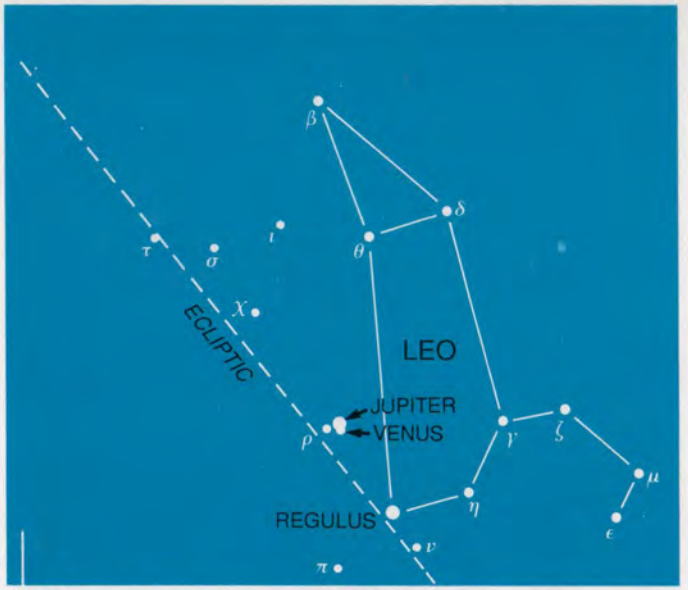
The best was yet to come.

In June, Venus reappeared from behind the sun and slowly drew close to Jupiter. The magi must have watched with interest. They saw that another Jupiter-Venus conjunction was about to occur, and they would have wondered just how close the two bright planets would come. They were not disappointed. On June 17, they saw them get very close indeed! New calculations by Roger Sinnott show that, as seen from Babylon, the two planets were 2.4 arcminutes apart and 30° above the horizon at 7:34 p.m., the end of civil twilight. (One arcminute is 1/60th of a degree, and the diameter of the moon is 30 arcminutes.) It would have been extremely difficult to distinguish them as separate objects. They moved closer still, and their light began to merge. They were at their closest at 8:51 p.m., by which time the sky was fully dark. They were still a comfortable 15° above the horizon. They were then separated by only one-half arcminute—so close that their disks almost overlapped (an occultation of Jupiter by Venus probably occurred as seen from the southern hemisphere). Even a good pair of binoculars would not have distinguished them as individual objects—and the magi did not have binoculars. For more than an hour, until they set at 10:06 p.m., the two



brightest planets shone as a single gleaming beacon in the west—the direction of Jerusalem—as seen from Babylon.

If the magi saw this exceptionally close conjunction of Jupiter and Venus on June 17, 2 B.C., they would have been impressed. Venus passes within one-quarter degree of Jupiter six times between 1980 and 1999, not counting those that take place too close to the sun to be seen[5]. About half of these events are visible from any one location. This is still *30 times* their separation on June 17, 2 B.C. The last two Venus-Jupiter




*Jupiter and Venus were again together on the evening of June 17, 2 B.C., when they passed so near to each other that, without binoculars, they would have looked like a single bright star. (James Roth, Griffith Observatory)*

[5] August 12, 1990; August 23, 1992; November 8, 1993; February 5, 1997; April 23, 1998; and February 23, 1999. They'll be separated by only 42 arcseconds on May 17, 2000.

occultations took place in 1570 and 1818, and the next will happen in 2065. There are *no* mutual planet occultations between *any* two planets during the entire twentieth century.

*Through a telescope, the magnificent conjunction of June 17 would have looked like this to the magi. The perspective is from near the equator. As seen from Babylon, Venus barely missed moving in front of Jupiter. (James Roth, Griffith Observatory, based on calculations by DeYoung and Hilton)*

We may have neared the end of our search for the identity of the star. If we take the text in Matthew literally, we are told that the star was a single object, rather than a grouping of objects. The word that Matthew used is *aster* (αστηρ), rather than *astron*, (αστρον), which would have been more proper if he meant a grouping of objects, or *planes aster* (πλανηζ αστηρ) if he meant planets. It may be that he simply chose to use the more familiar and dramatic word *aster*, in conformity with standard *Old Testament* style. If he did mean to refer to a single object, the one that participated in all of these events



is *Jupiter*, which formed two very close conjunctions with Venus and three with Regulus over a ten-month period. So perhaps Jupiter, as manifested in these motions, was the Christmas Star. Or, the "star" might have referred to the appearance of Venus and Jupiter on June 17, when they were so close that they appeared as a single star.

If this is so, it explains why only the magi saw the star and were so concerned, and why Herod and his advisors didn't. Herod didn't know, or probably care, any more about the motions of the planets than the governor of California does today—it was not the sort of thing he bothered about. But this was the sort of thing the magi mastered, and they would have found it exceptionally important.

Now, this doesn't mean that astrology works. It makes our search more rewarding to find a truly interesting astronomical event that happened at the probable time of the Nativity, but there are other possibilities. We've focused on planetary motions during a two-year period that was selected based on the most likely reconstruction of the history of Judea. When it was thought that Christ was born prior to 4 B.C., astronomers looked closely at a series of Jupiter-Saturn conjunctions in 7 and 6 B.C. The existence of interesting celestial events does nothing to prove that the birth of Christ was accompanied by a star, that the magi existed, or that any of these events necessarily took place within a certain time frame limited by the astronomy. There are always interesting things happening in the sky, and if you select any year you can find something that happened then that could have been an omen to the superstitious. This series of conjunctions is the most interesting astronomical event during the years we looked, and that's why we concentrate on it.

Assuming that all of this is correct and that the star was Jupiter as manifested in its series of conjunctions, we can reconstruct the history of events. The magi's attention was initially caught when Jupiter aligned with Venus in the predawn sky in August, 3 B.C. (They first saw the star "as it rose in the east.") They watched Jupiter move past Regulus three times

during 3 and 2 B.C. After its final conjunction with Venus (when the two planets appeared as a single "star"), they decided the prophecies had been fulfilled, and they set out to Jerusalem to see Herod, arriving in the late summer or early fall of 2 B.C. They asked Herod about the new king. This was news to Herod. He consulted his Jewish advisors, who told him about the prophecies. They reminded him that a ruler of Israel would arise from Bethlehem. Herod sent the magi to Bethlehem, asking them to report back afterwards "so that he could worship too." The magi presented their gifts to a child living in a house—not to a baby in a manger—and then departed secretly and went home another way. Herod was furious at having been tricked, and not wanting a rival, he ordered the slaughter of all the male children in Bethlehem who were up to two years of age, based on the magi's account of the first appearance of the star. (According to what he found by quizzing the magi, Christ was born some time during the previous year and a half. Perhaps Herod allowed another half-year margin of error.) This happened in the fall of 2 B.C. On January 9, 1 B.C., Herod burned the rebellious rabbis during an eclipse of the moon. His health worsened, and Herod died a few weeks later. And so the best we can do is say that Christ was a young child in the fall of 2 B.C., and was born sometime during the previous two years.

Now if this is true, we've answered our original question and identified the star, but we've raised another that is equally interesting. Why then is Christmas celebrated on *December 25*? None of these events took place in December, and there is no indication that Christ was born in December. Why, then, do we celebrate Christmas on December 25th?

The answer lies with the sun. December 25th is a date of great *astronomical* significance.

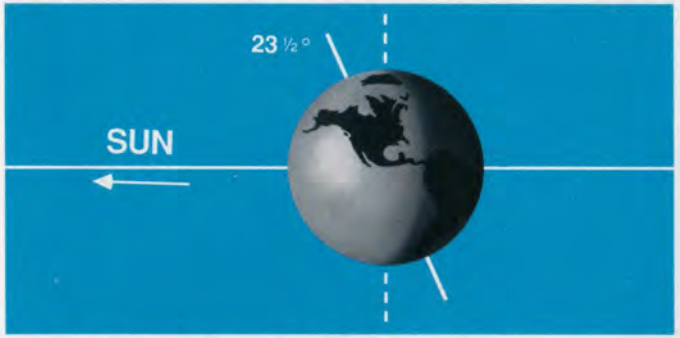


# PART FOUR

# Why Celebrate December 25th?

The earth is tilted on its axis by 23½ degrees. This causes the sun to rise higher in the sky during the summer than in the winter, and, in fact, this is the cause of the seasons. Without this tilt, the sun would follow the same apparent path across the sky each day, and the earth would have no seasons.

Each year, on about September 22, the sun rises due east and sets due west. This is the autumnal equinox. As seen from Jerusalem, the sun reaches a maximum noontime elevation on that day of 58½ degrees. (From Los Angeles, which is 2 degrees farther north of the equator, this elevation is 56½ degrees.) After the equinox, the sun is lower at its daily maximum. Its rays strike us at a shallower angle and are not as




*Because the earth is tilted on its axis, the sun seems to change its height in the sky. As seen from anywhere in the northern hemisphere, the sun is at its lowest on or near December 22—the winter solstice. (Robert Kline, Griffith Observatory)*



concentrated. The sun rises to the south of east, sets to the south of west, and is above the horizon for fewer hours of the day. The days grow shorter and the nights longer, and this makes the days cooler. This is why it's colder in the winter than in summer: The sun's rays are striking us at a lower angle and there are fewer hours of daylight. The sun reaches its lowest noontime elevation on the *winter solstice*, the first day of winter. On that day, the sun rises far to the south of east and sets far to the south of west, as opposed to the summer solstice, when it rises far to the northeast and sets far to the northwest. On the solstice, the sun reaches a maximum noontime elevation of 34½ degrees in Jerusalem (and 32½ degrees in Los Angeles).

Long ago, people did not live in houses with central heating and electric lights, so when it was cold and dark outside it was cold and dark inside too. When the sun reached the low point in its annual cycle and began to return, with its promise of renewed warmth, that was cause for celebration, and people did indeed celebrate. The winter solstice has always been an important holiday.

Although the winter solstice now occurs on December 22 (or sometimes the 21st), it used to occur on December 25. Minor changes in the calendar have shifted it.

The reason why the solstice now falls on the 22nd is interesting. The Julian calendar, established by Julius Caesar in 46 B.C., contained an error that caused it to lose one day in 128 years. The solstice, originally set for December 25, had slipped to December 22 by the time of the Council of Nicea in 325 A.D. and to December 12th in the sixteenth century. When Pope Gregory reformed the calendar in 1582, he restored the date of the solstice to the time of the Council of Nicea, the first great Christian gathering, rather than to the time of the birth of Christ or to the time of the founding of the Julian Calendar.

The solstice (December 25) was an important holiday in the Roman Empire, where the Christian church took root. Contrary to popular belief, the solstice did not fall during the

Saturnalia, a major Roman harvest festival. The Saturnalia was originally a one-day festival celebrated on December 17 and followed by two days of general holiday. It resembled an American Thanksgiving. It grew eventually to encompass seven days, and although Augustus limited it to three for the sake of business, it grew back to five. At no time did the Saturnalia extend to include the 25th. Many Christmas customs, however, derive from the Saturnalia and from other harvest festivals at this time of year both in and outside the Roman Empire.

December 25th became a major holiday in the Roman world in 275 A.D. when Emperor Aurelian proclaimed the date as *Dies Natali Invictus* or *Dies Natalis Solis Invicti*, the "Birthday of the Unconquered Sun," and with the followers of Mithra dedicated a temple to the sun in the Campus Martius. Christmas originated at a time when the sun cult was particularly strong in Rome, and modern Christmas celebrations include customs that can be traced back to ancient sun worship.

*The Roman Saturnalia evolved into a long holiday that was celebrated just before the winter solstice. (Lois Cohen, Griffith Observatory)*



Also contrary to popular legend, early Christians had little reason to keep a low profile during the Saturnalia by hiding in the catacombs and worshipping in secret. When Christmas began to be celebrated in the fourth century, Christianity was already legal and there was no reason to hide. When Christianity finally became the dominant religion in the empire, older pagan holidays and ancient customs were given new meanings. An obvious example is Easter, which is celebrated with rabbits and eggs—springtime symbols of fertility. Early church fathers found it impossible to stamp out popular pagan practices and compromised by Christianizing them. Mexico and Peru provide interesting examples of how the native Indian festivals acquired a thin veneer of Catholicism. Pope Gregory, in his instructions to Augustine in methods of converting the Anglo-Saxons of England to Christianity, directed him to accomodate heathen customs as much as possible so that the people would not be distressed by the changes. Christmas is celebrated at the time it is to give Christian meaning to previously existing pagan celebrations.

"Cryst-mass" was not celebrated at all until the middle of the fourth century. By the year 600 it was a significant holiday in some English counties. When Charlemagne was crowned Holy Roman Emperor, he chose to be crowned on Christmas day, as did England's William the Conqueror almost three centuries later.

December 25, then, is the date of the solstice in the old Julian calendar, and the solstice has been celebrated around the world for thousands of years.

# PART FIVE

# Christmas Customs & Solstice Ceremonies




Even in Southern California, where the winters don't get very cold, the local Chumash Indians of Santa Barbara and Ventura counties celebrated the winter solstice in a ceremony they called "Kakunupmawa."

Kakunupmawa began on the evening of December 24 when the Indians erected a sunstick, a long pole topped with a bluish or greenish stone. A crescent signifying the moon was painted on the stone. In the early evening they made sacrifices to the sun by throwing seeds and nuts saved from the harvest into a large fire, and then, after dark, they began to dance. Only the men danced, and they danced without singing, stepping around the pole while carrying a feathered stick in each hand. Each man danced around the fire three times and then passed his poles to another who continued the dance. They also danced a shorter and more complicated dance in which they would chant, "We shall always see the light of the sun." The purpose of this ceremony, held on what we would now call Christmas Eve and Christmas Day, was to insure that the sun would return. It was a festival in honor of the sun.

When Christianity appeared, there were two and then three main festivals in the Roman world at the time of the solstice. First came the Saturnalia, which began on December 17 and lasted three to seven days. It was followed, after the year 275, by the Birthday of the Unconquered Sun, which took place on the solstice, then celebrated on the 22nd or 23rd. Kalends followed a few days later and roughly corresponds to our New Years' Day; the Kalends alone might last three or more days.

*The Chumash Indians of southern California celebrated the winter solstice with rituals intended to maintain the balance of nature and cosmic order. So did many other people around the world. (Lois Cohen, Griffith Observatory)*

The festivals merged somewhat into one long season of celebration, sort of like our present Christmas-to-New Year holiday period. It was a very happy and joyous time of the year as we learn from this composite account:

> *Everywhere may be seen well-laden tables. No wars may be declared nor battles fought, and all business, be it public or private, is forbidden during the feast days. Houses are decorated with wreaths of laurel hung above the doors, and branches of evergreen are found within to bring good luck. The impulse to spend seizes everyone and people are generous to their fellow men. A stream of presents pours out on all sides, and gifts of food, candles, pieces of holly, trinkets, and small statues of the gods are seen everywhere. It is the fairest time of the year, and allows men to give themselves up to undisturbed pleasure.*



Other than the part about not fighting wars, we immediately see that many of what we might think are modern Christmas customs have their origins long ago in Roman festivals around the time of the winter solstice. A ceremony designed to insure the rebirth or return of the sun at the time of the winter solstice was common to many early agricultural cultures, our own included.

One of the many early solstice symbols is lights. Lights are a nearly universal symbol of the sun. The Romans gave candles as gifts at the solstice, and they were gifts of goodwill.

Outside the Roman Empire, northern Europeans lit bonfires on high places to nourish the reviving sun on the solstice. The word *bonfire* comes from "bone fire," and the bones were of sacrificial animals. A fire festival is still held in Devon, England, at the harvest. Another survival of ancient fires is the Yule log, still common last century in rural areas. The Viking Yule was a celebration of the triumph of light over darkness and of the rebirth of the sun at the darkest time of year.

Lights and candles have always been associated with the sun on the shortest day of the year. What would modern Christmas be without all the electric lights that make the long nights seem so much brighter.

Another modern Christmas custom is giving gifts. Although it is sometimes claimed that this is done to commemorate those first gifts presented by the magi to the baby Jesus, this custom too dates back to ancient Rome. At the Kalends, Romans gave small gifts to each other and to the poor. Early in Roman history, these gifts were simple: branches from a sacred grove that symbolized good will and happiness in the coming year. The branches were then hung in the house to bring good luck. Later in the Empire, gifts included food, trinkets, small statues of the gods, lamps, gold and silver, and particularly candles. According to one account, someone made the mistake of giving a gift to the emperor. The emperor was Caligula and the poor fool should have known

*In northern Europe, bonfires were lit on the solstice to rekindle the sun and provide for its return. (Lois Cohen, Griffith Observatory)*

better. The emperor liked the idea, immediately made it an annual tradition, suggested that the best gift might be gold, and publicly weighed each gift as it was presented.

The most common gift today is the humble Christmas card. The first was probably sent in 1843 by an English gentleman, Sir Henry Cole, although the idea occurred to a number of people at about the same time. Sir Henry had 1,000 printed in black and white and then hand colored. The first cards in the United States were sent in the late 1870s.



*Giving gifts at the solstice was a common custom in Roman times. The Emperor Caligula added his own interpretation of the custom's significance. (Lois Cohen, Griffith Observatory)*

*Odin (left) and St. Nicholas (right). (Lois Cohen, Griffith Observatory)*

The modern symbol of gifts is Santa Claus, who traces his ancestry back to both St. Nicholas, a fourth century bishop who became the patron of children, and Odin, the Norse god who rode his eight-legged horse across the frozen north, scattering gifts down on the sleeping children at the time of the solstice. Santa's red and white garb derive from the bishop's vestments, and in some countries he still looks much like a bishop. Today Santa, who is tracked by NORAD radar, perhaps best symbolizes the commercialism that Christmas has acquired.



And so gift-giving goes back to pre-Christian times.

Perhaps equally important at Christmas-time is the custom of inviting the friends and family over and stuffing ourselves silly. Feasting and drinking at the solstice is a custom that goes back many many centuries. The Saturnalia, in honor of the Roman god Saturn, god of agriculture, was originally a harvest festival very much like our Thanksgiving. When the snows came to Italy and it was no longer possible to work in the fields, they celebrated with a feast. Animals that could not be kept through the winter were slaughtered and added to the pot. A popular injunction at the Saturnalia was "Let none follow their avocations save cooks and bakers," who were kept busy. Improvements in agricultural methods eventually allowed animals to be kept well past the harvest and delayed the slaughter until early winter. And so feasting and drinking has always been a tradition at this time of year.

*The head of a wild boar was a popular dish at Christmas-time.*

During the Middle Ages and later, the Christmas feast was a lavish display of gluttony. The head of a wild boar (originally sacrificed, later just killed) with an apple in its mouth was the centerpiece of many tables. Today the Christmas ham is a modest substitute. Goose and turkey were similarly featured. The meat was followed with cakes, pies, plum puddings, tarts, breads, and other sweet pastries. Each country has its own variety, and many items are baked only at Christmas. Our Christmas cookies descend from cakes that were baked for such feasts. Often each member of the family had his own cake. The plate of cookies and glass of milk for Santa is an offering with many parallels; the Scandinavians, for example, appeased the evil spirits by leaving out a bowl of rich porridge.

The early Church, however, disapproved of feasting as the proper way to celebrate the birth of the Savior. As early as A.D. 389, St. Gregory warned his flock against "feasting to excess" at this time. The Church was so strict in Cromwell's England during the mid-1600s that soldiers patrolled the streets sniffing the air. Anyone found cooking a Christmas ham had dinner confiscated—and they were arrested.

*Cromwell's soldiers sniffed for illegal Christmas hams during the British Commonwealth, 1649-1660, when it was forbidden to celebrate Christ's birth by feasting. (Lois Cohen, Griffith Observatory)*



Similar laws were enacted in some of the new American colonies. In Massachusetts, the following became law in 1659.

> *Whosoever shall be found observing Christmas, either by forbearing of labor, feasting, or any other way, every such person shall pay as a fine five shillings to the county.*

The law was repealed in 1681.

Drinking was another Christmas tradition. In northern Europe, it may have been a continuation of the great drinking bouts for which the Vikings were famous, and in which they indulged during the Yule season. In more recent times, the English walked in groups from door to door through the town while carrying wassail bowls. The bowls were filled with hot spiced ale at each door. Here, however, the Church won one victory, or at least a compromise. Feasting is now OK at Christmas, but drinking is postponed one week—until New Year's.

One of the most important symbols of Christmas is plants. Green plants, especially evergreens, symbolize continuing life when all else is bare and brown and when even the sun appears to be dying. This was more important in northern climates than in southern California, where half the plants stay green anyway. Holly and ivy, whose berries thrive in the bleak days of winter, were venerated for their fertility. The Romans decked their homes with evergreens during the Kalends, placed wreaths of laurel (which symbolized victory) and holly on their doors, and gave branches to each other as gifts. The custom of decorating homes with green branches at the solstice may never have died out. In fifteenth century London, "every house was decked with ivy, bays, and whatsoever the season of the year afforded to be green."

Because green plants were so long used in magic fertility rites to insure the greenness of the land, the early Church

forbade their use as being too pagan. The custom was too deeply rooted for the ban to have effect, however, and today green plants are still an important part of the season's celebrations.

There is one plant that has particularly close associations with Christmas, and it's a plant that was used by the Druids of old England: Mistletoe.

The Druids of the British Isles celebrated the solstice by the light of the moon in sacred oak groves. The bards and heralds led the way, followed by the Archdruid and then by the people. The Archdruid, clad in long white flowing robes, found the tree with the largest mistletoe and climbed up to it. Mistletoe was a sacred plant. It was called "allheal" because it had magical properties and could cure all ills. It was considered a remedy against poisons, thought to induce fertility, and judged to protect the home from thunder and lightning. It was thought to contain the life of the oak tree when the tree was dead for the winter. The Archdruid cut the mistletoe with a golden knife, gathered it in his robes, and climbed back down the tree, never allowing the sacred plant to touch the ground. He broke the mistletoe into little pieces and gave one to each of his followers with a prayer that nature be good to them in the coming year.

*The Druids of ancient Britain celebrated the solstice in sacred oak groves. (Lois Cohen, Griffith Observatory)*



Because mistletoe has had more pagan associations with it than other green plants, the Church has frowned on its use, and it's not often found in churches. Mistletoe has, however, found a place in the home. From the Scandinavian countries comes the quaint custom of kissing under the suspended branch, a custom that has enthusiastic followers even today.

The best symbol of Christmas, though, is certainly the Christmas tree, which is after all a huge green plant. Christmas trees as we know them are relatively new, and they were rare anywhere until a century ago.

Northern Europeans had long worshipped trees or had worshipped in groves of trees, and the Christmas tree is certainly a carry-over from prehistoric times. Throughout Europe in the Middle Ages, there were folk tales of trees that mysteriously burst into bloom on Christmas Day. Evergreens with apples suspended from the branches were used in miracle plays in the fourteenth and fifteenth centuries. The first Christmas trees as we think of them appeared in Latvia and Estonia (now in the Soviet Union) and in Germany in the 1500s, but they were not elaborately decorated. In 1605 a traveler wrote "At Christmas they set up fir trees in the parlors at Strasbourg and hang upon them roses cut out of many-colored paper, apples, wafers, gold foil, and sweets." The rose was symbolic of the Virgin Mary, and the wafers are related to the communion host. Such *Christbaums* were often suspended upside down in the living room or over the door. They must have been common, as a local ordinance in Alsace prohibited the cutting of more than one Christmas tree per person. The Church, as usual, reacted negatively to the incorporation of pagan plants into sacred ceremonies, and in 1640 a Strasbourg theologian wrote, "Among other trifles which are

*Queen Victoria had a Christmas tree set up in Windsor Castle in 1841. The novelty appealed to the British upper classes who soon adopted the custom.*



set up during Christmas time, instead of God's word, is the Christmas tree or fir tree which is put up at home and decorated..." Still, its popularity spread. By the late 1600s, German trees were decorated with candles. In the next century, the decorations became more elaborate.

Christmas trees were a novelty in England when Queen Victoria and her husband, Prince Albert of Germany, set one up at Windsor Castle in 1841. Although not the first tree in the castle, it was widely publicized, and the English upper class, who liked nothing better than to imitate the royal family, quickly adopted the custom.

Although it is often stated that the first Christmas trees in the American Colonies were set up by Hessian soldiers during the Revolutionary War, this cannot be substantiated. The first trees in the United States were described in the 1820s and 1830s. The Dorcas Society in New York set one up at Christmas, 1830, and charged 6½ cents admission. A tree set up in a church in Cleveland in 1851 was branded a throwback to pagan customs. According to one account, President Franklin Pierce set one up in the White House in 1856, but the custom did not begin to spread in the United States until several years later. By 1883, a *New York Times* editorial predicted that the new "German Christmas Tree" was passé, and that we would soon see a return to the traditional Christmas stocking.

A hundred years ago, Christmas trees were decorated with all kinds of trinkets, most of it edible: Popcorn balls, candy canes, marshmallows, cookies, nuts, and fruit. You baked your ornaments. They were so loaded with sweets that in some areas they were called "sugartrees." They were decorated with candles, and one family member stood by with a bucket of water. Glass ornaments were imported from Germany beginning in 1870, but not in quantity until the 1880s, and they were very expensive. Artificial snow appeared in the 1890s. Community trees date from one erected in Madison Square Garden in New York City in 1912. By World War I, the Christmas tree was found in most American homes.

And so the tree is the perfect symbol for Christmas. The tree itself is evergreen, to symbolize the life that is absent in the winter, so important to agricultural communities. Trees are decorated with candles, or nowadays electric lights, to symbolize the sun and its rebirth. Gifts are arranged under it, and feasts are held nearby.

It is in the tree that we find the answer to that question, why do we celebrate Christmas on December 25th. It's because in the Julian calendar that was the date of the winter solstice, a date that has been celebrated since time immemorial. And in these customs we find the link that binds our culture to all others. Today, no matter who we are, no matter our faith or nationality, we all celebrate at this time of year for essentially the same basic reason—we celebrate peace on earth and good will towards all.



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