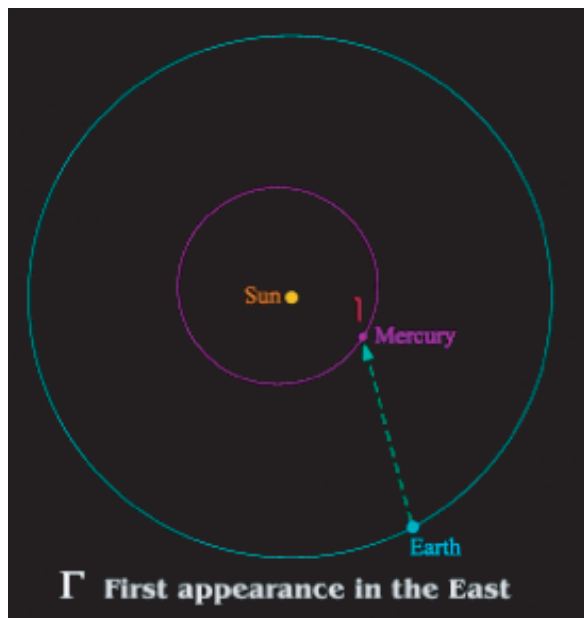


REPORT 41_(1/3) DIARY NO. -197

Seleucid Era Year 114 Month VII Day 19
Julian Year -197 (198 BCE) Oct 25/26

Time: Sunrise 6:14 am
View: East

Diary Line B6: *The 19th, Mercury's first appearance in the east in Libra, 3½ cubits behind Saturn to the east; it was bright, rising of Mercury: 16°; (ideal) first appearance on the 17th.*



Sunrise Oct 26, -197: Plan View, looking down (from the North) on planet orbits. Planets move in counterclockwise direction.

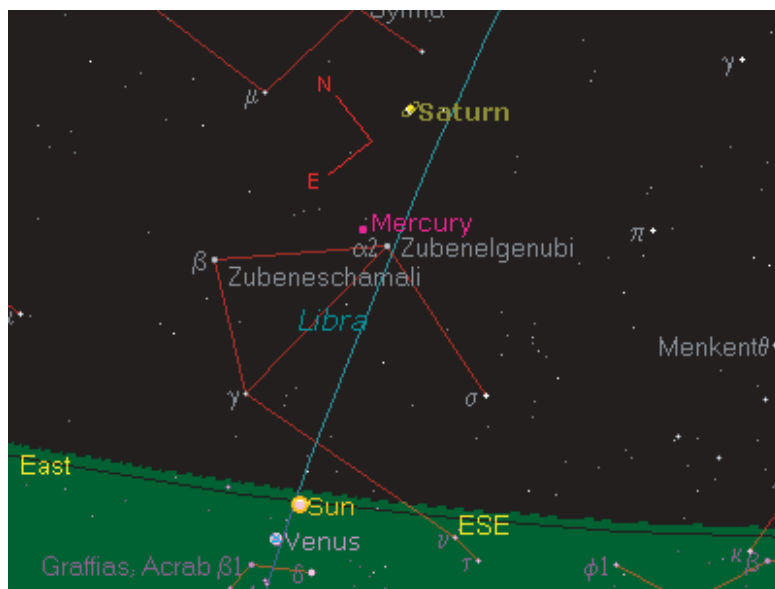
Comments: Mercury cannot be seen during the several days it is located between the earth and the sun. Eventually, outpacing the earth, Mercury moves ahead to the position pictured above. It then rises well before the Sun and it can be seen in the east before sunrise. The first day it is visible is the characteristic phenomenon "first appearance in the east."

REPORT 41^(2/3) DIARY NO. -197

Seleucid Era Year 114 Month VII Day 19
Julian Year -197 (198 BCE) Oct 25/26

Time: Sunrise 6:14 am
View: East

Diary Line B6: *The 19th, Mercury's first appearance in the east in Libra, 3½ cubits behind Saturn to the east; it was bright, rising of Mercury: 16°; (ideal) first appearance on the 17th.*



Sunrise Oct 26, -197: Mercury in Libra, 7° (3½ cubits) behind Saturn; Mercury rise to sunrise: 64 minutes (16°)

Comments: Mercury is in the constellation Libra, high in the sky at sunrise. The Skyshot shows Mercury rose after Saturn, which signifies Mercury is behind Saturn, as recorded in the Diary. TheSky computes the distance from Mercury to Saturn is 7°03', close to the separation recorded in the Diary (3½ cubits).

TheSky computes sunrise occurred at 6:14 am and Mercury first appeared at 5:04 am, 70 minutes earlier. The Diary logs that Mercury rose 64 minutes (16°) before sunrise. The difference is 6 minutes.

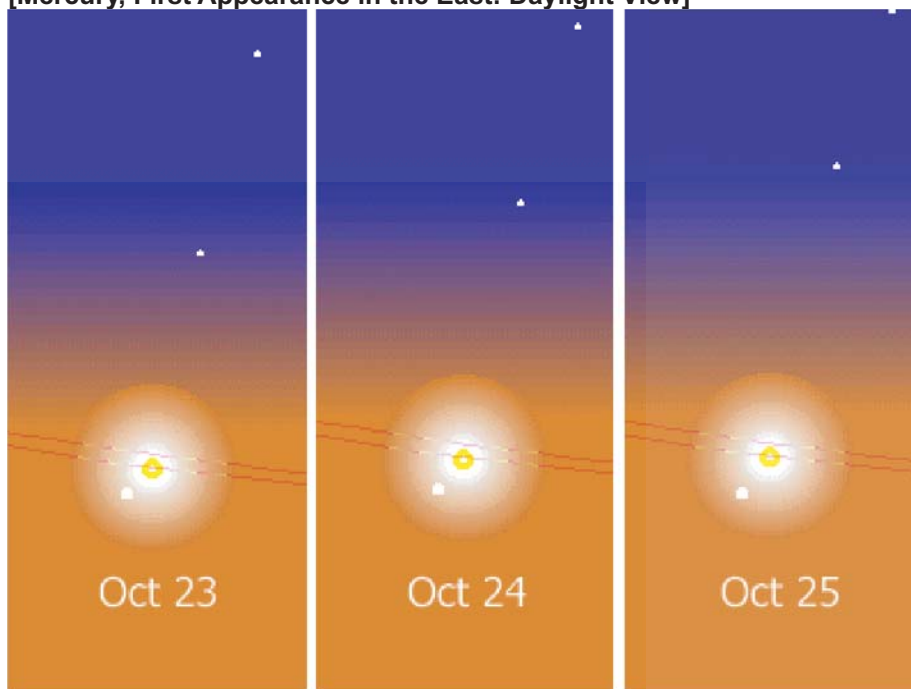
REPORT 41_(3/3) DIARY NO. -197

Seleucid Era Year 114 Month VII Day 19
Year -197 (198 BCE) Oct 23-25

Time: Sunrise 6:14 am
View: East

Diary Line B6: *The 19th, Mercury's first appearance in the east in Libra, 3½ cubits behind Saturn to the east; it was bright, rising of Mercury: 16°; (ideal) first appearance on the 17th.*

[Mercury, First Appearance in the East: Daylight View]



Sunrise Oct 23-25, -197:
(ideal) first appearance
on the 17th (Oct 24th)

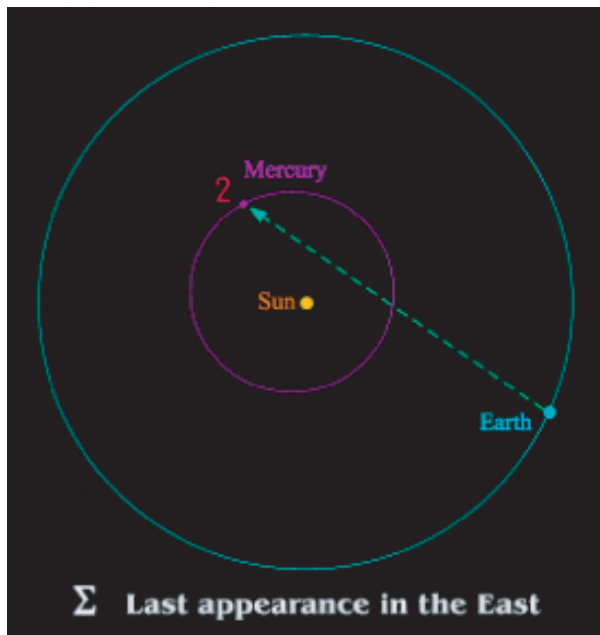
Comments: : Babylonian astronomers calculated that the first appearance of Mercury in the east should "ideally" occur on the 17th day of Month VII, which corresponds to Oct 24th (central panel). Mercury is the little white dot pictured in the transition zone where the orange of twilight shades to the blue of dusk. The series of Skyshots corroborates the calculations of the ancient astronomers - the first appearance of Mercury in the east occurred "ideally" on Oct 23rd or 24th.

REPORT 42 ^(1/2) DIARY NO. -197

Seleucid Era Year 114 Month VIII Day 27
Julian Year -197 (198 BCE) Dec 1/2

Time: Sunrise 6:50 am
View: East

Diary Line B9 (C2): *The 27th, Mercury's [last appearance] in the east in [Sagittarius...]*



Sunrise Dec 2, -197: Plan View, looking down (from North) on planet orbits. Planets move in counterclockwise direction.

Comments: After the First Appearance in the East, Mercury rises higher in the sky every morning until it reaches a maximum "elongation" from the sun. (A Plan View of a line drawn from the Earth to Mercury would be tangent to Mercury's orbit.) Mercury continues to outpace the Earth and eventually reaches a position where it is about to swing behind the sun (as in the diagram). On the morning of the Last Appearance in the East, Mercury appears low in the sky for a brief time before sunrise. Subsequently, Mercury goes behind the sun and thereafter it is not visible for many days.

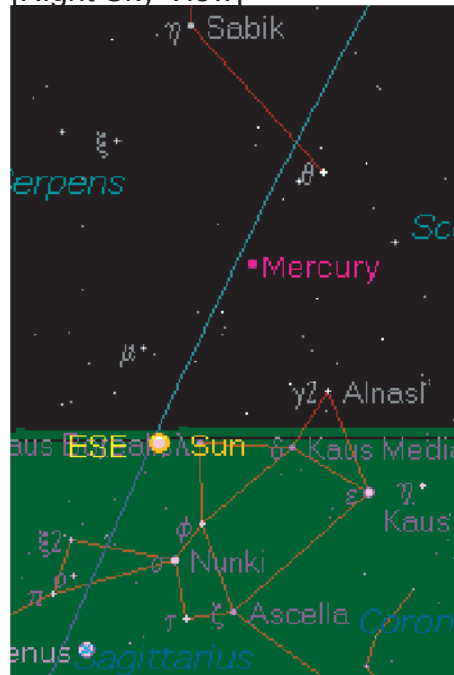
REPORT 42 (2/2) DIARY NO. -197

Seleucid Era Year 114 Month VIII Day 27
Julian Year -197 (198 BCE) Dec 1/2

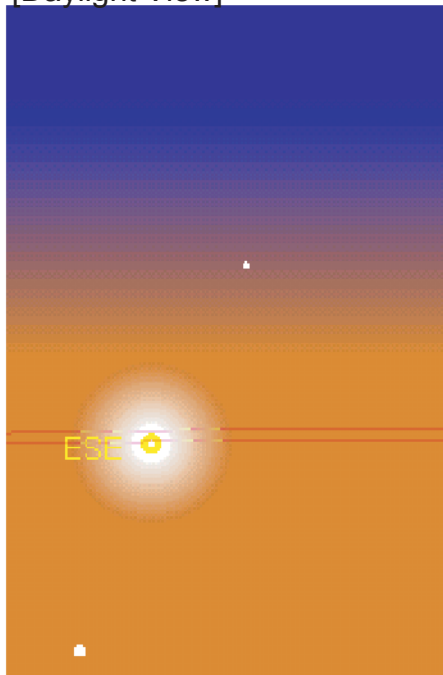
Time: Sunrise 6:50 am
View: East

Diary Line B9 (C2): *The 27th, Mercury's [last appearance] in the east in [Sagittarius...]*

[Night Sky View]



[Daylight View]



**Sunrise Dec 2, -197:
Last Appearance of
Mercury in the East**

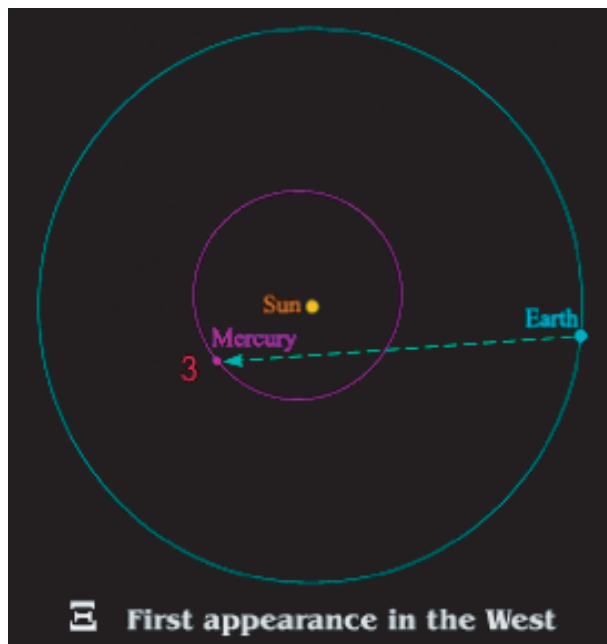
Comments: Mercury was low in the eastern sky at sunrise on Dec 2nd. Sky watchers would be fortunate to spot it before it was obliterated by the dawn light.. (The white dot at bottom left is Venus. It will not be visible when it rises later in the morning.) The Skyshot is consistent with the Diary record.

REPORT 43 ^(1/2) DIARY NO. -321

Philip III Year 2 Month I Day 20
Julian Year -321 (322 BCE) Apr 22

Time: Sunset 6:30 pm
View: West

Diary Line 11: *The 20th, Mercury's first appearance in the west in "Bull of Heaven" 3½ cubits in front of Venus to the west; sunset to setting of Mercury, 13°...*



Sunset Apr 22, -321: Plan View, looking down (from North) on planet orbits. Planets move in counterclockwise direction.

Comments: After disappearing from the morning sky, Mercury remains invisible while it swings around on the far side of the sun. Eventually it reappears one day around sunset low in the western sky - the First Appearance in the West.

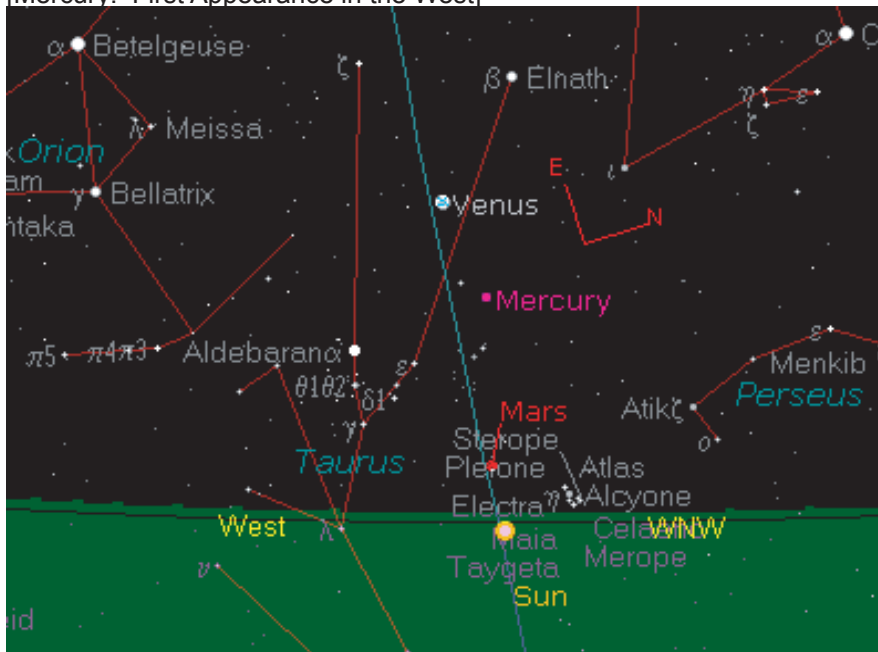
REPORT 43 (2/2) DIARY NO. -321

Philip III Year 2 Month I Day 20
Julian Year -321 (322 BCE) Apr 22

Time: Sunset 6:30 pm
View: West

Diary Line 11: *The 20th, Mercury's first appearance in the west in "Bull of Heaven" 3½ cubits in front of Venus to the west; sunset to setting of Mercury, 13°...*

[Mercury: First Appearance in the West]



Sunset Apr 22, -321: : Mercury in the "Bull of Heaven", 7° (3½ cubits) in front of Venus; sunset to setting of Mercury: 52 minutes (13°)

Comments: The Skyshot shows Mercury at sunset in Taurus - in the region of the constellation known to the Babylonians as the Bull of Heaven. (The normal star Aldebaran sported the name *Jaw of the Bull*.)

Mercury is low in the sky as expected on the first day it is visible in the west. TheSky computes sunset at 6:30 pm and the setting of Mercury 59 minutes later at 7:29 pm. The Diary records a time lapse of 52 minutes (13°). The mismatch is 7 minutes.

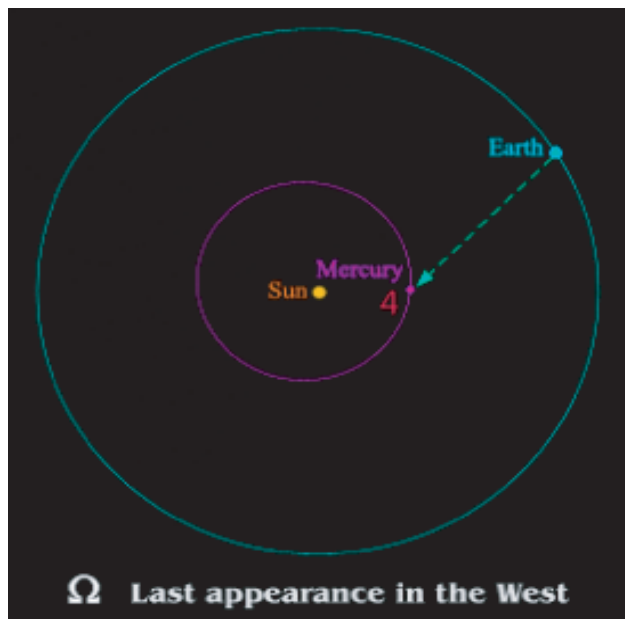
According to TheSky, Mercury is in front of Venus (Mercury will set first) by 5° 37'. The Diary gives the separation as 7° (3½ cubits). The mismatch is 1° 27', about 6 minutes.

REPORT 44 ^(1/2) DIARY NO. -346

Artaxerxes III Year 12 Month IX Day 21
Julian Year -346 (347 BCE) Dec 22

Time: Sunset 5:04 pm
View: West

Diary Line 10: *The 21st, Mercury's last appearance in the west in Capricorn...*



Sunset Dec 22, -346: Plan View, looking down (from North) on planet orbits. Planets move in counterclockwise direction.

Comments: After becoming visible in the west at sunset, Mercury continues to gain on the earth. With each passing day, it is seen higher in the sky until it reaches a maximum "elongation" from the sun. Mercury then begins the arc of the orbit that brings it around to position 4 in the Plan View. The Last Appearance in the West is the final day the planet can be seen before it passes into the region between the earth and the sun where it is invisible.

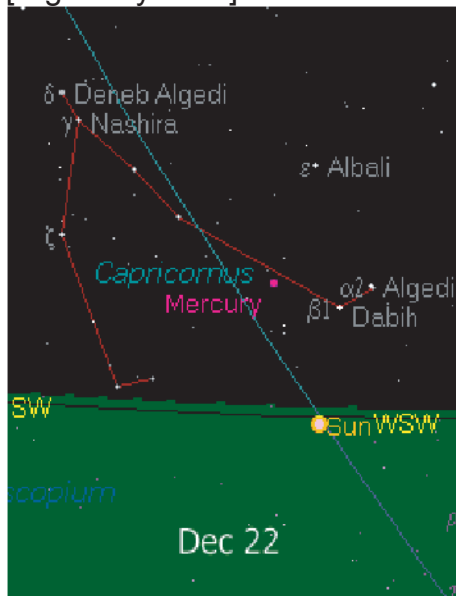
REPORT 44 (2/2) DIARY NO. -346

Artaxerxes III Year 12 Month IX Day 21
Julian Year -346 (347 BCE) Dec 22

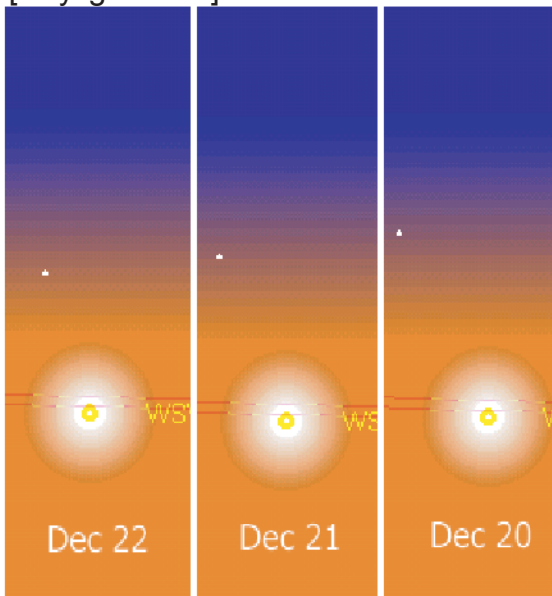
Time: Sunset 5:04 pm
View: West

Diary Line 10: *The 21st, Mercury's last appearance in the west in Capricornus...*

[Night Sky View]



[Daylight View]



Sunset Dec 22, -346: Mercury's last appearance in the west in Capricorn

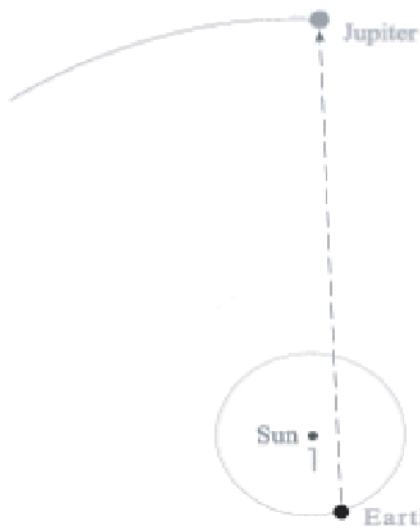
Comments: TheSky shows Mercury low in the sky in Capricorn, as recorded in the Diary. TheSky computes Mercury set 40 minutes after the sun on Dec 22nd. The Daylight Views suggests Mercury would have been lost in the rays of the sun on Dec 22nd, but possibly a sharp-eyed observer saw it.

REPORT 45 (1/2) DIARY NO. -378

Artaxerxes II Year 26 Month VIII Day 16
Julian Year -378 (379 BCE) Nov 11/12

Time: Sunrise 6:30 am
View: East

Diary Line 7': *[The 1]6th, Jupiter's first appearance in Scorpius; it was bright; rising of Jupiter to sunrise: 11° 30'.*



Sunrise Nov 12, -378: Plan View, looking down (from North) on planet orbits. Planets move in counterclockwise direction.

Γ First appearance in the East

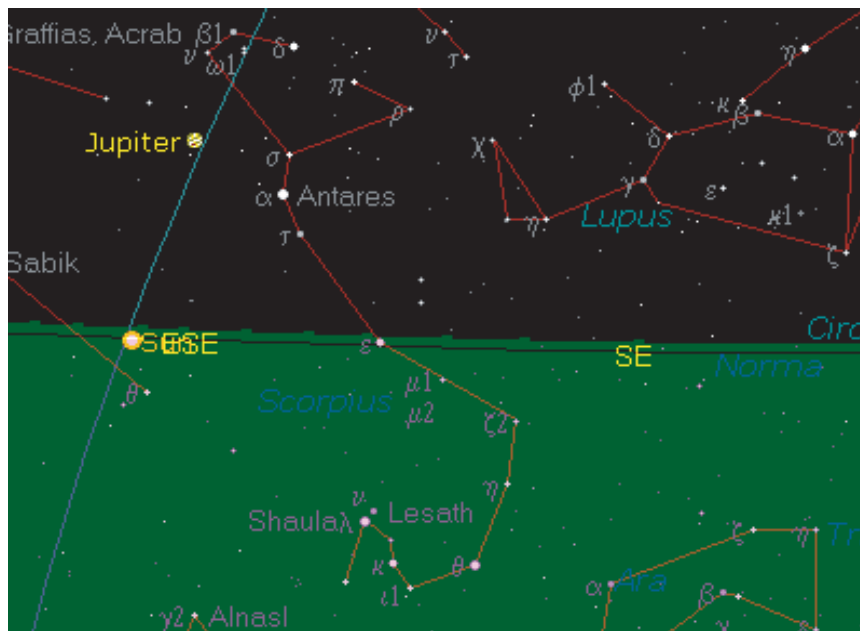
Comments: After an interval where the sun is between the earth and Jupiter, a day arrives when the light of the sun no longer obstructs with the line of sight to Jupiter. The planet is high enough in the sky at sunrise to be visible. That sighting is the First Appearance in the East.

REPORT 45 (2/2) DIARY NO. -378

Artaxerxes II Year 26 Month VIII Day 16
Julian Year -378 (379 BCE) Nov 11/12

Time: Sunrise 6:30 am
View: East

Diary Line 7': *[The 1]6th, Jupiter's first appearance in Scorpius; it was bright; rising of Jupiter to sunrise: 11° 30'.*



Sunrise Nov 12, -378:
Jupiter first appears in Scorpius; Jupiter rises 46 minutes (11° 30') before sunrise

Comments: Jupiter rose along with the leading section of Scorpius. The Skyshot shows that much of the constellation was still below the horizon at sunrise.

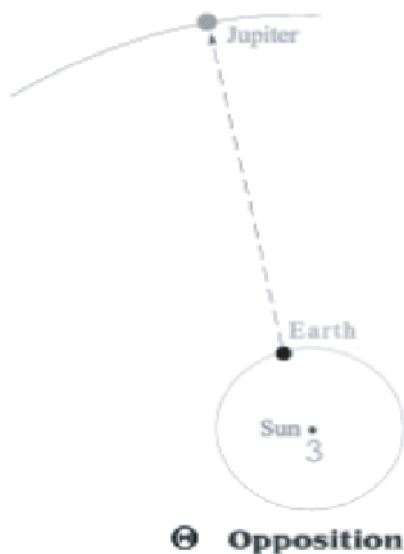
TheSky computes sunrise at 6:30 am and the rising of Jupiter at 5:44 am. Thus, the interval from the rising of Jupiter to sunrise is 46 minutes, exactly the time span recorded in the Diary (11° 30').

REPORT 46 (1/2) DIARY NO. -273

Seleucid Era Year 38 Month XII Day 16
Julian Year -272 (273 BCE) Mar 17

Time: Sunset 6:09 pm
View: East

Diary Line 21' & 22': *alpha Virginis, it stood ½ cubit in front of Jupiter to the west; around the 16th, Jupiter's acronychal rising. ...*



Sunset Mar 17, -272: Plan View. Jupiter, the earth and the sun in a line at acronychal rising (opposition) of Jupiter

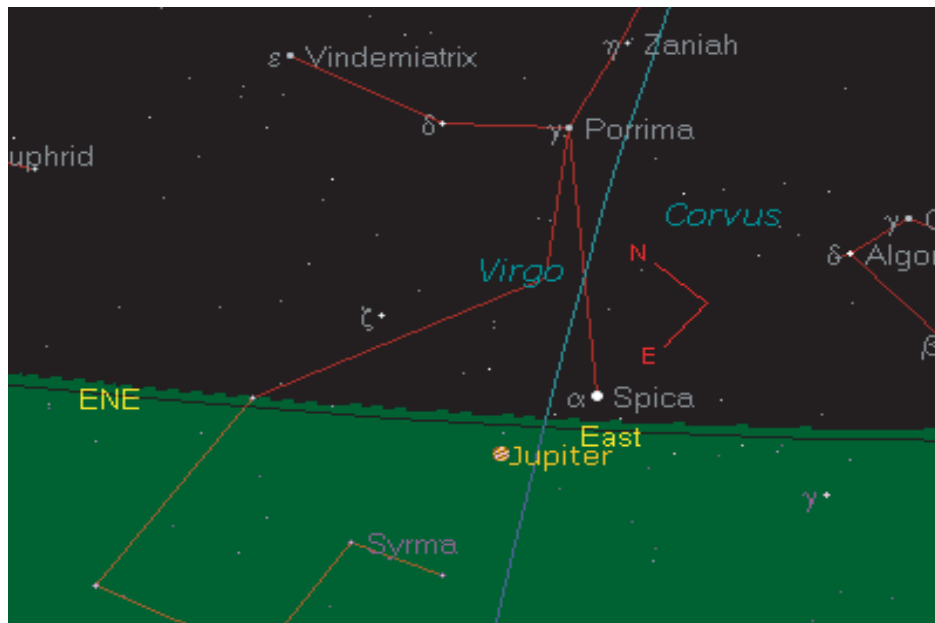
Comments: The acronychal rising of a superior planet, equivalent to opposition, occurs when the sun, the earth and the planet line up as in the diagram. On that day, the planet rises in the east at sunset. Later on in the Babylonian "day", the planet crosses the meridian at the mid-point of the night, and it sets as the sun rises the next morning.

REPORT 46 (2/2) DIARY NO. -273

Seleucid Era Year 38 Month XII Day 16
Julian Year -272 (273 BCE) Mar 17

Time: Sunset 6:09 pm
View: East

Diary Line 21' & 22': *alpha Virginis, it stood ½ cubit in front of Jupiter to the west; around the 16th, Jupiter's acronychal rising. ...*



Sunset Mar 17, -272:
View East. Spica stood 1° (½ cubit) in front of and west of Jupiter; acronychal rising of Jupiter.

Comments: : As the sun set on the evening of Mar 17th, Jupiter was close to rising in the east. TheSky computes Spica is 2° 52' in front of Jupiter. The Diary records a distance of 1° (½ cubit). The mismatch is 1° 52', about 7 minutes.

According to TheSky, Jupiter is not visible at sunset on Mar 17th. The next day, or certainly within two days, Jupiter will be visible at sunset. TheSky is consistent with the Diary entry that records Jupiter's acronychal rising occurred "around" Mar 17th.

REPORT 47 (1/3) DIARY NO. -321

Alexander III Year 14=Philip Year 1 Month XII Day 2
Julian Year -321 (322 BCE) Mar 5

Time: Sunset 6:01 pm
View: West, high in the sky

Diary Line 19: *Night of the 2nd, very overcast, lightning [...]*

Diary Line 20: *[...] when Saturn became stationary in the west, [it became] stationary ½ cubit behind theta Canceri, [nn fin]gers below Praesepe {skip}*

Diary Line 27: *... Around the 14th, Saturn moved back to the east.*



Sunset Mar 5, -321: Configuration of Jupiter (and likewise, the other Superior Planets Mars and Saturn) at a Stationary Point (Plan View)

Ψ Second stationary point

Comments: After opposition (acronychal rising) when sun, earth and Jupiter are in line, earth pulls ahead of Jupiter to the configuration depicted in the "Second Stationary Point." For an interval of a few nights, the line of sight from the earth to Jupiter remains unchanged. Hence, Jupiter appears stationary against the backdrop of fixed stars.

REPORT 47 ^(2/3) DIARY NO. -321

Alexander III Year 14=Philip Year 1 Month XII Day 2
Julian Year -321 (322 BCE) Mar 5

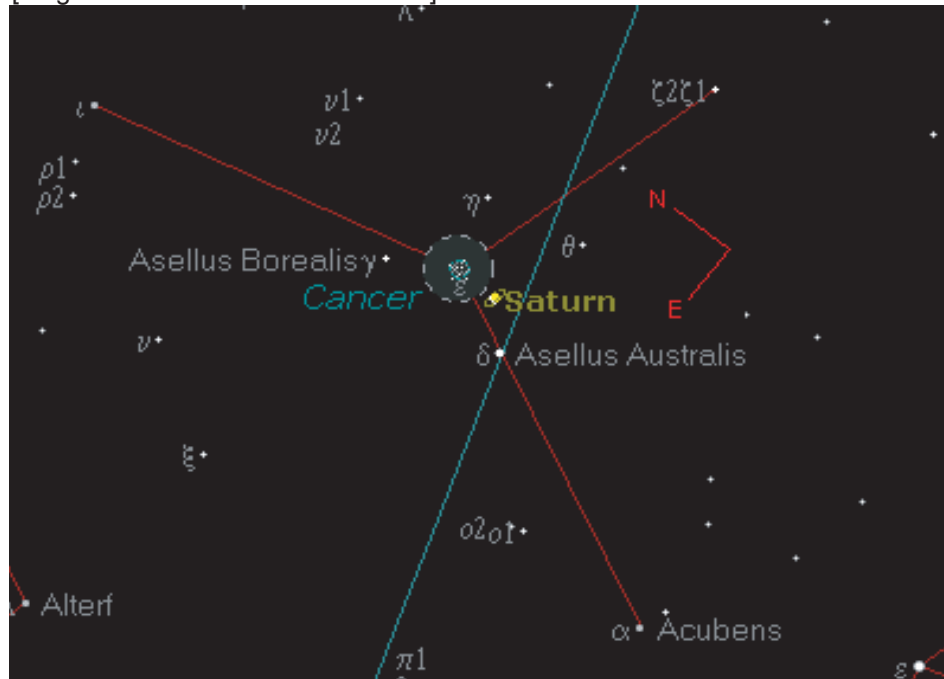
Time: Sunset 6:01 pm
View: West, high in the sky

Diary Line 19: *Night of the 2nd, very overcast, lightning [...]*

Diary Line 20: *[...] when Saturn became stationary in the west, [it became] stationary ½ cubit behind theta Canceri, [nn fin]gers below Praesepe {skip}*

Diary Line 27: *... Around the 14th, Saturn moved back to the east.*

[Magnification 2X Field of View 50°]



Sunset Mar 5, -321:
Saturn became stationary in the west, 1° (½ cubit) behind theta Canceri and several fingers below the Beehive Cluster (Praesepe)

Comments: The surviving Diary text does not give the date Saturn became stationary. However, Mar 5th should yield reasonably accurate results because near a stationary point, a planet appears at a standstill relative to the fixed stars. Only small shifts of position occur a few days before and after a stationary point in the orbit.

TheSky computes Saturn is 2° 19' behind (east) of theta Canceri. The Diary gives 1° (½ cubit), a difference of 1° 19' (approximately 5 minutes). TheSky positions Saturn 1° 01' (12 fingers) from the center of the Beehive Cluster (the circle in the Skyshot), a distance consistent with the Diary record.

REPORT 47 ^(3/3) DIARY NO. -321

Alexander III Year 14=Philip Year 1 Month XII Day 2
Julian Year -321 (322 BCE) Mar 5

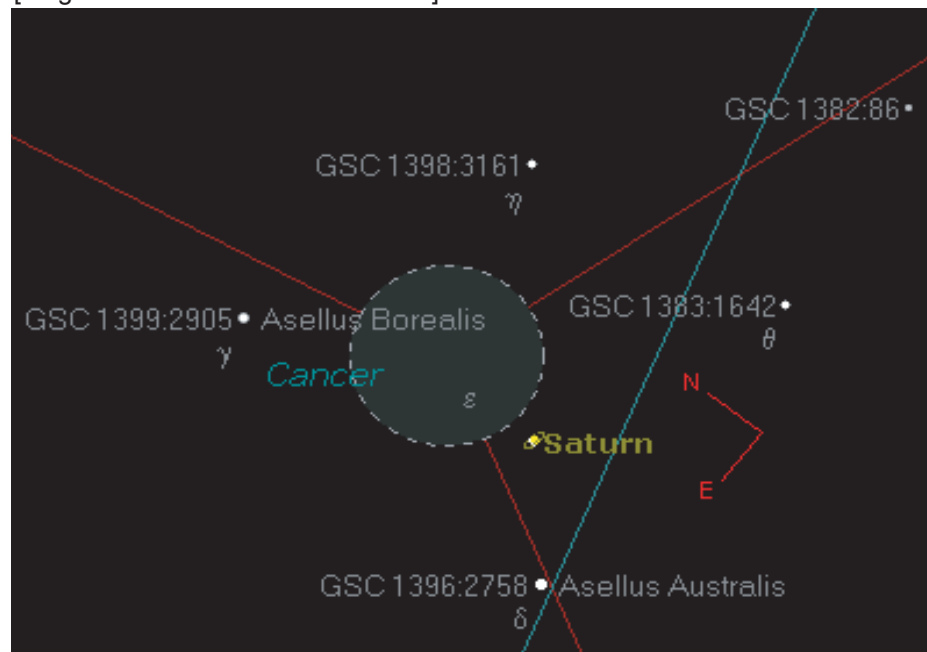
Time: Sunset 6:01 pm
View: West, high in the sky

Diary Line 19: *Night of the 2nd, very overcast, lightning [...]*

Diary Line 20: *[...] when Saturn became stationary in the west, [it became] stationary ½ cubit behind theta Canceri, [in fin]gers below Praesepe {skip}*

Diary Line 27: *... Around the 14th, Saturn moved back to the east.*

[Magnification 5X Field of View 18°]



Sunset Mar 5, -321:
Saturn near the
Beehive Cluster
(Circle), known as
Praesepe.

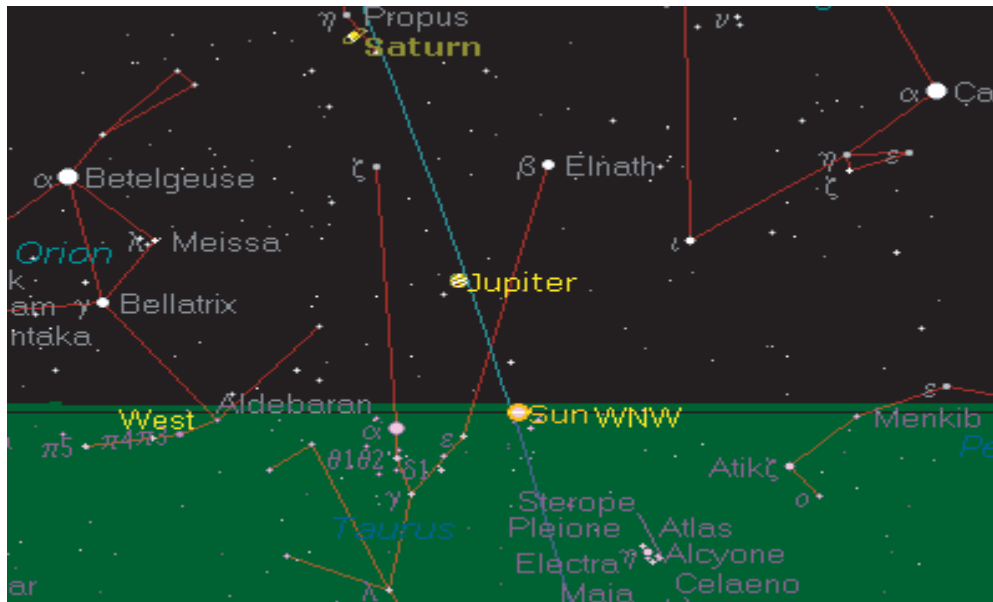
Comments: Under high magnification, small shifts in the position of Saturn relative to the stars can be discerned. The modest magnification in the above Skyshot is sufficient to determine that Saturn was stationary from Mar 11 to Mar 13. Prior to Mar 11, Saturn moved in a "retrograde" direction east to west, and after Mar 14 it established a "normal" west to east movement. The Diary records Saturn went back to the east "around" Mar 17 (the 14th day), 3 days later than TheSky's calculation.

REPORT 48^(1/2) DIARY NO. -324

Alexander III Year 12 Month 1 Day 28
Julian Year -324 (325 BCE) Mar 2

Time: Sunset 6:37 pm
View: West

Diary Line 12: *The 28th, Jupiter's last appearance in the Chariot.*



Sunset Mar 2,
-324: Last
appearance of
Jupiter in the
west, in the
Chariot.

Comments: Jupiter appears low in the west around sunset on May 2nd. TheSky computes sunset at 6:37 pm and the setting of Jupiter 36 minutes later at 7:13 pm. Thus, Jupiter is 9° from the sun, within the "indeterminate" range of visibility. Typically, a planet within 8° of the sun will be lost in the sunlight, and at an angle greater than 12° it will be visible.

Jupiter is in the Chariot, the region of Taurus around the normal stars at the points of the Bull's horns - beta Tauri and zeta Tauri.

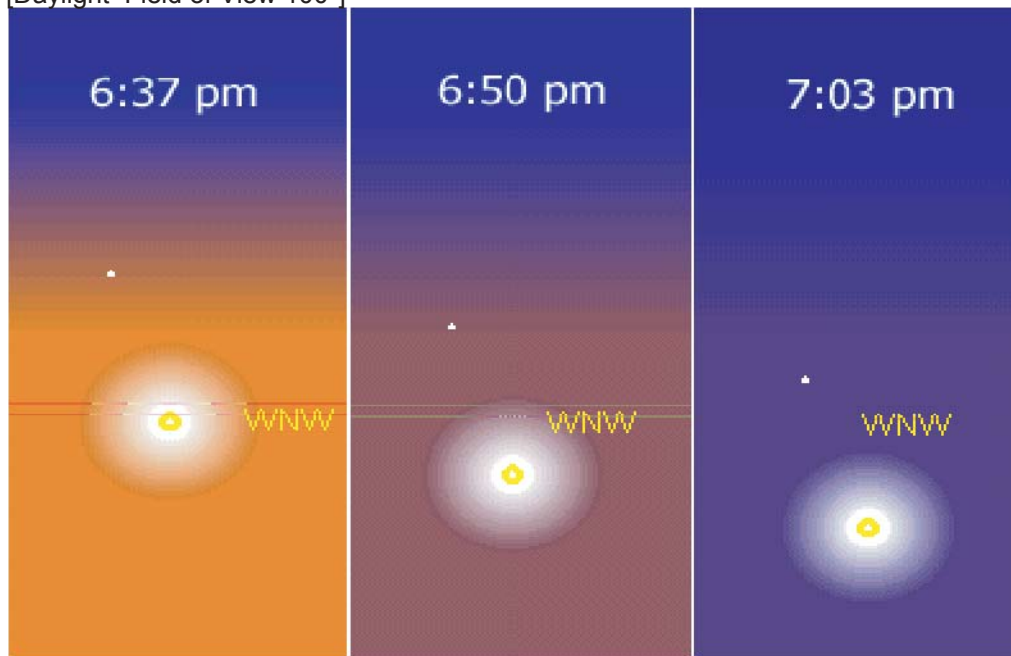
REPORT 48 (2/2) DIARY NO. -324

Alexander III Year 12 Month 1 Day 28
Julian Year -324 (325 BCE) Mar 2/3

Time: Sunset 6:37 pm
View: West

Diary Line 12: *The 28th, Jupiter's last appearance in the Chariot.*

[Daylight Field of View 100°]



Sunset Mar 2, -324: Last appearance of Jupiter in the west, in the Chariot.

Comments: On May 2, the sun set at 6:37 pm (1st panel). Jupiter likely was lost in the twilight until the sky darkened some minutes later. It would be more visible against a dark background. Panel 2 & 3 show Jupiter 23 minutes and 10 minutes before the planet disappeared over the horizon at 7:13 pm.