

Chapter 3

The Cycle of the Month

*When I consider thy heavens, the work of thy fingers, the moon and the stars,
which thou hast ordained, what is man that thou art mindful of him?
and the son of man, that thou visitest him? – Psalm 8:3, 4*

The Moon's appearance is constantly changing. Sometimes we see the Moon as a thin crescent. Other times the Moon is full. At various times, the Moon can be seen in the evening, at midnight, and in the morning. Sometimes we can even see the Moon during the day. But there is an order and a progression to the Moon's changing appearance. This is *the Cycle of the Month*.



The Moon's changing appearance follows a cycle of **phases**. The word *phase* comes from the Greek word *phaseis* (φαισεις) which means “appearance” or “shine.” Each different phase of the Moon represents a different shining appearance. Every month, the Moon appears in its crescent phase, increases to a Full Moon, and diminishes back again. The Moon's phase changes slightly from night to night as it moves across the sky.

Furthermore seven stages, which are called phaiseis in Greek, mark the passage of a month: new moon, half-moon, gibbous, full moon, gibbous, half-moon, and conjunction, the latter being the stage at which the moon's light is completely invisible to us. – Macrobius (circa A.D. 400)

The Wandering Moon

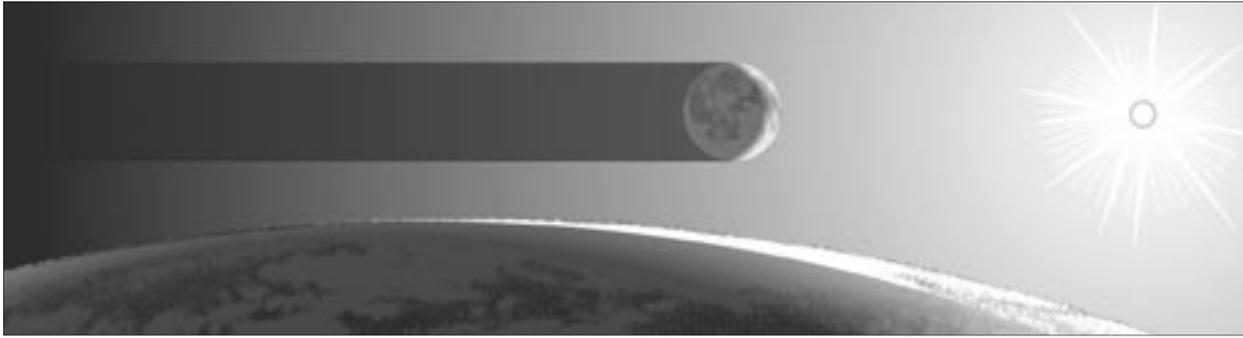
The Moon is a companion world to the Earth. The Moon circles around our world in an **orbit**. When we follow the cycle of the Moon's phases from night to night, we are actually observing the Moon at different positions in its orbit.



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Just as the Sun shines on the Earth, the Sun is also shining at all times on the Moon. Therefore, half of the Moon always has a brightly lit “day” side, and half the Moon is in the shadow of its “night” side. Like the Earth, the Moon has a terminator that divides its bright side from its dark side. The earliest Greek philosophers understood that the Moon only shines with the reflected light of the Sun. So when we see the Moon shining in the night sky, we are simply seeing the Sun’s rays reflected off the Moon’s surface.

*As sunlight striking the broad circle of the Moon, a borrowed light, circular in form,
it revolves around the Earth, as if following the track of a chariot.*

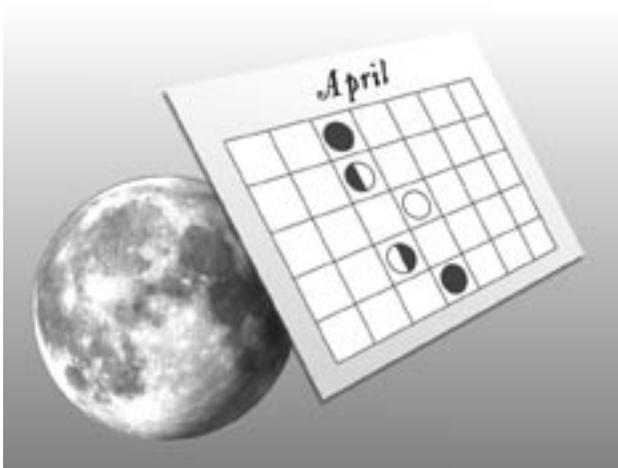
—Empedocles (circa 450 B.C.)

Lunar Calendar

Just as the cycle of the day measures off short periods of time according to the rising and setting of the Sun, the cycle of the month measures longer periods of time. The Moon moves through its cycle of phases in a **lunar month** of about 29½ days.

The ancient Israelites were commanded by the LORD to celebrate their festivals according to the cycles of the Moon’s phases. This is an example of a **lunar calendar**, measuring long periods of time by counting lunar months. Throughout history, many cultures have used a lunar calendar. But our western calendar is

a **solar calendar**, based on the Sun’s annual cycle of **the year**. So the 30- or 31-day “month” we use in our solar calendar is not an actual lunar month, but simply a convention used to divide the year into twelve units.



Many wall calendars indicate principal phases of the Moon. This is a surviving relic of the days when everyone read the old colonial almanacks to tell time, track the seasons and follow interesting events in the sky.

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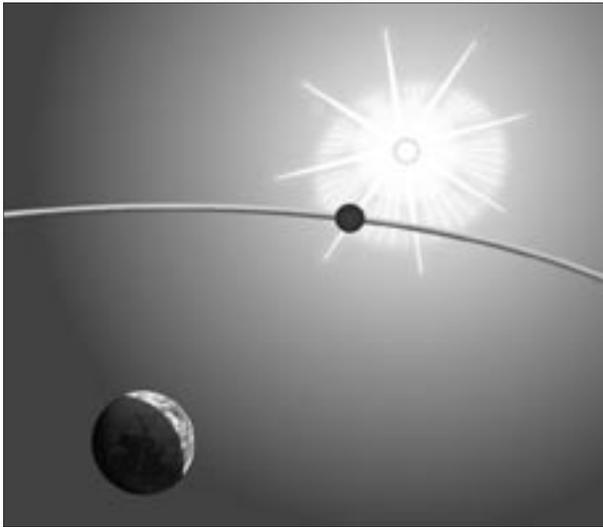
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The New Moon

During the time of the **New Moon**, we cannot see the Moon in the sky. The Moon at this time is at a place in its orbit between the Earth and the Sun. In the sky, the Moon is very close to the Sun and is lost in the Sun's bright glare. Also, when the Moon is new, its entire bright side is facing toward the Sun, and the dark side is facing toward the Earth. So even if the Moon was not hidden by the Sun's glare, it would not shine any light toward our world.

She is not seen in conjunction (i.e. at the New Moon), because, at that time, she sends back the whole stream of light to the source whence she has derived it.

—Pliny the Elder (circa A.D. 70)



Many wall calendars provide the date of the New Moon. This phase is symbolically depicted on the calendar as a black circle on a particular date because the New Moon cannot be seen from anywhere on the Earth. Since there is no bright edge, the Moon is an invisible black circle, just as shown on wall calendars.

New Moon

The Israelites were commanded to forever celebrate each New Moon as the beginning of another month. They celebrated by blowing trumpets and with burnt offerings at the temple.

Behold, I build an house to the name of the LORD my God, to dedicate it to Him, and to burn before Him sweet incense, and for the continual shewbread, and for the burnt offerings morning and evening, and on the Sabbaths, and on the New Moons, and on the solemn feasts of the LORD our God.

This is an ordinance forever to Israel. —2 Chronicles 2:4

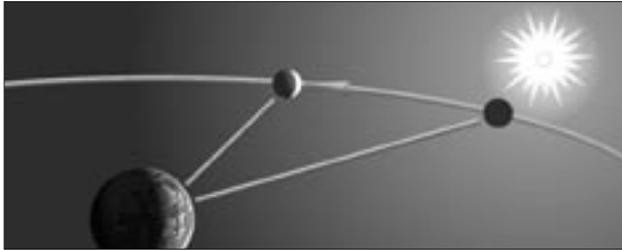
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The Waxing Crescent

As the Moon moves along its orbit, it circles around the Earth toward the east. After its New phase, the Moon moves east, away from the Sun's bright glare. It can now be seen hanging in the western sky after sunset. By this time, most of the bright side of the Moon is still turned toward the Sun. But since the Moon is not *completely* lined up with the Sun, a tiny edge of the bright side can now be seen.



In the days after the New Moon, the Moon is now in a **crescent** phase, appearing as a bright little fingernail in the evening sky. Traditionally, the lunar month begins on the evening of the first sighting of the crescent Moon. The ancient astronomers often said that the Moon has *horns* when in the crescent phase.

Do you not see when the Moon appears on the west side with thin horns that it marks the commencement of the month? — Aratus (circa 275 B.C.)

Whatever its phase, the brightly illuminated edge of the Moon always faces in the direction of the Sun, the source of its borrowed light. Therefore the “horns” of the waxing crescent Moon point *away* from the Sun, towards the east.

Clear it is, that the Moon always in her increasing, has the tips of her horns turned from the Sun toward the east. — Pliny the Elder (circa A.D. 70)

Each night, the Moon moves farther toward the east, and appears to move away from the Sun. We can then see a little more of the Moon's bright side, and so the crescent becomes thicker. During this period, the Moon is said to be **waxing**, an old-fashioned word that means “increasing.” With each passing night, the waxing crescent Moon is a little *thicker* and a little *farther away* from the sunset.



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The phase of the Moon simply depends on how much of the bright side is facing the Earth. As a waxing crescent, the Moon is at a section of its orbit “in front of” the Earth – more or less between the Earth and the Sun. As a result, most of the brightly lit part faces the Sun, and only a small portion is visible from the Earth. Since the Moon is in the general direction of the Sun, it can be found in the western half of the sky at sunset.

Earthshine

Sometimes, on a very clear night, you can look at a crescent Moon and actually see the outline of the dark side. The dark areas of the Moon seem to have a smoky glow, where the Moon’s features can be made out. Though it may seem to be your imagination, this is real! This smoky light is called **earthshine**, and it is light that is reflected from the Earth onto the Moon, partially lighting the Moon’s surface.

If we wish an evident proof that the Moon does not consume its body when at rest, we have only to open our eyes. If you look at it in a cloudless and clear sky, you observe, when it has taken the complete form of a crescent, that the part, which is dark and not lighted up, describes a circle equal to that which the full moon forms. Thus the eye can take in the whole circle, if it adds to the illuminated part this obscure and dark curve. – Basil of Caesarea (circa A.D. 360)



When the Moon is in its crescent phases, it is between the Earth and the Sun. The bright daylight reflecting off the Earth shines onto the Moon. This is enough light so that we actually see the lighted moonscape shining back on the Earth! The earthshine was first correctly explained by Leonardo da Vinci.

Some have believed that the moon has some light of its own, but this opinion is false, for they have based it upon the glimmer which is visible in the middle between the horns of the new moon, this brightness at such a time being derived from our ocean and the other inland seas, for they are at that time illumined by the Sun. The seas then perform the same office for the dark side of the moon as the moon when at the full does for us when the Sun is set.

– Leonardo da Vinci (circa A.D. 1500)

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