

Moving along in space

The presence of several bright planets highlights sky viewing this summer. Two of the brightest planets, Mars and Jupiter, are quite visible over the southern horizon after sunset from June through August. Mars is well placed for viewing to the southwest, while Jupiter sits to the southeast. Note how far apart the two planets are from one another at the start of summer vacation: Mars lies within the constellation Leo, while Jupiter is in Scorpius. Compare this distance with their close proximity during August—Mars will have moved out of Leo and be about halfway across the constellation of Virgo, near the bright blue-white star Spica.

Due to its faster orbital speed, Mars closes in on Jupiter as both planets move eastward along their respective orbital paths. Because the Earth is moving along its orbital path faster than both Mars and Jupiter, the angle at which we view the planets also changes. The combination of the two planets' motions and the Earth's motion accounts for both the closing distance between Mars and Jupiter and the sky's steady westward "drift." The two planets of course move eastward in the sky, opposite to the general westward drift.

Medicine, healing, and serpents

During July and August, when the Milky Way lies in a north-south position, the constellation Ophiuchus sits at its highest point over the southern horizon. Ophiuchus the Serpent Holder, usually depicted holding a long serpent in his hands, is credited with healing Orion the Hunter after he was mortally wounded in a great battle with Scorpius the Scorpion. It is thought that the caduceus, the symbol for medicine, comes from Ophiuchus, as he

was sometimes associated with the God of Medicine, Aesculapius.

Near the right shoulder of Ophiuchus is Barnard's Star, a small red star discovered by U.S. astronomer Edward Emerson Barnard in 1916. Also known as the Runaway Star, this star has the largest proper motion of any known star—from the Earth's perspective, moving approximately one degree every 350 years. Proper motion is a measure of a star's own motion through space. (Of course when measuring proper motion, the farther away an object is, the harder its motion is to detect.) Figure 1 shows an example of the projected effect of proper motion on the shape of a constellation.

Barnard's Star is the next closest star to our Sun after the Centauri triple-star system of Alpha, Beta, and Proxima, and is moving in the direction of our solar system. A few thousand years from now, it will be closer than Alpha Centauri.

Barnard's Star is estimated to have a diameter of about 250,000 kilometers, about 20 times that of the Earth,

or about 5.6 times smaller than that of the Sun. It is too dim to be seen with the naked eye or even most binoculars, but it can be seen with a small telescope.

Summer evening planets

Mars: Over southwestern horizon after sunset

Jupiter: Over southeastern to southwestern horizon after sunset

Moon phases

June

First Quarter - June 6

Full Moon - June 12

Third Quarter - June 19

New Moon - June 27

July

First Quarter - July 5

Full Moon - July 12

Third Quarter - July 19

New Moon - July 27

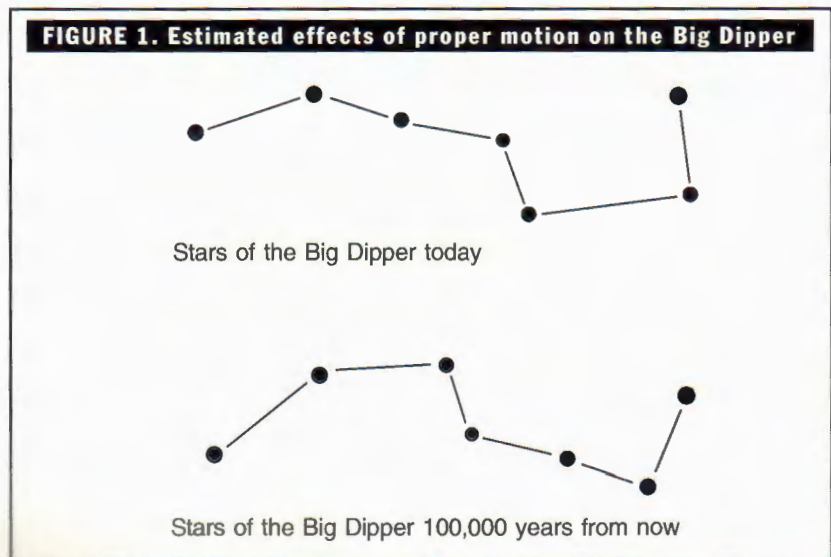
August

First Quarter - August 3

Full Moon - August 10

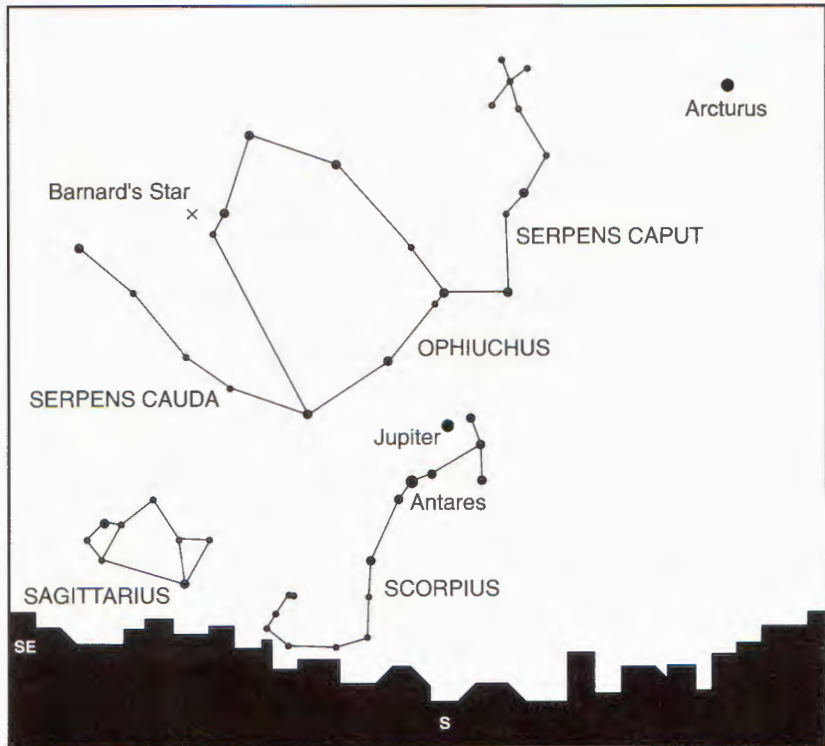
Third Quarter - August 17

New Moon - August 25



Summer sky highlights

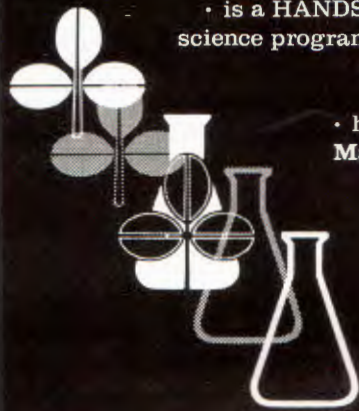
- June 4-5: Moon near Mars
- June 6: First quarter moon
- June 11-12: Moon near Jupiter (evening)
- June 12: Full moon
- June 19: Third quarter moon near Saturn (morning)
- June 21: June solstice (summer in northern hemisphere)
- June 26: Waning crescent moon near Venus and Mercury
- June 28: New moon
- July 2-4: Waxing crescent moon near Mars (evening)
- July 4: Earth reaches maximum annual distance from Sun (aphelion—152 million kilometers)
- July 5: First quarter moon
- July 8-9: Waxing gibbous moon near Jupiter (evening)
- July 12: Full moon
- July 17: Waning gibbous moon near Saturn (morning)
- July 19: Third quarter moon; Venus and Mercury close together (morning)
- July 26: Thin waning crescent moon near Venus
- July 27: New moon
- July 31, August 1: Waxing crescent moon near Mars (evening)
- August 3: First quarter moon
- August 4-5: Waxing gibbous moon near Jupiter (evening)
- August 10: Full moon
- August 12: Peak night for Perseid meteor shower (poor visibility because moon is up all night)
- August 13: Waning gibbous moon near Saturn (morning); third quarter moon (evening)
- August 25: New moon
- August 29-30: Waxing crescent moon near Mars (evening)



LOOKING SOUTH AT 9:00 P.M. ON JULY 31, 1995.

FAST

Foundational Approaches in Science Teaching (FAST), developed by the Curriculum Research & Development Group, University of Hawaii, for grades 6-10.



- is a HANDS-ON multidisciplinary, integrated inquiry science program that develops laboratory skills, thinking skills, and knowledge of science concepts.

- has three levels: **The Local Environment, Matter and Energy through the Biosphere, and Change over Time.**

- provides Teacher Training Institutes throughout the United States.

- is recognized as an exemplary science program by the National Diffusion Network (NDN) in the U.S. Department of Education and NSTA.

For information on program materials and training, contact
EMC/University of Hawaii • 1436 Spring Valley Drive • Roseville, California, 95661
(916) 782-3773 • Fax: (916) 782-9071

CIRCLE NO. 8 ON READERS SERVICE CARD