

## ASTRONOMY

# Summer Stars Begin to Appear

A total eclipse of the moon, the first this year, will highlight the astronomical events visible in the June evening skies containing an interesting display of stars.

By JAMES STOKLEY

▶ ALTHOUGH no naked-eye planet is visible on June evenings, the stars make an interesting display. And, as an added attraction, there will be a total eclipse of the moon on Wednesday evening, June 24.

The accompanying maps show the stars as they look about 11:00 p.m., your own kind of daylight saving time, on June 1. They look the same about 10:00 p.m. on the 15th.

A good place to start a survey of the June skies is high in the northwest, where the constellation of Ursa Major, the great bear, is shining. Here you find the well-known "big dipper," hanging downward from its handle. At the bottom are the pointers, Dubhe and Merak, through which you can trace a straight line to Polaris, the pole star. This is close to the north pole of the sky, around which the heavens seem to turn daily: thus it is always in about the same direction, in the north.

## Dipper's Handle Guide to Stars

The dipper's handle is also a guide to other stars. Follow its curve southward and you come to Arcturus in Bootes, the herdsman. This constellation is directly overhead at the times for which the maps are drawn.

Continued still farther south, the curved line of the dipper's handle takes you to another bright star, Spica, in Virgo, the virgin. And a little farther is the faint little group of Corvus, the crow. These are four stars arranged in the shape of a ship's mainsail.

Virgo is one of the 12 constellations of the zodiac, through which the sun, moon and principal planets seem to move. So is Leo, to the right, with the star called Regulus. This is at the end of the handle of a little sub-group called the sickle, because it is shaped like that implement.

Left of Virgo and a little lower is the constellation of Libra, the scales, a relatively inconspicuous figure. To its left is the scorpion, Scorpius. Not all of the figure is visible on the map, but the part that is includes its bright star, red in color, called Antares. The entire figure will appear later in the night, and also in the evening in July and August.

Over toward the east and northeast three prominent constellations are coming into view. They will be overhead on early autumn evenings. Highest of these is Lyra, the lyre, with Vega, the brightest star of the summer evening. Below stands Cygnus, the swan, with the star called Deneb. In this group is the "Northern Cross," now tilted over, for Deneb marks the top of the cross. And to the right (shown on the southern

sky map) is Aquila, the eagle, with the star Altair.

Barely visible above the northwestern horizon are some of the stars that were so prominent in the evenings of last winter. There are Castor and Pollux, in Gemini, the twins, and Capella, in Auriga, the charioteer. All of these stars are greatly dimmed: they are so low in the sky that their light is absorbed by the great thickness of air through which it must now pass.

About midnight Saturn rises, in Aquarius, the watercarrier. This is the first planet you can see. It is equal to a first magnitude star in brightness. Jupiter follows later, about two hours ahead of the sun. Its magnitude is minus 1.7, which makes it some 12 times brighter than Saturn. Still later Mars rises, but it is hard to see, because it is appreciably fainter than Saturn—similar to a second magnitude star.

The total eclipse of the moon on June 24 is the first lunar eclipse of the year, although there was one in the early morning on Dec. 30, 1963. This time it will occur in the early evening. In fact, it will start before the moon rises for people in North America. In the Northwest the main part will be over by the time the moon rises.

An eclipse of the moon occurs when the moon is full, but not at every full moon. Then the moon is in the opposite direction

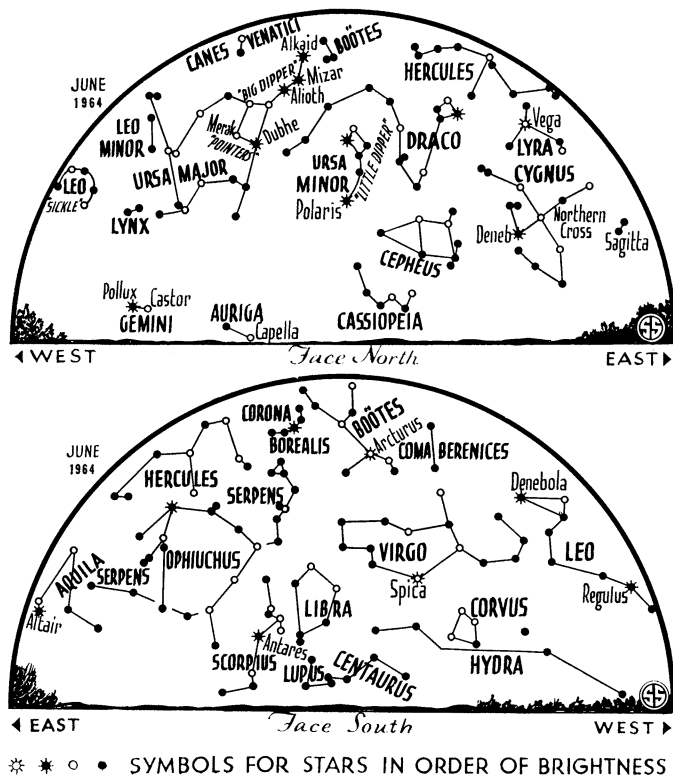
from the sun, and its entire illuminated hemisphere is turned toward us. But generally it is either above or below the earth's shadow, which extends out into space in that direction. But sometimes the moon enters the shadow and then we have an eclipse: total if it goes completely into the shadow, partial if some of the lunar surface remains outside.

## Eclipse of the Moon

On the 24th the moon begins to enter the shadow at 7:10 p.m., EDT and at 8:16 it is completely shaded by the earth. In New York, the moon rises about 8:19 so it will be still later before it climbs high enough to be easily visible. But by 9:58, when the moon begins to emerge from the shadow, it will have risen for all but the Far West. And even there, except in western Canada and Alaska, people will see the final phases, when the curved edge of the terrestrial shadow is creeping off the face of the moon. At 11:04 p.m., EDT, the moon will be out of the shadow and the main parts of the eclipse will be over.

Generally, even when the eclipse is total, the moon remains visible. It glows with a dull copper-red color. This is due to sunlight which the earth's atmosphere bends around into the shadow. Blue rays from this light are scattered on its way through, and this is what gives the daytime sky its blue color. With blue eliminated, the light that finally reaches the moon is quite red.

But eclipses vary in their brilliance. Last Dec. 30, the moon did vanish during the



eclipse. Apparently atmospheric conditions in the air through which the light passed caused its complete absorption. It is unlikely that similar conditions will prevail in June.

This is not the only eclipse of the month, for on the night of June 9, when the moon is new, its shadow will partly touch the earth. This will produce a partial eclipse of the sun, visible in Australia, where the date will be June 10.

The next total eclipse of the moon will come on Dec. 18. This will be visible completely in all of North and South America: the middle of the eclipse will come at 9:38 p.m., EST.

### CELESTIAL TIME TABLE FOR JUNE

JUNE	EDT	
2	2:00 pm	Moon passes Saturn
3	7:08 am	Moon in last quarter
7	1:00 pm	Moon passes Jupiter
8	6:00 am	Moon passes Mars
9	10:00 pm	Moon nearest, distance 222,100 miles
10	12:23 am	New moon; partial eclipse of sun visible in Australia
16	7:02 pm	Moon in first quarter
19	7:00 pm	Venus between earth and sun
21	4:57 pm	Sun farthest north; summer commences in Northern Hemisphere
23	8:00 am	Moon farthest, distance 252,400 miles
24	9:09 pm	Full moon, total eclipse
27	3:00 am	Mercury behind sun
29	8:00 pm	Moon passes Saturn

Subtract one hour for CDT, two hours for MDT, and three hours for PDT.

• Science News Letter, 85:330 May 23, 1964

### PHYSICS

## No News Is Good News About Speed of Light

► A CASE of no news is good news has now been made for the speed of light.

Three scientists have found that light waves and radio waves travel through space at the same speed, just as everyone has thought and all previous tests have shown.

One of the basic assumptions of modern physics is that all electromagnetic radiation, such as light and radio waves, travel at the same speed. The value now used for this is 186,291 miles per second, usually rounded off to 186,000 miles per second.

The "no-news" result is based on studies of radio waves emitted from individual flare stars. The studies were made by Sir Bernard Lovell, director of the Nuffield Radio Astronomy Laboratories, Jodrell Bank, and two U.S. astronomers, Dr. Fred L. Whipple, director, Smithsonian Astrophysical Observatory, Cambridge, Mass., and Dr. Leonard H. Solomon, also of the observatory.

These scientists found that bursts of light from flare stars up to 50 light years away are observed almost simultaneously as radio signals from the flare. This indicates that any difference in velocity of the two kinds of waves must be less than one part in a million.

Their conclusion confirms measurements of the velocity of electromagnetic radiation made on earth's surface. Their report is made in *Nature*, 202:377, 1964.

• Science News Letter, 85:331 May 23, 1964

GET READY FOR THE SPACE and SCIENCE ERA! SEE SATELLITES, MOON ROCKETS CLOSE-UP



# AMAZING SCIENCE BUYS

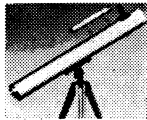
for FUN, STUDY or PROFIT



### BE READY FOR THE MOON SHOTS

Ranger, Surveyor, Lunar Orbiter unmanned space probes will shed exciting new light on the mystery of the moon and outer space. See the results close-up. Edmund low-cost, top-quality equipment and accessories put you right there—provide valuable and complete information to keep you on target.

### Bargain 3" Astronomical Telescope



See the stars, moon, phases of Venus, planets close up! 60 to 180 power—famous Mt. Palomar Reflecting type. Unusual Buy! Equipped with Equatorial mount; finder telescope; hardwood tripod. Included Free: "STAR CHART"; 272-page "HANDBOOK OF HEAVENS"; "HOW TO USE YOUR TELESCOPE" book.

Stock No. 85,050-Q ..... \$29.95 Ppd.  
4 1/4" Astronomical Reflector Telescope  
Stock No. 85,105-Q ..... \$79.50 F.O.B.



### Intriguing Low-Cost Moon Model

Exciting outer space display and conversation piece. Exact replica. 30,000 formations—peaks, craters, Ocean of Storms, etc.—all in relief. Scaled to size. Accurate distance relationships. Proper lighting shows moon phase; "black light" produces startling effects. Tough, washable plastic. Three colors. Far side blank—can be used for space data. Excellent gift item. 12" dia., wt. 1/2 lb.

Stock No. 70,515-Q ..... \$12.50 Ppd.

### A TRIP TO THE MOON

As the universe shrinks, interest in astronomy increases. This highly informative series of 29 black-and-white slide features such topography as the southwestern limb and Mare Imbrium—the "pearl of the moon." Also, full moon taken with Mount Wilson 100-inch reflector and the crater Clavius through the 200-inch.



Stock No. 60,348-Q ..... \$5.00 Ppd.

### BIG DETAILED 35" x 46" MOON MAP

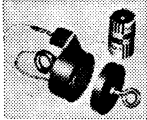
Black and white photo reproduction of full moon with all named lunar formations clearly marked. Complete index to locations and other valuable information.

Stock No. 9297-Q ..... 95¢ Ppd.

### RUGGED, LOW-PRICED

#### EXPERIMENTAL ELECTRO-MAGNET

Hobbyists, instructors and industrial lab men will find this well-built Electro-Magnet invaluable. Demonstrate principles of electromagnetism. Actually lifts 100 lbs. when powered by a single 45 amp flashlight battery. Easily deactivated. Includes instructions for 6 experiments—lifting power, magnetic flux and magnetomotive force, air gap, area of contact, retentivity and field configuration. Unit includes magnet and yoke assembly, battery holder, leads, clips and eyebolts. Steel core and yoke precision ground for max. flatness. About 2 1/2" dia. x 4 1/2" lg. Wgt. 2 lbs.



Stock No. 80,438-Q ..... \$10.00 Ppd.

### For Condensers, Trick Photography, Solar Energy

#### PLASTIC FRESNEL LENSES

Lightweight, unbreakable in normal handling. Plastic Fresnel lenses provide transmittance far greater than conventional lens of same focal length. Makes brighter, evenly illuminated image on rear-projections... composition and focusing much easier on reflex cameras and brighter images on overhead projectors. Also useful for lighting fixtures, industrial magnifiers, spotlights, or as condensers on low-heat optical systems.



Stock No.	Size	Focal Length	Price
40,894-Q	6" sq.	28"	\$ 4.00 Ppd.
50,272-Q	10" sq.	14"	5.00 Ppd.
70,130-Q	14" round	14"	6.00 Ppd.
19,076-Q	42" sq.	30"	700.00 F.O.B.

### GRADUATED MECHANICAL SLIDE EASILY ATTACHES TO MICROSCOPE

Eliminates awkward handling when slide must be moved. Has 30 mm. front to back and 50 mm. left to right excursions. Fixed verniers read to 0.1 mm. Dual control knobs horizontally positioned, conveniently located on right. Slide holder with adjustable arm and spring clip accepts large and small glass slides, max. opening 3 1/4". Metal unit finished in black and chrome. Microscope stage easily drilled to attach with two locating pins and thumb screw; turn two screws for simple removal.

Stock No. 30,058-Q in wooden case. \$31.50 Ppd.

### Make Your Own Astronomical Telescope GRIND YOUR OWN MIRROR

Kits contain mirror blank, tool, abrasives, diagonal mirror and eyepiece lenses. You build instruments ranging in value from \$75.00 to hundreds of dollars.

Stock No.	Diam.	Mirror Thickness	Price
70,003-Q	4 1/4"	3/4"	\$ 7.50 Ppd.
70,004-Q	6"	1 1/4"	11.50 Ppd.
70,005-Q	8"	1 3/4"	19.50 Ppd.
70,006-Q	10"	1 3/4"	30.75 f.o.b.
70,007-Q	12 1/2"	2 1/4"	59.95 Barrington

### AUTOMATICALLY SHOWS TIME, TIDES, POSITION OF SUN, MOON, STARS NEW SPILHAUS SPACE CLOCK



19 Different Readings At A Glance! Startling scientific achievement, yet completely practical and functional. Designed for the space age by world renowned scientist, Dr. Athelstan Spilhaus, Dean of Technology, University of Minnesota. Handsome conversation piece—constantly up-to-date encyclopedia of the sky. The Spilhaus Space Clock has beautiful fruitwood case and 3 sky-blue dials. Blends with decor of any home, office, club room, classroom, museum, display window, hotel, etc. Large dial shows sun position, daily sun rise and set, moon position, moon rise and set, phase of moon, low and high tide time, current stage of tide, day and month of year, current position of stars in sky, time of star rise and star set, relationship of sun, moon and stars, sidereal or star time. Left dial shows local time. Right dial shows world time including major U. S. cities and Universal (Greenwich) time. Operates on house current—requires only one simple setting for any geographic location. Measures 16" high x 11 1/2" wide x 4 1/2" deep. Presentation plaques available. Complete satisfaction guaranteed or money refunded. Shp. wt. 12 lbs.

Stock No. 1201-Q. \$175 F.O.B. (+\$5.00 F.E.T.)

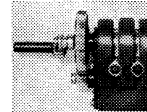
### New! 2 in 1 Combination Pocket-Size 50 POWER MICROSCOPE and 10 POWER TELESCOPE



Useful Telescope and Microscope combined in one amazing precision instrument. Imported! No larger than a fountain pen. Telescope is 10 Power. Microscope magnifies 50 Times. Sharp focus at any range. Handy for sports, looking at small objects, just plain snooping.

Stock No. 30,059-Q ..... \$4.50 Ppd.

### WAR SURPLUS ELECTRIC GENERATOR



Brand-new Signal Corps Generator for endless experiments, electrical users, demonstrations. Generates up to 90 volts by turning crank. Use in high impedance relays. Ring bells. Or charge ground and bring up night crawlers for fishing bait. Has 2 Alnico Magnets. Wt. 2 lbs. Cost to Govt. \$15.00

Stock No. 50,225-Q ..... \$6.95 Ppd.

### Terrific Buy! American Model OPAQUE PROJECTOR



Projects illustration up to 3" X 3 1/2" and enlarges them to 35" X 30" if screen is 6 1/2 ft. from projector; larger pictures if screen is further away. No film or negatives needed. Projects charts, diagrams, pictures, photos, lettering in full color or black-and-white. Operates on 115 volts. A.C. current. . . 6-ft. extension cord and plug included. Operates on 60 watt bulb, not included. Size 12" X 8" X 4 1/2" wide. Weight 1 lb. 2 ozs. Plastic case.

Stock No. 70,189-Q ..... \$7.95 Ppd.

### 'FISH' WITH A WAR SURPLUS MAGNET Go Treasure Hunting on the Bottom

Great idea! Fascinating fun and sometimes tremendously profitable! Tie a line to our 5-lb. Magnet—drop it overboard in bay, river, lake or ocean. Troll it along the bottom—your "treasure" haul can be outboard motors, anchors, fishing tackle, all kinds of metal valuables. 5-lb. Magnet is war surplus—Alnico Type. Gov't cost \$50. Lifts over 125 lbs. on land—much greater weights under water. Order now and try this new sport.



Stock No.	Weight	Price
70,570-Q	3 1/2 lb. size	\$8.75 Ppd.
70,571-Q	5-lb. Magnet	\$12.50 Ppd.
70,572-Q	7 1/2 lb. Magnet	\$18.75 Ppd.
85-152-Q	15 lb. size	

Lifts 250 lbs. .... \$33.50 FOB

### ERECT IMAGE LOW POWER MICROSCOPE—5X, 10X, 20X \$60.00 Value — ONLY \$19.95



Extremely sturdy with rack and pinion focusing, color corrected optics, turnable microscope body for inclined viewing. Made from war surplus optical instrument. Weighs 4 lbs., 13" high. TEN-DAY FREE TRIAL! Accessory objectives available for powers of 15X, 30X, 40X.

Stock No. 70,172-Q ..... \$19.95 Ppd.

### MAIL COUPON for FREE CATALOG "Q"

COMPLETELY NEW & ENLARGED  
148 pages. Nearly 4000 Bargains  
EDMUND SCIENTIFIC CO.  
Barrington, New Jersey  
Please rush Free Giant Catalog Q

Name .....

Address .....

City .....

Zone .. State ..



ORDER BY STOCK NUMBER . SEND CHECK OR MONEY ORDER . SATISFACTION GUARANTEED!

EDMUND SCIENTIFIC CO., BARRINGTON, N. J.