

ASTRONOMY

# Jupiter Back in Evening Sky

Jupiter shines brightly again, and Vega is the brightest star in the June sky. Jupiter, a cold planet, emits radio waves as does also the moon.

By JAMES STOKLEY

AFTER AN ABSENCE of several months, the planet Jupiter is on view on June evenings, shining brilliantly in the southeastern sky. So is Saturn, although considerably fainter.

Both are shown on the accompanying maps, which depict the sky as it looks about 10:00 p.m. your own kind of standard time (add one hour for daylight saving time) at the first of June, and about 9:00 p.m. in the middle of the month. Jupiter is low in the southeast, and is in the constellation of Sagittarius, the archer. No stars of this group are indicated; they are so low that absorption of their light by the air makes them too faint to be shown.

On the astronomer's brightness scale, Jupiter is of magnitude minus 2.2. Saturn, which you see a little lower and to the left, rates plus 0.4 on the magnitude scale, or a little less than a tenth as bright as Jupiter. In the position shown, so close to the horizon, Saturn is subject to considerable atmospheric absorption of its light. That is why it is marked by the symbol for a much fainter object. Later at night both planets will be much higher in the sky, however, and will shine more brilliantly.

The brightest star to be seen on June evenings is Vega, in Lyra the lyre, high in the northeast. Below it is Cygnus, the swan, in which some of the stars form a figure called the northern cross. Deneb is the brightest star in this group. And to the right of the cross, directly east, one can see Aquila, the eagle, with first-magnitude Altair (somewhat dimmed by its low altitude).

## The Dipper Points

The great dipper, part of Ursa Major, the great bear, is in the north. At the bottom of the dipper are the two stars called the pointers, which show the direction to Polaris, the pole star, off to the right in Ursa Minor, the lesser bear. And if you follow the curve of the dipper's handle southward, you will come to two more first-magnitude stars: Arcturus in Bootes, the bear-driver, and Spica, in Virgo, the virgin.

To the right of Virgo, in the west, stands Leo the lion. In this is a sub-group called the sickle, with the star Regulus at the end of the handle. On the left side of Virgo you can see the rather faint constellation of Libra, the scales, and to the left of that is Scorpius, the scorpion. In it is a red star called Antares, another one that is dimmed by its nearness to the horizon.

This is also true of two first-magnitude stars that you will find near the north-western horizon. These are Pollux, in

Gemini, the twins, and Capella, in Auriga, the charioteer. They are all that remain visible of the brilliant stars of the winter evening sky.

Jupiter and Saturn are two of the five planets that may be visible to the naked eye. As for the others, Mercury will be farthest east of the sun on June 19, and for a few days about then you may be able to see it low in the west soon after sunset.

Venus will be behind the sun on the 22nd, and cannot be seen at all in June. Mars comes up in the east about three hours before the sun, and during the month moves from Pisces, the fishes, into Aries, the ram.

On June 19 Jupiter will be opposite the sun, rising at sunset and setting at sunrise; thus it will be visible all night. Saturn rises about an hour after sunset, and is visible the rest of the night.

When you look at Jupiter you not only see a bright planet; you are also viewing a powerful radio transmitter.

For Jupiter, as many objects in the sky do, is sending out radio waves. For many years astronomers have known how to detect them. From their studies have come a vast amount of new knowledge of the universe.

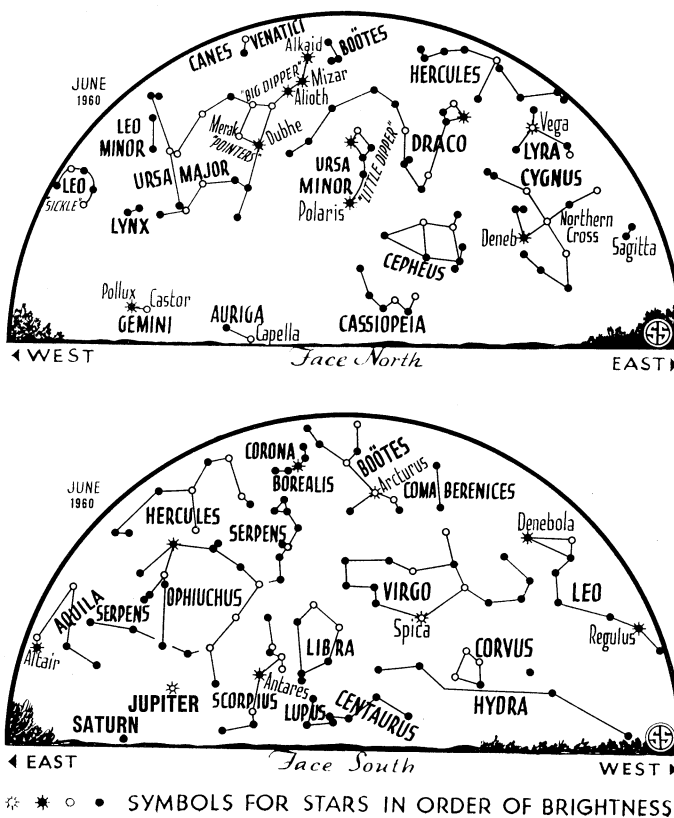
Jupiter is a cold planet, but even objects considered to be cold have atoms in rapid motion, which are also emitting radiation. This radiation is in waves similar to those of visible light, but considerably longer—infrared waves, or red waves of longer wavelength than the longest the eye can detect. The longest infrared waves overlap into the shortest radio waves. An object of any temperature above absolute zero, minus 459.7 degrees Fahrenheit, will produce detectable heat radiation.

Radio waves, about half an inch in length, have been picked up from such a "cold" object as the moon, but with an important difference.

## Radio "Light" of the Moon

In visible light, the moon is brightest when it is full, that is, when the sun is shining on it from behind us and the entire sunlit hemisphere is turned toward us. But in radio "light" the moon is brightest about four days after it is in the full phase. Apparently the radio waves come from a region a foot or so beneath the surface and it takes that long for the heat to be conducted to that depth. The moon seems to be covered with something that is a good insulator for heat.

Jupiter is even colder than the moon, as well as being farther away, but very feeble radio waves of this sort have been detected from it. In 1955 two scientists at the Department of Terrestrial Magnetism of the



Carnegie Institution in Washington picked up a far more powerful radio transmission from this planet. Its wavelength is about 50 feet and in many ways it resembles the radio static produced by lightning flashes.

Could it be that there are huge electrical storms on Jupiter, which produce static so powerful that its effect is felt on earth, an average of some half a billion miles away? This is one theory, but the radio bursts from Jupiter seem to have about a hundred trillion times the power of the average terrestrial lightning stroke, and they last as much as a second, while our strokes are but a few thousandths of a second long.

The planet Jupiter is very different from earth. It is about 87,000 miles in diameter. At the center, it seems, there is a rocky core. Around this there is a layer of ice, and over that an atmosphere of hydrogen, methane and ammonia several thousand miles thick.

The pressure is so great that this "atmosphere" is, on the average, about a third as dense as water. In it there must be great clouds of electrically charged gases, and as these interact with each other they produce the radio waves which signal to us their presence.

### Celestial Timetable for June

JUNE EST	Time	Event
2	11:02 a.m.	Moon in first quarter
9	8:02 a.m.	Full moon
	9:00 p.m.	Moon nearest, distance 222,100 miles
10	2:00 a.m.	Moon passes north of Jupiter
11	5:00 a.m.	Moon passes north of Saturn
15	11:36 p.m.	Moon in last quarter
18	2:00 p.m.	Moon passes south of Mars
19	9:00 a.m.	Mercury farthest east of sun, visible for a few days around this time in west just after sunset
	9:00 p.m.	Jupiter in opposite direction from sun and nearest earth; distance 393,800,000 miles
21	4:43 a.m.	Sun farthest north, summer commences in Northern Hemisphere (winter begins in Southern Hemisphere)
22	11:00 a.m.	Venus behind sun
23	10:27 p.m.	New moon
24	5:00 a.m.	Moon farthest, distance 252,700 miles
26	4:00 a.m.	Moon passes south of Mercury

Subtract one hour for CST, two hours for MST, and three for PST.

Science News Letter, May 28, 1960

### AERONAUTICS

## New Solar Cells Made: No Batteries Needed

A SOLAR CELL that serves as its own storage battery was reported to engineers attending a Society of Automotive Engineers aeronautic meeting in New York. If it fulfills its apparent promise, the cell will make obsolete solar cells now powering American satellites. These older cells require heavy storage batteries to store the electricity converted from sunlight.

The new cells convert solar energy directly to chemical energy. The cells themselves store the chemical energy for later conversion to electrical energy. Bert H. Clampitt and Dale E. German of the Wichita, Kans., division of the Boeing Airplane Company built the experimental cells.

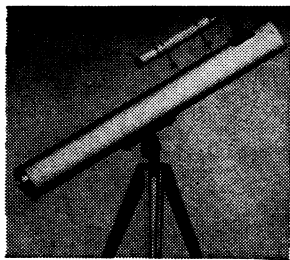
Science News Letter, May 28, 1960

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



## AMAZING SCIENCE BUYS

for FUN, STUDY or PROFIT



### See the Stars, Moon, Planets Close Up!

**Photographers!**  
Adapt your camera to this Scope for excellent Telephoto shots and fascinating photos of moon!

### 3" ASTRONOMICAL REFLECTING TELESCOPE

#### Famous Mt. Palomar-Type

#### 60 to 180 Power—An Unusual Buy!

You'll see the Rings of Saturn, the fascinating planet Mars, huge craters on the Moon, Star Clusters, Moons of Jupiter in detail. Galaxies! This is a fine quality, American-made telescope engineered and built for clear definition and resolution. Equatorial mount with lock on both axes—you automatically follow stars across the heavens. Aluminized and overcoated 3" diameter high-speed 3/10 mirror. Each mirror focally tested. Telescope comes equipped with a 60X eyepiece and a mounted Barlow Lens, giving you 60 to 180 powers. Accessory eyepieces available for higher powers. An Optical Finder Telescope, always so essential, is also included. Sturdy, hardwood portable tripod.

FREE with Scope: Valuable STAR CHART plus 272 page "HANDBOOK OF HEAVENS" plus "HOW TO USE YOUR TELESCOPE" BOOK. Stock No. 85,050-Q.....\$29.95 Postpaid



This is an actual photograph of the moon, taken through our Astronomical Telescope by a 17-year-old student.

### Terrific Buy! American Model OPAQUE PROJECTOR



Projects illustrations up to 3" x 3 1/2" and enlarges them. No film or negatives needed. Projects charts, diagrams, pictures, photos, lettering in full color or black-and-white. Operates on 115 volt, 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". Weight 1 lb., 2 oz. Plastic case with built-in handle.

Stock No. 70,199-Q.....\$7.95 Postpaid

### 3-D DESIGN WITH SPACE SPIDER

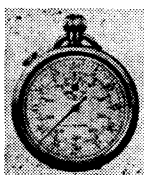


Create 3-dimensional colored designs that "float in space" simply by weaving fluorescent strands between different planes of "shadow box." Design abstractions, plane and solid geometrical figures. Demonstrates equations x, y, and z planes. Visualize engineering concepts. For home decoration or educational use. "Black Light" the design and create incredibly beautiful sight. Kit contains 3 black notched wood panels (the background) each 6 1/2" sq., 3 reels fluorescent thread, black clips, needle, instruction booklet.

Stock No. 70,278-Q.....\$2.95 postpaid

### LOW PRICED STOP WATCH

Has decimal timer so highly recommended for time study use. Seven jewels and unbreakable main spring. Dial registers in 1/5th seconds. One revolution of long hand is 60 seconds. Small hand registers up to 30 minutes. Dial is divided into 1/100ths of a minute for time study work. Start, stop, continue from that reading by pushing crown. Push side dial and all hands return to zero. Chromium plated case.



Stock No. 30,371-Q....\$15.95 Postpaid (tax incl.)

### D-STIX CONSTRUCTION KITS Great Teaching Aid!

Newest, handiest visualizing and demonstration tool for teachers—elementary, high school or college. Colored wood sticks 1/4" thick and "easy-on" rubber joints approx. 3/16" diam. fit together quickly to form all kinds of simple or complex shapes, structures.

Ideal for teaching mathematics, chemistry, physics, design, engineering, architecture, abstract art—or for developing children's interest in form and structure. Work out geometric figures, molecular structures, structural members, configurations and perspectives, models of many types. 3-dimensional visualization adds interest—speeds understanding. Used by professional planners, designers, architects. Money-back guarantee. Stock No. 70,209-Q (230 pcs.).....\$3.00 Pstpd. Stock No. 70,210-Q (370 pcs.).....\$5.00 Pstpd. Stock No. 70,211-Q (452 pcs.).....\$7.00 Pstpd.

### INSTRUCTION BOOKLETS

How to Build Projectors.....	Stock No. 9014-Q	Price Pstpd.
Homebuilt Telescopes.....	9008-Q	40¢
All About Telescopes.....	9036-Q	60¢
Ultra Close-Up Photography.....	9040-Q	60¢
Infra-red Light and Its Uses.....	9042-Q	75¢
Homemade Stereo-Adapters.....	9032-Q	30¢
Homemade Stereo-Viewers.....	9034-Q	30¢
Time in Astronomy.....	9054-Q	60¢
FUN WITH OPTICS.....	9050-Q	60¢
The Camera Lucida.....	9044-Q	20¢
Photography with your Telescope.....	9058-Q	25¢
How to use your Telescope.....	9035-Q	60¢

(Includes directions on how to take photographs thru your telescope)



### STEREO MICROSCOPE

Over 50% Saving. Up to 3" Working Distance—Erect Image—Wide 3 Dimensional Field. Used for inspections, counting, checking, assembling, dissecting. 2 sets of objectives on rotating turret. Standard pair of wide field 10X Kellner Eyepieces give you 23 power and 40 power. Helical rack and pinion focusing. TEN-DAY TRIAL!

Order Stock No. 85,058-Q Full price.....\$99.50 f.o.b. Barrington, N. J.

NOTICE: EDMUND IS NOW HEADQUARTERS FOR MATH LEARNING AND TEACHING AIDS! SEE DOZENS OF OFFERINGS IN OUR FREE CATALOG Q.

### NEW, LOW-COST LAB PROJECTOR SHOWS EXPERIMENTS ON SCREEN



New way to teach chemistry, biology. Protect actual experiments on screen, magnified for class viewing. No individual experiments, errors, waste. Important phases, reactions clearly seen. 3-element, 80mm focal length f/3.5 anastigmat lens, fast 28mm focal length, 4-element f/1.2 lens for microslide projection. Plastic chemical holders and other accessories available.

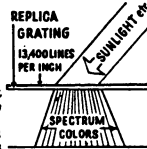
Stock No. 70-230-Q.....\$45.00 postpaid  
CELL KIT—Consists of clear plastic containers and plates to make 12 different cells—includes vials, eye-droppers, cement and directions.  
Stock No. 50-280-Q.....\$5.00 postpaid

### REPLICA GRATING

#### Low, Low Cost

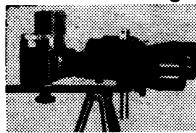
Take Unusual Color Photos at Night

It's here—after decades of effort. Replica Grating—on film—at very low price. Breaks up white light into full spectrum colors. An exciting display 13,400 lines per inch. Diffraction Grating has been used to answer more questions about the structure of the material world and the universe than any other single device. Use it for making spectroscopes, for experiments as a fascinating novelty. First time available such large size—so cheaply. Comes in clear plastic protector.  
Stock No. 50-202-Q.... Includes 2 pieces 8"x5 1/2" —1 transmission type, 1 reflecting type. \$2.00 Postpd.



### NEW BINOCULAR-TO-CAMERA HOLDER

#### For Exciting Telephoto Pictures



Will Fit Any Camera Bring distant objects 7 times nearer with a 35mm camera. 7x50 binocular and our NEW BINOCULAR-TO-CAMERA HOLDER. Ideal for long-range shots of wild life, flying birds, nests, etc. Camera and binoculars attach easily. Use any binocular or monocular—any camera, still or movie. Take color or black and white. Full directions for making telephotos.

Stock No. 70,223-Q.....\$11.50 Postpaid

### FREE CATALOG - Q

#### 128 Pages! Over 1000 Bargains!

America's No. 1 source of supply for science experiments, hobbyists. Complete line of Astronomical Telescope parts and assembled Telescopes. Also huge selection of lenses, prisms, war surplus optical instruments, parts and accessories. Telescopes, microscopes, satellite scopes, binoculars, infra-red sniper-scopes... items for making "Science Fair" projects, math learning and teaching aids.



Request Catalog-Q EASY PAYMENT PLAN AVAILABLE! DETAILS WITH CATALOG!

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

EDMUND SCIENTIFIC CO., BARRINGTON, N. J.