ASTRONOMY

Venus Shines in West

It is most brilliant object in June evening skies. Summer starts on June 21, when the Northern Hemisphere begins to receive its greatest radiation from the sun.

By JAMES STOKLEY

➤ LOW in the west, as the evening skies darken, is the brightest star or planet of June. This is Venus, which is gradually swinging around to the east of the sun so that it remains longer and longer in view after the sun has gone down. It is in the constellation of Gemini, the twins, but these stars are much fainter, and not as easy to locate. The two principal ones in the constellation—Castor and Pollux—are both shown on the accompanying maps. These depict the heavens at 10:00 p. m., your own kind of standard time, on June 1 and an hour earlier at the middle of the month. Where daylight saving time is observed, this will, of course, be at 11:00 p. m. on the first and 10:00 p. m. on the 15th.

On the astronomer's scale, Venus is of magnitude minus 3.4. Close to it is another planet, Saturn, which is much fainter, of magnitude 0.4. On the map, Saturn is shown below Venus as it will be after the middle of June. Earlier, Venus will be lower, and on June 12 will pass her fainter and more distant brother.

Mars and Jupiter

Two other planets are also indicated, in somewhat better positions for viewing. Directly west, in the constellation of Leo, the lion, is the red planet Mars. Since January 10, Mars has been receding from the earth and continually dimming. Then its magnitude was minus 1.2, but it was at the comparatively short distance of 59,400,000 miles. Now it has gone out to 169,440,000 miles, and has dropped to magnitude 1.6. By December it will be still more distant, at 225,580,000 miles, but it will be nearly in line with the sun and not visible. Mars in June is close to the star Regulus. On June 18 they will be nearest, with Mars less than a degree (twice the apparent diameter of the full moon) to the north.

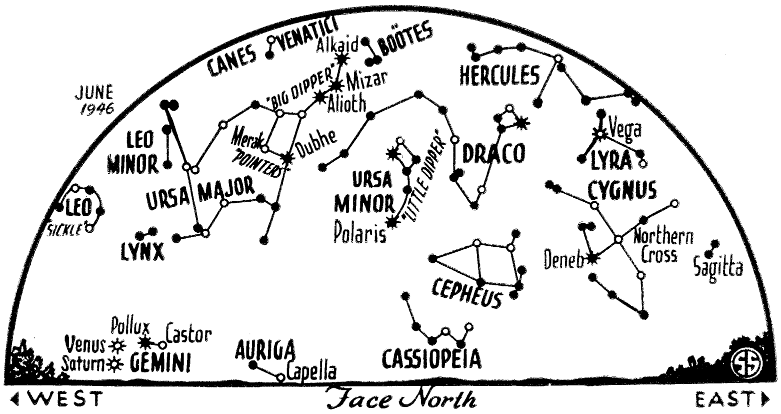
Our fourth June planet is Jupiter. With magnitude minus 1.8, it is more brilliant than any except Venus. The constellation of Virgo is its location, and it is close to the star Spica, which it exceeds in brightness about 16 times.

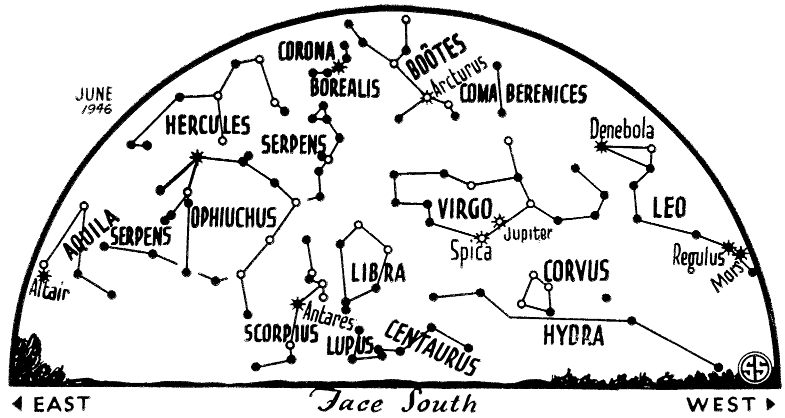
Mercury, the only other planet that ever becomes bright enough to be seen without a telescope, will hardly be visible at all in June. By the 30th, however, it will be about 15 degrees above the horizon at sunset, just north of the west point. Then, and for the next few days, it will be possible to get a glimpse of it if you have a clear view to the west.

Some of the stars of June evenings have been mentioned. The brightest is Vega, in Lyra, the lyre, which is high in the east. Below it is Cygnus, the swan. Six of the stars in this group form the "northern cross" with Deneb at the northern end. To the right of Cygnus is Aquila, the eagle, where Altair is the brightest star. High in the south, above the eastern end of Virgo, is Bootes, the bear driver, containing first magnitude Arcturus. Just to the left of this figure is a semicircular group called Corona Borealis, the northern crown. It was in this constellation that a star called T Coronae Borealis unexpectedly flashed out to naked eye visibility a few months ago, but now it has dimmed again and can only be seen with a telescope. (*See* SNL, Feb. 16).

Low in the south is Scorpio, the scorpion, in which ruddy Antares shines. Only part of this constellation is indicated, but later in the evening it is entirely in view. Extending eastward from Antares is a hook-shaped row of stars which forms the scorpion's tail.

On June 21, at 7:45 p. m. EST, occurs the summer solstice. This is the moment when the sun, which has been moving northward since last December, reaches its farthest north. In the northern hemisphere this is the beginning of summer,





SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS but in countries south of the Tropic of Capricorn, it marks the beginning of winter.

This year there are six eclipses, of which the third and four come in June, but unfortunately, neither will be visible in the United States. On June 14 the moon will enter the earth's shadow, producing a total lunar eclipse. This will be seen throughout most of the Eastern Hemisphere, Antarctica, Australia and New Zealand, and the eastern tip of South America.

Two weeks after that, when the moon has moved half way around the sky and is in the same direction as the sun, it will come partly between the sun and the earth, producing a partial solar eclipse. At a point in Greenland, near the Arctic Circle, this will be at maximum, but even there less than a fifth of the sun's diameter will be hidden. In northern Canada it will be visible also, during the night, for this is the land of the midnight sun.

At this time of year, when the sun is farthest north, we in the Northern Hemisphere receive the greatest radiation from it, and we begin to be impressed, unpleasantly perhaps, on a hot summer day, with the energy that it sends us. Without it however, the earth could be a dead, cold world. Upon this radiation of energy, most of which is broadcast to space so that only a very minute fraction reaches our planet, we are completely dependent for our very existence.

Old Atomic Energy

No matter whether we burn wood, coal or oil, or whether we use power from falling water, or from the wind, all of our energy ultimately comes from the sun. And this energy has an atomic source. Thus atomic energy, which has become such a common topic of discussion, is nothing new. Indeed, the earth has never used anything else but atomic energy! However, we have had to use it very indirectly—now we are beginning to learn how to take it directly from the sources at the hearts of atoms.

Hans A. Bethe, Swiss-born physicist of Cornell University, is the scientist who finally gave a solution to the old problem of how the sun keeps fueled. Ordinary burning is not nearly adequate, a fact that was long ago recognized. Other theories have been propounded but they, too, were found wanting. Though Dr. Bethe's suggestion is still only a theory, it seems to rest on very solid ground, and is now generally accepted by astronomers.

In the process thus envisaged, hydrogen is the fuel. This is the lightest and simplest of the elements. Its atom consists of a proton, a particle with a positive electrical charge, around which revolves a single electron, carrying a charge of negative electricity. In the sun, and in other stars, four nuclei of hydrogen atoms are eventually combined to form a single atomic nucleus, which is that of the gas helium. The helium nucleus, however, is not quite four times as massive as one of hydrogen. Some of the mass is lost in the process, and this is given off as energy.

Six Steps in Process

The process has six steps. It is a cyclic one, but usually it is considered as starting with an atom of ordinary carbon, with which an atom of hydrogen unites, resulting in the emission of some energy and leaving an atom of a short-lived variety of nitrogen, which quickly changes to another form of carbon. Then the second hydrogen atom comes along, the carbon is transmuted to ordinary nitrogen, the kind which makes up most of our atmosphere. Energy comes off again at this transformation. Along comes another hydrogen, and the nitrogen is changed to a rare kind of oxygen. This, too, lasts briefly, and soon changes to still another kind of nitrogen. Then the fourth hydrogen atom arrives, and the nitrogen changes to helium and ordinary carbon. The latter is what we started with, so the cycle is ready to start over again.

The times required, on the average, for these changes, vary widely. The fourth step from nitrogen to oxygen requires 4,000,000 years for one atom but there is so much material in the sun that it is occurring all the time. The next step is the shortest, and an atom of the oxygen produced will probably change to nitrogen in about two minutes.

Though this process is so important, it is unlikely that we will ever be able to reproduce it on earth, for it takes place only under the conditions of temperature—millions of degrees—and the enormous pressures that prevail inside the stars. Atomic energy on earth will probably long continue to be dependent on the process of fission of uranium, as used in the atomic bomb, or one that is comparable to it.

Celestial Time Table for June

June	EST	
1	6:36 p. m.	Moon passes Venus
2	1:21 p. m.	Moon passes Saturn
4	1:35 p. m.	Moon passes Mars
6	11:06 a. m.	Moon in first quarter
8	10:22 p. m.	Moon passes Jupiter
12	8:00 a. m.	Venus passes Saturn
	5:00 p. m.	Moon farthest, distance 252,300 miles
14	1:42 p. m.	Full moon, total eclipse of moon, visible in Eastern Hemisphere
21	7:45 p. m	Sun farthest north, summer commences
22	8:12 a. m.	Moon in last quarter
23	8:00 p. m.	Mercury passes Saturn
27	7:00 p. m.	Moon nearest, distance 223,400 miles
28	11:06 p. m.	New moon, partial eclipse of sun, visible in Arctic regions
30	4:55 a. m.	Moon passes Saturn
	6:17 p. m.	Moon passes Mercury

Subtract one hour for CST, two hours for MST, and three for PST. Add one hour for the corresponding Daylight Saving Time.

Science News Letter, May 25, 1946

NUTRITION

Letting Milk Stand May Reduce Value

➤ LETTING milk stand in bottles on the doorstep may destroy some of its nutritional value. Using ultraviolet light to destroy germs in it may be even worse. Experiments reported by H. D. Kay of the National Institute for Research in Dairying at Shinfield, Reading, England, indicate that exposure to light destroys a fat-digesting enzyme present in milk as it is drawn from the cow. Even a few minutes of such exposure will cause a partial breakdown of this compound; a half-hour's exposure produces 80% destruction.

Science News Letter, May 25, 1946