ASTRONOMY

Three Planets Visible

Venus, the first of the three planets to appear in the August evening skies, shines brilliantly at dusk low in the west but sets before the other planets become visible.

By JAMES STOKLEY

➤ THREE PLANETS, Venus, Saturn and Mars, will be visible in the August evening skies.

First to appear is Venus, which sets an hour or so after the sun. But it shines so brilliantly that you can see it low in the west at dusk, long before any other star or planet is visible. It will be gone by the time the twilight is over and the sky is dark.

Mars is farther south and a little higher than Venus. Although it shines with light equal to a first magnitude star, it is about a 70th as bright as Venus. It has the steady glow of a planet, different from the scintillating brilliance of a bright star. During the daylight hours of Aug. 8 it passes just to the north of the bright star Spica, in the constellation of Virgo, the virgin.

Neither of these planets is shown on the accompanying maps, which depict the sky as it looks later in the evening. These maps are drawn for about 11:00 p.m., your own kind of daylight saving time, at the first of August, an hour earlier in the middle of the month, and two hours earlier at the end.

Saturn Brighter Than Mars

Saturn is shown over toward the east in Aquarius, the water-carrier. It is about a third brighter than Mars. Rising shortly after sunset, Saturn remains visible the rest of the night.

Brightest star of the August evening is Vega, in Lyra, the lyre. This group stands at the zenith, as shown on the maps. To the east (shown partly on the northern sky map, partly on the southern) is Cygnus, the swan, with the bright star called Deneb. And if you go from Lyra toward the southeast, you come to Altair, in Aquila, the eagle. Vega, Deneb and Altair form a figure often called the "summer triangle" because it is so prominent in the evening at this time of year.

Low in the south are two other groups that characterize the summer skies. These are Sagittarius, the archer, and Scorpius, the scorpion. In the latter constellation is the star Antares, notable because of its red color.

Hanging in the northwest is the big dipper, which is part of Ursa Major, the great bear. In the bowl of the dipper, toward the northern horizon, are the famous pointers, whose direction, followed upward and to the right, guides you to the pole star. Polaris, which is in the little dipper. And this, in turn, is part of the little bear, Ursa Minor.

The big dipper's handle is also a useful guide. If you follow its curve toward the west you reach Arcturus, another first magnitude star. This is in Bootes, the herdsman.

Twisting around the little dipper is Draco, the dragon. The head is toward the top, close to Hercules. One of his mythological labors was to slay the dragon.

Over in the northeast are four constellations that represent characters is another well-known story from mythology. A W-shaped group of stars forms part of Cassiopeia, the queen. Above is Cepheus, the king. Andromeda, to the right, was their daughter, the princess who was chained to a rock. Toward the southern horizon is Perseus, the hero who rescued her.

Bright Stars Surround Jupiter

If you stay up late and look toward the east in the early morning hours, you will see another planet: Jupiter. It is about a fifth as bright as Venus and it stands in Taurus, the bull. Around it are many bright stars—those which make the winter evening sky so brilliant. In the pre-dawn hours of late summer, you can get a preview of them.

Antares, the red star now seen low in the southern evening sky, has a number of points of interest. One is the color, which makes it look something like Mars. In fact, its name means "rival of Mars."

Its color indicates that it is relatively cool; its surface temperature is about 6,000 degrees Fahrenheit. The sun's temperature is about 10,000 degrees Fahrenheit. Some stars are much hotter. Spica, for instance, in Virgo, is bluish-white. The temperature at its surface is something like 45,000 degrees Fahrenheit.

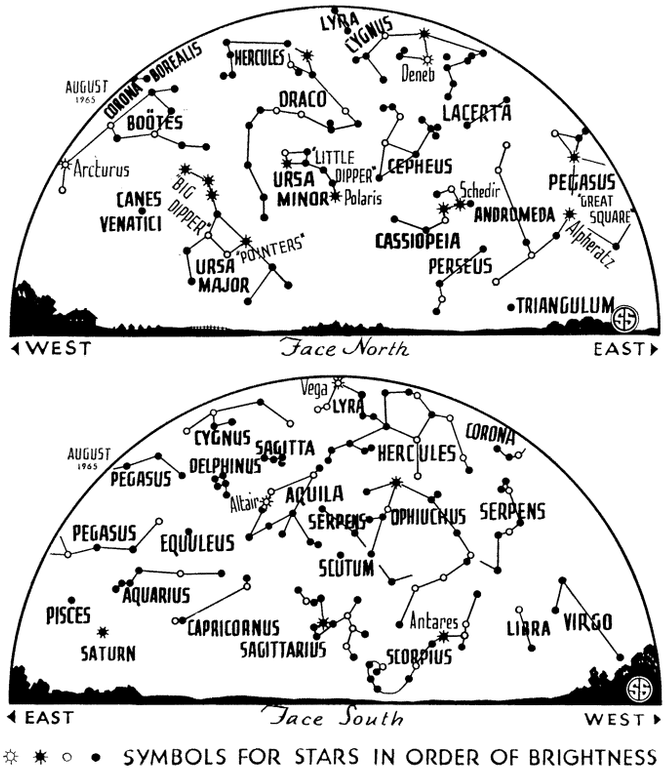
Perhaps you have heated a poker in a fire. If so, you know that it begins to glow a dull red at first, when its temperature is about 1,000 degrees Fahrenheit. Around 2,000 degrees Fahrenheit it is yellow; and around 2,800 degrees Fahrenheit (near its melting point) it is a dazzling white.

Temperature of Star

Something similar occurs with the stars. Just as the metal-worker can estimate the temperature of a metal from the color of its light, so the astronomer can tell from the color how hot a star is. Not only does the color change—the total amount of light given off by each square inch of a star's surface increases as it gets hotter.

Astronomers distinguish between the apparent brightness of a star (i.e., how bright it looks) and its intrinsic brightness, or luminosity. A very luminous star far away may look faint, while a rather dim one that is nearby may look quite bright. If its apparent brightness and its distance are known, scientists can determine how bright it really is.

Antares is at least 3,000 times as bright as the sun, but emits per square mile only one-eightieth as much as the sun. Since it



is considerably cooler than the sun, a given area of its surface sends out far less light than the same solar area. To make it so bright, therefore, there must be a lot more surface: i.e., it must be many times bigger than the sun. This has been confirmed with an instrument called the stellar interferometer, attached to the 100-inch telescope of the Mt. Wilson Observatory in California.

Antares is so huge, in fact, that if the sun were at its center there would still be room inside its globe for Mercury, Venus and the earth to revolve around it in their customary orbits.

Although stars vary enormously in brightness and in diameter, their variation in mass is far less. So to have approximately the same amount of matter spread over so large a volume, the density of Antares and similar stars, which are called "red giants," is very low.

Celestial Timetable for August

AUG.	EDT	
2	5:00 a.m.	Moon passes south of Mars
4	1:48 a.m.	Moon in first quarter
8	noon	Mars passes north of Spica
10	4:00 p.m.	Moon farthest, distance 252,400 miles
12	4:23 p.m.	Full moon
14	6:00 a.m.	Moon passes south of Saturn
15	3:00 p.m.	Mercury between earth and sun
19	11:51 p.m.	Moon in last quarter
22	3:00 a.m.	Moon passes north of Jupiter
25	3:00 p.m.	Moon nearest, distance 223,100 miles
26	2:51 p.m.	New moon
29	2:00 a.m.	Moon passes north of Venus
30	11:00 p.m.	Moon passes north of Mars

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

• Science News Letter, 88:58 July 24, 1965

EDUCATION

More Science by Doing Stressed in Britain

➤ SCIENCE EDUCATION in Great Britain is being revamped to give students an earlier crack at experimentation and practical inquiry.

In an effort to stimulate the student's imagination, the Nuffield Foundation, an independent charitable organization, has undertaken a thorough revision of the science curricula and teaching methods.

For the past three years, the organization has been developing a system that will bring continuing change to British scientific education. Aimed primarily at secondary schools, the Nuffield project plans to thoroughly cover the fields of chemistry, physics and biology.

A editorial in Endeavour, 24:565, 1965, points out that the Foundation is also considering "the possibility of introducing some science into primary school teaching."

Because of the "repercussions on scientific education generally," pre-university and university programs are also being evaluated.

As part of the revised secondary school science program, Foundation officials collaborating with school administrators are testing new items of apparatus films and books.

• Science News Letter, 88:59 July 24, 1965

ASTROPHYSICS

Decay May Split Comets, Not Nearness to Sun

➤ DISINTEGRATION of comets, long thought to be the result of nearness to the sun or other planets, may actually be caused by internal decay.

Two astronomers advanced the theory that decay of radioactive material at the comet's core may so weaken the body's structure as to break it apart when the comet hits warmer regions near the planets after a cold ride through outer solar systems beyond. This theory was advanced by Dr. Fred L. Whipple and Robert Stefanik, Smithsonian Astrophysical and Harvard College Observatories, in Cambridge, Mass. to the 13th International Astrophysical Symposium in Leige, Belgium.

• Science News Letter, 88:59 July 24, 1965

ASTRONOMY

40-Inch Telescope to Be Built in Wisconsin

➤ A 40-INCH reflecting telescope for astronomical research will be constructed by the University of Chicago at Yerkes Observatory on the shores of Lake Geneva in Williams Bay, Wis.

The National Science Foundation has awarded the university $176,000 for construction of the new telescope. The announcement was made by Dr. W. Albert Hiltner, director of the Yerkes Observatory, and William W. Morgan, chairman of the department of astronomy.

The university also operates a 40-inch refractor telescope—the largest of its kind in the world—and several smaller research instruments at Yerkes. Research requiring greater telescopic power is carried out by members of the department of astronomy either at the McDonald Observatory, used under contract with the University of Texas, or at the Kitt Peak National Observatory near Tucson, Ariz.

"Because of technical improvements, we will be able to obtain results with the new 40-inch telescope which will be comparable with those which could be obtained only with much larger instruments a few years ago," Dr. Morgan said.

• Science News Letter, 88:59 July 24, 1965

GEOLOGY

Remains of Inland Sea Discovered in Australia

➤ OIL DRILLERS have discovered the remains of an inland sea similar to the Dead Sea in the Blackall district of central-western Queensland, Australia.

Geologists estimate that the sea, now a big underground salt bed, existed between 300 million and 400 million years ago.

As yet, the contents of the salt bed and their potential value have not been assessed in any detail, but in other parts of the world salt beds have carried valuable deposits of potash, boron and magnesium salts.

The remains of the sea were encountered by drillers in the American Overseas Petroleum Ltd. (Amoseas) Boree No. 1 well, 24 miles southeast of Blackall.

• Science News Letter, 88:59 July 24, 1965