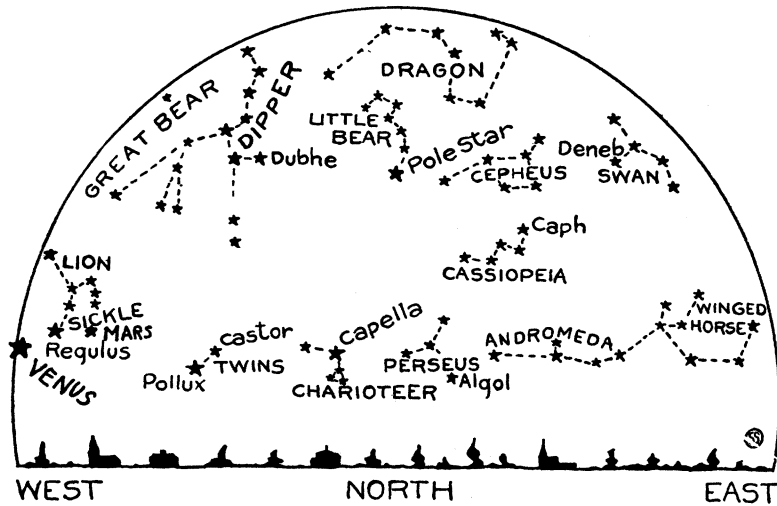


# Sun Farthest Now, Despite Hot Weather



By JAMES STOKLEY

With July, in most parts of our country, comes hot weather; the noon-day sun seems hotter than ever, and we long for the coolness of January. But, surprising though it may seem, the earth is now about three million miles farther from the sun than it was in the first month of the year. On Sunday, July 3, at two o'clock in the afternoon, eastern standard time, the earth is in aphelion, which is the name that astronomers give to the part of its orbit when the greatest distance separates it from the sun. Then, the two bodies are 94,454,200 miles from each other. On the second of January they were in perihelion, or closest together. At that time, while many people were complaining about the cold weather, the sun was only 91,346,100 miles from us.

## Less Heat Now From Sun

At the great distance that the sun is from the earth at any time, three million miles doesn't make a great deal of difference, but the light and heat varies, not as the distance of the source, but as the square of the distance. That is, if you have two 25 candlepower electric lamps, one two feet away, the other four, the closer one will not give twice as much light on your face as the distant one, but four times as much. The intensity varies as the difference between four and sixteen, not as between two and four. The intensity of the sunlight in January, if we figure only from the distance, should be about seven per cent. more than it is now.

Then, one asks, why is it hotter now, if the intensity of the light and heat from the sun is about seven per cent. less than it was in January? The answer is that it is seven per cent.

less only when the sun is overhead in both cases. In January, the sun is nearer, but it is far to the south, the light and heat rays strike the earth at a low angle. Imagine a beam of sunlight a yard square. When it strikes the earth at an angle of 30 degrees, about what it would be at noon in winter, the yard square beam will cover an area of two square yards, so that the heating effect is only half of what it would be if the sun were overhead.

## Summer Sunshine Concentrated

But in summer, the sun is higher, about 70 degrees at noon in the United States, and then the yard square beam will cover an area of about one and a tenth square yards of the earth's surface, so we get nearly twice the heating effect that we do in winter. With nearly a hundred per cent. greater heat thus coming from the sun to the earth in summer on this

account, the seven per cent. difference due to the greater distance of the sun has little effect.

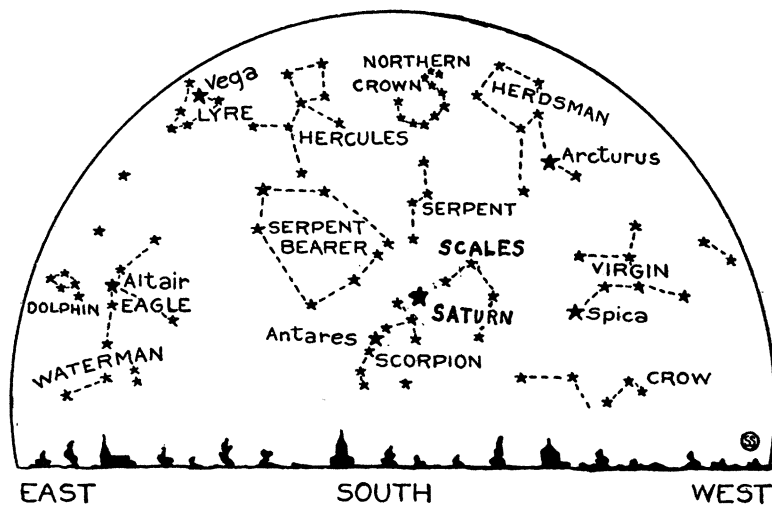
However, there are still other factors which make for hot weather, or else the hottest weather would come in June, when the sun is farthest north, and the coldest in December, when it is farthest south. Actually, as everyone knows, the hottest weather occurs a month or so after the summer solstice, when the sun is really giving us the most heat.

This is due to the fact that the earth holds its heat for a time. It is always absorbing a certain amount of heat from the sun, in winter and summer, and likewise, at all times of the year, it is radiating a certain amount of heat out into space. During the early winter, it gives off heat faster than it takes it in from the sun, and so the average temperature becomes less. But, during the spring, it takes it in faster than it gives it off, and the thermometer starts to go up. Then comes June, the sun begins to calm down a little in the quantity of heat that it gives us, but the earth has been storing up heat all spring, therefore, it doesn't start giving off excess heat until about August, and not until then does the average temperature begin to go down.

## Venus In Evening Sky

In this warm weather, the evenings are welcome, and there are plenty of interesting objects in the evening skies to attract the amateur star gazer. The most prominent thing in the evening sky, except the moon, of course,

*(Just turn the page)*



Hold these maps in front of you and face north or south. They will then show stars as they appear to you in the sky.

## July Skies

(Continued from page 7)

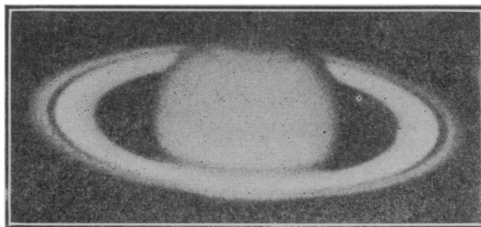
is the planet Venus. On the fifth of July this planet will engage in a little show of its own when it comes close to Regulus, the bright star at the end of the handle of the "Sickle" in Leo, the lion. Regulus is almost directly west about 8:30 p. m., at this time, and Venus will be to the north a distance about equal to the diameter of the full moon. Though Regulus is a first magnitude star, Venus will be a great deal brighter.

Mars, one of the two other naked eye planets now visible in the evening sky, is also in this part of the heavens, and on the twenty-third of the month it will also be near Regulus, but about twice the diameter of the moon away. Mars, however, will be about a magnitude fainter than Regulus.

Saturn is probably the most interesting of the planets now in the evening sky, though to appreciate fully its features one needs a small telescope. Saturn is now in the southern sky, directly south about 8:30 p. m. Most conspicuous about it is the famous system of rings, shown in the illustration in a photograph made at the Mt. Wilson Observatory. These rings were first noticed by Galileo, who, in 1610, was the first man to examine the heavens with a telescope, but he did not realize just what they were. It was not until 1656 that Huyghens, the Dutch astronomer, and inventor of the pendulum clock, discovered their true nature.

### Saturn's Giant Rings

The rings are enormous things. The planet itself is about 74,100 miles in diameter, but the outermost ring is 171,000 miles from one edge to the



SATURN—the ringed planet

opposite, while the innermost ring is 88,100 miles in its internal diameter. To a person on the planet's surface at the equator, therefore, the nearest part of the ring system would be about 7,000 miles overhead, nearly a distance great enough to permit the earth to pass through them.

Yet despite the great diameter of the rings, they are very thin. Their thickness is not over 10 miles, so thin that if we were to make a model of them to the scale of 10,000 miles to the inch, which would make the outer ring about 17 inches in diameter, the thinnest tissue paper would be too thick to represent them properly.

As Saturn reappears in the evening sky year after year, the rings take on a different aspect. Sometimes they seem to be spread out, much more nearly circular than at other times, when they are very thin and may even disappear for a time. This is a result of the planet's revolution in its orbit, and the fact that the plane of the rings is not the same as the plane in which the planet itself moves. Sometimes the earth is directly in line with the rings; this happened in 1921, when the rings appeared at best as a thin line. Since then, however, the rings have been spreading out until now they are nearly as far open as in the illustration, while by 1936 they will again be seen on edge.

### Planet Occulted

On July 10, the moon, which will than be in a gibbous phase between first quarter and full moon, will come close to Saturn, finally passing in front of it. This is called occultation. At 4:30 p. m., eastern standard time, on the 10th, which is a Sunday, despite the blue laws in some parts of the country, the planet will disappear behind the lunar disc. As this is several hours before sunset, it will not be possible to see Saturn with the naked eye, though the moon will be easily visible, in the southeast. However, with a small telescope, the planet should be picked up as it vanishes. Then, at 5:30 p. m., eastern standard time, comes the emersion, when the planet reappears on the opposite side of the moon.

## ASTRONOMY

### Eclipse Cloudy In Norway

Partial success of the observations of the total eclipse of the sun of June 29 in England and the failure of expeditions to Norway because of clouds have again proven the fallibility of advance weather prospects. The English chances of clear weather were estimated months ago as only one in three, while in Norway, they were said to be even. Yet the eclipse was seen in England, partly through light clouds, while in Norway thick clouds completely obscured the view. Dr. S. A. Mitchell, director of the McCormick-Chaloner expedition to Norway, the only scientific party from the United States, was unable to make any observations. This was his seventh eclipse, yet the magic number failed to bring him luck.

Dr. L. J. Comrie, of the British Nautical Almanac Office, who made the official advance calculations of the path of the eclipse over Britain, was at Southport, near Liverpool. He reports that the eclipse was seen from there through thin clouds, which concealed the faint outer extensions of the corona that were so noticeable at the eclipse of January, 1925, visible in New York. The corona is the outermost part of the sun, consisting at least partly of fine "dust" particles, and can only be seen at the time of a total eclipse. However, the bright inner corona, and the ring of the chromosphere, the sun's outer layer, or "atmosphere," could be seen behind the black disc of the moon. A large prominence, or red flame of hydrogen, was observed from the upper part of the sun.

Gerald Merton, British astronomer and former war aviator, observed the eclipse from his own airplane, and succeeded in rising above two layers of clouds, at 4,000 and 9,000 feet altitude. He flew at 10,000 feet and while another layer of clouds was 5,000 feet above him, he had a fair view of the phenomenon. He also observed the shadow of the moon sweeping across the clouds beneath him.

At Giggleswick, where Sir Frank Dyson, astronomer royal, located his instruments, a rift in the clouds appeared opportunely a few minutes before the total eclipse commenced. It was observed with a clear sky from that point. Even this was not as narrow an escape as that of a party from the Lick Observatory to Goldendale, Washington, to observe the eclipse in June, 1918.

Blue Band  
VELVET  
PENCILS

Used by millions

5¢  
At all dealers

The Lead has special strength with perfect smoothness and softness, is very black, yet it is readily erased.

The Rubber is of the famous Venus quality.

The Costly Wood is a specially selected cedar, treated to give best satisfaction in sharpening.

The Walnut Finish and Blue Band make it easily recognized.

Write for Sample

AMERICAN LEAD PENCIL CO., 218 FIFTH AVE., N.Y.  
Makers of the famous VENUS Pencils