

ASTRONOMY

Five Evening Stars

February To Bring Parade of All Planets Visible Without Optical Aid and Brightest of Others in Row

By JAMES STOKLEY

WHEN we talk about "evening stars," or "morning stars," we never really refer to stars. That word is now confined to mean a distant sun, a glowing globe of gas, shining with its own light, like the sun around which the earth and other planets revolve.

The evening or morning star is always a planet. The apparent daily motion of the sky from east to west is an effect of the earth's turning from east to west. Therefore, a planet that happens to be to the east of the sun follows in its daily journey, and sets after sunset. Then it is visible in the evening, and we call it an "evening star."

But on other occasions the same planet will be to the west of the sun. Then it will go down before sunset, and not be seen in the evening. But, since it precedes the sun in its daily motion it rises before sunrise. It is visible in the morning, and is a "morning star."

Generally the planets are more or less evenly divided, and it is very unusual to have them all on one side or the other simultaneously.

That, however, is what February brings. At the end of the month all five of the planets that can be seen with the naked eye, as well as the brightest of those that are seen only with a telescope, will be lined up at one time in the western sky, all visible like beads on a string. This is an exceedingly rare event, and it should be watched for in the last few days of February, and the first few in March.

Look to the West

As one looks to the west, in the gathering dusk, Mercury will be seen near the horizon. Above, a little to the south, and a little brighter, will shine Jupiter. Close above this, and still brighter, will be Venus. Considerably fainter, above, and to the south, will appear Saturn, and above this, and still fainter, though brighter than any nearby star, Mars will shine, with a red color. And a little higher yet, and farther south, Uranus will be situated, visible with a small telescope. The five naked eye planets will be within 45 degrees of each other, so they

will surely make a magnificent display.

In fact, at this time, all the planets will be in the same half of the sky. Pluto, the most distant, which is seen only with a very powerful telescope, is to the east in the figure of Cancer, the crab. And Neptune, the next one in, occupies a place in Virgo, the Virgin, and rises just before Mercury sets.

On the accompanying maps the stars of the February evening are shown as at 10 o'clock on the first, 9 o'clock on the 15th and 8 o'clock on the 29th. The three planets that are shown are placed the way they will be on the 15th. On the first of the month Mars will be between Jupiter and Saturn. It passes the latter on the thirteenth.

Of the stars, Sirius is brightest, in Canis Major, the great dog, but Orion is the finest constellation visible. The three stars which form the warrior's belt make it easy to locate. Above, and to the right, is Aldebaran, in Taurus, the bull, which Orion is supposed to be fighting. Regulus, in Leo, the lion, is to the east, in the so-called "sickle." It marks the end of the handle.

Great Bear

To the north the great dipper, part of Ursa Major, the great bear, is swinging into a better position than it has been in for several months, with the handle hanging downwards. To the northeast is the W-shaped figure of Cassiopeia, the queen. Between her and the dipper is Polaris, the pole star.

When they view the planets in their

unique February arrangement, many persons will wonder about these neighbors of the earth. What are they like? Are they inhabited?

To the latter question, the astronomer usually answers, "No." It seems very doubtful that any sort of intelligent life, even remotely resembling anything that we know, could exist on any of them. The farthest science will go is to admit that green areas regularly appear and disappear on Mars, and that these behave as if they were areas of vegetation.

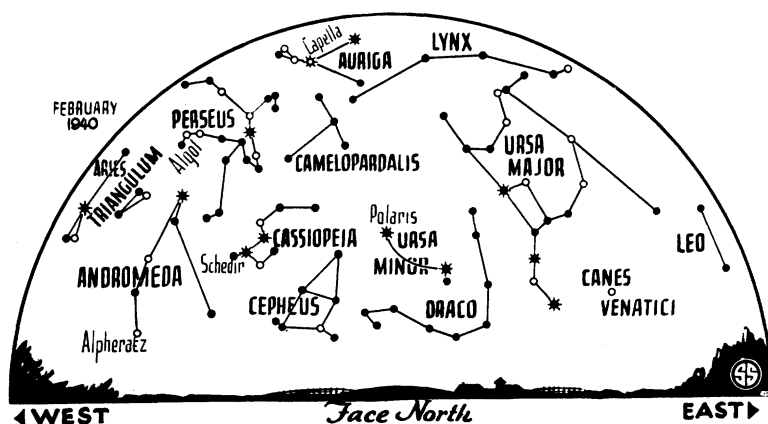
After all, life as we know it requires a very delicately balanced set of conditions. The temperature must be right, not too hot and not too cold. Even here on the earth we find extremes in places where we cannot live.

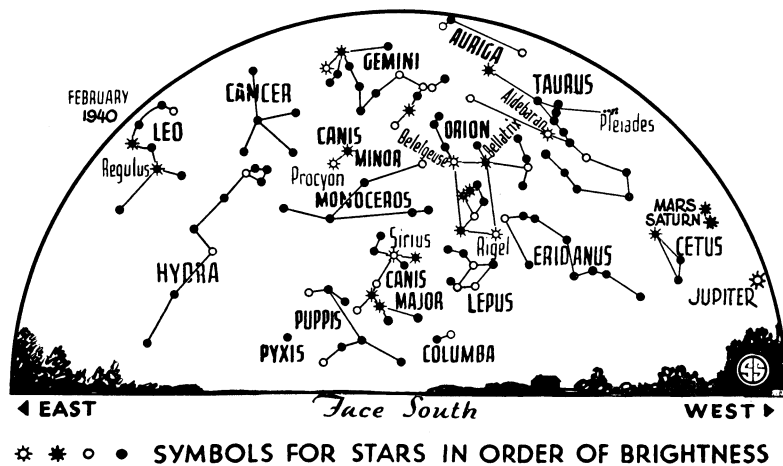
There must be an atmosphere of the right density and composition. If it does not contain enough oxygen, we cannot breathe. If it is too thin, as on the top of a high mountain, we cannot use it. Too dense an atmosphere would also be unsuitable.

Air Has Weight

Air seems almost the lightest thing we know, but it does have weight, and a common experiment in elementary physics is to weigh a copper globe before and after the air has been exhausted from it, for there is really a marked difference.

Furthermore, it is the gravitational force of the earth that holds our atmosphere around this planet. The moon, being much smaller than the earth, has much less gravitational force, and things would weigh less there than they do here. The force of gravity on the moon is not enough to hold an atmosphere. If some superhuman power were to endow it





with one, it would soon float off into space!

The same thing is true of the planet Mercury. Also, Mercury is only a little more than a third as far from the sun as we are, and it is very hot. It is hot enough, on the part of Mercury which faces the sun, for lead to melt, so that planet hardly seems to be a suitable place of habitation.

Venus is almost as big as the earth, and the force of gravity is nearly as great as it is here. It has an atmosphere, but one that is continually laden with clouds, of which we see only the tops, and through which we cannot penetrate to see the surface of the planet. The temperature above these clouds is about ten degrees below zero Fahrenheit, but, of course, it may be much warmer below. However, spectroscopic studies have revealed no trace of water vapor or oxygen in this atmosphere, so the chances of life there seem rather slight.

Mars Farther Off

Mars this month is not nearly so close as it was last July, and that is why it is now so faint. Mars has an atmosphere, for sometimes clouds can be observed in them. But there also no water vapor or oxygen has been detected. However, there may be slight amounts, though too little to produce an effect that we can find. The white areas, which come and go around the poles of Mars, are probably polar caps of ice or snow, and these would put small amounts of moisture into the air. The green areas which appear in the Martian springtime, and vanish in the autumn and winter, behave like vegetation. There may be vegetable life on Mars, though it is hard to imagine animal life, and especially intelligent animals.

Jupiter and Saturn are both so far out from the sun that the temperatures there are very low. They have atmospheres, but of methane and ammonia, poison gases on earth. They could hardly be the abode of life, even if it could be acclimated to the extreme cold. Uranus and Neptune, telescopic planets, are believed to be similarly constituted, and even colder. Pluto, the present most distant known planet, is much smaller, probably no bigger than Mercury, so it is too small to have atmosphere, and in addition is colder even than Neptune. It seems, therefore, that the planet earth is the only one in the solar system which we are sure is inhabited by intelligent life—and sometimes we have reason to doubt even its intelligence.

Celestial Time Table for February

Monday, Feb. 5, 1:58 a. m., Algol at minimum brightness. **Wednesday, Feb. 7,** 10:47 p. m., Algol at minimum. **Thursday, Feb. 8,** 2:45 a. m., New Moon; 9:08 p. m., Moon passes Mercury. **Saturday, Feb. 10,** 7:36 p. m., Algol at minimum; 9:00 p. m., Moon farthest, 252,400 miles from earth. **Sunday, Feb. 11,** 4:11 p. m., Moon passes Venus. **Monday, Feb. 12,** 9:32 a. m., Moon passes Jupiter. **Tuesday, Feb. 13,** 3:00 a. m., Mars passes Saturn; 4:26 p. m., Algol at minimum; 9:55 p. m., Moon passes Saturn; 10:53 p. m., Moon passes Mars, about two lunar diameters to the south. **Thursday, Feb. 15,** 2:20 p. m., Moon passes Uranus. **Friday, Feb. 16,** 7:55 a. m., Moon at first quarter. **Tuesday, Feb. 20,** 5:00 p. m., Venus passes Jupiter, two lunar diameters to the north. **Friday, Feb. 23,** 4:55 a. m., Full moon; 5:00 p. m., Moon nearest, 221,900 miles from earth. **Saturday, Feb. 24,** 4:21 p. m., Moon passes Neptune. **Sunday, Feb. 25,** 3:43 a. m., Algol at minimum. **Tuesday, Feb. 27,** during evenings of next week remarkable planet display seen in west after sunset. **Wednesday, Feb. 28,** 6:00 a. m., Mercury farthest east of sun, seen as evening star about this date. **Thursday, Feb. 29,** 9:35 a. m., Moon in last quarter.

Eastern Standard Time throughout.

Science News Letter, January 27, 1940

PHYSICS

Neutral Meson Particle Needed to Explain Forces

A NEW kind of atomic particle that would make "triplets" out of the "twin" meson particles found in cosmic rays, is suggested by the man who worked out the theory of how the sun keeps shining, Prof. Hans A. Bethe, Cornell University physicist.

Prof. Bethe has been applying his skill in mathematical physics to calculations on how meson particles—having 200 times the mass of ordinary charges of electricity, the electrons—can be used to explain nuclear forces. These attractive forces within the nucleus help hold all atoms, and hence all matter, together and form a sort of "cement" that binds together the atomic building blocks of the physical world.

That meson particles might exist and have the role of transferring energy between nuclear particles was first suggested in 1935 by the young Japanese physicist Yukawa. This was before the particles were actually found in cosmic radiation.

For an atom to liberate a meson particle would require from 80,000,000 to 100,000,000 electron volts of energy, Prof. Bethe's calculations show. This is far beyond any energies yet available in the laboratory through bombardment by giant machines for smashing the atom.

The new triplet kind of meson, yet unbound but needed to explain more fully nuclear forces, would be without an electrical charge, says Prof. Bethe. Mesons with positive and negative electrical charges—the twins—are already known.

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