ASTRONOMY

Mercury to Show Itself

Elusive Planet Will Offer Best Opportunity for Observation During Brief Visit After April 19

By JAMES STOKLEY

WHEN Mercury makes its brief appearance for a few days before and after April 19 we shall have the best opportunity this year of seeing this elusive planet. Most people have never seen it, and some astronomers never had the chance. For instance, the great Copernicus, who showed that Mercury and the earth are both the same kind of body, is said never to have viewed it. It is never seen very high in the sky, and the low fogs of his native Poland were always a hindrance.

Mercury is smaller in size than any of the other planets, except Pluto. Its diameter is only 3,100 miles, as compared with 7,927 for the earth. On the average it is 36,000,000 miles from the sun, but it has, again with the exception of Pluto, the most eccentric of the planetary orbits. Sometimes it comes within 28,500,000 miles of the sun, while it may draw as far as 43,350,000 miles away.

Every 88 days it goes around the sun, so its distance from the earth varies tremendously. At the beginning of this month it is about 115,000,000 miles from us. When visible, about the 19th, it will be around 85,000,000 miles distant, while at the end of April it will be at 60,000,000 miles.

Though the year of Mercury, the time it takes to encircle the sun, is 88 days, the earth also goes around the sun in the same direction, but more slowly, and Mercury catches up with us every 116 days. The time when Mercury is between the sun and earth is called inferior conjunction, and then it is not visible, because it is lost in the solar glare. About 58 days later, the three bodies are again in line. This time the sun is in the middle, and then Mercury is said to be in superior conjunction.

Between these conjunctions it draws some distance away from the sun, as we see them in the sky. After inferior conjunction, it is west of the sun, at "greatest western elongation." Then it moves ahead of the sun, in its daily motion across the sky, and rises before sunrise. It is visible as a morning star. After superior conjunction it is east of the sun, which it follows in daily motion, so it sets after sunset, and is an evening star. This is the time of its "greatest eastern elongation," which happens on April 19.

But some other factors may prevent its visibility. Obviously, if either elongation occurs when it is at its smallest actual distance from the sun, it does not appear as far to the east or west as when at the largest distance. Even under the latter circumstances, its apparent separation from the sun is only 28 degrees. This is a little less than a third the distance from horizon to zenith, the point of the sky directly overhead.

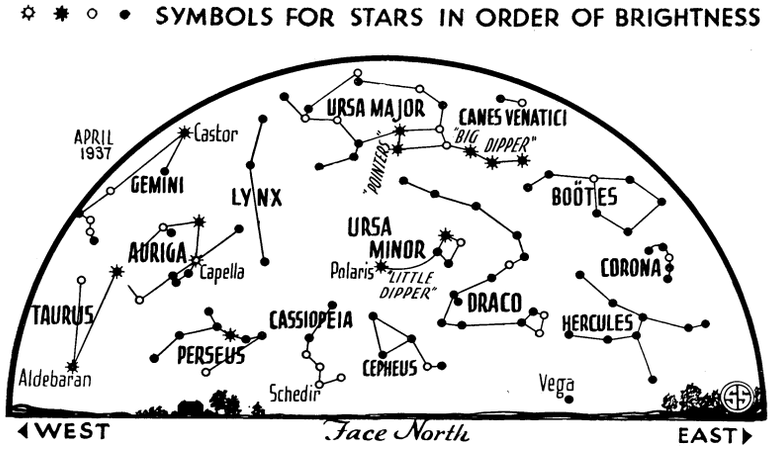
Also, the planets move along a narrow band called the Zodiac, in the center of which lies the ecliptic, the path of the sun among the stars. This line goes partly through the southern half of the sky, partly through the northern. In the autumn evenings it makes a low angle with the western horizon. Thus, at an eastern elongation of Mercury in the fall of the year, even though the planet may be the greatest distance away from the sun, it is only a short distance above the horizon when the sun is setting, and it vanishes very soon afterwards. It can never be seen to advantage as an evening star during these months.

In the springtime, however, the ecliptic makes almost a right angle with the horizon. Mercury is then, at an eastern elongation, as high as it can be at sunset, and sets at its latest. This happens this month. On the 19th, Mercury will be 32,294,000 miles from the sun, actually less than average distance, and the separation of the two bodies in the sky only 20 degrees. But despite these disadvantages, the planet should be easily found.

If the time should ever come when rocket propulsion makes inter-planetary travel a fact, explorers of space will not find Mercury very hospitable. Its day is the same length as its year, that is, it turns once on its axis as it goes once around the sun, so that most of one hemisphere is always illuminated, the other always dark. Actually, there is a certain amount of swinging.

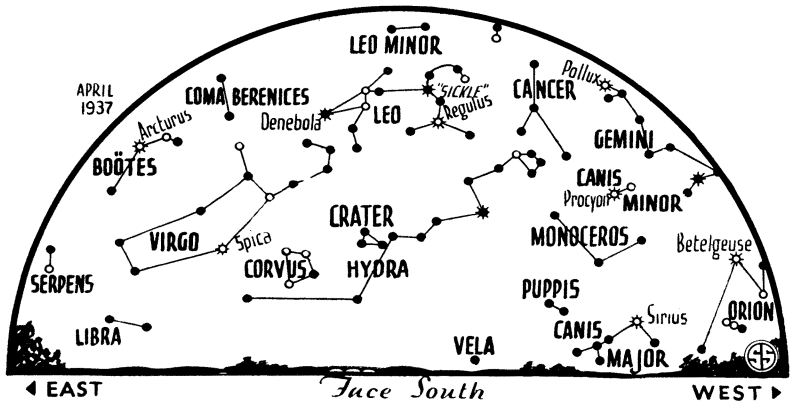
Only about 37 per cent of the surface has perpetual daylight, and the same proportion continual darkness. The rest has alternation of day and night, but of a very strange kind. To a Mercurian living in the middle of these regions, the sun would rise every 88 earth days, climb to a height of 24 degrees, then sink below the same horizon at which it rose. It would be visible to him about half the time.

On these parts of Mercury the average temperature would be about the same as on the earth, but the extremes might vary far more than they do for us. Mercury has practically no atmosphere to mitigate the sun's heat, or to conserve it after sunset. In the regions always exposed to the nearby sun the



BEAR DRIVER

Follow the handle of the dipper to the south to find Arcturus.



MERCURY IN WEST

Appearing too early to be shown on this map, this rarely seen planet may be observed soon after sunset in the west.

surface of Mercury reaches a temperature far above the boiling point of water, while in the opposite portions it is almost at the absolute zero of outer space. This is shown by actual measurements made at the Mt. Wilson Observatory.

Venus, Mars and Mercury are passing planetary visitors in the sky this month but none of them are visible throughout the entire evening and they are not shown on the accompanying maps. These maps depict the appearance of April skies at 10:00 p.m., April 1; 9:00 p.m., on the 15th and 8:00 p.m. at the end of the month.

At the beginning of April Venus is low in the western sky at dusk but quickly moves westward. On the 17th it is in line with the sun and cannot be seen. After a few weeks more, it will begin to appear in the eastern sky, before sunrise, that is, as a morning star.

About 10:00 p.m. in the middle of the month, Mars rises in the east and can be seen, as a brilliant red object, by 11:00 o'clock. It is in the constellation of the Scorpion, familiar in the southern evening sky of summer. The brightest star in the scorpion is called Antares, which means "rival of Mars," a name applied because it also has a red color. But at present Mars is several times brighter than its rival, and seems to have the advantage.

As for the other planets, Jupiter appears in the east about midnight, in the constellation of Sagittarius, the archer, east of the scorpion. About two and a half times as bright as Mars, it should be detected without trouble. Saturn is now almost in line with the sun and cannot be seen at all this month.

The stars now visible in the evening present a typically springtime appearance, with the Sickle very appropriately hanging high in the south. This is part of Leo, the lion, and the bright star Regulus is at the end of the handle. About as high, in the northern sky, is the great dipper, in Ursa Major, the great bear. The "pointers" indicate the direction of Polaris, in Ursa Minor, the little bear, which is below.

Crow

If the curved handle of the dipper is followed to the south, one comes to Arcturus, in Bootes, the bear driver, and then to Spica, in Virgo. Beyond Spica is a group of four stars forming Corvus, the crow. Sometimes this is called the "mainsail," from its shape.

Orion, so brilliant during the winter months, has descended low into the west, along with the two dogs, Canis Major and Canis Minor, which follow him. Betelgeuse is the uppermost star in Orion, while Sirius and Procyon mark the dogs. Above Canis Minor are the twins, Gemini, with first magnitude Pollux. Aldebaran, in Taurus, the bull, is just north of Orion.

In the northwest is Auriga, the charioteer, with brilliant Capella, and below this Perseus is apparent. To the right of Perseus is Cassiopeia, a letter W on one side. Low in the northeast is a bright star, Vega, all that can now be seen of Lyra, the lyre, a group that will shine at the zenith on summer evenings.

During April the moon goes through its phases as indicated below. On the 12th, it will be at perigee, or nearest earth, only 223,250 miles from us. Apogee, its greatest distance of the month, comes on the 27th, with 252,320 miles. On the 27th also, at 10:27 p.m., when two and a half days after full, it passes within about twice its own diameter to the south of Mars.

Phases of Moon

			E.S.T.
Last quarter	April	3	10:53 p.m.
New	"	11	12:10 a.m.
First quarter	"	17	3:34 p.m.
Full	"	25	10:24 a.m.

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PHYSICS

New Trap For Atoms In Photographic Film

THE SENSITIVE emulsion of photographic film, such as records permanently images of yourself and your friends, provides a new tool of science holding the possibility of aiding research on cosmic rays and the disintegrations of the atom.

One basic device of scientists for interpreting the multitudinous debris thrown out in atomic collisions is the Wilson cloud chamber. This machine makes visible for photographic reproduction the tracks of the charged collision of particles as they speed through the saturated water vapor of the apparatus.

Moreover, when the Wilson cloud chamber is used in conjunction with a strong magnetic field from the poles of an electromagnet the charged particles are bent in their paths. Negatively charged particles curve one way and positively charged particles the other, so that a means is thus found for distinguishing between the two types. Moreover, the radius of curvature of the bending is an index of the energy which the particle has. Such matters are highly important in cosmic ray studies and in research on atomic disintegration and bombardment of the nucleus.

It was with such an apparatus, as only one example, that Dr. Carl Anderson discovered the positron, in recognition of which he won the joint award of the 1936 Nobel Prize in physics.

The magnetic field of the Wilson cloud chamber easily distinguishes between positively and negatively charged particles—the electrons and positrons, deuterons, protons and alpha particles—but as yet has difficulty in helping decide whether a "positive" track is due to a proton (charged nucleus of a hydrogen atom) or an alpha particle (charged nucleus of a helium atom).

These two particles differ in mass by a factor of four, but may very well have the same appearance in their curved path. This is because particles having the same energy show the same amount of curvature in the magnetic field. Energy, it should be realized, is equal to the