

ASTRONOMY

Total Moon Eclipse

Five eclipses, three of the sun and two of the moon, are scheduled for 1954. Total eclipse of sun on June 30 will be first visible in any part of United States since 1945.

By JAMES STOKLEY

► A TOTAL eclipse of the moon, on the evening of Monday, Jan. 18, one of five eclipses in 1954, is the chief event on the month's astronomical calendar.

Visible all over the United States, as well as Canada and the rest of North America, it will be at its height at 9:32 p.m. EST (8:32 CST, 7:32 MST or 6:32 PST). A little more than three hours will elapse from the time the moon enters the earth's shadow until it leaves it.

Aside from this, we also have the usual January evening skies, which are always brilliant, although this year the presence of a bright planet makes them even more so. This is Jupiter, high in the south in the constellation of Taurus, the bull.

Its magnitude is minus 2.2 on the astronomical scale, so it exceeds in brightness any star, or any other planet, now visible.

The accompanying maps show the appearance of the heavens about 10:00 p.m., your own kind of standard time, on the first of January; an hour earlier at the middle of the month, and two hours earlier at the end.

Jupiter Is Only Planet

They show the location of Jupiter, just to the left of Aldebaran, the first magnitude star in Taurus that marks the animal's eye. Jupiter is the only planet in the evening sky.

Still higher, directly overhead as shown on the maps, we find Capella, in Auriga, the charioteer. To the left of Jupiter, in the constellation of Gemini, the twins, are Castor and Pollux. The latter is the brighter and a star of the first magnitude.

Below Jupiter we come to one of the best known of all the star groups, Orion, the warrior, which is easily recognized by the three stars in a row that form his belt. Above this trio is Betelgeuse and below is Rigel, both of them also stars of the first magnitude.

The brightest of the stars, which are distant suns and, unlike the planets, shine by reflected sunlight, is Sirius, the dog-star. It is in Canis Major, the great dog, below and to the left of Orion. Higher, and farther left, is Canis Minor, the lesser dog, with the bright star Procyon. Going upwards still farther from this group we are again in Gemini.

In addition to the stars mentioned, two others of the first magnitude are also shown on our maps, although their low altitude

causes considerable atmospheric absorption of their light. This is particularly true of Deneb, in Cygnus, the swan, which is just above the northwestern horizon. It is all that remains visible of the northern cross, which shone so prominently in the evening sky a few months ago.

The case is opposite for the other star—Regulus, in Leo, the lion—which is low in the east. In coming months it will become more and more prominent, until on April evenings it will stand where Taurus does now.

January Lunar Eclipse

As for the other planets, Mercury and Venus are about in the same direction as the sun, and can hardly be seen at all. Venus, in fact, passes behind the sun on Jan. 29. Mars and Saturn are both in Libra, the scales, rising several hours before sunrise. Saturn is to the west, and although both now rate with stars of the first magnitude, Saturn is about one and three-quarters times as bright as its brother planet. Mars, of course, is characteristically red in color. Later in the year it will come into much greater prominence as it approaches within a little less than 40,000,000 miles of the earth on July 2.

The total eclipse of the moon on Jan. 18 is one of two eclipses that occur in January, although the first, which is of the sun on Jan. 5, is not of great interest in this part of the world. One must go to Antarctica or New Zealand to see it. But 1954 brings a total of five eclipses, one of them a total eclipse of the sun, the first visible in any part of the United States or Canada since 1945.

Basically, an eclipse occurs when one ob-

ject gets between two others. On Jan. 18 the earth will pass between the sun and moon. Since the source of the moon's light is the sun, its illumination is then largely cut off.

On the other hand, the moon may get between the sun and the earth, and this is what happens on Jan. 5, so the moon's shadow will then reach toward the surface of the earth, in the region around the south pole.

Because the sun is 864,000 miles in diameter, and the moon only 2,160 miles, the lunar shadow tapers to a point, at a distance from the moon of about 230,000 miles. This is the inner shadow, the umbra, where the lunar disk completely hides the sun, and around it is a larger region, the penumbra, where the disk of the sun would only be partially covered.

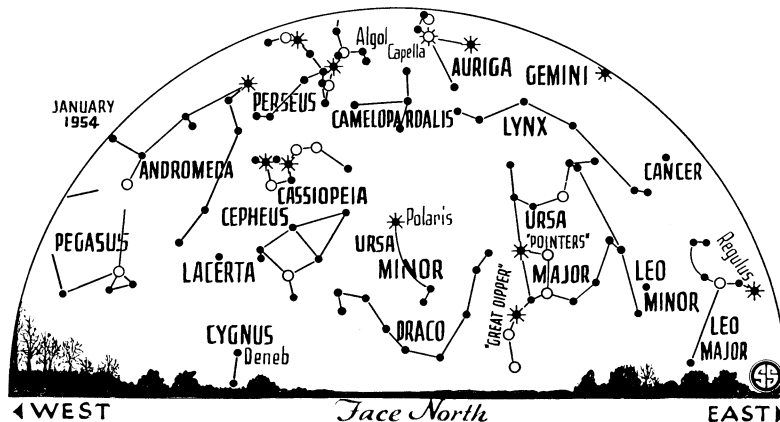
Sometimes the umbra reaches the surface of the earth. However, on Jan. 5 it falls short, so even in the part of the world, Antarctica, toward which the shadow is aimed, the solar disk would not be completely covered. The moon then will be far enough away that it will look a little smaller than the sun.

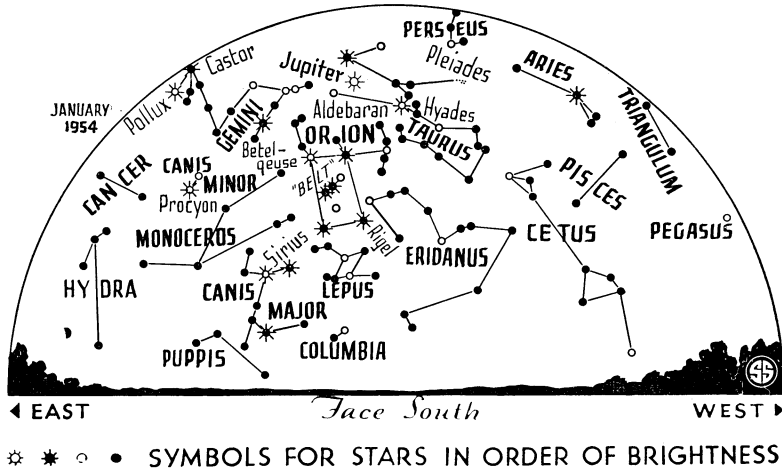
The result is that even though it goes in front of the sun a ring of that body, called the annulus, which is Latin for ring, remains visible around the dark moon. Hence such an eclipse is called "annular."

Totality Path in U. S.

On June 30 the moon again comes between sun and earth, producing the year's second solar eclipse. But this time the tip of the umbra does reach the ground. As it moves along it traces out a strip nearly a hundred miles wide and thousands of miles long—the path of totality—in which the total eclipse is seen.

This path starts in Nebraska as the sun is rising there, then travels northeastward over Iowa, Minnesota (including Minneapolis), Wisconsin and Michigan. After





crossing Lake Superior, it traverses the Canadian provinces of Ontario and Quebec to the coast of Labrador. Thence it goes eastward and southeastward over the Atlantic Ocean, southern Greenland, Iceland, Norway, Sweden, Lithuania, Russia, the Caspian Sea, Iran, Afghanistan, Pakistan, and ends in India as the sun is setting.

Many scientific expeditions will be located along this path to make the many observations that can only be made at such an eclipse. And also many astronomical enthusiasts, not professional astronomers, will gather at points of vantage to see this rare phenomenon, a total eclipse of the sun, which is unquestionably one of the most magnificent spectacles offered by nature.

For those who want to plan such observations, the U. S. Naval Observatory in Washington has issued a 42-page booklet, with tables and maps, entitled "Total Eclipse of the Sun, June 30, 1954," which gives full details as to how it will appear from different parts of the earth. This is obtainable for 40 cents from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Two weeks later, on the evening of July 15, the earth will again come between sun and moon, although the latter body will not enter completely into our shadow. Thus it will be only a partial eclipse; at best only a little more than four-fifths of the lunar diameter will be shaded. This eclipse will be visible in the eastern parts of the United States and Canada.

The year's fifth and last eclipse will come on Christmas day and, like the one which began the 1954 program, it will be of the sun and annular. The path over which the annular eclipse will be visible starts in the south Atlantic Ocean, crosses South Africa and the Indian Ocean, ending in Timor, the large island northwest of Australia. Over a larger area, including most of southern Africa, Australia, Indonesia and the Philippines, as well as part of Antarctica, the sun will be partially eclipsed.

However, it is the total eclipse of the moon on Jan. 18 that is of most immediate interest. The accompanying diagram shows the way the moon passes through the earth's shadow on that evening. North, i.e., the

direction toward the pole star, is at the top. The large circle represents the shadow, and the small circles, I, II, III and IV, successive positions of the moon.

Position I occurs at 7:50 p.m., EST (one hour earlier for CST, two for MST and three for PST). At this time the moon starts to enter the shadow, and its curved edge will be seen gradually creeping over the lunar disk until 9:17 when the eclipse will be total, with the moon completely immersed in the shadow. During this time the moon does not disappear from view, for even in the center of the shadow there is some light, caused by rays from the sun which have been bent by the earth's atmosphere.

Because the blue waves of light are scattered in this passage through the air, thus

giving the daytime sky its blue color, that which passes on through into the shadow is reddened, and the eclipsed moon has a typical coppery red color. In this particular eclipse the moon just gets into the shadow, and does not pass through its center.

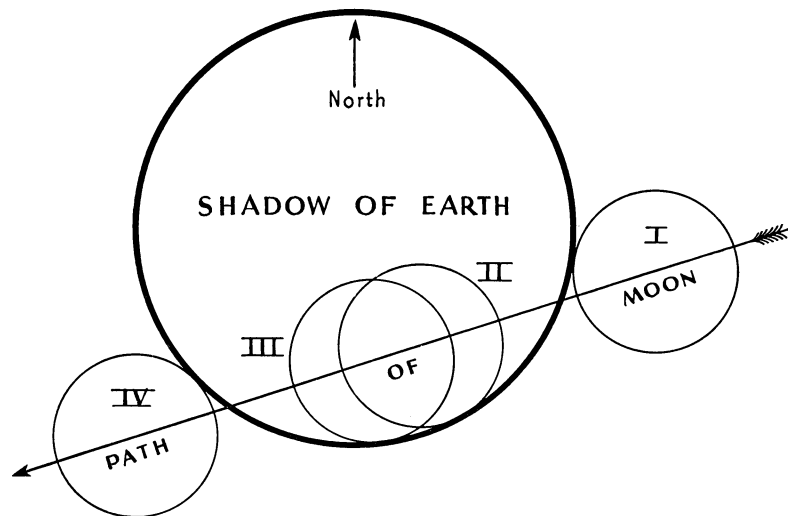
Hence the southern edge of the moon, which is never far from the edge of the shadow, will probably look noticeably brighter than the rest of its surface, even at mid-eclipse, which comes at 9:32 p.m., EST.

At 9:47 p.m. the total phase of the eclipse ends, and once more the curved edge of the shadow will be seen traversing the face of the moon. Finally, at 11:13 p.m., the moon will be out of the shadow and the entire eclipse will be over. However, the moon will still be in the outer part of the shadow, the penumbra, until 12:24 a.m., and during this period an observer on the moon would see the earth partially hiding the sun. But even with part of the sun shining on the moon it still looks so bright that it seems practically normal.

Celestial Time Table for January

Jan.	EST	
2	3:00 a.m.	Earth nearest sun, distance 91,348,000 miles.
	10:55 p.m.	Algol (variable star in Perseus) at minimum brightness.
4	9:21 p.m.	New moon, annular eclipse of sun visible in Antarctica.
5	7:44 p.m.	Algol at minimum.
8	4:34 p.m.	Algol at minimum.
10	5:00 a.m.	Moon nearest, distance 229,800 miles.
11	7:22 p.m.	Moon in first quarter.
15	8:30 p.m.	Moon passes Jupiter.
18	9:37 p.m.	Full moon, total eclipse of moon visible in U. S. and Canada.

TOTAL ECLIPSE of MOON, JAN. 18, 1954



The large circle represents the shadow of the earth, and the small circles, I, II, III and IV, indicate the successive positions of the moon as it passes through the shadow. The four phases shown occur at the following times:

I	7:50 p.m. EST	6:50 p.m. CST	5:50 p.m. MST	4:50 p.m. PST
II	9:17	8:17	7:17	6:17
III	9:47	8:47	7:47	6:47
IV	11:13	10:13	9:13	8:13

- 20 3:51 a.m. Algol at minimum.
 - 23 12:40 a.m. Algol at minimum.
 - 25 7:00 a.m. Moon farthest, distance 251,400 miles.
 - 9:29 p.m. Algol at minimum.
 - 26 10:28 p.m. Moon in last quarter.
 - 28 10:03 a.m. Moon passes Mars.
 - 6:19 p.m. Algol at minimum.
 - 29 7:00 p.m. Venus behind sun.
- Subtract one hour for CST, two hours for MST, and three for PST.

Science News Letter, December 26, 1953

MEDICINE

Exchange Resin Makes TB Medicine Easier to Take

➤ AN ANION exchange resin is coming to the rescue of tuberculosis patients who find PAS, or para-aminosalicylic acid, hard to take.

The PAS is adsorbed on the resin and when the combination is swallowed, the hydrochloric acid in the stomach gradually displaces the PAS. As it passes into the intestine, it is absorbed by the body and carried in the blood just as efficiently as if it had been taken alone.

This new product was announced by its manufacturer, E. R. Squibb and Sons, who have trademarked it Rezipas.

Science News Letter, December 26, 1953

AERONAUTICS

1,650 Miles Per Hour Sets New Speed Record

➤ VIRTUALLY ON the eve of aviation's golden anniversary, the U. S. again focused world attention upon the skies. Air Force Maj. Charles E. Yeager rocketed to 1,650 miles an hour in the Bell X-1A research plane.

This world speed record of Mach 2.5—which is two and a half times the speed of sound—was chalked up Dec. 12 by the 30-year-old West Virginian.

The Air Force said that Yeager's flight was the "fastest known to have been attained by any aircraft or any human being anywhere in the world."

The rocket plane was powered by one engine rated at 6,000 pounds of thrust. The designed speed of the plane is 1,600 miles an hour, and apparently Maj. Yeager coaxed another 50 mph from the little craft. Its wings measure 28 feet, and its length is 35.5 feet.

Since it has merely a 4.2-minute "range," the X-1A was carried aloft in a B-29 Superfort, then released. The 1,650 mph speed record it subsequently established will not be officially recognized. International rules dictate that all planes trying for new speed records must take off from the ground under their own power.

Maj. Yeager later told newsmen that he expects his new speed record to be shattered soon by a new rocket plane, the steel-bodied Bell X-2. The X-2's steel construction is aimed at reducing some of the heat problems created by friction at such speeds.

Science News Letter, December 26, 1953

ELECTRONICS

Optical Sensing Device

Data reader, FOSDIC, capable of translating up to 10,000,000 answer positions per hour for use in electronic computers, built by National Bureau of Standards.

➤ A HIGH speed electronic device, called FOSDIC, that can read marks on census data sheets and feed the information directly to an electronic computer for processing has been built by the National Bureau of Standards.

Use of FOSDIC will provide an accurate, convenient method for mathematically treating much of the data obtained in a census count. It is expected to reduce greatly the large volume of paper work required to summarize census information.

Designed at Standards for the Bureau of the Census, FOSDIC may be generally applied to the processing of other types of information that must be handled in large quantities such as business and labor statistics.

As part of a program to speed up processing census data, the Census Bureau has been using UNIVAC, an electronic digital computer. This machine can process data much faster than it can be translated from the data sheets, so FOSDIC, a contraction for "Film Optical Sensing Device for Input to Computers," was designed to speed up the translation process.

The machine reads microfilm copies of census takers' documents and processes the information contained in the form of positioned marks into electrical pulses that are recorded on magnetic tape. The magnetic tape can then be used directly by the computing machinery.

Basically the instrument is built around a combination of two rather common electronic devices, consisting of a cathode-ray tube and an electric eye. In combination, these two devices can visually sense whether or not pencil or pen marks exist on particular spots of an answer form. Since FOSDIC utilizes an optical principle, marks may be made with any common type of pencil or pen.

When the original documents are micro-filmed, they do not have to be precisely aligned. Instead, an aligning index marker is printed on the form below each column of twelve possible answer positions. One column might contain answers to six yes-no questions.

When the device scans a census form, its beam moves across a page until it senses a mark indicating possible answers in the column above. FOSDIC then sends its scanning beam up the column, reading and recording out on the magnetic tape each tally mark. Upon completion of the column, the machine then searches for the next index.

To assure accuracy, FOSDIC keeps count of the number of columns read on each page. If for any reason a column is missed,

the device makes a record on the magnetic tape informing the computer that the preceding information is not trustworthy. Under laboratory test, FOSDIC has shown that it has nearly perfect performance when good marking and filming conditions exist.

Currently the equipment is designed to provide for a maximum of some 2,800 answer locations on each frame of 16mm microfilm—an area of about one-quarter square inch. Its speed corresponds to a reading transcription rate of about 60 document sides per minute, and the transcription accuracy appears to be equal to or better than that of a skilled human copyist.

FOSDIC was shown for the first time to scientists and engineers attending the Joint Computer Conference and Exhibition sponsored in Washington by the American Institute of Electrical Engineers, the Institute of Radio Engineers, and the Association for Computing Machinery.

Science News Letter, December 26, 1953

ZOOLOGY

Unusual Rats Collected In Thailand for Museum

➤ WEIRD RATS, some two feet long and colored orange, buff, yellow-brown and blue-gray, were among 2,000 mammals and birds collected in Thailand for the U. S. National Museum by H. G. Deignan, associate curator of birds at the Smithsonian Institution.

The rats were caught in a region of high limestone crags and forests north of the Chao-Phraya river delta.

Science News Letter, December 26, 1953

LISTEN and LEARN A LANGUAGE by **LINGUAPHONE** **IN 20 MINUTES A DAY**

World's-Standard Conversational Method
FRENCH **SPANISH** **GERMAN**
RUSSIAN **JAPANESE** **NORWEGIAN**
 —29 Languages available

At Home learn easily, quickly by the LINGUAPHONE CONVERSATIONAL METHOD. It's like living in another country. You LISTEN—you hear native men and women speak—you understand—you SPEAK, correctly as they do. Worldwide educational endorsement: a million home-study students. Write for FREE Book, "Passport to A New World of Opportunity."

SEND FOR FREE BOOKLET

LINGUAPHONE INSTITUTE
 8-12 Mezz., Rockefeller Plaza
 New York 20, N. Y.

Send me your FREE book. I want to learn..... language.

Name.....

Address.....

City.....Zone...State.....