



blue waves are scattered, which make the daytime sky look blue. Thus the light that passes through and shines on the moon has a higher proportion of red than normally, giving the eclipsed moon its characteristic color.

If there are thick layers of high clouds in the part of the atmosphere through which the sunlight passes, much of it may be cut off, and the eclipsed moon will be darker than usual. Occasionally the moon may disappear completely, as it did at a total eclipse of the moon a year ago. This one, however, will probably not be as dark.

Scientifically a total lunar eclipse is of relatively little significance compared with one of the sun, but it is a fascinating spectacle. This one will be widely observed in the United States and Canada if the weather is good, since the eclipse occurs at a convenient viewing hour in the evening.

**Celestial Timetable for December**

DEC.	EST	
3	8:19 p.m.	New moon, partial eclipse of sun
6	7:00 a.m.	Moon farthest, distance 252,500 miles
10	4:00 a.m.	Algol (variable star in Perseus) at minimum brightness
	7:00 a.m.	Moon passes south of Saturn
12	1:02 a.m.	Moon in first quarter
13	early a.m.	Meteors visible apparently radiating from constellation of Gemini
	12:50 a.m.	Algol at minimum
15	9:30 p.m.	Algol at minimum
16	4:00 a.m.	Moon passes south of Jupiter
18	4:00 p.m.	Mercury between earth and sun
	6:20 p.m.	Algol at minimum
	9:42 p.m.	Full moon, total eclipse
19	6:00 a.m.	Moon nearest, distance 221,700 miles
21	2:50 p.m.	Sun farthest south, winter begins in Northern Hemisphere
24	2:00 p.m.	Moon passes north of Mars
25	2:27 p.m.	Moon in last quarter
31	9:00 a.m.	Moon passes south of Venus

Subtract one hour for CST, two hours for MST, and three hours for PST.

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**ASTRONOMY**

**Jupiter's Magnetic Poles Found in Unusual Position**

► THE MAGNETIC POLES of Jupiter are in a strange position, far to one side of the axis about which the planet rotates every ten hours, radio astronomers have found.

Dr. David Morris, a research fellow in radio astronomy, and Glenn Berge, a graduate student, both at the California Institute of Technology's Owens Valley Radio Observatory, located the magnetic axis some 30,000 miles from the center of Jupiter, which is 89,000 miles in diameter. The center of the axis, they found, is 40,000 miles above the equatorial plane.

Earth's magnetic axis misses the earth's center by only about 200 miles, and its magnetic poles are only some 800 miles from the geographic poles.

The observations help explain a mystery about Jupiter that has puzzled astronomers for a decade—the origin of bursts of low frequency radio signals that apparently come from fixed places on the cloud-covered planet.

The best explanation required an off-center magnetic field like that now discovered. The bursts are detected when Jupiter's rotation brings the magnetic poles into the proper position to beam the planet's electromagnetic radiation toward the earth.

Jupiter is also ringed, like the earth, with a vast radiation belt. The Jovian belt is doughnut shaped, some 300,000 miles in diameter and 80,000 miles in cross section.

This radiation doughnut wobbles as the planet rotates. It also seems alternately to accelerate and decelerate in relation to the planet's position in its orbit around the sun. This alternating cycle lasts ten hours, and is believed to be caused by a bulge in one side of the radiation doughnut.

The scientists used the twin 90-foot receivers of the radio observatory as an interferometer to obtain their picture of this abnormality. The observation wavelength was ten centimeters.

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**TECHNOLOGY**

**Nuclear Experiment May Unleash Oil Reserves**

► A DREAM that oil men have held for many years may be one step closer to reality now that the Atomic Energy Commission exploded a nuclear device deep in a carbonate rock formation.

Even though it is no longer economical to take oil from a so-called depleted field, a fair amount usually remains in the ground. A nuclear blast detonated in such an oil-bearing formation could create new channels through which oil could flow.

By heating the oil the blast might also make the oil flow more freely. Another dividend could be that some of the oil would be turned into gas, driving additional oil to the surface.

The experiment by the Atomic Energy Commission to set off a deeply buried underground nuclear device, equivalent to about 10,000 tons of TNT, tests the feasibility of such practical applications of underground explosions.

It is the first nuclear blast in carbonate rock in the Plowshare Program, aimed at developing peaceful uses for atomic detonations.

Carbonate rock, which is similar to limestone, is often associated with deeply buried oil and gas, as well as minerals which might also be recovered by nuclear explosions.

With nuclear methods, exploitation of the vast reserves of oil shale, not profitable to work now, might become available for commercial production.

The AEC detonation took place Nov. 5 in a drilled vertical hole at a depth of 1,320 feet. The radioactive debris from the explosion is sealed in, since the hole was filled with concrete and gravel.

The University of California's Lawrence Radiation Laboratory is conducting exploratory operations to determine the underground effects.

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**GENERAL SCIENCE**

**Laud Weizmann Institute On 20th Anniversary**

► THE WEIZMANN INSTITUTE OF SCIENCE will celebrate its 20th anniversary in New York December 9th with participation by more than 436 dignitaries from 16 countries, including 32 Nobel Laureates.

Located at Rehovoth, Israel, the 60-million-dollar institute now includes a faculty of 450 scientists, a technical staff of 750, and about 200 current research projects in such fields as applied mathematics, biochemistry, biophysics, cell biology, electronics, genetics, isotope research, nuclear physics, organic chemistry and X-ray crystallography.

The institute was founded in 1944 when friends in Britain and the United States made a gift of the Weizmann Institute of Science to Chaim Weizmann, Israel's first president and its premier scientist statesman.

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