

## GEOLOGY

# Great California Storm Changed Geography

**T**HE GREAT California storm that recently wrought havoc with the works of man, washing away houses, ruining streets, burying automobiles in mud, etc., brought notable changes also to the natural formations along the coast. These have been observed with a scientific eye by Prof. Francis P. Shepard, geologist of the University of Illinois.

"Most of the small intermittent streams which come down from the Santa Monica Mountains into the ocean near the city of Santa Monica," Prof. Shepard states, "are unable to build deltas during ordinary rainy periods because the waves remove the debris almost as fast as it is carried to the sea. The recent unprecedented rains, however, produced such excessive wash that the waves were unable to cope with it and sizable deltas were built during this short period.

"The deltas extend somewhat more to the south of the stream mouths than to the north despite the southerly winds which prevailed during the rain storm. It appears that some counter-current must have developed along the coast.

"Samples of the river water during the storm revealed large percentages of fine sediment, and the ocean water along the shore contained almost as much of this silt and clay. Examination of the deltas at low tide after the storm was over showed that the sediment was entirely sand and gravel, indicating that the fine sediments had been carried out to sea by the waves. This muddy material continued to discolor the water for some time and interfered with fishing miles from the shore.

"Where Beverly Boulevard comes down to the sea through a notch in the high coastal terrace west of Santa Monica, a flood of water 100 feet across and four feet deep swept over the road, in some places burying it deep in debris and elsewhere taking great gouges out of the slab. Where this flood crossed the Coast Highway and spilled over the bank into the ocean a narrow ditch was turned into a complex series of amphitheaters 100 feet or more in breadth, and great mudflows carried away the foundation of the margin of the road. This material eroded at this point was

mostly fine and when it was swept into the sea the waves carried it away, leaving only scattered boulders and vast quantities of driftwood on the beach.

"The Coast Highway which extends west from Santa Monica along the base of the mountains has been built in some places along the base of wave-cut cliffs which were abandoned by the sea through the forming of a wave-built beach at their base. The cliffs are almost vertical and are formed on unconsolidated sand and gravel.

"Many homes are located at the tops of these cliffs and at the tops of similar cliffs on the sides of Santa Monica Canyon. It might have been supposed that these precariously located residences would have been endangered by landslides from saturated ground, but these cliffs have had only negligible effects from the rain.

"On the other hand, the road cuts in solid, but weak rock along the Coast Highway were greatly eroded. . ."

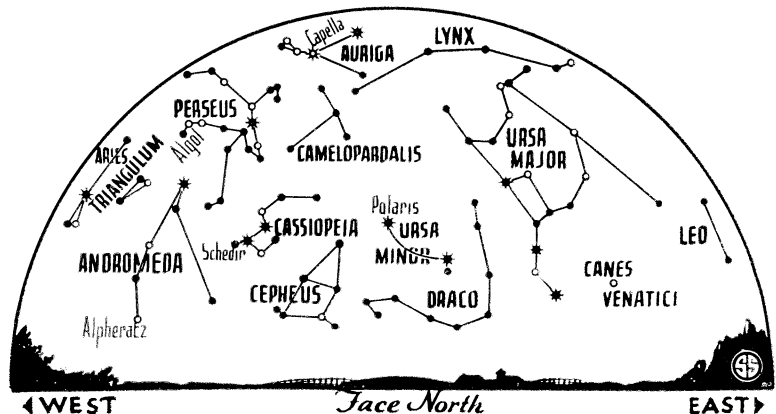
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## METEOROLOGY

## Sunspot Storms May Lighten Air

**G**REATER storminess in the earth's atmosphere, known to accompany an increase in sunspot numbers, may give us lighter air to breathe, through the stirring up of the air strata.

☼ \* ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS



Passing months bring the "Great Dipper" of Ursa Major higher into the sky. It and other stars and constellations of the maps appear as represented about 10 p. m. on the first of the month, 9 p. m. on the 15th and 8 p. m. on the 30th.

This suggestion is contained in a communication by L. W. Tilton, of the National Bureau of Standards, to *Nature*. The refractivity of the air, or its power of bending a ray of light, is greater when sunspots and storms are fewer, Mr. Tilton says. Other things being equal, increased refractivity means greater density. He therefore suggests as a possible explanation that when the atmosphere is calm over long periods, certain denser components of the atmosphere, perhaps associated molecules or isotopes, settle down in greater numbers and produce at the earth's surface a gaseous mixture having a slightly higher index of refraction.

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## ORNITHOLOGY

## Poisoning of Ducks With Phosphorus Stopped

**B**OMBS of fiery phosphorus, exploded merely for testing purposes at the Army Proving Ground at Aberdeen, Md., have been causing thousands of unintended casualties; but these are now to be stopped. The casualties have been ducks, especially the precious canvasbacks, shovelling for food in the mud where lurked unburned fragments of the poisonous element from exploded test bombs.

Cessation of the destruction has been brought about through the necessity for dredging up part of the shallow bottom, to make an addition to the airplane landing field. In doing this work, the War Department is receiving the scientific cooperation of the bureau of biological survey, U. S. Department of Agriculture.

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ASTRONOMY

# February to Be Month Without Full Moon

## Shortest Month Happens to Fall Within Complete Phase; Planets Poor Attraction But Stars Most Brilliant of Year

By JAMES STOKLEY

**T**HIS MONTH brings high into the southern sky the most brilliant of the constellations, Orion, the mighty warrior, which can be recognized from the three stars forming his belt, above which is the giant Betelgeuse, and below, Rigel. With upraised club in his left arm and a lion skin over his right, Orion is supposed to be warding off the attack of Taurus, the bull, the constellation next towards the west. In Taurus is the red star Aldebaran, which marks the bull's eye and is part of a V-shaped group of stars called the Hyades. A little farther west are the Pleiades, a famous loose cluster of stars, six of which can be seen with the unaided eye.

Nearly overhead and directly north of Orion is the star Capella, part of Auriga, the charioteer. To the southeast of Auriga are two bright stars, Castor and Pollux, forming part of the constellation of Gemini, the twins, and south of them is the lesser dog star, Procyon.

Sirius, the dog star, in Canis Major, the greater dog, is in the south. It is the brightest star in the sky and the nearest of those seen ordinarily from the United States.

The Great Dipper is to the northeast, with the handle downwards and the pointers above. A line from the pointers indicates the pole-star, Polaris. In the northwest, on the other side of the pole, is the constellation of Cassiopeia, shaped like a W on its side.

No bright planets can be seen this month during the whole of the evening; but Mars may be glimpsed early in the evening, just after sunset, and will be accompanied by Mercury about the eighteenth. Jupiter appears in the east about ten o'clock as a brilliant star, and rises higher during the night.

The stars visible this month are the most brilliant that can be seen at any time of the year. Orion is always a delight, whether observed with the naked eye or a small telescope. The

star Betelgeuse, brightest in the constellation, is of particular interest because of its great size. Our sun, which is a star, is about 866,000 miles in diameter, but Betelgeuse has a diameter of 215 million miles, which means that if it were a hollow shell 27 million suns could be poured into it. However, it consists of only fifty times as much matter as the sun, because the stuff of which it is made is very diffuse, more so than the highest vacuum that can be attained on earth.

The second brightest star in Orion, Rigel, is also of interest, because it is one of the brightest stars in the sky, not in appearance, but in reality. Sirius, the dog-star, looks the brightest, but that is because it is so close to us, only 8.6 light-years away, and it exceeds the sun in candlepower by only 27 times. Rigel, however, is 14,000 times the intrinsic brightness of the sun, and is 540 light years from us. The light-year, the astronomer's measuring stick, is the distance that a beam of light will travel in a year, going all the time at the rate of 186,000 miles a second, and is equal to approximately six trillion miles.

During February the moon is new on the thirteenth. Last quarter occurs on the seventh, and first quarter on the twenty-first, so that the last few days of the month will have moonlit evenings.

There is no full moon in February,

a rather rare occurrence. This is because it is full just at the end of January, and the time between any phase and the same phase again is about 29 days. The moon takes about 28 days to make one circuit about the earth, but during that time the sun has moved eastward a little among the stars, and so the moon has to go that much farther to catch up to it. Full moon happens when the sun and moon are on opposite sides of the earth, and we can see all of the moon's illuminated half. When it is in line with the sun, we can see none of the bright part, but a few days later the young crescent is visible in the western evening twilight.

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## Paradox Eclipse

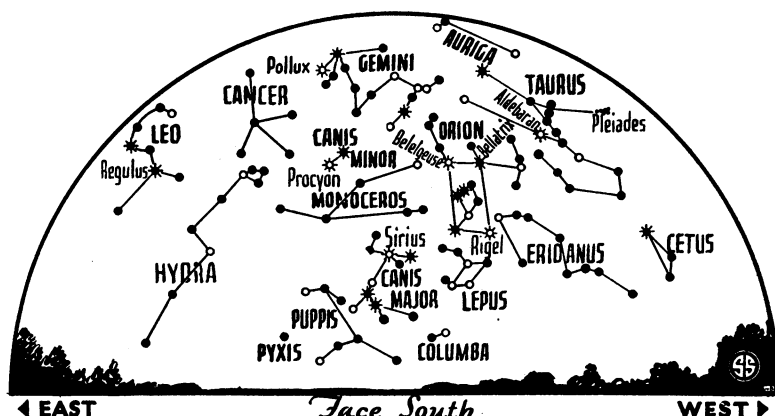
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degrees 19 seconds. Expressed in the local civil times of locations of its beginning and ending, the eclipse will begin on February 14 at 6:08 a. m. and end on February 13 at 5:24½ p. m.

It was the Naval Observatory's intention to organize an expedition to observe the eclipse from the Island of Losap, but federal finances did not warrant this expense, which would be very heavy because of the inaccessibility of Losap and the necessity of maintaining a floating base during the period of preparation.

Steamships on the Pacific at the time of the eclipse are being urged by the Navy Department to alter their courses so as to be within the path of total eclipse. The U. S. Naval Observatory through the U. S. Hydrographic Office has furnished mariners with complete suggestions for observing the eclipse in the belief that their observations will be of considerable scientific interest.

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Orion, the bold winter constellation, continues to shine gloriously.