

body is seriously embarrassed if a monopoly charges several prices for the supply. The South American producers could furnish a very much larger quantity than that now marketed, but prefer to restrict trade and charge a high toll.

Iodine has two inexpensive chemical brothers, chlorine and bromine, which have taken over most of the large-scale duties which manufacturers might well have assigned to the more expensive element. Iodine is a solid, rather than a fuming liquid like bromine, or a corrosive gas like chlorine. There are accordingly many situations where chemical manufacturers would find it superior in technical use. As long as iodine is a hundred times as costly as free chlorine, and fifteen times as expensive as bromine, it can hardly make much industrial progress.

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## ASTRONOMY

## Suggests Sun Spots Due To Tidal Effect of Planets

JUST as the sun and moon produce tides on the earth, so does the gravitational attraction of the planets produce tides in the sun. These tides, in turn, are responsible for sun spots, in the opinion of Dr. Dinsmore Alter, professor of astronomy at the University of Kansas. Speaking in Cleveland before the astronomical section of the American Association for the Advancement of Science, Dr. Alter announced that he had secured a very close correlation between the computed numbers of sun spots and those actually observed. The chance of accidentally obtaining such a close correspondence between theory and fact is about one in thirty thousand, he declared.

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## RADIO-ASTRONOMY

# Moon's Position Thought To Affect Radio Transmission

## Astronomer Belives That Its Distance From The Meridian Is Associated with Height of Kennelly-Heaviside Layer

AN apparent influence of the position of the moon in the sky upon radio transmission on the earth has been detected by Dr. Harlan T. Stetson, director of the Perkins Observatory, at Ohio Wesleyan University.

Speaking in Cleveland before the astronomical section of the American Association for the Advancement of Science, Dr. Stetson presented his hypothesis that the hour angle of the moon, that is, its distance from the meridian, is associated with the height of the Kennelly-Heaviside layer. This is the ionized layer in the upper atmosphere that is supposed to reflect radio waves downwards, and so make long distance transmission possible.

For some years Dr. Stetson has studied the reception of the carrier wave from a Chicago broadcasting station and has found good evidence of a connection between the transmission and the number of sunspots. He attributed this to differences in the height of the reflecting layer. Now his latest studies give evidence that the moon is also involved.

The main cycle of variation for sunspots is about eleven years, but Dr. Stetson's researches have shown a shorter one of about 15 months. He pointed out that this period corresponds closely with the recurrence of certain

arrangements of Venus and Mercury, thus suggesting a possible tidal effect.

He also stated that the maximum of the last sunspot cycle had occurred about July 1, 1928, while the last two months have shown the rise of a secondary maximum. This, he said, should be over in a few months, and by the end of 1931 spots will be fewer than since 1925. Also, this will mean an improvement in radio transmission. He said that last summer's time of minimum activity on the Sun had been associated with very good radio connections.

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## ICHTHYOLOGY-

## A Fish That Walks On the Sea Bottom

A SPECIMEN of a fish that walks on the bottom of the sea is now on exhibition among the piscatorial exhibits at Field Museum of Natural History, Chicago. It is the batfish, a native of the tropical and semi-tropical seas of the Gulf of Mexico.

The batfish has many peculiarities. Looking down at it from above it seems to have a body like a toad, but with a fishy tail. Body and tail are covered with warts and a scanty growth of white whiskers. Looked at from the side, it appears to have four legs with finny feet, and these are additionally odd from the fact that the pair close together under the throat are the hind feet, while the forefeet or hands are far apart and set well back.

While it can swim with its tail, like any ordinary fish, the batfish usually walks or hops along the bottom in comparatively shallow places, according to Alfred C. Weed, assistant curator of fishes. In its hopping, Mr. Weed says, it moves exactly in the same way as a rabbit feeding on a lawn. The weight is rested on the forward pair of feet and the rear ones are brought ahead; then the weight is shifted to the rear pair and the forward ones moved along.

*Science News Letter, January 3, 1931*



THE BATFISH

*A specimen of which is now on exhibition at the Field Museum of Natural History, Chicago, walks on the sea floor. It has hind feet where its front feet should be.*