

## PHYSICS

# Ultraviolet and Sunlight Make "Radio Roof" Fluctuate

ULTRAVIOLET rays from the sun, combined with the sun's warming visible rays, suffice to explain the daily and seasonal fluctuations of the earth's "radio roof" or ionosphere and hence longer or shorter transmission of radio waves, it was indicated by an address presented before the meeting of the American Geophysical Union, by Dr. E. O. Hulburt, of the Naval Research Laboratory at Bellevue, D. C.

From earliest radio days, it has been known to physicists that the radio waves most used strike the lower side of the ionosphere and "bounce back" repeatedly. If it were not for this, they would probably be lost out into space.

The ionosphere is a great region of the atmosphere so far out that the now much-publicized stratosphere is only a stone's throw upward by comparison. The lowermost of its two strata, called the "E" layer, is about 60 miles over our heads; the upper, or "F" layer, has an altitude averaging two and a half times that distance.

That is the night position of the "F" layer. In the daytime it rises higher and higher until about noon one part of it, the "F<sub>2</sub>" layer, is some 200 miles up—less in midwinter, considerably more in midsummer.

The sun obviously has a good deal to do with this behavior of the "radio roof," making it seem more like the top of a wind-billowing circus-tent than a respectable permanent roof.

Dr. Hulburt's observations and calculations have convinced him that the sun's effect is two-fold. First, the ultraviolet radiation charges the air mole-

cules and other particles that may be present with electricity, causing them to fly apart and thus produce a general expansion. Second, the sun's warming rays have an additional expansive effect. The two together produce the "hump" which always "rides" the ionosphere directly beneath the sun.

Such a vast mountain of even the thinnest air naturally tends to smooth itself out by flowing away in all directions. The stream that flows westward against the earth's rotation, is roiled and thrown into invisible waves. The eastward stream flows smoothly and steadily. This picture, Dr. Hulburt said, fits in well with observed radio phenomena.

There are one or two radio facts that do not yet fit into the picture, and these challenge geophysicists to attempt further solutions to the problem.

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## MEDICINE

## Electricity in Teeth May Lead to Cancer

ELECTRIC currents in the mouth due to fillings and dentures made of alloys of different electrical potentials have been found to cause irritation of the gums, tongue and cheek tissues and may be a contributing factor in cancer and other malignant diseases of the mouth.

Galvanism of the mouth, as this trouble is known, has been subjected to a clinical research study at the Harvard Dental School by Dr. Raymond J. Nagle, and almost 200 cases of suspected galvanic action have been observed.

"There is no doubt of the existence of electric action causing irritation, but the number of cases in which such a diagnosis can safely be made is very small," according to Dr. Nagle.

In most of the cases investigated, general systemic disorders of one sort or another have been present, so that it was impossible to accept galvanic action definitely as the cause of the irritation observed.

He succeeded in eliminating these other factors in five cases, however, and these responded significantly to the treatment recommended for galvanism. This consists of removing all fillings, crowns, plates and bridges from the patient's mouth and replacing them by materials that will cause no electric action. Gold which has been prepared under uniform conditions from a single casting is used in this replacement.

"Very little definite information regarding galvanic action is available, although dental literature contains many articles on the subject," Dr. Nagle said. "Our studies indicate that while galvanic action does exist, possibly in every mouth, most persons are not susceptible to any irritation from it."

"This leads us to believe that an unknown factor rather than the electric current itself produces the irritation in the few persons for whom a diagnosis of galvanism is reasonable. It appears that probably more cases are believed to be suffering from galvanic irritation than actually are affected by it."

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## BOTANY

## 75-Year-Old Yucca Blossoms Again

BLOSSOMING after many years of mere vegetative existence, a yucca plant in the Missouri Botanical Garden has roused considerable comment among botanists at St. Louis, Mo. Most plants of this type do not reach a fraction of this age.

A memorial tablet, shaped like an old fashioned tombstone, stands behind the plant with the inscription: "YUCCA angustifolia, planted 1869 by the lamented Charles A. Pope, placed here in memoriam, by H. S." H. S. was the late Henry Shaw, founder of the Garden.

Now the botanists are speculating whether marble tablet and venerable plant will survive to reach the century mark, 25 years hence.

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