

PHYSICS

# "Fingerprinted" Light Gives Clue to Upper Atmosphere

## Searchlights Shooting Beams, Interrupted at Given Frequency, Used to Explore Regions 20 to 50 Miles Up

A NEW method of discovering what exists in the unexplored upper air beyond the reach of balloons, some 20 to 50 miles above the earth, has been developed by three Washington physicists connected with the Carnegie Institution's Department of Terrestrial Magnetism and the U. S. Department of Agriculture's Bureau of Chemistry and Soils.

Searchlights will be used to shoot light into the night sky, light that is "fingerprinted" by being interrupted at a given frequency using a "light-chopper" so that when it is scattered by the upper air and picked up by large mirrors it can be recognized by tuning the observing instruments.

From what happens to the light in the upper air's greatest unknown region

will come the answer to some questions that science is eagerly asking.

How the thinning air's density varies with height some thirty miles above the stratosphere, in the region known as the "ozonosphere" and the "altotroposphere," will become known. This is important basic information now lacking.

The research team that has taken the first steps toward conquest of the region between where the stratosphere leaves off and the aurora begins to be born, consists of Dr. M. A. Tuve and Dr. E. A. Johnson of the Carnegie Institution of Washington and Dr. Oliver R. Wulf of the U. S. Department of Agriculture. They gave the first hint of their researches in a short letter published in the current issue of the *Physical Review*.

So far tests have been confined to an artificial light in the laboratory but field tests are being organized, probably with the aid of large Army-type searchlights of great brilliance. Just one large searchlight is expected to furnish enough light for the experiment, thanks to the device of using "chopped" light.

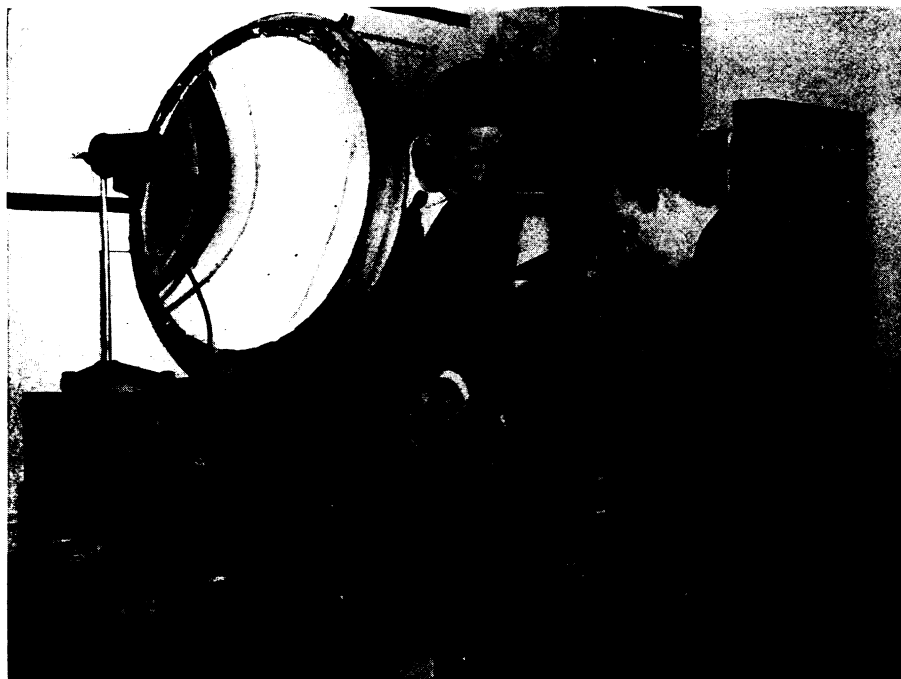
Once the delicate instruments are put into use analyzing the scattered "fingerprinted" light gathered by the mirror, the scientists expect to solve other numerous problems, connected with water vapor, turbulence, winds and dust, as well as the chemical state of the rarefied atmosphere that allows it to shine with fluorescent light at times.

### Too High for Man

In no other way can science adequately probe the region 20 to 50 miles above the earth. Man-carrying balloons' "highest up" is the 14 miles of the recent stratosphere flight. Unmanned balloons can reach only about 20 miles altitude, the top of the stratosphere. At about 60 miles above the earth there is found the base of the auroral displays and the first of the ionized or electrical layers that reflect radio waves. The region between stratosphere and the altostratosphere, which begins at about 60 miles, can be probed with no means so far suggested except the modulated Tuve-Johnson-Wulf light.

Using light as a probe was originally suggested about five years ago by an English scientist, Dr. E. H. Synge, who wanted the Army and Navy to assemble several hundred searchlights and shine them on one place in the upper air. The tests made by the Washington scientists, however, indicate that by using "fingerprinted" light even better information should be obtained with a single searchlight aimed at the sky.

*Science News Letter, December 14, 1935*



### TO EXPLORE BEYOND STRATOSPHERE WITH LIGHT

Dr. M. A. Tuve, left, and Dr. E. A. Johnson setting up light and electrical apparatus that will be used to detect searchlight illumination scattered from 20 to 50 miles high above the earth. By use of "fingerprinted" light, these Carnegie Institution of Washington scientists, with the help of Dr. Oliver R. Wulf of U. S. Department of Agriculture, expect to discover just what exists in the unexplored region of the upper air. The large mirror will gather up the light from the sky.

PHYSIOLOGY

## Stuttering Stopped By Walking on All Fours

WALKING on all fours as a remedy for stuttering sounds like a fantastic, Alice-in-Wonderland dream. But it actually worked in the case of stutterers studied at the University of Michigan laboratory of biophysics, Hazle Geniesse reports. (*Science*, Nov. 29)

Miss Geniesse does not suggest that stutterers immediately drop on all fours when they want to speak. But she believes the studies indicate a new approach to the problem and suggest new methods of treating the condition.

"A marked improvement, even to

complete cessation of stuttering, was noted when the stutterer spoke while walking on all fours," she reported from her study of twenty-four cases.

No explanation can as yet be given for the phenomenon, Miss Geniesse states, but she has a theory about it. Reduced to very elementary terms, it is a matter of blood pressure and spasm in part of the brain. If stuttering is looked on as a kind of spasm, it may be caused by a temporary stimulus to a motor nerve cell. The stimulus, in turn, may

be caused by temporary dilatation of small blood vessels in part of the brain. Getting on all fours changes the blood pressure, releases the blood that dilates the small blood vessels, the state of spasm stops, and the stutterer carries on a more nearly normal conversation.

"If this view proves correct," Miss Geniesse states, "then present theories and methods for correcting stuttering should be revised and greater efforts should be made to place them upon a physiological basis."

*Science News Letter, December 14, 1935*

#### PSYCHOLOGY

## Sleep After Memorizing Makes Recall Easier

**I**F A PERSON memorizes certain kinds of material perfectly, and goes to sleep afterwards, he will recall more of it, and also re-learn the whole task more economically after a lapse of 24 hours, than if he waits even a few hours before he goes to sleep, Dr. H. M. Johnson, professor of psychology of American University, Washington, D. C., announced at Cornell University.

Experiments based on different methods, made by Dr. Rosa Heine Katz, at the University of Göttingen, and by Joseph F. O'Brien, graduate student at American University, showed that all the subjects who were studied were better able to recall and also to re-learn material that they had learned by rote and partially forgotten, if they first slept for eight hours and then worked for 16 hours, than if they distributed their rest and activity in any other way during the 24-hour period.

The differences in favor of sleeping immediately varied between 20 per cent. and 30 per cent., according to the subject and the task. One would be justified in offering a bet of 100,000 to one that Mr. O'Brien's results were not due to chance, Dr. Johnson said.

Two explanations have been offered. One, which Dr. Johnson called the "hardening" hypothesis, pictures the brain as inert during sleep, giving recently received impressions a chance to become "set." The other, called the "reverberation" hypothesis, regards the brain as an active organ even during sleep, and supposes that it goes on repeating or "reverberating" recently received impressions during the unconscious period.

Dr. Johnson does not regard either

hypothesis as satisfactory. The "hardening" hypothesis is cast into doubt by the poor recall of memorized material made by persons who had "hardened" their brains with the equivalent of only one highball. Furthermore, very recent studies on brain waves show that these fluctuations in the electric potential of the brain go on continuously during sleep, though not in their ordinary "waking" patterns. Finally, studies on sleep conducted by Dr. Johnson himself several years ago at the Mellon Institute show that sleepers assume muscular positions which they can maintain only by dint of strenuous brain exertion.

Dr. Johnson offered a third hypothesis, which, however, he did not urge as necessarily correct. He suggested that the memorized material might "reverberate" in the brain, but during the drowsy periods before sleep and during the slow awakening process, and also during the frequent half-wakeful periods during the night which most persons experience without realizing or remembering them.

*Science News Letter, December 14, 1935*

#### MEDICINE

## Treatment Saves Drunks From Dangerous Stupor

**F**OR DRUNKS who have reached a state of coma, medical science has discovered an emergency treatment. The new treatment will bring them speedily out of the dangerous state of paralytic alcoholism which sometimes leads to death. Dr. Leon J. Robinson and Dr. Sydney Selesnick of Boston City Hospital report results of the treatment. (*Jour-*

*nal, American Medical Association, Nov. 30*)

These cases of acute alcoholism are brought immediately to the hospital, and are allowed to breathe a mixture of 10 per cent. carbon dioxide and 90 per cent. oxygen for half an hour or longer. This, in the words of the Boston physicians, is what happens:

"In every case of unarousable alcoholic coma, with slow, jerky, shallow respiration and cyanosis, carbon dioxide-oxygen inhalation caused the respirations to become deep and regular almost at once."

The doctors emphasize that this is an emergency treatment and is not indicated in the moderate degrees of intoxication frequently encountered.

By comparing man with animals, these doctors believe that it would require about a pint of whisky taken at once to cause coma in man. This coma, accompanied by troubled breathing, paralysis and blueness of the skin, constitutes a medical emergency. Death may be definitely prevented and recovery hastened by the inhalation of this mixture, they declare.

Administration of this treatment increases the amount of alcohol exhaled from the lungs and so decreases the total alcohol in the body.

The Boston physicians make no attempt completely to arouse the stuporous patient but merely use this treatment to reduce him from a state of dangerous paralytic alcoholism to a less deep stage of anesthesia from which he can be expected to recover safely.

*Science News Letter, December 14, 1935*

#### ENGINEERING

## Concreting Nearly Done At Norris Dam of TVA

See Front Cover

**S**USPENDED high in the air from the cable-way, the photographer looked down on the view of Norris Dam which appears on the front cover of this week's SCIENCE NEWS LETTER.

Water is now impounded to a depth of 50 feet. When full, the dam will back water 40 miles up the Clinch and Powell River valleys.

Ninety-five per cent. of the concrete has now been poured.

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Cornell scientists hope for a time when hens can be bred and managed, so as to produce eggs for many years, thus doing away with the expensive process of renewing at least half of a flock each year.