

## ASTRONOMY

# Sun Catapults Gas Here

Hydrogen is being flung toward the earth by solar magnetic fields. Clouds of gas striking the earth probably cause the aurora borealis.

By WADSWORTH LIKELY

► **MASSES** of hydrogen and other gases are being catapulted at the earth by the sun's magnetic fields. Dr. Donald Menzel, associate director for solar research of the Harvard College Observatory, has reached this conclusion after studying movies of the sun's corona.

Brilliant displays of northern lights, or the aurora borealis, he says, are probably caused by clouds of gas striking the earth after having been shot away from the sun.

## Energy Creation

However, this hydrogen that reaches the earth is similar to that used in the vast process of energy creation which is going on continuously in the sun. That energy which the sun creates out of hydrogen, the sun sends us so that we may live.

Dr. Menzel and other astrophysicists are studying the sun to learn more about this life-giving process. From a mountain peak in Colorado, Harvard scientists have taken movies which have resulted in a new theory about the sun's prominences, flares and corona and a new explanation of the relationship of these solar phenomena to the earth.

The sun creates energy, as Dr. Hans Bethe, famed physicist of Cornell, has explained, when, deep in the sun's interior, carbon atoms capture hydrogen atoms, digest them by atomic processes, spit out an atom of helium and a lot of energy and in the same instant return to carbon to begin the process all over again.

## Great Clouds of Gas

Dr. Menzel's motion pictures show great clouds of shining gas—mostly hydrogen—raining down on the sun from enormous heights above the surface. Two things about this solar rain struck Dr. Menzel. First, the volume of gas going down to the surface of the sun did not seem to be equaled by the visible amount going up. Second, the "rain" didn't fall fast enough.

Occasionally, says Dr. Menzel, there are upward streams of material, great surges of gas that rise perhaps a quarter of a million miles, sometimes as high as a million miles. Some of these surges look like super-giant geysers, whose width is greater than that of the earth. But most of this material seems to cascade immediately back upon the solar surface and does not appear to cause what Dr. Menzel calls rain.

Since the scientists atop their Colorado

mountain could not see the upward-rising mass of hydrogen which had to be present to provide a source for the rain, they concluded that, when it rose, it was not luminous and, therefore, invisible. Recently a colleague of Dr. Menzel's, Dr. Walter Roberts, discovered an activity on the sun's surface which he called "polar spicules."

These objects are bubbling, spurting jets, which shoot out a core of luminous hydrogen gas that dims out while it is still rising. These jets are found near the sun's poles.

Dr. Menzel says that the gas from these spicules, while it is falling, goes to make up the sun's corona—that halo we see during a total solar eclipse. As the hydrogen comes down, he says it becomes intensely hot, four times hotter than even the normal shining surface of the sun. As it becomes hot, it once more becomes luminous, and therefore visible.

As the gas becomes hotter, it is falling toward the sun's surface. But it is not falling fast enough. Something is competing with the sun's gravitational pull. Dr. Menzel

thinks that both the heating and the slowing down are caused by the sun's magnetic field.

The magnetic field, he says, has associated with it invisible lines of force, which extend out into space all around the sun in a fairly regular pattern. As the clouds of hydrogen fall, they become entangled in this mesh of lines, which might be termed a mighty roof of magnetic girders over the sun.

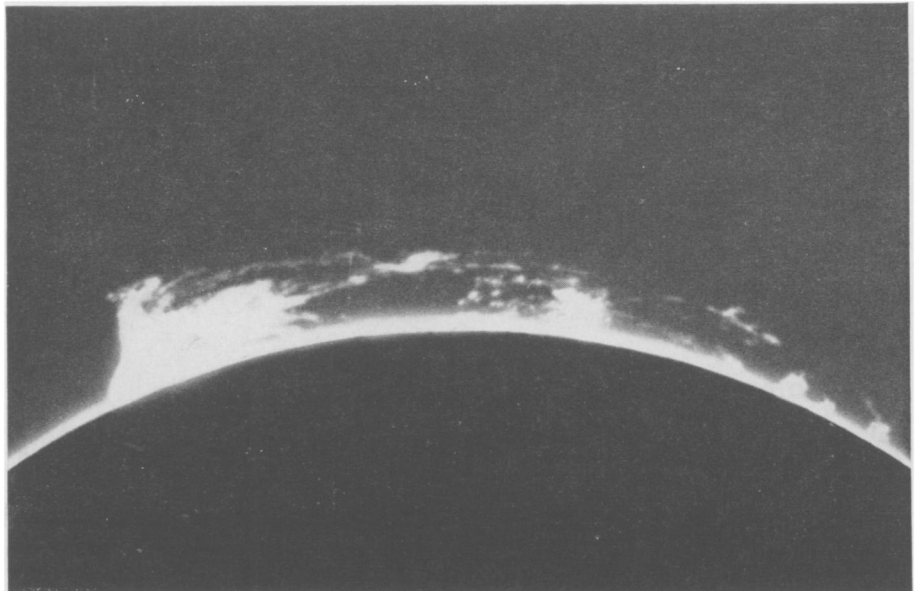
## Lines Support Gas

This mesh of lines tends to support the gas, unless too much gas accumulates. Then the lines, which are partially elastic, tend to sag and form a pocket. Of course, more and more gas tumbles into the pocket, until the mesh collapses and the gas falls to the sun's surface.

The sag in the mesh lies on the sun's surface until some of the gas leaks away, like snow melting. When the amount of gas diminishes far enough, the normal elasticity of the mesh of lines of force reasserts itself, and the gas is flung back out into space, as from a giant slingshot.

It is then that some of the gas is sent toward the earth.

Dr. Menzel uses an instrument known as a coronagraph to make his observations



**"ACTION ON THE SUN"**—Stills from movies showing the prominences of the sun are part of about 15,000 feet of motion pictures of the sun which went into a film called "Action on the Sun" taken since 1943 at the High Altitude Observatory of Harvard University and the University of Colorado, Climax, Colo. The movies show great clouds of luminous gas, mostly hydrogen, raining down on the sun, sometimes from heights as great as a quarter of a million miles.



**SUN GAZING**—Two miles up, in Climax, Colo., scientists study the sun from the observatory. Using a rare coronagraph, they have taken movies which throw new light on the activities above the sun's surface and the relation of those activities to the earth.

of the sun. There are only two of these in the western hemisphere now, one two miles up at Climax, Colorado, and the other on Sacramento Peak in New Mexico.

Harvard and the University of Colorado operate the Climax station jointly, under the sponsorship of the Navy and the National Bureau of Standards. They go two miles up in the mountains because the skies

are so clear and blue there.

The coronagraph is a telescope with a very perfect lens, made from the finest glass which is kept completely free of dust. Because Dr. Menzel and his associates want to study the corona around the sun, they put a small disk in the telescope which just eclipses the sun—artificially.

Science News Letter, March 4, 1950

**MEDICINE**

# Blood Plasma for Arthritis

➤ **BLOOD** plasma from women who have just given birth to babies may be added to the new medical weapons against arthritis.

"Striking clinical improvement" lasting from three to 16 weeks after such treatment in rheumatoid arthritis patients is reported by Dr. Louis W. Granirer of the arthritis clinic at Queens General Hospital, Jamaica, N. Y.

"Improved sense of well-being, a brighter mental outlook, increased appetite, a disappearance of joint symptoms, a gain in weight" are among the results of the treatment reported by Dr. Granirer in the journal, *SCIENCE* (Feb. 24).

There were no toxic effects and in 320 such plasma transfusions no case of jaundice.

The material is readily available and comparatively inexpensive, Dr. Granirer points out.

The pattern of albumin and globulin and total proteins in the blood plasma of the mothers just after childbirth, he found, seems to be like the pattern for these chemicals in the blood plasma of expectant mothers at or near term. This may explain why the post-childbirth blood plasma is

effective in rheumatoid arthritis. Pregnancy has previously been known to produce a partial or complete let-up of symptoms in rheumatoid arthritis in a high percentage of cases.

The effect of the post-childbirth plasma, Dr. Granirer thinks, is not solely due to a "steroidal factor," such as ACTH or cortisone, the two anti-arthritis hormone chemicals.

Science News Letter, March 4, 1950

**NUCLEAR PHYSICS**

# Scientists Look for Increase in Cosmic Rays

➤ **SCIENTISTS** have sent balloons high into the air trying to catch increased cosmic ray activity on photographic plates.

They were looking for a sharp increase in this ray activity because of the sudden increased activity of the giant sun spot area that recently traveled across the sun.

They are trying to find out if there is a correlation between the solar noise outbursts and cosmic ray activity, in order to

get a better idea of the origin of cosmic rays.

There are, however, only five known instances of cosmic ray photographs being taken at the time of or directly after a solar flare. Scientists, therefore, need more instances of this type before they can establish any correlation between solar flares and increased cosmic ray activity.

Science News Letter, March 4, 1950

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