

PUBLIC HEALTH

# Radiation Limits Unsafe

Results of the first experiments involving radiation effects on human cells indicate the present "safe" dose of radiation may be from three to five times too high.

► A SIGNIFICANT number of tomorrow's children will be deformed if today's fathers receive anywhere near the amount of radiation now considered to be a safe amount.

Evidence supporting this comes from the first study ever made on the effects of radiation on normal human cells, reported at the American Institute of Biological Sciences meeting, Palo Alto, Calif., by Dr. Michael A. Bender of Johns Hopkins University, Baltimore, Md. (See pp. 149 and 150.)

The experiments indicate that the ten roentgen "maximum permissible dose" to the reproductive organs from birth to 30 years of age, set by the National Academy of Sciences, is "too high."

In discussing the results of his work to date, Dr. Bender warned, "If the rates of this and other types of radiation-induced damage to human tissues are found to be correspondingly high in further experiments, a sharp revision will have to be made in our estimates of 'safe' doses of radiation." The biologist told SCIENCE SERVICE that he thought the present "safe" limit of ten roentgens probably was from three to five times too high.

The experiments, described as the first done on human cells with known doses of

radiation and the amount of resulting damage carefully measured, were conducted on normal kidney cells in tissue culture. The cells were subjected to X-ray bombardment of 25 roentgens and 50 roentgens from a standard X-ray machine used in many American hospitals.

(A routine fluoroscopic examination may result in a radiation dosage equal to those given to the kidney cells.)

What resulted was an increase in the breakage of chromosomes in proportion to the amount of radiation given.

Normally, one chromosome break in 100 cells occurs. Geneticists term this the "spontaneous breakage rate." If this breakage rate were increased because of radiation, as is indicated in the human cell experiments carried out by Dr. Bender, then a significant increase of hereditary defects in future generations can be expected. The amount of radiation required to produce this increase is in question.

But the human kidney tissues used in the experiment showed the following: when exposed to 25 roentgens, roughly six breaks per 100 cells were produced; and at 50 roentgens, upwards of 15 breaks were found.

"The breakage rate found in these experi-

ments is much higher than that which has been generally assumed to occur for such low doses," Dr. Bender told the meeting.

"In fact," he added, "the present experiments, taken by themselves, lend great weight to the belief of many geneticists that there is no 'safe' dose of radiation.

"Careful consideration of whether the benefits to be gained are worth the risk to ourselves and to our descendants should be given to any proposed increase in the amount of radiation we receive."

Studies are now underway on other human cells and on mouse cells, which when matched might give a good standard for comparing the radiation damage suffered by man with more easily conducted experiments with mice.

Dr. Bender pointed out that the study was made on only one particular type of human cell and in tissue culture. He explained that this might leave his findings open to question, because it is not known whether cells in the human body would all react in the same way. However, he added, "There is no reason to believe that they would not."

Science News Letter, September 7, 1957

ASTRONOMY

## Plan Unique Photographs Of Sun From Balloon

► UNIQUE photographs of the sun from a high-flying unmanned balloon will be taken within the next few weeks.

The Skyhook balloon will be equipped with a powerful, especially designed 12-inch telescope, a light-sensitive pointing mechanism and a motion picture camera. It is expected to rise to heights of 80,000 feet over Minnesota. Once stable there, the camera will automatically take some 8,000 pictures of the sun, one each second.

One giant balloon, equipped with a dummy telescope, has been successfully launched in a test flight that proved the feasibility of the system, developed under Project Stratoscope. Aim of the system is to obtain solar photographs three times clearer than any taken previously.

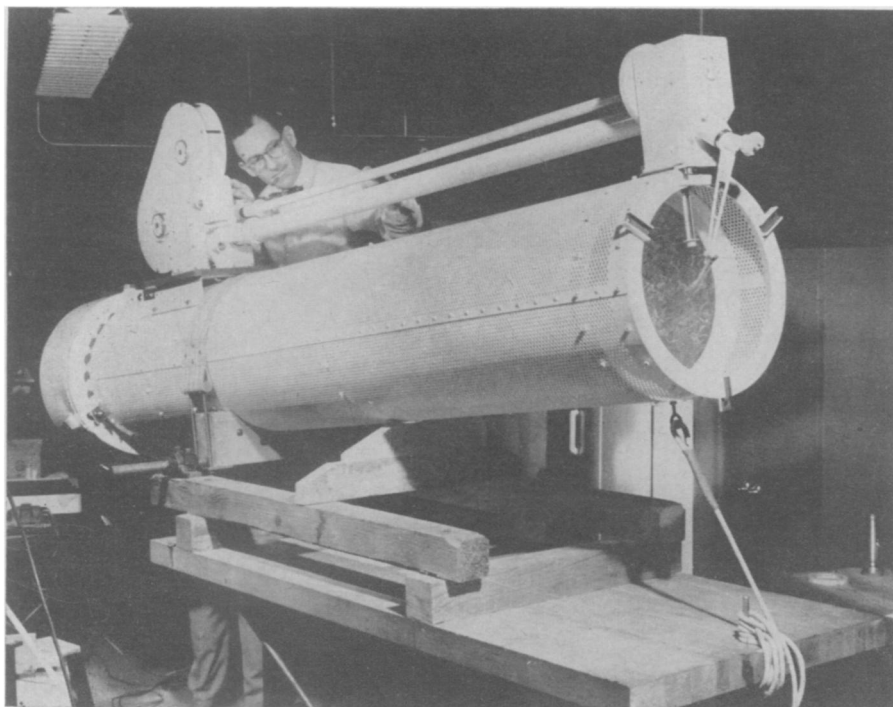
The project, sponsored by the Office of Naval Research, is directed by Dr. Martin Schwarzschild, Princeton University astronomy professor. It is an attempt to gain a better understanding of turbulence in the solar atmosphere by going above most of the earth's own turbulent atmosphere. Because this planet's air is in a constant state of turmoil, only solar events having a diameter of 600 miles or more can be readily distinguishable.

The new pictures are expected to reveal the true size of the large eddies as well as of smaller ones.

This will be man's first attempt at high-definition, high-altitude vehicular astronomy. An earlier trial at better "seeing" made last spring by the French reached only to 25,000 feet, where the turbulent air of the tropopause, about 40,000 feet, still remains between the telescope and the sun.

Special arrangements are being made to compensate for changes in the telescope's focal length due to solar heating.

Science News Letter, September 7, 1957



**SOLAR TELESCOPE**—Pictures taken through this balloon-borne solar telescope, designed and built by Perkin-Elmer Corp., Norwalk, Conn., are expected to be three times sharper than any obtained with even the most powerful earth-bound telescope. Scientists hope to obtain fundamental data on the sun's surface activity.