# SCIENCE NEWS

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## STARS FATTER AND "SOLIDER"

THAT we live in a much fatter and "solider" galaxy of stars than previously supposed was announced by Dr. Harlow Shapley, director of the Harvard College Observatory, in the twenty-second annual Sigma Xi lecture at the University of Chicago.

An enormous thickness of the Milky Way, the galaxy or "universe" of stars in which the sun and earth are located, is established definitely through a general revision of the distances of the globular star clusters which has just been completed at Harvard. No large alterations are found necessary in the diameters of the galaxies, but Dr. Shapley confirms his earlier evidence that our own wheel-shaped galaxy is surrounded by an extensive haze of stars that is approximately spherical in shape.

The overall thickness of the surrounding star haze is found by Dr. Shapley to exceed 100,000 light years, that is, it would take light 100,000 years to cross the galaxy, traveling at its speed of 186,000 miles per second. This is 580,000,000,000,000,000 miles.

We are still located about 30,000 light years from the center of the Milky Way, as the distance calculations made possible by the new researches caused little revision.

Dr. Shapley said: "The original determination of distance and distribution of globular clusters led to the abandonment of the heliocentric hypothesis of the sidereal universe since it pointed to the star clouds in Sagittarius as a region around which the globular clusters are aggregated. That region was assumed to be the center also for all stars of the Milky Way. The clue given by clusters was later verified by studies of motions of stars around that center, again demonstrating that the sun and earth are in the outer part of the wheel.

"Cosmic dust and gas clouds between Milky Way stars have hindered our direct exploration of the home galaxy and especially prevented measurements of accurate distances for remote objects that are in low galactic latitudes, that is, near the Milky Way circle. But in higher latitudes far from the Milky Way band we escape much of the space-absorption and when more than 20 degrees from the galactic circle we can see through the dust. In those latitudes from 20 degrees to the poles at 90 degrees on both sides of Milky Way, we can now safely measure positions of globular clusters in space.

"One test for transparency of space is through measuring colors of remote objects. If there is reddening or color excess over normal for average stars we suspect presence of absorbing dust and gas in interstellar space. A better test is now provided by external galaxies. If they are present and numerous in the field of globular clusters, space is clear. If absent, they have been blocked out by space absorption. If present but scarce, the transparency is partial."

The determinations of the distances in the Milky Way were made with the help of the Harvard Observatory's extensive surveys of faint and distant galaxies, through the use of new studies of the magnitudes of variables and giant stars in globular clusters and with new measurements for nearly all globular clusters in latitudes higher than 20 degrees. These researches were reported for the first time by Dr. Shapley.

"The globular star clusters average more than 100,000 times the brightness of the sun. When compared with clusters in neighboring galaxy in Andromeda they appear to be systematically brighter or more probably they indicate that distance of the Andromeda nebula is now considerably underestimated."

## NICOTINE SOLUTION FOR GREENHOUSE PESTS

RESEARCH by U. S. Department of Agriculture entomologists has demonstrated that the aerosol method, used now against malaria mosquitoes on many American fighting fronts, is effective also in attacks on insect pests that damage plants growing in greenhouses and other closed spaces. The only difference is that whereas pyrethrum is the poison used in the mosquito-killing bombs, the standard munition in chemical warfare against aphids is nicotine.

The "bombs" used are small, grenade-shaped containers loaded with the insecticides dissolved in Freon, the compound first brought out for the cooling coils of electric refrigerators. It is a gas at ordinary temperatures, but becomes a liquid under slight pressure. The bombs do not actually burst, but the sudden release of the internal pressure when they are opened sends the poison-loaded Freon vapor out into all corners of the room or tent that is being purged of its pests. Harmless to humans, the vapor is deadly to insects.

The tests showed that a given quantity of nicotine released as an aerosol from a Freon bomb will kill the insects in twice as many cubic feet of greenhouse space as when burned for fumigation in the method now used, besides eliminating the fire hazard involved at present.

It is not expected that the new method will come into general use until after the war because of present difficulty in obtaining necessary materials. All Freon bombs that can now be produced are needed for the protection of troops and the "de-mosquitoing" of airplanes in malaria-infested regions.

## SEASICKNESS

A COMBINATION of two drugs which acting together may prevent seasickness has been discovered by Captain Stewart Wolf, M.C., A.U.S., in studies at the Ninth General Hospital, U. S. Army, the Boston City Hospital and Harvard Medical School, and the New York Hospital and Cornell Medical College. Announcement of the discovery appears in the *Journal of Clinical Investigation.* The drugs are atropine, the antispasmodic drug extracted from belladonna, and prostigmine, the synthetic drug which has been used in treating the muscle weakness disease, myasthenia gravis.

Neither of these drugs would be effective alone. In

combination, however, they prevented nausea in humans even when gagging was induced by touching the throat with a tongue depressor. In other tests, irrigation of the ear canal with icy cold water for five minutes failed to induce nausea when these drugs had been given, though without the drugs, the investigators, one of whom was Captain Wolf himself, rapidly became nauseated by this ear irrigation. Rhythmic rotation of the head while the eyes fixed a spot on the ceiling also failed to induce nausea after the atropine-prostigmine combination, but did induce nausea without it.

The drugs prevent nausea, apparently, by blocking inhibition of stomach contractions. In the tests, Captain Wolf had found that the first effect on the body of nauseating stimuli was to stop the normal activity of the stomach. This inhibition of stomach activity occurred within one minute of application of the nauseating stimuli and considerably before the skin grew clammy, the eyes began to move rapidly and involuntarily and the person felt dizzy and nauseated.

It was to learn whether nausea would occur without the stopping of stomach activity that Captain Wolf tried the effects of atropine and prostigmine. The drugs did keep the stomach contracting at the normal rate and no nausea was felt, from which it is concluded that the drugs might be used to prevent seasickness.

## EYEGLASSES AND DIET

A WORLD of the future in which no one will need to wear eyeglasses because the mothers of the race will eat a superior diet was predicted by Dr. Russell M. Wilder, of the Mayo Clinic, at the wartime conference on nutrition by the Institute of Medicine of Chicago.

Application to human diets of existing knowledge of nutrition, beginning early in childhood and continuing through life, may reasonably be expected, he said, to delay the development of presbyopia, the kind of farsightedness that comes in middle life or old age, and even prevent the development of cataract. "It may even be supposed," he continued, "that astigmatism, longsightedness and shortsightedness will be found to be preventable" by suitable nourishment of the mother during the development of the eye of the unborn child. "In that case wearing glasses may become outmoded."

Nightblindness and certain other eye diseases are known to be caused by faulty diet. The eye, Dr. Wilder pointed out, like other organs of the body, is probably affected by diet in still other ways and like the rest of the body is affected by the changes accompanying the process of growing old. Nutritional scientists are finding that in rats, which are much like humans with respect to nutrition and eating, the growing-old process can be greatly delayed by proper diet. Changes in the eyes due to the aging process might similarly be prevented.

The eyes may even help in finding more ways for postponing aging and preventing not merely disease but poor health because the eyes can be examined internally and externally during life.

## ITEMS

THREE new and sensitive methods of chemical analysis useful to wartime chemistry are described by Professor John H. Yoe, of the University of Virginia. Two are based on the formation of highly colored compounds with palladium and iron, while the other involves the formation of a slightly soluble precipitate with tungsten. The new reagent for tungsten is important at this time because it will replace war-scarce cinchonine, an antimalarial compound closely related to quinine. Dr. Yoe was assisted by Dr. A. L. Jones, now at Cornell University. The new reaction for palladium developed by Dr. Yoe and Dr. L. G. Overholser is so sensitive that it is possible to measure one part of the element in 300,000,000 parts of solution. For iron a new reagent which permits iron determination at concentration as low as one in 200,000,000 parts of solution, was developed by Dr. Yoe, assisted by Dr. Jones.

THAT lessons in efficient soaring technique can be learned from the world's largest flying birds, the nearly extinct California condors, was pointed out by John H. Storer, ornithologist, of Waltham, Mass., at the autumn meeting of the American Philosophical Society. Two types of wing-tip have been developed by soaring birds. One is pointed, and has reached a highly advanced stage in such birds as albatross and gull. The other presents a slotted surface to the up-currents, giving highly sensitive control, especially in strong but very localized currents such as are found in the mountains. The condor, probably the world's most highly developed soaring bird, has the largest slots. Mr. Storer showed slow-motion pictures of California condors taking off and in flight, showing in detail how they use their feathered control surfaces. He also stated that he is at present carrying on wind-tunnel experiments with models based on these pictures.

THAT crop losses due to heavy rains soaking poorly drained farm areas represent an unnecessary loss to the nation's potential food supply, was stated by John G. Sutton, of the U. S. Soil Conservation Service, in a report to the American Society of Agricultural Engineers. With proper drainage to prevent crop drowning, Mr. Sutton estimates that production output of at least 6,500,000 acres of land now being farmed could be substantially increased. A U. S. Soil Conservation Service survey of "before and after" yields of farms which have recently benefited from construction of drainage facilities shows that the average "bonus" attained in terms of extra bushels produced per acre is as follows: corn, 18; wheat, 5; grain sorghum, 20; rice, 18; potatoes, 39; soybeans, 9. Drainage projects now in use are in many cases not functioning to best advantage. Of the 87,000,000 acres in organized drainage projects, the Soil Conservation Service estimates that almost 25 million acres are in need of rehabilitation. Cost of this land improvement is small in relation to the benefits. Based on experience with large scale operations, it is estimated that at least 80 per cent. of the rehabilitation of open ditch work could be reconstructed at a cost of less than $10 per acre.