

GENERAL SCIENCE

# Earth Is in Suburbs, Not the Downtown Section, of Galaxy

## Reports from Many Fields Are Presented to National Academy of Sciences at the Annual Spring Meeting

**T**HE SUN, together with the earth and other members of the solar system, is in the suburbs of our vast celestial city, or galaxy—not part way down town, as astronomers have supposed.

Observations which seem to remove us from a more central location were announced by Dr. Arthur B. Wyse and Dr. Nicholas U. Mayall, of the Lick Observatory of the University of California. Their data were presented to the National Academy of Sciences meeting in Washington.

All the stars that can be observed, even with most telescopes, and the sun as well, are members of the galaxy, a swarm of stars in the shape of a huge disk. Looking in the plane of the disk, we see many more stars than when we look to the sides. So concentrated are they in the disk's plane that the naked eye cannot detect them individually, and the effect is the Milky Way.

Outside this galaxy are millions of other galaxies, formerly called spiral nebulae. Only one of these, in the constellation of Andromeda, directly overhead on autumn evenings, is visible, as a faint patch of light, without a telescope. This is Messier 31, its number in the catalog of nebulae prepared in 1781 by Charles Messier, a French astronomer. Drs. Wyse and Mayall have studied this galaxy, as well as Messier 33, which is in the same part of the sky, in the constellation of Triangulum.

Up to now, it has been assumed that there was a great concentration of the mass of these galaxies toward their centers. Consequently, the stars in each system, revolving around the center in merry-go-round fashion, would be subject to the same sort of motion as in the solar system. In the latter case, the sun contains most of the mass, and the innermost planet, Mercury, travels fastest. Farther out, speeds are progressively slower, because these planets are not pulled as much by the sun's gravitation. Mercury, for example, moves around the sun at about 30 miles per second, the earth at 18.5 miles per second, Jupiter at

8 miles per second, and Pluto, most distant, only 3 miles per second.

Using the spectroscope to analyze the light of the two galaxies, and to measure the speed of various sections, the California astronomers find that a short distance from the center of Messier 31 the speed is not fastest, but slowest. "The velocities in both cases," they report, "increase outwards to unexpectedly large distances from the center." This is similar to movement of parts of a solid wheel, rather than a group of separate stars. By a mathematical study, they found a distribution of the stars in such a system that would account for this.

"The results for both spirals," they announced, "indicate only a very slight tendency for the mass to be concentrated toward the center."

Then they checked over measurements of the rotation of stars in our galaxy, and found that these did not necessarily indicate a high concentration of the galactic mass to the center, which is in the

direction of the constellation of Sagittarius.

"Comparison of the densities and the rotational velocities in the two spirals with those in the solar neighborhood, suggests that the sun may be situated in the outermost parts of the galaxy, well beyond the main body of the system," they declared.

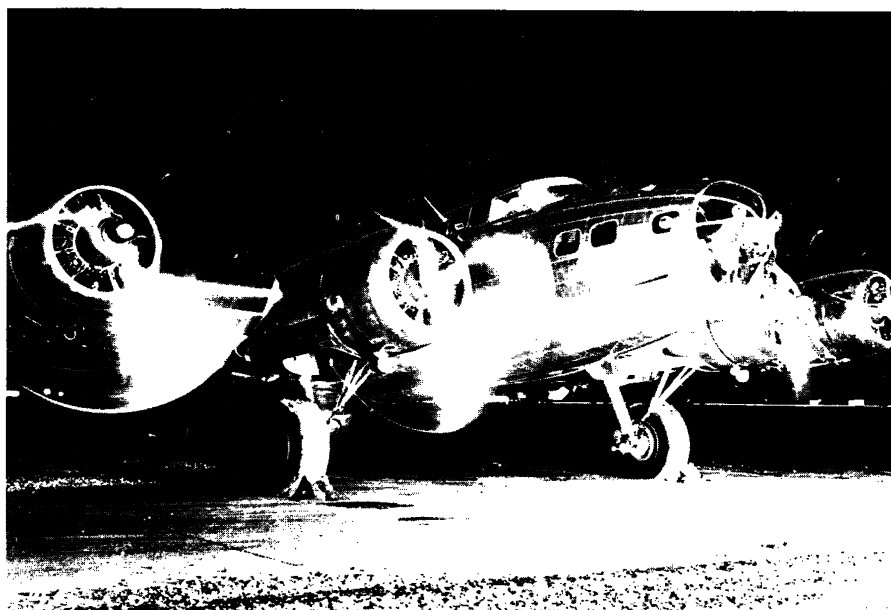
Many observations have indicated that the stars that are nearer the center of the galaxy are going faster than the sun, and those farther out are going more slowly. But if we are in the galactic suburbs, it may be that we are so far out from the center that there is a falling off of speed.

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## Spirals "Trail Their Arms"

**F**IRST unambiguous determination of the direction in which one of these spiral galaxies rotates was announced by Dr. Edwin P. Hubble, of the Mt. Wilson Observatory, in paper prepared jointly with Dr. Mayall. Since it cannot always be determined which edge of the disk is nearer, spectroscopic measures, while they reveal speeds, do not necessarily show the direction.

Of 1000 of the brightest galaxies in the northern sky, only one, NCG 3190, in the constellation of Leo, permits both a spectroscopic measure of the movement along the spiral arms, and a definite



**NIGHT FLIGHT**

*In the glare of floodlights is visible the 4-engine Flying Fortress built by Boeing in Seattle for the U. S. Army Air Corps and Britain's R. A. F.*

indication of the way it is tilted. This object, it was announced, "trails its arms as it rotates." In five others, though it is not so certain, the same condition seems to prevail, so they conclude that "all spirals trail their arms as they rotate."

*Science News Letter, May 3, 1941*

## Produces Seedless Tomatoes

**P**RODUCTION of seedless tomatoes from unpollinated flowers, and even from unopened buds, by spraying with solutions of a growth-promoting substance was described before the Academy meeting by Dr. P. W. Zimmerman of the Boyce Thompson Institute for Plant Research. The substance is an organic compound known as beta naphthoxyacetic acid, which the speaker stated has several advantages for practical production of seedless tomatoes and possibly of other fruits.

The flowers were sprayed just after opening, or in some cases as well-developed buds. In the latter, the fruits sometimes began to enlarge before the flowers opened, bursting out through the sides of the corollas. Petals, stamens and pistils of sprayed flowers persisted for an abnormally long time. In some cases both petals and stamens remained in good condition for 30 days, while flowers left unsprayed withered within three days after opening.

The naphthoxyacetic acid and its derivatives caused erratic behavior in other plants. Tobacco stalks sprayed at the tip grew taller and flowered earlier than unsprayed control plants. Compound leaves were either reduced partly or altogether to simple leaves, or stimulated to develop into double-compound forms. When spray treatments were suspended, however, treated plants again grew normally, producing leaves and flowers of their customary types.

*Science News Letter, May 3, 1941*

## Draper Medal to Wood

**D**R. Robert Williams Wood, professor emeritus of experimental physics at the Johns Hopkins University, Baltimore, was awarded the Henry Draper Gold Medal of the National Academy of Sciences. It was conferred by Dr. Frank B. Jewett, president of the Academy.

The medal, awarded 25 times since it was established in 1883, is given for important original investigations in astronomical physics. Dr. Otto Struve, director of the Yerkes Observatory and a mem-

ber of the committee which recommended the medal for Dr. Wood, said that three of his researches, among many others, stand out particularly. These are his pioneer work in resonance spectra, his use of color screens in astronomical photography and the advances he has made in the preparation of diffraction gratings, which take the place of prisms in analyzing light, from sun or stars, into spectra.

*Science News Letter, May 3, 1941*

## X-Ray Danger Postponed

**X**-RAY workers whose reproductive cells are exposed to heavy doses of powerful radiations need not fear that their immediate offspring will be deformed or defective as a consequence. Nevertheless, there is a chance that such deleterious mutations may crop up among their descendants centuries later, after as many as a hundred generations.

These are possible practical implications of a statistical study on X-rays and human gene mutations reported by Prof. H. J. Muller, of the University of Edinburgh and Amherst College. Despite the remoteness of possible ill consequences of X-ray exposure, Prof. Muller recommended that laboratory workers with the

dangerous radiations shield themselves behind lead plates wherever practicable.

Gene mutations caused by X-rays or other powerful radiations are usually undesirable from the human point of view. Fortunately, however, they usually are also recessives, that is, two of the same kind have to be mated in order to produce the ill effect.

There are two ways in which genes made defective by X-rays can cause trouble. One is by the encounter of an X-ray mutation with a similar gene already existing in the general population. Prof. Muller calculated the chance of this occurrence as possible once in 30, or more likely 100 or more generations—that is, some 750 to 3,000 years of human history.

The second possible way for two such genes to encounter is through the mating of relatives descended from the original victim of the rays. Even with the closest kind of human inbreeding, this would not be likely to happen more than once in 200 generations—about 5,000 years.

However, Prof. Muller cautioned, the likelihood of a defective gene being "bred out," once it is established, is exceedingly remote. Hence the desirability of protection for persons habitually exposed to heavy X-ray doses.

*Science News Letter, May 3, 1941*



EXAMINATION

*Prof. Harry Berman examines one of his cyclotron-green diamonds under the binocular microscope. Its white "twin" is on the dark plate.*