

of the center of the galaxy, our "nation" of stars, of which those we see in the night-time sky are a small part.

The galaxy has the shape of a thin, flat watch, and contains about a hundred thousand million stars.

In addition, between the stars, there is about as much matter as there is in the stars themselves. Interstellar space is not truly empty. It is far more so than the best vacuum we can produce on earth, but there is so much of it that it can hold a great deal of material.

We are about 150 million billion miles from the center, a distance that a beam of light, traveling 186,000 miles each second, would take about 27,000 years to cover. The total diameter of the galaxy is such that light takes about a hundred thousand years to cross it.

Why the Milky Way

When we look at any direction in its plane, we see a great many more stars than when we look off to one of the sides. This vast swarm of stars seems to the naked eye to blend into a continuous band of light. This produces the effect we know as the Milky Way, the brightest part of which is in Sagittarius, where the concentration of stars is thickest.

Because we are inside the galaxy, it is hard to tell much about its general shape. However, outside its limits there are other disc-shaped aggregations of stars. Some of these, called "spiral nebulae," have a characteristic spiral structure, and it has been surmised that if an astronomer out there were to look back at us, he would see very much the same thing.

Very recently, partly with the aid of radio waves broadcast from clouds of interstellar hydrogen gas, some of these spiral arms in our galaxy have been identified, which seems to confirm this theory.

Celestial Time Table for September

Sept.	EST	
1	2:00 a.m.	Sun between earth and Venus.
2	2:59 a.m.	Full moon.
9	2:59 a.m.	Moon in last quarter.
	8:00 p.m.	Moon nearest, distance, 229,800 miles.
13	6:49 p.m.	Moon passes Jupiter.
16	1:19 a.m.	New moon.
20	11:06 a.m.	Moon passes Saturn.
23	6:00 a.m.	Moon farthest, distance 251,200 miles.
	2:42 p.m.	Autumnal equinox, sun over equator, autumn begins in Northern Hemisphere.
	10:40 p.m.	Moon in first quarter.

Subtract one hour for CST, two hours for MST, and three for PST.

Science News Letter, August 27, 1955

Reclamation developments can be credited with adding about \$4,000,000,000 in Federal tax revenues since 1916.

Untreated hay fever can lead to asthma, serious bronchial difficulties and to chronic nasal sinus infections.

GENERAL SCIENCE

Radiation Danger Halved

AEC reports chemical treatment that helps mice endure large doses of radiation and a method for obtaining temperatures nearer absolute zero than previously possible.

➤ A TREATMENT that cuts the danger of death by radiation more than half, at least for bacteria and mice, has been reported by the Atomic Energy Commission.

The mice were given chemicals before exposure and bone marrow after irradiation. They were also given streptomycin to reduce infection. With this treatment, it was possible to "more than double the amount of radiation which a mouse can survive."

The findings resulted from studies at Oak Ridge National Laboratory and elsewhere in which scientists found that bone marrow, spleen, and extracts of spleen and of yeast have a protective effect against radiation in laboratory animals and bacteria.

Certain chemicals are almost as effective as the yeast and spleen extracts in producing recovery of one strain of bacteria from radiation damage, Oak Ridge scientists found.

These chemicals are glutamic acid, uracil and guanine. By combining chemical protection before irradiation and these recovery chemicals afterwards, it was possible to make a very high percentage of bacteria resist large quantities of radiation. When nutrition and temperature conditions were right, it was possible to reduce potentially lethal damage by 50% or more. These same chemicals were effective in mice.

The recovered bacterial cells, it was also found, had a lower mutation rate than expected from the amount of radiation exposure. This suggests a relation between the reduction in mutation rate and the increase in survival produced by the chemicals. Both effects may be produced by the same protective mechanism, it appears.

The low mutation rate is called "an interesting finding" because previous experiments had indicated that mutation production depended solely on the amount of radiation to which the cell is exposed.

The findings, with their hope of leading to human application, appear in the Eighteenth Semiannual Report of the Atomic Energy Commission.

Reach Low Temperatures

➤ A UNIQUE METHOD for reaching temperatures much lower than ever before possible is also described in the report.

To learn about atoms and their hard cores, or nuclei, scientists have found it very useful to study them at temperatures as close as possible to absolute zero, 459.72 degrees below zero on the Fahrenheit scale.

At this temperature, all substances or particles reach a state of frozen immobility.

Theoretically it is impossible to reach absolute zero, but scientists have devised ways of coming within a few hundredths of a degree of it. The new method now suggested by the AEC would cool the metal indium by "temperatures perhaps one-hundredth as great as those realized previously in low temperature research."

It would be reached by placing the metal indium between the poles of a magnet at a temperature below 459 degrees Fahrenheit, then later cutting off the magnetic field. Under these conditions the neutrons and protons that make up its hard core tend to line up in one direction, that of the applied magnetic field.

When such nuclei revert to a random arrangement, they should absorb energy from the motion of the atoms. Since temperature is simply a measure of the energy state—the higher the temperature, the greater the energy—absorption of the nuclear energy would lower the metal's temperature.

What is now needed, the AEC said, are "advances in techniques to increase the degree of polarization," or alignment, of nuclei. Experiments at Oak Ridge National Laboratory are aimed in this direction.

Science News Letter, August 27, 1955

More than half of the drugs in use today were unknown 17 years ago.

A tree, shaded and protected from wind by other trees in the woods, may easily blow over or suffer from sunscald in winter when suddenly left to stand alone.

GOLF: Your LEFT SHOULDER makes the amazing difference!

One of the most startling discoveries to emerge from wide research in the golf swing is that your game literally hinges on your left shoulder!

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