

The birth rate of small stars in the Milky Way is lower now than it was long ago, a study of the amounts of metals in the atmosphere of 56 small stars within a few hundred light years of the solar system indicated.

America's biggest radio telescope, a 300-foot dish mounted as a transit instrument was placed in operation at the National Radio Observatory at Green Bank, W. Va.; a 150-foot dish was installed on the Stanford University campus in California.

The world's second largest radio telescope, a 210-foot saucer located 200 miles west of Sydney, Australia, began operation.

A study of how the sun might have formed from a cloud of interstellar gas indicates that the sun, when it was forming, had a radius several hundred times the distance (93 million miles) from the earth to the sun.

The planets of the solar system were formed from tiny dust particles accumulating around the sun as it passed through a vast dust cloud in space, it was suggested.

The high abundance of rare earth elements in certain stars was explained as due to localized regions of strongly magnetic stars having field strengths ten times greater than the star as a whole.

Observations of the red-shift of light of very distant galaxies indicated that the universe is slowing down in its expansion and may come eventually to a stop and begin contracting.

An observatory was started in Argentina, filling the need for a large observatory to measure accurately the positions of stars over an area amounting to about one-third of the sky.

Hydrogen was discovered on Saturn, upholding the theory that the planet is mainly hydrogen and helium like the youthful sun.

It was indicated by infrared spectra that the chunks of matter comprising the rings of Saturn are coated with frost crystals.

The world's largest solar telescope, forming a 34-inch image, went into operation at Kitt Peak National Observatory, near Tucson, Ariz.

On Feb. 5, Mercury, Venus, earth, Mars, Jupiter, Saturn, and the sun and moon were all within 16 degrees of each other in the sky, with a simultaneous solar eclipse!

A supernova was spotted in the constellation of Virgo.

Radar measurements showed that the moon's surface is likely to be 90 per cent smooth.

The Soviet Union has announced plans to build the largest telescope in the world, set up on one of the summits of the Northern Caucasus, surrounded by other equipment as part of a proposed institute of theoretical astronomy.

Cosmic radiation from outer space travels millions of light years before reaching the earth, observations of photography plates exposed in a high-altitude balloon 136,000 feet in the air showed.

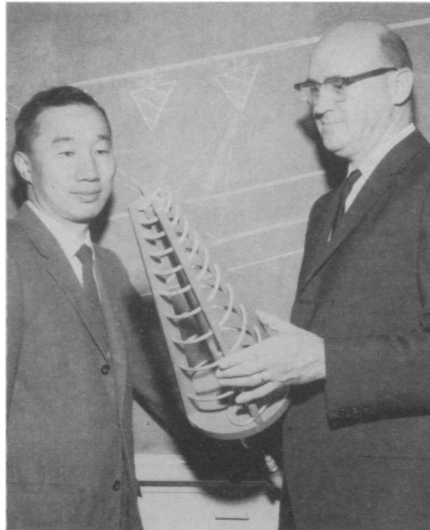
A bright comet, Seki-Lines, was discovered on Feb. 4 by an amateur Japanese astronomer, and again, independently, two days later by an American in Phoenix, Ariz.

A strange-appearing comet, believed to be caused by reactions with solar particles while still 240 million miles from the sun, was observed.

The sun carves out a cavity in space by creating a solar wind of charged particles that reaches out to distances twice as far as from the sun to the earth.

The most accurate measurements so far obtained showed the distance to Andromeda Galaxy is 2.2 million light years.

The earth's outer atmosphere at about 400 miles high was found to change density in tune with the sun's 11-year cycle of activity.



University of Illinois

**SPIRAL ANTENNA**—*The logarithmic spiral antenna developed by Prof. J. D. Dyson (right) in University of Illinois antenna laboratory is a key factor in the university's big new radio telescope. The arrangement of these antenna was planned by Prof. Y. T. Lo (left). By combining variable spacing of the units and variable coupling of the antennas to the receiver, a pencil-like receiving beam is obtained.*

#### BIOLOGICAL SCIENCES

### Infective Virus Made From Dormant Molecules

An infective virus was manufactured from four large non-living molecules—adenosine, guanosine, cytidine and uridine triphosphates—that were isolated from infected plants cells.

The primary act of conversion of energy in photosynthesis was found to involve the separation of negative electrons from the positive "holes" electrons leave behind when they move.

Scientists succeeded in eliminating the need for light in a key energy-transforming reaction of the photosynthetic process, replacing the light energy with a chemical source.

A fuel cell whose bacteria use electrical charges instead of solid foods was reported.

A microbiologist proved that microscopic plants such as algae have circulatory systems, using a film that shows how liquid passes through tiny plants.

Life-like chemicals, palmitic and stearic acids, were reported found in rocks two and a half billion years old.

Daring experiments in human heredity were forecast as a result of partially breaking the genetic code of the life-building chemicals, DNA and RNA, respectively deoxyribonucleic acid and ribonucleic acid.

Histone was found to be the chemical key that tells the body's hereditary carriers, the genes, when to start reproducing themselves.

Sterile male screwworm flies were factory-produced in Texas as part of an artificial barrier to eliminate the livestock pests.

Thirteen species of American birds including the whooping crane, the California condor and the American ivory-billed woodpecker may soon be extinct, a Government scientist reported.

Two kinds of bacteria were found to be capable of surviving in a simulated Martian atmosphere.

Proteins and amino acids existing side by side were found to be the most likely materials of the first life on earth.

Fossil spores of 650 species and pollen grains of 56 new morphological genera were found in rocks up to two billion years old in the Soviet Union and Europe.

Chlorophyll-protein 666, a substance that, with sunlight, makes living organic material from chemicals, was discovered.

A three- to five-year International Biological Program with biologists from 32 nations was slated to begin after 1965.

A group of new organisms, accidentally discovered in soil samples, may link fungi and bacteria.

Ant sounds—snapping of joints, scraping of feet and rapping mandibles—were heard and recorded for the first time by humans.

Most North American fish secrete a substance when they are attacked or wounded that warns the rest of the fishes.

Warming the water around mosquito eggs turned potential males into females.

Research on a bacterium of the intestinal tract showed that human tissues and bacteria have the same rate of cell reproduction.

A bacterium that, injected into white mice, allowed them to withstand large amounts of radiation, was discovered.

The virgin queen honey bee attracts male bees with perfume-like chemicals from glands in her head, scientists reported.

Mutant plants of *Marchantia polymorpha* that cannot live without the addition of essential amino acids or vitamins were developed, thus permitting genetic studies of a type not previously done in higher green plants.

Bacteria left in the Antarctic at the beginning of the century were found alive.

The first radiation effects on the mammalian nervous system were observed in sleeping rats that awakened 12 seconds after low-level exposure to ionizing radiation.

A chemical that causes low germination and poor seedling development in clover and alfalfa was discovered, a step in efforts to improve pasture and forage legumes.

A natural leaf and fruit drop promoter, abscisic acid, was found in immature cotton bolls and may be used to develop more effective chemical defoliant.

Scientists learned from electron microscope pictures that each living cell has an outer layer of complex sugar compounds, which aid in some cases in the selective uptake of substances by the cell.

A biochemical system that can manufacture specific proteins was prepared, thereby giving information on the human genetic message system.

A new chemical discovery protects plants against long dry spells by closing the stomata, or pores, inhibiting evaporation of the water from the plant.

A colony of fresh-water clam shrimp, thought extinct for 83 years, was found in a trap on a Woods Hole, Mass., golf course.

Scientists are now able to study virus formation in plant cells with a recently isolated immature form of tobacco mosaic virus.

A genetic pollen restorer that will make male-sterile wheat fertile was found; it is considered the "missing link" in producing hybrid wheat.

To determine family relationships in plants which have no blood, plant protein patterns were distinguished with tests using the circulatory systems of laboratory animals.

The vital fruiting hormone, florigen, was found to be a steroid in the same chemical class at sex hormones in animals.