

## METALLOGRAPHY

**Pictures of Metals Rival Abstract Art**

➤ **ABSTRACT ART** will be advanced by microscopic looks at the interior of metals, called metallographs, shown at the National Metal Congress in New York.

Metallographs are photographs of the minute structure of materials as revealed by the microscope. Through electron microscopy, metallographs can be made of structures magnified upwards of 25,000 times their original sizes. Though metallography primarily is used to explain why metals behave as they do under various circumstances and different combinations, the end result often rivals the creation of painters like Jackson Pollack and William de Kooning.

Recognizing the artistic creation as well as the scientific purpose of such photographs the American Society for Metals staged its 16th annual exhibit in competition for the benefit of the 300 metallographers.

The prize-winning creations are being sent on tour to various communities throughout the United States and Canada. The American Society for Metals, mobile metallographic training laboratory for aspiring metallographers started its travels from Metals Park, Ohio.

At first glance, the photographs in both color and black and white seem to be a myriad of meaningless shapes and designs. Closer inspection may reveal a city skyline in black, greys and whites, which actually turns out to be a study of surface evaporation on a columbium-titanium alloy section magnified 2,500 times. A color kaleidoscope becomes a microscopic study of magnesium platinum cyanide magnified 130 times.

This year's grand prize winner is a black and white photograph of aluminum alloy silicone substrate under electron beam bombardment.

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## GENERAL SCIENCE

**Foreign Scientist Impact On U.S. Science Noted**

➤ **ALBERT EINSTEIN**, Enrico Fermi, Georg von Bekesy. . . .

All these great names have at least one thing in common. They are among the many foreign-born scientists and engineers who have played a large role in the United States' present lofty position in the world of science and technology.

The National Science Foundation, in a special study entitled Scientific Manpower From Abroad, found that:

Fifteen of the 40 U.S. Nobel Prize winners in physics and chemistry were foreign born.

Each year from 1957 to 1961, most scientists and engineers immigrating to the United States came from Canada, followed by the United Kingdom and Germany.

About one out of every six members of the National Academy of Sciences is foreign born and foreign trained.

Between 1949 and 1961, more than 43,000

scientists and engineers were admitted to the United States as immigrants. The study goes back to 1949, when immigration records began including sufficient detail about occupations. Engineers accounted for 75.3 per cent of the total, followed by chemists who accounted for 13 per cent.

"It is particularly interesting that the percentage of immigrant scientists in the United States has tended to increase in proportion to the level of scientific eminence," the report noted.

More than a million professional scientists and engineers are employed in the American economy. This is a conservative estimate.

The report is available from the Superintendent of Documents, U.S. Government Printing Office, for 25¢.

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## SPACE

**Life on Earth Revealed To Stars by Nuclear War**

➤ **INHABITANTS** of other planets may first discover the existence of supposedly intelligent life on earth only while it is destroying itself in an all-out nuclear war. The light from nuclear bombs, which exceeds all other man-made sources of light and is comparable to the sun, might be detected from other planets with a super-large telescope.

This possibility is mentioned by Clay P. Butler of the U. S. Naval Radiological Defense Laboratory, San Francisco, in the journal of the American Association for the Advancement of Science, 138:483, 1962. In an article on the light of the atom bomb, Mr. Butler said that the reasoning behind this suggestion is that the flash of the bomb burst "could not be explained on the basis of a falling meteorite or any other common geological phenomenon and hence would indicate the existence of intelligent life in the solar system."

The flash of a single 10-megaton bomb, viewed from a distance approximating that of the nearest star, would not, he believes, be visible with the 200-inch telescope at Palomar.

"It does not seem reasonable that such a faint pulse of light could be found above the background of the sun," he said.

However, it is possible that a simultaneous burst of many 50-megaton nuclear bombs could be viewed from another star. According to information in *The Effects of Nuclear Weapons* published April 1962 by the Department of the Army, nuclear tests of less than 100 kilotons made at low altitudes at the Nevada Test Site in the early hours of dawn were visible beyond 400 miles.

High altitude bursts in the megaton range have been seen from as far as 700 miles away. The brightness of the fireball that results depends on the surface temperature which does not vary greatly with total energy yield. It would, therefore, probably take many nuclear bursts. Because of the contaminating fallout that would result, it is unlikely that such simultaneous explosions would occur short of a nuclear war.

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**IN SCIENCE**

## SPACE

**Radar Exploration Of Venus Reported**

➤ **A NEW EXPERIMENT** to explore Venus by radar was reported by scientists at the National Aeronautics and Space Administration's Jet Propulsion Laboratory, Pasadena, Calif.

The experiment is the second of its kind conducted by JPL in support of NASA's planetary program and is designed to learn more about Venus by bouncing radio signals off the planet and analyzing the echoes. The experiment began Oct. 1, and will continue for approximately three months.

The scientific information gathered by radar will be compared with that obtained by Mariner II, launched Aug. 27, when it passes Venus for a fly-by exploration at a distance of 20,000 miles on Dec. 14.

These experiments are being conducted at this time because of the close proximity of the earth and Venus. Venus and earth approach each other once every 19 months, coming within 26 million miles.

Preliminary data from this year's experiment seem to confirm results of the 1961 Venus radar bounce experiment.

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## MEDICINE

**Heart Valves Replaced; Patients Live in Health**

➤ **CONTINUED SUCCESS** in difficult heart valve replacement was reported to the American Heart Association by three surgical teams. More people are surviving the operation.

Dr. C. Walton Lillehei, a pioneer in valve replacement surgery, reported that the first patient at the University of Minnesota Hospital, Minneapolis, who had an aortic valve replacement in 1958, is still in good health.

Among 100 extremely ill patients operated on at St. Vincent Charity Hospital, Cleveland, during a two-year period beginning in April, 1960, 16 per cent died, but only five per cent of the deaths were caused by failure of the operation itself. Dr. Earle B. Kay, who headed the Cleveland team, presented follow-up studies that show better than 90 per cent improvement in the patients' health. A fabric-type valve fashioned after the normal anatomical aortic valve was used.

A new type of fixation ring made of silicone rubber has been developed for the ball-valve device. This makes it easier to insert and fit at the junction of the aorta and the left ventricle. Ten patients have survived replacement with the modified valve. This device was designed by Dr. Albert Starr and M. Lowell Edwards of the University of Oregon, Portland.

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# E FIELDS

## BIOPHYSICS

### Major Kidney Disease Analyzed by Computer

➤ A MAJOR KIDNEY disease called pyelonephritis is really four different diseases, the powerful IBM computer 7090 has reported through sorting of 800 facts about each of 400 patients.

Dr. Hans S. Zinsser, associate professor of urology, Columbia-Presbyterian Medical Center, New York, told the fourth annual International Business Machines Medical Symposium in Endicott, N. Y., that better understanding of other diseases such as multiple sclerosis might be possible through use of this same computer.

Pyelonephritis is caused by bacterial infection of the kidney and is present in 20 per cent of persons autopsied, although it is estimated that it causes only five per cent of such deaths. Most dogs die of this disease.

"The infection comes and goes and we do not understand why," Dr. Zinsser told SCIENCE SERVICE. "Some patients have pain but others show no sign of pain. The disease has always been too loosely diagnosed, but the variables fed into the computer will help doctors to understand its implications and eventually to work out better treatment."

Dr. Zinsser said the computer had helped patients diagnose their disease themselves by furnishing facts about other cases. This bears out the contention of Rousseau that there are "no diseases, only sick people," the urologist believes.

Aiding with the technical part of the computer study was Dr. Raymond E. Bonner, an IBM engineer. Three medical students who assisted Dr. Zinsser in the study were Arthur Lemlich of Roosevelt Hospital, New York, and Logan Roots and Lawrence Cohen of Harvard University.

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## SPACE

### Military Has Hopes For Expansion in Space

➤ THE MILITARY has hopes of extending its authority in United States space programs beyond the support of peaceful efforts to which it now is limited. Over 95 per cent of the more than 100 space vehicles placed into orbit by the National Aeronautics and Space Administration have been boosted by military rockets.

However, in spite of its great lifting power, military ambitions are confined to "just a few miles in space" rather than the interplanetary scope of NASA, Lt. Gen. James Ferguson, Air Force Deputy Chief of Staff for Research and Technology, told several hundred scientists from colleges, research organizations, government and industry who attended the symposium on

Dynamics of Manned Lifting Planetary Entry in Philadelphia.

These are the few miles from which military space applications can be earth-oriented for defense purposes.

"We (the military) must look downward and around us in space, while the scientists look upward and outward," Gen. Ferguson said.

Two of these "downward" space objectives are more reliable space-based communications and weather satellites because military operations are dependent upon them for success.

Extension of the earth-based warning system into space and defense against ballistic missile attack also are military space objectives.

Orbiting a payload for "space operations of a routine military nature will have to be in a much lower price bracket" than those for scientific research and the rocket should be reusable. The X-20, capable of multi-orbit flight, soon to be boosted into orbit atop a Titan III and which will be flown through reentry like an airplane, is one such military vehicle.

Gen. Ferguson also spoke of the military need for man in space. Man's value in space lies in the inspection role, as equipment operator, and as a superb reporter and communications link.

Dogfights between fighter spacecraft now are ruled out since celestial mechanics limit maneuvers in space. There is, however, need for military studies in space propulsion to advance maneuverability. New studies also should be undertaken to protect U.S. men in space against possibly hostile man-made radiation sources. Indications are that the Administration may be sympathetic to military space ambitions limited to these areas.

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## AGRICULTURE

### Mechanical Apple Harvester Developed

➤ MACHINES may soon replace man in apple harvesting. A new machine for harvesting apples was tried in an orchard this fall in the cooperative project between the New York Agricultural Experiment Station and the Cornell University department of agricultural engineering.

It may be necessary to redesign the tree in order for the harvester to work most economically and efficiently. Now the scientists think it will be necessary to prune the trees in such a way that the fruit will be forced to grow on the outside limbs rather than having so much fruit in the center of the trees.

One of the biggest problems to overcome in mechanical harvesting is bruising to the fruit and extensive tests attempt to keep bruising at a minimum.

Because of increasing labor costs, research is being done to develop machines to harvest agricultural products. The ultimate aim is to reduce the cost to the consumer. In recent years, experimental or prototype models have been built to harvest beans, grapes, tomatoes and cherries.

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## METEOROLOGY

### Propose Stamp Honoring U.S. Weather Network

➤ A POSTAGE STAMP commemorating the first U.S. weather network has been proposed by Secretary of Commerce Luther H. Hodges.

On May 2, 1814, Dr. James Tilton, Surgeon General of the U.S. Army, issued an order instructing hospital surgeons to "keep a diary of weather." This was America's first official notice of weather and the beginning of one of the world's first weather networks.

The network of weather observing stations started by Dr. Tilton's order grew slowly but continued to grow and now numbers over 12,000 stations. This is the earliest governmental weather network still in operation.

Decision on the proposed stamp will be made by the Postmaster General and the Citizens Stamp Advisory Committee in 1963.

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## GENERAL SCIENCE

### New Opportunities For Farm Youth

➤ THE 4-H CLUBS and SCIENCE SERVICE have announced a joint effort to prepare farm youth in various fields of science. This will allow farm youth to join in the science youth program of Science Clubs of America, organized by SCIENCE SERVICE, in which about a million boys and girls throughout the nation already participate.

In a message to State 4-H leaders, the Federal Extension Service of the U.S. Department of Agriculture declares that 4-H Clubs and Science Clubs of America have much in common, both being educational youth development programs conducted primarily through the efforts of adult volunteer local leaders. Both are available to every boy and girl in every community on the basis of choice by the community, the boys and girls, their parents, volunteer leaders and teachers.

SCIENCE SERVICE is recommending that science club sponsors accept completed 4-H projects as evidence of members' science projects in various fields of science. 4-H suggests that projects in such fields as biology, chemistry, physics, safety, health, and other areas that are completed for science clubs or fairs be recognized by 4-H Club leaders.

Through scientific projects, 4-H Club members can prepare for better futures as scientific farmers, agricultural researchers, or as industrial scientists and technicians. Cooperation between 4-H Clubs and Science Clubs of America can help to create a balance out of a farm youth surplus and a scientific and technical manpower shortage.

A joint Bureau of Census-Department of Agriculture study shows that only about a fourth of the farm youth go to college. In a new cooperative program, the 4-H aims at a better future, through science, for all farm youth regardless of whether they remain on the farm or go to the city.

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