

GENERAL SCIENCE

# Science Advances in 1964

Exploding population and the link of cigarette smoking to lung cancer rated top science events. Moon photographs, China's atom bomb, seeing by telephone, among advances.

By WATSON DAVIS

► TWO GREAT DANGERS were brought to the attention of the public during 1964—one of them rampant life upon the earth and the other a cause of cancer deaths.

The population explosion, which adds 120 mouths to feed each minute to the world, was dramatized and recognized as an overwhelming problem. Birth control and family limitation techniques were medically explored and more widely tested.

The U.S. Public Health Service's report on the link between smoking and lung cancer emphasized the dangers of cigarette smoking. But millions, perhaps believing but not stopping, nevertheless pushed upward the sales of cigarettes throughout the world.

In space, the rush toward exploration of parts of the solar system that a few years ago were beyond the realm of the exploration of human travel continues from both U.S.A. and U.S.S.R.

Three Russians orbited the earth in the most ambitious manned space shot so far, and included among these were scientists not primarily trained as astronauts.

The U.S. moon shot, Ranger 7, crashed into our natural satellite, transmitting back to earth extraordinary photographs of the moon's surface that will be helpful when, along about the end of the decade, men will aspire to set foot on that airless, silvery sphere.

## Mars Seen Prime Objective

The greatest objective for space exploration, in the opinion of a scientific board of the National Academy of Sciences, is the planet Mars, toward which exploratory probes are being directed. These are not intended to collide but to pass sufficiently close to the ruddy planet to allow better estimates as to whether there is a chance that a low order of life exists there.

The space program maintains its leadership as the nation's top effort in research and development but atomic energy and developments for defense continue to be major Government endeavors.

The exploration of the oceans—a great unknown space here on earth—during the year was accelerated with new ships and devices being spread over the face of the waters to obtain knowledge which will serve all of mankind.

Red China became the fifth atomic power through its explosion of a fission bomb. This fulfilled predicted expectations. There were renewed predictions that other countries would join the atomic bomb club of nations in the future. U.S. and Soviet Russia

remain the major nuclear powers so far as nuclear bombs and means of delivery are concerned. Each of them has enough destructive power to annihilate the other and virtually ruin civilization.

There was international stock-taking during the year of our atomic knowledge at the third world conference on peaceful uses of atomic energy, with new summaries of the progress of the world toward increasing use of the atom and the multiplication of the peaceful by-products of atomic energy. Progress toward harnessing fusion reaction of the hydrogen and thermonuclear bombs to peaceful power has been disappointing but research continued hopefully.

The first international inspection of a nuclear reactor by the International Atomic Energy Agency to assure that fissionable materials are not being diverted to military use was made. Although the reactor inspected was in the United States, this step in arms limitation through international inspection is rated to be in the same class with the limited nuclear test ban treaty of 1953.

Giant atom smashers, devices for creation of high energy, useful in bombarding atomic



Celanese Corporation of America

**CAN YOU STOP?**—Smoking a cigarette with obvious enjoyment is Waller George, who heads research on cigarette filters for Celanese Corporation of America at Summit, N.J. Many millions continued smoking even after the U.S. Public Health Service report indicting cigarettes as a cancer cause was made public.

hearts, have revealed more of the mysteries of the constitution of the atomic nucleus. More so-called "strange particles" have been identified, the latest of them called omega minus, whose discovery confirmed a theory that has brought some order into the chaotic world of nuclear particles. There are now more than 30 of these so-called fundamental entities contrasted with three or four when the era of atomic energy began. The prediction is that new sources of energy or unimagined benefits of practical use may come from these stirrings of matter's innermost realms.

The desalination program for obtaining fresh drinkable water from the sea or brackish sources was given impetus by Government support for research and construction of experimental plants. Dual atomic power plants were projected with atomic heat used for both power production and water evaporation for salt removal.

## Wood-Plastic Composition

A new kind of material which is part plastic and part wood was developed by impregnating the wood with a liquid monomer plastic and exposing it to gamma radiation either from reactor by-products or accelerators. This is expected to be one of the most useful atomic energy "spinoffs."

The era of seeing people over the telephone began with the commercial operation of the picturephone service between a few large cities.

Two great traffic links over waterways—the Chesapeake Bay Bridge-Tunnel spanning the mouth of the Chesapeake Bay and the Verrazano-Narrows Bridge linking New York and Staten Island—were opened to traffic.

The first steps were taken in the creation of supersonic transport planes, which within the next decade promise to contract again the time to span oceans and continents.

The giant earthquake that shook Alaska on Good Friday elevated the crust of the earth as much as 50 feet.

A new theory of the earth's crust that continental land masses have "roots" extending deep into the earth's and that the earth's composition under the seas is not the same as under the continents called in question the Mohole deep-drilling project.

From a weather standpoint a severe drought occurred in most areas of the United States east of the Rockies.

Medicine made new gains in both knowledge and development of promising treatments. Drugs of various sorts were reported promising to treat influenza, trichinosis, Hodgkin's disease, migraine headaches, osteoporosis, and one of the most severe and complex children's diseases—Cooley's anemia—among others. A vaccine for hepatitis was reported in an early stage of development. Severed arms were replanted in two cases. Self-allergy was blamed for the muscle weakness disease, myasthenia gravis. A one-minute test for diabetes was developed.

Troublesome adhesions were prevented by use of electrically charged gold leaves. Wisdom teeth were transplanted to replace first molars. The use of an antibiotic in the feed of pet birds reduced the danger of psittacosis.

There were epidemics of measles, encephalitis and meningitis in the United States, but thanks to immunizations, some of the old plagues, like polio, were reduced to almost insignificant proportions.

### Communication by Vibration

Psychologists continued to discover new facts. One research problem concerns the attempt to communicate language through the skin by vibrations, which met with some success.

The ability of some persons to differentiate colors through their fingers received further substantiation.

A Japanese scientist catalogued the noises used by monkeys to communicate among themselves in the hope that these studies will aid exploration of the origin and growth of language.

In the universe far beyond the solar system, it was suggested that gravity reactions are the fuel for strange objects called quasars, which are puzzling sources of light and radio waves. Combined oxygen and hydrogen atoms, hydroxyl molecules, were found near the center of the Milky Way.

Twenty observatories around the world were named as recipients of a new image tube that photographs stars electronically and makes any existing telescope the equal of triple its size. A National Academy of Sciences report called for doubling the country's ground-based astronomical facilities in the next decade.

Man's delving into his past revealed new archaeological treasures ranging from what may be the oldest habitation of man in Europe, a camp of rhinoceros hunters in Greece dating from 40,000 to 50,000 years ago, to a large burial tomb of the 7th century B.C., uncovered near Sadis in Turkey.

Civilization's first pins were found in a Tigris River excavation.

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### OCEANOGRAPHY

## Antarctic Seals Studied In Chamber Under Ice

➤ A BOX suspended in the frigid Antarctic Ocean beneath five feet of solid ice has been used by U.S. scientists to study the sounds seals make when they "talk" to each other.

The noises seals make sound like whistles, buzzes, beeps and chirps, biologists from Woods Hole Oceanographic Institution, Massachusetts, and the New York Zoological Society reported.

The observers listened to sounds piped in from hydrophones outside the steel box, which was six feet high and four feet wide. Range of the hydrophones was more than five miles, and visibility through the water was more than 200 feet.

The recorded sounds are now being analyzed. The animals responsible for the noises were Weddell seals, which are 11 feet long and weigh 1,300 pounds when adult.

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### GENERAL SCIENCE

## Ten Top Science Advances Chosen by Science Service

➤ THE TEN TOP science, medicine and technology advances in 1964 as selected by Dr. Watson Davis, director of Science Service, are:

1. Close-up photographs of the moon taken by the U.S. Ranger 7.
2. Three cosmonauts orbited earth in Russian "Sunrise" satellite.
3. Report incriminating cigarettes as cause of lung cancer and other diseases.
4. Growing awareness of dangers of population explosion, spread of birth control and lessening of Catholic condemnation.
5. Discovery of brightest, most violent and heaviest sources of light and radio waves, very distant quasi-stellar sources (quasars), possibly fueled by collapse of gravity waves.
6. Explosion of atom bomb by Red China.
7. Discovery of omega minus meson, heaviest inhabitant of atomic nucleus.
8. Prevention of adhesions in surgery by use of electrically charged gold leaves.
9. Discovery of brown matter on air bubbles in ocean as vast source of marine food.
10. New kind of material produced by impregnating wood with plastic and hardened by gamma radiation.

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### PUBLIC HEALTH

## U.S. People Healthier This Year Than Last

➤ AMERICAN PEOPLE were healthier during the 12 months ending in June 1964 than in the year before, figures from the U.S. Public Health Service's Health Interview Survey indicate.

The estimated 387 million acute illnesses and injuries requiring either medical attention or restriction of daily activities from July 1963 through June 1964 showed a reduction of 13.4 million from the preceding year.

A substantial decline in influenza and the common cold occurred during the year, Charles S. Wilder, division of health interview statistics, said. A rise in the number of injuries and common childhood diseases tended to cancel out a large part of the decline, however.

Measles and rubella, the German measles disease, accounted for much of the increase in childhood diseases.

The rate of injury in automobile crashes and other types of moving vehicle accidents was the same as that during the previous period, but injuries at work, in the home and in "other" events increased.

More than half the number of persons interviewed had seen a physician within six months of the time of the interview, and only 1.3% had never made a visit to a doctor.

The Health Interview Survey is done in cooperation with the U.S. Bureau of the Census to sample civilian noninstitutional population of the United States. Interviews are conducted every week.

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# Questions

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**ARCHAEOLOGY**—What did a discovery in Israel reveal about smelting processes used 30 centuries ago? p. 389.

**BEHAVIORAL SCIENCES**—What new information has been found regarding "paradoxical" sleep? p. 390.

**BIOTECHNOLOGY**—What material is used for making a new artificial bone? p. 396.

**ENGINEERING AND TECHNOLOGY**—How will photochromics help astronauts? p. 392.

**GENERAL SCIENCE**—Up to how many feet was the earth's crust elevated by the Alaskan earthquake? p. 387.

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