

## CHEMISTRY

**Formaldehyde Treats Radioactive Wastes**

➤ **FORMALDEHYDE**, an embalming fluid and an ingredient in explosives, is now being used successfully for treating radioactive wastes in nuclear fission operations.

R. C. Forsman and G. C. Oberg of the General Electric research and engineering department, Richland, Wash., reported the new use of formaldehyde at a meeting of the American Institute of Chemical Engineers in Las Vegas. They termed the new process safe and economical.

The process reduces chemical costs of waste treatment and storage and increases the storage capacity of underground tanks, since it removes salts in the wastes. The process also increases the flexibility of waste treatment equipment and improves the quality of feed for fission product recovery, it was reported.

• Science News Letter, 86:216 Oct. 3, 1964

## MILITARY SCIENCE

**Radar Warning System Can 'See' Over Horizon**

➤ **THE UNITED STATES'** new radar system, able to "see" aircraft and rockets over the horizon, could be a version of the "Sky Scanner" which the Air Force has been developing for years.

President Johnson, revealing the new system in a speech in Sacramento, Calif., said it would provide warning of any hostile missiles "within seconds after they are launched."

The Sky Scanner is a device that would send up radar beams which bounce off gas particles in the atmosphere, hit an object and then travel the same route back. Such a system is believed to require ten or more times as much power as a conventional line-of-sight radar.

It is very similar to the already-existing SouPac scatter system in use by the Army in the Pacific for communications in stages from Hawaii to Midway to Guam to the Philippines to Okinawa.

Until now, radar has not been able to "see" over the horizon, because no electromagnetic radiation, including radio waves and light, can bend. The waves must follow a straight line from the sending station to the object and back to the sending station.

The reason it requires so much more power to bounce a radar beam off of the ionosphere is that the particles in the atmosphere reflect the radar beam in all directions, preventing all but a small percentage of the beam from reaching the target.

One way to transmit light and infrared signals beyond the horizon at night is to scatter them off tiny, aerosol-like particles always present in the earth's atmosphere. Infrared is superior to visible light for such transmissions because it is not scattered as much as the atmospheric particles.

Studies have shown that detectable signals can be received at distances of more than 200 miles by this forward scatter method, even when the transmitter and receiver are at sea level.

However, sending light, infrared beams, radio waves or any other form of electromagnetic radiation from the ground to be reflected from earth's atmosphere back to the ground involves a heavy loss in power and intensity of the signal.

An equal loss occurs when this signal is reflected back to the atmosphere, and a further loss—equal to that resulting from the first reflection by earth's atmosphere—would occur when the returning signal is again reflected to earth.

A satellite in the proper position at the right time would considerably reduce the power requirements. It could pick up faint signals and give them a boost before sending them on.

• Science News Letter, 86:216 Oct. 3, 1964

## PUBLIC SAFETY

**Rubber Guard Posts Give Motorists Big Bounce**

➤ **A POTENTIALLY** serious accident can be turned into merely a big bounce when a driver runs into a new highway guard post made of rubber.

The highway posts are hollow rubber cylinders, seven inches in diameter. Their height after installation is three feet but posts can be built to fit any specific safety requirements.

A steel pipe that extends only three inches above ground level anchors each post in cement.

When struck, the posts react like stretched rubber bands, their resistance increasing as they are bent.

The rubber posts were installed in Cuyahoga Falls, Ohio, first on a trial basis and now permanently. They have proven effective in eliminating traffic hazards that had injured motorists and damaged their cars for years.

A driver has less chance of injury when bouncing off a rubber guard than if he were to crash into a conventional guard made of steel, concrete or wood.

Goodyear Tire and Rubber Company's industrial products division, Akron, Ohio, developed the rubber posts, which are patterned after rubber dock fenders that help protect ships and piers from damage.

• Science News Letter, 86:216 Oct. 3, 1964

## ENGINEERING

**Reservoirs Flood-Readied With Drawdown Process**

➤ **ENGINEERS** are already preparing for expected winter and spring floods, even though much of the nation is now suffering from a lack of water.

The annual autumn drawdown of Tennessee River mainstream reservoirs is now under way, the Tennessee Valley Authority reported.

Drawdown is a process of lowering the water level in the reservoirs to provide storage space for the January-April flood season.

The drawn-out water is used to increase stream flows for navigation and for power production.

• Science News Letter, 86:216 Oct. 3, 1964

**IN SCIEN**

## ENGINEERING

**Cheap Process Tested For Desalting Water**

➤ **A THOUSAND GALLONS** of salt water could be made fresh for less than a dime by a natural freezing process being tested.

If fresh water can be produced at that figure, it could provide an economical supply for irrigation and small town needs, reported Prof. D. L. Stinson of Wyoming University at a meeting of the American Institute of Chemical Engineers in Las Vegas.

Prof. Stinson's process, tested in field trials, uses low temperature air to freeze a part of the salty water as it is sprayed through the air. The resulting ice is accumulated on the ground or a large prepared outside surface.

By using cold air from the environment the major expense of most freezing processes is eliminated, Prof. Stinson reported. Because of the high cost of refrigeration and difficulties in separating ice from the brine, most freezing processes have kept the probable cost of drinkable water about 50 cents per 1,000 gallons, he said.

The new process has an annual cycle—freezing during the winter and collecting the produced water as the ice melts during the spring and summer.

• Science News Letter, 86:216 Oct. 3, 1964

## BIOTECHNOLOGY

**Intestinal Examinations Made by Flexible Tube**

➤ **A FLEXIBLE TUBE** for use in examining the intestines and other body parts formerly accessible only by surgery is being tried out at the Hadassah-University Hospital in Jerusalem. A small camera, a medication dispenser and a device for the removal of foreign bodies may be added to the tube.

The new medical instrument consists principally of a round gun-like holder for the tube, along with a water pump for extending the tube, and a heater that adjusts the water temperature to body heat.

The method of insertion may be compared to turning a stocking inside out and steadily pushing through from the inside until the tip comes out. The system of internal folding leaves the outside stationary, preventing friction and injury during penetration and recovery.

The flexible tube is easily adaptable to the narrow, twisting passages of the intestines. Also, markings on the length of the tube may permit location of bleeding.

The new instrument has been developed by scientists of the National Council for Research and Development, attached to the Israel Prime Minister's office.

• Science News Letter, 86:216 Oct. 3, 1964

# CE FIELDS

## AERONAUTICS

### XB70 Bomber Makes Costly Research Plane

► THE U.S. AIR FORCE XB70, the missile with wings that made a shaky maiden flight Sept. 21, has been turned into a "research" plane.

In the past seven years taxpayers have paid \$1.5 billion to have it built as a bomber.

The plane, which has met many technical and financial problems during the past few years, has now been assigned the sole job of gathering data on supersonic flights. The XB70 is considered the forerunner of supersonic airliners which will zoom across the country in 90 minutes. It is designed to reach speeds of more than 2,000 miles per hour. Weighing 275 tons, it is the heaviest plane ever to get off the ground.

The XB70 will be useful in finding out what happens when such a large craft flies at three times the speed of sound, an Air Force official said.

On its first flight, however, the XB70 was held to a maximum speed of only 375 miles per hour, with an altitude of 16,000 feet.

New technology in the building of the XB70 has already resulted in more than 1,000 patent applications. Only one more plane is to be built under present plans.

The life of the XB70 has been controversial. Although Congress has repeatedly provided enough funds, the Defense Department has clung to the belief that a supersonic bomber force would be a luxury rather than a necessity. The Defense Department has held that a force of long-range ballistic missiles would provide adequate striking power.

The first test of the XB70 was not a total success since mechanical failure caused the plane to fly with its landing gear down during the entire flight and a tire blew out on landing.

Designed to fly with a range of 6,000 miles and at an altitude of 70,000 feet, the XB70 was built by North American Aviation, Inc.

• Science News Letter, 86:217 Oct. 3, 1964

## FORESTRY

### Radioactive Forest Study To Help Improve Trees

► A RADIOACTIVE forest nursery is being created near Rhineland, Wis., in the hope of developing changes in characteristics that will be valuable in breeding stronger and better trees.

Trees, both native and from other areas, will be planted and studied to determine their development after exposure to various degrees of radiation.

The trees will be grown on an isolated 40-acre research site enclosed by a high fence. A six and one-half acre section of the

site will contain a radiation source used to give the trees controlled doses of radiation. This section will be surrounded by an earth wall.

Whole plants, seed and pollen will be treated in the study, which is on a \$34,000 grant from the Atomic Energy Commission to the U.S. Forest Service.

Research will be directed by Thomas D. Rudolph, plant geneticist, Northern Institute of Forest Genetics, Rhineland.

• Science News Letter, 86:217 Oct. 3, 1964

## BIOTECHNOLOGY

### Ultrasound Used to Save Eye of 8-Year-Old Boy

► AN EIGHT-YEAR-OLD BOY who had a brass chip from an exploding rifle bullet removed from his eye in Washington, D.C. with the help of ultrasound, a high-frequency sound wave treatment, now has a fighting chance to keep the sight of the eye.

It will take several months of observation, however, before it is certain that he will not lose the eye.

The boy, James Cassaday, son of Air Force Col. and Mrs. Benjamin B. Cassaday Jr., Falls Church, Va., was tinkering with a 22-caliber short cartridge when it exploded.

Before the quarter-inch long chip could be taken out, it was necessary to remove a damaged lens from the boy's eye, and prepare the back of the eye for the operation. The actual removal of the chip required only 20 seconds.

Ultrasound, a technique like sonar, which is used to detect submarines, already has become a valuable tool in diagnosing eye diseases such as glaucoma. This is the first time it has been used to help extract an object from the eye of a live person, however.

The ultrasound apparatus used on the boy was supplied by Smith Kline Instrument Company of Philadelphia, a subsidiary of Smith Kline & French Laboratories. It had previously been confined to extracting objects from the eyes of animals and from eyebank eyes, removed after death.

The brass chip in the boy's eye was not magnetic and would not respond to the usual methods of removal, so the operation was arranged by Col. Jack W. Passmore, chief of the ophthalmological service at Walter Reed General Hospital of the Army Medical Center in Washington.

Dr. Nathaniel R. Bronson, ophthalmologist of the Manhattan Eye and Ear Hospital, New York, who developed the use of ultrasound for eye work five years ago in conjunction with the instrument company, performed the operation.

A small transducer was used to locate the chip by means of sonar, which bounces sound off an object, after which location of the chip was plotted on an oscilloscope next to the boy's head.

Dr. Bronson guided the optical extractor with a tiny transducer built into it, to the object in the boy's eye. Both the chip and the extractor were visible on the oscilloscope, which is similar to a TV picture tube.

• Science News Letter, 86:217 Oct. 3, 1964

## ENGINEERING

### Engineering Grads Find High-Paying Jobs Easily

► NINETY-EIGHT PERCENT of the engineers who graduated from college last June have found jobs by now, most of them earning salaries between \$610 and \$625 a month, a survey shows.

Earlier this year it was predicted that engineering graduates would have a tough time finding jobs after cancellations and cutbacks in Government contracts caused hundreds of layoffs by aerospace and electronic firms. Aerospace, nevertheless, has provided more jobs for last June's engineering graduates than any other field of business or industry, and electronics remains a major market, the survey indicated.

On the Pacific Coast, where cutbacks were greatest, there were fewer jobs to choose from at some schools. Yet all eight of the major engineering colleges and technical schools covered in that region reported placement of 95% to 100% of the graduates.

The few grads still unplaced are mostly foreign students who have a limited market in the United States because they are ineligible to work on Government contracts.

Although in many schools there was an actual decline reported in the number of jobs offered engineering grads, the declines merely cut down somewhat the large excess of jobs that has prevailed.

Engineering grads got the highest salary offers. Physical scientists—mathematicians, physicists and chemists—were a close second, at about \$600 a month.

The survey was conducted by Northwestern National Life Insurance Company, Minneapolis, Minn.

• Science News Letter, 86:217 Oct. 3, 1964

## SPACE TECHNOLOGY

### Spacecraft Antenna Unfolds After Launching

#### See Front Cover

► A RADIO ANTENNA for interplanetary spacecraft has been developed that will unfold from a 3.5-foot package into a 9-foot fan after it is launched.

Eight miles of wire as fine as human hair is woven into lace-like mesh and attached to a framework of paper-thin metal ribs, as shown by the research model on this week's front cover.

As the ribs unfold around a circular hub, the wire mesh is stretched to form a reflective surface for radio signals. The antenna could send signals to earth from a vehicle millions of miles away.

The use of expandable antennas will increase reflectivity to nine times the amount obtainable with rigid antennas currently used for limited-size communications packages of interplanetary spacecraft.

Goodyear Aerospace Corporation, Akron, developed the antenna for California Institute of Technology's Jet Propulsion Laboratory, Pasadena, which sent Ranger 7 to the moon for the closest, clearest pictures ever taken of the lunar surface.

• Science News Letter, 86:217 Oct. 3, 1964