

PHYSICS

Twin Masers Keep Atomic Clocks Accurate

► THE MASTER CLOCK in the U.S. Naval Observatory has two atomic "watch-dogs" to keep it accurate to within one second every 300,000 years.

Twin atomic hydrogen masers are used to provide super-accurate intervals of time to continuously reset the clocks. Their preciseness comes from the fact that a hydrogen atom's transition period (the length of time required for an electron to change from one energy level to another) is almost constant.

The masers, installed at the Naval Research Laboratory (NRL), deviate from each other by only a few parts in 10 million.

In addition to providing time signals, the masers will be used to synchronize U.S. Navy very low frequency (VLF) radio transmissions so that they are all at exactly the same frequency. The Coast Guard will do the same things with its Loran C navigation equipment.

Careful measurements by NRL, combined with observations by the observatory, pinpointed the frequency of the hydrogen atom's transition at an incredibly exact 1,420,405,751,694 cycles per second.

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PUBLIC HEALTH

Pesticide Users Advised Of Poisoning Dangers

► PESTICIDES, becoming ever more powerful, represent an increasing hazard to careless users.

A Texas physician, Dr. George L. Gallaher, who practices in Harlingen in the lower Rio Grande Valley, writes in *Texas Medicine*, April 1965, that pesticide workers should be particularly careful with the compounds parathion and methyl parathion.

These organic phosphorus compounds are similar to nerve gases developed by German chemists during World War II. Their danger lies in their inhibition of the enzyme cholinesterase, which is essential to life.

Parathion is easily absorbed through the skin and delicate membrane that covers the eyeball, by breathing the fumes or eating or drinking material that has been contaminated.

A person may be poisoned during several days of exposure without knowing it, Dr. Gallaher says, but the only fatal and near-fatal cases reported have been due to massive exposure and gross carelessness. The victims did not believe what they had read on the label.

Dr. Gallaher has seen many cases of chemical pesticide poisoning among duster pilots, loaders and farm workers in the cotton-growing district where he lives.

The first symptom is often nausea, followed by vomiting, abdominal cramps, diarrhea and excessive salivation. With more exposure to the poison there may be headache, giddiness, dizziness and weakness, followed by a runny nose and a sensation

of tightness in the chest if the pesticide has been inhaled.

Sometimes there is blurring and dim vision or pain in the eyes. There may be muscle coordination loss, slurring of speech, twitching of muscles and general profound weakness. Mental confusion, drowsiness, difficulty in breathing, convulsions, coma and death describe the sequence of fatal poisoning.

If parathion or methyl parathion poisoning is suspected and no physician is available, as may be the case in rural areas, Dr. Gallaher suggests these first aid measures: remove the clothing and thoroughly wash the body and hair with soap and water; rinse thoroughly and repeat. After this, wash repeatedly with alcohol. It may be necessary to give artificial respiration.

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GENERAL SCIENCE

Government Hires More Scientists Than Clerks

► THE FEDERAL GOVERNMENT employs more physical scientists than general clerks, and more engineers than typists.

So states John W. Macy Jr., chairman of the U.S. Civil Service Commission, in an analysis of science and the Federal establishment.

Ten years ago there were 56,700 Federal employees in the physical and biological sciences. Now there are 71,000. In 1955, there were 60,500 Federal engineers. Now there are 188,000.

Why the increase? Mr. Macy, reporting in *Science*, 148:51, 1965, attributed it to challenging missions, creative atmosphere, freedom from trivia, good equipment, opportunity for service to the nation and high salaries plus fringe benefits.

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MILITARY SCIENCE

Navy Ship 'Blasted' In Explosion Test

See Front Cover

► THE EXPLOSION of 500 tons of TNT rocked a Navy test ship floating nearby recently to simulate some of the damaging effects of a nuclear blast.

The explosion was the second in a three part series of tests called Operation Sailor Hat. The tests are designed to simulate the air blast pressure wave that would result from a nuclear explosion.

The light cruiser USS Atlanta, especially instrumented for its part in the tests, was anchored less than half a mile from the explosion in the first test. It is seen on this week's front cover, dwarfed by the massive mushroom-shaped cloud. In the second test (April 15) the Atlanta was moved closer to the explosion site.

Data received from the test instruments is expected to show the effect of the air blast on the superstructure and associated electronics and weapons systems aboard the ship. Researchers from the URS Corporation, Burlingame, Calif., assisted the Navy in the tests made in the Pacific Ocean.

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ARCHAEOLOGY

Complex Ancient Society Puzzles Archaeologists

► PEELING BACK layers of plaster, walls of masonry and flights of stairs from a man-made mountain of ancient cities, archaeologists are finding hints of how people lived prior to the gifted civilization of the Maya Indians a thousand years ago.

The magnificent centers of Maya ceremony, government, artisanship and life were at their peak during the centuries of 200 to 900 A.D., when the empire mysteriously decayed and failed, stated Dr. William R. Coe, University of Pennsylvania and director of the Tikal Project of the University Museum.

Scientists trying to find the roots of such a highly developed culture have uncovered the huge center of Tikal, which was once physically the greatest of the thriving Maya lowland cities, Dr. Coe reported in *Science*, 147:1401, 1965.

By analyzing pottery, jade, log-roofed tombs and large ceremonial adobe constructions of pre-Maya Indians, scientists conclude that in the first century B.C. a theoretically dominated peasantry formed the labor pool necessary for building great religious edifices and ceremonial palaces. By this time a surplus-producing economy had been built up which could sustain craft specialists, traders and an elite society, Dr. Coe explained. There was a high degree of reciprocity between peasant and priest. The priest provided total control through family prestige, magic and religious assurance, and the farmer sustained the pyramidal social structure by his labor and field crops.

With a constant quest for construction and a "seemingly interminable need to build and revamp," said Dr. Coe, the people tore down older structures, reused them or covered them up, leaving little original material for modern archaeologists to inspect in unraveling Maya and pre-Maya mysteries.

• Science News Letter, 87:280 May 1, 1965

TECHNOLOGY

Superconducting Coil Reaches 132,000 Gauss

► A NEW SUPERCONDUCTING magnet, wound from 3,500 feet of wire, has super pulling power.

The coil, which is six inches long and four inches in outside diameter, recently reached magnetic fields of 132,000 gauss. Gauss is the unit used for measuring a coil's magnetism or pulling power.

Developed by researchers at the General Electric Research Laboratory, Schenectady, N.Y., the superconducting coil operates at a temperature of minus 452 degrees Fahrenheit.

• Science News Letter, 87:280 May 1, 1965

CE FIELDS

MILITARY SCIENCE

Army Shows Interest In Solar-Powered Boat

► A BOAT that runs by the sun may one day be used by the military to sneak silently into enemy waters.

The craft, powered by solar cells which convert the sun's energy into electricity, recently received a boost from the U.S. Army in a report that after considerable testing "the use of solar cells for propulsion of lightweight watercraft is feasible."

The boat, which is only slightly larger than a regular row boat, "may have potential military application where it is necessary to operate quietly and without using conventional fuel," the report stated.

John Hoke, Atlantic Research Corporation, Alexandria, Va., built the twin-motored craft some three years ago for the Agency for International Development (AID). He believes that it may find particular use in underdeveloped areas where fuel and power are at a premium.

The novel craft was reported in *Science*, 147:1559, 1965.

• *Science News Letter*, 87:281 May 1, 1965

PUBLIC SAFETY

AMA Warns Divers Of Gas, Pressure Dangers

► "SURFERS' KNOTS," the knobby lumps that form on the legs and feet of surfboard riders are the newest status symbol of water sports, reported Dr. Sheldon Swift of the department of dermatology, Southern California Permanente Medical Group, Kaiser-Permanente Medical Center, Panorama City, Calif., in the *Journal of the American Medical Association*, 192:146, 1965.

Although the knots are apparently harmless, surfers do experience occasional discomfort.

There are two types of these knobby lumps, each formed by friction between surfboard and skin.

The knot that forms just below the knee is a hard lump which is essentially a giant callus. A more bothersome type appears on the upper surface of the foot. This is a softer cystic swelling which varies in size, and often grows rapidly after a day in the surf. It may rupture and discharge a white fluid.

Dr. Swift said that the lesions are regarded as "nuisances which subside to a great extent when the surfing seasons ends."

On the more dangerous side of sporting activity, three physicians caution that only well-prepared divers should venture beneath the water's surface.

Since 1959 there have been 21 scuba-diving deaths in Michigan, reported Dr. Myron K. Denney of the department of surgery of Wayne State University College

of Medicine and Dr. Raymond C. Read of the department of surgery, Detroit Receiving Hospital.

Fifteen of these Michigan victims were inexperienced divers. For some, death came on their first diving attempt. Eighteen of the deaths occurred in water 25 feet deep or less.

Dr. John B. Weeth of the division of research, Alton Ochsner Medical Foundation and the department of medicine, Ochsner Clinic, New Orleans, La., reports that there are five general types of underwater accidents associated with gas or pressure phenomena—suction and blast injuries, gas-expansion injuries, decompression sickness, gas-poisoning residuals and emotional reactions such as panic.

Drowning is still the major cause of deaths from underwater accidents, Dr. Weeth said.

In 9 of 15 reported deaths in Massachusetts the victims perished on the surface after their face mask either had filled with water or was lost. In Florida, 14 of 24 deaths could have been prevented by safety lines used correctly.

• *Science News Letter*, 87:281 May 1, 1965

BIOCHEMISTRY

Indian Birth Control Plant Holds Clues to Glands

► STUDY of a mysterious plant substance used as a birth control method for many years by Indians of the western United States is on the verge of solving basic chemical mysteries.

Two Indiana University professors have discovered clues to the mechanism of the entire hormone-producing endocrine gland system. Although their research with the plant substance could lead to a better oral contraceptive, they emphasize that the most important aspect of their work is the light it is throwing on fundamental body processes.

Shoshone Indian squaws in Nevada have been known to use a water extract of plant *Lithospermum ruderale* to suppress ovulation. The plant is popularly called gray millet, stone seed or gromwell. It has a relative called *Lithospermum arvense* that is found in dry spots of Indiana and other Midwestern states.

Just how the potent liquid material inhibits hormones involved in the controlling mechanisms of the body is the subject of the Indiana research, which has been made possible by grants from the U.S. Public Health Service.

Dr. William Breneman, an endocrinologist and professor of zoology, tested chickens and mice with water extracts of substances from the *Lithospermum ruderale* plant and found that the liquid really has powerful inhibitory effects on such hormones as oxytocin, which controls contractions of the womb and suppresses blood pressure.

Dr. Marvin Carmack, professor of chemistry, found that the substance is one of a group of unstable compounds known as polyphenols.

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EDUCATION

Professors' Salaries Still Near Bottom of Scale

► COLLEGE PROFESSORS are still near the bottom of the salary scale when compared with other top professionals.

In every age group until 65, physicians, lawyers, engineers, social scientists and osteopaths top academics in salary.

Only after 65 do university and college teachers' salaries show some "relative improvement," the American Association of University Professors reported at its 50th anniversary meeting in Washington. But even then, the gains are modest, the report pointed out.

Despite the efforts taken to improve academic salaries, a survey of 36 public institutions revealed that if incomes in each profession increase as they did during the last decade, "by 1969 it would take an additional 74% increase for academic incomes to equal the top five professional occupations."

Although salaries for all teaching ranks increased on the average of 6% during 1964-65, the increase fell below the target of 7.2% needed to double academic salaries over the decade.

The report stated that the rate of increase in academic earnings during the 1960s is unlikely to exceed the rate of growth for academic incomes during the 1950s.

During the past year, public and church-related institutions showed marked improvement in increasing faculty salaries.

However, this improvement alone does not mean that public institutions are at last catching up with their private counterparts.

On the contrary, "compensations in public institutions are still rising more slowly than those of other higher educational establishments," the report pointed out.

While professors teaching at public universities during 1964-65 received salary increases averaging \$1,550, those teaching at private secular and church-related institutions received increases averaging \$1,900 and \$1,700, respectively.

• *Science News Letter*, 87:281 May 1, 1965

TECHNOLOGY

Ceiling Heating System Applied Like Wallpaper

► FAMILIES can now help keep their homes warm with a special plug-in "ceiling" that can be rolled on like wallpaper.

The ceiling is a new electric heating system that emits waves of radiant energy, which is converted to heat when it contacts objects in the room in much the same way as the sun's rays warm objects.

Called Sun-Glo, the system is a flexible "sandwich" consisting of two outer layers of thin vinyl and a filling of nylon net interwoven with thread-thin resistance wiring. It is installed in panels which are unrolled onto the ceiling and bonded with a special paste.

The Sun-Glo, which operates on 240 volts with a heat output of about 17 watts per square foot, was developed by the Goodyear Tire and Rubber Company, Akron, Ohio.

• *Science News Letter*, 87:281 May 1, 1965