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SCIENCE NEWS LETTER

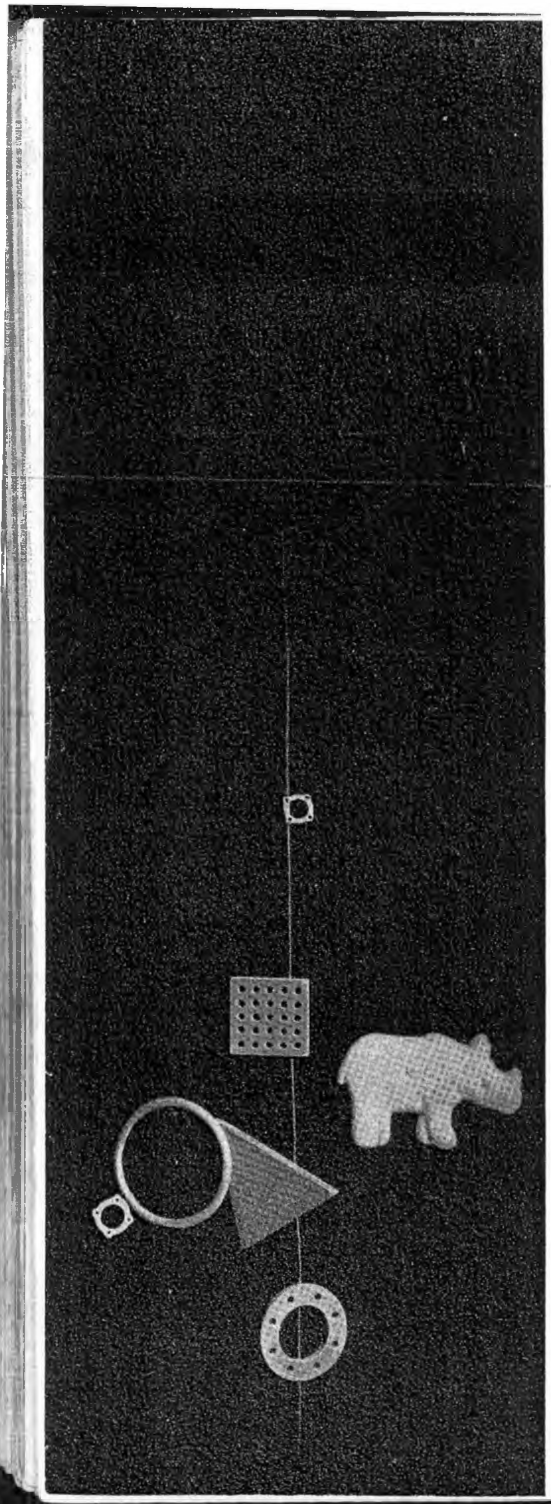
THE WEEKLY SUMMARY OF CURRENT SCIENCE

General Electric Research Laboratory

Filtered Fresh Air

See Page 293

A SCIENCE SERVICE PUBLICATION



One of a series briefly describing GM's research in depth

SQUARE LOOP FERRITES NOW IN ODDBALL SHAPES

Ceramic ferrites are versatile magnetic oxides usually made by the press forming of powdered ingredients. Here at the Laboratories, a recent spill-over from our fundamental research in ferrites has resulted in a new fabrication technique. It makes ferrites of virtually any type or shape practicable: permanent magnetic ferrites, high frequency core materials, computer elements with square hysteresis loops.

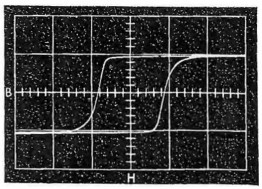
The new "cookie cutter" process begins with ferrite powder mixed with a plastic binder on a rubber mill. This forms a flexible sheet of almost any thickness down to 0.005 inch. From it, ferrites of any desired shape can be cut or molded—easily and economically—before the special presintering and sintering treatments. The fired ferrites shrink evenly and are exceptionally uniform in material density and magnetic characteristics.

Our electronics engineers have found the new fabrication technique particularly valuable for making multiaperture devices—wafer-thin square loop ferrites used in computer memory cores and switching circuits. Practical development of these and other applications is continuing as a team effort of the Laboratories and GM divisions.

Involving a blend of scientific understanding and engineering know-how, this new process is another example of the advances in technology being made by GM's research in depth.

General Motors Research Laboratories

Warren, Michigan



Hysteresis loop from ferrite memory core prepared by new GMR process

MEDICINE

Drugs Conquer Fungus

A new antifungal agent has brought relief from itching and burning to hundreds suffering from such superficial fungus infections as ringworm and athlete's foot.

➤ FUNGUS INFECTIONS, like those causing ringworm and athlete's foot, may be on their way out as a threat to human well-being, studies on a new antifungal agent indicate.

The agent, called tolnaftate, has been found to achieve "complete curing or definite control of infection" in 320 of 520 cases of superficial fungus infections. The cases, examined in 19 independent clinical investigations, included infections of the feet, groin, body, head, hands and nails.

Dr. John A. Leer of the Schering Corporation, Bloomfield, N.J., reported these findings to the Fourth Interscience Conference on Antimicrobial Agents and Chemotherapy in New York, sponsored by the American Society of Microbiology.

Dr. Leer said tolnaftate was applied to areas of infection twice or three times daily, usually for two to four weeks. The infections in persons tested had been present from three days to 30 years.

Results of the various studies showed that itching and burning were usually relieved within 24 hours after the start of treatment with the preparation. One fungus infection in particular, athlete's foot, was usually cured after two weeks of treatment with tolnaftate.

At the same meeting two scientists reported that a second drug, thiabendazole, had been found effective in laboratory tests against athlete's foot fungus. Thiabendazole at present is widely known for its veterinary use in preventing parasitic worm infections in sheep.

Drs. Lloyd J. Sorensen and Harry J. Robinson, both of Merck Institute for Therapeutic Research, Rahway, N.J., reported that the drug cleared up infections immediately in guinea pigs experimentally given the fungus that causes athlete's foot.

The scientists said infections with the athlete's foot fungus were induced into the skin of shaven guinea pigs.

Each day, new hair growth was taken from the infected areas and examined for fungal activity.

When the drug was applied in a four percent ointment four days after the infection was introduced to the pigs, the fungus disappeared in less than one day, the scientists reported.

Lower concentrations of the ointment were found not as effective as the four percent dosage. A delay in treatment also gave less effective results in that 12 days were required before infections cleared up.

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Armed Forces Institute of Pathology

PENGUIN AUDIENCE — Carl Eklund, a biologist from Atlanta, Ga., moves an antenna into position at McMurdo Sound as penguins watch.

PSYCHOLOGY

Work Cures Boredom on South Pole Navy Base

➤ WORK KEEPS UP the morale of the Navy and civilian personnel confined with the same group of men for six to 12 months at the South Pole.

The individual's ability to control his emotions, as well as his consideration and friendliness to his fellow workmen are also important, Lt. Paul D. Nelson of the U.S. Navy Medical Neuropsyschiatric Research Unit, San Diego, Calif., reported to the meeting of the Association of Military Surgeons of the U.S. in Washington, D.C.

McMurdo Base, the largest of the research stations on the Antarctic Continent, is composed of about 200 men. Smaller outlying stations, Byrd, Hallett and Eights, vary in size from 12 to 35 men.

• Science News Letter, 86:291 November 7, 1964

BIOPHYSICS

Sound Waves Locate Tumors in Eye Socket

➤ SOUND WAVES are four times more sensitive than X-rays in locating tumors within the eye's orbit, or socket, a New York ophthalmologist reported in Chicago.

Diagnosis of an orbital tumor proved accurate in 32 of 54 cases examined by ultrasonography. This was later confirmed by surgery and medical tests, Dr. Gilbert Baum of the Albert Einstein College of Medicine of Yeshiva University, N.Y., said.

Dr. Baum's study was reported at the meeting of the American Academy of Ophthalmology and Otolaryngology. The study was supported by a National Cancer Institute grant.

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PUBLIC HEALTH

Defects Cause Guilt Sense

➤ A MISTAKEN SENSE of guilt still exists among many parents today who blame themselves for their defective children, Basil O'Connor, president of the National Foundation-March of Dimes said in Washington.

Parents still believe that some external cause such as a fright during pregnancy is the reason an abnormal child is born. Or they think they must have sinned in some way.

The word "harelip" got its name from its resemblance to a rabbit's mouth, and the mother of a child with this deformity was believed to have looked at a rabbit while pregnant.

With 250,000 children born with birth defects each year and 30,000 annual deaths from such causes, public education is gradually erasing the guilt feelings that have often kept abnormal children hidden away in attics.

Until research makes more progress in the prevention of birth defects, treatment can make them less tragic. The National Foundation is sponsoring 50 treatment centers for abnormal children. In one, as many as a dozen specialists treat the many problems common to birth defects. Otherwise, a child might have to be shuttled between medical experts scattered throughout a city or even an entire state.

Three of these centers, in Madison, Wisc., Boston and New Orleans, are particularly following up the earliest birth defects to be discovered, even minor ones.

Outstanding among the achievements in overcoming birth defects are the blood test for phenylketonuria, or PKU, which enables the child to be put on a special diet to avoid severe mental retardation, and that for galactosemia, which causes blindness as well as retardation, if not discovered shortly after birth.

Hydrocephalus, or water on the brain, can be treated by draining fluid so the head size becomes more normal.

The new Salk Institute for Biological Studies at San Diego, under the leadership of Dr. Jonas Salk, who developed the polio vaccine, is expected to probe into some of the basic problems behind birth defects, Mr. O'Connor told SCIENCE SERVICE. The institute will not work on any one disease, but in fields of microbiology, genetics and enzymes that could lead to specific practical results.

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SCIENTIA INTERNATIONAL

NOVAS DEL MENSE IN INTERLINGUA

Epidemiologia. – Le currente augmento del incidentia de encephalitis in certe partes de New Jersey, e le inusualmente alte procentage de feminas inter le victimas in ille stato, pare esser attribuibile (indirectemente) al inclemente tempestate que iste autumno ha arrivate anormalmente tosto in le Statos Unite oriental. Le catena causal – postulate per Dr. H. D. Pratt del statounitese Servicio de Hygiene Public – es que le mosquito Culex pipiens (responsabile pro le transmission del virus de encephalitis in circa 50 pro cento del casos) tende a invader calefacite domicilios human quando le temperaturas al extero declina subitemente ante le fin del normal cyclo vital de ille insecto.

Herbert Hoover, le trenta-prime Presidente del Statos Unite, teneva grados academic honorari ab 85 universitates e collegios; ille esseva membro honorari de 60 societates scientific e technologic; ille habeva recipite 468 medalias e citationes honorari. Ante le prime Guerra Mundial, Herbert Hoover – in collaboration con su uxor – traduceva le "de Re Metallica" de Agricola (1556) ab le latino ad in le anglese. Post ille guerra, in 1920, un astronomo austriac nominava un asteroide (que ille habeva discoperite) Hooveria in gratitude pro le effortios de Herbert Hoover de alimentar Europa famelic. In su carriera civil Herbert Hoover esseva ingeniero minatori. Como tal ille travaliava in Siberia, Australia, China, Sud-Africa, e alterubi. Con su activitate como ingeniero ille associava un forte initiativa de reforma social, spectacularmente evidente – per exemplo – in le citate de minatores Kyshtim in le Ural. Herbert Hoover opinava que le scientia theoric es cosa eminentemente practic e que promover recercas de base es un del deberes de un nation industrial como le Statos Unite.

Ornithologia. – Columbas ha un surprendentemente potente capacitate pro recognoscer complexe formas (como le contorno del figura human), mesmo quando iste formas es presentate a illos como picturas sin movimento o de facto como picturas blanc e nigre sin ulle altere color. Isto esseva constatate per scientistas del Universitate Harvard in experimentos in que le columbas esseva conditionate a obtener alimento per deprimer un levator, con le complication additional que le depression del levator resultava in le presentation de alimento solmente quando picturas includente specific conformationes (como contornos de figuras human) esseva simultaneemente visibile.

Physica Atomic. – Le detonation atomic in China ha producite pauc repercussiones in le Statos Unite. On insiste que le publicamente accessibile bibliographia del scientia nucleari ha devenite si ric que le disveloppamento de un bomba atomic ha cessate esser un formidabile interprisa. In iste vista, Sveda, Switza, Germania Occidental, e altere paises industrial es theoricamente capace a duplicar le attingimento chinese. Etiam, disveloppar "vehiculos de application" pro le bomba va costar China un decennio de labor o plus.

Physiologia Cerebral. – Notante que undas cerebral del typo alpha es subjecte in multe individuos a un extense regulation voluntari, Dr. G. M. Dewan del Laboratorio Recercatori Cambridge del statounitese Fortia Aeree ha presentate le notion speculative que victimas de paralyse total pote apprender a communicar con le mundo externe per medio de signales recipite per microelectrodos directemente ab le cerebro. Il evidentemente non se tractarea de "render pensatas visibile" sed de voluntarimente traducer parolas ad in un specie de codice Morse.

Pro information in re Interlingua e su utilisation practic como etiam su bases theoric, adressar se per favor a: Science Service, Division de Interlingua / 80 East Eleventh Street / New York, N.Y. 10003.

Physiologia Cerebral. – Le fortia del undas cerebral es directemente correlationate con le tension del sanguine secundo investigationes conducite al Collegio Medical de Virginia a Richmond. Le investigationes esseva limitate a subjectos dormiente proque le undas cerebral in stato eveliate es extrememente complexificate per un grande numero de heterogenee factores non-cerebral.

Questions

AGRICULTURE—How has "air conditioning" produced healthy fruits and vegetables despite high temperatures? p. 297.

MEDICINE—How are new antifungal agents helping to eliminate superficial fungus infections? p. 291.

PHYSICS—Why can 3-D photographs let one look behind objects? p. 295.

PSYCHOLOGY—What does a Perceptual Quotient, or PQ, indicate to school administrators? p. 302.

PUBLIC SAFETY—How could three taillight colors help reduce automobile collisions? p. 294.

TECHNOLOGY—How can a computer be used to get more accurate versions of literary classics? p. 297

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TECHNOLOGY

Membrane Filters Air

Using a new synthetic silicone membrane, submarine crews may soon be supplied with air from the waters surrounding them, and patients may have a cheap oxygen supply.

See Front Cover

➤ A WISP of synthetic membrane, only a thousandth of an inch thick, may hold the answer to a simple system for supplying submarines with air drawn from the water around them, the purification of air in space capsules or moon stations, and a means of providing cheap, reliable oxygen supplies for patients in hospitals or at home.

The secret lies in a silicone film that is thinner, and therefore more permeable, than any silicone membrane ever before reported. Even though this membrane is completely free of holes, it permits the passage of liquids or gases.

Since different gases pass through the membrane at different rates, it is called "selective." The ability of the membrane to "select" those gases which will pass through most easily could be applied in a space capsule.

An opening covered with such a membrane would allow unwanted water vapor and carbon dioxide to escape easily into the vacuum of space, while vital oxygen was held in, because the first two gases pass through much more quickly than oxygen.

Oxygen, on the other hand, passes through such a membrane over twice as fast as nitrogen, which makes up 80% of the air we breathe. As a result, if ordinary air is brought into contact with one side of a membrane while the other side of the membrane is maintained at a lower pressure, the gas passing through the membrane will be rich in oxygen.

A man consumes about three quarters of a cubic foot of oxygen per hour. To meet his requirements solely by means of a selective membrane system could require as little as two and one-half square yards of membrane, plus a compressor or pump to remove the enriched air from the low pressure side of the membrane. The membrane is more than 100 times as permeable as the membrane material of which the lungs are composed.

For patients needing oxygen-rich air in hospitals or at home, a small air-enriching device with a compressor to provide a difference in pressure and a membrane to separate the gases could replace pure oxygen bought by the tank, cutting costs sharply.

Underwater applications would depend upon the fact that seawater is essentially saturated with air to a depth of many hundreds of feet.

The "aqua-hamster" penned in a submerged plastic tank, shown on this week's cover, is kept alive by an artificial "gill," a piece of the synthetic membrane stretched across the top, bottom, and two sides of its underwater home.

The "gill" extracts air from the surrounding water, while resisting the passage of the liquid. Carbon dioxide exhaled by the hamster passes out through the membrane, dissolves in the water and is carried away.

Since a small quantity of water with the salt removed would pass through the membrane, the hamster, the crew of a submarine, or the inhabitants of an underwater experimental station would be supplied not only with air but also with fresh water for drinking.

The method of producing the membrane was discovered by Dr. Walter L. Robb of the General Electric Research Laboratory, Schenectady, N.Y., who is shown in the picture standing behind the fish tank. Possible applications are being studied at General Electric's Advanced Technology Laboratories and elsewhere.

• Science News Letter, 86:293 November 7, 1964

PHYSICS

Superconducting Magnet Aids Nuclear Studies

➤ A NEW SUPERCONDUCTING magnet —a magnet made of materials that lose all electrical resistance when cooled to near absolute zero—has been developed.

Believed by researchers to be the biggest of its kind, the new magnet has an outside diameter of 24 inches and a bore or inside diameter of 10 inches. Present plans are to use it in conjunction with a particle accelerator to study subnuclear reactions. The superconducting magnet was built by Avco-Everett Research Laboratory, Everett, Mass.

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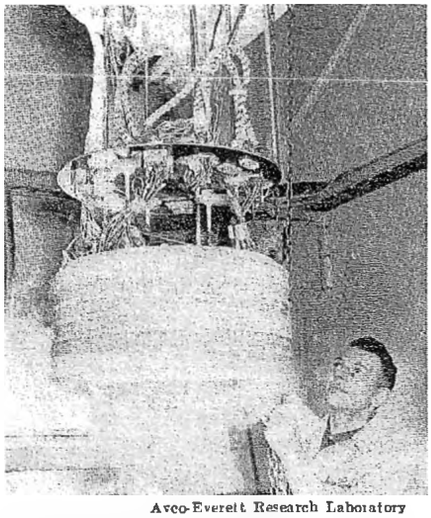

Avco-Everett Research Laboratory

SUPERCONDUCTING MAGNET —The ten-inch diameter superconducting magnet is lifted from its container of liquid helium after a test run.

PHYSIOLOGY

High Pressure Oxygen May Cause Malformation

➤ WARNINGS of possible human malformations if pregnant women are treated with high-pressure oxygen have been sounded as a result of experiments with golden hamsters.

With increasing use of hyperbaric oxygen treatment in medical practice, Dr. Vergil H. Ferm of the Dartmouth Medical School, Hanover, N.H., said other species should be studied to determine the effect on embryonic development.

Open spines, protruding brains, umbilical hernia, harelip and peculiar limb defects were found in a small but significant number of hamster fetuses after such treatment, he said.

Fifty-three pregnant hamsters in the early stages of pregnancy were placed in a 22-foot hyperbaric chamber, which was then flushed with 100% oxygen for three minutes.

They were then exposed to hyperbaric oxygen at 3.0, 3.6 and 4.0 atmospheres for periods of three and two hours.

Forty-one animals survived the treatment without apparent ill effects, but the fetuses showed gross malformations.

The U. S. Public Health Service supported the study, which was reported in the Proceedings of the Society for Experimental Biology and Medicine, 116:975, 1964.

• Science News Letter, 86:293 November 7, 1964

PUBLIC HEALTH

Membrane Helps Purify Contaminated Water

➤ FRESH DRINKING WATER can be obtained by forcing contaminated water through a membrane and filtering out the impurities.

This new, economical method, called the reverse osmosis process, uses a semipermeable membrane of cellulose acetate which filters out most minerals and organic materials.

Detergent impurities also are removed, leaving fresh non-sudsy water. The membrane may even filter out radioactive contamination.

While fresh water and contaminated water are separated in this new process, under normal conditions fresh water would naturally flow by osmosis through the membrane into the waste water.

However, by applying a force greater than the normal osmotic pressure to the contaminated water, fresh water is produced as the membrane filters out the impurities.

Designed and tested at the Aerojet-General Corporation in Azusa, Calif., the process can convert 96% of waste water into freshwater with a purity exceeding potability standards set by the Public Health Service.

The process is easier and cheaper to run than other purification methods of distillation and freezing that require large amounts of power to change water into vapor or ice to remove impurities.

• Science News Letter, 86:293 November 7, 1964

GENERAL SCIENCE

San Salvador Seen First

Studies of climate, topography, botany and archaeology indicate that San Salvador was the first land sighted by Columbus in the New World—By Barbara Tufty

➤ THAT MYSTERIOUS LIGHT seen by Christopher Columbus "like a candle falling and rising" 472 years ago as he approached the New World the night of Oct. 11, was probably caused by natives burning fires to keep away annoying sand flies. The light was not a hallucination or a "spiritual light" as many men have thought.

The "white head of sand" which the famous navigator sighted at two o'clock the next morning was actually High Cay, a straight white rocky cliff rising 114 feet above sea level to the southeast of San Salvador Island.

These and other discoveries have led Ruth G. Durlacher Wolper, director of the New World Museum of San Salvador, to identify the first land sighted by Columbus and his crew as San Salvador. This land is the southeasternmost island of the Bahamian Archipelago above the Tropic of Cancer.

For almost 500 years, scholars and laymen have been trying to solve the mystery of Columbus's light and to define the exact island the men first saw and walked upon. Practically every island in the Bahamas has been nominated for one reason or another to hold the honor of being the first.

Mrs. Wolper recently released a monograph, published by the Smithsonian Institution, describing her research to prove that San Salvador is the island.

With the aid of scientists and historians, Mrs. Wolper followed Columbus's statements in his Journal word for word and spent seven years exploring San Salvador Island by plane, jeep, foot and boat, as well as making accurate measurements and excavations on land and sea.

Columbus approached the island at a dead reckoning at 23° 47′ 24″ North in October near the end of the rainy season. At this time, states Mrs. Wolper, the foliage on the trees and plants is green, the lakes are filled with fresh water and fires are necessary in the evenings after the rains to ward off sand flies.

By conducting an expedition on the 110-foot long M. V. Drake, at the same time of year and evening, Mrs. Wolper and her assistants found similar conditions described by Columbus and his men. "Rising and falling" lights glowed in the dark from fires built by the natives, following today some of the customs of their forefathers. They tended these fires by throwing on about three leaves of the waxy Sabal palmetto tree every half hour, a procedure that caused the light to rise and fall.

The light could be seen as far out at sea as 27 nautical miles, just the distance of the Santa Maria where Columbus was standing on the stern-castle.

Early in the morning, four hours after spotting the light, land was sighted straight ahead, records the Journal. This "white head of sand" was glowing in the moonlight, six nights after the full moon.

Columbus then ordered his fleet of three ships to "jog off-and-on" near the southeastern reefs until daylight, when they sailed around a long ridge of connecting reefs searching for a place to land. They dropped anchor in a quiet lagoon that opens to the sea through what is now known as Gardiner's Reef.

Point by point, Mrs. Wolper examined the journal of Columbus and answered each fact to prove that San Salvador today is the island once called Guanahani by the Indians and renamed San Salvador by Columbus.

She backs her arguments with facts of climate, topography and botany. She cites artifacts identified from scientific archaeological excavations where Columbus described the Indians and villages he saw, and notes the links in the cultural development from the past to the older native folk of today.

During the scramble for the honor of being Columbus's first island, San Salvador has also been called Watling, and other islands have been named San Salvador.

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PUBLIC SAFETY

Three Taillight Colors May Reduce Collisions

➤ YELLOW AND GREEN as well as red taillights would reduce rear-end collisions, the annual convention of the National Safety Council meeting in Chicago was told.

The green lights would automatically be switched on when the car traveled at speeds exceeding 40 miles an hour.

Yellow colors would automatically appear when the car began mild deceleration from high speeds, remaining on while it was traveling below 40 miles an hour.

Brake application would cause switching from either green or yellow to the red lights, which would stay on when the car was stopped.

K. A. Harkness, director of the department of agricultural engineering, Ohio State University, made this suggestion, which grew out of research into Ohio highway accidents involving slow-moving vehicles during 1961 and 1962.

One of the major accident factors, said Mr. Harkness, was found to be the failure of other motorists to recognize the slow ones soon enough to avoid rear-end collisions.

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UPI

PROF. A. M. PROKHOROV

UPI

PROF. NIKOLAY G. BASOV

UPI

DR. CHARLES H. TOWNES

GENERAL SCIENCE

Nobel Prize Winners

Work on crystallography and the maser-laser principle won Nobel Prizes in Chemistry and Physics for an English woman, two Russians and an American.

➤ FOR THEIR WORK on lasers and masers and contribution to the field of quantum electronics, an American and two Russians were awarded the 1964 Nobel Prize for Physics.

Dr. Charles H. Townes, provost of the Massachusetts Institute of Technology and recipient of half the $52,500 award, will share his prize with Profs. Nikolay G. Basov and Aleksander M. Prokhorov of the Lebedev Institute for Physics of the Academy of Sciences of the USSR.

The revolutionary maser-laser principle of concentrated radio and light beams was discovered in 1951 by Dr. Townes and shortly after, Profs. Prokhorov and Basov independently came upon the principle.

Scientists have predicted that the extraordinarily intense laser light will be used to map the moon, act as radar, serve for space communications and, some say, even become that seemingly impossible instrument of warfare, a death ray. It is already being used as a surgeon's scalpel, to illuminate the moon and to pierce steel and diamonds.

By observing the actions of a boy on a swing one can understand how and why a maser or laser works. If the boy sits perfectly still on a moving swing, the amplitude of the swing's motion gradually decreases due to friction.

However, by moving in unison with the swing's motion, the boy can "pump up" or amplify the swinging motion. By opposite body motions—against the rhythm of the swing's motion—the boy can decrease the amplitude and stop the swing much more rapidly than by friction alone.

These three varying effects of the boy's motion on that of the swing correspond respectively to spontaneous emission, absorption and induced emission, which are the three effects on which masers and lasers operate.

Radiant energy is used to force the maser's atoms into excited energy states, since they have absorbed the energy. Some of the atoms will then spontaneously emit radiation and fall back to the lower energy state. However, by hitting the laser material with radiation of precisely the energy that would be emitted spontaneously, the atoms can be stimulated to emit their radiation in one great cascade.

This induced radiation is the secret of the maser's operation and also the source of its name, an acronym for Micromave Amplification by Stimulated Emission of Radiation. For a laser, light is used instead of microwaves.

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Prize for Chemistry

➤ FEW FIELDS of science have changed more in the first half of the 20th century than crystallography, the field in which Dr. Dorothy Crowfoot Hodgkin won the Nobel Prize in Chemistry for 1964.

The knowledge of the precise way atoms are arranged in crystals has given much new data to chemistry. It has brought about the general rewriting of inorganic chemistry in terms of ions, or electrically charged atoms.

Dr. Hodgkin's X-ray crystallography unit at Oxford did the painstaking work, announced in 1955, to detect the structure of vitamin B-12. Her unit also worked on the chemical structure of the drug cephalosporin C, closely related to the pencillin family, but able to wipe out many of the infections resisting penicillin.

Vitamin B-12 is the largest and most complex molecule to be defined in complete detail. The final picture, completed after almost a dozen years of work on both sides of the Atlantic, shed new light on blood-building processes. The compound contains cobalt and has a specific curative effect in pernicious anemia which can be fatal.

Dr. Hodgkin determined the atomic structures of this and other important biochemical compounds by studying the X-rays emitted by a crystal of the substance when exposed to an X-ray beam.

The 54-year-old winner of the $52,500 prize is a research professor of the British Royal Society as well as an Oxford Fellow. She is at present in Accra, Ghana, with her husband, Thomas L. Hodgkin, who is director of the Institute for African Studies at the University of Ghana.

The Swedish Academy of Science, in its Nobel citation of Dr. Hodgkin, praised her "exceptional skill in which chemical knowledge, intuition, imagination and perseverance have been conspicuous."

• Science News Letter, 86:295 November 7, 1964

MEDICINE

Stillbirths High Among Diabetic Women

➤ UNTREATED DIABETES in pregnant women 30% of the time results in either a stillbirth or an early death for the newly born infant, a physician reported in Postgraduate Medicine, 36:301, 1964.

Dr. Elsie R. Carrington, Woman's Medical College of Pennsylvania, Philadelphia, said from the viewpoints of both individual and public health, a planned screening test for every woman about to have a baby should be made.

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PSYCHOLOGY

Mice Prefer Square Wheels to Round Ones

➤ FOR MANY YEARS pet fanciers have been providing rodents with round activity wheels for exercise. Now it turns out that they may like square wheels better.

Drs. J. L. Kavanau and D. H. Brant, zoologists at the University of California at Los Angeles, suggest that wild mice prefer square activity wheels because these require more split-second timing and coordination of movements.

Captive rodents spend a great deal of their time running activity wheels. It appears that, in addition to providing a strenuous form of exercise not otherwise available to confined animals, wheel-running is fun to the animals.

The manipulation and control of the movements of an activity wheel may be rewarding to them, quite independent of exercise, Dr. Kavanau says.

In the experiments, wild mice were given a choice of three different types of round wheels and a square wheel. Mice, being very conservative animals, usually will stick to whatever wheel they try first, virtually ignoring the others.

After a wheel was selected and used for a time by a mouse, it was locked, forcing him to choose another. Each time a choice was made and experience was gained with a wheel it was locked, and on down the line until a mouse had had experience with each wheel. Then the wheels were unlocked in reverse order to which they were locked.

Results indicated that when the mice had experience with all wheels, they generally preferred the square one. It appears that the challenge of the square wheel (it required jumping at the corners at rates up to nine times per second) was more appealing to the animals.

• Science News Letter, 86:296 November 7, 1964

MEDICINE

Cancer Deaths Reported Equal to Cancer Cures

➤ ALMOST AS MANY cancer patients in the United States have been cured as have died in the past five years.

More than 1.3 million former cancer patients now living in the United States are considered "cured" of cancer since they have had no evidence of the disease for five years.

Another 700,000 persons who have been treated within the past five years are expected to join the ranks of the cured, the American Cancer Society reported.

The Society's booklet, 1965 Cancer Facts and Figures, contains these announcements along with significant figures on the status of different kinds of cancer. Here are some of the statements:

Lung cancer is the leading cause of cancer death. An estimated 52,000 new cases are expected in 1965, with 47,000 deaths. Three fourths of these deaths could be avoided if people did not smoke cigarettes.

Next highest number of estimated deaths in 1965 will be 43,000 from colon and rectum cancer, although 73,000 new cases are expected. Examination with an instrument called a proctoscope once a year and prompt treatment could save three out of four of these cases.

Breast cancer is expected to cause 26,000 deaths in 1965, and is the leading cause of death in women. Estimated new cases will be 62,000.

Cancer of the stomach is expected to account for 18,000 deaths next year, although recent studies have shown a considerable reduction in deaths, 34% among men and 37% among women.

Cancer of the pancreas will cause 16,300 deaths and cancer of the prostrate gland an estimated 16,000.

Deaths from lymphomas, which arise in the lypmh system and include Hodgkin's disease, are expected to reach 15,000, out of 20,000 cases.

Next year, 17,000 cases of leukemia are expected, with 14,000 deaths.

In 1965, of every 100 cancer deaths, 55 are expected to be males while 45 will be females.

• Science News Letter, 86:296 November 7, 1964

PUBLIC HEALTH

Packaged Baby Formulas Could Prove Dangerous

➤ THE COMMERCIAL PREPARATION of baby formulas in prepackaged "nurser units" could pose a potential danger to infants unless there are sanitary controls which are carefully observed.

Edwin L. Ruppert of the U.S. Public Health Service's division of environmental engineering and food protection, speaking before the American Public Health Association in New York City said that the use of baby food formulas packaged in nurser units is a significant new pattern in baby feeding, estimated to be used in providing nourishment to more than three-quarters of a million babies in hospitals this year alone.

While firms which process these formulas cite greater variety and formula choice as well as freedom from the trouble of formula preparation as advantages, Mr. Ruppert declared that mass production of such liquids, if controls were lacking or inadequate, could possibly result in widespread infection or poisoning episodes.

Mr. Ruppert pointed out that a number of communities had developed control measures but added that standardization of such controls by the issuance of a Federal recommended standard of operation is necessary and will be forthcoming after a study of current infant feeding services and systems is made by the Public Health Service.

The studies are now underway, he said, in cooperation with the American Academy of Pediatrics, the American Medical Association and other interested organizations including the baby formula manufacturing industry. A standard of operations would provide uniform guides for state and local health agencies just as do the Public Health Service recommended Milk Ordinance and Code, the Food Service Sanitation Manual and the Frozen Desserts Ordinance and Code.

• Science News Letter, 86:296 November 7, 1964

IN SCIENCE

MEDICINE

Fear and Anger Appear The Same to the Heart

➤ THOUGH ANGER AND FEAR are two different emotions, the heart cannot tell the difference.

Doctors from University Hospital, Columbus, Ohio, told a meeting of the American Heart Association in Atlantic City how they hypnotized nine people repeatedly so that each experienced either intense anger or fear.

While the person was hypnotized, the doctors took a series of measurements to see how the heart and circulatory system performed.

Results showed that anger and fear produced virtually identical responses; the heart beat much faster; the breathing rate more than doubled; blood pressure rose in the arteries.

Generally, these and other mechanisms work together to improve the body's "defense" capacity when threatened.

However, in this study, when one of these defense mechanisms — an outpouring of adrenalin in response to strong emotion — was blocked, the heart turned to others.

The adrenalin response, which for 40 years has been thought to represent the means by which emotions cause the heart to deliver more blood to the body, was suppressed by a new drug.

With adrenalin blocked, the normal emotion-induced speed-up in the heart rate was reduced by 60%. But the heart still increased its output per minute by simply pumping out more blood during each beat.

Drs. Willard S. Harris, Clyde D. Schoenfield, Peter H. Gwynne, Arnold M. Weissler and James V. Warren, all of Columbus, reported the study.

• Science News Letter, 86:296 November 7, 1964

MARINE BIOLOGY

Sea Animals Show Resistance to Disease

➤ FISH AND OTHER CREATURES of the sea seem to have fewer infections and fewer cancers than land animals.

In a study of how primitive animals manage to cope with infectious diseases, 200 fish are now under careful observation for the Variety Children's Research Foundation, a non-profit organization conducting research in children's diseases.

Fifty sharks and 150 other varieties of fish swim around in large tanks and are readily identified by colored nylon tags, harmlessly attached to the cartilage of their dorsal fins.

The continuing program is being conducted by Dr. Michael Sigel and Dr. L. William Clem, at the Lerner Marine Laboratory near Miami, Fla.

• Science News Letter, 86:296 November 7, 1964

NCE FIELDS

TECHNOLOGY

Insulating System Creates Square Vacuum Bottles

➤ A GOAL that has eluded scientists for more than half a century, a square vacuum bottle, has now been reached because of a newly developed vacuum insulation system.

A major obstacle to "squaring the vacuum bottle," which would give it more storage space, was the need for a filler material that would prevent the walls of a bottle from collapsing under atmospheric pressure and would not transmit too much heat by conduction.

Flat panels of the new system, called P-Zero, have passed the atmospheric and thermal tests with great success, the General Electric Research Laboratory, Schenectady, N.Y., developer of the new system, reported.

The system consists of a thin metal envelope that encloses a specially compacted pad of glass fiber. It has potential applications in the trucking, railroad, chemical and food industries as well as in the manufacture and storage of liquid rocket fuels.

Fundamental studies on thermal insulation by Dr. Herbert M. Strong, Dr. Francis P. Bundy and Harold P. Bovenkerk produced this new system.

• Science News Letter, 86:297 November 7, 1964

TECHNOLOGY

Computer Shows How Shelley Aped Milton

➤ BECAUSE OF electronic computers readers can now get more accurate versions of literary classics.

By comparing different editions of a writer's work, literary data processing is catching changes and errors. The reader is thus offered a version closer to the author's intent.

The computer is also being used as a never-miss proofreader; its eyes do not grow tired, and its attention never wanders. It can rapidly compile indexes, and concordances which are alphabetical listings of the principal words in a work and cite the passages in which they occur.

Dr. Vinton Dearing, an English professor at the University of California at Los Angeles, is using a computer in his work on the 17th century English poet, dramatist and critic, John Dryden.

A computer has been used to show how the diction of the 17th century Puritan poet, John Milton, was apparently purposely imitated by the 19th century romantic poet, Percy Shelley, to refute Milton's philosophical contentions.

Development of a writer's unconscious thought and the growth of language by charting changes in the meaning of words also have been the subjects of computer study. Other computers have produced indexes and concordances of the Dead Sea Scrolls, the works of St. Thomas Aquinas and other great writings.

Dr. Dearing says the computer is not only freeing scholars from a large amount of tedious, repetitious clerical work but is giving them more time for research and for the enjoyment of literature.

Dr. Dearing points out, however, that a computer deals only with quantity—not quality.

"It cannot decide whether a piece of writing is good literature, nor can it tell us, at the present time, about the personality of the author," he said.

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MEDICINE

Cervical Cancer Need Not Injure Baby

➤ IN RARE CASES of pregnancy accompanied by cancer of the cervix or neck of the womb, babies need not be sacrificed for early treatment of the mother unless the malignancy has invaded the womb, an Air Force physician reported.

Six babies were allowed to come to term when the cancers were "in situ," or confined to the site of origin on the outside of the womb, Dr. Calvin N. Ladner told SCIENCE SERVICE.

Caesarian operations were performed when the cancer had become invasive, however, which occurred in 11 cases. All patients were treated, of course, after the babies were delivered.

At Madigan General Hospital in Tacoma, where Dr. Ladner is on the staff, approximately one in 2,200 deliveries occurred when cancer was present, he said. He warned that individual cases require different treatment, and especially emphasized that no woman should allow herself to become pregnant if she knows she has cancer.

"We were able to follow eight of our patients for three years," Dr. Ladner said, "and only one mother had died."

Dr. Ladner made his report to the annual scientific meetings of the Armed Forces Chapter of the American College of Obstetricians and Gynecologists at Andrews Air Force Base, Washington, D.C.

• Science News Letter, 86:297 November 7, 1964

AGRICULTURE

New Kind of Onion Resists Storm Damage

➤ THE LOWLY ONION can now stand up to the mighty thunderstorms.

A new hybrid, dark golden onion called Sunburst has recently been bred to resist tipburn—a damaging burn on the plant tips caused by ozone accumulated during thunderstorms. Tipburn is a serious problem to many Midwest farmers.

This globe-type onion, developed by biologists at the University of Wisconsin, is bred from two other onions called W4A and W101B. The Sunburst has a dense upright top with leaves that do not break as the plant grows and scales that do not rub off when handled. During storage the onion will shrink slightly, and over the winter months it will not sprout roots.

• Science News Letter, 86:297 November 7, 1964

AGRICULTURE

Fruitful Results from 'Air Conditioning' Fruits

➤ BY "AIR CONDITIONING" fruits and vegetables with a fine spray of water, a scientist has produced healthy crops, even during a summer with above-average temperatures.

With tiny water nozzles, one-sixth of an inch in diameter, Dr. Robert Carolus of Michigan State University, East Lansing, sprayed tomatoes, lettuce, strawberries and other garden crops. By reducing the water loss from the leaves, a satisfactory water balance in plants was maintained.

Mist irrigation has several advantages over common soil irrigation, Dr. Carolus said. It cools the vegetables, reduces their transpiration and conserves their energy for producing higher yields.

Dr. Carolus found that the "air conditioning" reduced transpiration or water loss by more than 80% when the air temperature was 85 degrees Fahrenheit and humidity 35%.

• Science News Letter, 86:297 November 7, 1964

PUBLIC HEALTH

Asbestos Workers Live Longer But Get Cancer

➤ ASBESTOS WORKERS used to die young of tuberculosis or pneumonia brought about by poor factory conditions and lack of drugs to control these diseases. Now they live longer but get cancer.

Later effects of asbestosis, or lung disease caused by inhaling asbestos dust, included severe bronchial conditions and enlargement of the heart, Dr. J. C. Gilson, researcher of Glamorgan, Wales, told an international conference on biological effects of asbestos in New York City.

"Still more recently," said Dr. Gilson, "the workers who have developed only moderate degrees of asbestosis have survived long enough to develop the associated bronchial carcinoma."

In addition, and unexpectedly, the researcher reported, malignant tumors called mesotheliomas, arising from the linings of the chest and abdominal cavities, are now occurring in workers after a delay of 40 or more years.

Another speaker from the Pneumoconiosis Research Unit of Glamorgan was Dr. J. C. Wagner, who told the conference that it is not known exactly how asbestos causes disease, nor how asbestos fibers migrate in the body.

Injections of the major varieties of asbestos—chrysotile, crocidolite and amosite—have apparently caused mesotheliomas in the chest cavities of animals.

These pleural mesotheliomas have also been the result of injections of silica, which occurs naturally in asbestas as well as in sand and quartz.

To find out more about the effects of asbestos, Dr. Wagner said there is a need for a joint effort by the experimental biologist, mineralogist and chemist.

• Science News Letter, 86:297 November 7, 1964

PHYSICS

Universe's Most Mysterious Force

One of the most mysterious, yet weakest forces in the universe, the pull of gravity, is now also believed to be responsible for the gravitational collapse of star-like objects.

By ANN EWING

➤ GRAVITATION is the most mysterious —and weakest—force in the universe.

It is weak in comparison to the other three universal forces known It only seems strong because the earth is such a massive object.

Any child who has fallen from a chair or a tree is sobbing proof of the effect, and force, of the earth's gravitational pull. However, this seemingly strong effect is weak when it is measured between particles

It is so weak that the force the entire earth exerts upon a particle is equal to the electrical attraction between two unlike charged particles placed three feet apart.

Although gravity and gravitation are often used interchangeably, gravitation properly refers to the universal property of matter to attract, whereas gravity means that attraction as exerted by the earth, sun or another rotating mass.

Most Brilliant Objects in Cosmos

When objects are considerably more massive than the earth or the sun, such as concentrations of a hundred million suns in a relatively small volume of space, gravitational collapse can occur. Such a super-explosion may result in the most brilliant light sources known and yields the greatest energy yet discovered in the universe, billions upon billions of times greater than that involved in the nuclear fusion of the hydrogen bomb.

The recent discovery of objects, called "quasars," a contraction of quasi-stellar sources, that may be undergoing gravitational collapse is considered one of the most important milestones in the history of astronomy

Thanks to three of the all-time giants of science—Galileo, Newton and Einstein—scientists can describe and predict the way in which gravitation works.

Scientists are sure of one thing—there is no known practical way to shield against the pull of earth's gravity. Nor can gravity be controlled. If it could be controlled, a gravity shield could lift satellites effortlessly into orbit or on space journeys.

In a sense, however, the effects of gravity can be controlled, and this is done every time an earth-circling satellite is put into orbit. In an orbiting satellite, persons or objects are weightless, or under zero gravity Of course, the energy required to reach the zero gravity of a satellite is enormous.

Gravity is always pulling on an orbiting satellite. However, as the satellite falls toward the earth, the horizontal velocity with which it was hurled into space by the launching rocket is such that the satellite covers enough distance to always miss the earth.

Actually, there is no physical distinction between orbiting and falling—in both cases the object or person is reacting freely to the pull of gravity. This is in accordance with Newton's laws, the first two of which were stated informally by Galileo.

Newton's three laws of motion can be stated as follows:

1. A body in motion will continue in motion, and a body at rest will remain at rest, unless acted upon by some outside force.

2. Change of motion is proportional to the force that acts on a body and takes place in the direction of this force.

3. To every action there is an equal and opposite reaction.

Newton then applied these laws to show there is a force of gravity acting between any two bodies in the universe that is directly proportional to the product of their masses and inversely proportional to the square of the distance between them.

Thus the laws that govern the launching and orbiting of space satellites were known almost 300 years ago—only the energy source was lacking.

The zero gravity attained in an orbiting satellite also can be achieved experimentally for a few seconds in an airplane flying along a path such that the plane's speed and direction are temporarily what they would be in a natural orbit at that altitude.

U.S astronauts and Russian cosmonauts have experienced zero gravity in two situations—when in orbit and during their training when they were in the above-mentioned airplane.

Gravitational attraction is the most widely accepted theory to account for the formation of the solar system's sun and planets. According to this view, the planets are chunks of matter left over when the sun condensed from a giant primeval cloud of swirling dust and gas.

Nuclear Force Is Strongest

However, the great cloud did not go on contracting into a point because of angular momentum, changing the motion of matter from falling to swirling. Other forces may then come into play. One of these forces is electrical. The electrical force of repulsion between two electrons, for instance, is ten thousand billion billion billion billion times stronger than the gravitational force between them.

The electrical force affects only charged particles, whereas gravitational force affects

U.S Air Force

FLOATING FREE—Two astronauts and their instructor momentarily experience the effects of weightlessness when the pull of earth's gravity has been reduced to zero by an intricate maneuver of the plane in which they are riding. Floating free are, from left, Dr. Edwin Vail of the Air Force Systems Command, Wright-Patterson Air Force Base, Dayton, Ohio, and Astronauts Leroy G. Cooper Jr. and Virgil I. Grissom.

all particles, And the electrical force is weak compared to the extremely strong nuclear force that binds the particles inside an atomic nucleus.

The other known force is that of weak interactions, one example of which is the disintegration of radioactive atoms. This fourth force has a strength between electrical and gravitational forces.

Although the motion of an orbiting satellite is governed strictly by Newton's laws, scientists once proposed using a satellite to make another check of Einstein's relativity theory. Before this was done, however, the effect, called the gravitational red shift, was verified in the laboratory, confirming astronomical observations made on distant stars.

The reddening of light due to gravitation results from the slowing effect that strong gravitational fields have on time, whether time is clocked by the vibrations of atoms or by other rhythmic processes.

Einstein's Influence

Einstein's concept of general relativity brought a revolutionary change in people's ideas about the world. He showed that time and space are not separate, but joined in a framework, and this mesh of space and time is distorted by mass.

One of the basic assumptions of the general theory is that no detectable difference exists between the force of gravity and the force produced by acceleration outside a gravitational field. Measuring the gravitational red shift has confirmed this assumption.

Scientists for the past few years have been investigating the possibility of "quantizing" general relativity, that is, treating gravitational radiation as if it were not continuous but consisted of tiny packets. This can be likened to the situation with light, which many years ago was thought to be continuous radiation but is now known to consist of tiny light packets, or photons.

The packet of gravitational energy is the graviton. Unlike light, which will interact only with charged particles, gravitons can interact with neutral particles.

Detecting Gravity Waves

A device to detect gravity waves is in the final stages of construction by Dr. Joseph Weber and his associates at the University of Maryland. The existence of gravity waves, generated by any mass that is accelerated, is predicted by Einstein's general theory of relativity.

Dr. Weber's device is based on the small effect gravity waves are predicted to have on a relatively large mass. When a gravity wave penetrates the mass, small relative motions of different parts occur, setting up tiny internal oscillations.

These internal jigglings can be converted by crystals and low-noise amplifiers into an electrical output in the radio wave range.

Successful detection of gravity waves would be another proof of Einstein's general theory of relativity. Three effects have so far been verified:

1. Changes in the perihelion (the point closest to the sun) of the planet Mercury's orbit, which observations have shown come very close to prediction.

2. The bending of light from faraway stars by the sun's gravitational field, which comes very close to the amount predicted by Einstein's theory.

3. The displacement, or reddening, of spectral lines due to the gravitational attraction of the sun and certain other stars; laboratory confirmation of this gravitational red shift by measuring the change in frequency of gamma rays given off by iron-57.

Bold experiments on gravitation are scheduled for the future. Some are now in the planning stages. It is, however, difficult to devise new tests because the specific effects of general relativity on matter and energy are very small and hard to measure.

Paper and Pencil Experiments

Another way of attacking the problem of gravitational research is to use not apparatus but the human brain. Scientists with paper and pencil or chalk and blackboard can perform experiments.

Many are using their fertile imaginations to gain insight into how matter and energy are affected by gravitation.

Among these are Drs. Peter Bergmann of Yeshiva University, New York; Hermann Bondi and F. A. E. Pirani of King's College, London; Nobelist P. A. M. Dirac of St. John's College, Cambridge, England; V. A. Fock of the Academy of Sciences of the USSR; Leopold Infeld, director of the Theoretical Physics Institute of the University of Warsaw; Otto Heckmann of the University of Hamburg, Germany; Oscar Klein of the University of Stockholm; Andre Lichnerowicz of the College of France, Paris; Christian Moeller of the University of Copenhagen; A. Schild of the University of Texas; J. L. Synge of the Dublin Institute for Advanced Study, Ireland; and John A. Wheeler, Princeton University.

They are now turning their attention to the gravitational collapse of very large masses. Discovery of the vast energies released by the superexplosion of cosmic dust in objects 100 million times as massive as the sun at fantastic speed has called for a new analysis of the fundamentals of relativity.

MEDICINE

Find Blood to Be Primary In Hardening of Arteries

➤ EVIDENCE that "fatty plaques" (or hardening of the arteries) are formed from the circulating blood was presented before the annual meeting of the American Heart Association in Atlantic City.

This finding contradicts the popular view that fatty plaques of atherosclerosis must start with initial changes in the artery wall itself, said Drs. I. Ernest Gonzalez and Fred Vermeullen, University of California Medical Center, San Francisco.

Dacron ribbons were suspended in teflon tubes inserted into the chest aorta of rabbits with high fat levels in their blood. The scientists discovered that fatty plaques developed on these ribbons in 150 days. Since the dacron ribbon was in contact only with the blood, it was concluded that these plaques were formed from the constituents of the circulating blood. Similar plaques have been observed by the scientists in synthetic blood vessels grafted into human arteries.

Books of the Week

Listing is for readers' information, not advertising. For convenient purchase of any book listed or any U.S. book in print, remit retail price (we pay postage) plus 25¢ handling charge if price is less than $2 to Book Department, Science Service, 1719 N St., N.W., Washington, D. C. 20036.

ADVANCES IN ORGANIC CHEMISTRY AND RADIOCHEMISTRY, Vol. 6—H. J. Emeleus and A. G. Sharpe, Eds.—Academic Press, 530 p., diagrams, $16. Among other subjects, deals with anhydrous metal nitrates, the chemistry of astatine, and peroxy compounds of transition metals.

ATOMS AT THE SCIENCE FAIR: Exhibiting Nuclear Projects—Robert G. Le Compte and Burrell L. Wood—USAEC, 52 p., illus., paper, single copies free upon request direct to USAEC, P.O. Box 62, Oak Ridge, Tenn. 37831. Prepared by the Atomic Energy Commission to help science fair project exhibitors and their teachers with planning and constructing successful exhibits.

BEYOND THE SUGAR CANE FIELD: UNICEF in Asia—Louisa R. Shotwell—World Pub. Co., 96 p., photographs, $3.50. A book about what UNICEF is doing for the children in India, Thailand and Indonesia.

BIOCHEMISTRY AND BEHAVIOR—Samuel Eidelson and others—Van Nostrand, 554 p., diagrams, $15. Attempts to bring together within the framework of biochemistry those kinds of correspondences that have been postulated by the literature to exist between biochemistry and behavior.

BIOLOGY DATA BOOK—Philip L. Altman and Dorothy S. Dittmer, Eds.—Fed. of Am. Soc. for Experimental Biology, 633 p., illus., $10. An authoritative handbook for research worker and student, with tables arranged in 18 sections, from genetics and cytology to materials and methods, includes appendixes giving estimated number of species and taxonomic classification, formulas, factors and constants.

CALIFORNIA CONDOR: Vanishing American—Dick Smith and Robert Easton, introd. by Brooks Atkinson—McNally & Loftin (Lane Bk. Co.), 111 p., photographs and illus. by Dick Smith, $3.50. A study of the largest bird in North America, "symbolic link" with the Pleistocene Age.

CATS OF THE WORLD—Armand Denis, preface by Roger Tory Peterson—Houghton, 144 p., photographs, $5.95. Authoritative and readable descriptions of every recognized species of the cat family in Africa, Asia, the Americas and Europe, and the outlook for saving them for posterity.

CONFERENCE ON THE VIBRATIONAL SPECTRA OF HIGH POLYMERS—Giulio Natta and Giuseppe Zerbi, Eds.—Interscience, 226 p., illus., paper, $10. Survey papers and other contributions on recent developments in theory and methods of infrared spectra of polymers.

CULTURE AND THE DIRECTION OF HUMAN EVOLUTION—Albert A. Dahlberg, Theodosius Dobzhansky and others, Stanley M. Garn, Ed.—Wayne State Univ. Press, 98 p., illus., $4.95. Symposium considered dental evolution, the significance of increased brain size, and the overall importance of culture in giving direction to human evolution.

DYNAMICS OF CHARGED PARTICLES—Bo Lehnert—Interscience, 300 p., diagrams, $11.50. A study of the dynamics of ionized matter in electric and magnetic fields, mainly on the basis of a single particle picture.

EDUCATORS GUIDE TO FREE SOCIAL STUDIES MATERIALS—Patricia H. Suttles with Wm. H. Hartley—Educators Progress Service, 4th ed., 423 p., paper, $6.75. Annotated list of currently available audiovisual and other social studies curriculum aids.

HOW TO TAKE A CHANCE—Darrell Huff—Norton, 173 p., illus. by Irving Geis, paper, $1.25. Reprint (1959), discusses amusingly the laws of the mathematics of probability.

HUMAN JUDGMENTS AND OPTIMALITY—Maynard W. Shelly II and Glenn L. Bryan, Eds.—Wiley, 436 p., illus., $8.95. Presents research in the behavioral and social sciences and sets forth relevant developments in statistics, mathematics, and management science.

INTRODUCTION TO PROBABILITY AND STATISTICS—Henry L. Adler and Edward B. Roessler—Freeman, 3rd ed., 313 p., illus., $6. Examples and exercises are chosen from agriculture, business administration, sociology, psychology and geology; treatment assumes only modest mathematical background.

THE KINEMATICS OF MACHINERY: Outlines of a Theory of Machines—Franz Reuleaux, transl. by Alexander B. W. Kennedy, Ed., new introd. by Eugene S. Ferguson—Dover, 622 p., illus., paper, $3. Unabridged and corrected republication of 1876 edition.

KNOWING YOUR TREES—G. H. Collingwood and Warren D. Brush; rev. by Devereux Butcher, Ed.—Am. Forestry Assn., rev. ed., 348 p., 900 photographs, maps, $7.50. Popular sourcebook for identification, describes characteristics and contributions of 170 outstanding American trees, showing in detail their leaves, bark, flowers and fruits.

MAN PROBES THE UNIVERSE—Colin A. Ronan—Nat. Hist. Press (Doubleday), 156 p., photographs, diagrams by Sidney W. Woods, $4.95. Published for the American Museum of Natural History, explains with the help of many illustrations and diagrams how astronomers, by analyzing radiation from stellar sources, can discover what elements they are made of, and develop theories about the universe.

MENTAL RETARDATION: A Review of Research—Harvey A. Stevens and Rick Heber, Eds.—Univ. of Chicago Press, 502 p., 32 plates, $12.50. According to 1962 estimates, more than five million people in the U.S. were mentally retarded; this volume presents what research in all major scientific disciplines has contributed to better understanding of the complex phenomena involved.

METHODS OF ESTIMATING THE DEMAND FOR SPECIALISTS AND OF PLANNING SPECIALIZED TRAINING WITHIN THE USSR—K. G. Nozhko—UNESCO (N.Y.), 63 p., paper, $1. Discusses annual and long-term plans, gives lists of specializations in secondary and higher education.

RED PEAK: A Personal Account of the British-Soviet Pamir Expedition—Malcolm Slesser—Coward-McCann, 256 p., photographs, $5.75. Less concerned with technical mountaineering than with presenting the life-cycle of an expedition and analyzing the impact of the British on the Russians and vice versa.

REPRODUCTIVE PHYSIOLOGY: Comparative Reproductive Physiology of Domestic Animals, Laboratory Animals and Man—A. V. Nalbandov—Freeman, 2nd ed., 316 p., illus., $7.50. Revised edition incorporates advances since 1958.

RUSSIA IN THE THAW—Alberto Ronchey, transl. from Italian by Raymond Rosenthal—Norton, 249 p., photographs, $5. Italian journalist's observations as Russian correspondent during the years 1959-1961.

SELECTED PAPERS ON THE THEORY OF THERMAL CONVECTON with Special Application to the Earth's Planetary Atmosphere—Barry Saltzman, Ed.—Dover, 461 p., paper, $3. New collection of 25 basic theoretical papers.

SOCIAL ORGANIZATION AND BEHAVIOR: A Reader in General Sociology—Richard L. Simpson and Ida Harper Simpson, Eds.—Wiley, 457 p., paper, $5.25. Selected readings representative of the chief fields of specialized sociological inquiry.

SPIDER SILK—Augusta Goldin—Crowell, unpaged, illus. by Joseph Low, $2.75. About spider webs, for the youngest readers.

THE STORY OF THE EARTH'S MAGNETIC FIELD—Germaine Beiser—Dutton, 128 p., illus. by Joseph M. Sedacca, $3.50. Tells how man learned about the earth's field, and about the theories and experiments that followed.

THE THYMUS: Symposium Monograph No. 2—Vittorio Defendi and Donald Metcalf, Eds.—Wistar Inst. Press, (Philadelphia), 145 p., illus., paper, $5. Papers and discussions dealing with the influence of the thymus on functional capacity of the nonthymic lymphoid organs, immunological responsiveness, and the role of thymus in carcinogenesis.

A UNIVERSITY IN THE MAKING—Albert E. Sloman—Oxford Univ. Press, 90 p., map, $3.25. The Vice-Chancellor of the new University of Essex in England outlines plans for this university which incorporates many new ideas.

VITREOUS LITHIUM SILICATES: Properties and Applications—Sarra Konstantinovna Dubrovo, transl. from Russian by E. B. Uvarov—Consultants (Plenum Press), 46 p., illus., $12.50. Focus is on investigations of the physical properties of simple lithium silicate glasses in comparison with other alkali silicates.

WATCH HONEYBEES WITH ME—Judy Hawes—Crowell, unpaged, illus. by Helen Stone, $2.75. For young readers.

WHERE DO BABIES COME FROM?—Irving Orenstein—Pyramid Bk., 63 p., illus., paper, 50¢. Answers the growing child's questions about human reproduction.

WHERE FOUR WORLDS MEET: Hindu Kush, 1959—Fosco Maraini, transl. from Italian by Peter Green—Harcourt, 290 p., photographs, maps, $12.50. The story of a mountaineering journey through Pakistan, meeting on the way the historical civilizations of Islam, Buddhism, Hinduism and the influences of Communism.

WHERE IN THE WORLD?—Philip S. Egan, foreword by Jane McGuigan—Rand McNally, 104 p., illus. by David Cunningham, $3.95. Provides, in question-and-answer form, a wide variety of information about land areas, seas, weather, climate and space, for young browsers.

WONDERS OF THE ANIMAL WORLD—Walt Disney, text by Vezio Melegari—Golden Press, 176 p., 150 full-color photographs, $4.95. Explores some habits of the beautiful and grotesque among animals.

WOOD AND CELLULOSE SCIENCE—Alfred J. Stamm—Ronald, 549 p., illus., $15. Emphasis in this reference work is on the fundamental physical properties of wood and wood components.

YOU, ME AND THE ANIMAL WORLD—Martin Wells—Houghton, 114 p., illus. by author, $3.50. Zoologist's entertaining and informative observations about bats, birds, octopuses and other animals.

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PSYCHOLOGY

'Perceptual Quotient' Devised for Children

➤ ELEMENTARY SCHOOLS may soon be using a "perceptual quotient," or PQ, to detect children with retarded perceptual abilities.

Like the familiar intelligence quotient, the IQ, this newly standardized PQ compares a child's level of ability with that of his peers'.

But while a low IQ score is accepted as a valid explanation of a child's lack of progress in school, a low PQ score indicates that a child needs help.

Researchers at the Marianne Frostig School of Educational Therapy, Los Angeles, who developed and standardized the perceptual quotient, found that above average PQ scores do not generally indicate future achievement in school, as high IQ scores do.

However, children in kindergarten and first grade with low PQ scores are likely to have difficulty in learning to read and to be poorly adjusted to school.

These early difficulties may be overcome by remedial training and readiness school programs, the researchers stated.

The sub-tests used to evaluate a child's PQ deal with different areas of visual perception. In each test the child attempts a series of carefully graded tasks.

To assess eye-hand coordination, for example, the child must draw straight and curved lines between increasingly narrow boundaries, or draw a straight line to a target.

Similar tasks have been developed to measure perception of figure-ground relationships, form constancy, position in space and spatial relationships.

Researchers Phyllis Maslow and Marianne Frostig of the Frostig School, D. Welty Lefever of the University of Southern California at Los Angeles, and John R. B. Whittlesley of the Brain Research Institute, University of California at Los Angeles, reported their work in Perceptual and Motor Skills Monograph Supplement, 1964.

The researchers believe that testing these different abilities enables evaluation of more specific assets and liabilities and study of the relationships between these abilities, school achievement and personality measurements.

• Science News Letter, 86:302 November 7, 1964

Nature Note

The Opossum

➤ THE VIRGINIA OPOSSUM, *Didelphis,* is the only pouched animal living wild in the United States.

A member of the marsupial order, the female opossum has a warm, fur-lined pouch on her abdomen into which creep the tiny babies as soon as they are born, only 12 days after conception. At this time the babies weigh about 1/15th of an ounce —over a dozen could fit into one teaspoon. As soon as the babies struggle into the pouch, they attach themselves securely onto one of her 13 nipples which are no bigger than the head of a pin. If there are more than 13 children in the brood, the excess soon starve to death.

The surviving babies grow rapidly. In about a week they are ten times as large as they were at birth. When they are ten weeks old, they start to emerge from their snug pouch and climb onto their mother's back, holding tightly to her long hair. After about 14 weeks, they are independent and on their own.

When fully grown, the opossum is an unattractive creature, about the size of a cat, with a pointed rat's face, naked ears and long black or grey hair growing over a dense, creamy-white undercoat. Its tail, bare or scaly and furred at the base, is prehensile and can be used as a fifth paw to hang from a tree or hold onto food.

Considered one of the ugliest and stupidest of creatures in the United States, the opossum has the peculiar habit of "playing possum," or going into a coma-like state of shock when frightened and rolling over as if dead.

Yet this unattractive tree-climbing nocturnal animal is aiding research, for scientists are able to observe the tiny babies at different stages of their embryonic development. Other animal embryos develop inside the mother's uterus and hence are inaccessible.

• Science News Letter, 86:302 November 7, 1964

INVENTION

Patents of the Week

The nose cone of a gun-toting rocket, which could down enemy missiles with deadly accuracy, conceals its weapon until the missile is airborne—By William McCann

➤ A "PISTOL-PACKING" MISSILE that has a gun cleverly concealed in its nose cone to shoot down enemy missiles and satellites earned a patent from the U.S. Patent Office.

Once the missile is in the air its nose cone folds away, revealing a gun designed to fire an explosive charge, such as an atomic shell, from a stabilized platform.

As the missile comes within about 80,000 feet of an oncoming target, a fire control system inside establishes a line-of-sight detection and takes deadly aim. Thus, rather than aiming itself at an enemy ICMB, the gun-toting missile need only come within "shooting" range.

Co-inventors Dr. Frederick W. Ross, Del Mar, Calif., and Morris Kaswen, San Diego, report a number of advantages of this weapon over conventional anti-missile missiles: 1) increased maneuverability, 2) less weight, 3) high intercept accuracy, and 4) less need of a highly accurate launch.

The inventors claim the missile, which earned patent 3,153,367, will improve defense against high-speed enemy missiles from ground level to altitudes of more than 50 miles.

They assigned patent rights to the U.S. Army. The missile is now under development contract to the Army Materiel Command and the Solar Aircraft Company, San Diego.

Baseball Pitching Aid

Johnny Sain, former Boston Brave and New York Yankee pitching star, was awarded a patent for a device that helps train young baseball players to pitch.

A baseball with a hole drilled in it is attached to a rod and handle. The baseball is mounted on a spindle so it can twirl freely. A youngster can hold the handle in his free hand while practicing various pitches on the rotating ball with his pitching hand.

In addition to teaching a young ball player the proper way to throw curves, sliders, sinkers, screwballs or fast balls by spinning the ball different ways, the device can be used to develop and coordinate arm muscles, Mr. Sain reported in his patent.

Mr. Sain, of Walnut Ridge, Ark., who recently signed a 1965 contract as coach for the Minnesota Twins, earned patent 3,152,803 for his pitching aid.

Artificial Heart

Three pioneers in research on the artificial heart have been awarded a patent for an improved version, which they hope will someday be an adequate substitute for the human heart.

Profs. William J. Fry, his brother, Francis J. Fry and Reginald C. Eggleton, all of Champaign, Ill., earned patent 3,152,340 for their improvements of the overall design features and pumping apparatus in an artificial heart. The researchers, who assigned patent rights to Interscience Research Institute, Urbana, Ill., have been working on the substitute heart since 1955 and have used it experimentally with dogs in the laboratory.

The ultimate goal of the artificial heart is the complete internal replacement of the human heart, Prof. William Fry told SCIENCE SERVICE. It is designed for long-lasting use.

Other Interesting Patents

A parking garage shaped like a water wheel was awarded patent 3,153,488. This new rotary garage is designed to handle a number of cars and yet take up as little space as possible. It was invented by Kyosuke Mori of Tokyo, Japan.

A device that counts and measures the size of raindrops earned patent 3,153,727 for Alan M. Nathan, New York City. The raindrop sizer and counter relays its information to a memory or counter unit which can be placed in a shelter some distance away. Patent rights were assigned to the U.S. Army.

A steering mechanism for a portable dam used on irrigation ditches earned patent 3,153,330 for John E. Melin, Livingston, Mont. The mechanism allows the dam to automatically adjust to the contours of a ditch.

David K. Bosshardt, Berkeley Heights, N.J., Eugene E. Howe, Somerset, N.J., and Jesse W. Huff, Westfield, N.J., were awarded patent 3,153,615 for their method of reducing the cholesterol content in the blood. The method consists of incorporating lithocholic acid or hyodeoxycholic acid in the diet. Patent rights were assigned to Merck & Co., Rahway, N.J.

• Science News Letter, 86:303 November 7, 1964

Do You Know?

Approximately 92% of the *money* spent in the U.S. space program goes into ground facilities.

Water pollution killed more than an estimated 7.8 million *fish* in 1963, the U.S. Public Health Service says.

A 1963 survey showed that only 47% of the motorists with *seat belts* in their cars use them during local travel.

The Alaskan *tidal waves* last March were caused by the shifting of a piece of the earth's crust larger than Florida.

• Science News Letter, 86:303 November 7, 1964

New Ideas and Gadgets

Ask for Gadget Bulletin 1273 for sources of new things described. Send a self-addressed envelope to SCIENCE SERVICE, 1719 N St., N.W., Washington, D. C. 20036. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

⚙ WHEELLESS LAWN MOWER floats on a cushion of air. Weighing just 30 pounds and powered by a 2½ h.p. engine, the rotary mower is easy to operate and maneuver. Only finger-tip pressure is required to guide the mower which trims close under trees, shrubs and bushes. Its height of cut can be adjusted from 5/16 to 1-7/16 inches. The mower hugs the ground keeping the blade away from hands and feet.

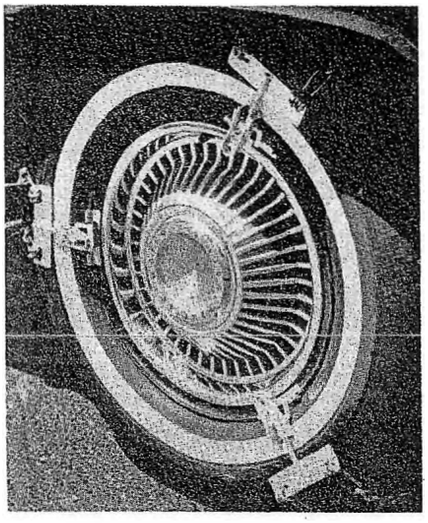
• Science News Letter, 86:304 November 7, 1964

⚙ POCKET TIMER is a personal time reminder that is attached to a key chain and can be carried in the pocket or purse. The timer, which can be set for periods of five minutes up to one hour, softly buzzes an alarm when the pre-set time interval has passed. It is useful as a reminder for taking pills, making phone calls, keeping important engagements or parking time.

• Science News Letter, 86:304 November 7, 1964

⚙ FLUORESCENT MARKERS for school or home can write with fluorescent colors on any surface, including paper, leather and plastic. Useful for making posters or signs, for artcraft, or for marking children's bicycles for safety at night, the felt-tipped markers come in five colors. The ink in the markers dries instantly and is smear-proof and waterproof.

• Science News Letter, 86:304 November 7, 1964



⚙ CLIP-ON TIRE CHAINS, shown in photograph, can be quickly placed on tires without jacking even if vehicle is mired in snow or mud. Easily installed clips are permanently fastened to the inside and outside rim of the back wheels and a cross chain assembly is then fastened to the clips and across the tire whenever traction is required. Sizes are available for U.S. and foreign cars, and light trucks. No special tools are required.

• Science News Letter, 86:304 November 7, 1964

⚙ "AFTER FIVE" COFFEE TABLE is a walnut grain Formica top circular table 36 inches in diameter with a 17-inch circular clock face at its center. The clock dial, having brushed copper finish and walnut hour markings, is covered with a heavy dust-tight plate glass crystal sealed in place. The clock movement is powered by a mercury battery that will operate the clock for approximately two years.

• Science News Letter, 86:304 November 7, 1964

⚙ MULTIRULE CALCULATOR provides children in grades five to eight with a wide range of mathematical activity from ratio, proportion and fractions to the use of the slide rule. The device, consisting of two matching straight-edge scales numbered from 1 to 100, helps children learn to use the slide rule by themselves. A teacher manual comes with each set of six multirules.

• Science News Letter, 86:304 November 7, 1964

⚙ THERMAL WIRE STRIPPER that protects the operator against burns, automatically centers the wire to be stripped over the warmest area. The stripper, built like hand pliers, is flexible and easy to operate, and can be utilized in the tightest quarters without burning adjacent wires. The tool is supplied with a compact control box, treadle rest to turn off power and on-off indicator light.

• Science News Letter, 86:304 November 7, 1964

Doctors Are Reading

Better Helmets Needed to Avoid Football Injuries

➤ THE STEADY INCREASE in the number of head and neck injuries in football calls for better helmets, a physician indicated in GP, 30:106, 1964, Journal of the American Academy of General Practice.

Head and neck injuries are responsible for 72% of all deaths directly attributed to football, said Dr. H. A. Fenner, Jr., Hobbs, N.M. The number of deaths directly due to football injuries over the past 31 years is 539, he said.

A good way to cut down on serious football injuries, he recommends, is to use helmets of tough, durable materials that are not flexible, as are leather and plastic helmets now used.

One helmet in particular that has proved valuable is a model that has a tough fiber glass shell and a nonresilient liner. Its advantages are that it is safer, more comfortable, and does not strike the shoulder pads when the player is in a "football stance."

Cat-Scratch Disease May Afflict Brain

Cat-scratch disease, an infection caused by virus transmitted through cat scratches, may lead to encephalopathy, an affliction of the brain, a physician reported in Postgraduate Medicine, 36:368, 1964.

If encephalopathy does follow cat-scratch disease, the onset is sudden, with resulting fever, coma and convulsions, said Dr. Fred S. Brooksaler, University of Texas Southwestern Medical School, Dallas.

Many Suicides See Physicians Before They Act

About 60% of all persons who commit suicide see their physicians a short while before their deaths, a professor of psychiatry reported in GP 30:133, 1964.

For this reason, Dr. Eugene R. Inwood of the Georgetown University School of Medicine, Washington, D.C., said physicians should be aware of suicide clues. Some of these "cries for help" include feelings of helplessness and hopelessness, or may come out as an exaggeration of physical discomfort.

Heart Beats Transmitted by Telephone

Transmitting heart beats by telephone has shown to be practical, accurate and easy to perform, a team of researchers reports.

In a three-month study of 71 patients, in which 102 tracings were made, telephonocardiography was found to be extremely valuable in five of the cases. In 11 of the patients, the method was of considerable value in allowing immediate diagnosis for needed treatment.

Drs. Constantine T. Cerkez, B. Bacongallo, George W. Manning and Mr. Gordon C. Steward, all of London, Ontario, reported the study in the Canadian Medical Association Journal, 91:727, 1964.

• Science News Letter, 86:304 November 7, 1964