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SCIENCE REVIEW OF THE YEAR

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • DECEMBER 22, 1945

Streptomycin Source

See Page 394

A SCIENCE SERVICE PUBLICATION

GENERAL SCIENCE

Rush of Scientific Ideas

Many discoveries, dammed up in researchers' minds as they toiled at wartime tasks, expected by Dr. Vannevar Bush, Carnegie Institution President.

➤ SCIENTIFIC discoveries can be expected to take a big spurt ahead in the next few years, if the world remains at peace and the country continues prosperous, Dr. Vannevar Bush, president of the Carnegie Institution of Washington, predicted in his annual report.

Several factors figure in this expected upswing in research, Dr. Bush stated. To one, he gave final emphasis:

"Many a scientist has now applied himself assiduously for five years to tasks often far from his inclinations, assigned by the needs of the moment, and requiring his full energies. Yet the speculative mind has not been idle, even though it has been temporarily inhibited from entering those inviting trails that have been glimpsed in the midst of harassing and confining duties. Every brilliant scientist in the country's service probably has one or more of these which he has promised himself he would pursue when the release came, and it has now come. We have had a partial moratorium on the creations of fundamental science, we have unwisely produced a deficit of scientific manpower, but we undoubtedly have a new stock of dammed-up ideas. It will be interesting to watch what happens as the dam breaks."

As wartime chairman of the Office of Scientific Research and Development, Dr. Bush had to watch the demands of war pull the best research men out of the laboratories, not only of his own institution but of all the universities and research establishments of the country. He again called attention to sins committed against the scientific welfare of this country by the indiscriminate shoveling of the best scientific brains into pick-and-shovel and potato-peeling tasks:

"By taking altogether too many trained young scientists and engineers out of the laboratories and industry, we very nearly wrecked that part of our war effort which consists in keeping the instrumentalities in the hands of our fighting men substantially superior to those of the enemy. We also sacrificed the future to immediate needs, more than did any of our allies or indeed our enemies, by halting our processes of advanced education, thus creating a lack of scientific manpower from which we shall not recover for many years. We are a strange country. As this is written we are at peace, but we are still doing both these things."

Finally, Dr. Bush adverted to recently expressed misgivings lest the great emphasis of science bring about a state of educational unbalance in this country. The right remedy, he declared, is not to slow down science but to widen opportunities in all the arts and professions—including the improvement of the education of future politicians who will govern our democracy.

"Specifically," he said, "we need to educate fully in this country all the brilliant young minds that can be found, wherever they may be located and whatever their station. We have never done so nearly well enough."

Antibiotic Structure

➤ GERM-STOPPING substances with penicillin-like action formed by green plants apparently belong to the well-known group of organic compounds chemically classified as unsaturated fatty acids, Dr. H. A. Spoehr and his associates state in the new Yearbook of the Carnegie Institution of Washington. Commonest use of fatty acids is in the making of soap.

Scientists in Dr. Spoehr's laboratory discovered, a year or so ago, that a one-celled green water plant known as Chlorella, secreted a germ-stopping substance, or antibiotic, into the water. They gave this substance the name of chlorellin. To get it in a more concentrated form in less time, they tried grinding up dried masses of Chlorella and extracting them. What came out was a dark, oily material which had no particular germ-stopping power but which acquired it upon exposure to air and sunlight.

This oily stuff was identified as a fatty acid of the unsaturated series, that is, one still capable of taking in more oxygen. When more familiar unsaturated fatty acids such as lauric and linoleic were tried out they produced similar results: no action when freshly prepared, but germ-stopping effects after exposure to air and sunlight. Similarly, extracts made from leaves of a wide variety of green plants behaved like the chlorellin preparations.

Dr. Spoehr suggests that mankind has been for ages unconsciously giving itself some protection against germs through the antibiotic action of the green plants in most diets.

Hybrid Grass for Pastures

➤ HYBRID CORN in the fields may soon be waving its greetings to a newcomer: hybrid grass in the pastures. Breeding experiments of Carnegie Institution plant scientists under the direction of Dr. Jens Clausen are producing crosses between widely different species of bluegrass that promise to thrive under climatic and soil conditions forbidding to both parents. One such hybrid, between a giant bluegrass from the prairies of eastern Washington and a hardy race of Kentucky bluegrass from Swedish Lapland, combines a bunch-grass growing habit with the production of stolons or runners, and a summer-active, winter-dormant way of life with its exact opposite, the tendency to grow in winter and lie dormant in summer. Out of such combinations of opposites it is hoped to produce more vigorous, more nutritious grass varieties for the range.

How Volcanoes Make Fossils

➤ VOLCANOES have apparently always been prime makers of plant fossils; at least, such fossils are always especially abundant in deposits of volcanic ash. Studies of the process at its beginning have been made possible by the opportune birth of the young volcano Paricutin in Mexico; Dr. Ralph W. Chaney, leader of the Institution's work in paleobotany, reports on findings made in the region by Dr. Erling Dorf.

Fossil formation is a slow job, and little or no change can be seen yet in the leaves, stems and fruits buried by Paricutin's ash showers. Apparently the relative abundance of fossils does not necessarily give a true picture of the original state of the vegetation, for Dr. Dorf has found relatively few alder, linden and cherry remains, though these trees are plentiful in the neighborhood; buried pine and oak remains are more abundant. There seem to be better chances for plant parts to survive as fossils if they are buried in dry ash than if the ash falls on (*Turn to page 388*)

PHYSICS

Man-Made Cosmic Rays

4,000-ton cyclotron may permit their artificial production, the obtaining of atomic energy from cheaper sources and the discovery of many new elements.

➤ BREAKING the war-imposed silence which has shrouded atomic research since 1941, Prof. Ernest O. Lawrence, University of California physicist and Nobel Prizewinner, disclosed that work has been commenced on a $1,450,000 project which will provide the university with a gigantic 4,000-ton cyclotron, three times larger than any now available, for use in peacetime atomic exploration. The machine, which will be completed next summer, may for the first time permit the artificial production of cosmic rays, the obtaining of atomic energy from cheaper sources than uranium, and the discovery of many new elements, Dr. Lawrence predicted.

The youthful-appearing scientist was frankly elated as he announced that military authorities had flashed a green light to "go ahead with unhampered peacetime atomic research."

"Certain security restrictions will continue in effect," he said, "but I believe we shall be able fully to publicize our activities in the very near future."

For the present, though, Dr. Lawrence added, American researchers must confine their experiments to this country, not exchanging findings or data with scientists of other nations.

"I find no fault with these security restrictions," he emphasized.

Construction of the 4,000-ton cyclotron began in 1940, Dr. Lawrence continued, but was halted two years later to permit use of the equipment already installed for production of the first sizable portions of U-235 pure enough for use in the atomic bomb.

When completed the giant atom-smasher will be five times more powerful than the present 60-inch Berkeley cyclotron, which was also a top-secret wartime project when it was employed in research on the bombs that leveled Nagasaki and Hiroshima. The new 184-inch cyclotron was originally designed to produce deuterons (heavy hydrogen nuclei) of 100,000,000 electron volts, Dr. Lawrence said, but knowledge gained in war research has resulted in plan changes which will permit physicists to accelerate deuterons to energies of 200,000,000 electron volts and alpha particles (helium nuclei) and protons (hydrogen nuclei) to energies of 400,000,000 electron volts. However, he added, the machine, which includes a 3,700-ton electromagnet—the largest known to exist—will initially be capable of producing deuterons with energies of 60,000,000 electron volts and alpha particles of 120,000,000 electron volts. These are merely words to the average layman but to Dr. Lawrence and his associates they spell the opening of broad new fields for research from which radical changes affecting all human life may develop.

"The enormous energies which will be achieved will make practical the heretofore impossible testing of many theories of atomic structure," Dr. Lawrence stated. "Nobody knows what the ultimate results will be, but this laboratory will be open 24 hours a day, seven days a week, constantly pressing the quest for new knowledge."

Operation of the giant atom smasher, he declared, will bring science into a "new realm of the atom."

"We shall be breaking through a new barrier," he said. "What we find beyond should be as exciting as what we have found since the 1930's, when we began breaking into the nucleus of the atom. That we shall learn more of the elementary forces of nature is almost certain. The opportunity will exist for mankind to gain greater control of our environment through the use of this information."

The research machine will provide new tools for research in biology, medicine, chemistry and agriculture, Dr. Lawrence pointed out.

Prof. Wendell M. Latimer, Dean of the University of California college of chemistry, and Prof. Glenn T. Seaborg, one of the discoverers of plutonium, said they hoped it will be immediately possible to use the device to produce new trans-uranic elements, four of which have been obtained by combined processes of bombardment in the 60-inch cyclotron and chemical separation.

The promised artificial production of cosmic rays is significant, Dr. Lawrence pointed out, because scientists presently pin their hopes of eventually understand-

LONDON CONFERENCE—U. S. delegation at the UNESCO Conference, (See SNL, Dec. 1), included: first row, right to left: Senator James Murray, Archibald MacLeish, Chester E. Merrow, Dean Mildred Thompson; second row, right to left: Dr. Warren Kelchner, Dr. Bryn J. Hovde, Dr. Harlow Shapley, Dr. Grayson N. Kefauver; next row: Kenneth Holland, Charles Thomson.

ing the nature of matter on these rays.

Cosmic rays, he added, are believed to result from explosions in nature releasing atomic energy. Laboratory production of them will permit a constant study, he explained, as contrasted with the present limitation which permits study of chance cosmic rays only as they pass through instruments such as cloud chambers.

"Such fundamental research is necessary if we are to understand the forces with which we are working," Dr. Lawrence declared. "While we know how to produce the atomic energy in a bomb, we know very little about the elementary nuclear forces involved in the release of atomic energy."

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MEDICINE

Unbearable Pain Relieved

Brain operation removes fear and worry and thus remedies the pain of cancer, spinal nerve root inflammation and tabes dorsalis.

➤ UNBEARABLE pain in cancer and in spinal nerve root inflammation, and the girdle and lightning pains of tabes dorsalis, have been relieved by a brain-cutting operation, Dr. James W. Watts and Dr. Walter Freeman reported at the meeting of the United States Chapter of the International College of Surgeons in Washington, D. C.

Prefrontal lobotomy is the technical name for the surgical procedure. The brain is cut but no part of it is removed. The operation was first devised for certain types of mental and nervous illness. Connections between the frontal lobes and other parts of the brain are severed by this operation and thereafter anxiety, worry and nervous tension are relieved.

With the banishing of fear and worry by the operation, patients who had been complaining unceasingly of pain stopped complaining. They no longer asked for morphine and appeared comfortable and in good spirits. When asked about the pain, however, some admitted it was still present and exactly like it was before the operation.

The operation, the surgeons concluded, changes the patient's reaction to pain without materially changing his ability to feel pain. Among those with unbearable pain before the operation, even in cases of cancer, the fear of pain and worry over it seemed to be quite as important as the pain itself.

The discovery that the operation would affect unbearable pain was made in experiences with some of the 360 patients for whom it was performed for nervous and mental diseases. Following this, it was tried in other patients without mental or nervous disease. The results were equally successful.

"It goes without saying," the surgeons stated, "that an individual who bears his pain with fortitude is not a candidate for psychosurgery. But when the pain becomes unbearable and when fear of pain becomes as important as pain itself, then lobotomy has something to offer."

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MEDICINE

Disease Treatments Sought In Herbs of Central Asia

➤ NEW treatments for disease are hoped for through use of plants and herbs expected to be discovered by a Soviet medical expedition in the mountainous Altai region of central Asia.

The sending of several expeditions to this area has been announced by the U. S. S. R. Academy of Medical Sciences through its secretary, Prof. V. V. Parin.

Other inquiries under way include a survey of the health conditions in the regions that were occupied. In all, 30 medical expeditions are now in the field.

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matted wet accumulations in ponds and streams. The most likely place for Paricutin's plant burials to become fossils is in the valley ash covered by lava flows.

Field Work Resumed

➤ FURTHER digging into America's remote past has already been started, now that the war is at an end, Dr. A. V. Kidder reports. More ambitious projects will be undertaken in the coming year. One place where work will be actively pushed is in Guatemala, where preliminary surveys have already discovered ruins that appear to date from late prehistoric times, Dr. Kidder said.

A Mexican draftsman of mixed Spanish and Maya descent, Isaac Esquiliano, of Merida, is working under the direction of Dr. S. G. Morley on a dictionary of the still-unsolved hieroglyphic writing of the ancient Maya people. Although the glyphs cannot yet be read, their general subjects can be identified, and a classification is thus possible. This in turn is expect to aid in the classification of new glyphs as they are discovered, as well as in the more accurate identification of partially destroyed inscriptions.

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GENERAL SCIENCE

Atomic Power Leads

Science Review for 1945 shows the atomic bomb, radar, proximity fuze, and influenza vaccine have top billing among the year's advancements.

This summary of the year's happenings in the world of science is limited by space to just the highlights. Most of the events are described in detail in the pages of the SCIENCE NEWS LETTER *for the current year. If you wish to refer to any particular report you may find it readily through the index. (See SNL, June 30 and also the issue which will appear next week, Dec. 29).*

By SCIENCE SERVICE STAFF

➤ ENERGY from within the atom used in the atomic bomb is the most important advance in science announced in 1945 with world-shaking consequences. Possibility that atomic bombs will aid the elimination of future wars or make the next world conflict a danger to civilization's continuance has projected science into first place in international affairs.

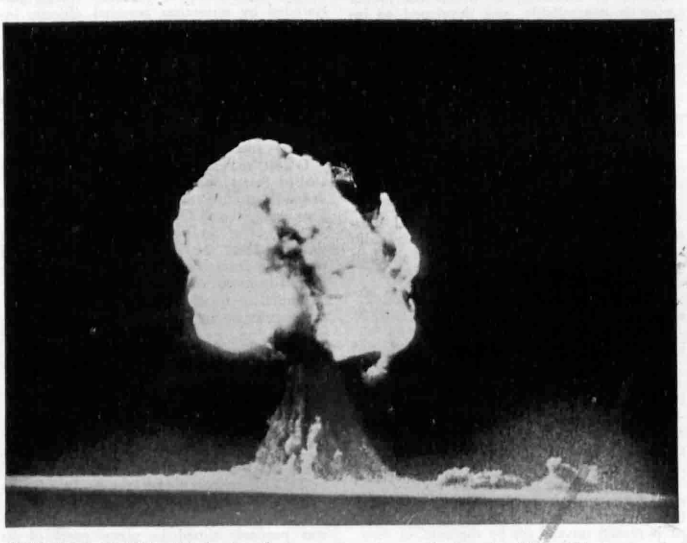
Science summaries for 1940, 1941, 1942, 1943 and 1944 need additions due to advances kept secret. Achievement of the first cyclic nuclear reaction in 1942 ranks with the discovery of fire. Four new chemical elements have been added to the 92 previously known and one of these, 94, or plutonium, is the material most effectively used in the atomic bomb.

No less important are the by-products of nuclear fission, including the large variety of radioactive products not completely revealed that promise major medical treatments and explorations of cancer and other diseases and the industrial use of chemical production methods developed in the $2,000,000,000 atomic bomb project.

War applications of electronics, including radar, the proximity fuze using radar principle, loran which is a radio navigation system, perfected radio communication methods, and other developments were announced with the promise of many peacetime uses.

Among the health advances were several treatments for diseases unconquered, use of influenza vaccine on a large scale, an antidote for arsenic and bichloride of mercury, two promising rat poisons and continued applications of DDT.

First legislative steps were taken toward a federally supported national research foundation.



ATOMIC TEST—Light in the atomic test explosion in New Mexico gave way to the huge fiery ball of vapor which is shown boiling skyward above a pillar of dust in this U. S. Army Air Forces photograph.

ATOMIC POWER

Dropping of Atomic Bomb Announced on Aug. 6

➤ DROPPING of an atomic bomb on Hiroshima, Japan, was announced by President Truman on Aug. 6. A second bomb of the same character was dropped on Nagasaki on Aug. 8.

The War Department released on Aug. 10 a semi-technical report on the processes by which the use of atomic energy for military purposes had been achieved. It was written by Dr. H. D. Smyth of Princeton at the request of Maj. Gen. L. R. Groves, U. S. Army, head of the "Manhattan Project," which was the Army's designation of the atomic bomb project.

Reports by the British and Canadian governments on their share in developing the atomic power project were released simultaneously with the Smyth Report.

The Smyth Report revealed the following steps in the development of the atomic bomb —these steps had previously been withheld from publication by a voluntary secrecy agreement set up by the scientists working on the problem:

Possibility of using the large amounts of energy released by nuclear fission for production of a bomb began in 1939 with confirmation of the announcement of fission of uranium—European-born physicists were instrumental in getting U. S. Government support for this project. Scientists voluntarily restricted publication of papers on the subject of uranium fission in scientific journals.

Fission of uranium isotope of atomic weight 235 was the only likely source of atomic power at the time the U. S. Government took up the atomic power project.

Research on U 235 fission, using heavy water (D_2O) as the moderator, was under way in both England and Germany in 1939. American scientists substituted specially purified graphite for heavy water.

In order to make the fission self-sustaining, it was found necessary to separate U 235 (less than ½% in any uranium sample) from the more abundant isotope U 238 (more than 99%). The more common kind prevents the chain reaction by absorbing neutrons.

An enormous isotope separation plant, using gaseous diffusion methods, was erected at Oak Ridge, Tenn., where much of the experimental work for the whole project was done.

Formation of element 94 from uranium 238 by neutron capture was effected in the Radiation Laboratory of the University of California in 1941. The new element was found to undergo slow neutron fission like uranium 235. It was named plutonium.

Plutonium (Pu), element 94, radioactive but approximately as stable as radium, was obtained from uranium 238, element 92, by way of the intermediate short-lived element 93, named neptunium (Np). At least two isotopes of each of the new elements, 93 Np 238, 93 Np 239, 94 Pu 238, 94 Pu 239, are known. Uranium 238 changes to neptunium and neptunium to plutonium by beta-ray transformation. Plutonium emits an alpha ray and slowly changes back into U 235.

Manufacture of plutonium from U 238 allowed utilization of the inert uranium isotope for atomic power purposes. It allowed the advantage of sharp chemical separation of different elements instead of the tedious diffusion methods of isotope separation.

On Dec. 2, 1942, the first selfsustaining nuclear chain reaction ever initiated by human beings began at West Stands pile, Stagg Field Stadium, Chicago.

The organization of the atomic bomb project was at first under OSRD. During 1942 and the spring of 1943, control was gradually shifted to the Army, and in May 1943 the Army Engineer Corps took over.

Production of materials for atomic bombs was at first planned to be located at the Clinton Engineer Works at Oak Ridge in the Tennessee Valley. Later the plant for full scale manufacture of plutonium was built at Hanford, Wash., and the bomb laboratory was located at Los Alamos, N. M.

July, 1945, the date of completion of the Smyth Report, found the scientists who had worked on the project prepared for the first use of the atomic bomb as a weapon and looking ahead to the possible peacetime uses of nuclear power and the social consequences of the terrible weapon they had evoked.

International implications of the atomic bomb became apparent when various proposals were considered by Congress and the atom bomb became a growing factor in relations with other nations.

AERONAUTICS

Jet-Propelled P-80 Goes 550 Miles Per Hour

➤ JET-PROPELLED P-80 or "Shooting Star," with a speed of over 550 miles per hour and able to cruise at 45,000 feet, was designed with a new type of wing with a knife-like leading edge.

The Army's giant B-32 bomber, equipped with eight turbo-superchargers and weighing 50 tons, was designed to fly at more than 300 miles per hour.

Rapid climbing ability was one of the special features of the new Navy Corsair, fighter-bomber, with a speed of 425 miles per hour.

A new type of airplane, the Navy "Fireball," was equipped with two engines which can be operated together or separately, one of which is a reciprocating engine driving conventional propellers and the other a jet propulsion engine.

An adaptation of the "Lightning," P-38 fighter, was especially designed for carrying cargo.

The "Packet," heavy cargo plane, was produced with 22,000-pound useful load capacity; it has a nearly square fuselage and in effect is a large flying truck or freight car that can be loaded through tail doors.

"Seahawk," Navy's observation-scout plane, was made to fly higher, farther and twice as fast as any previous models.

A 10-passenger or cargo helicopter with two rotors in tandem, mounted at the front and rear on the fuselage, successfully passed tests in the air.

A commercial transport, the 202, accommodating 30 passengers, was designed to fly 250 miles per hour, faster than any prewar twin-engined airliner.

A giant Clipper was designed to carry 204 passengers and 14,000 pounds of cargo, at a speed of 340 miles per hour, which would mean New York to London in ten hours.

A glider capable of carrying 16 men and two tons of freight, 500 pounds more than previous models, was developed with reinforced nose section that opens like a mouth, and short wings.

A 8,198-mile non-stop, non-refueling flight was made by a Superfortress that flew from Guam to Washington, D. C., in 35 hours, 5 minutes.

Radar equipment, permitting operators on the ground to see on a radarscope the actual position of all aircraft within a 25-mile radius, enabled them to direct pilots to safe landings in heavy fog or overcast.

A small detector attached to the carburetor was devised to warn pilots of impending engine trouble by showing changes in horsepower output.

A compact turbosupercharger, that muffles engine noises and makes possible increased speed of planes, was invented.

An electronic control stick that requires only one hand made it possible for one-armed drivers to fly heavy four-engine bombers.

An experimental plane without rudders, ailerons or elevators, in which the whole wing is controllable, was developed to increase safety and ease of handling of personal planes.

A portable plane-handling apparatus, consisting of steel cables and nylon rope loops, provided a braking system for light planes and permitted them to land and take off without landing runway or field.

A direct fuel injection system for air-cooled engines was developed that reduces fuel consumption and makes possible increased rate of climb and acceleration.

A new instrument approach control technique using VHF, very high frequency radio waves, allowed safe landing of planes through overcast at three-minute intervals.

Radiant heating was introduced into airliners, using heated air between the inner and outer walls.

An international air freight service was inaugurated.

A variable-density wind tunnel, capable of simulating flight conditions within speed-of-sound range, made it possible to test jet-propelled airplane models with wingspans up to 10 feet at pressures comparable to 35,000-foot altitude.

An acetylene-burning beacon light, visible at 12 miles, was developed that will burn for a year without adjustment or refueling; it is turned on and off by the sun.

Ultra-high radio frequency was used to operate from the ground pilotless, model airplanes used as antiaircraft targets for gunnery practice.

ANTHROPOLOGY-ARCHAEOLOGY

New Find Is Identical With Famous Wadjak Skull

➤ A TOMB of the late first century A. D., found between Jerusalem and Bethlehem, yielded inscriptions which may have been written by followers of Jesus.

A human skull discovered near Keilor, Australia, was shown to be identical with the famous Wadjak skull, believed to be 20,000 years old.

Restudy of the ancient child's skull found in 1938 in Uzbekistan, Central Asia, led to the belief that it is not a Neanderthal of the classic European type, but a more advanced human type.

The Plesianthropus, or "almost man" skull from Africa, was found to be more manlike than preliminary studies showed.

Measurements of the faces of 3,000 soldiers were made under the direction of anthropologists with a new instrument making simultaneous measurements of 62 facial characteristics; ten different head types were established.

An expedition into interior Chiapas, Mexico, made additional findings of gigantic images of human heads, as well as caves stacked with ceremonial pottery.

Arrangements were made to move 20 giant prehistoric statues for exhibition in Mexico City from an inaccessible region of Tabasco.

By studying the twists in human leg bones, anthropologists obtained knowledge useful in correcting bad foot posture.

Shells of giant ostrich and dinosaur eggs show the same X-ray diffraction patterns of calcite as lobster claw and modern hen's egg.

A well-preserved corpse, buried in frozen soil 180 to 200 years ago near Yakutsk in northern Siberia, was reported found, surrounded by numerous personal objects, including butter, porridge and sour cream.

The first simultaneous census of all the countries of the Western Hemisphere was planned for 1950.

Rare example of Arabic block print on parchment, probably from the 14th century, was identified in an old collection of papyri in the United States.

Oldest recognized culture in the eastern United States, the Archaic, was more clearly defined in the description of a site on Frontenac Island, Cayuga Lake, N. Y.

Analysis of findings in Kentucky mounds showed that the Adena people differed physically from the Hopewellians and were culturally more primitive.

Studies of fossil pollen under way in Australia promise to throw light on the cause of variation in coal and on conditions of coal formation.

ASTRONOMY

Total Eclipse of Sun Occurred on July 9

➤ TOTAL eclipse of the sun on July 9 was studied by astronomers in Montana, Canada, Norway, Sweden and the USSR; the eclipse was precisely timed in many parts of its path and cause of polar rays of the sun and the phenomenon of the "falling shadow" studied.

A supernova or brilliant exploding star

100 million times as bright as the sun was discovered near the center of Messier 51, famous spiral nebula in the constellation Canes Venatici; a nova 80,000 times solar brightness was located in the constellation Aquila.

The new comets du Toit III, IV and V and Friend-Peltier were discovered; Comet Pons-Winnecke and Kopff's periodic comet, both last seen in 1939, were rediscovered.

Series of photographs taken with the coronagraph showed that tiny, spike-like prominences on the sun called spicules are more frequent than previously supposed and last only four or five minutes.

Half-a-dozen double stars were found to have either one or both components surrounded by rings of flaming gases rotating in the same direction as the stars. These Saturn-like rings are believed to surround many two-star systems and to have been formed early in the system's history.

Study of the infrared spectrum was found to reveal size and distance of the cooler component of double stars and the absolute magnitude of M-type stars which are rich in infrared rays.

Discovery of a double star composed of two white dwarfs was reported; five new white dwarf stars were found, bringing to about 75 the number of known white dwarfs.

Watch-shaped swarms of stars, with long spiral arms may be "young" galaxies that will develop into compact clusters of suns, it was suggested.

Two photoelectric cells in a balanced circuit were used to record automatically the passing of meteors or "shooting stars," and to measure their brilliance.

A brilliant fireball, seen and heard by many persons early in the morning of May 4, was determined from reports by observers to have burst at a low altitude southwest of Philadelphia, probably near Chester, Pa.

Evergreen plants may exist on Mars, resemblances between infrared-photographs of the spectrum of distant conifers here on earth and of portions of Mars indicate.

Infrared auroral display, detected in the night sky as far more intense than the ordinary persistent aurora, was believed due to a large number of nitrogen atoms in the high atmosphere.

Gases from one of the sun's flame-like clouds high above a group of sunspots were attracted to a neighboring prominence of fiery gases, giving information as to forces acting on the sun.

The atmosphere of Titan, Saturn's largest moon, was formed after the satellite cooled off, temperature studies indicated.

BIOLOGICAL SCIENCES

Powerful New Pesticides Released for Civilian Use

➤ SEVERAL powerful new pesticides, restricted to military and experimental uses during the war, were released for civilian employment; they include DDT and Gammexane (British) against insects, 1080 and ANTU against rats, 2-4-D and ammonium sulfamate against weeds, and G-412 and G-410 specifically against ragweed.

Germ-stopping substances similar in action to penicillin were found in lichens, in wilt-resistant tomato plants, in leaves of Scotch thistle, mullein and peony, and in the fruits of blueberry, currant, mountain-ash and honeysuckle.

Formulae for several effective mosquito repellents were released by the Army and Navy.

Heartbeats of birds, many times more rapid than those of humans, were counted with a sensitive electrical instrument attached to the twig on which the bird perched or even under the nest.

Plant disease viruses, far too small to be seen with any instrument, were studied by depositing gold films, eight Angstroms thick, on protein particles of submicroscopic size and using an electron microscope.

Bacteriophage, foe of disease germs, formerly invisible, was seen through an ordinary microscope after being treated with a dye and irradiated with ultra-violet rays.

Bacteria-like parasites within the bodies of cockroaches were killed with penicillin; soon the cockroaches died also.

Fungus that causes one of the most destructive of plant diseases, flax wilt, was found to be a potential source of most of the B vitamins.

Unexpected new sources of quinine were located in South America: some species of cinchona were found more abundant than previously believed; the bark of other species was found to produce good yields of quinine.

Large-scale soilless gardens were established in a number of out-of-the-way places in the tropics to produce otherwise unavailable salad vegetables for Air Force personnel.

A variety of lettuce called Slobolt, that does not "go to seed" with warm weather, was announced.

Mosquito larvae were found to get cramps and drown when breeding ponds are treated with DDT.

Mushrooms, proverbially shortest-lived of plants, were found alive 35 years after being sealed up in glass tubes under high vacuum.

Oysters were induced to produce eggs in winter for research purposes by warming them up to mid-summer temperature.

Love-songs of mate-seeking mosquitoes were recorded on phonograph records for use in luring the pests to their death in insect traps.

Ergot, fungus drug used in childbirth, was successfully cultivated under tropical conditions in India.

Radioactive phosphorus injected into the body of a pregnant female mouse was found in the full-grown offspring three months later.

Plant growth was speeded by weak solutions of colchicine, the "evolution chemical" used previously to originate new species of plants by multiplying the heredity-bearing chromosomes of old ones.

Carotin, yellow pigment in plants, was found essential to reproduction in cattle.

Tomato plants were stimulated to highest production by protecting them from the heat of the early afternoon sun with tar-paper coverings.

Rubber was extracted from the leaves of *Cryptostegia grandiflora*, a tropical milkweed-like vine, through bacterial fermentation.

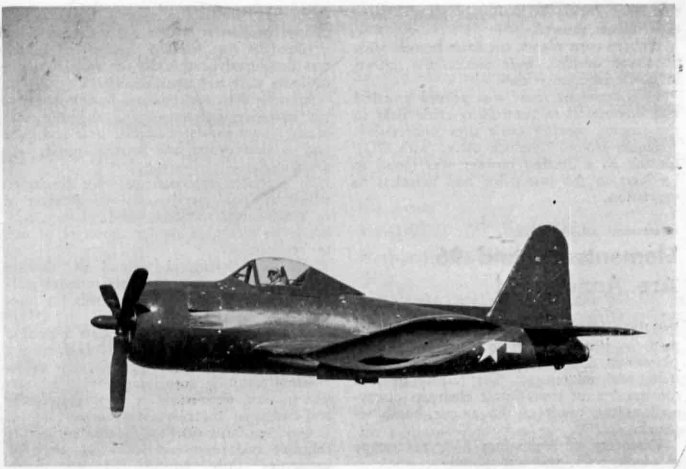
Ways were studied of utilizing for livestock feeds the B vitamin manufactured in the cow's stomach and excreted with digestive wastes.

Resumption of scientific expeditions began with plans for one early in 1946 to Nyasaland, South Africa, to study small animal life.

Genes, or heredity-determining units within a cell, were reported as being seen at work chemically influencing the course of physiology.

One species of black wasp was found to kill crop-devouring Mormon crickets at the rate of one million per square mile each season.

Hatchability of hens' eggs is not affected by low atmospheric pressures like those en-



TWO POWER SOURCES—In flight this Ryan Fireball fighter can be operated on either its jet engine alone or the conventional power plant only, but for peak performance the two power sources are used together.

countered during high-altitude plane flights, experiments showed.

Embryo corn plants, cut from kernels with dissecting needles, were successfully grown in sterile laboratory vials.

DDT-rotenone spray was proved practical and economical in controlling cattle ticks in the tropics, making cattle dips unnecessary.

Finely ground limerock mixed with DDT for use as a dusting powder was found to be inert to the insecticide and harmless to vegetation.

CHEMISTRY AND PHYSICS

Elements 95 and 96 Are Announced

➤ DISCOVERY of elements 95 and 96, made by bombardment of uranium 238 and plutonium 239 with high energy alpha particles, was announced, thus raising to four the number of trans-uranic elements discovered as the result of the atomic bomb research.

Discovery of neptunium 237, an isotope of element 93, was announced.

A 100,000,000-volt electron accelerator or betatron for X-rays was perfected; it may also produce other forms of radiation available before only in the cosmic rays.

A 100-ton electronic differential analyzer was announced; no longer needed for secret war research, it was used in solving scientific and industrial engineering problems, for which it was designed.

A tiny oscillator tube, more powerful than any broadcast station, but which gives off its power burst within one millionth of a second, has been used in radar, it was announced.

Automatic radar recording camera was developed that photographs the radar image on the radar oscilloscope while the operator is watching it.

The proximity or VT fuze exploded projectiles on approaching a target close enough to inflict damage; a miniature radio station in the nose of the shell sends out impulses which are reflected back by a target, the frequency of the echo changing as the target is approached.

Television pictures in full color were successfully transmitted through the air by use of ultra-high frequency radio waves.

Thin stainless steel film on optical glass disks, placed before wide angle lenses, was found to eliminate the problem of "hot spots" on aerial photographs.

An electrical micrometer, so sensitive that it can measure movements as small as one-tenth of a millionth of an inch without touching the object, was developed.

Knowledge of the ionosphere and of the relation of solar activity and geomagnetic and auroral conditions to short wave radio transmission was advanced to the point where long range prediction of reception became an actuality.

Chemical analysis of gases, liquids and solids was perfected by shooting X-rays through substances to determine the chemical elements present.

A new elastic electrical insulating enamel made from sand-based silicone was developed to withstand extreme temperature changes and exclude moisture.

Plastics plated with metal produced materials which were found to have inherent properties of the plastic in addition to the desired properties of the deposited metal.

Chemical test for the quality of butter was developed using xylol, as an aid in the ordinary taste and smell method.

Lightweight, fire-resistant building material, using cement and organic and inorganic fibers, which insulates against heat and cold and is non-rotting and termite proof, was developed.

Synthetic organic cements were developed which will hold metal plates without riveting or can be used to bond wood, plastics, rubber or fabrics to a similar substance or one to another.

An electro-chemical method of filtering water freed it of undesirable mineral salts by passing it through two beds of ion-exchange resins.

A perfect mold of optical glass weighing 379 pounds, the largest ever obtained for a scientific instrument prism, was made.

Vinyl chloride co-polymers, new rubber-like plastics, were made by passing acetylene and hydrogen chloride over catalysts.

Quick-molding odorless thermoplastic from cellulose and propionic acid, with electrical properties little affected by atmopheric change, was made possible by development of a commercially practical process for producing propionic acid from natural gases.

Sono-radio buoys, that pick up submarine noises by hydrophones and transform them into radio signals, were announced.

The 1945 Nobel prize in physics was awarded to Prof. Wolfgang Pauli, atomic research expert; the 1944 award in chemistry went to Prof. Otto Hahn, German authority on radio-activity and the atom; the 1945 award in chemistry went to Artturi Virtanen, Finnish bio-chemist.

EARTH SCIENCES

Complete World Weather Information Available

➤ COMPLETE world weather information was made available for forecasting when exchanges of meteorological data with Japan and Russia were developed.

There were 46 earthquakes of sufficient strength to record themselves on distant seismograph instruments; notable among them was a destructive quake in central Chile on Sept. 13.

A quake-caused tidal wave in November killed 4,000 people on the coast of India.

Radar can be used in obtaining weather observations, it was announced; approaching storms up to 200 miles away are indicated on a detecting screen.

A new yellowish-green gem stone was described, and given the name of Brazilianite for the country of its origin.

Constant pressure upper air charts replaced constant level charts as official Weather Bureau maps as a basis for domestic aero weather forecasts.

Maps showing trafficability of enemy country, sources of construction material, areas where underground water supplies could be obtained, and other geological features, aided Allied invasions.

Maps were made from the point of view of human comfort, showing the climate month by month and clothing needed.

For the first time a volcano in eruption was studied in the air above it from a helicopter; unusual lava flow formations unsuspected from the ground were observed and photographed in color.

Drilling of 237 oil wells in England, which produced 300,000 tons of crude oil, was announced.

Actual reserves of iron ore in the Mesabi range, Minnesota, were estimated to be capable of high production for another 100 years; the previous estimate was that they would be exhausted by 1950.

Discovery in the Southwest of new, large oil pools emphasized the need for intensive subsurface engineering and geophysical work in other likely oil-bearing strata.

ENGINEERING AND TECHNOLOGY

Loran Perfected as Navigation Aid

➤ LORAN, wartime navigation aid developed for air and surface ships, was perfected and many new installations made; ship location is determined by picking up on a cathode ray tube signals from separated shore radio stations.

A new pulse time modulation principle of transmission made possible twenty-four two-way simultaneous conversations on a single radio-frequency carrier wave.

Automatic dialing of all long-distance telephone calls by subscribers was announced as possible.

Television broadcasts from planes six miles above the earth was planned; this will give larger area coverage, making the impulses reach a greater distance than the 50-mile limit possible with towers on the ground.

An electronic eye for television, 100 times as sensitive as any previously used, extended the lighting range possible in pick-up and the depth of perception.

Television receivers were developed which will show larger, brighter and clearer pictures due to new high-voltage tube and new plastic screen.

Radar apparatus for vessels which will detect obstacles above water through darkness, fog and storm at distances up to 30 miles was developed for commercial ships.

An easy-to-use high-speed camera with self-contained light source was developed for taking pictures of surgical operations.

A turbo-charged gas-diesel engine was developed possessing a 40% thermal efficiency, delivering more power in proportion to fuel consumed than any type of engine yet developed.

Model of an engine with a ram-jet motor of unusual design, claimed to be the simplest engine in the world, was demonstrated.

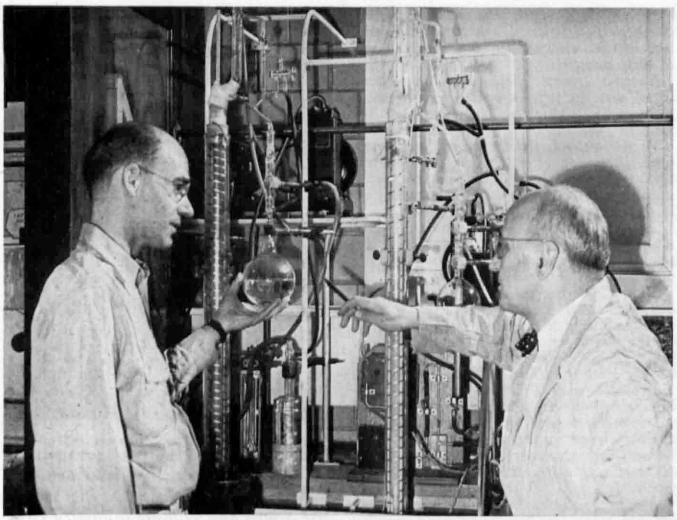
Smoke from locomotives is lessened by use of properly designed steam air jets and of adequate mufflers.

Powerful, high-speed coal-burning steam turbine locomotive was designed to have the cab and boiler section between the coal and water compartments.

A new method of admitting gas with the diesel engine air intake was developed, making possible the use of either gas or oil as a fuel without any electric sparking device.

New safety fuel for aircraft was developed that does not form enough inflammable vapors in the air to ignite except at temperatures above 100 degrees Fahrenheit.

Successful extraction of 17 to 40 gallons of petroleum from one ton of oil shale was made possible by a new process.



SYNTHETIC CAFFEINE—Volume production will be undertaken by the Monsanto Chemical Company, utilizing an improved process worked out by Dr. Oliver J. Weinkauff, left, under the supervision of Dr. Lucas P. Kyrides, organic research director of the company.

Lubricating oils were found to be improved by the addition of small amounts of selenium compounds, reducing the tendency to oxidize and form sludge and gummy resins in engines.

A wax-free lubricant was developed for internal combustion engines having unusual advantages over mineral oil, particularly in cold weather.

Substitute for gasoline giving one-fourth more power in a properly designed internal-combustion engine was developed, using a blend of ethyl alcohol, diethyl ether, acetone and butanol.

Inexpensive production of thiophene from petroleum permitted its use in the plastic, pharmaceutical and dyestuffs industries.

Industrial diamonds were cut by an electric arc, a process two to four times as fast as present methods.

An all-electric torpedo, fired under water and gyroscopically controlled, making no tell-tale wake of air bubbles to warn the enemy, was announced.

An improved infra-red gas analyzer was developed that gives a continuous analysis of gaseous organic compounds during their manufacture.

Electronic vulcanization of rubber, instead of the familiar heating method, was developed to speed production and give more uniform and higher quality products.

Synthetic tires as good as prewar natural rubber tires were made from a special variety of GR-S synthetic rubber with a rosin-based soap replacing fatty acid soap as an emulsifier.

Use of helium to inflate heavy airplane tires was announced as practical for a weight-saving device.

Electronic method of applying a phosphor coating to the inner walls of fluorescent lamp tubes was found to speed production and result in better light.

A process for making ethyl chloride by reacting chlorine with waste products from other ethyl chloride plants instead of hydrochlorination of alcohol or ethylene was announced.

A new glass-to-metal sealing method provides a seal tight enough to protect delicate electrical instruments immersed in water for days.

A high-strength phenol formaldehyde resin adhesive, that is not only waterproof but has a short curing time at high temperature, was used in making air-sea rescue boats.

Cloth shrinkage was reduced and controlled by treating wool and wool blends with a melamin resin.

Artificial bristles for paint brushes were made from casein, protein ingredient of milk.

The physical properties of a yarn made by coating cotton, rayon or fiberglas with plastic may be changed by varying the formula of the plastic used.

Bagasse, a waste product from sugar factories, was successfully used to make a new plastic molding compound.

Fluorescein, a chemical compound used by downed airmen to color surrounding water to mark locations, helped detect leaks in underwater fuel pipelines.

Fiberglas mats, wrapped around underground oil, gas and other pipelines, protected them against electrolytic action and corrosion.

Partially acetylated cotton cloth was found to resist mildew and failed to rot during six months in soil teeming with rot-producing micro-organisms.

Sawdust and other wood wastes were made into fine quality hard wallboard by a new chemical process and use of a hydraulic press.

Processed wood was compressed by a method which assures that although the wood swells with atmospheric moisture, it will return to its original compressed thickness when dried.

A direct radiotelephone circuit between San Francisco and Wellington, New Zealand, was put into operation.

INVENTIONS

Register of Salable Patents Is Published

➤ THE PATENT OFFICE began publication of a register of salable and licensable patents, thus providing a simple means for manufacturer-inventor contacts and assuring an increased development of patents.

Notable and interesting inventions patented during the year include:

Anti-knock motor fuels produced through the addition of compounds of heavy metals other than lead.

An activated clay filter that takes tetra ethyl lead out of gasoline and permits its use as a stove fuel or as a cleaning fluid.

An apparatus that super-powders coal to get maximum heating value from anthracites and other coals of high-ash content.

An apparatus employing streams of electrons or gamma rays to search thick steel plates for hidden flaws.

A process that yields by the same operation magnesium, alloy steel and cement from silica-containing ores of magnesium.

A method for smelting magnesium directly from its silicate ores; a method for extracting magnesium from sea water, using the water-softener principle.

A low-pressure, low-temperature process for separating magnesium from its commoner ores.

Polymerized silicones used with additions of other chemical elements to make new resin-like substances.

A method of salvaging pure sulfur from hydrogen sulfide, through the use of sulfur dioxide under high pressure and temperature.

Electric wires with an insulating coating of sodium silicate that is flexible and not hygroscopic.

A plastic sheathing between copper wire and rubber insulations that protects the rubber from chemical damage by the copper.

An extremely hard tool steel containing carbides of tungsten or vanadium, made by a new sintering process.

A method for making wide strips of thin, flexible glass which can be used instead of mica for most purposes.

A sintering process that produces thin-walled articles by spreading the metal or carbide powder mixed with oil on the mold.

A system of microphotography on rectangular pieces of film suitable for filing in card indexes.

Chemical separation of actinomycin into two fractions, one of which is powerful in its action against certain microorganisms.

Simplification of the process for isolating gramicidin, germ-checking substance similar to penicillin, from bacterial cultures.

A high-wheeled locomotive with tubular boiler that permits a lower placement and better balance of weights.

A war-born high explosive called pentolite, consisting of PETN, mixed with TNT, insensitive to shock, but more violent than TNT.

A gas-mask filter medium made from highly adsorbent cellulose fibers.

Rubber separated out of macerated native goldenrod by adding an alkali salt to the flotation medium.

A method of freezing foods by constant agitation in a nearly saturated atmosphere, producing uncaked frozen products.

A method of preserving food by use of a highly volatile substance such as ethylene oxide or methyl bromide which does not injure the product.

Flexible plastic bags as containers for sterilized foods, instead of the conventional glass or metal.

A way of making for paint fillers silica grains as small as the smallest bacteria by pouring sodium silicate into methanol and bubbling carbon dioxide through the solution.

A new orange variety of high quality that ripens from five to eight weeks earlier than other Florida oranges.

A new type motion picture theater that has the screen on the ceiling and reclining couch seats.

A method for detecting small amounts of poison in the air by dissolving the gas molecules and then measuring the electrical conductivity of the solution.

A circuit of water channels that tests ship models as a wind tunnel does airplanes.

A flexible "iron lung" that encloses the torso only and enables the patient to change position and move more freely.

Synthetic chewing-gum bases consisting of fatty acids or hydrogenated resins.

MEDICAL SCIENCES

Streptomycin Used for T. B. and Typhoid

STREPTOMYCIN, which proved effective in controlling tuberculosis in guinea pigs, was given to 34 human patients with a limited suppressive effect; recovery from typhoid in three of five cases suggested that the drug may bring recoveries and prevent carriers; streptomycin also checked the growth of Friedlander's bacilli and Klebsiella in laboratory experiments. (See front cover.)

An operation for saving the lives of "blue babies" born with certain types of heart defects by joining a branch of the aorta and one of the pulmonary arteries to increase the flow of blood through the veins was devised and successfully performed on many patients.

Identity of BAL (British antilewisite) was announced as 2, 3 dithiopropanol with reports that this alcohol, developed for local use as a skin decontaminant in protection against the war gas, had been developed into an effective remedy for arsenic and possibly mercury poisoning.

Vaccination of all U. S. Army personnel for protection against influenza was ordered.

Penicillin made 25 of 39 babies with congenital syphilis well, brought speedy recovery from trench mouth, and brought improvement for patients with brain and nervous system syphilis.

Muscular dystrophy remedy may come from a new chemical made from the two vitamins, tocopherol and inositol, it was reported.

The virus of horse "sleeping sickness" was isolated from chicken mites.

A new chemical weapon, gamma-(p-arsenosophenyl)-butyric acid, against African sleeping sickness, was reported to give speedy cure of early cases.

Vaccine against dengue, or "break-bone fever" may result from first success in mouse passage and consequent attenuation of the virus.

A new weapon against malaria was developed, consisting of a portable plant for extracting, at low cost, quinine and other antimalaria drugs from the bark of cinchona trees in the remote spots where they grow.

Artificial eyes made of plastic instead of glass were developed; the plastic eyes resemble natural eyes more closely than do glass ones and are more comfortable to wear.

Riddle of what causes one kind of heart disease, known medically as acute interstitial myocarditis of unknown etiology, may be on the way to solution with the discovery of the substance, apparently a virus, that causes similar ailment in apes and smaller animals.

Evidence was found that infectious hepatitis spreads through contaminated drinking water; this is the first satisfactory evidence that a virus disease can be naturally acquired by humans through water; gamma globulin, immune substance from blood, gives protection against it.

Heparin, anti-blood clotting chemical, may become means of preventing gangrene and loss of limb after frostbite, extensive studies indicate.

A skin graft operation on a hemophiliac was performed successfully for the first time; an active thrombin preparation applied to the place from which the skin graft was taken apparently was responsible for saving the patient from bleeding to death from this wound.

Sensitivity to the Rh blood factor may last for lifetime, investigations showed; a blood bank to save the lives of mothers and babies threatened because of a difference between the mothers' and fathers' blood was announced; the Rh factor was found to be absent in chimpanzees.

From 10,000 to 15,000 blind persons may have a chance to see again as the result of the formation of an eye bank to collect and make available human corneas for grafting.

Persons whose eye lenses have been removed in cataract operations can see ultraviolet radiations invisible to normal eyes, it was discovered.

Recovery from cholera can be assured in every case, it was announced, by new treatment combining sulfadiazine, plasma and saline injection.

Severe poisoning from breathing the fumes of carbon tetrachloride was successfully treated with methionine, one of the amino acids.

Experiments demonstrated for the first time that there is a definite link between the kidney and ovarian functions.

Hearts were successfully transplanted in warm-blooded animals for the first time.

A new approach to conquest of venereal disease by mass testing plus penicillin treatment was pioneered in Birmingham, Ala., where, although new state law required blood tests and treatment, when necessary, for all citizens between 14 and 50 years, 260,216 came voluntarily for testing as result of high pressure publicity program.

Syphilis and tuberculosis case finding were combined for the first time in a 45-day campaign in Savannah, Ga.

Actin was announced as a previously undiscovered protein which plays a part in muscle contraction.

FLU VACCINE—Fluid contents of an egg are being sucked into a chilled bottle as one of the steps in making the Sharp and Dohme influenza virus vaccine.

Dentist's drill may be replaced by a new device which operates on the sandblast principle; it is painless, swift and silent, it was announced.

Penicillin was put on the market for civilian use on March 15.

New ways to give penicillin include: by mouth, using sodium citrate as a buffer against stomach acid; mist inhalations; mixing with special gelatin and chemical to reduce number of injections needed; injections into artery for severe infections of arms and legs; in lozenges; in gelatin capsules; more effective penicillin treatment may result from a new substance in which it is combined with albumin of human blood.

The cause of toothache at high altitudes, studies indicate, is a disturbance of circulation in the pulp of the tooth which prevents equalization of pressures during change in altitude.

Possible substitute for a scarce heart disease medicine, fogarine, has been found in a chemical from an Argentine tree.

A chemical from mushrooms, tyrosinase, was studied as a promising cure for the itch of poison ivy.

The chemical structure of streptomycin was almost completely worked out.

Influenza viruses cultured on two different kinds of living tissue, chick embryo and mouse lung, were shown to be chemically and physically identical.

A new remedy and preventive for athlete's foot was found in undecylenic acid, a fatty acid found in sweat.

Discovery of a new vitamin A, twin to the one already known, was announced.

Thiouracil, a chemical which suppresses the thyroid gland hormone, helped seven out of 10 patients with angina pectoris, it was reported.

A simple method recently developed as an aid in the diagnosis of cancer of the uterus has been found helpful also in the diagnosis

of cancer of the kidneys, bladder and other organs of the genito-urinary tract.

Absenteeism and turnover were reduced and work performance improved when a vitamin supplement was given workers in an aircraft plant.

The mold source of penicillin was found to be a good source of vitamin D_2 when irradiated with ultraviolet.

An antianemia vitamin factor, vitamin Bc conjugate, was isolated in a new pure form for the first time.

One of the new B vitamins, folic acid, was reported to have anti-cancer activity; spontaneous cancers in mice disappeared in the laboratory tests.

All the family's bills for sickness, injury and childbirth can now be paid for $6 a month under a new, expanded medical care plan launched in New York.

At the request of the Surgeon General of the Army, the National Academy of Sciences and the National Research Council created a committee for developing the best possible artificial limbs for war veterans.

The following advances in germ-fighting were made: Dicumarol, anti-blood clotting substance, has anti-germ activity as well; material obtained from a strain of the fungus *Aspergillus fumigatus* checked TB germs in test tubes; a mold from human hair stopped typhoid and dysentery germs; the fungi that cause athlete's foot yielded an anti-germ substance; gramicidin, still potent against bacteria, was made less poisonous to animals; a chemical from pine trees may prove useful as an antiseptic for humans; anti-germ activity was found in buttercup juice; sulfa drugs were made more effective against certain bacteria by use in combination with dyes; a new antibiotic substance, "puchiin," resembling penicillin in its action, was found in Chinese waterchestnuts; bacitracin, germ-checking substance of the penicillin type, was isolated from bacteria found in wounds.

Some strains of influenza virus can act like a poison, damaging the liver and other organs, as well as causing the disease, influenza, studies indicated.

Blackout of eyesight in aviators during sharp turns or dive pull-outs at high speeds is due to a temporary anemia in the eyeballs themselves; it can be prevented by suction applied to the eyeballs by special goggles.

Eyes need protection against longer wavelengths of ultraviolet light than was previously supposed; damage to sight may occur without obvious signs of eye injury, studies indicate.

Histoplasmosis, previously considered rare and always fatal disease, is apparently widespread in mild form and may be mistaken for healed tuberculosis, X-ray pictures in tuberculosis survey indicated.

Records for recovery from extensive burns were apparently broken when a Marine who had 83% of his body burned was able to return to duty within three months.

Cancer research progress was given new impetus by $4,000,000 grant to establish Sloan-Kettering Institute for Cancer Research at Memorial Hospital, New York City, and by expansion of research program by American Cancer Society.

Pain, tenderness and wasting of muscles in some cases of rheumatoid arthritis was apparently explained by finding inflammatory nodules widely distributed in the skeletal muscles and the peripheral nerve trunks.

Encouraging results with neostigmine in paralysis, rheumatoid arthritis and crippling from injury or infection were reported.

Daily doses of the chemical, pregnenolone, were reported to have anti-fatigue effects.

A new anti-bleeding material prepared from blood plasma and human placentas was announced; extensive studies are necessary before it can be tried on patients with hemophilia.

Study of first, second and third children born shows that the unusually large number of births in the United States during the War years 1941-44 does not mean more children per family, but mainly the starting point in these years of hundreds of thousands of families which were postponed by the depression and of others which would have been started in later years if there had been no war.

A study of all families of Indianapolis showed that Protestant couples have 6/7 as many children as Catholic couples, while Jewish couples and mixed Protestant-Catholic couples have about 9/10 as many as Protestant couples: the larger size of Catholic and Protestant families is especially noticeable in the upper income and educational classes, among the poorer people with little schooling the Protestant families average as large as or larger than those of Catholics.

A systematic study of the pre-natal stages of human behavior demonstrated a continuity in the patterning of behavior in embryo, fetus, fetal infant and neonate.

Greater amounts of anti-germ chemicals such as penicillin may come from neutron bombardment of mold spores, it was announced.

Discovery of a change in blood clotting caused by penicillin, pointing both to possible danger and possible further benefits from the mold chemical, was announced.

New devices to help deaf people learn to talk and use the telephone and enjoy radio by seeing sound patterns for speech and music were developed.

Better treatment of cirrhosis of the liver may come through use of a new goiter medicine, thiouracil, it was announced.

The Nobel prize in physiology and medicine for 1945 was awarded to Sir Alexander Fleming, discoverer of penicillin, and Sir Howard W. Florey and Dr. Ernst B. Chain, who fathered its development into a life-saving remedy.

An Institute of Forensic Medicine, first of its kind in the world, will be established at New York University College of Medicine, it was announced.

The Red Cross will continue to operate for civilians, in cooperation with an approved sponsoring health or medical agency, the blood donor service which has been so successful in supplying blood, plasma and albumin to the armed forces, it was announced.

PSYCHOLOGY AND PSYCHIATRY

Psychological Warfare Has Important Role

➤ FOR THE FIRST TIME in warfare all the events in a campaign, diplomatic and also military, were dictated by the considerations of psychological warfare; leading, after the military defeat, to the final surrender of Japan without armed invasion, saving an estimated half-million American lives.

Ten points of human nature considered essential as bases for a lasting peace were framed and agreed upon by more than 2,000 American psychologists, and sent to members of Congress to aid them in their peace planning.

Measures for the prevention of another war, advocated by a national society of psychologists, emphasized the need for immediate and enlarged supplies of food for the starving people of Europe and Asia because "starvation sows the mental seeds of war."

A new index was found for measurement of social development in the individual's willingness to try again tasks at which he has failed.

People most likely to believe rumors are older persons, those less informed and working in non-professional occupations and persons who "want" to believe rumors because of grudges or personal needs, a wartime survey indicated.

High altitude causes loss in ability to speak clearly, a fact that may make it difficult for air crews in the stratosphere to understand each other by phone.

Given the same environment, studies indicated that racial differences are so small that they are less than differences between the two sexes of the same race.

Smell-blindness was found, unlike color-blindness, to be a dominant, non-sex-linked characteristic; it was demonstrated that a smell-blind person was able to distinguish flavors.

Successful training of a Rhesus monkey to sort objects by color when given a cue in the form of a colorless block made possible new research on this type of abstract thinking and possibly use of these animals in study of brain injuries such as those suffered by soldiers in combat.

Although rapid learners retain what they have learned better than do their slower associates, they lose their advantage after long periods of retention; a month or two later the slow learners are found to remember the most, experiments showed.

Use of baby development tests on infant chimpanzees showed that in general the ape baby develops at an earlier age than the human, but that human babies can sit alone sooner, probably because of differences in structure.

Study of pure strains of dogs differing as much as possible in emotion and intelligence was undertaken to increase knowledge of the probable influence of heredity on these characteristics in humans.

Chimpanzees do not suffer from mental disease or malignant growths, it was announced after study of 100 of the animals.

An unusual mental illness affecting children of intelligent parents was observed, in which the symptoms are inability to use language for communication, disregard of people and compulsive desire to avoid change.

A survey was made of the number of men discharged from the service who will need psychiatric care and the hospitals and other facilities for caring for them, revealing a shortage of at least 10,000 psychiatrists with the necessary auxiliary staffs.

A simple 92-question "yes"-"no" test, developed for the armed services, was found highly accurate for screening out men with serious personality or nervous difficulties.

Electric shock treatment for mental illnesses causes impairment of memory and ability to re-learn due to direct effect on brain tissue, experiments on rats indicated.

Blind people were found to utilize the echoes of their footsteps to "see" obstacles with surprising accuracy.

Veterans with nervous ailments were aided by use of psychodrama, a therapeutic type of drama, in which the actors do not learn parts, but make them up spontaneously to meet the situation being enacted; this technique was also used successfully for training psychiatric social workers and persons in supervisory positions.

Psychology was represented in exchange fellowships to other countries; one exchange professor going to Brazil and another to Turkey.

Maladjusted students can be picked out and academic work of normal students predicted by use of the Rorschach Test, in which people are asked to report what they see in standardized inkblots, experiments showed.

Science News Letter, December 22, 1945

GENERAL SCIENCE

Ten Important Science Developments of Year

➤ THE TEN most important advances in science made during 1945, as picked by Watson Davis, director of Science Service, are:

1. The atomic bomb and the practical release of nuclear energy of potential industrial use.

2. Discovery and verification of the trans-uranium chemical elements 93, 94, 95 and 96, and the large-scale production of 94, plutonium, for use in the atomic bomb.

3. Use of the antibiotic, streptomycin, for the treatment of many diseases, especially those not cured by the sulfa drugs and penicillin.

4. Development of the proximity fuze.

5. Development and use of loran, which allows determination of exact positions at sea and in the air through use of exactly timed radio signals.

6. Use of psychological warfare methods in hastening the Japanese unconditional surrender.

7. Development and use of BAL, a kind of alcohol, for the treatment of arsenic and mercury poisoning.

8. Development and use of the chemicals, ANTU and 1080, for killing rats and other rodents.

9. Successful transplantation of hearts in warmblooded animals.

10. Steps taken in Congress for the establishment of a National Science Foundation.

Some of these developments were actually made before 1945 but on account of war secrecy were not announced until 1945.

Science News Letter, December 22, 1945

Hundreds of tons of *murumuru*, a Brazilian vegetable wax, are now being used by American soap manufacturers in place of products formerly obtained from the Far East.

A *quinine factory*, erected by the Belgian Congo government during the war, is producing 2,200 pounds of quinine salts a month, half of which is exported; the plant is operated without view to profit.

Do You Know?

There are over 100 distinct breeds of *pigeons* in America.

Most *oysters* are from four to five years of age when marketed.

Greater hardness is provided by the use of *calcium chloride* in concrete.

Headaches are the most common reason for consulting physicians.

Helicopters for farmers, foresters and others are to be constructed in Australia by a local company.

The *petroleum fly* breeds in pools of waste petroleum and feeds upon other insects that have fallen into the pool.

The body as a whole contains more *lime* than any other inorganic material because of the high concentration of calcium phosphate in the bones.

Argon, an inert colorless gas found in the air, is used in modern high-efficiency incandescent lamps; it enters into no known chemical compounds.

Nerve cells in man have projecting filaments never more than one five-thousandth of an inch thick, yet may grow to a distance three or four feet from the cell.

Lactic acid, used normally in the manufacture of such essentials as leather, textiles, foods, and liquors, was used during the war in a fire-quenching solution to prevent explosions in tank interiors.

The United States is not a heavy consumer of *rice* in comparison to certain other countries, but it produced and exported over 490,000,000 pounds milled during the year from August 1944 through July 1945.

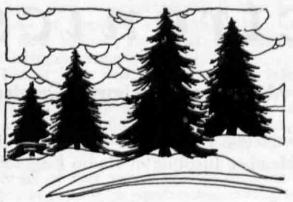
Civilian *aerosol bombs* for household use in killing insects must, under government regulations, contain 3% DDT and a suitable amount of pyrethrum dissolved in a liquid gas under pressure that forms a fine mist when released.

Radio *loudspeaker equipment*, operating at a power more than 1,000 times that of ordinary apparatus, was used in American airplanes two miles above the earth to let Japs in isolated places know the was was over.

ECOLOGY

NATURE RAMBLINGS

by Frank Thone



Who Are God's Friends?

"Peace on earth to men that are God's friends."

So runs a new English translation of the song the angels sang on the first Christmas.

This is a hard saying indeed, a more severe condition than is imposed even by the Vulgate's *"pax hominibus bonae voluntatis."* We may all claim to be men of good will, however badly our deeds may fall behind our professions; but who would have the temerity to make outright claim of friendship with God? Only the greatest saints might fairly do that, but none of them would, because of humility.

We can, of course, fall back on Abou Ben Adhem's alternative, and offer love of our fellow-men as the best substitute at our command. Certainly there is need for all of that we can muster up, in this first winter after the ending of war but before the advent of real peace: no end of our neighbors' trespasses against us to be forgiven, and no end of want and misery to be relieved. Very nearly a saint's-size task in that assignment alone.

Yet even after the last homeless refugee has been provided with a roof and the last hungry child fed, there will still remain unhealed wounds to be tended. War's havoc in the fought-over lands, and war's insatiable demands even here in safe America, have done horrid things to the land we live on—mined fields of their fertility, stripped forests faster than they can re-grow. Our mother the earth, as St. Francis called her, bleeds grievously. We are even constrained, by the very need to relieve human distress for yet another season of emergency, to carry on the exploitation a little longer—like the pelican's offspring in the pious old myth.

As soon as we are able, however, it is imperative that we use utmost diligence, and all the knowledge and skill we have, to heal these wounds that war has left in the earth. Soil conservation practices must be resumed and extended, rangelands given their chance to grow new grass, forests restored and their shy inhabitants encouraged to return.

"The earth is the Lord's, and the fullness thereof," declares one of the noblest of the Psalms. We have presumed upon that fullness too long, at first through thoughtless selfishness, now through sheer necessity. If we aspire even to the penumbra of friendship for God, we must render again to him the things that are his.

Science News Letter, December 22, 1945

PUBLIC HEALTH

Influenza Higher Than For Several Years

➤ WITH 50,000 cases of influenza reported in one week, a higher figure than for a good many years past at this season, health authorities around the country are wondering whether this winter will bring another epidemic like that in 1918.

Cases reported to the U. S. Public Health Service for the week ending Dec. 8, latest on which figures are available, totalled 49,667. Figures from Rhode Island and Maryland have not yet been received and may push the total for the week over 50,000.

The actual number of cases is probably far higher than the reported number. In Oregon, for example, only 45 cases were reported to the state health officer but that official estimates, on the basis of school absenteeism and similar reports, that there were probably 4,100 cases in his state during the week ending Dec. 8.

Largest number of cases were reported from Kentucky, 15,358. Texas reported 7,332; Kansas 6,848; Utah 4,241, and West Virginia and Virginia each over 3,000.

The outbreaks are due to Type B influenza virus which until last spring had not produced any sweeping epidemics. At that time outbreaks of Type B influenza running into thousands of cases each occurred at Army installations. These scattered outbreaks, possibly heralding a sweeping epidemic in the fall and winter, caused the order for vaccination of all Army personnel in October and November.

The vaccine used by the Army is effective against Types A and B virus. Whether the entire Army has now been vaccinated and whether those vaccinated are escaping the disease as expected is not yet known. There has not been enough time for all vaccination records and reports on current cases to reach the Surgeon General's Office.

Manufacturers of the vaccine hoped to have supplies available for civilians by the first of the year. All that had been produced previously was needed by the Army.

Science News Letter, December 22, 1945

PALEONTOLOGY

Many Fossil Bones Brought from Colombia

➤ FOSSIL bones of an animal that looked like a wolf and lived like a wolf but was really more closely related to opossums and kangaroos have been brought from Colombia to the University of California by Dr. R. A. Stirton, who made the collections while in the South American republic as a Guggenheim fellow. This marsupial wolf, which is only one of 28 species dug up, lived about 30 million years ago, Dr. Stirton stated.

He also brought back the fossil remains of several species of reptiles believed new to science. These are of Cretaceous age, or about 100 million years old.

Science News Letter, December 22, 1945

MEDICINE

Drug for Epilepsy

Tridione gives good results in petit mal epilepsy of childhood. It may bring new knowledge of underlying problems of brain and nerve physiology.

➤ GOOD RESULTS in treatment of petit mal epilepsy with a new drug, Tridione, are reported by Dr. William G. Lennox of Harvard Medical School. (*Journal, American Medical Association,* Dec. 15.)

In a period of days to weeks, the frequent daily seizures were stopped by the new drug in more than a fourth (28%) of the 50 patients on whom Dr. Lennox reports. The scores of daily seizures were reduced to less than a fourth their usual number in 52% of the patients, but were little affected in 20%.

Tridione gives the "most dramatic" results of any drug yet tried for petit mal epilepsy, Dr. Lennox finds. Its chemical name is 3, 5, 5-trimethyloxazolidine-2, 4-dione. It is made by the Abbott Laboratories but is not yet on the market. It is taken in capsules, doses varying from 15 to 30 grains, or three to six capsules, daily.

Some patients after taking the medicine for a time have been able to get along without it for several months. Whether they will need it again cannot be determined as yet.

Skin rashes and sensitivity of the eyes to bright daylight, which disappears a week or 10 days after the medicine has been stopped, seem to be the only unpleasant effects. Improved appetite, weight gain, improvement in school performance or deportment in children are among the pleasant side effects.

Besides the practical effects of Tridione in relieving petit mal epilepsy, Dr. Lennox believes it may bring new knowledge of underlying problems of brain and nerve physiology.

It is petit mal, not grand mal, epilepsy which is helped by this new drug, Dr. Lennox stressed. The petit mal type usually occurs in childhood. Seizures begin and end abruptly. They are more likely to occur in the minutes or hours after rising. They are less frequent during physical or mental activity. Girls are more often affected than boys.

The seizures may consist of a transient lapse of consciousness or "blackout," or of a single quick contraction of muscles like a jerk, or of a sudden loss of posture control in which the child falls down suddenly but usually picks himself up immediately. These seizures may come from five to scores of times a day. Some patients have had as many as 200,000 seizures. Patients with "pure petit mal epilepsy" seem unusually bright and score high on intelligence tests, but the frequent seizures interfere with schooling.

Brain-wave records of this type of epilepsy show characteristic patterns. The pure petit mal epilepsy has a spike and dome pattern.

Distinguishing between this and grand mal epilepsy with its less frequent but severe convulsions and psychomotor epilepsy in which there is loss of memory is important because the basis of treatment is exactly opposite. Sedative drugs, including the recently developed dyphenylhydantoinsodium, are helpful in grand mal epilepsy but not in petit mal.

Stimulating drugs, Dr. Lennox reports, are more effective in petit mal epilepsy. One of his adult patients incapacitated by this epilepsy found for himself that he could get relief only by drinking five to 10 cups of coffee daily. Caffeine either in tablets or coffee has been found helpful for some patients but not all, and it produces too much nervousness or wakefulness to be useful in some cases.

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ELECTRONICS

German Magnetic Tape Machine Brought to U. S.

➤ A NEW German magnetic tape recording machine, to make records of code or voice messages, obtained by the Army in Germany, has been on public display recently in the Department of Commerce, Office of the Publication Board. Details concerning its assembly and use have been prepared, translated from the German, and are available from OPB in photostatic or microfilm form at a reasonable cost for American manufacturers and others.

The equipment, which operates on alternating current, is designed primarily for connection to a radio receiver for recording, and to head-phones for playback. The signal from the receiver passes through an amplifier to the recording head, which magnetizes the coating on the tape. The exact composition of the tape is not known, but it appears to be a plastic composition coated with material having high magnetic qualities.

The tape is very thin but fairly strong, and can be demagnetized and reused many times without signs of wear or deterioration. Each tape is about a half-mile in length on a single reel, and provides a recording time of about 45 minutes at average ribbon speed.

One of the interesting features of this machine, in Germany known as the Tonschreiber, is a pitch-restoring head. This device, used when the tape is played back at speeds other than the recording speed, permits restoration of the original pitch.

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ENGINEERING

Two 1500 Horsepower Engines in One Unit

➤ A NEW powerful diesel-electric locomotive, completed this month by the Baldwin Locomotive Works, is distinctive in that it has two 1500 horsepower engines in a single unit instead of the usual two or more units coupled together to give the needed power. It is for the Seaboard Railway, to rush fresh vegetables and fruit from Florida to the northern markets.

The new locomotive has two supercharged engines in one cab. One of its most important advantages is that the over-all length is less than that of a locomotive with the same amount of power in two or more units. The engines drive generators that furnish electric power to operate motors on eight of the locomotive's 12 axles. Although capable of a speed of 120 miles an hour, the maximum speed restriction of the new locomotive is 85 miles.

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Books of the Week

ATOMIC ENERGY IN WAR AND PEACE—Gessner G. Hawley and Sigmund W. Leifson, *Reinhold,* 210 p., illus. and diagrams, $2.50. A readable condensation of the vast new subject which the title indicates.

AVIATION FACTS AND FIGURES—Rudolf Modley, Ed. *McGraw-Hill,* 173 p., tables, $2.50. An appraisal of the true value of air power and its impact upon military and economic security, emphasizing the importance of civil aviation and aircraft manufacturing.

CONSTITUTION OF THE UNION OF SOVIET SOCIALIST REPUBLICS—*Embassy of the Union of Soviet Socialist Republics,* 31 p., free. The text of the Constitution (Fundamental Law) of the Union of Soviet Socialist Republics, as amended and supplemented by the First, Second, Third, Sixth, Seventh, and Eighth Sessions of the Supreme Soviet of the USSR.

DICTIONARY OF EDUCATION—Carter V. Good, Ed.—*McGraw,* 495 p., $4. Exact definitions of educational terms.

ELECTRONIC DICTIONARY — Nelson M. Cooke and John Markus—*McGraw,* 433 p., illus., $5. An up-to-date, well illustrated glossary containing clear-cut and accurate definitions of nearly 6,500 terms used in radio, television, industrial electronics, communications, etc.

ELEMENTARY ELECTRIC-CIRCUIT THEORY—Richard H. Frazer—*McGraw,* 434 p., diagrams, $4. A systematic introduction to basic concepts of electro-magnetic waves, antennas, electromagnetic horns, wave guides, etc.

FACTS AND FIGURES ABOUT INFANTILE PARALYSIS—*The National Foundation for Infantile Paralysis,* 30 p., charts, free. A compilation of figures from an authoritative source.

FLAVOR—E. C. Crocker—*McGraw,* 172 p., tables and illus. $2.50. A comprehensive book for food technologists, tasters and others concerned with commercial aspects of flavor.

HYPOANALYSIS—Lewis R. Wolberg, *Grune & Stratton,* 342 p., $4. An account of the hypnoanalytic treatment of a patient followed by a discussion of the theory and practise of hypnoanalysis. A technical book for psychiatrists.

INTRODUCTION TO INDUSTRIAL CHEMISTRY—W. T. Frier and A. C. Hollet—*McGraw,* 368 p., illus., tables, $3. An elementary course designed for the use of those who have had little scientific background.

INTRODUCTION TO MAGNESIUM AND ITS ALLOYS—John Alico, *Ziff*—183 p., diagrams and illus., $5. A survey of available information on magnesium. Of interest to metallurgical students as well as to those concerned with the practical aspects of the fabrication of metals.

AN INTRODUCTION TO PHYSICAL ANTHROPOLOGY—M. F. Ashley Montagu—*Thomas* 325 p, illus., charts, $4. For the general reader interested in the basic study of man.

NORTH AMERICAN GAME FISHES—Francesca Lamonte, *Doubleday*—202 p., illus., $3. A non-technical guide identifying and describing fresh and salt water game fishes in North American rivers, lakes, brooks, bordering seas, and oceans.

PREDICTION OF THE ADJUSTMENT AND ACADEMIC PERFORMANCE OF COLLEGE STUDENTS BY A MODIFICATION OF THE RORSCHACH METHOD—Ruth Learned Munroe—*Stanford Univ. Press,* 104 p., charts, $1.25 paper, $2 cloth. A study of the Rorschach responses of hundreds of entering students at Sarah Lawrence College compared with their competence in academic work and with their social adjustment in college.

REPORT OF THE SECRETARY OF THE SMITHSONIAN INSTITUTION AND FINANCIAL REPORT OF THE EXECUTIVE COMMITTEE OF THE BOARD OF REGENTS 1944—*Government Printing Office,* 116 p., illus., 25 cents. Contains detailed appendix for: the National Museum; the National Gallery of Art; the National Collection of Fine Arts; the Freer Gallery of Art; Bureau of American Ethnology; International Exchange Service; National Zoological Park; Astrophysical Observatory.

SUGGESTED SCHOOL HEALTH POLICIES: A CHARTER FOR SCHOOL HEALTH—National Committee on School Health Policies—*Health Education Council,* 46 p., Second ed. rev. 25 cents. Proposals made by 15 national organizations concerned with school health.

WAR AND PEACE AIMSS Extracts from statements of United Nations leaders. *United Nations Information Office,* 192 p. 75 cents. An official compilation.

WHAT EVERY TEACHER SHOULD KNOW ABOUT THE PHYSICAL CONDITION OF HER PUPILS—James Frederick Rogers—*Government Printing Office,* 19 p., 10 cents. An elementary guide for those in charge of children.

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Question Box

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What powerful pesticides have been developed? p. 391.

CHEMISTRY

What two new chemical elements were announced in 1945? p. 392.

GENERAL SCIENCE

What are the four top science developments of 1945? p. 396.

Why will there probably be a rush of scientific ideas in the near future. p. 386.

MEDICINE

How are "blue babies" now saved from certain death? p. 394.

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