

GENERAL SCIENCE

Science Speeds Victory

Science Review for 1944 shows jet-propulsion, rocket bombs, DDT, and the B-29 Superfortress 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 24 and also the issue which will appear next week, Dec. 30.)

By SCIENCE SERVICE STAFF

► JET-PROPULSION, rocket bombs, DDT, and the B-29 Superfortress get top billing in 1944's science and technology. There were scores of other important developments that came to public

attention, some of them under secret development before this year and announced only after they were put into use.

Science continued to contribute to the winning of the war and to the making of the peace. There was considerable thought as to reconversion of science and technology to the postwar world while uninterrupted research for the fighting forces continued.

Health advances were led by the remarkable effectiveness of DDT against insects, and the expanding usefulness of penicillin in treating many diseases, surpassing even the record of the sulfa drugs.

New materials and new processes that will prove of continuing usefulness were made known, among them the methylolurea impregnation of wood that converts soft woods into hard ones, the silicone family of synthetic resins that waterproof and insulate various materials, and chemical treatments to make stockings runless and clothes wrinkleless.

A camera photographed the floor of the ocean and a new gigantic calculator went to work.

Human blood was made to yield a measles preventive, a surgical plastic, a skin grafting material, and a substance to prevent bleeding, as well as albumin for shock.

Within secret laboratories scientists and engineers continued to work on new inventions, devices and processes for war and victory, but many of the advances made will not be announced until future years.

The detailed annual Science Service survey of the year's progress in science and technology follows:

AERONAUTICS

B-29 Superfortress Put Into Service by the Army

► THE B-29 Superfortress, speedy, long-range battleship of the air, was put into service by the Army.

The CW-20E, luxury airliner version of the military transport, was designed to meet the needs of medium-range airline operations; the cross-section of the fuselage is shaped like a figure-8 to permit maintaining constant atmospheric pressure and oxygen supply regardless of altitude.

The C-82 cargo plane, utilizing the twin-boom tail, was developed to carry heavy loads of troops and supplies to points where other cargo planes cannot land.

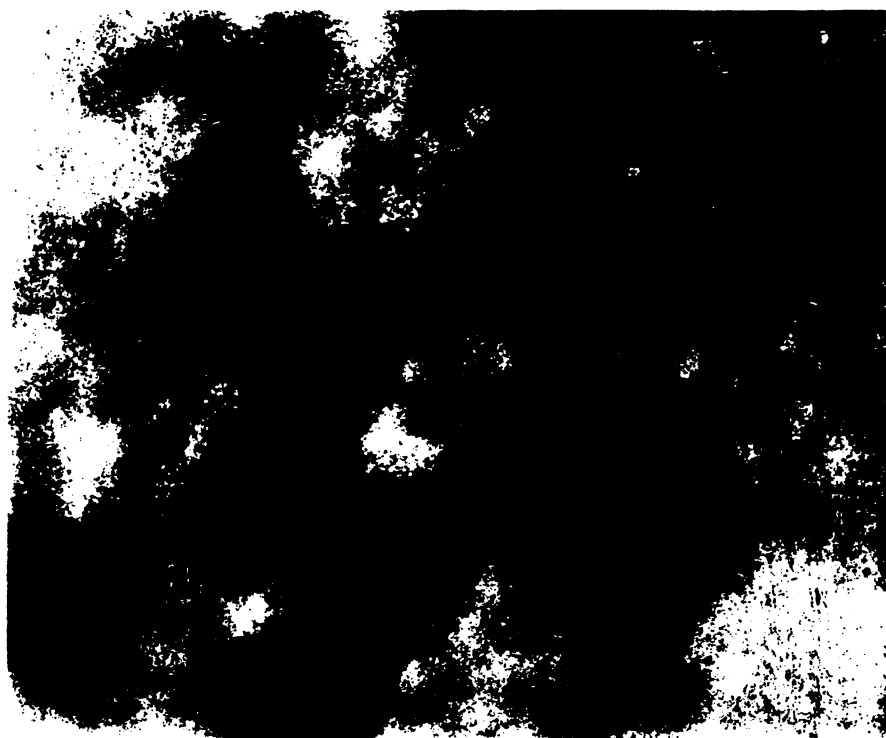
A droppable fuel tank attached to the wings of aircraft was announced which increases the operational range 60% with only a 2% decrease in top speed.

The stabilizing device for helicopters, placed between the mast and the rotor to keep the rotor in a horizontal plane regardless of the angle of the fuselage with the earth, was announced.

Jet-propulsion was used for fighter plane power for high speed, high altitude operation, and jet boosters for lifting heavy aircraft off the ground during takeoff.

Jets of air were discharged at the tips of rotor blades of helicopters to improve the efficiency of the vertical climb aircraft.

An electrical de-icer for airplane propellers was devised of three layers of synthetic rubber, the center layer being an electricity-conducting rubber containing a continuous chain of carbon particles.



PORTRAIT OF THE INVISIBLE—By a new development of the Bragg method, this picture has been made of a single molecule of hexamethylbenzene, a coal tar derivative, magnified about 200,000,000 times. It turns out to look like molecular patterns drawn from theory, except that the three hydrogen atoms known to cling to each of the six carbon atoms of the outer ring do not show because they have only one electron. The process developed by Eastman Kodak Laboratories involves making an X-ray diffraction photograph and then, with the information it provides, drawing a series of interference patterns which are then photographed in suitable combinations to give the picture shown.

A large cargo airplane of stainless steel construction was successfully tested.

A "sky-hook," which causes packages to spin as they fall, was developed to make packages dropped from planes land almost directly beneath the point of release.

Use of new bonding material in the sandwich construction of airplanes made possible a light, inexpensive plane for private use.

The Black Widow, P61, large and most powerful long-range pursuit plane, was put into service for night fighting.

The Army's A-26 fighter-bomber, the Invader, was designed with an all-purpose nose that makes it possible to equip the plane on the production line with special devices in addition to standard armament.

A Navy blimp was equipped with reversible propellers which can be used as brakes.

The P-63, an all-metal, low-winged fighter plane with more power and greater range and speed than its predecessor the P-39, was developed.

An improved oxygen supply system, developed for aircraft, utilizes a regulator controlled by atmospheric pressure which automatically delivers increasing quantities of oxygen to the mask as the pressure decreases.

A water injection device was developed to give an extra burst of power to an airplane engine.

A light-weight passenger seat for aircraft, saving over 157 pounds of weight in a 24-passenger plane, was developed.

A self-propelled aircraft electric generator power plant, mounted on a three-wheeled scooter, was developed to speed the starting of airplane engines.

Red-lighted instrument panels, a military development to prevent interference with night vision, were installed in commercial planes.

The performance of the big, heavy single-engine P-47 Thunderbolt fighter was improved and its radius of operation increased.

A high-frequency, all-direction radio range, believed to be static free, and which enables a pilot to select any course toward or away from it, was developed.

Stall-warning devices for private airplanes were perfected.

Giant, 18-foot, hollow steel airplane propellers satisfactorily passed service tests.

ANTHROPOLOGY-ARCHAEOLOGY

Bone Fragments Indicate Huge Ice Age Giants

► REASSEMBLY of bone fragments led to the announcement that Javanese giants with jawbones much larger than those of any known human beings, living or extinct, lived during the Ice Age.

Ancient clay tablets from the Near East, deciphered for the first time, describe a Babylonian mythological hero pleading with the god to grant life everlasting, and are the oldest known written record of man's longing for immortality.

Identification of plant pictures in the Voynich manuscript showed it could not have been written by Roger Bacon, its supposed author, since at least two of the plants illustrated were unknown in Europe until after Columbus' return from the New World.

Pollen grains found in successive layers of peat and muck in Danish swamps indi-

cated that New Stone Age farmers cleared away the major forest trees.

Stories about Yurikawa, legendary hero of Japan, were reported to have been borrowed from Homer's immortal Odyssey.

Evidences found in old Indian graves and dwelling sites suggested that the cultivation of such vegetables as squashes and pumpkins was started quite independently by different tribes.

Prehistoric skulls with filed teeth were discovered for the first time in the Mississippi valley.

ASTRONOMY

Saturn's Largest Moon Has Observable Atmosphere

► SUCCESSFUL photographing of the spectrum of Titan, Saturn's largest moon, showed it to have an atmosphere of methane and possibly ammonia, making it the only moon in the solar system known to have an observable atmosphere.

The discovery of two new members of our local group of galaxies brought to 13 the number of universes known to be our close neighbors.

Two double stars in the constellation of Cassiopeia were found to be surrounded by thick nebulous envelopes; their approximate size and ellipticity were found to be less in photographic light than in visual light.

New comets discovered were: du Toit II, Van Gent II, Berry; Comet Van Gent I was rediscovered by Peltier after being lost for about a month.

The orbit of the earth was shown to revolve in keeping with predictions of relativity theory.

The total eclipse of the sun on Jan. 25 was studied by an expedition of Mexican astronomers in Chiclayo, Peru; astronomers in Lima reported the eclipse lasted three seconds less than predicted.

Stars of the Pleiades were discovered to be receding from the solar system at a speed of about five miles each second.

A star was discovered of such extremely low luminosity that a million stars like it would be needed to equal our sun's brilliance.

An old nova in the southern constellation of Pictor was found to have become decidedly elongated since it brightened to first magnitude about 20 years ago.

A red giant, millions of times larger in volume than our sun but of such low density it is practically a luminous vacuum, was discovered through the use of an optical defect in refracting telescopes which makes it possible to take photographs alternately at the red and blue focuses of the telescope.

Nine-tenths of the stars in our galaxy were reported to be closer to its center than is our sun.

The atmosphere of the moon, if any exists, was estimated to have an upper limit in mass of one-millionth that of the earth.

The path of the Indiana-Illinois-Ohio fireball of Aug. 18, which exploded in daylight at a height of 10 to 20 miles, was traced.

A double star in the southern constellation of Antlia was discovered to be composed of two white dwarfs.

Evidence indicated that a star in the constellation of Libra has an intensely bright stratum of hydrogen just above its luminous, incandescent surface.



NORDEN BOMBSIGHT—With the publishing of this Army Air Force photograph, the cover of secrecy is lifted from America's unparalleled aerial weapon. (See SNL, Dec. 9).

Predictions were made that the next period of sunspot maximum would occur early, sometime before May, 1948.

Single-sun stellar systems such as ours were reported to be the exception rather than the rule.

The Mexican Government awarded to Dr. Harlow Shapley, director of Harvard Observatory, the Order of the Aztec Eagle, third class, for aid to Mexican astronomy.

BIOLOGICAL SCIENCES

Crown Gall of Plants Cured by Penicillin

► CROWN gall of plants, often called plant cancer, was cured by the application of crude penicillin.

Tristeza, extremely destructive disease of citrus trees, was given its first full description in English and Portuguese by an American plant pathologist.

Chlorellin, new antibacterial substance related to penicillin and similar in its action, was discovered in a common one-celled freshwater alga, which manufactures its own substance out of natural raw materials.

A germ-stopping substance, streptomycin, which gives protection against fowl typhoid, was found in soil micro-organisms.

DDT successfully wiped out gipsy-moth caterpillars on a test woodland tract.

A mold that lives in the soil was reported to catch and devour insect prey.

Production of new hybrids was facilitated by the discovery of a strain of onions with exclusively female flowers and tomato plants having pollen-less flowers.

Ultraviolet rays were used to produce new strains of molds; some were changed in appearance; others underwent internal changes although they looked the same.

Discovery in Peru of chimney swifts wear-

ing bands put on their legs in the United States solved the mystery of where these birds go for the winter.

The aerosol method for spraying an exceedingly fine mist was successful in distributing growth-control substances to secure seedless fruit from unpollinated flowers.

A new strain of food yeast, which promises to be a quick-producing source of edible protein since the cells are twice the size of its parent species, was developed through the use of camphor vapor.

Gelatin capsules containing necessary nutrients were used as micro-greenhouses in growing tiny plant embryos, too feeble to sprout out of the seeds in which they are formed or to produce their own roots.

Natural gas, unlike manufactured gas, was found harmless to potted plants and cut flowers.

A hybrid gibbon was born in captivity to a Siamese gibbon mother and a Sumatran gibbon father.

Statistical analysis of the phrase order in the song of a wood pewee indicated that birds are conscious composers.

An easily-grown mold proved to be a good test plant for fertilizer elements needed by crop and garden plants.

Large reductions or increases in the amount of light were found to cause weasel pelts to change to white or brown by a complete shedding of the previous coat.

Low-acid peaches for persons with gastric ulcers resulted from a 15-year plant breeding program just completed.

A school of Pan-American agriculture was formally inaugurated in Honduras.

Lettuce seeds were made to sprout in soil at midsummer temperatures by soaking them in a solution of thiourea.

The Stephen Hale Award in plant physiology was given to Dr. Ray F. Dawson of Princeton University.

Prof. N. G. Cholodny of the University of Kiev, was awarded the Charles Reid Barnes Life Membership in the American Society of Plant Physiologists.

The Sir William Schlich forestry medal was given to Prof. Henry S. Graves, emeritus dean of the Yale School of Forestry.

Recipients of the Daniel Giraud Elliot gold medal of the National Academy of Sciences in recognition of outstanding publications in zoology or paleontology were: Prof. Malcolm R. Irwin, University of Wisconsin (for 1938); Prof. John H. Northrop, Rockefeller Institute of Medical Research (for 1939), and Prof. William Berryman Scott, Princeton University (for 1940).

CHEMISTRY AND PHYSICS

Mathematical Robot Solves Intricate Problems

► A MATHEMATICAL robot, an automatic sequence control calculator which can perform a series of operations without resetting, making possible calculations formerly impracticable because of the time required, was put into operation.

Completion of a 225-ton cyclotron, one of the two largest in the world and capable of generating atom-smashing projectiles of 15,000,000 electron volts energy, was announced.

By impregnating wood with methylolurea

in water solution, it was found possible chemically to convert soft woods into much harder grades.

A continuous polymerization process was developed to replace the older batch type of synthetic rubber production, making possible an estimated 40% increase in output.

Milling time was cut by a new method of mixing carbon black with synthetic rubber in the liquid state instead of later.

An electronic device which registers the speed of flight of ammunition accurately to 1/100,000 of a second was developed.

A new family of synthetic resins, called silicones, for waterproofing and fireproofing materials, was produced by combining slippery organic compounds with the gritty components of sand and glass.

Quinine was synthesized from a coal-tar derivative.

Independent development of two 2,000,000-volt X-ray tubes made possible X-ray pictures through extremely thick sections of steel and also wider applications of X-rays in medical research.

Chemical treatments were developed to make stockings unruled, trousers remain creased and dresses that will not wrinkle.

Sawdust and sawmill wastes yielded a new plastic, acetic acid, industrial alcohol and several chemicals by means of a continuous method of chemically adding water to wood.

A method was developed for using lignin wastes from sulfite paper mills to bring about the formation of useful granules in the soil; a black opaque plastic of high tensile strength and good resistance to moisture was made from wood shavings and sawdust.

Two new kinds of synthetic rubber were developed, one from lactic acid and the other from butadiene and dichlorostyrene.

Electronic heating was used to give a permanent set to the twist in rayon cord, making the cord stronger and safer for use in tires.

An electronic cyclograph was used to determine rapidly whether a piece of metal meets hardness specifications.

An electroplating process for copper-plating was devised which speeds up production by using potassium salts in the bath.

An electron spectroscopy was used in combination with an electron microscope to identify chemical elements composed of sub-microscopic particles; it was used with a three-dimensional polaroid vectograph to obtain three-dimensional views of sub-microscopic structures.

Chlorine dioxide, powerful oxidizing and bleaching agent, was produced by a new dry process which depends upon the reaction of chlorine and sodium chlorite.

Wood veneer was bonded to metal surfaces by a rubberlike adhesive.

Itaconic acid, a chemical used in the production of plastics, was made by fermenting corn sugar with a mold.

New knowledge of the chemical constitution of coal was obtained by studying the quantity of methane it contains.

Fluorescent pigments of zinc and cadmium sulfide were added to paper while still in the pulp stage, eliminating the need of special inks for fluorescent maps.

A glass highly resistant to hydrofluoric acid was developed.

Increased production of vitamin C, or ascorbic acid, was made possible by a new method of making it from the galacturonic acid in sugar beet pulp.

Heating in automobile tires made of synthetic Buna rubber was diminished by the addition of certain non-black pigments of fine particle sizes.

A plastic was developed which in manufacture is expanded to many times its original size; it is lighter than cork and lower in heat conductivity than rock wool or glass.

A heat-resistant plastic, dichlorostyrene, was developed for use in electrical insulation.

A high-speed panchromatic film was developed for taking pictures under extremely adverse light conditions at high shutter speeds.

Starch and protein grains in bread, put into the tombs with Egypt's ancient mummified dead, were found to be still in good chemical condition.

X-rays were used to keep uniform the thickness of white-hot sheets of steel squeezed out between rollers.

Rubber and resins were bubble-floated out of the mashed pulp of milkweed and other plants by a process similar to the flotation method of separating metals from their ores.

X-ray can be used to change the rate of oscillation in quartz crystals used to control radio transmitters, thus tuning the plates, it was reported.

A high-pressure mercury vapor lamp was developed which permits the operator to adjust the light intensity at various levels in printing motion film sound tracks.

A color film that can be processed at home in 90 minutes was made available to the public.

A heat-resistant plastic, a readily moldable synthetic co-polymer containing carbon, hydrogen and nitrogen, was developed to withstand heat of boiling-water temperature.

A resin compound which makes soil waterproof, thus eliminating mud, was announced.

Improved processes for obtaining from coal chemicals similar to those extracted from petroleum were developed.

Synthetic menthol which resembles the natural product in chemical structure was produced from thymol.

Post-graduate fellowships in physics mathematics and chemistry were established in honor of Dr. Frank B. Jewett, \$3,000 a year to be given to each recipient and \$1,500 to the institution at which the work is done.

Dr. Isidor I. Rabi of Columbia University received the 1944 Nobel award in physics for investigating magnetic and electric properties of the atomic nucleus by means of the "magnetic resonance method"; Dr. Otto Stern of the Carnegie Institute of Technology received the 1943 Nobel prize in physics for his studies of the structure of the atom by means of the "molecular beam" method.

The 1943 Nobel prize in chemistry was awarded Prof. Georg von Hevesy of the Danish Institute of Theoretical Physics, Copenhagen, for work in the use of isotopes as indicators in studying chemical properties.

Dr. William Mansfield Clark of the Johns Hopkins University, who has worked on the precise determination of the acid or alkaline state of milk, received the Borden Company prize of \$1,000.

Dr. Joseph S. Fruton of the Rockefeller Institute for Medical Research received the \$1,000 Eli Lilly and Co. prize in biological chemistry for studies of the amino acids.

Dr. Elmer K. Bolton, chemical director of

the du Pont Company, was awarded the Perkin medal by the American Section of the Society of Chemical Industry.

Dr. Arthur C. Cope of Columbia University was presented the American Chemical Society award of \$1,000 in pure chemistry for researches on vinyl and allyl chemical types in plastics and drugs.

Dr. William David Coolidge of the General Electric Co., and Dr. Peter Kapitza of the USSR Academy of Sciences, were awarded Franklin medals by Franklin Institute.

Dr. Robert Clark Jones was awarded the Adolph Lomb medal for developing a system of mathematical calculation for optics which made possible an optical gunsight for bazookas.

Col. Bradley Dewey, former U. S. Rubber Director, was awarded the annual Chemical Industry medal for his work in colloid chemistry, especially pertaining to rubber.

EARTH SCIENCES

Underwater Camera Shows New Features of Ocean

► A CAMERA developed for taking pictures of the ocean's floor disclosed hitherto unknown features in the life and geological processes on the ocean bottom; flashlights are set off and the camera shutter clicks when the tip of a special trigger hanging from the bottom touches the floor.

Among several damaging hurricanes was an unusually severe one that caused death and destruction along the Atlantic seaboard the middle of September, beginning somewhere in the Atlantic, off the West Indies.

Seismologists located epicenters of 33 distant earthquakes through correlation of seismographic data; notable among them were two in Turkey in the same general region, and earthquakes in Argentina, southern Mexico, northern New York, and one that shook the southern islands of Japan, comparable to the 1923 quake there.

A new electronic amplifying device, operated by batteries, was developed to magnify and record near and distant earthquakes.

The Mississippi Valley suffered from floods during the spring; at St. Louis flood waters reached a height of 39.1 feet, highest since 1844.

A fossil cactus of Eocene date, similar to the modern prickly pear, was found in the rocks of Utah.

A tectonic map of the United States, depicting its complete geologic structure, was completed.

A diamond weighing 34.46 carats, second largest ever discovered in the United States, was reported found in West Virginia.

A 200-million-year-old fossil jaw, complete with 53 teeth, was discovered near Philadelphia—relic of 10- to 20-foot crocodile-like reptiles that haunted swamps and lakes during the Triassic period.

The discovery of thick beds of potash-containing minerals underlying a large area in eastern Utah substantially increased America's known reserves of potash.

Conifer pollens found in an ancient bog indicate that Texas once had a climate resembling that of the present Great Lakes region.

Bones of a mastodon, primitive Ice Age elephant, were found in Ohio.

The enemy in Holland flooded farm land to the extent of at least 375,000 acres, a major disaster affecting at least 15% of Holland's farm land; some of the flooding is with salt water which will make the land useless for farming for many years.

A process was developed for producing pure tungsten directly from tungsten ore of all grades, thus eliminating the necessity of transforming tungsten in the ore used into alkali tungstate.

The Mary Clark Thompson gold medal of the National Academy of Sciences for outstanding work in geology and paleontology was awarded to: Prof. Edward W. Berry of the John Hopkins University (for 1942); Dr. George Gaylord Simpson of the American Museum of Natural History (for 1943), and Prof. William J. Arkell of Oxford University (for 1944).

ENGINEERING AND TECHNOLOGY

Anthracite Furnace Has New Burning System

► A NEW anthracite furnace made use of a steel tube as combustion chamber, a worm for fuel feeding, air drawn through by suction pump for draft and a water jacket surrounding the tube to transmit the heat.

Gas turbine engines for aircraft, railroad trains and automobiles developed several thousand horsepower as a result of improvements in metals and efficiency, offering a large saving in fuel and weight for long-range operation.

Larger television pictures were made possible by the development of high-voltage cathode-ray tubes capable of producing extremely bright pictures.

A device was invented that can be installed in a jeep or other vehicle to plot the course traveled by the automobile as it speeds over highways or across terrain.

A two-way electronic train telephone system enabled freight conductors and engineers to talk with each other from opposite ends of a train.

An electrolytic process was developed for rapidly depositing a tin coating of any desired thickness on any gauge of electric wire without producing a copper-tin alloy on the wire.

A nylon compound coating on electric wire, applied by an extruding process, was found to be tough, abrasion and heat-resistant, and impervious to most solvents.

Pilotless jet-propelled planes carrying large explosive charges, nicknamed "buzz-bombs" and "robot bombs," were used by the Germans in long-range attacks.

The V-2 stratosphere rocket, a spinner using nine tons of fuel and carrying one ton of explosive, was developed to follow a parabolic trajectory that has its peak 60 miles up and a top speed of 1,000 to 3,500 miles an hour.

A miniature seven-pound electric motor which operates at 120,000 revolutions a minute was developed.

Porcelain enamel that can withstand extremely high temperatures was developed and used on warplane exhausts.

An explosive 20% more powerful than TNT was made by nitrating an alcohol which in turn is made by treating a mixture of formaldehyde and acetaldehyde with lime.

An electronic "ear" was devised to test shells for imperfections by recording the sound made when the shells were dropped on an anvil.

Chrome-plated cylinder barrels gave longer service life to automobile engines.

Columbium metal was obtained in high-purity form by heating columbium carbide and columbium oxide in a vacuum.

The double process of chromium plating and soaking in hot oil to release hydrogen was discovered to lengthen the life of cutting tools for machine shops.

A three-metal electrolytic plating process was developed which used copper-tin-zinc alloy as the anode, and a special salt in the bath.

The "Crocodile" flame thrower, using a new type of fuel, shot a stream of fire 450 feet.

Fighting armored tanks fitted with bulldozer blades that can be discarded before combat were used as dual-purpose machines.

The noise made by primers on hand grenades was diminished by a new primer containing milder detonating ingredients.

Midget M2 fog generators were used to produce a concealing white cloud in warfare.

Rockets, known as flying bazookas, were discharged from tubes placed under the wings of warplanes.

"Speed-up" motion pictures in color were used to study combustion efficiency in stoker fuel beds in furnaces.

Sound waves were used to test the elasticity of fabric yarns by setting up a vibration in a steel bar attached to the fiber and measuring the velocity of sound passing through the fiber.

Aluminum alloy landing mats, weighing 50% less than steel mats, were used for emergency flying fields.

Fuel tablets, made of a synthetic compound known as trioxane were developed to heat food for soldiers.

Good coke was made from Colorado coal by adding in the coking process a char made from similar coal by driving out part of the volatile matter.

Development was announced of an Army vehicle, called the "weasel" which carries men or cargo over snow, mud and other treacherous ground, and climbs a 45-degree slope.

A fire bomb, which upon contact spits flaming oil in all directions, was developed to start fires in enemy territory.

The Edison medal was awarded to Dr. Vannevar Bush, president of the Carnegie Institution of Washington, for contributions in electrical engineering.

The Faraday medal of the British Institute of Electrical Engineers was awarded Dr. Irving Langmuir of the General Electric Research Laboratory.

The John Fritz medal, given in recognition of distinguished contributions in the field of applied science, was awarded to John L. Savage, for many years designing engineer of the U. S. Bureau of Reclamation and consulting engineer for the Tennessee Valley Authority.

INVENTION

Industrial Inventions Outstanding This Year

► **NOTABLE** and interesting inventions patented during the year include:

A process for enriching blast-furnace gases so they may be better used as a source for commercial chemicals such as ammonia.

A process for the synthetic production of toluene from benzene and methane.

A process for making synthetic liquid fuels and oils out of cheap gases.

A method for recovering small nuggets of steel embedded in old furnace slag.

A process for transmitting color pictures by wire or wireless in the form of three-color separation films ready for the usual photographic processing.

A new type of giant locomotive, built in three sections to get around curves, with two fuel-and-water tenders and two sets of driving wheels.

An apparatus which substitutes air pressure for gravity in administering blood plasma to the wounded in battle.

A space-saving cathode tube for use in electron microscopes and television sets.

A camera latching mechanism that prevents double exposure.

A fuel injector for internal combustion engines that injects the fuel at a relatively constant rate irrespective of the speed of the engine or amount being injected at each stroke.

A process for cracking naphtha and rearranging its atomic fragments into aviation gasoline in the presence of a synthetic silica alumina catalyst.

An ozone treatment to protect meat against spoilage, the ozone being generated by ultraviolet radiation.

Use of one of the chemicals of the chlorophenol group to protect green lumber against fungi while under treatment to prevent cracking and splitting.

A system of illuminating airfields by underground lights, eliminating overhead flood lights and superstructures.

A series of double salts of nicotine for insect-fighting, to replace the unstable simpler nicotine salts formerly used.

An airplane combining the advantages of conventional propellers and the newer jet propulsion.

A simple dashboard instrument for airplanes that shows climb and drop quickly and sensitively.

An infra-red bread-baking machine that cooks loaves evenly in 20% to 30% less than the usual time.

MEDICAL SCIENCES

DDT Hailed as Great Contribution to Health

► **THE INSECTICIDE**, DDT, was hailed as a contribution to world health, following Army experience in which it checked a louse-borne typhus epidemic when dusted as a powder in mass delousing of civilians and aided in control of malaria when used as an anti-mosquito spray.

Blood protein derivatives were put to many new uses; gamma globulin to prevent measles, albumin for shock, fibrin foam to stop bleed-

ing, fibrin film (a plastic) to repair the tough cover of the brain, and fibrinogen with thrombin for cementing skin grafts in place.

A paste of red blood cells salvaged from plasma production was reported to give good results in speeding the healing of old, infected burns, varicose and other ulcers, and extensive granulating wounds.

Thanks to mobile surgery and reconditioning treatment, 97% of the wounded soldiers recovered and about one-half of these returned to duty; death rates from disease among the fighting forces were lower than the annual death rate in the Army during any one of the last 10 years of peace.

Ultraviolet radiation of barracks reduced respiratory illness by one-fourth.

Daily doses of sulfadiazine cut down meningitis, scarlet fever and streptococcus sore throat, and subsequent attacks of rheumatic fever in Army and Navy camps; care was necessary, however, to prevent harm from the sulfadiazine treatment itself.

The spread of colds and other air-borne diseases can be checked by the vapor of triethylene glycol, a large-scale test in a military camp showed.

Faulty function of the cortex of the adrenal glands was seen as a possible cause of leukemia.

Penicillin showed possibilities as an effective remedy for relapsing fever, Haverhill fever, parrot fever and erysipeloid; the drug proved effective in preventing peritonitis and in treating syphilis.

Sulfa-resistant gonorrhea was successfully treated in six hours with penicillin.

Experiments with mice led to the hope that anthrax may yield to penicillin.

The action of penicillin was prolonged by mixing it with beeswax and oil; elimination of penicillin via kidneys was slowed by the use of para-aminohippuric acid, and

also by chilling the tissues into which it was injected.

The production of penicillin was speeded by the use of radium and also by placing strips of cellophane in the culture medium; radio heat proved to be 48 times as fast as the old "freeze-drying" method for drying the drug.

Human ova were fertilized outside the body and their development through the first two cell-division stages observed.

Isolation of the growth-stimulating hormone from the pituitary gland was announced.

Aid to the diagnosis and prognosis in diseases of circulation, including immersion foot, was found in the use of radioactive sodium for measurement of circulation time.

Discovery was reported of a unique protein, apoferritin, that acts as an iron storage depot for the body, the stored iron having a magnetic susceptibility of a magnitude rare in iron compounds.

A chemical, named pyrexin, was found that apparently causes the fever that comes with inflammations.

A hormone produced by the pituitary gland in the head, the adrenotrophic factor, was reported to play an important role in body resistance to invasion by disease germs and poisonous substances through influence on the lymphoid tissue.

Drinking large quantities of sodium lactate solution saved victims of shocks in severe burns without the use of blood plasma.

An anti-malaria vaccine was successful in laboratory tests on animals.

An anti-reticulocytotoxic serum was reported effective for stimulating wound healing, suggesting its use as a weapon against cancer, high blood pressure and premature old age.

An airman's ceiling may be raised as much as a mile by eating sugar before flight and



LIKE A SKY ROCKET—Jet-assisted take-off enables the Navy's massive twin-motored Martin Mariner to shoot up from the water rocket-fashion.

refraining from excessive smoking, laboratory tests indicated.

An anti-enzyme substance in beef sweetbreads and soybeans may be a new weapon for fighting certain streptococcal infections, it was reported.

Blood clotting was found to involve changes in molecular shape of the same kind as occur in the contraction of muscle tissues and the elastic stretching of skin and hair.

Streptothricin, germ-killer from a microbe that lives in the soil, promised to become a weapon against dysentery and infected wounds.

Refrigeration of the jaw showed promising results as a pain-killing aid to dentistry with complete loss of sensation obtained in the majority of cases tried.

Successful experiments on high blood pressure in rats pointed toward trials of vitamin K as a high blood pressure remedy.

Finding that there are certain changes in the excretion of hormones following injury suggested new methods of treating the burned and wounded.

The discovery of the presence of certain catalysts known as porphyrins, revealed by the fluorescent glow of white matter in the brain, gave light on the problem of mental disease.

Biotin may have a part in the utilization of starches and sugars by humans, tests of liver slices kept alive outside the body indicated.

A Soviet scientist successfully transplanted the hearts of frogs; some of the animals lived for four months with new hearts completely replacing their own.

A germ-killing soap that may reduce infections was announced.

Radium treatment was tried for the prevention of aviator's ear with good results.

Meals high in starches and sugars or fats were found to help offset the effect of cold weather on body temperature and on the coordination of nerves and muscles.

Phenoxetol, a chemical relative of ethylglycol, was announced as an effective remedy for "blue pus" infection in wounds.

A sulfa drug, sulfamylon, effective against gas gangrene and other anaerobic organisms, was developed.

Increased resistance to oxygen lack at low atmospheric pressure was achieved for rats by dilantin sodium, a drug used in epilepsy, and thiourea and thiouracil, chemicals recently found effective in slowing thyroid gland activity.

Quinacrine (atabrine) was reported to be as good as quinine in control of malaria and even better in some respects.

Encouraging results in treatment of clinical tuberculosis with sulfabnamide, a special kind of sulfa drug, were reported, but the drug was not developed to the point of curing the disease.

Two sets of quadruplets in the rare combination of three girls and one boy, were born in the United States, one set is believed to have been the first quadruplets in medical history delivered by a Caesarean operation; reports of the birth of quintuplets came from Argentina and Turkey.

One of the worst infantile paralysis epidemics since 1916 occurred in the United States with total cases reported for the year expected to be 20,000 or more; influenza was epidemic during the winter of 1943-44.

Experiments with rats led to the hope that

extra doses of B vitamins would improve the promin treatment of tuberculosis.

Riboflavin, one of the B vitamins, was found to be manufactured by bacteria in the human intestinal tract; revision of dietary requirement standards may follow.

Experiments with rabbits, showing that air-borne spread of tuberculosis germs could be stopped by ultraviolet irradiation, suggested a possible aid to the control of human tuberculosis.

The addition of auxiliaries, such as paraffin oil containing dead tuberculosis germs, a related microorganism, *Mycobacterium butyricum* and an absorption base known as Falba suggested a more effective influenza vaccine.

A method was developed for completely and almost instantly killing germs of both bacteria and filterable viruses with ultraviolet light, giving promise of a method of preparing more effective vaccines for some diseases.

Large doses of para-aminobenzoic acid were found effective against louse-borne typhus when treatment was begun during the first week of illness, the course of the disease was made less severe and the average duration of the fever considerably shortened.

A procedure was developed for temporary complete arrest for scientific study of the flow of blood to the human brain, using a specially designed, inflatable, head-pressure cuff, held down to the lower third of the neck; recovery of consciousness occurred quickly.

Whole communities became "guinea pigs" in controlled large scale experiments to determine whether tooth decay can be prevented by adding minute amounts of fluorine to a community's drinking water.

A special solution of the plastic, polyvinyl alcohol, was reported more than twice as effective as plasma in saving rats from dying of experimental shock.

A vaccine, promising to be effective against many strains of dysentery bacilli, was developed.

Electric sleep, differing from electric shock treatment in that it keeps the patient asleep for seven minutes, was announced as a treatment for the mental disease, schizophrenia.

Swift relief of painful muscle spasm and consequent disability in rheumatoid arthritis was reported to follow treatment with prostigmine, synthetic chemical used to treat myasthenia gravis.

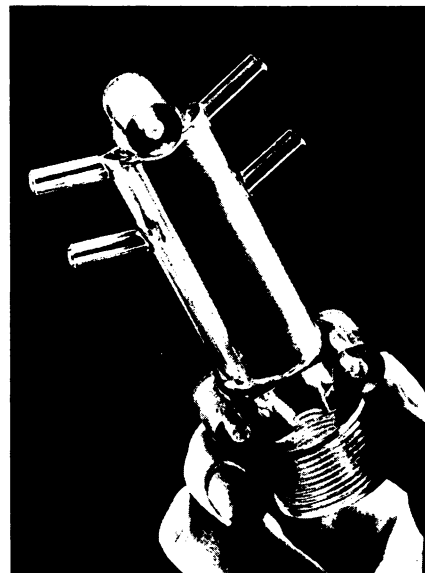
Success with sulfaguinidine treatment of Asiatic cholera was said to promise conquest of this ancient plague.

Research showed that the water requirement of the human body cannot, contrary to an old theory, be suppressed by physical conditioning; it was found that a part of the requirement for water in an emergency can be supplied by eating glucose.

Excessive production of the polysaccharide, hyaluronic acid, with failure or insufficiency of the enzyme, hyaluronidase, to break up the big acid molecule, was seen as an important factor in rheumatic fever.

Two vitamins of the B complex group, riboflavin and pellagra-preventing niacin, were reported to be factors necessary for the production and regeneration of the blood in the animal body.

Successful mice experiments led to the hope that toxoplasmosis could be cured by



KEEPS WATER OUT—To guard against the possibility of water in 100 octane gasoline, Douglas Aircraft employs this alternate static vent drain of transparent Tenite plastic in the fuel system of one of its planes. If any water should be present in the gasoline, it is automatically drained to this vent, where it accumulates and regardless of altitude, never freezes.

sulfapyridine.

Tests repeated many times on the same inveterate smokers showed they responded to tobacco with increase in blood pressure and pulse rate, decrease in the temperature of the skin at the extremities, and change in heart rate as demonstrated electro-cardiographically, together with change in the T-wave.

A case of complete pancreatectomy with survival following operation for more than a few weeks was reported; it is the first total pancreatectomy for a benign lesion of the pancreas.

The male sex hormone was found to have an important influence in promoting muscular strength.

Children were found to grow most rapidly in height in summer and in weight in winter; new bone centers in their skeletons appear most rapidly in summer.

Feeding expectant mothers thyroid to make them produce small, easily-born babies was discovered to have the reverse effect, actually producing larger babies.

Clinical studies in America confirmed belief that rubella (German measles), as first noted in Australia, contracted during the first three months of pregnancy produces congenital abnormalities of the eyes and defects of the central nervous system in the offspring.

A condition corresponding to the menopause in women was discovered to occur in some men; it was satisfactorily treated with the male sex hormone.

Delivery by Caesarean of a living baby from each horn of a double uterus in a

mother who also had a complete double birth canal, and the birth of a living baby from an ovarian pregnancy were among unusual obstetrical events.

The 1943 and 1944 Nobel prizes in medicine were awarded to four men: Dr. Henrik Dam and Dr. Edward A. Doisy shared the 1943 prize for the discovery and synthesis of vitamin K; Dr. Joseph Erlanger and Dr. Herbert S. Gasser received the 1944 award for their fundamental research on nerves.

Grants totalling \$1,100,000 were given by Bernard M. Baruch for teaching and research in physical medicine.

The gold medal of the American Academy of Orthopedic Surgeons was awarded to Col. John L. Gallagher for his development of compression dressings for burns, wounds and frostbite.

Establishment of the Passano Foundation to aid medical research and education, was announced.

Discovery that certain hormones and synthetic chemicals may become weapons for fighting tumors of the uterus which develop in women during the child-bearing period won the second \$2,000 Charles L. Mayer Award for Dr. Alexander Lipschutz of Chile.

PSYCHOLOGY AND PSYCHIATRY

Five to 14 Quanta Can Stimulate Retina of Eye

► THE SMALLEST amount of light capable of stimulating the retina of the human eye was found to be between five and 14 quanta, representing an energy expenditure of between two and six ten-billionths of an erg, and often a single quantum is adequate for the effective excitation of a single retinal nerve-cell.

A portable night-vision testing instrument was developed for the Navy which uses a luminous dial, made of radioactive material sandwiched between two disks of glass, against which a test letter is seen in faint silhouette.

Under certain conditions the exact center of the fovea of your eye is partially color-blind, affecting ability to distinguish blue from green, or orange from purple in small objects or those seen at a distance, experiments showed.

Reaction time to a change in intensity of the stimulus was developed as a new psycho-physical method; it was applied successfully to measuring sensation of light.

New types of ear defenders made of synthetic rubber which reduce battle noise without preventing the hearing of commands were made available in the Navy; they protect fighters against painful noise and lessen the chance of deafness; used experimentally in noisy war factories they cut down absenteeism.

Data were found indicating that from one-sixth to one-quarter of feeblemindedness results from incompatibility reactions between a mother lacking the Rh blood factor and her unborn child who has it.

Which region of the body sends most information to the brain's cortex was found to be related to how the animal habitually obtains its food.

Restraint of physical activity, which causes tic-like head shakes in hens, bears

and other animals, was also found to lead to over-activity and temper tantrums of children.

A battery of 20 psychological tests developed for the selection of aviation cadet candidates was reported to be useful in predicting which would later be successful in combat and which most likely to be missing in action.

Opinion surveys reached a new high in accuracy, predicting the popular vote in the presidential election with an error of only one per cent.

Personal liking for a candidate was discovered to follow rather than precede the decision to vote for him, and change of vote, when it occurs, is due more to the influence of friends than to campaign speeches.

Study of cats made "neurotic" by inner conflict between hunger and fear in experiments to investigate reasons for use of morphine by humans showed that the more recently-learned abnormal behavior patterns disappeared first and reappeared last as effects of the drug wore off.

A case of total color blindness with red seen as black was traced, through hypnotism, to hysteria in the man's childhood; sensitivity to red rays of the spectrum was restored.

By immediate diagnosis of mental casualties and treatment in the front lines, up to 80% of the service men receiving mental or emotional wounds were returned to duty.

A psychiatrist was appointed on the staff of each Army division as an aid in salvaging for combat or other active military duty those who would otherwise crack up mentally under the strains of warfare.

A re-education program set up in three replacement training centers enabled the Army to take out of hospitals a group of soldiers suffering mental or nervous breakdowns and return most of them to full-time jobs.

"Battle reaction" type of war neurosis was successfully treated in merchant seamen with ergotamine tartrate, a drug acting on the autonomic nervous system.

Experience with government employees indicated that in some cases when workers appear to be neurotic, their symptoms may be due instead to inability to meet the demands of the job; better placement may relieve the condition.

Pencil-and-paper tests proved better than practical performance tests for picking radar technicians, airplane mechanics or radio repairmen for army.

Close resemblance was found between non-twin brothers and sisters and evidence indicated that this is due more to heredity than environment.

A combination of hypnosis and psychoanalysis was reported to be a successful treatment for psychopathic criminals where ordinary psychoanalysis would fail due to lack of cooperation on the part of the criminal.

"Three-day schizophrenia," a mental illness like schizophrenia but of brief duration, was reported as developing in combat, but due more to background personality than type of duty.

"Grief reaction" depression following tragic bereavement was treated successfully by electric shock.

A survey of men rejected or discharged by the Army for neuropsychiatric reasons showed that 80% needed psychiatric treat-

ment or advice, but only 5% got it.

A non-profit institution, the Worcester Foundation for Experimental Biology, was established to study problems of industrial fatigue and mental illness, and search for more knowledge of the nervous system and the hormones.

Col. William C. Menninger, chief of the psychiatric division of the Army's Surgeon General's Office, received from the National Committee for Mental Hygiene the new \$1,000 Lasker award for his outstanding contribution to the mental health of service men and women.

Science News Letter, December 23, 1944

ASTRONOMY

Fire-Ball Fragments Near Parkersburg, Illinois

► FRAGMENTS of the fire-ball of Aug. 18, which was seen by hundreds of people in Indiana, Illinois and Ohio, can probably be found in the vicinity of Parkersburg in Richland County, Ill., reports Dr. Charles P. Olivier, director of the Flower Observatory and president of the American Meteor Society.

This is about 15 to 20 miles north of the point where it was originally estimated that the fire-ball ended. In all, about 250 reports were sent to Dr. Olivier by readers of newspapers serviced by Science Service, and it was from these that the path of the meteor was plotted.

The fire-ball, described by some as being bright as the sun, or with a disk as large as the full moon, was at first mistaken by many to be a burning airplane. Robot bombs were in the minds of others upon seeing it.

At first the object was silver-white, then it grew yellow and finally became red as it neared its end. The head of the meteor was oval-shaped, with hot, colored gases, some 10 to 15 times as long as the head's diameter, trailing along with it. The smoke train was not visible at great distances, being only about as intense as sky-writing.

Special "explosions" occurred at two places along its path. The first consisted of the separation of the head into two or three pieces which continued straight on their course. The second point was probably that of general disintegration, the fragments continuing nevertheless some 40 miles.

"I rarely remember handling a case in which, when averaged in, the data so corroborated themselves in the sense that each part of the solution somewhat checked the other parts," stated Dr. Olivier, who coordinated and gave meaning to the miscellaneous information sent to him.

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