GENERAL SCIENCE

Science Goes to War in 1942

Medical and military advances are outstanding developments of past year. War effort is aided by men fighting on war fronts of science.

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 27 and also the issue which will appear next week, December 26.)*

By SCIENCE SERVICE STAFF

➤ AMERICAN VICTORIES against the Axis in 1942 have been greatly aided by the men in the laboratories, fighting on the war fronts of science. Much scientific progress is shrouded in military secrecy but a great part of the year's advance has been announced.

In its annual survey, *Science Service* presents the highlights of the year's scientific progress:

AERONAUTICS

Aeronautical Research Leads to Better Airplanes

Solution of certain research problems—development of new low-drag wing sections, improvement of flaps, improvement of cooling systems, improved engines and new propeller designs — made it possible for America to build planes to fly faster than 400 miles per hour.

Cylinder heads made by forging in a die, with fins cut on the exterior by a high-speed milling machine, made possible reduction in weight of airplane engines to less than one pound per horsepower.

The Franklin Medal was awarded by Franklin Institute to Dr. Jerome Clarke Hunsaker, chairman of the National Advisory Committee for Aeronautics.

A new laboratory devoted exclusively to research on airplane engines was opened at the Cleveland Airport by the N. A. C. A.

A new wind tunnel for airplane research was opened at Wright Field; the contract for another at Moffet Field was awarded.

Extra wings for take off and more economical cruising at low speeds, which can be discarded in flight, were patented.

A floating waterproofed fabric bag to store gasoline at sea for the quick refueling of seaplanes was patented.

A portable catapult was developed for land launching of airplanes.

Modification of battle-tested airplanes made possible the development of a new technique of air warfare—low flight at high speed for horizontal bombing, and use of the plane as a fighter when bombs have been dropped.

Inboard bomb racks for wide-hulled flying boats, with guides to "steer" bombs over the side and start them accurately downward, were invented.

Auxiliary turbo-driven propellers for getting rocket planes up through the denser lower atmosphere were invented; they are powered by the rocket blast, and are to be jettisoned once the plane has reached the stratosphere.

New multi-engined transition training planes for instruction of flight crews were developed and put in use.

Pre-flight aviation training was introduced as a regular part of the curriculum in elementary and secondary schools.

A new telescopic sight for rear gunners made possible wider arc of fire and better streamlining of the fuselage.

Apparatus for automatic control of the pressure within a sealed airplane cabin by blowing off to outside air when pressure is high and turning on a supercharger when it falls, was invented.

A cooling meter for aircraft engine cooling, and meters for measuring the visibility of exhaust gases from airplane engines were developed.

A de-icer for airplane propellers that provides for the forcing of anti-freeze chemical through a series of holes when the propeller is rotated, was patented.

A device was developed that warns the pilot of approaching stall conditions by means of a tube which transmits pressure changes from the trailing edge of the wing to a diaphragm within the wing connected with an electric instrument.

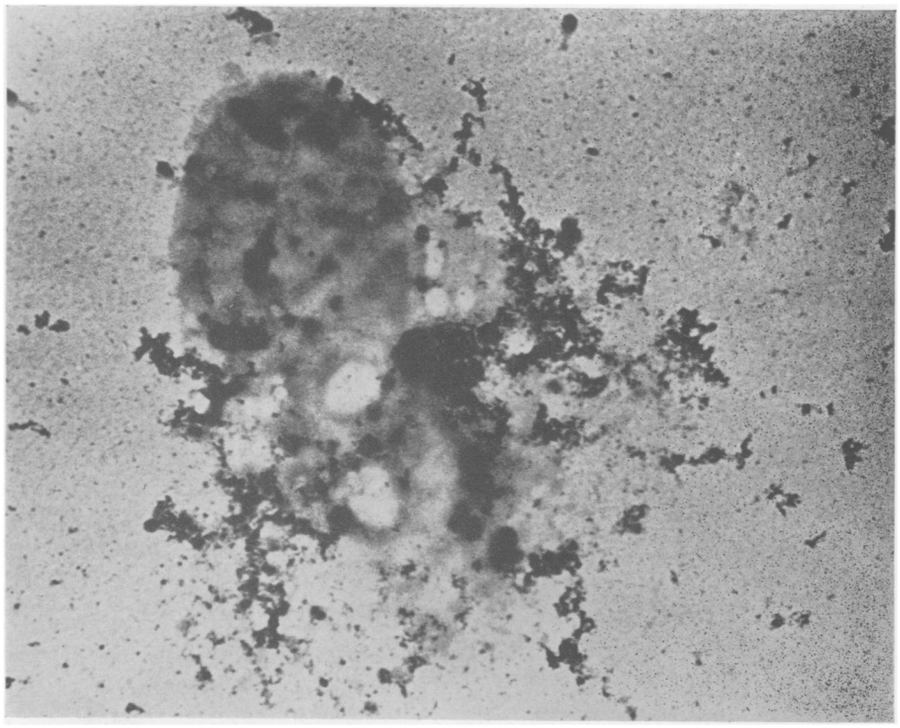
Caterpillar-type treads for airplane landing gear were invented.

A new ordnance mount for machine guns, combined with gunner's seat mounted on a circular track, was developed for enabling the gunner to swing himself and his weapon around to fire at any angle and if necessary to pilot the plane.

ANTHROPOLOGY—ARCHAEOLOGY

New Stone Age Implements Found; Find Tiny Skull

New Stone Age implements were found in the famous cave on Mt. Carmel in Palestine where only Old Stone Age records had previously been known, thus closing a long gap in the site's prehistory.



VICTORY—Extensively damaged, this germ (Escherichia coli) is shown magnified many thousand times by the RCA electron microscope, in a state of dissolution after a twenty-minute attack by bacteriophage. The cover of this week's SCIENCE NEWS LETTER shows the germs ten minutes after the first attack, as the bacteriophage particles attach themselves to the germs.

Cannibals and head-hunters in some South Sea islands reverted to old practices, due to removal of governmental controls and missionary influences by Jap invasion.

Despite a wartime spurt in the birth rate, the population of the United States is becoming stationary, statistical studies indicated.

No human artifacts were uncovered along the whole length of the new Alaskan Highway.

The smallest known normal human skull was found in an ancient cemetery in coastal Peru.

ASTRONOMY

First Planet Outside Our Solar System Discovered

The first planet outside our own solar system was discovered, a satellite of an obscure double star in Cygnus, that is a sixtieth the mass of the sun and about 16 times the mass of Jupiter.

The brightest nova since 1918, Nova Puppis, rose to brilliance greater than first magnitude.

A remnant of Kepler's famous nova of 1604 was discovered as a small fan-shaped cloud.

A "Saturn" star, an intensely hot body surrounded by a luminous gas ring four times the diameter of our sun, was discovered.

Four components for Algol, the Demon Star, instead of three, seemed probable.

S Doradus, a star 600,000 times brighter than our sun, was shown to be a double star, with each twin a giant.

Three of four mysterious spectral lines in starlight were explained by assuming that a substance impossible on earth, CH, or hydrogen carbide, exists in the so-called "empty" space between stars.

The mass of the moon was determined anew, this latest value making it 1/81.271 of the earth's mass.

A new "window" in the atmosphere was discovered when the observable spectrum in the infrared region was extended to 24 mu.

Lithium, third lightest element, was discovered in 19 of the coolest stars.

A third component of the double-star Mu Draconis was discovered photographically.

The most powerful magnetic field measured in a group of sunspots was recorded for the group visible to the unaided eye Feb. 25 to March 1.

The reddest star ever photographed was discovered in the constellation of Monoceros.

A nova or exploding star was discovered in the constellation of Cygnus.

New comets discovered were: Whipple, Oterma I, Oterma II.

Comets rediscovered were: Grigg-Skjellerup, Forbes, Schwassmann-Wachmann I, Wolf I.

A military version of the Schmidt camera-telescope went into war service as an aerial camera.

Pronunciations of constellations, stars, planets, etc. were standardized.

War time was adopted Feb. 9 when all civil clocks were advanced an hour.

Mexico's new Astrophysical Observatory at Tonanzintla was opened in February, equipped with a large Schmidt telescope of Harvard manufacture.

BIOLOGICAL SCIENCES

Record Crops Harvested; Foreign Cooperation Up

Crops of corn, wheat, soybeans and several other products broke all records, despite menacing farm-labor shortages and early frosts.

An American scientific mission went to China, to aid in improving agriculture and soil conservation there.

There was lively interchange of scientific personnel and information between U. S. A. and Latin-American agriculture.

The U. S. A. and Britain offered aid to the USSR in reconstructing agriculture in the "scorched earth" regions after the war.

Search for new sources of natural rubber included enormous expansion of guayule acreage, importation of hundreds of pounds of kok-sagyz seed from the USSR, efforts to organize collections of wild rubber in South and Central America, and planting selected seedling and grafted trees in the same tropical regions.

Day-and-night changes in temperature were found necessary for the production of fruit and seed by plants.

Discovery of a substance in yeast, possibly a carbohydrate, that destroys the disease-causing power of a plant-mosaic virus was announced.

Sanguinarin, drug from bloodroot, was found to have the same evolution-speeding effects as colchicine, product of autumn-flowering crocus.

Tobacco mosaic virus kept 28 years in a bottle was found still able to produce disease.

The four great regional laboratories of the U. S. Department of Agriculture concentrated efforts on war problems.

The country-wide Victory Gardens movement was successfully carried through.

Domestic production was undertaken in many crops hitherto imported: hemp and other fibers, cork oak, drug plants, flavoring herbs, etc.

Great shark fisheries were developed off the Pacific and Florida coasts because of the discovery of rich vitamin supplies in shark livers.

Flooding old fields in the South was found a way of getting a new and profitable crop off them—fish.

A machine was invented to introduce ammonia gas directly into the soil, as a fertilizer.

Rice-growing experiments were successful in the Florida Everglades.

The number of plant patents passed 500.

Mechanization of beet sugar production was advanced by invention of a machine for planting treated seed, and of another to top harvested beets; both previously hand work.

Many new insecticides, both natural and synthetic, were tried, in search for substitutes for previously imported pyrethrum and rotenone.

A substitute for tapioca, both for food and "stickum" for stamps, was found in "Leoti" sorghum seed.

Possible substitute sources were found for agar, cut off because pre-war supply all came from Japan.

Airplanes were used instead of horses in rounding up fleet pronghorn antelope for transplanting to new ranges.

Thousands of sea birds became U-boat victims, killed by oil released from torpedoed ships.

The Charles L. Mayer awards for research on cell growth, particularly cancer, were established under the National Science Fund.

CHEMISTRY AND PHYSICS

X-Ray Devices Developed; Improve Microscopes

Electron accelerator, whirling electrons up to 20,000,000 volts and producing X-rays of like power was completed, and a similar 100,000,000-volt machine is being built.

A direct current X-ray generator operating at a potential more than 4,000,000 volts was developed.

An X-ray microscope has been devised which, by a photographic process, converts the usual diffraction pattern of a crystal into an actual picture of the arrangement of the atoms in one plane of the crystal.

New electron spectrometer, utilizing the varied slowing up of electrons passing through a specimen, produces a "spectrum" which aids in identifying the material, and supplements the electron microscope examination.

New ultra-fast oscillograph, with a beam sweeping at 18,000 miles per second, and timing to a few billionths of a second, records the wave form of transients, lightning flashes, and other oscillatory discharges up to 113 megacycles.

New scanning electron microscope makes use of television principles to examine opaque objects (not possible in the ordinary electron microscope), and reproduces the picture on a telegraphic facsimile printer.

An adapter has been devised which converts the ordinary electron microscope into a diffraction camera, so that in addition to the usual electron picture, the crystal or molecular structure of the specimen may also be determined.

Desk-size electron microscopes were developed, having simplified operation and much lower cost.

Chemical element 61, illinium, which does not occur in nature, was produced artificially by atomic bombardment with the cyclotron, but quickly disappeared by radioactive disintegration.

New measurements of the "proper" life of the mesotron gave it 2.8 millionths of a second in place of 1.6 millionths of a second previously estimated.

Electron microscope examination of developed silver grain leads to new theory of photographic latent image and action of the developer.

A new determination of Avogadro's number gave 6.02331 times 10^{23} in place of the previously accepted 6.0230 times 10^{23}.

A new measurement of the constant of gravitation gave 6.673 plus or minus 0.003 times 10^{-8} in place of the previous figure 6.670 plus or minus 0.005 times 10^{-8}.

The proposal has been made to use the freezing point of benzoic acid, 122.37 degrees centigrade for the standardization of thermometers.

Neutron pictures to supplement X-ray pictures showed certain advantages; neutrons were also employed in geophysical prospecting.

The semi-crystalline state of molecules in a liquid was reduced to mathematical formula.

Synthetic cellulose was made for the first time.

Hydrogen fluoride was found to be a catalyst superior to aluminum chloride in the manufacture of synthetic rubber and of 100-octane gasoline.

Methods were found for making many kinds of oil out of any vegetable or animal fat.

By the use of fusel oil, alcohol was made from agricultural and industrial wastes without the expensive distillation process.

New solvents of the nitroparaffin class were developed for paints, lacquers and varnishes.

A solution of potassium, copper and arsenic salts has been found an effective means of retarding decay in telephone poles.

Color photography at night from high flying airplanes has been made possible by special filters and brilliant flash bombs of colored light.

Synthetic chewing gum was produced to replace chicle from tropical America.

Bread molds were found superior to malt in alcoholic fermentation.

Joseph A. Becker of Bell Telephone Laboratories was awarded the Mendel Medal in recognition of his contributions to the knowledge of thermo emission of electrons.

Dr. Earl A. Evans, Jr., of University of Chicago, was awarded the Eli Lilly Prize in biological chemistry.

Dr. Donald S. Frederick of Rohm & Haas received the first John Wesley Hyatt plastics award, established by Hercules Powder Company.

Dr. George E. Holm of the U. S. Bureau of Dairy Industry won the Borden Award in the Chemistry of Milk.

Dr. Harrison E. Howe, editor of Industrial and Engineering Chemistry, was awarded the Chemical Industry Medal.

Dr. Martin Hill Ittner, research chemist of the Colgate-Palmolive-Peet Company, was awarded the Perkin Medal.

Dr. John L. Oncley of Harvard and M. I. T. won the American Chemical Society award in pure chemistry.

Dr. Florence Seibert of the Henry Phipps Institute was awarded the Francis P. Garvan gold medal.

E. Clifford Williams of General Mills won the Walker medal of the American Institute of Chemical Engineers.

Dr. Robert R. Williams, chemical director of Bell Telephone Laboratories, was awarded the Charles Frederick Chandler Medal for his isolation of vitamin B_1 and also the John Scott Medal in recognition of his synthesis of vitamin B_1.

EARTH SCIENCES

Weather Forecasts Stop; 40 Quakes During Year

In order to deprive the enemy of weather information, daily maps and forecasts were suspended by the U. S. Weather Bureau for the duration.

There were 41 earthquakes of sufficient strength to record themselves on distant seismograph instruments; notable among them was a "family" of nine shocks in Ecuador at the beginning of July.

A gas well yielding pure nitrogen surprised its drillers in Wyoming.

Major readjustments in procurement of such important minerals as tin, copper, tungsten and manganese ores from overseas were rapidly made.

A new device for sorting valuable particles out of low-grade tin ores and other minerals was developed.

Large-scale tests of sponge-iron production were undertaken in order to relieve scrap shortage in steel production.

A safety spray containing alkali polysulfides was found effective in ridding mercury mines of the poisonous vapors of mercury.

A robot weather station, suitable for installing on mountaintops or uninhabited islands, was invented.

An unprecedentedly wet season kept some central areas of the country soggy during much of the summer, and caused some floods.

There were several severe tornadoes; one of them, in the Ozarks, killed 28, injured 200.

A storm-caused tidal wave near Calcutta drowned more than 10,000 persons.

The thighbone of a big dinosaur was found within the city limits of Washington, D. C.

No tropical storms of full hurricane strength reached the United States from the Caribbean-Gulf region.

A new branch of geological science made its bow: paleogrostology, the study of fossil grasses.

An outflow of lava from Mauna Loa menaced the city of Hilo, but stopped before doing damage.

ENGINEERING AND TECHNOLOGY

Puffed Sand Insulates; Glass Replaces Cork

Puffed up sand, known as silica aerogel, was introduced as a heat insulator twice as effective as any other substance.

Glass that floats in water and replaces cork, balsa, cellular rubber or kapok in life preservers and life rafts, was made by foaming glass with carbon additions during manufacture.

A continuous fermentation process was developed to convert molasses into alcohol in three to five hours.

A method of heat treating iron or steel in inert atmosphere or vacuum furnace was demonstrated to remove or prevent scale formation.

Plastic coatings were used to replace tin upon cans for many uses, including food packing.

Non-metallic containers of various sorts were introduced to replace tin cans in many industrial uses.

A new electroplating process saved half the tin that goes into a tin can and saved electric power and half the time of plating.

Steam acidified with gluconic acid was used to clean milk cans more quickly.

Induction heating furnaces, operated by electron tubes, were used to coat and flow tin on iron sheet in tin plating process.

A new plastic that can be kneaded and thrust into leaks in life boats was put into use.

Foods, such as lard, were made to refrigerate perishable goods on overseas journeys by being chilled to sub-zero temperatures and placed about the food-stuffs to be kept chilled.

Soldier's V-mail was transported overseas as microfilm and photographically enlarged for delivery.

Heavily coking bituminous coals were successfully burned in household furnaces by use of improved underfed stokers.

Synthetic glass jewels were made in America for pivot bearings of small instruments.

Iron was substituted for printing plates of nickel and copper in experiments.

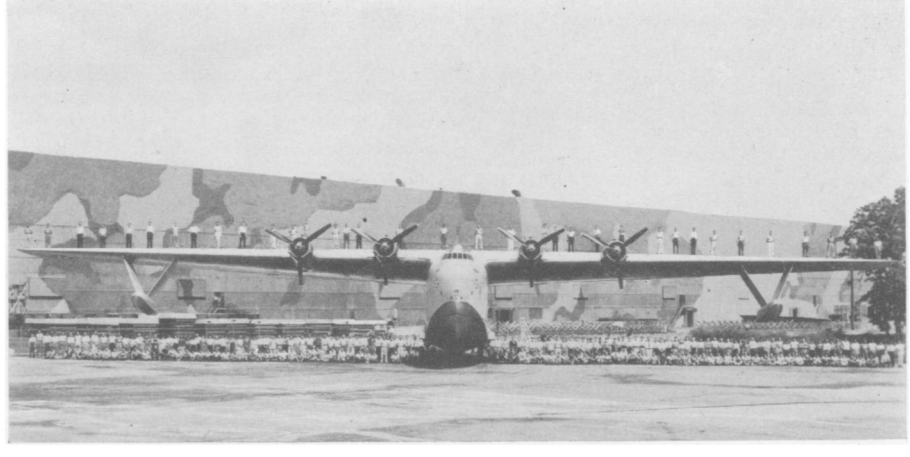
Chemically toughened wool, resistant to moths and soap, was developed.

A new inflatable rubber pontoon was substituted for the standard aluminum boat for temporary bridges formerly used by the Army, saving rubber by reducing the truck transport needed.

A "pancake" diesel engine for Navy subchasers was announced as in production.

A wire "umbrella" was developed to pro-

(*Turn to Page 396*)



MARS—The huge Glenn-Martin flying boat, now converted for carrying cargo, is shown against the camouflaged hangar.

MEDICINE

Army Doctors Important

Physicians play decisive role in both war and peace. Disease has struck down more soldiers in former wars than the enemy's weapons. Stimulates research.

➤ MILITARY doctors play a decisive role in war between nations and in mankind's peacetime fight against disease. Their triumphs in both kinds of war were reported by Col. Edgar Erskine Hume, of the Army's Medical Field Service School at Carlisle Barracks, in a public lecture at the New York Academy of Medicine.

"Half a million men can turn the tide of a war, even in these days of huge armies," Col. Erskine declared.

The United States, he pointed out, might have had that number of men put out of action in World War I, not by enemy guns but by a single disease, if our Army had not been effectively protected against typhoid fever. In the first World War there were only 1,500 cases of typhoid fever instead of half a million as would have been expected on the basis of the numbers affected by this disease in our war with Spain in 1898, before doctors knew how to vaccinate against typhoid fever.

"In all past wars disease has struck down more soldiers than all the combined effects of the enemy's weapons," Col. Hume declared. "The soldier's duty is to fight, not to die, for his country. The army's medical department has the task of keeping him fit, 'To Conserve Fighting Strength,' to quote the motto of the Medical Field Service School, Carlisle Barracks, Pa."

Recalling that the disastrous ending of Napoleon's Russian campaign was the result of an outbreak of typhus fever, to which the Russians were immune but the French and their allies were not, "Who knows but what something of this kind may not happen in the present war in Russia?" Col. Hume asked.

"Horrible though war is, it has stimulated medical advances," he continued. "Some of the world's great medical discoveries have been made by military surgeons, particularly in connection with field service. Every war has added to the sum of medical knowledge."

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tect explosives plants and oil storage from lightning.

Cellulose acetate now completely replaces silk as an insulation for telephone wires with considerable improvement.

A blanket made of two layers of rubber, one vulcanized, the other one sticky, was just coming into general use for temporary protection of telephone cable splices when the rubber shortage intervened.

The same type of two-faced rubber but in the form of tape is used after telephone wires are spliced together to make them re-usable.

Transoceanic telephone cables now seem to be practicable due to the invention of a telephone repeater which can be built into the cable structure itself.

Method of wiping lead joints on telephone cables was brought into use, which saves about 60% of the usual requirements of tin.

Typewriter cylinders in which the rubber has become hard and shiny can be rehabilitated by sand blasting them.

A method of producing X-ray photographs that show three dimensions on a single film was demonstrated.

Levulinic acid was made available in commercial quantities.

Automatic soundings of the upper atmosphere made it possible to predict best wavelengths for shortwave radio.

An Office of Production Research and Development was set up within the War Production Board.

Merchant shipbuilding facilities were expanded to the point where there are more than 60 yards, with 300 ways and nearly 2,000,000 workers, producing 8,000,000 tons of shipping in 1942.

Cargo ships of 10,500 tons were completed from keel laying to launching in 4 2/3 days and from launching to delivery in eight days.

Side-launching of ships was used extensively in war shipbuilding program.

Dr. Paul Dyer Merica, vice-president of the International Nickel Company of Canada, discoverer of many alloys and of a principle of precipitation hardening, was awarded the Franklin Medal by the Franklin Institute.

S. A. Schelkunoff of Bell Telephone Laboratories was awarded the Morris Liebmann Memorial Prize of the Institute of Radio Engineers for his contributions to the theory of electro-magnetic fields in wave transmission and radiations.

Gerard Swope, president of the General Electric Company, was awarded the Hoover Medal.

Dr. Willis Rodney Whitney of the General Electric Company, was awarded the John Fritz medal.

INVENTIONS

Patents Mark Progress In Arts of War and Peace

Notable and interesting inventions patented during the year include:

Use of crushed rock materials to extinguish incendiary bombs by melting and smothering them.

Steel cartridge cases, especially for fixed artillery ammunition, releasing great quantities of brass for other war uses.

Rifle bullets that indicate point of impact by flashes or smoke-puffs.

"Unjammable" secret radio communication, using phase modulation instead of amplitude or frequency modulation.

An automatic radio repeating station that receives, amplifies and re-transmits messages without human attention.

An electric furnace for the production of gas-mask charcoal.

A lifeboat that can be held at deck level while loading.

For torpedo tubes: a recoil system to lessen jar, a "wad" to follow torpedo in discharge, a special light-construction type for mosquito boats.

Air raid sirens that give short barks or yelps, instead of the long, continuous howls now familiar.

Silver linings for machine bearings.

A new primer for setting off explosives, in which a lead compound is substituted for fulminate of mercury.

Double-decked dining cars, with kitchen "amidships" on lower deck.

An improved mill for getting rubber out of guayule plants.

"Repeating" flashlight bulbs, good for several photoflashes; also non-shatterable flashlight bulbs made of plastics, in handy flat, square shapes.

MATHEMATICS

Progress Made in Mathematical Research

It was demonstrated that every *sufficiently large* integer can be expressed as the sum of not more than 23 fifth powers of integers, and also as the sum of not more than 36 sixth powers of integers; the lowest values previously known were 28 and 42, respectively.

The ordinary Euclidean algorithm, which is used to find the highest common factor of two or more numbers, was given a remarkable extension to a similar algorithm for vectors, with many applications.

A postulate system for Post algebras was given, and the algebras generalized, somewhat similar to the extension from 2-element Boolean algebras to n-element algebras.

The sandwich theorem, which states that any three volumes can be simultaneously bisected by a single plane, was generalized to figures in spaces of higher dimensions.

A considerable extension was made in the class of functions for which it is known that the Fourier-Bessel expansion is valid.

Significant extensions were made to the theory of tolerance limits.

A marked advance was made in the analysis of relaxation oscillations.

MEDICAL SCIENCES

Lowest Death Rate Recorded In the United States

Lowest death rate in the history of the United States death registration area and an all-time record low in smallpox cases, recorded in 1941 were reported, after an interval for collection of figures, in 1942.

For the first time in medical history, disease-fighting substances in the blood known as antibodies were formed artificially in laboratory flasks, confirming the theory of molecular changes in immunization.

First direct evidence of human need for certain amino acids in protein foods was discovered in diet studies with human volunteers which showed that arginine is required for spermatogenesis, lysine plays a role in the female reproductive cycle, and tryptophane is also essential, lack of it leading in rats and possibly also in humans to baldness and sex gland atrophy in males and to teeth defects and cataracts in young, growing animals.

First, and strikingly successful, use of the Moorhead Foreign-Body Finder, which uses a radio frequency circuit with movable coil and steel finger to detect shell fragments and the like in war wounds within a few minutes instead of hours as by X-ray and probe, was reported from Pearl Harbor.

Efficient U. S. Army system of evacuating the wounded under fire, sulfanilamide and blood plasma banks scored a notable triumph in saving lives at the Pearl Harbor raid, where almost 100% of abdominal wounds healed without infection, less than 4% of compound fractures and flesh injuries became infected.

Propylene glycol vapor was found to be a safe, effective substance for destroying influenza virus and other germs in the air in laboratory experiments and was credited with reducing significantly respiratory infections among 16 children in the ward of an institution where it was tried.

Experimental use of a 10-hour combined chemical and fever treatment of syphilis and, on a wider scale, of six to ten-week intensive chemical treatments were announced.

Discovery that ants are capable of spreading dysentery was announced.

Discovery of chemicals, probably enzymes, in the bodies of young mice which destroy the drug-resistant waxy parts of the tuberculosis germ were announced with some hope of development of an enzyme preparation that might be used to treat tuberculosis.

Hope for a chemical conquest of tuberculosis was encouraged by announcement of successful results in treatment of patients with a relatively new drug, Promin, and by announcement of even greater success in treatment of tuberculous animals with a related chemical, di-amino-di-phenyl sulfone.

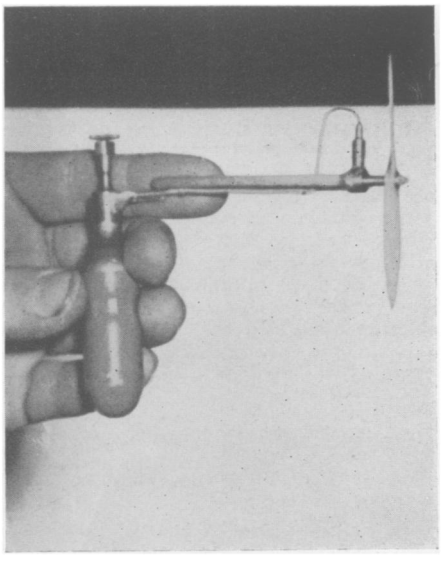
Reduction of venereal disease in the Army to a rate of 38.2 per 1,000 for the first six months of 1942, with a syphilis rate the lowest in Army history, was accomplished following establishment in the Surgeon General's office of a division of venereal disease control with officers assigned to each large Army camp and each of the larger tactical units.

A method of investigating motor nerve end plates and their control of muscle fibers which should give fundamental aid to investigations of paralytic and muscular diseases was developed by Dr. Eben J. Carey and Leo C. Massopust, Marquette University, who received the American Medical Association gold medal for an exhibit of their work.

Search for a chemical cure for cancer, involving tests of some 70 compounds, resulted in discovery of one type of chemical which in the test tube apparently interferes with the health of human breast cancer cells and in the same concentration does not interfere with the well-being of any normal organ tissue so far tested.

Indication of prevention of both breast cancer and leukemia in mice by diets lacking only the one chemical, cystine, was reported.

Conclusive proof that normal subcutaneous mouse fibroblasts can be transformed, while growing in culture in vitro, into sarcoma cells, as shown by the production of highly malignant tumors following inoculation of these cultures into mice of the same strain which furnished the normal cultures, establishes for the first time that at least in this instance cancer cells can be produced without the operation of factors



IT WORKS—This tiny model airplane motor, only three-fourths of an inch tall, uses 8 grams of liquid carbon dioxide as fuel in two minutes. It has an estimated horsepower of .005. It was made on a watchmaker's lathe from tool steel by William L. Brown, instrument maker at Pennsylvania State College.

(systemic) involving the animal body as a whole.

Chemical structure of biotin, vitamin essential for rat nutrition and believed to hold a clue to solution of the production of liver cancer in rats, was discovered.

Development of a 3,000,000-volt X-ray machine and encouraging results in its use to treat deep-seated human cancers were reported.

Two new cancer diagnostic tests were reported: one distinguishes cancer from overgrowth of the adrenal glands, the other detects early cancer of the uterus by microscopic examination of surface cells shed by the cancer during its rapid growth.

Vitamin C was reported effective in treating and preventing heat cramps and heat prostration and its use for preventing shock after injury or surgical operations was suggested.

Totaquine, from cinchona bark, and two synthetic chemicals, pamaquine naphthoate and quinacrine hydrochloride, were put into the new U. S. Pharmacopoeia XII as acceptable anti-malarial drugs that can be used in place of quinine.

Evidence that vitamins are important for resistance to disease germs appeared in the discovery that mice were more susceptible to fatal infection with Type I pneumonia when their diets were deficient in two B vitamins, thiamin and riboflavin.

Dr. John R. Suman was awarded the Anthony F. Lucas gold medal of the American Institute of Mining and Metallurgical Engineers.

A cat infection was linked with the atypical human pneumonia cases of past few years.

Instruction courses in the Sister Kenny method of infantile paralysis treatment were established by the National Foundation for Infantile Paralysis.

A national emergency blood supply system for civilian use was inaugurated by the OCD, with the American Red Cross, already collecting 17,000 donations of blood per week for the Army and Navy, agreeing to collect blood for the dried plasma for the civilian supply without interfering with its services to the armed forces.

Safer blood transfusions may result from the discovery of a relation between safety of transfusion and the amount and kind of food eaten by donor and recipient before the transfusion.

Albumen extracted from human blood was used successfully in treating shock and efforts were reported under way to prepare a safe beef blood albumen for the same purpose.

A skin test was developed and advised for safer blood plasma transfusions.

Fourteenth pair of Siamese twins known to medical scientists was born in New York City.

Demerol, new synthetic pain-killing drug, was announced as closest of all so far developed to being a safe substitute for morphine.

Successful treatment of headache and dizziness following concussion of the brain, expected to be more frequent as a result of war injuries, was achieved with the synthetic chemical, prostigmine.

Discovery of Kitol, a new parent chemical for vitamin A, expected to double the amount of the vitamin that can be obtained from whale and probably other fish liver oil, was announced.

A new "butter" that resists temperatures up to 110 degrees Fahrenheit and can be shipped without refrigeration was developed by the Army Quartermaster Corps and is being shipped in large quantities to U. S. troops overseas.

Successful vaccination against influenza A of 43 out of 44 boys directly exposed to the virus in a controlled experiment was reported.

Isolation of a toxin from the influenza bacillus (not the virus) and production from it of a vaccine successful in protecting rabbits against this bacillus was announced.

Isolation from influenza patients of a new, unidentified pneumonia virus, believed the cause of many cases of atypical pneumonia, was announced.

Use of ultraviolet lamps to sterilize the air received further support from announcement that such lamps had stopped a measles epidemic in certain Philadelphia schools and from the announcement that such lamps meeting certain requirements will be given A.M.A. approval for use in hospitals, nurseries and operating rooms.

28,585 cases of jaundice, with 62 deaths, occurred in the Army among men vaccinated with certain batches of anti-yellow fever vaccine but following a change in the method of producing the vaccine and restriction of its use to men destined for service in yellow fever epidemic areas, cases of the jaundice stopped.

Greater, because safer, usefulness for the sulfa drugs may result from discovery that certain toxic reactions to the drugs, including agranulocytosis, probably result from drug interference with hitherto unknown and as yet unidentified members of the vitamin B group.

Two new sulfa drugs, sulfapyrazine and succinyl sulfathiazole, were announced.

Sulfa drugs appeared as possible preventives of whooping cough; dysentery; bad colds, bronchitis and pneumonia; and as possible cures for Asiatic cholera on the basis of animal experiments and some clinical evidence.

A new kind of surgical dressing for burns and wounds, consisting of a plastic film carrying 30% to 50% sulfadiazine, was developed.

Warnings appeared that sulfathiazole may cause convulsions and death if used within the skull; that nasal injections of this drug may damage the mucous membrane; and that development of more potent sulfa drugs may be stopped by the discovery that the more potent ones are capable of greater damage to the nervous system.

Purification of penicillin, germ-killer from mold, has advanced to the point where a preparation of its barium salt stops completely the growth of most strains of Sta-

phylococcus aureus in a dilution of one part in 12,000,000.

Two new germ-fighters isolated from microorganisms were discovered: fumigacin and clavacin.

Extraction from soil bacilli of a new chemical remedy against germs, H-1, said to be very effective against germs likely to be found in war wounds, was announced.

Cause of an acute illness affecting hundreds of workers in cotton mills, rural mattress making plants and cottonseed processing plants, believed to be the same as mill fever, Monday fever and gin fever previously reported in cotton mill workers, was found in the toxin of bacteria in low-grade, dusty cotton.

New kidney function, that of regulating the concentration of fats and related substances in the blood, was discovered.

Male sex hormone was found to promote the functional activity of the kidneys.

Experiments said to show for the first time that butter fat is superior nutritionally, apart from its vitamin content, to vegetable oils were reported.

Vitamin A was found to reduce blood pressure in animals with experimental renal hypertension.

It was pointed out that a sulfa drug might be of value in lessening slow oozing hemorrhage.

A dietary disease, biotin deficiency, heretofore known only in laboratory animals, was induced in humans by experimental diets of which dried egg whites made up 30% of the calories.

A smooth, "washable" ointment base that can be washed from clothes or skin with plain water was developed to replace old-style, greasy ointments.

Ergot with two to four times the potency of the official standard for this valuable drug used in childbirth was collected in Oregon, suggesting domestic production may overcome the war shortage of this drug formerly imported from Russia and Spain.

The active principle of tube curare, deadly South American Indian arrow poison now used as antidote to metrazol in shock treatment of some mental disorders, was extracted in crystalline form.

The anti-pellagra vitamins, nicotinic acid and nicotinic acid amide, were rechristened niacin and niacin amide, to prevent needless alarm because the non-poisonous nicotinic acid is being put into enriched bread and flour.

Development of germ syrups which, at a lifetime cost of $2 per per person, would change the human intestinal flora to make possible digestion of grass, leaves and wood and to supply B vitamins through bacterial synthesis was reported.

For research on the B vitamins Dr. George W. Cowgill of Yale University was awarded the $1,000 Mead Johnson and Company prize by the American Institute of Nutrition.

Prof. Frank H. Johnson of Princeton and Prof. Dugald E. S. Brown and Prof. Douglas A. Marsland of New York University were awarded the $1,000 prize of the American Association for the Advancement of Science for research explaining how enzymes function even when drugged with narcotics like alcohol and ether.

The Chicago Dental Society's prize awards of $300 and $200 respectively for original research went to Dr. LeRoy E. Kurth, Chicago, for developing new knowledge of the movements of the lower jaw in chewing, and to Dr. Herman Becks, University of California Medical Center, for studies indicating that excessive amounts of vitamin D result in severe tooth malformation and malocclusion.

The $1,000 Eli Lilly and Company Research Award was given to Dr. Alwin M. Pappenheimer, Jr., of New York University College of Medicine, for studies of the chemical nature of the poisons produced by diphtheria and scarlet fever germs.

PSYCHOLOGY AND PSYCHIATRY

Number of Brain Cells Can Be Increased

The number of brain cells in baby rats was increased artificially by injecting the mothers with pituitary growth hormones before the birth of the young, but their ability to learn was not increased.

Brain wave rhythms which are blocked out when the eyes see light can be used to detect cases of faked complete blindness, it was found.

A test for color aptitude has been prepared for evaluating workers in industries requiring accurate discrimination of small color difference.

Experiments showed that a change in the pitch of sound may be heard although there has been no shift in the point of maximal stimulation on the basilar membrane of the cochlea.

By stimulation of the eye with a barely perceptible electric current, it is possible to distinguish between blindness due to disease of the eye's retina and blindness caused by disease of the nerve, experiments indicated.

By leaving intact a tiny isolated blob of pituitary gland and hypothalamus to maintain the water and sugar balance of the body, it was possible to discover that animals lacking 95% of the brain can walk, jump, claw and right themselves.

Single application of alum to the motor area of the brain made animals subject to repeated epileptic-like seizures when exposed to loud noise, apparently by permanent alteration of the brain cells.

Brain injuries resulting in spastic paralysis do not result in any characteristic personality traits, survey of 123 child patients revealed.

The character of brain activity, which changes with increasing age during the period of growth, was observed to continue to change toward the fast end of the brain frequency spectrum during adult life.

A monkey was taught to distinguish objects on the basis of such qualities as mobility and color, demonstrating a capability for abstract thinking.

Rats so sensitive to noise that they would be thrown into fits by a shrill sound were made immune for days to such sounds by a two-week treatment in which the fit-producing noises were preceded by harmless sounds.

A muscle of the ear, the stapedius muscle, was found to serve as an automatic damping agent to protect the inner ear against excessive noise—perhaps partly explaining why loud noise temporarily deafens.

Airsickness and other types of motion sickness, although originally due to action of the balancing mechanism in the inner ear, is often the result of conditioning to other sights, smells and motions, and if so can usually be prevented and cured by psychological means.

Some cases of weakness in distinguishing colors can be relieved by doses of vitamin A, it was reported.

Nail-biting is not an exclusively human failing but occurs in rats faced with problems too difficult for solution, it was discovered.

Individuals who have recently received doses of the sulfa drugs may make wrong decisions because of mental confusion that sometimes persists after this treatment, it was reported.

Behavior problems and subnormal mentality were found to be more common among children who had had whooping cough in infancy than in an otherwise comparable group.

The bizarre craving to eat dirt may be caused by diet deficiency rather than mental illness, a survey of the diet of school children showed.

Radio in the farm districts increases the contentment of those who are well-adjusted to farm life, and increases discontent among the ill-adjusted.

Hallucinations can be produced in normal individuals by the simple form of learning known as conditioning, experiments showed.

The traumatic neurosis of this war, seemingly more severe than the "shell shock" of last time, is expected to take more physical forms such as peptic ulcers and heart complaints, with less functional paralysis; effective treatment combines hypnosis or hypnotic drugs with psychoanalytic methods.

Evidence that the way insulin shock treatment aids the mentally ill is by making them forget recently acquired abnormal ideas and behavior was furnished by experiments in which newly acquired learning was forgotten after insulin treatment while older, more thoroughly drilled habits were retained. Similar results were obtained in human schizophrenic patients treated with metrazol shocks.

Sub-shock doses of electric current through the brain were found to shorten the duration of delirium tremens following prolonged alcoholism.

Pneumoencephalography, invaluable in the location of intracranial tumors, was proved to be prognostically misleading in cases of so-called cerebral atrophy; in spite of X-ray evidence of atrophy, behavior development was found to proceed normally.

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