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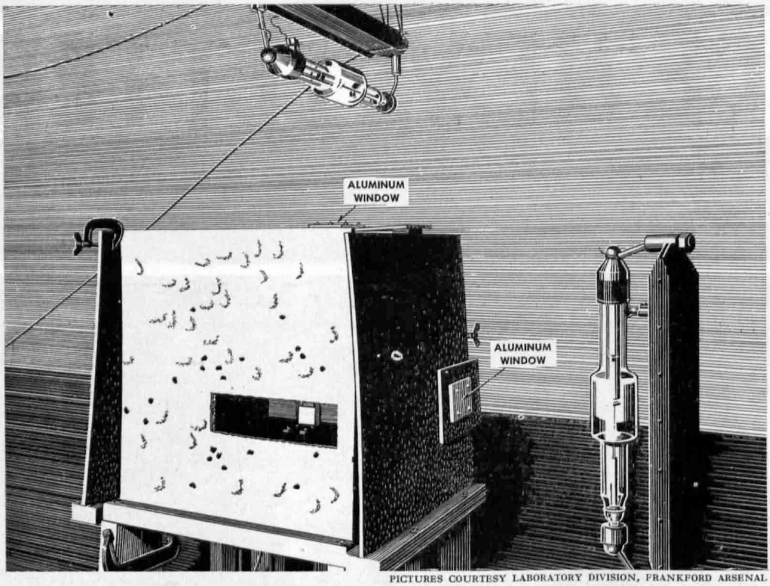
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • DECEMBER 9, 1944

Precious Pedigrees

See Page 382

A SCIENCE SERVICE PUBLICATION



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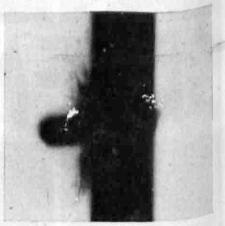
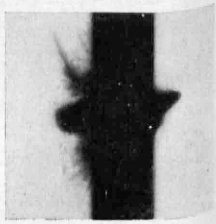


High-speed X-ray picture of cal. .30 bullet penetrating 1/2 inch thick armor



High-speed X-ray picture of same bullet 20 millionths of a second later

14,285 times quicker than a wink

Westinghouse research engineers have developed an ultra-high speed X-ray tube that makes possible X-ray pictures, taken at the terrific speed of *one-millionth of a second.* These pictures show armor-piercing bullets penetrating ½ inch of solid steel armor plate.

The action is 10,000 times faster than any conventional X-ray—literally 14,285 times *quicker than a wink!*

Secret of this revolutionary X-ray is the new type tube that can handle a jolt of 2000 amperes, at 300,000 volts. This is applied in a flash by electrostatic condensers—creating a tremendous surge of *X-radiation.*

With this new X-ray, U.S. Army ballistic experts can "freeze" the image of a bullet, while it travels within a gun barrel at 2600 feet per second—or study the action of projectiles as they smash through armor plate.

When peace returns, this new example of Westinghouse *skill in research* will enable machine builders to study the strains in rapidly moving parts—improve performance and increase the life of peacetime products.

Westinghouse Electric & Manufacturing Company, Pittsburgh 30, Pennsylvania.

Westinghouse

PLANTS IN 25 CITIES OFFICES EVERYWHERE

TUNE IN: John Charles Thomas, *Sunday* 2:30, EWT, NBC
Ted Malone, *Mon. Wed. Fri.*, 10:15 pm, EWT, Blue Network

KEEPING UP WITH *Electricity*

MAN-MADE HURRICANE BLOWS OUT ELECTRICITY. Engineers can now "blow out" electricity as easily as you extinguish the flame from your cigarette lighter. Circuit breakers built by Westinghouse unleash a 600-mile-an-hour blast of compressed air to snuff out powerful short-circuit arcs and prevent damage to vital electrical equipment on power lines. The hurricane of air can smother a 1,000,000-kilowatt electric arc in less than a hundredth of a second.

REPRESENTATIVES OF 257 PRE-WAR PROFESSIONS, businesses, and trades are now employed at the Westinghouse-operated Naval Gun Plant at Louisville, Kentucky. Included are: former circus performers, several embalmers, a former professional hill-billy musician, and a pipe-organ builder. Despite their unusual peace-time occupations, all here have been able to learn the amazing high precision needed in making Naval Guns.

A NEW GUNSIGHT LAMP that enables American gunners to aim *directly into the sun* and yet fire with deadly accuracy has been developed for the Army and Navy by Westinghouse Lamp Engineers. Former gunsight lamps allowed gunners to aim within only 15 degrees of the sun, leaving a dreaded "blind spot."

FREE . . . "Engineering Highlights of 1944"—a 32 page book, filled with interesting articles on new developments in electrical research and engineering in wartime. Write: Westinghouse Engineer (SNL-124).

MEDICINE

Soldiers on the Mend

Reconditioning speeds recovery of wounded soldiers and makes able men of disabled; GI hospital life includes lessons and quiz sessions.

By JANE STAFFORD

Miss Stafford recently toured Army hospitals where wounded men are being restored to health.

➤ THE PRIVATE was jitterbugging with a wooden leg. And the corporal with hooks where his hands used to be wore a broad smile at his carpentering because, as he said, "I couldn't do this when I did have hands."

These GIs were just two out of thousands who are happy and determined, after taking the Army's most powerful medicine, with all due deference to plasma, penicillin and sulfa drugs.

That medicine is "reconditioning," the process of restoring wounded men to usefulness, either at the fighting front again or at some civilian job.

A look behind the scenes of four large Army hospitals brings conviction that a Purple Heart, won at great personal sacrifice, is not the end of human usefulness.

Suppose you get down on your belly, put the palms of your hands on the floor, push up, let down, push up, let down. Go on. Do it again and again and again as long as you can. How many times?

In the course of an Army-conducted flying tour of these hospitals I saw soldiers who had been ill abed of wounds for weeks now doing 25 to 30 such "push-ups." And hiking 15 miles or so, too.

(Just to restore your self-esteem, if you did try to do those push-ups, the average soldier can only do about a dozen!)

We who have seen the troop trains going to overseas ports, written cheery letters, and then waited at home with apprehensive hearts, we who stay at home had a dread of visiting the other side of war, the places of men who are temporarily or permanently through with fighting. Hospitals of this war are cheerful places. We civilians can learn a lot from them.

To give this new reconditioning medicine, the Army uses specially trained men, just as it uses specialists for bone surgery, brain surgery, tropical diseases and so on. Top man is Col. Augustus Thorndike, who left his job as associate in surgery at Harvard Medical School to go to the South Pacific with a hospital unit and now is chief of the reconditioning section in the Surgeon General's Office in Washington.

At Lawson General Hospital, Atlanta, Ga., we found Capt. Anthony C. Rieger, chief of the reconditioning service. At Northington, in Tuscaloosa, Ala., it was Major Brent O. Gunts; at Moore, in Swannanoa, N. C., Major Ferdinand Piazza; and at Ashford, White Sulphur Springs, W. Va., Capt. Frederick T. Hubbard.

Lessons and Quiz Sessions

➤ PATIENTS in Army hospitals no longer find their major occupation counting cracks in the ceiling and walls.

Even the man with a broken neck and a plaster cast from his head to his waist is too busy to know whether the ceiling has cracks. Right after breakfast he gets the news of the day over the hospital public address system. Later he joins his buddies in other wards in a lively discussion of current topics, such as the GI bill of rights.

Microphones are passed around from bed to bed for this part of the reconditioning which is the Army's newest medicine for the sick and wounded of this war.

Group discussions and newscasts are part of the orientation activities that keep soldier patients abreast of the fighting front they have left, give them a picture of what goes on at home.

Lying in bed while a shattered thigh bone heals gives a man a chance to continue his war-interrupted education. If he wants to learn Spanish or brush up on spelling, teachers will be found for him. The U. S. Armed Forces Institute brings him self-teaching text books or correspondence courses that carry university credits.

MAKING THE PATH CLEAR—Three-dimensional terrain models based on aerial photographs, reconnaissance reports and prewar maps brought up to date are now in use in studying objectives before Navy and Marine operations are launched. In this official U. S. Navy photograph, officers are presiding at a briefing session aboard a Navy warship en route to Attu. The seizure of the island was implemented by the careful perusal of this immense terrain model of the Aleutian Islands.

If he is headed for civilian life and thinking about a job, nearby factories will send expert workmen to give instruction. At Lawson General Hospital, Atlanta, men lying in bed waiting for their amputation stumps to heal and harden were studying blue prints while an instructor from the Bell Bomber plant gave them a preliminary course on machine tools.

One patient at Northington General Hospital goes every day to classes at the University of Alabama and will get credit toward his college degree. Professors from the University come to the hospital to give lectures to others.

Hospital Life Strenuous

➤ YOU'D THINK that a wounded soldier would get plenty of rest in an Army hospital. Even too much rest.

Reconditioning is so strenuous at Northington General Hospital, Tuscaloosa, Ala., that this story is going the rounds there:

"Doc, how about me signing up for the paratroopers," said one GI bed patient, "I want to get some rest."

But it is a strenuous life with a purpose, which is to keep them happy and get them well fast.

When a man gets out of an Army hospital bed, he does not have that weak-as-water feeling we civilians get after a siege in hospital. He has been having calisthenics twice daily to keep his muscles hard and his blood circulating vigorously. (That last helps speed healing of his injury, too.)

The man with the broken neck does "squeezing" exercises with hands and feet. They strengthen arches and leg muscles, increase the power of his grip. The man with a broken leg swung up in traction can do weight lifting. Until he can get to the gymnasium, the "muscle wagon" brings pulleys and other exercising devices to his bedside.

NP patients, the men who have broken mentally or emotionally, are not left to brood in their wards. I saw a group of them shouting and laughing as they batted a volley ball back and forth over the net at one end of a gymnasium while another group had a fast game of basket ball going at the other end. Neurotic? Washed up? They looked and acted like any group of healthy young Americans you would have found in prewar days at an athletic club or Y.M.C.A. gymnasium.

Actually, of course, the soldier patients do get rest, not only at night but for an hour or an hour and a half after the noon meal. Those meals are good, incidentally. You do not hear the usual patients' complaints about the food in Army hospitals.

No man gets more reconditioning than his medical or surgical condition allows. Individual prescriptions are written for each soldier patient by his medical officer. As he gets better, he gets a new prescription calling for more and more activity to help speed him from class IV out of bed into class III and then into classes II and I where he does those 25 push-ups and the 15-mile hikes that are too much for you and me.

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GENERAL SCIENCE

Valuables Returned

➤ HOW LITTLE weight Washington scientists attach to rumors and threats of impending robomb raids on the Capital and other seaboard cities is evidenced by the announcement, made by the Smithsonian Institution, that all the precious and irreplaceable collections of scientific specimens and historic objects, evacuated to a safe place immediately after Pearl Harbor, have now been brought back to the U. S. National Museum in Washington.

They were taken away at a time when it was considered at least possible that German or Italian long-range planes, known to be capable of spanning the Atlantic on at least a one-way flight, might attempt suicide spite raids. While sequestered under constant guard outside Washington, the collections were frequently visited by Smithsonian curators, who kept careful check on their condition. Everything has been returned in perfect condition.

Included in the scientific collections were thousands of type specimens of plants and animals, on which the original botanical and zoological descriptions were based. Since the exact identity of doubtful new specimens is often determined by direct comparison with these classic examples, they are perhaps the most valuable objects, from the scientific viewpoint, in the Museum.

Some of the objects brought back have both scientific and historic value. This is especially true of the original working models of famous inventions, such as the original Morse telegraph instrument.

Among objects of purely historic significance, perhaps the most outstanding is the original Star Spangled Banner—the flag that flew over Fort McHenry while Francis Scott Key, held aboard a British man-of-war, composed the first draft of what is now the American national anthem.

Total weight of the specimens involved in the transfer was 117,543 pounds, the material occupying 21,000 cubic feet of space.

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TRAVEL

Flying in the Sub-Arctic

The North Atlantic can be flown in winter thanks to weather science, our air bases and our Air Force; flight over Greenland Icecap.

By WATSON DAVIS

Mr. Davis flew 6500 miles (37 flying hours) with a group of newspaper correspondents in an Army transport plane to see the North Atlantic Air Route to Europe.

➤ THE SCIENCE of weather, the skill of men, and the might of machines that fly have combined in the service of war to make taking off on the great circle route to Europe, via Newfoundland, Labrador, Greenland, or Iceland a rather routine departure, thrilling as it is to those who thus set sail.

For the Army Air Transport Command, North Atlantic Division, have made the northern air route east and west across the ocean a year-round operation with several dozens of transport planes alone daily clearing one of the largest and northern-most U. S. ports of aerial debarkation.

Weather men, served by a gigantic collecting net of observations on land, at sea, and in the air, have the last say as to when planes fly or when they must wait for safe flying. But even in winter there are relatively few delays.

So newspaper men may see for themselves how the job is done, a group of war correspondents accredited to this phase of the battle of transport visited Newfoundland, Labrador, Greenland, and Iceland. Peary, Nansen, Rasmussen, and other explorers of pre-air days would recognize the Arctic clothing issued them, but the giant C-54 with four roaring engines that carries them would be a strange sledge indeed.

As modern as the airplanes that fly is the weather forecasting that tells the pilots when, how and where they may fly in safety.

In Arctic and Subarctic Canada and up and down the east and west coasts of Greenland, the Army has its own weather observers who radio information supplements in the basic pattern of weather provided by the great meteorological system of the U. S. and Canada. So useful is Greenland weather that the Nazis not long ago established weather stations on Greenland's east coast and one of our pilots, Capt. Fred P. Koupal, led bombing flights against this invasion.

From key points such as Newfoundland, the tip of Greenland and Iceland, special weather-observing airplanes stab out for 700 miles over the ocean, sampling wind, temperature, barometric pressure, clouds, at the two-mile-high level outward bound and barely skipping over the waves on the return trip. This is as valuable as reports from several dozen reporting stations in an area that would otherwise be a blank. All planes on flights report weather regularly. Automatic feather-weight weather reporting radiosondes are sent aloft attached to balloons from land stations and there are surface ships whose function is weather observing.

All this complex system, knit together by radio, gives the ocean-hopping pilot almost a prescription for getting safely from where he is to where he is ordered to go. Weather thus helps air transport in what was once the remote north where weather was thought to be man's worst enemy.

➤ BWI, GREENLAND—Once one of the most remote parts of the globe, this Army Air Transport Command base on the tip of Greenland is now a mere five hours from that 42d Street and Broadway of the North Atlantic air route, Harmon Field on Newfoundland.

Our sturdy C-54 started out in the Newfoundland dawn and purred along with never a miss in its four engines, delivering us down the BWI runway well before the long, slow sunset of the shortening subarctic winter day.

Were it not that this air route is used as a major artery for supplies, fighting craft and personnel for the war, this might have been a high epic of arctic adventure. Routine as the operation might be considered by the men who wear the wings, for war correspondents it still has all the high thrill of an unknown mission.

The ocean thousands of feet below seemed cold and choppy when we broke out of the fleecy clouds over which we had been riding. Were those white patches on the sea ice? Not yet, said those who knew. Behind us the sun cast a pink light over the clouds we had deserted.

The first little iceberg was like sighting a sought-for continent, soon to be melted in memory by great fleets of ice masses sedately moving south. A cloud bank on the eastern horizon set up the false cry of land, but finally the real solid mountains of Greenland's southernmost tip, Cape Farewell, did come into view, first sight of an ice-laden island continent.

Great rock masses, streaked with snow, rose out of the distance, and beyond

ARCTIC FLIGHT GROUP—Shown leaving National Airport in Washington for the press indoctrination tour of the Air Transport Command's North Atlantic Division are: in doorway of plane (left to right), Capt. Fred P. Koupal, pilot; Lt. B. P. Henderson, ATC, and Lt. George W. Mason, Jr. of Army Public Relations; on the ladder is William H. Shippen, Jr., Washington Star. Standing on the ground are (left to right), John U. Terrell, Newsweek magazine; Bob Considine, International News Service; Reuel Moore, United Press; Watson Davis, Science Service. Kneeling are Peter Edson, Scripps-Howard newspapers, and Frank Cipriani, Chicago Tribune.

there was the great sea of perpetual ice, the ice cap, like a relentless unbroken bank of solid clouds. Our course lay up the historically famous Tunugdliarfik Fjord, with the little town of Julianehaab seen below us near its mouth. The fjord was getting its early coating of winter ice that must in the not too distant future cut off the air base BW1 from the sea and make it accessible only from the air, which is of course the speediest and most comfortable method of getting in and out.

Little glaciers from the ice cap reach down little branches of the fjord, calving some baby icebergs. It is Land of Desolation, which is what John Davis in 1586 christened this region which that Icelander, Eric the Red, in 981 had called Green Land because he hoped that such an attractive name would make his fellow countrymen wish to settle there.

Yet when we reached the air base with its business-like barracks and Nissen huts, circled up one fjord and down another and felt the wheels of the airplane roll along the broad hard-surfaced runway, we felt that John Davis was far too pessimistic, even if the green of the hillsides is a little faint.

For there was an outpost of the ATC, with American soldiers welcoming ferry pilots, fighter and bomber crews and passengers alike. Here we found an overseas operation not too remote from the fighting fronts of sea and air.

It is a neat little colony, with exposed buildings held to earth by steel cables to withstand the tug of winds that sometimes blow 120 miles an hour and whirl the loose glacial stones and gravel into the air like bullets. Here is the main nest of Greenland's weather prediction and radio communications and the supply base for more remote air bases and weather stations up both the east and west Greenland coasts.

Except for its air links to Iceland east and the U.S.A. south, this is an isolated post, with no contact with Greenlanders —either Danes or Eskimos. A GI stationed here has practically no chance of seeing any of the people of Greenland, and officers who have to travel on business to Julianehaab, 50 miles away, or to some other place, such as Greenland's capital, Godthaab, up the west coast, are the only ones who are likely to see the natives.

A woman's voice is a rarity at BW1, with only its 15 nurses and six Red Cross girls, unless it is on a record that is played over the very popular Army radio station. One can not travel far from BW1, with its 10 miles of roads that lead nowhere else. Geography has put the rest of the world "out of bounds."

LIGHT-WEIGHT ENGINE—This Cyclone 9, just announced by the Wright Aeronautical Corporation, produces 1,350 horsepower, yet weighs only 0.97 pounds per horsepower. First use of these engines is in the new FM-2 Wildcat fighter of the Navy.

Across the fjord from BW1 there are ranges on which thousands of head of sheep graze summer and winter, we were told. One of the farms of famous Eric the Red is said to have been in the vicinity. Along the coast Greenlanders fish for cod. They raise vegetables in the short growing season, there are summer flowers in the frantic profusion of the Far North. But BW1 gastronomically is U.S.A. exclusively; it does not live on the country at all.

All BW1 is a creation of the past 2½ years. Even the oldest veterans here can not tell us who located and laid out the airport, which is not surprising since the tour of duty here is supposed to be 18 months at the most.

The soldiers here are pioneers of the air age, followers of the explorers of previous centuries and decades who by boat and dog-sledge probed the fjords and ventured at risk of life upon the ice cap.

Weather is still the determining factor in Greenland flying, but through winter as in summer the air routes are open a surprising part of the time.

Our party of war correspondents got in one day and out the next, thanks to the science of meteorology and aviation and a lot of fortunate circumstance.

➤ OVER THE GREENLAND ICE CAP—If we had been Nansen or Rasmussen in an earlier year, we would have been preparing for a year or so for what we are now doing—crossing the Greenland ice cap and cruising up the east coast of the land of snow and ice. And it would have taken us months instead of hours—if we had made it.

As it is, our Army Air Transport Command C-54 is flying over the great expanse of snow that covers a couple of miles depth of ice and we see below us immense crevasses, peaks of mountains submerged in ice and gigantic glaciers frozenly dumping icebergs into the sea. It is as easy as airline travel in the U.S.A.

The sun had not risen when our C-54 rolled down the runway at BW1, the ATC base on the south tip of Greenland. Down the fjord, climbing to gain altitude, we turned at the coast and started northeastward. Our climbing made the run rise over the mountain range eastward. Then it flashed brilliant light over the great plain of snow that is the ice cap. In the light of dawn it seemed smooth as a sheet, but the glancing sun

rays showed great rolling waves in the snow which covers, scientists say, perpetual ice that is thousands of feet thick.

The sheer beauty of color and contrasts drives away any remembrance that men in airplanes have been forced down upon this ice cap and have returned to civilization only after many days or even months of strenuous rescue effort by air and by land.

We speed along, while Capt. Fred P. Koupal, veteran of Greenland army flying, points out the geography and the aviation features of this unusual snowscape.

Any geologist or geographer would give a good chunk of his life to have such an opportunity.

We reach and fly up the east coast of Greenland with its rugged mountains, seeming to hold back the ice. A score of glaciers are nestled in the valleys.

At one point the airplane dropped altitude and plunged up a fjord to waggle its wings at the soldiers gathered along the icy runway of the ATC west coast air strip, known as BE2, located 500 miles north of the south tip of Greenland, 35 miles northeast of Angmagssalik.

Then we go farther north, farther than most men ever get. We are crossing the Arctic Circle, that imaginary line on the earth's surface beyond which the sun never rises in winter and never sets in summer, 66 degrees 32 minutes north latitude. There during the few minutes in the Arctic is born a new flying organization—the Circle of Arctic Bluie—Bluie being the ATC way of saying "base" in Greenland. Our pilot, Maj. E. E. (Ernie) Dryer, duly initiates the travelers.

Our exploration of Greenland is ended and we head for Iceland some 450 miles away. A thousand years or more ago Icelanders traveled to explore and settle Greenland. We are determined to return the call in a modern manner.

(Next week—Air Visits to Iceland and Labrador.)

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FORESTRY

Pulp Production Expanded

➤ THE WOOD distillation industry and production of chemical by-products of wood pulp have greatly expanded in Sweden during the war, Dr. Edwin C. Jahn, professor of forest chemistry, at the New York State College of Forestry, told those attending the wood products conference at the New York State College of Forestry, Syracuse University.

A pronounced trend toward higher quality pulps was noticed in Sweden by Dr. Jahn, who has just returned from more than a year's tour in Sweden, Finland and Great Britain to study wartime developments in pulp and paper under the auspices of the American industries and the U. S. Department of Agriculture.

Soap, sizing agents, materials for the paint and varnish industry, motor fuel of different types for gas and Diesel engines, adhesives, lubricating oils, artificial leather, staple fiber, new types of insulating materials, plastics, artificial rubber, and such chemicals as chloroform, acetone and toluene are a few of the products made from wood. Many are purely of an emergency nature, but others will continue after the war, Dr. Jahn predicted.

The pulp and paper industry lost about 85% of its normal markets due to the war. Despite this loss it maintained production at about 50% of the prewar level from 1940 to 1942, Dr. Jahn explained. This was made possible by the production of nearly 1,000,000 tons of fodder cellulose; increased export of viscose pulp to continental Europe; greater use at home for wood products, especially kraft and newsprint papers; and the demand for spin paper in Europe for making twine and woven sacks. During 1944, however, the export market to Europe has steadily dropped, he pointed out.

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Doors That Won't Stick

➤ DOORS and windows that won't stick or become loose with changes in atmospheric conditions were predicted at the meeting by Dr. J. F. T. Berliner of the E. I. du Pont de Nemours and Company. Bureau and desk drawers made of wood impregnated with methylolurea, a new treatment designed to minimize swelling, shrinking and warping of wood, will pull out smoothly and easily.

Although the natural color of wood is not altered by the treatment, Dr. Berliner stated, suitable dyes may be introduced with the treating chemicals to color the wood throughout. Then when the furniture chips, the freshly exposed surface may be finished without staining.

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LAST OF "WARHAWKS"—This plane bears the fighting insignia of over 20 different nations and fighting groups who used the Curtiss-Wright Warhawk in combat against the Axis. It has been used in practically every theater of air warfare.

MEDICINE

AMA Brands Cold Vaccines, Have Not Proved of Value

➤ IF YOU had hoped to get yourself vaccinated against colds this winter, you are probably in for some disappointment.

Of the cold vaccines now available, none "when administered by the routes advised have proved value," the American Medical Association's councils on pharmacy and chemistry and on industrial health state (*Journal, American Medical Association,* Dec. 2).

The report is based on studies of cold vaccines made by various groups of physicians. Vaccines to be given by mouth, by hypodermic injection and by spray into the nose were included in these studies. The results of use of these vaccines were either negative or, according to the A.M.A. councils, were used on too few persons or for too short a time to be conclusive.

Any attempt at present to prevent colds by use of vaccines is "purely experimental," the medical association report states. Their uncontrolled use should be discouraged. If industrial physicians use them, they are advised to do so under rigidly controlled conditions and to report their results "so that useless preparations can be promptly eliminated and further progress made."

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HUSBANDRY

Cows Artificially Bred Give More, Richer Milk

➤ MORE MILK, richer in butterfat, was obtained from a carefully checked group of 120 dairy cows brought into the world by means of the artificial breeding method than their 120 naturally-bred mothers produced over a similar period, Dr. J. W. Bartlett, head of the department of dairy husbandry, New Jersey State College of Agriculture, reported before the meeting of the American Society of Animal Production, held in Chicago.

The study was based on a state-wide survey of dairy herd associations in New Jersey. The 240 animals whose records were compared were all high-grade cows, though the feeding and handling methods used by their owners naturally varied from farm to farm. Over-all figures showed an increase of 9.3% in total milk, and 14% in total butterfat, by the "artificial" daughters as compared with their "natural" mothers.

In artificial breeding the semen of blue-blooded sires is collected, carefully treated to keep it alive, and divided for use among many times more cows than could be done under traditional breeding procedure. This makes it possible for one extra-choice animal to become the father of 30 or 40 calves where only one was the rule before. It also makes possible the breeding of calves many miles—even hundreds of miles—from the pen where the bull is kept, for the semen can be shipped by fast express, or even by airplane, on journeys lasting many hours.

Artificial breeding, Dr. Bartlett pointed out, offers special advantages to the owners of small herds—20 cows or fewer—who cannot afford to maintain a high-grade herd sire on their own farms, but who need, quite as much as do the bigger operators, the advantages of high-yield breeding stock in building up their herds.

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ENGINEERING

Steam Turbine Locomotive Now Under Service Test

➤ THE FIRST American-built locomotive powered by a steam turbine, instead of cylinders, pistons and driving rods, has been completed and is now under service tests on the Pennsylvania Railroad, for which it was designed and constructed. It is a giant in size, and is a coal-burning engine of the direct-drive steam-turbine type.

In this new locomotive the turbine shaft is rotated by the pressure of jets of steam against the vanes of the turbine wheel, and a continuous flow of power is transmitted to the driving wheels through speed reducing gears. It eliminates the reciprocating parts of the conventional steam locomotive, obtaining a uniform flow of power to the driving wheels, and obtains the economies inherent in a turbine for railroad motive power.

The new giant is 123 feet in length and weighs nearly 500 tons. The turbine is designed to develop 6,900 shaft horsepower, providing power at the tender coupler sufficient to pull a full-length passenger train at 100 miles an hour. The boiler is of the conventional type, carrying 310 pounds of steam pressure and fired by mechanical stoker. The steam travels through the entire battery of turbine blades, expending all of its energy except approximately 15 pounds.

The new locomotive was designed and constructed by the Baldwin Locomotive Works and the Westinghouse Electric & Manufacturing Co., in collaboration with the Pennsylvania Railroad.

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IN SCIEN

TOXICOLOGY

DDT Found Highly Toxic To Fish and Frogs

➤ DDT has been found to be more poisonous to cold-blooded animals (fish and frogs) than to mammals, in experiments performed at the University of Missouri Medical School by Prof. M. M. Ellis, Dr. B. A. Westfall and Dr. M. D. Ellis. Their results are reported briefly, (*Science,* Nov. 24).

A practical significance of this investigation is hinted in their concluding paragraph, in which they suggest that it is "of interest in connecton with the proposed use of DDT in regions where malaria is endemic against the larvae of the mosquito vectors of that disease." In plain English, this means that wholesale spraying of swamps and ponds with DDT can be expected to kill a great many fish, frogs and other cold-blooded animals, as well as the insects at which the poison barrage is particularly aimed.

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GENERAL SCIENCE

Honorable Mention Students Receive $82,500

➤JUST BEING "mentioned" in the Science Talent Search, conducted annually by the Science Clubs of America, has turned out to be an open sesame to the scholarship aid from colleges and universities throughout the United States. A survey of the 300 winners and "honorable mentions" of the second Science Talent Search shows that grants totalling approximately $82,500 have been made to these students, in addition to $11,000 in prize scholarships awarded by the Westinghouse Electric & Manufacturing Company. (See *SNL,* Oct. 7.)

In response to widespread demand, the Science Clubs of America published an Honorable Mentions list of 300 names, including the 40 finalists and 260 runners-up. Practically every student on this list received scholarship honors and financial aid from colleges and universities, in addition to the immediate honors and awards of the contest itself. Finalists received an average of $500 each in scholarship grants, while the students on the Honorable Mentions list averaged $208 apiece.

Science News Letter, December 9, 1944

FIELDS

ENGINEERING

Magnesium Plane Wings 14% Lighter Than Aluminum

➤ ALL-MAGNESIUM wings on aircraft, fabricated entirely of magnesium, have been in use for over a year on Navy training planes, according to J. C. Mathes of The Dow Chemical Company, located in Midland, Mich., who divulged the information at a meeting of the American Society of Mechanical Engineers in New York. Thirty sets of wings, he said, have been in regular service at naval training stations since early in 1943, and have proven entirely satisfactory.

Development work on all-magnesium wings has been under way by the Dow Company, in cooperation with the Navy and the U. S. Bureau of Aeronautics, since 1940, he stated. The original set was designed for the Navy's SNJ-2 advanced trainer built by North American Aircraft Company. After static tests and certain minor changes in design in 1942, the 30 sets were ordered.

The magnesium wings are 14% lighter than the standard aluminum wings, and, according to the speaker, are stronger than wings of low-carbon steel, stainless steel, plywood and other materials tested.

The success of these wings, Mr. Mathes declared, "foreshadows all-magnesium airplanes in the near future." Since magnesium is one-third lighter than aluminum, such planes would be notably lighter than present types, a factor that would do much in making air transportation more economical.

Science News Letter, December 9, 1944

CHEMISTRY

Smokeless Ball Powder Requires No Alcohol

➤ A NEW SMOKELESS ball powder that is probably the teetotaler's dream because it is not only non-alcoholic but also definitely on the water-wagon is described by Dr. Fred Olsen, research director of the Western Cartridge Company. Unlike most smokeless powders which require vast quantities of alcohol in their production, the new smokeless ball powder uses no alcohol and is made by a new under-water process. Speed of producing smokeless ball powder is up to ten times faster than the production of smokeless powder by usual methods, Dr. Olsen stated.

In the conventional process, alcohol is used to drive out the water in which nitrocellulose is washed. A closely-regulated amount of alcohol is permitted to remain in the nitrocellulose. This material is then treated with ether, which when mixed with alcohol causes the nitrocellulose to gelatinize, so that it can be pressed through holes in a die and formed into spaghetti-like strings in much the same way that a meat grinder extrudes ground meat. These strings are larger or smaller in diameter depending upon the size of the ammunition, and are cut into tiny tube-shaped powder grains.

The new smokeless ball method, Dr. Olsen points out, keeps nitrocellulose immersed in water, where it is liquefied by ethyl acetate, the same material used in making fingernail polish.

The liquefied nitrocellulose then rises to the surface of the water, where it is broken into tiny globules by stirring. The size of the globules or balls ranging from six to 30 thousandths of an inch in diameter is controlled by the speed of stirring. Smaller balls are produced by faster stirring. Colloids are added while the nitrocellulose mixture is being stirred so that the balls retain their shape when the stirring is stopped.

These balls are used, like the powder grains, for small-arms ammunition.

Science News Letter, December 9, 1944

ORDNANCE

New Shoulder Mortar Fires With Very Little Recoil

➤ GOING ONE better on the much-publicized Japanese knee mortar (which incidentally cannot be fired from the knee), Melvin M. Johnson, Jr., of the well-known arms designing and manufacturing concern, has built a shoulder mortar that can fire regular mortar ammunition with very little recoil. The barrel, which is muzzle-loading, slides within an outer tube. It is "cocked" before loading by pressing it back against a soft coil spring. When the trigger is pulled, this is released, and the barrel is still in forward motion when the propellant charge is fired. Thus the forward momentum must be overcome before recoil can begin to take place; by this device most of the "kick" is taken out of the piece. This invention is covered by patent 2,363,675.

Science News Letter, December 9, 1944

ENGINEERING

Magnetic Tailwind Helps Pilots Save on Gasoline

➤ A NEW MAGNETIC instrument, called a "magnetic tailwind," enables bomber and fighter plane pilots to fly their planes 100 miles or more beyond their present range by adjusting the engines to achieve maximum fuel economy, squeezing 5% to 10% more miles out of each gallon of high-octane gasoline, Barnard F. Langer, research engineer of the Westinghouse Electric & Manufacturing Company, told the American Society of Mechanical Engineers.

The new device makes it possible for a bomber pilot to determine the power output of his engines 10 to 15 times more accurately than with the method now commonly used, Mr. Langer remarked. Known officially as a magnetic coupled torquemeter, it conveys its information to the pilot by measuring the "twist" in the hollow steel shaft connecting a bomber engine to its propeller. The amount of the twist, which may be only a few thousandths of an inch for a distance of several inches along the shaft, is an accurate measure of the driving force delivered to the propeller.

"As the engine turns over at high speed," Mr. Langer stated, "it sends its power to the propeller blades through the shaft. The blades slashing through the air act as a drag on the engine and this action twists the apparently rigid steel shaft, just as you can twist a short length of garden hose by gripping it at each end and turning your hands in opposite directions."

When the motor stops, the twist disappears and the steel shaft, being elastic, returns to its original shape.

The magnetic instrument consists of a stationary metal sleeve and coil assembly which encircles the propeller shaft; and projecting from rings on the propeller shaft are two sets of gear-like teeth whose faces are a few thousandths of an inch apart. As the propeller shaft twists under load, the distance between the teeth changes. Magnetic "fingers" extending across the gap between the metal sleeve and the shaft detect this change and report it electrically to an instrument on the control instrument panel in the pilot's cockpit.

After the war, the device will have wide use in civil aviation, increasing safety and making possible longer hops with larger payloads, Mr. Langer predicted.

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ELECTRONICS

Electrons Serve Man

During the war, though veiled in censorship, research has developed or improved electronic devices that can see, feel, taste, measure, count and talk.

By ROBERT N. FARR

➤ DEVELOPMENTS in electronics, the art of harnessing electrons to the service of mankind, are far-reaching in possible benefits to the average American. During the war, though veiled in censorship, research has developed or improved electronic devices that can see, feel, taste, measure, count and talk.

Many new elctronic devices will be familiar in our everyday lives once the war is over. Electronic sewing machines using radio-frequency current instead of ordinary needle and thread, "stitch" a thin solid seam in thermoplastic coated fabrics, creating a bond as strong as the plastic itself. Medical men will use electronics to delve further into the secrets of the human body and to treat baffling diseases. Towns, cities, even homes will have the air cleaned by the precipitron, an electronic air cleaner, resulting in smokeless cities and homes.

In 1949 you may be able, through home television, to see as well as hear the inauguration of a new president as he takes the oath of office on the steps of the Capitol. Electronic lamps that destroy bacteria may disinfect the air in your home, helping you keep food free from spoilage. You can step from your bed at night while the room is dark and the lights will go on—without your touching a switch—through use of the "electric eye."

Static Eliminated

Annoying static on the radio is eliminated by an electronic radio system known as frequency modulation. High-frequency heat supplied by electronic tubes makes possible new industrial techniques. Used in bonding plywood, it has reduced the time required to produce many wood-plastic items.

If you have ever stuck an iron poker into the hot coals of the furnace at night and held it there until it turned red, then seen tiny sparks shoot out into space from the poker, you have seen a phenomenon similar to electronic emission. Heat literally "boils" the infinitely small particles of electricity out of metal in the same way that it "boils" steam out of water.

If you could weigh electrons it would take about 30 billion, billion, billion electrons to weigh an ounce. A single electron is much smaller compared to the head of a pin, than a drop of water compared to Niagara Falls.

In 1883, Thomas Edison paved the way for proving that electrons are emitted from heated metal. He put a cold piece of metal opposite the metal wire filament inside an electric light bulb. Electrons flowing along the wire created an electrical current.

"Edison Effect"

The filament, heated by the flow of electric current through it, emitted electrons and a minute electric current flowed along an external wire connecting the plate and the filament. Edison proved that the current would always flow in the same direction. This discovery is known as the *Edison effect*, the fundamental principle used in radio vacuum tubes.

Edison could find no use for this phenomenon. It was not until 21 years later, in 1904, that Sir J. Ambrose Fleming, a British professor of physics, picked up Edison's clue, and developed the first simple detector tube for radio reception.

The next step in the development of the electronic tube was to control the flow of electrons from the plate to the filament so that practically any desired magnitude of current could be obtained at a given instant and to make the flow of electrons change their direction so rapidly that they would send out waves through space. This was accomplished by Dr. Lee De Forest in 1906. He placed a light metal screen or grid between the plate and the filament. When fed a tiny electric current this metal screen controls the flow of electrons from filament to plate with accuracy and speed.

Dr. De Forest's electronic tube was the beginning of a still-growing six-billion-dollar-a-year electronics industry. New improvements on the original electronic tube enables men to start and stop the movement of electric force more than a billion times a second, or to release electric energy that operated a two-million volt X-ray machine.

Connected in the proper circuit of coils of wire, condensers and so on, the basic electronic tube can generate electrical oscillations in the form of radio waves which carry words and music to your radio from any point on this globe. This same electronic tube helps carry the pictures you will see on your television receiver, and to do a thousand and one other jobs.

The development of new electronic tubes, the heart and brain of every electronic circuit, will expand still further the usefulness and value of electronic science. One of these tubes is a new disk-seal "lighthouse" tube, known to engineers as the megatron. This tube has given the Allies a decided edge over the Axis by greatly advancing the power and frequencies available in the field of electronics. It has made possible a whole new family of ultra-high frequency electronic tubes, circuits and apparatus. (*See SNL*, Aug. 19).

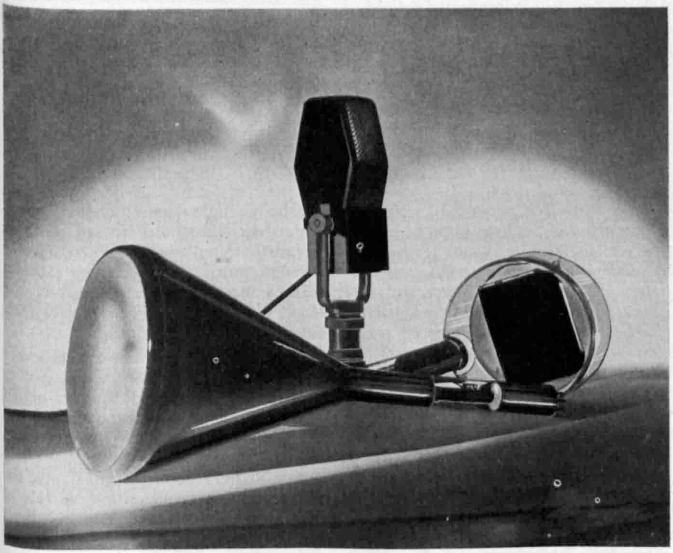
The new tube eliminates the conventional type of grid, filament and plate fitted around each other. In the megatron they are constructed in parallel layers, with glass and metal fused in rigid, inseparable units that are capable of withstanding severe handling.

Relayed Great Distances

Although military authorities will not permit the release of specific information on circuits or apparatus in which the tubes are used it is known that the megatron will make it possible to relay FM and television over great distances, speeding up the time when these services will be available to more people. It will also be used to reduce interference between radio stations on the same spot on your radio dial.

Some recently developed electronic tubes control the speed of giant motors in warplants while others are able to operate sensitive instruments that measure and record the currents generated in the human brain.

Like the tubes in your radio, these electronic tubes depend upon electromagnetic waves. If you toss a stone into a pool of water, waves travel outward in ever-widening circles from the place where the stone entered the water. There is a definite, measurable distance from the crest of one wave to the crest of the next. This is called wave-length. Even though they are not visible, electromagnetic waves have wave-length too. If a



CARRY SOUND AND LIGHT—Modern devices enable electrons to carry sound and light to distant places. The funnel-shaped tube is a cathode-ray tube on which pictures in your television receiver will appear. The microphone picks up words and music. The tube at right is the electronic kinescope which picks up pictures in the television camera for transmission to your home.

wave is said to have a frequency of 10,000 cycles a second, it means that 10,000 of these waves will pass a given point in a second.

Ordinary electric current used in your home alternates in its direction of flow 60 times a second. This produces an electromagnetic wave of 60 cycles a second. These waves travel comparatively short distances.

This 60 cycle house current may be considered as being at one end of the electronic highway. If we increase the frequency, the waves travel farther and will eventually include all frequencies suitable for sending sound and pictures. They will include infra-red rays for producing heat, light waves. ultra-violet rays which cause sunburn, X-rays which can penetrate sections of steel a foot thick, gamma rays which are produced by radium, and, finally, cosmic rays.

Ultra-High Frequencies

The ultra-high frequencies which offer excellent possibilities for electronic expansion are between 30,000 cycles and 300,000,000 cycles. There is very little static interference at these frequencies although radio communication is not possible much beyond the line of sight.

Radio was born out of World War I. Electronic research and development that promises even greater significance to our peacetime lives is growing out of World War II.

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ENGINEERING

Freon Is Cooling Agent In Tiny, Powerful Motor

➤ FREON, the wonder-chemical used both as a refrigerant and as a carrier for insecticides in aerosol bombs, is used as an internal cooling agent in a new type of small but powerful electric motors, on which U. S. patent 2,364,000 has been issued to Marion B. Sawyer of Los Angeles.

One such motor, described by Mr. Sawyer in his patent, is only 6.75 inches long by two inches in diameter and weighs about four pounds, yet develops three horsepower at 18,000 revolutions per minute.

Pouring enough electrical energy to develop that much power through such a small machine naturally causes severe heating. To keep the motor from burning itself out in a few minutes, special cooling measures must be taken. Those used by the inventor are principally two: he makes the necessary framework out of solid cast silver, because that metal is one of the best of heat-conductors; and he introduces Freon into spaces in the motor's interior through a hollow shaft. The Freon is evaporated, producing, according to Mr. Sawyer, "a temperature such as 20 degrees below zero at 100 pounds per square inch pressure." Freon has the further advantages of being an electrical non-conductor, thereby eliminating danger of shorting, and of being non-poisonous to human lungs.

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Do You Know?

Bituminous *coal* is used to heat over 40% of American homes.

Some typical tropical *ulcers* may harbor diphtheria germs.

Switzerland, unable to import *radio tubes,* is now producing its own.

The principal plant crop of North America is *weeds.*

Dahlia tubers, buried in boxes of sand or light soil, will winter safely in a cellar.

The Lake Superior *iron ore* region normally produces 85% of the ore mined in the United States.

The Army has purchased more than 2,500,000 buttons of *"vegetable-ivory,"* made from tagua nuts, the seed of a South American palm.

Mount Rainier, now covered with a mantle of glacial ice, once was a flaming volcano, and steam jets at its summit melt caves in the snow.

Starfish meal for chickens, made by drying and grinding whole starfish, contains about 30% protein, over 17% calcium, and 0.35% phosphorus.

Some 200,000 barrels of Nova Scotia *apple juice* fortified with vitamin C were sent last summer to Canadian fighting men and other soldiers overseas.

Perennial *sow thistle,* first observed in northeastern Canada, has spread over three-fourths of the United States during the past 50 years.

Bolivia has completed construction of a national *fish hatchery* and hopes to be able soon to stock its lakes and rivers and thus become a country independent of fish importation.

The 1944 pack of Alaska *canned salmon* will be about 20% below 1943 because of the smaller run of fish due to severe winter conditions in the spawning streams several years ago that killed fish that would be mature adults now.

To combat *locust* plagues in the Middle East, an organization has been set up in London under the Anti-Locust Research Center, to send tried poisons to the entire territory and to conduct new local experiments.

CHEMISTRY

Hormone Builds Resistance

Produced by the pituitary gland in the head, it plays an important role in body resistance to invasion by disease germs.

➤ A HORMONE produced by the pituitary gland in the head plays an important role in body resistance to invasion by disease germs and poisonous substances, Dr. Abraham White and Dr. Thomas F. Dougherty, of Yale University School of Medicine, announced at the meeting of the American Chemical Society in New York City.

The hormone is called the adrenotrophic factor because of its influence on the cortex of the adrenal glands. Acting through its influence on the adrenal cortex, the pituitary hormone controls the rate at which lymphocytes are washed out of lymphoid tissue. The lymphocytes are one kind of white blood cell which scientists have long known played a part in the body's fight against disease germs.

Pursing their studies further, the Yale scientists found that injection of the adrenotrophic pituitary hormone causes a marked increase in the proteins in the blood serum, including the protein fraction that contains antibodies.

Antibodies are also part of the body's germ-fighting forces. Specific antibodies for dealing with different kinds of germs have been found, such as the measles immune globulin now being obtained from blood plasma.

The studies reported, it is said, give the physiological explanation for the role of the lymphoid tissue against infectious diseases.

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ASTRONOMY

Bright Lines of Hydrogen

➤ A STAR in the constellation of Libra, probably has an intensely bright stratum of hydrogen just above the luminous, incandescent surface visible from the earth. This star is 48 Librae, one of great interest to astronomers because of the unusual behavior of its spectrum during recent years.

In some white or bluish-white stars (which have a large amount of hydrogen in their make-up), particularly in those with shell spectra, a special supply of hydrogen atoms or protons is released just above the photosphere, Dr. Paul W. Merrill and Dr. Roscoe F. Sanford of Mount Wilson Observatory suggest (*Astrophysical Journal.*)

It is usually assumed that the bright lines in a star's spectrum are caused by an atmosphere which rotates in a direction opposite to that of the rest of the star and which extends far above the layer in the shell of the star. Although this is true in many cases, the Mount Wilson astronomers point out, sometimes quite the reverse occurs. In many red stars the reversing layer probably lies above the source of the bright lines of the spectrum.

The cloud of hydrogen which they believe to exist above the photosphere pushes part of the reversing layer upward to a level where it is cooler and less dense than normal. In this way a shell spectrum may be created, the astronomers state.

"The hydrogen may be produced by the disintegration of an unstable atomic nucleus of an unfamiliar type coming from the stellar interior," Dr. Merrill and Dr. Sanford report. "If the supply is cut off, the bright lines disappear, as they did in mu Centauri and Pleione, to reappear upon re-establishment of the special mechanism of hydrogen release."

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BOTANY

NATURE RAMBLINGS by Frank Thone

Buy British!

➤ WE CAN BE more patriotically American in our Christmas shopping by "buying British" when it comes to holly. This is not based on a semi-altruistic impulse to help our transatlantic ally by giving him our money for his wares. It is simply that if we buy English holly we do not buy native American holly, and in that case we let our native American woods stand unrobbed to the degree of our abstention.

For the English holly offered in American markets is all cultivated, and helps to make an honest living for those who raise it. American holly, on the other hand, is almost always stolen; for the collectors and dealers are seldom the owners of the woods where the holly grows. Even if they are, they are robbing themselves and their heirs, for stripping the woods of these bright-berried bushes and small trees leaves the next generation inevitably poorer.

Actually, when we purchase English holly on an American market stall we are not "buying British" in the literal sense. The English holly we see here is not imported. It is the long-since-naturalized descendant of originally English ancestry—like an Alden or a Dwight or a Calvert. The nurseries where holly is grown for the market are mainly in the Pacific Northwest, where the climate is most like that of northwestern Europe, although substantial amounts of English holly are grown also in some of the Eastern states.

English holly can be distinguished from the native American species readily enough. It has bigger, brighter, redder berries and its leaves are a darker, glossier green, usually with somewhat spinier margins. It looks more like the holly of Christmas-card paintings.

Holly (both English and American) is one of those peculiar plants that has its berry-producing or female flowers and its pollen-producing or male flowers on different bushes. This makes it necessary to have one otherwise unprofitable (because berryless) bush for every dozen or so of the berry-bearing bushes.

Lately, however, plant physiologists have discovered a way to make berries develop from unpollinated female flowers, simply by spraying them with a dilute solution of one of the growth-promoting chemicals, or hormones. To be sure, these fatherless berries do not contain fertile seed, but that does not make any difference, so far as their ornamental appearance is concerned.

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GEOGRAPHY

Black Forest of Germany Presents Terrain Problem

➤ THE FAMOUS Black Forest of Germany with its noted timber and its outstanding scenic beauty, a favorite region visited by many thousands of American tourists and foresters in peacetimes, is located just across the Rhine from northeastern France in the direct road of the American Army en route from French Alsace-Lorraine to Berlin. Its mountainous roughness, its snowy winters, and its concealing evergreens present difficult military obstacles to an invading army. The Black Forest, both a mountain range called Schwarzwald in Germany and a forest area, is mainly in the German state of Baden, which lies on the east bank of the Rhine. The range extends from the Swiss border a hundred miles or so northward to the city of Baden-Baden and beyond, and is from 10 to 15 miles in width, spreading out eastward into Wurttemberg. The towns of Freiburg, Offenburg and Lahr lie on its western slope facing the Rhine.

The Schwarzwald is divided into a northern and a southern section by the Kinzig river which enters the Rhine near Strasbourg after passing close to Offenburg and previously cutting a great loop to the south through the mountains. The northern mountains have an average height of 2,000 feet with several peaks considerably higher. The southern Schwarzwald has an average altitude of approximately 4,000 feet, and a number of peaks that extend upward close to a 5,000-foot height.

On the western slopes the hills fall steeply away to the Rhenish plain and are deeply furrowed with valleys. The northern Schwarzwald is a land of conical hills many of which are a brightly colored sandstone. The southern Schwarzwald, up to the 4,000-foot height, is covered with forests of fir which have made the terms "forest" and "mountain" synonyms in the area.

On the higher elevations nothing grows but grass and mountain pine.

The winter climate of the Black Forest is not the best for military maneuvers. It has long snowy months with much raw weather, and, in general, is in the part of the Reich that has the heaviest annual rainfall. In the higher district only the hardy cereals are grown. The valleys, however, are warmer and have good pasture land and vineyards. The summer climate is described as delightful from June through September. In prewar days it was a land of winter sports in January and February, a land of skiing, skating and sledding.

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METALLURGY

Bath of Molten Lead for Continuous Steel Casting

➤ CONTINUOUS processes always attract industrial interest. One of the most difficult problems in this field, that of continuous casting of rods, sheets and other shapes of steel, is tackled from a novel angle by a German inventor, Herbert Ruppik of Düsseldorf, who passes the solidifying steel through a bath of molten lead, to maintain its shape while the temperature is gradually reduced. His patent, No. 2,363,695, is vested in the Alien Property Custodian.

Science News Letter, December 9, 1944

MILITARY SCIENCE

Norden Bombsight

Consists basically of a telescope with a special control mechanism, a gyroscope, an automatic pilot, and an electric release button for dropping bombs.

➤ AT LAST details of the Norden bombsight, an optical instrument that accounts for the pin-point accuracy of American bombing operations, have been revealed by the War Department. So secret has the Norden sight been up to now that it is delivered to the plane just before the take-off by an armed guard.

The basic design for the bombsight that helps Yank bombardiers hit a pickle-barrel with a blockbuster was invented in 1924 by C. L. Norden, and was originally developed and used by the Naval Air Service. Current advanced models are now used by both the Army and Navy.

Men who use the bombsight require special training and a technique of operation that is much like learning to play the piano; success comes only with sustained practice. It requires 482 hours of training over a period of 18 weeks for a man to become familiar with the Norden bombsight as a biologist is familiar with a microscope, the familiarity that breeds good bombing.

Basically, the Norden bombsight consists of a telescope with a special control mechanism, a gyroscope, an automatic pilot that controls the airplane during the run on the target, and an electric release button for dropping the bombs.

In actual use, the bombardier adjusts the Norden bombsight for the determined speed and altitude. He starts the gyroscope spinning, its axis at right angles to the ground. Peering through the telescope, he synchronizes the controls with the apparent ground speed. The angle at which the bombs are dropped is automatically set by the sight itself. Now ready for the bombing run, the bombardier prepares the fuses of the bombs for detonation. Next he takes control of the airplane away from the pilot by means of an automatic pilot attached to the bombsight. He must work fast, for if he keeps a straight course longer than 25 seconds he will enable enemy flak to get his range. He manipulates four knobs on the bombsight, two controlling the telescope mechanism, and two the course of the plane. When the angle of closure reaches the computed dropping angle, he releases the bombs by pressing the electric button. When the run is completed, control of the plane passes back to the pilot.

About one minute is needed for a complete bombing run, from the time the bombardier starts the Norden bombsight until the bomb-load is released. In spite of the accuracy and effectiveness of present bombsights, constant research is continued so that improvements will enable us to maintain superiority over an ingenious enemy.

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ZOOLOGY

Chinchillas in U. S. Zoo Have Proud Lineage

See Front Cover

➤ FOUR LITTLE aristocrats recently took up residence in Washington, D. C., at the National Zoological Park. They are two pairs of chinchillas, rarest and costliest domesticated fur-bearing animals in the world.

Two of them are shown in the photograph by Fremont Davis, Science Service staff photographer, on the front cover of this SCIENCE NEWS LETTER.

Back of the new acquisitions at the Washington zoo are 14 generations of known pedigree—three generations more than Mayflower descendants can boast. Their lineage traces back to Chile, via a famous chinchilla farm in California.

Director William M. Mann states that the purchase was "practically a gift—the four together cost rather less than the price of one rhinoceros." That should make them still rather costly, taken by the ounce; the four chinchillas together weigh about six pounds; an African rhinoceros weighs well over two tons.

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CHEMISTRY

Discoveries Help Prevent Steam Turbine Failure

➤ NEW DISCOVERIES that help prevent turbine failure caused by silica deposits from high-pressure steam are credited to Prof. Frederick G. Straub, of the Department of Chemical Engineering at the University of Illinois.

The installation of high-pressure turbines in power plants has resulted in a serious prob'em of hard silica deposits, which analysis shows to be almost pure quartz. These steam turbines, working in tandem with high-pressure units, cake up with silica so rapidly as to result in a 30% loss in efficiency in four months. Decreased turbine efficiency, lost time, and the cost of overhauling the equipment has meant an annual loss of thousands of dollars to power plants.

The cause of the deposits, it was learned, is the silicates in the boiler water, which under high heat and pressure form silicic acid. This acid is vaporized and passed into the turbines. At the low-pressure end of the steam turbine the vapor precipitates into a solid crystalline mass, which sticks to the walls.

Mr. Straub, in collaboration with Hilary A. Grabowski, developed a method for quickly analyzing high-pressure steam for its silica content. It is possible to detect the presence of silicates in quantities as low as one-hundredth of one part per million. If the analysis indicates the presence of silica in the boiler steam in sufficient quantity to cause trouble, previously developed methods are used to reduce the silica content. Where the silica is less than one-tenth of one part per million, little trouble is experienced.

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Modern battleships require over 1,600 *electronic tubes* each.

Books of the Week

A MAZE OF AMAZING FACTS is a collection of perhaps a thousand disconnected items of interest, mostly in the fields of science and scientific developments, collected by Daniel Sargunas. It is for "relaxation" reading. (*Meador*, $2.)

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A LAYMAN'S book in physics is THE A B C OF PHYSICS by Jerome S. Meyer. It tells interestingly in non-technical language the science of the radio, telephone, television, and many other technical applications of science. It covers the fields in standard physics texts. (*Dial Press*, $3.50.)

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TECHNICAL DEVELOPMENT of radio broadcasting is traced through the biographies of 100 men who have contributed to the science in RAD'O'S 100 MEN OF SCIENCE by Orrin E. Dunlap, Jr. (*Harper*, $3.50). This is the ninth book written by Mr. Dunlap on radio. The narratives begin with Thales of Miletus (640-548 B.C.) who beheld "Elektron sparks", and conclude with such contemporaries as Lee De Forest, Maj. E. H. Armstrong, and Vladimir K. Zworykin. Of the men represented, 46 were born in the United States, and 18 others migrated to America. The book has the added advantage of containing personal observations, since Mr. Dunlap has met personally and interviewed many of those of whom he writes.

Science News Letter, December 9, 1944

PLASTIC MOLDING AND PLANT MANAGEMENT by D. A. Dearle is a book for executives, engineers and plant foremen which describes many of the processes in using plastics, particularly the technique of compression and injection molding. It is in simple, clear language easily understood by the layman. (*Chemical Pub. Co., Inc.*, $3.50.)

Science News Letter, December 9, 1944

CHEMISTS, PHYSICISTS and many other scientists will be interested in THE THEORY OF RESONANCE AND ITS APPLICATIONS TO ORGANIC CHEMISTRY by George Willard Wheland. (*Wiley*, $4.50.) This theory is the most important addition to chemical structural theory since the concept of the shared-electron bond, according to the author. This book is a comprehensive survey of literature on the subject.

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WITH AMERICA'S EYES now on the western Pacific, THE PACIFIC WORLD, edited by Fairfield Osborn, will prove of interest. It is full of reliable information by outstanding American men of science on the ocean and its islands, the climates, winds, currents, tides, native people, fauna and flora. (*Norton*, $3.)

Science News Letter, December 9, 1944

Just Off the Press

AVIATION ANNUAL OF 1945—Reginald M. Cleveland and Frederick P. Graham, eds.—*Doubleday*, 205 p., illus., $3.75.

THE BIOLOGICAL BASIS OF INDIVIDUALITY—Leo Loeb—*C. C. Thomas*, 711 p., $10.50.

FATS AND OILS, an Outline of their Chemistry and Technology—H. G. Kirschenbauer—*Reinhold*, 154 p., illus., $2.75.

FIGHTING WINGS—Gilbert Paust and Milton Lancelot—*Duell*, 256 p., illus., $2.75.

THE GEOLOGY AND PALEONTOLOGY OF THE MARINE PLIOCENE OF SAN DIEGO, CALIFORNIA, Part 1, Geology—Leo George Hertlein and U. S. Grant, IV—*San Diego Society of Natural History*, 72 p., paper, illus., $1.50.

OUTLINE OF THE AMINO ACIDS AND PROTEINS—Melville Sahyun, ed.—*Reinhold*, 251 p., illus., $4.

PHYSICAL MEDICINE IN GENERAL PRACTICE—William Bierman—*Hoeber*, 654 p., illus., $7.50.

UNITED STATES GOVERNMENT MANUAL, SUMMER 1944—Office of War Information, Div. of Public Inquiries—*Gov't Print. Off.*, 712 p., paper, $1.

Science News Letter, December 9, 1944

MEDICINE

Resistance to Hookworms Weakened by Malnutrition

A MAN who turned guinea pig for science, letting over 5,000 hookworm larvae burrow through his skin during the course of a year, has forged another link in the chain of evidence showing that malnutrition weakens resistance to hookworm invasion.

The study was reported by Dr. G. F. Otto, of the Johns Hopkins School of Hygiene and Public Health, at the meeting of the American Society of Tropical Medicine, held in St. Louis.

This one experiment "leaves much yet to be answered," Dr. Otto said.

Significantly, however, it bears out results of previous studies he made with hookworm in dogs. These animals, he found, could build up an immunity to hookworms through repeated light infections, so that after a time they could resist as much as 20 to 50 times the killing dose. Malnourished animals, however, were not able to develop such immunity.

Malnutrition, Dr. Otto concluded, stands out as probably the most frequent cause of inability to combat successfully the attack of the hookworm.

The human guinea pig reported on was a well-nourished man. Starting with 26 hookworm larvae, he gradually was exposed to attacks of 2,400 larvae 450 days later. On the basis of the daily egg production resulting from the initial infection, the 2,400 larvae alone should have resulted in a daily egg production of two and one-half million and the accumulated worms should have produced over five million eggs per day. Actually the highest count, recorded only on one day, only reached one million. For the most part the egg production was in the neighborhood of half a million, which was about one-tenth of the level to be expected if all worms had developed.

The only symptoms reported by the man were severe itching where the larvae penetrated the skin and chronic pains over the stomach, gnawing hunger and diarrhea during the sixth week of the infection. This was just before the first crop of worms matured in his body. With the appearance of the first eggs on the forty-second day, these symptoms disappeared and scarcely ever returned. No anemia or loss of weight, such as chronic hookworm patients suffer, occurred.

Science News Letter, December 9, 1944

Sugar normally provides 15% of the calories in the American diet.

•New Machines and Gadgets•

❁ *PARLOR ring-tossing game has a new variant. Each ring has a small pointer on one side, and the base which holds the stake upright is divided into sectors, each with a printed value. When the player makes a ringer, his score is indicated by the figure in the sector containing the pointer.*

Science News Letter, December 9, 1944

❁ *DUFFLE BAG, now issued to soldiers overseas to replace the two barracks bags formerly used, has a 12-inch rectangular base and is three feet deep. It has a snap closure and padlock, and can be carried by special straps either as a suitcase or over the shoulder like a golf bag.*

Science News Letter, December 9, 1944

❁ *AUTOMATIC VALVE, dubbed a "thinking" valve, anticipates the requirements of a room by admitting to an air-conditioning unit cold or hot fluids as needed. When once adjusted, it will, without resetting during the year, assure proper compensation for changes in weather conditions.*

Science News Letter, December 9, 1944

❁ *ELECTRONIC rat trap operates when a rat passing through an open tunnel cuts an invisible ray beamed on a photocell. Trap doors drop down at both ends and the rat, seeing light above, goes up a ramp to a small chamber where he steps on a switch plate which turns on a current to electrocute him.*

Science News Letter, December 9, 1944

❁ *PLASTIC CAPS are used in one aircraft factory during storage to keep all dust out of tubing for use in the hydraulics system in the planes. One grain of dust under a relief valve might prevent the hydraulics system from functioning. Wooden hammers are used, as shown in the picture, to tap the caps into place.*

Science News Letter, December 9, 1944

❁ *PEA POD OPENER, to select and open green peas suitable for freezing, is a machine in which the pods after cleaning are passed through a cooling chamber to make them crisp and brittle, then into a chamber where they are subjected to increased atmospheric pressure, then quickly into a partial vacuum where they pop open. By regulating the degree of the vacuum the pods of a particular quality can be made to open.*

Science News Letter, December 9, 1944

❁ *RAIN GOGGLE for motorcyclists has a transparent disk which rotates in front of both eyes on a pivot at the bridge of the nose. The wind hits vanes projecting from the edge of the disk and causes it to turn rapidly enough to throw off the raindrops by centrifugal force.*

Science News Letter, December 9, 1944

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W. Washington 6, D. C., and ask for Gadget Bulletin 237.

Question Box

CHEMISTRY

What hormone helps build resistance to disease germs? p. 380.

HUSBANDRY

What effect has artificial breeding of cows had on the milk they produce? p. 376.

ELECTRONICS

In what ways do electrons serve man? p. 378.

ENGINEERING

How does the new "magnetic tailwind" help pilots? p. 377.

What advantage do magnesium plane wings have over the standard aluminum ones? p. 377.

What is the advantage of using Freon as a cooling agent in electric motors? p. 379.

MILITARY SCIENCE

What does the Norden bombsight consist of? p. 382.

MEDICINE

What is the Army's most powerful medicine? p. 371.

Why have cold vaccines been branded by the AMA? p. 376.

TOXICOLOGY

What effect has DDT been found to have on fish and frogs? p. 376.

TRAVEL

What has made it possible to fly the North Atlantic in winter? p. 373.

ZOOLOGY

How many generations of pedigree are behind the four chinchillas which recently came to the Washington Zoo? p. 382.

Where published sources are used they are cited.