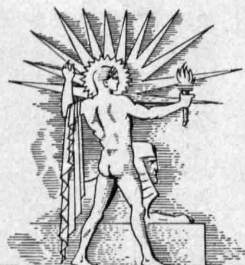
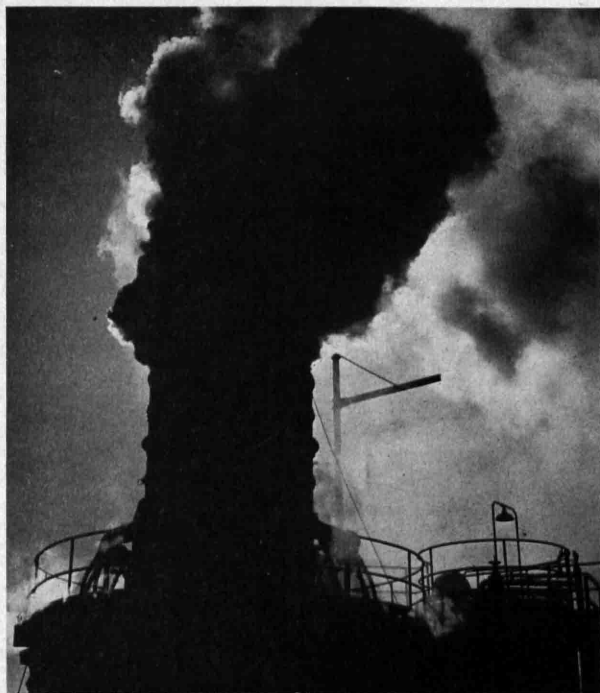


# SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



January 17, 1942

War Industry

See Page 42

A SCIENCE SERVICE PUBLICATION

# Do You Know?

The University of Chicago map collection number 110,000 sheets and is still growing.

*Vanilla* is the only orchid of commercial importance, aside from those grown for their flowers.

Ancient China may have had the first plastic when it started using paper-mache, long ago.

After a cold snap, lemon trees produce lemons with more seed, says a Federal plant scientist.

Hollow apple trees are especially attractive homes for screech owls, crested flycatchers and flickers.

A healthy adult has in his body about 25 trillion red blood corpuscles and 30 billion white corpuscles.

Farmers are being advised to repair farm machinery during this winter, when there is time and parts can be had.

Sugar-coating steel molds with dry, pure corn sugar is the latest way of improving the surface of steel.

Railroad researchers estimate the cost of stopping a modern streamliner at \$1.69.

The Consumers' Guide, Department of Agriculture publication, says: "You usually have to drink 2 cups of tomato juice to get as much vitamin C as you get from one cup of orange juice. But of course you want to figure costs per cup, too."

## QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.

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### PUBLIC HEALTH

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What device may be used to prevent influenza and infantile paralysis epidemics? p. 39.

What new industrial hazard is being guarded against in war industries using magnesium? p. 37.

More than 56,000 blankets made of discarded paper machine felt have been sent to Britain.

One- and two-humped camels are crossed in the Middle East, producing a one-humped hybrid of superior strength and endurance.

Since black fabrics are depressing, special efforts to develop blackout fabrics that are more attractive indoors have been made in England.

The United States' population increased from 131,669,275 to 132,818,005 in the year ended April 1, 1941, the Census Bureau estimates.

*Asparagus* belongs to the lily family.

*Sparkproof* shoes for men dispensing gasoline are being tested by the Army.

Some *Mother Goose* rhymes can be traced back 2,000 years, says Dr. Arthur Taylor of the University of California.

*Latex*, obtained from rubber trees, has been used by Hollywood to make artificial animals—an octopus so constructed cost \$10,000.

Innocent-appearing messages on postcards written by Poles to enemies of Germany actually were code messages containing valuable information.

## SCIENCE NEWS LETTER

Vol. 41 JANUARY 17, 1942 No. 3

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N. W., Washington, D. C. Edited by WATSON DAVIS.

Subscriptions—\$5.00 a year; two years, \$7.00; 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Back numbers more than six months old, 25 cents.

In requesting change of address, please give your old address as well as the new one, at least two weeks before change is to become effective.

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Cable address: Scienserv, Washington. Entered as second class matter at the post-office at Washington, D. C., under the Act of March 3, 1879. Established in mimeographed

form March 18, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Readers' Guide to Periodical Literature, Abridged Guide, and in the Engineering Index.

The Science Observer, established by the American Institute of the City of New York, is now included in the SCIENCE NEWS LETTER.

Members of the American Association for the Advancement of Science have privilege of subscribing to SCIENCE NEWS LETTER, at \$3 a year.

The New York Museum of Science and Industry has elected SCIENCE NEWS LETTER as its official publication to be received by its members.

Advertising rates on application. Member Audit Bureau of Circulation.

SCIENCE SERVICE is the Institution for the Popularization of Science organized 1921 as a non-profit corporation.

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AERONAUTICS

# "Dual Personality" Airplane Flies Close To Ground

## Fighter Which Is Also Bomber Drops Two Bombs From So Low an Altitude They Ricochet Along Ground

A NEW airplane with a dual personality—fighter as well as bomber—has enabled the British to develop a technique of bombing entirely new even among the novelties of modern aerial warfare. This is disclosed in recent issues of British aviation journals which have arrived here after delays (*Aeroplane*, Nov. 28, and *Flight*, Nov. 27).

In a day when new planes are being equipped with superchargers to cruise in the heights of the stratosphere, this latest air weapon hugs the ground and even dips into hollows or ravines to hide from enemy fire.

While most bombers are heavy craft difficult to maneuver and requiring for protection convoys of fast darting fighters or the shelter of high altitudes and masking clouds or darkness, these new Hurricanes need no escort and make no attempt at high altitude flying.

With military experts pinning their faith on intricate bomb-sights, these pilots used no aiming devices at all.

Machine-gun "strafing" from low altitudes is something European fighters have been familiar with since the days of World War I. Dive bombers are by now taken for granted. But this new sort of "horizontal bombing" from planes grazing the tops of the hedges, and whizzing by at 340-mile-an-hour speed, has provided the Germans with a complete surprise.

The British journal *Flight* reports it as an actual fact that the Germans are building 30-foot anti-aircraft towers in order to be able to shoot down on these new bombers.

The new technique has produced its own problems in ballistics. When a bomb hits the ground from such a low height, it ricochets along the ground horizontally and hits the target from the side instead of from above. This is all right for a huge target. But one pilot who watched a companion attack a railway station reports that the bombs went clean through both walls of the station and exploded harmlessly in fields some 300 yards away.

The airplane is in some danger from its own bombs at such low altitudes. In

order to be reasonably safe from the explosion of a 250-pound bomb such as those carried by the new Hurricane, an airplane must be at a greater height than 1,500 feet—2,000 feet would be better.

To get around this, delayed-action bombs that do not explode on impact are being used, and formations have abandoned their sentimental attachment for the V symbol in favor of flight abreast. If one plane flew behind the others, the last man would be blown up by the bombs dropped by the leader.

The regular procedure has been this. The planes cross the channel flying in formation at economical cruising speed. As soon as the coast of France is reached, they throw the throttles wide open and zip across country at full speed which is some 500 feet per second. At this speed anti-aircraft fire finds them a very diffi-

cult target, and they have approached, passed and gone before interceptor planes can leave the ground.

The two bombs carried by each plane are both dropped at one time, some distance from the target to allow for the tendency to ricochet along the ground in the direction of the plane's flight. Before their bombs explode, the bombers are already away—and no longer bombers. With their loads discharged, these dual-personality aircraft become fighters with all the speed and maneuverability for which the Hurricane is famous, capable of dealing with any interceptor planes.

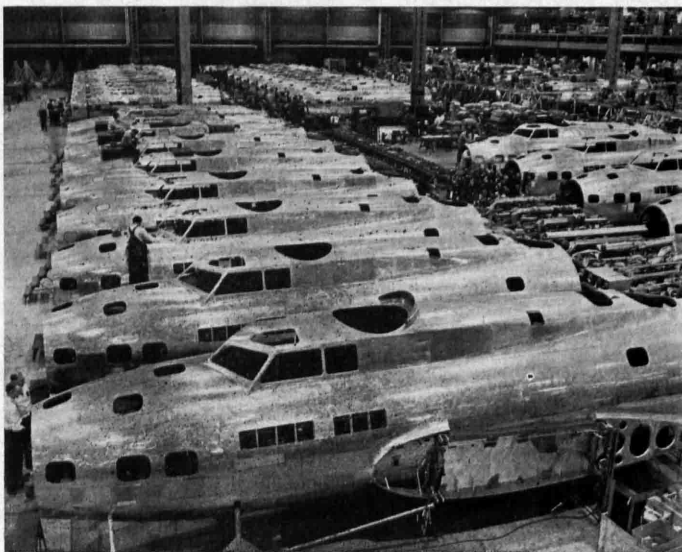
*Science News Letter, January 17, 1942*

## POPULATION

## Men Aged 20-44 in U. S. Double Number in Japan

AMERICA has more than twice as many men to draw on in the military age group, 20-44, as Japan, an analysis of the latest available figures by life insurance statisticians shows.

In Japan, the proportion of men of military age is 34%, or a total of 11 millions. In America, the proportion is 38.5%, or a total of 25 millions. (*Turn to next page*).



## WARTIME PRODUCTION

This is the way that Flying Fortress heavy bombers are being turned out in the new speed-up wartime production at one of the Boeing Aircraft Company plants at Seattle, Washington.

While Japan's birthrate of 2 million annually is only slightly behind ours of 2-1.4 million, its mortality is much higher. The Japanese death rate is 17.4 per 1,000 as compared to 10 or 11 in the United States.

Japan's present death rate, in fact, resembles ours of 1900. Individual causes of death in Japan are about as prevalent now as in this country about 1900. For example, the United States tuberculosis death rate now is 45 per 100,000. In Japan in 1937 the rate was 204, closely

resembling our tuberculosis death rate in 1900-1916. The picture is similar for diarrhea and enteritis.

To offset these disadvantages, the Japanese cabinet in 1941 approved a plan for giving Japan a population of 100,000,000 by 1960. The plan is modeled on German and Italian birth-increase plans, offering various forms of subsidies and bonuses for large families, penalizing small families and unmarried persons. Present population of Japan is 73,000,000.

*Science News Letter, January 17, 1942*

comes positively electric on its underside, negatively on its upper side. About half an hour later, the tip begins to bend upward at the point where the electrical difference developed.

In a third piece of apparatus, tiny onions are grown in such a way that electric current flows downward along one set of roots, upward against a second set. The downward current has no effect on the rate of growth, but the upward current causes a slowing of growth in the roots that are pointed against its direction.

*Science News Letter, January 17, 1942*

#### MEDICINE

## Youth Recovers Though Heart Stopped for 20 Minutes

### Forced To "Beat" Artificially by Rhythmic Contractions Of Surgeon's Skilled Hand Kept Up Without Ceasing

**A** 20-YEAR-OLD youth whose heart ceased to beat for 20 minutes while he lay within the shadow of death on an operating table completely recovered partly because of heroic surgical teamwork, partly for reasons no man understands.

During those 20 long minutes, the youth's heart was forced to continue its motion artificially by the rhythmic contractions of the surgeon's hand placed directly on the paralyzed organ.

Described by surgeons as "almost unheard of" this case is reported by Drs. Herbert D. Adams and Leo V. Hand of Lahey Clinic, Boston (*Journal, American Medical Association*, Jan. 10).

The patient's heart stopped two hours after anesthesia had begun during a lengthy chest operation. Immediately the surgeon began the artificial contractions of the heart with his hand, while stimulants were injected into the heart muscle and artificial respiration maintained. At one time the heart stirred naturally, beat five or six times, then ceased. Finally it began its natural beat, this time permanently.

Normally death comes from 7 to 10 minutes after the heart stops. Tiny nerve centers in the brain which control breathing die from blood starvation. Even though the heart may be forced to beat again briefly, the patient's life cannot be saved.

In this case these brain centers were kept alive by lowering the patient's head to aid blood flow, artificial respiration and circulation. Even so, however, the

patient's survival, surgeons believe, can be called a "miracle."

With magnificent understatement, Drs. Adams and Hand comment: "This case demonstrates that the time interval of cardiac arrest compatible with normal recovery is much longer than formerly appreciated."

*Science News Letter, January 17, 1942*

#### BIOLOGY

## Electricity's Tie-Up With Life Itself Shown

**E**LECTRICITY'S intimate tie-up with life itself is strikingly shown in experiments with apparatus displayed at the exhibit of the University of Texas in connection with the meeting of the American Association for the Advancement of Science, in Dallas.

Research with this apparatus, so delicately adjusted that single cells of living plants can be picked up and accurately manipulated, is being conducted by Dr. E. J. Lund and his associates.

One of the devices picks up a single thread of a lower waterplant, or alga, and dips its end in a tiny cup of water. The exceedingly minute current of electricity which it generates as long as it is alive is recorded. The electrical potential is shown to be higher near the ends of the long cells and is at its highest in the region of the actively growing tip, where life is most intense.

Another device shows how a small plant, when laid on its side, instantly be-

#### PLANT PHYSIOLOGY

## Coconut Is Foster-Mother To Tiny Plant Embryos

**A** COCONUT served as foster-mother to embryo plants much as a cow or goat serves as foster-mother to infants of our own species, in experiments reported to the American Society of Plant Physiologists by Dr. J. van Overbeek of the California Institute of Technology.

Inducing very small plant embryos to grow outside their seeds is a feat comparable in difficulty with growing chick embryos outside their eggs. Working in cooperation with Dr. Marie E. Conklin of the Brooklyn Botanic Garden and Dr. A. F. Blakeslee of the Carnegie Institution of Washington, Dr. van Overbeek succeeded in getting them to grow in glass laboratory dishes, feeding them on a solution of nutrient chemicals.

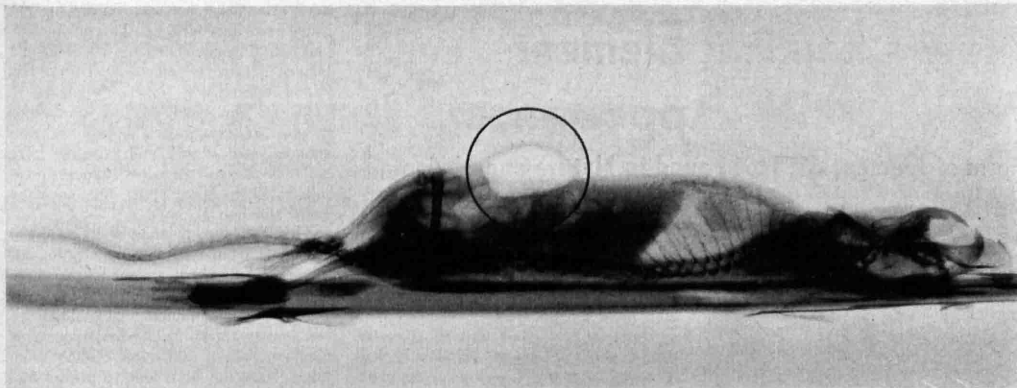
At first the embryos would not grow. Recalling the physiological function of the milk in the coconut, in feeding the embryo of the coconut palm, he decided to add some coconut milk to his nutrient medium. It worked.

The embryos he reared were those of jimsonweed. He succeeded in carrying them through from specks about the size of a pinpoint to a diameter of nearly a quarter of an inch, in six days' time. After a week in the coconut-milk-enriched fluid medium, they were "weaned" by transfer to a milkless solution, and later planted in ordinary garden soil.

Dr. van Overbeek has detected evidence of the presence of at least three distinct enzymes, hormones or similar substances in coconut milk, that influence the growth of embryos. He is now investigating the chemistry of the one that seems to be most important.

*Science News Letter, January 17, 1942*

South Sea Islanders eat with their fingers and use leaves for plates.



PUBLIC HEALTH

## New Kind of Gas Gangrene If Magnesium Enters Wounds

Unless the Metal Is Promptly and Completely Cleaned Out of Wound, Even Trivial Injury May Become Serious

**A** NEW kind of gas gangrene threatens workers in America's war industries unless care is taken to guard open cuts and wounds from magnesium splinters and dust, it appears from a report by Dr. Carey P. McCord, of the medical department of Chrysler Corporation.

Metallic magnesium and some of its alloys, the newest widely used metal in war industries, have been found to produce a unique gaseous condition when they get into wounds. Unless the magnesium is promptly and completely cleaned out of the wound, even trivial injuries may become serious and prolonged. The condition that results is similar to gas gangrene, serious war wound danger, except that it is caused by the magnesium instead of by germs.

This kind of chemical gas gangrene has been very prevalent in German industries with as many as 5,000 cases in 1939, according to reports received by the Chrysler Corporation's medical division.

The studies by Dr. McCord, Dr. Stuart F. Meek and Dr. Gordon C. Harrold, also of the Corporation's medical department, are believed to be the first in the United States showing the danger of not cleaning out all metal particles or dust from a wound in which mag-

nesium particles might be involved. "Early in our investigation," Dr. McCord reported, "we found that rat wounds in which small particles of magnesium had been introduced, unlike those contaminated with most metals, glass and wood, promptly lead to hydrogen gas formation in the tissues. The quantity of gas we found to be extensive and if neglected probably would produce a condition akin to a chemical gas gangrene.

"In the presence of magnesium particles it was discovered that hydrogen was evolved from the fluids of the tissues themselves and if the metal was not immediately extracted, would form a gaseous tumor. Thus it would seem that injuries resulting from not cleaning all magnesium particles from wounds may be much more serious than ordinary industrial injuries.

"The danger of this effect of magnesium calls, in the first place, for special preventive procedure against accidental injuries where magnesium particles might be involved, and in the second place, the availability of immediate proper medical care. The complete removal of all metallic magnesium apparently is vital."

*Science News Letter, January 17, 1942*

NEW HAZARD

*This X-ray of a rat shows (in circle) the sort of bubble that forms when magnesium metal such as that in scrap turnings gets into a wound. This sort of gas gangrene is now recognized as one of the hazards against which precautions must be taken in war industries handling magnesium.*

AGRICULTURE

## Grow Bigger Crops With Hormone Treatments

**B**IGGER yields of a number of field crops were obtained by treating their seed before sowing, and in some instances by spraying the plants in the field, with plant hormones or growth-promoting substances, in large-scale tests reported by Prof. J. C. Ireland of Oklahoma A. and M. College. Of special potential practical interest is the fact that the stimulant he found most valuable, levulinic acid, can be made cheaply from waste materials. Its most important present use is in the making of plastics.

"The most outstanding results with levulinic acid were obtained in the treatment of cotton seed and cowpeas," Prof. Ireland stated. "The results show that there is not only more than a 50% increase in the yields over the untreated but that dusting with soyflour and 1% levulinic acid during the flowering period aids in the setting of bolls."

An acre of cotton thus treated would yield 838 pounds, worth about \$134, as compared with a yield from an acre of untreated crop of only 581 pounds, worth \$93. Cost of materials for treating one acre with levulinic acid is about \$3, so that the method appears to be commercially profitable.

*Science News Letter, January 17, 1942*

## CHEMISTRY

# New Chemical Element Makes Brief Appearance

Form of Element 61, Not Found in Nature and Never Before Produced Artificially, Made With Cyclotron

**A** FORM of element 61, believed to be the only element of the 92 in the chemist's periodic table not found in Nature and never before produced artificially, made a brief appearance as a result of bombardment of other elements with atomic fragments whirled at them by the University of California's cyclotron.

The new substance stayed just long enough to show by its radioactivity that it existed and then disappeared completely by disintegration.

The experiments were made by Dr. Emilio Segre, research associate in the Radiation Laboratory, and Dr. Chien Shiung-Wu, research fellow. The rare earths bombarded were sent to Dr. Segre a year ago by an Italian chemist, Dr. Luigi Rolla.

Element 61 belongs to the group of rare earths, of which there are 15. The atomic number 61 means that the nucleus or central core of its atom has a positive charge 61 times that on the nucleus of a hydrogen atom, and this is neutralized by 61 negative electrons revolving about it like planets around a central sun. Each chemical element has various forms, known as isotopes, and one of these of element 61 is believed to have been discovered.

From its position in the periodic table, scientists know that the atomic weight of element 61 should be about 148, and can predict fairly accurately its principal chemical and physical properties. But

unless and until a fairly stable form is found, one that will at least stick around long enough to be measured, these predictions cannot be verified.

In 1926, Prof. B. Smith Hopkins of the University of Illinois believed he had captured a stable form of element 61 which he recognized by its X-ray spectrum. It was named illinium. In 1933 the French scientist Maurice Curie believed he had isolated an isotope of illinium and noted its radioactivity.

Three other elements, numbers 43, 85 and 87, are considered in the same doubtful class.

Alabamine, element 85, and virginium, element 87, were claimed by Prof. Fred Allison of the Alabama Polytechnic Institute. Because of their position among the radioactive elements in the periodic table (radium is element 88), these elements are probably radioactive with short life periods and may have consequently disappeared from the earth. It may be the only way to find them would be to create them artificially by atomic bombardment of neighboring elements.

The case for masurium, element 43, is somewhat stronger. Its discovery was reported almost simultaneously by two groups of scientists, one in England, the other in Germany. Also its position in the periodic table is among the stable elements. It should be a metal resembling manganese.

*Science News Letter, January 17, 1942*

## NUTRITION

# Pellagra-Preventing Vitamin Is Given a New Name

**T**HE VITAMINS which prevent and cure pellagra, nicotinic acid and nicotinic acid amide, should be rechristened with the names, "Niacin" and "Niacin Amide," the food and nutrition board of the National Research Council recommends.

The committee which made the recommendation was composed of Dr. C. A. Elvehjem, University of Wisconsin scientist who discovered that nicotinic acid cures black tongue in dogs; Dr. Tom D. Spies, of the University of Cincinnati and Hillman Hospital, Birming-

ham, Ala., who was one of the first to extend this discovery to the cure of pellagra in humans; and the U. S. Public Health Service expert in nutrition, Dr. W. H. Sebrell.

Reason for changing the names of the two substances used to cure and prevent pellagra is that many people have been needlessly alarmed because nicotinic acid is being put into enriched bread and flour.

This chemical, in spite of its name, is not made from tobacco and is quite different from the poisonous alkaloid, nicotine.

People, unacquainted with chemistry but well aware of the deadly character of nicotine and of nitric acid taken separately, have not been able to understand how the combination of two poisons could produce a substance necessary to life and hence have opposed its use in food.

It is hoped that the word "Niacin" may be widely adopted and may allay popular misgivings as to the nature and effect of the anti-pellagra vitamin.

*Science News Letter, January 17, 1942*

## PHYSIOLOGY

# Vitamin Lack Prevents Liver's Action on Hormone

**N**EW KNOWLEDGE of the importance of the B vitamins to health, this time in connection with liver function and sex hormones, appears in a report by Dr. Morton S. Biskind, of Beth Israel Hospital, New York, and Dr. Gerson S. Biskind, of Mount Zion Hospital and the University of California Medical School, San Francisco. (*Science*, Nov. 14).

When the diet is deficient in the vitamin B complex, these scientists found, the liver cannot inactivate sex hormones as it normally does. The findings were made on castrate female rats given the sex hormone estrone by implantation into the spleen of pellets of hormone crystals. The scientists believe the findings will have practical application for human patients, but state that it is too early to draw any conclusions on this.

The vitamin B complex has previously been found to aid the liver in detoxification of a cancer-causing chemical used in laboratory experiments. Now, it appears, this vitamin group has a similar effect on a chemical produced by the body.

Which of the many members of the B complex is responsible for the effect on liver inactivation of sex hormones has not yet been determined.

*Science News Letter, January 17, 1942*

PUBLIC HEALTH

# Test Ultraviolet Rays As Weapon Against Epidemics

## Tiny Germs, Invisible Under Microscope, Which Cause Influenza and Infantile Paralysis May Be Killed

TESTS of ultraviolet rays as a weapon against epidemics of influenza or other virus-caused diseases that may follow the war are now under way at the Westinghouse Lamp Laboratories. Dr. Harvey C. Rentschler, director, announced.

In his laboratory stand row after row of test tubes, cloudy from the pus germs growing inside them. These germs are the staphylococci that cause boils and other skin infections. When Dr. Rentschler pours a few drops of a staphylococcus bacteriophage into the tubes, the cloudiness disappears, because the bacteriophage has destroyed the staphylococci.

The staphylococci and the bacteriophage have no direct connection with influenza or colds. But they are part of the elaborate set-up devised by Dr. Rentschler to test the power of the ultraviolet rays to kill germs that cause influenza, colds, infantile paralysis and the like.

These germs are viruses. Unlike the staphylococci of boils and other bacteria, the bacteriophage and other viruses cannot be seen even under very powerful microscopes. Shadow pictures of them have been taken with the electron microscope, but except for these, the viruses have remained completely invisible. Yet they take a staggering toll of life in man, plants and animals.

How to tell whether you have killed or paralyzed something you cannot see is part of the problem Dr. Rentschler set out to solve in order to test the possibility of using ultraviolet light to stop epidemics caused by these invisible agents of disease.

He believes he can solve it with the staphylococci and the bacteriophage that lives on them. Bacteriophage is a virus, although it does not attack humans. If it can be destroyed by ultraviolet rays, perhaps the rays can kill other viruses that do attack man.

You can actually see whether or not bacteriophage has been destroyed. If, after it has been irradiated with ultraviolet, it fails to clear up the cloudy tube

of growing staphylococci, it seems logical to conclude that it has either been killed by the rays or at least has lost its ability to destroy the staphylococci.

Experimentally it isn't just as simple as that. Dr. Rentschler points out that chance plays a large part in such a test, for he has no idea of the number of bacteriophage particles that go into a given bacteria-infested tube. Individual drops of solution may contain one active particle, or a million. They cannot be counted in an electron microscope because the electron beam probably would destroy their potency as quickly and surely as ultraviolet rays. So the only scientifically accurate approach is to make thousands of tests until observed results can no longer be attributed to chance. It takes 96 hours to grow and then destroy a single staphylococcus culture; consequently Dr. Rentschler and his staff anticipate years of hard, painstaking labor before they can hope for conclusive evidence of the value of ultraviolet as a weapon against viruses.

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PUBLIC HEALTH

## Shoe Sterilizer for Army To Prevent Athlete's Foot

CONSTRUCTION of the first "shoe sterilizer" on Sheppard Field, the army's newest and largest air corps technical school, was ordered recently by Capt. Morton Hack, commanding officer of the 408th School Squadron, Air Corps Replacement Training Center.

The unique instrument designed by Capt. Hack is intended to sterilize 45 pairs of shoes at one time, and it is the hope of this officer to prevent and eliminate any cases of ringworm among members of his squadron.

The wooden cabinet, now being built by Private First Class Bill Jenkins, carpenter of the squadron, will be airtight and built on wheels. When finished it will be 5 feet tall, 2 to 3 feet wide and 2 to 3 feet deep. It will have partitions in the interior built to contain 45 pairs



WAR IN TEST TUBE

The long process of isolating cultures of virus is shown here being checked by Dr. H. C. Rentschler, director of research for the Westinghouse Lamp Division. The invisible viruses are allowed to invade test tubes clouded with *Staphylococcus* bacteria. When the liquid in the tubes is clear, the bacteria are all exterminated and only the invaders remain. The virus is then used to test the killing powers of ultraviolet rays.

of shoes at one time with the contained air circulating freely throughout the interior. On the bottom of the container will be a metal dish for chemicals. The shoes will remain in the sterilizer with chemical vapor overnight.

"By combining once-a-month inspection of the feet of the entire personnel, treatment of the feet found to be infected and a periodic treatment of the shoes and stockings of the soldiers in the shoe sterilizer, a complete elimination of ringworm can be attained," according to Capt. Hack, who in civilian life was a chiropodist on the staff of two Detroit, Mich., hospitals as well as president of the Michigan Chiropody Association.

Science News Letter, January 17, 1942

## ● RADIO

Saturday, January 24, 1:30 p.m., EST

On "Adventures in Science," with Watson Davis, director of Science Service, over Columbia Broadcasting System.

Captain Lynn Farnol, Air Corps, Mitchell Field, New York, will discuss the military aspects of air raids and protection from air raids.

Listen in each Saturday.

Tuesday, January 27, 10:15 p.m., EST

Science Clubs of America programs over WRUL, Boston, on 6.04 and 11.73 megacycles.

One in a series of regular periods over this short wave station to serve science clubs, particularly in high schools, throughout the Americas. Have your science group listen in at this time.

## GENERAL SCIENCE

## British Scientists Discuss Speeding War Uses

**B**RITISH scientists met Saturday and Sunday, January 10-11, in London to discuss how science can be put to larger use in the war effort. The conference was under the auspices of the British Association of Scientific Workers.

Sessions were held on food and agriculture, building, housing and air raid precautions, training of technical personnel, science in the military services and industrial production.

American scientists sent greetings and suggestions to the conference, Dr. Harry Grundfest, national secretary of the American Association of Scientific Workers, announced.

In inviting American participation, the British organization sent greetings to American colleagues, stating that "American, Soviet and British scientists have the responsibility of preserving the scientific heritage of the world against the barbarism and obscurantism of Fascist ideology."

*Science News Letter, January 17, 1942*

## POPULATION

## Cupid and Stork Working Overtime During War Boom

**T**HAT little man with the bow and arrow is working overtime like everybody else.

A survey of 30 large American cities housing about one-fourth of our population showed an increase of 8.8% in marriage licenses issued from the first of 1941 through November, compared to the same period in 1940. The survey was made by Metropolitan Life Insurance Company statisticians.

Baltimore, where big shipyards, steel mills and aviation factories boom, gained almost 40% in marriage licenses issued this year over last year.

In Washington, where the principal industry is the federal government, the increase was about one-third. Marriage gains in the six largest cities surveyed were not as high as those just cited. In New York the gain was only 2½%; Philadelphia, 3½%; Chicago, 6%; Detroit, 5½%; Los Angeles, 10%; Cleveland, 2¼%.

Cities showing the greatest increase in marriage licenses were those most affected by the war boom. The largest cities, with a larger total economy, were least affected by the war boom.

The survey predicted 1942 will be even a bigger year for cupid, with the

war industries speeding up and the military age limit already extended.

Meanwhile, Joe Stork got a lot more orders. On the basis of the first four months of last year the U. S. Bureau of the Census predicted that the year's final birth rate would be 18.5 per thousand population as compared to 17.9 for 1940. Later reports indicate the birth rate will reach 18.8 per 1,000. If so, it will be the highest birth rate since 1930.

*Science News Letter, January 17, 1942*

## COMMUNICATION

## Navy Issues Radio-Less Signals for Aircraft

**S**HIPS and planes in the Netherlands East Indies area that cannot use radio lest they disclose their position, were issued substitute means of communication in the *Hydrographic Bulletin*, published by the Navy.

Airplanes wishing to attract a vessel's attention are to circle at low altitude. In urgent cases, the plane may drop green fire balls or green flashes. If the airplane does not itself need assistance, but wants the assistance for another plane or ship it departs in the direction of the vessel in distress after giving these signals.

To indicate the signals have been received, the ship must repeat the letter "T" in Morse code a number of times, or hoist the answering pennant by day.

*Science News Letter, January 17, 1942*

## PHYSICS

## Doughnut Lens for Heater Which Captures Sun's Rays

**A** GLASS doughnut that will capture the sun's rays to heat your house or give you power is the invention of John David McCain of Phoenix, Ariz., Patent 2,259,902.

The glass ring is not exactly like a doughnut, for if you cut it in two, the section is not round but shaped like that of a biconvex lens cut in two. It is in fact a lens, a continuous lens that entirely surrounds the object to be heated which is placed at its center. The ring is tilted so as to be always between the sun and the object.

Some former solar engines required machinery like that used by a telescope to keep them always directed toward the sun.

The height of the arc which the sun describes in the sky varies, of course, with the seasons. But the inclination of the ring lens can easily be adjusted accordingly.

*Science News Letter, January 17, 1942*

# IN SCIENCE

## AGRICULTURE

## Coffee Perfume Is Urged By Agriculture Report

**I**F MRS. Newlywed flunks the morning coffee test, she may try to win hubby over in the evening with the suave fragrance of perfume made from coffee flowers.

That's the essence of a Department of Agriculture bulletin which laments that this country can no longer get natural fragrance oils from Southern France. Some bright lad with a keen nose down in the Department's Puerto Rico station, however, got a whiff of coffee flowers—possibly in line of duty, possibly during leisure hours.

Anyway, the Department's thoroughly scientific report unbends sufficiently to concede that the coffee flower has a "delightful, suave fragrance, with a faint jasmin note." There is also a hint of mimosa, and even "a faint, scarcely recognizable coffee aroma."

Coffee flowers, continues the report, can be used for perfume without interfering with the more brisk business of the coffee bean. They bloom virtually the year round and so are plentiful.

*Science News Letter, January 17, 1942*

## OCEANOGRAPHY

## U. S. Navy Warns of "Obstructions" in Cuba

**T**HAT the waters around Cuba as well as important U. S. waterways have been made unsafe for any enemy vessels attempting to enter them was revealed indirectly in warnings to U. S. ships issued by the U. S. Navy.

Special warning, No. 143, contained in the *Hydrographic Bulletin*, announces that "obstructions have been placed in the entrance to Guantanamo Bay, Cuba, and the entrance to the bay is restricted to daylight hours only for all vessels except Naval craft."

The Navy warns that shipping must be escorted by escort vessels maintaining a 24-hour watch.

The bulletin states that "obstructions have been placed in the harbor of St. Thomas, Virgin Islands. Vessels should approach the harbor with caution."

*Science News Letter, January 17, 1942*



# E FIELDS

## CHEMISTRY

## Urges Appropriation For Synthetic Rubber

**S**TOCKPILES of rubber and other strategic materials should be maintained after the war as well as during the war and the United States Government should immediately appropriate \$100,000,000 for the development of synthetic rubber, Dr. Harry N. Holmes, head of the department of chemistry of Oberlin College, declared to the American Chemical Society on assuming office as president.

Many contend, he continued, that we are promised free access to raw materials all over the world when peace comes. But treaties have been broken before and we must not again be caught napping.

And what if some unprincipled nation having a monopoly of some essential material should suddenly treble or quadruple the price, as Japan did with her camphor monopoly, he asked. That monopoly was broken by the German discovery of synthetic camphor—a splendid example of the strategic value of having such processes in reserve.

*Science News Letter, January 17, 1942*

## BOTANY

## Rubber Trees Replanted At First Home of Species

**H**ENRY FORD'S new rubber plantation at Belterra, Brazil, is within a few miles of the spot where in 1876 Henry A. Wickham obtained 70,000 seeds of the Hevea tree and smuggled them out of the country to England. These seeds became the ancestors of nearly all the rubber trees of the East Indies, from which the United States obtains 93% of its rubber supplies.

Although the 3,651,500 rubber trees planted at Belterra (the name means beautiful land) are still quite young, they are already in production on a limited scale. About 750 tons of concentrated latex will be shipped to Dearborn in 1942. By 1950 the estimated production is 7,500 tons, and the eventual goal is 38,000 tons annually.

While this is only a fraction of the

600,000 tons this nation normally consumes in a year, Ford and the Department of Agriculture experts believe that in time rubber production in the Western Hemisphere can be brought to the point where we shall never again be faced with the problem of bringing our rubber half way around a hostile world.

There is also the Mexican guayule shrub, which grows well in Southwestern United States and is already under cultivation there.

As a quick source of natural rubber, this plant is unrivalled. Rubber can be obtained after one year's growth, although it is better after four years. Without a de-resinating process, the rubber is not the equal of that from the Hevea trees and is more costly. But as a stop-gap until the new Hevea trees get going, it may be a life saver.

*Science News Letter, January 17, 1942*

## PUBLIC HEALTH

## Keep Busy, Don't Brood Over War Disasters

**P**ROTECT yourself from war's threat to your nerves and sanity by keeping busy at some useful job.

If your home is destroyed or some other worse tragedy befalls you, don't sit alone brooding over it but, as quickly as possible, get back to regular activities among other people.

War has just struck us here in America but it is none too early to start applying what England has learned about prevention of nervous and mental breakdown under the strain of war.

Disorganization of daily life after a bombing or other disaster is a worse foe to mental health and sanity than fright. This is one of the lessons American psychiatrists learned only last month from Dr. Robert Dick Gillespie, psychiatrist to the Royal Air Force, who was granted special leave of absence to lecture to American Army, Navy and medical authorities.

British authorities, he said, are now aware that the re-establishment of homes after bombings is as important as hospital treatment for maintaining good mental health.

Those who did suffer nervous and mental disorder after bombings did not develop any symptoms for the first two or three weeks.

"It was only after the individuals concerned had finished rearranging themselves and their affairs," he stated, "and had time to sit down and consider the situation that the symptoms appeared."

*Science News Letter, January 17, 1942*

## DENTISTRY

## Ally of Sulfa Drug Kills Pain After Tooth Pulling

**T**HAT long, dull ache remaining in your jaw after a tooth has been pulled can be mercifully reduced by a drug with a long name, para-nitrobenzoic acid, which is allied to the sulfa drugs.

The drug also is the most deadly of all its relatives against the germ found most frequently in infected tooth sockets—streptococcus viridans. So report three dentists of the division of oral surgery, University of Minnesota Dental School, Drs. C. A. Griffith, A. D. Hirschfelder, and W. J. Simon (*Journal, American Dental Association, January*).

In routine extractions (not impacted teeth), the dentists found that with use of the para-nitrobenzoic acid, pain occurred in only three, or .6% of 528 cases. Of 7,060 cases not given the acid, 353 or 5% had pain following the extraction.

While the acid treatment did not reduce pain following surgical extraction of impacted teeth, it did reduce the number of treatments needed after extraction.

*Science News Letter, January 17, 1942*

## ENGINEERING

## New Mercury Vapor Lamp Most Powerful In the World

**A** NEW 3,000-watt mercury vapor lamp, the largest of its type in the world, has been announced both by General Electric and Westinghouse.

General Electric believes that the new lamp will be a boon for the lighting of steel mills, foundries and other shops where large areas require a lofty mounting of the lights.

Westinghouse plans to use the lamp if possible for a new lighting of the torch of the Statue of Liberty.

The 3,000-watt mercury lamp is a tubular light source 55 inches in length and a trifle over an inch in diameter. It is rated at 120,000 lumens, which is eight times more powerful than its nearest rival, a 400-watt mercury lamp, although it is only four times its length. The latter, previous world champion in its class, is today the chief source of illumination in many factories.

The new lamp gives twice as much light per watt as an incandescent lamp. The cost of using a single large unit, the companies point out, is considerably less than that of several smaller ones.

*Science News Letter, January 17, 1942*

CHEMISTRY

# Munitions from the Sea

## Magnesium, Fiery Lightweight Champion of Metals, Is Mined From the Ocean To Make Bombs and Bombers

By PERRY GITHENS

See Front Cover

**M**AGNESIUM, the Cinderella metal, has leaped from obscurity into fame, from relative insignificance into commanding war-time importance.

In 1918, we produced a paltry 284,000 lbs. In 1941, we made 54,000,000 lbs. This year, 125,000,000 lbs. will be produced. Eventually, plants now built, or building, are expected to produce 400,000,000 lbs. annually. Cinderella, indeed: no other metal has ever reached such heights so quickly! And this Cinderella is part mermaid; a large proportion of our magnesium is drawn from the sea.

Once a laboratory curiosity costing \$5 a pound, magnesium owes its new importance in warfare to its hot temper and its lightness of spirit. As powder, chips or shavings, it ignites almost as easily as gasoline, and burns with an eye-splitting blue-white flame that water cannot quench. In solid form—as bars, or sheets, or castings of magnesium alloy (which can't be ignited with a blow-torch), it's the world's lightest metal to make things with.

In all-out war, this means millions of pounds for "military pyrotechnics"—star shells, signal flares, incendiary bombs, flash bombs for night pictures of enemy positions. For the tracer bullets in every fifth cartridge of machine gun belts, for naval and artillery and anti-aircraft tracer shells.

### 180 Pounds Do Work of 270

It means still more millions of pounds for airplanes. The 180 pounds of magnesium alloy that go into a typical airplane engine do the work of 270 pounds of aluminum alloy, ex-lightweight champion of metals, thus saving 90 pounds weight. In a four-motor bomber, the saving is 360 pounds, equivalent to the weight of two men in the crew; or 360 pounds of extra bomb load; or an extra barrel of gasoline to fly the plane farther and still get home.

It's too scarce yet to use anywhere but in motors. When we get full production from new plants, plane makers

are anxious to use it for landing gear, pedals, fuselage and even wing coverings—almost everywhere aluminum or aluminum alloy is now used.

The Germans are way ahead of us in this. We used to buy from them what little we needed (mostly for photographic purposes) before 1914. After World War I, they had plenty of it, a by-product of their big potash industry. But they were short of copper and other metals which had to be imported. So they had strong incentive to see what could be done with magnesium.

Some of our observers knew they had achieved some success, but not until the British shot down a couple of Messerschmitts was the full extent of their development appreciated.

### Plenty, But Never Pure

Then we got extremely busy. We wanted great quantities of magnesium as quickly as possible. There is plenty of it—it is the third most common element in the earth's crust, but it is never found pure. It is too unstable to live alone. Singly, it is weak—physically and, so to speak, morally—welcoming the

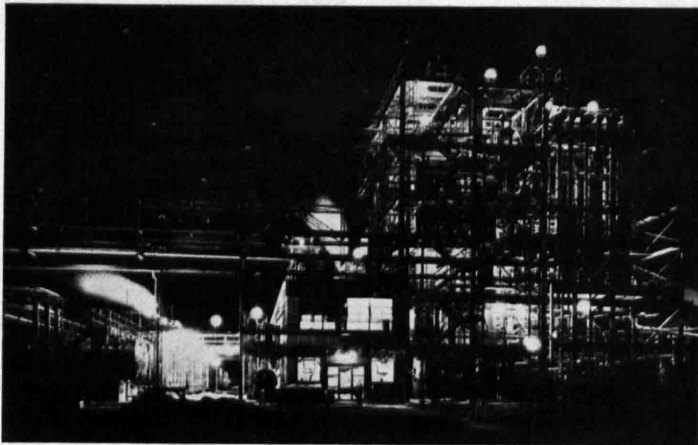
advances of any aggressive element and eagerly combining with it. Which easy virtue is just what makes it valuable for star shells—the mating of magnesium and oxygen is something to see!

So pure magnesium has to be divorced, with difficulty, from its affinities. There was only one domestic producer, the Dow Chemical Company. For years, it had been extracting such vital chemicals as bromine, chlorine, and calcium and sodium salts from its brine wells in Michigan. When World War I cut off our imports of magnesium, Dow undertook to supply our Army's needs, and in 1915 produced the first ingot from the same salt wells.

### Used in Household

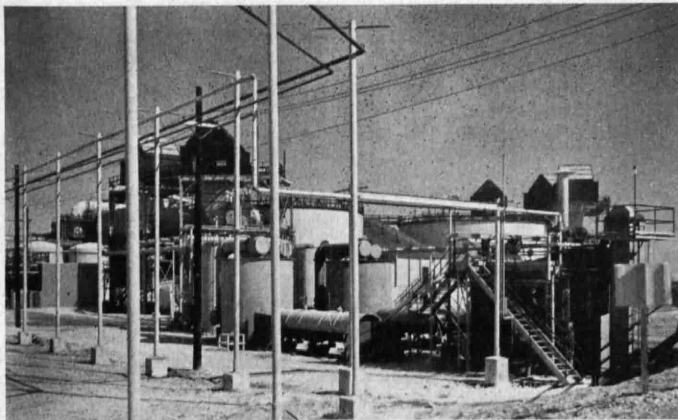
The military fireworks over, Dow patiently experimented, pioneered and evangelized for the use of magnesium as an industrial raw material. It had some small success—the nozzle of your vacuum cleaner is probably made of magnesium alloy, though you've supposed it was aluminum. So is the pressure cooker in your kitchen—surely you noticed how light it is for all its bulk. And so are parts of your typewriter. But until this war started, the company could make much more than it could sell.

To meet the new demand, Dow kicked



NIGHT

*Magnesium production at the Freeport plant of the Dow Chemical Company never stops, day or night.*



## DAY

*Bromine for gasoline of high anti-knock performance is extracted from the seawater along with the magnesium, at the \$25,000,000 plant on the Gulf Coast. Enormous quantities of water have to be evaporated off before the magnesium chloride can be melted and electrolyzed for its pure metallic content. On the cover of this week's Science News Letter is the plant's evaporator, pouring out steam like an artificial volcano.*

up its Michigan production from 7,000,000 pounds in 1939 to 18,000,000 pounds a year—about all the old wells could stand. As lease-lend needs increased, Dow began prospecting the possibilities of the greatest, the most accessible, the inexhaustible deposit—the sea.

Scientists have calculated that there are about 5,700,000 tons of magnesium in every cubic mile of sea water. If such figures make the head swim, think of a bathtub full of sea water. Kick it around chemically, squeeze it electrically, and you'd get about a quarter of a pound of metallic magnesium.

Ocean-mining was nothing new to Dow. Years ago, it started mining bromine (for ethyl gasoline) out of the sea. But mining magnesium meant more than running a pipe down a beach. Cheap fuel, plentiful power, and lots of lime were needed. Also the claim had to be staked where the used ocean water wouldn't dilute the intake.

### Engineer's Dream

Dow found a site at Freeport, Texas, after a careful survey. The Freeport plant is an engineer's dream. Sea water—300,000,000 gallons a day—is pumped in from one side of a long neck of land; the waste water emerges at the other side, seven miles away. Oyster shells dredged nearby supply lime. There's plenty of salt. There's abundant electric power, and natural gas in that region

sells for an extremely low rate.

The process sounds simple: the shells are burned to make slaked lime; the ocean water, mixed with this lime, forms the magnesium hydrate—better known in the medicine chest as milk of magnesia. Treated with hydrochloric acid (produced from the salt) the milk of magnesia is changed into magnesium chloride, which is dried and melted in a gas-fired furnace. An electric current divorces the chlorine (which is piped off as a gas for its own uses) from the magnesium. The metal is drawn off in molten state and cast into ingots.

### 800 Tons of Water to Ton

Very simple: but 800 tons of sea water must be processed to make a single ton of metallic magnesium. And many Dow men spent many years to learn how. For this achievement, the Dow Company received the 1941 Chemical and Metallurgical Engineering award.

The Freeport plant was blueprinted to produce 18,000,000 pounds a year. Before construction began, the Dow Company was asked by the government to double its capacity. Before it was completed, it was ordered to double again. The plant produced its first magnesium—the first bar of solid metal ever made from sea water—January 21, 1941. From the sea and from its Michigan brine wells alone the Dow Company this year will extract fourteen times as

much magnesium as this country used in 1940.

That isn't going to be as much as we want. To get more, the government has financed the construction of several plants which are to mine magnesium from various rich deposits of ores. When they get going—they are having difficulties so far—their output is expected to exceed Dow's.

While this urgent drive for production was going on, our aviation industry had to learn how to use the stuff. We knew the laboratory facts. We knew this flighty metal settled down when wedded to certain other metals. An alloy of aluminum and magnesium, for example, is stronger and tougher than either apart. A little manganese and zinc make it very moral, improving its resistance to corrosion. Typical alloy includes 5% aluminum, 3% zinc, .15% manganese.

### Handled Like Steel

When thus alloyed, magnesium can be handled like steel. It can be rolled into sheets, plates, strips and ribbons; cast and die-cast; extruded as bars, rods or tubing; it can be forged. Its the easiest of all metals to machine—a sharp tool cuts it like a hot knife in butter. And it weighs less than one-fourth as much as steel; a cubic foot tips the scales at a mere 112 pounds as against 175 pounds for aluminum, 493 pounds for steel.

What we did not know was that the hundred and one practical points about handling it could only be learned by experience. We had to begin at the beginning, had to find out, by costly practice, that molten magnesium starts to burn when exposed to air and that the chips and dust from the machines shaping it are worse than gunpowder waiting for the spark.

In spite of this, magnesium alloys when in solid, not powdered form, have an ignition point much higher than any

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temperature reached in an airplane motor.

An outstanding example of American ability to profit by experience with magnesium is provided by the Wright Aeronautical Corporation, makers of engines for bombers, clippers, transport planes and tanks. In Fairlawn, New Jersey, it operates its own magnesium foundry, the largest in the world. (An Aluminum Company foundry, now pouring for Pratt and Whitney, may challenge the title.)

### 159 Engine Parts

Here, and in nearby Paterson, Wright makes 150 different parts for its engines out of magnesium alloy. Castings for the front and rear of the engines as big as a spare tire, supercharger covers, intake manifolds, oil pumps and ventilators, and many small parts.

Ingots of metal and sand for the moulds go in one end of the foundry, finished castings come out the other, in orderly progression, from the sculptors in sand who make the moulds, past the men who tend and pour the pots of molten alloy, to the "knockout men" who slam away the sand and excess metal with sledges.

It looks easy, about as risky as a bakery. But it took much ruined work and many bad burns to develop the technique that seems so simple. To melt magnesium for casting without its catching fire, air must be kept away from its seething surface. So a powder of sulfur and boric acid, called a "flux," is sprinkled over the molten metal.

Wherever there's molten magnesium, starting at Freeport, with the pouring crews, there's a man with a flour-shaker to sprinkle the flame-quenching flux. It goes into the sand, too, so that the moulds may welcome this excitable metal without sputtering.

In the machine shops, tools are kept extra sharp. Every scrap tooled off is sucked away by a current of air, before

a stray spark can turn the place into one big flame.

Prevention is the best cure for trouble with magnesium, but in the event of a dull tool setting up enough friction to ignite the chips, pails of talc are kept handy. Sand would choke the flames but ruin the machine tools; any liquid would scatter the feather-light particles—so all extinguishers are labeled "Not for use on Magnesium." Water is permissible only as a cooling, smothering spray—a point to remember with incendiary bombs.

At long last, magnesium has won recognition as a metal to make things with. And production, which used to exceed demand, is catching up fast. Cinderella has arrived!

And after the ball? Well, the new production capacity means sweeping changes in our everyday life after the war. Plentiful, low-priced magnesium (it's 22½ cents a pound now, should go lower) will expand its use.

It will become a household metal. It will make a baby carriage light enough to be carried up the front steps—baby and all. When the Cinderella metal goes back to the kitchen, it will be in pots and pans, low-priced, thick and strong, but light enough for a woman's wrist. Perhaps it will go into pianos one man can lift; into furniture, big and comfortable, a girl can move with ease. Into lawnmowers, shovels, farm tools, bicycles, roller skates, household appliances.

But it's greatest use is likely to be in transportation. It will mean cheaper planes—cheaper in first cost, cheaper to fly. It has already been used successfully in truck and bus bodies. It will be used in streamlined trains and in automobiles. Wherever lightness and strength are needed, magnesium—the metal that's almost as light as wood and quite as strong as iron—will play a new part in the machinery of our living.

*Science News Letter, January 17, 1942*

### ANTHROPOLOGY

## Last Invasion From Asia Occurred 2,000 Years Ago

AMERICA'S first winter sportsmen crossed from Asia to Alaska some 2,000 years ago, bringing with them the bow and arrow, snowshoe and toboggan.

They constituted the last great aboriginal invasion of North America, preceding the Christian era by only a short time. This is the theory of Dr. Diamond Jenness of the National Museum of Canada, described in the latest annual report of the Smithsonian Institution.

These latest invaders, called Athapascans, chased the Eskimos from the Mackenzie River basin to the northeastern coast of Canada, eventually Greenland. From these Eskimos descended the Algonquin Indians, who greeted the first English settlers on the Atlantic seaboard.

Only about a thousand years ago, the Athapaskan descendants reached the southwestern part of this continent, and from them descended the Navaho Indians of today.

Dr. Jenness reconstructed this picture from archaeological remains and from linguistic evidence.

*Science News Letter, January 17, 1942*

### INVENTION

## Ventilated Rain Coat Keeps You Warm and Dry

A SNUG rain coat that will keep out driving sleet without steaming you within has been designed by Alfred A. Glidden, Watertown, Mass., Patent 2,259,560.

The garment, which might almost be called air conditioned, has a lining of perforated material, to the outside of which are attached horizontal strips of rubber or any waterproof material. The strips are attached by their upper edges only, and hang overlapping like shingles. Thus they shed the water, yet allow some passage of air in and out.

*Science News Letter, January 17, 1942*

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### Forgotten Lesson

**S**OIL conservationists are increasingly concerned over the tendency of farmers, especially in the West, to plow up lands now protected against erosion and plant wheat and other loose-soil crops. They see in this ignoring of the hard lesson of the mid-thirties a renewal and deepening of the dangers to which this country was exposed during those troubled times.

Reports to the state agricultural experiment stations and to the U. S. Department of Agriculture in Washington indicates that in addition to lands that have been re-established under sod since the days of drought, considerable acreage of the remaining virgin prairies has also been plowed up and seeded to winter wheat. More will probably follow, to be seeded to other crops next spring.

Three factors have conspired in restarting this perilous practice.

First, and probably most compelling, is the rise in farm prices. For the first time in 20 years, farmers are getting what they consider just prices for their produce—figures near or even a little above “parity.” This is stimulated more by the improvement in the domestic market than by overseas demand. The war has caused a further decline in our already diminished export trade—quite the opposite of what happened during the first World War. But prices have gone up anyway, and the temptation is strong to “cash in.”

The second cause is a reflex of the first. Prices of manufactured products which the farmer needs have advanced steeply, and sharp rises in taxes are immediately in prospect. Farmers simply must have more cash to meet them.

Finally, the terrible drought that scourged all the Midwest and West during the middle of the last decade is definitely ended. During the past summer

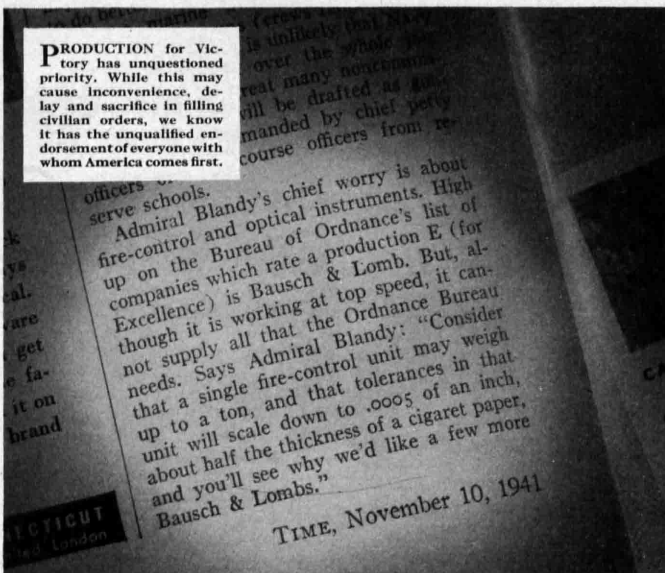
the Great Plains area has had such an excess of rain that there was reason to complain of flooding, and of fields too muddy to work, rather than parched crops and dust storms. The Western farmer has always been an optimist, even a gambler. He could hardly be anything else, to farm in that marginal region. So he is eagerly plowing up lands now grass-held, and not looking for troubles beyond the horizon.

Nevertheless, tomorrow and next year and next decade are certainly coming. Prices will drop (though taxes won't),

and it is highly probable that the drought cycle will return. Are we to witness a repetition of topsoil whirled to the black skies, and a melancholy trek of dispossessed farmers, drifting, like their soil, no one knows whither? Unless men in those dangerous lands hold back their hand from the plow today, that is the prospect their children must face.

*Science News Letter, January 17, 1942*

Early Greek and Roman women used *barley-meal* for face powder.



## Why Bausch & Lomb?

**T**HE ability of Bausch & Lomb to produce the highly specialized optical instruments needed by the armed forces of the United States was not born of the present emergency. It has been acquired over eighty-nine years of research and unbroken experience.

Today the abilities and facilities and accumulated experience of Bausch & Lomb are being directed in their entirety to filling the needs of Production for Victory. Needed immediately are the instruments of which Admiral Blandy speaks—the rangefinders, binoculars, aerial height finders, and photographic lenses.

Vital as these are, there are others

equally essential which Admiral Blandy did not mention. Among these are the spectrographic and metallographic equipments used in the analysis and quality control of cartridge cases and armor plate, the contour projectors and the tool-makers microscopes for the fine measurements upon which mass production of tanks and airplanes depends. To help maintain health and efficiency, military and civilian, there are microscopes, diagnostic instruments and spectacles.

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## ASTRONOMY

# Expanding Finite Universe "Improbably Young and Dense"

## 200-Inch Telescope May Provide Data To Help Decide Which of Conflicting Views of Universe Is Correct

TWO opposite ways of looking at the starry universe, each nearly self-consistent but each having difficulties in the way of full acceptance, await the completion of the great 200-inch reflecting telescope on Mount Palomar to resolve the difficulties and bring about a decision, Dr. Edwin P. Hubble of Mount Wilson Observatory made evident in the annual address sponsored by the Society of Sigma Xi, before the midwinter meeting of the American Association for the Advancement of Science.

Central in the problem is the phenomenon known as the red shift. This means that light from distant stars or galaxies shifts toward the red end of the spectrum when viewed through a spectroscope, the shift increasing with the distance of the star. This red shift has been so generally interpreted to mean that all galaxies are receding from the earth, that the idea of an expanding or exploding universe has become a part of the orthodoxy of science.

This interpretation Dr. Hubble disputes. He shows that it leads to an expanding universe that is "improbably young" and disconcertingly small and dense — of which we are already able to see, with existing telescopes, perhaps one-fourth of the total volume. One calculation allows only a thousand million years for the age of the universe—and that is less than the geologically ascertained time since life appeared on the nearly finished and well-cooled earth.

On the other hand, if the red shift is not interpreted as representing a velocity but is attributed to some as yet unknown principle of nature, then the possibility is opened of "a sensibly infinite homogeneous universe of which the observable region is an insignificant fraction," as Dr. Hubble puts it.

"This view has no vital effect upon the theory of expanding universes," he ex-

plains further. "If red shifts do not represent actual motion, we may still assume that our universe is either contracting or expanding at a rate that cannot now be measured by the observer."

Another possibility is that our measurements of the red shift may not be entirely reliable. The operations are extremely delicate, Dr. Hubble states. The shift becomes conspicuous only for the most distant nebulae which lie at the extreme limits of our most powerful telescopes.

"This possibility," said Dr. Hubble, "will persist until the critical investigations can be repeated with improved and more powerful telescopes. Ultimately, the matter should be settled beyond question by the 200-inch reflector destined for Mount Palomar."

*Science News Letter, January 17, 1942*

## ASTRONOMY—AERONAUTICS

# Astronomy Gives Air Force One of Keenest Camera Eyes

ASTRONOMERS have contributed to our war forces one of the keenest camera "eyes" used in aerial observation—the Schmidt camera-telescope invented in Germany before Hitler but developed in this country to its present state of high perfection.

At the sessions of the American Astronomical Society in Cleveland, it was learned that military versions of this astronomical "weapon" are already in mass production.

James G. Baker of Harvard College Observatory explained to the astronomers that the type of Schmidt camera used in war is but one of the variations of this telescope.

Basically, the Schmidt instrument is a spherical mirror before which is placed a thin glass correcting lens. This makes possible with the astronomical instrument photographs of large regions of the sky far superior to those taken with ordinary lens-type cameras.

The greatest contributions to astronomy during the next decade will come through use of Schmidt telescopic cameras, it was predicted by Dr. Harlow Shapley, Harvard College Observatory director, and other speakers at the meeting.

More information on distribution of the stars in our Milky Way or galaxy to a distance of 10,000 light years, more

than three times as far as at present, will be possible through use of large Schmidt telescopes, Dr. Bart J. Bok of Harvard explained. This may show that the great mass of stars in which the sun is located has a spiral structure like the great nebulae seen in the distant sky.

Analysis of star light will be revolutionized by use of the Schmidt cameras fitted with diffraction gratings of larger size than ever made before. Dr. Robert W. Wood of Johns Hopkins University, veteran physicist, told how such necessary gratings for star spectra are being made.

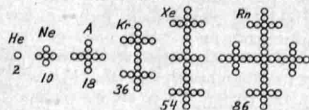
One of the world's largest Schmidt cameras located at the Warner & Swasey Observatory, Cleveland, was demonstrated by Dr. J. J. Nassau, director. Other such telescopes are located on Mt. Palomar, Calif., at Harvard and the latest is for the new National Observatory in Mexico that will be dedicated at Tonanzintla in February.

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Ultraviolet rays help textile makers fight *mildew*.

In Army language, a *hutment* is a standard sleeping tent frame made more house-like by shingle roof, plastic screening and plywood shutters.

### ESSAYS ON THE NEW VORTEX ATOM



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The author maintains that the atoms do not have any nuclei, but only structural centers or centers of symmetry. Free upon request.

C. F. KRAFFT

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## INVENTION

# New Machines And Gadgets

## Novel Things for Better Living

Plucking a hen is a long and tedious hand job. Originally the housewife did it herself; then she left it to the butcher; then the butcher left it to the farmer; now the farmer is tired of it too. So he will be relieved to know that it can now be done by machinery according to an invention recently patented. It is a pretty complicated machine, for the hen is a pretty complicated animal, so it cannot be described in this space.

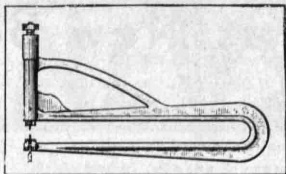
Sportsmen and others will find a rust-proofing liquid that is sprayed on with an atomizer, like that used for gargling the throat, very convenient. To preserve a gun after it has been used out in the wet, the spray is simply shot through the barrel. No swabbing with a ram rod is needed. Other parts of the gun can also be sprayed.

Earthworms are useful for maintaining the fertility of the soil as well as for fish bait. This was perhaps first brought out by Charles Darwin, founder of the theory of evolution, in his book "The Formation of Vegetable Mould by the Action of Worms." Worms burrow many feet into the ground during the day and come to the surface at night, bringing with them materials from below, which otherwise are beyond reach of the plant roots. So useful are these little creatures that you can now buy earthworm eggs and raise a husky brood of your own in case the native denizens of your garden are too few or too feeble to do the work nicely.

The keyhole of your automobile door will not be hard to find when the night is dark or other conditions are unfavorable if you use an illuminated keyhole that has recently been patented. So long as you can find the handle to the door and press a button conveniently on it, you are all right. Of course, if you can't find the automobile. . . .

A radio-equipped walking stick for watchmen is a new device developed by a radio company to aid in the protection of property. The radio device is concealed within the stick. By pushing a button, the watchman sends a special wireless signal which can be arranged to set off alarm sirens or bells, warn other guards or notify the police.

This double glass cutter, which cuts both the top and bottom surfaces of the glass at the same time, is especially adapted for shatter-proof glass. The latter is composed of two sheets of glass cemented to a flexible transparent sheet between them. With the ordinary glass



cutter, the wheel must first be run along one side of the glass, the pane then turned over and the wheel run along the other side. If the second cut is not exactly over the first, an irregular broken edge results. The double cutter assures exact registration of the two cuts. A patent has been awarded for it.

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, D. C., and ask for Gadget Bulletin No. 87.

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## SCIENCE CLUBS OF AMERICA

### NEWS OF CLUBS

**NEW YORK, N. Y.**—The Science Workshop Club formed at the High School of Music and Arts is a combination of seven workshop clubs dealing respectively with poster making, model making in balsa wood, photomicrography, biology experiments, needlework diagrams, making slides for projection, and vitamin studies and rat breeding. This club, sponsored by Dorothy M. Muller, teacher in advanced biology, also is affiliated with The American Institute Science and Engineering Clubs.

**YOUNGSTOWN, Ohio**—"Gnosis" is the unusual name which members of a science club at Ursuline High School, have selected. The word means "an assured knowledge of the sciences" and the members have applied themselves to the task by studying First Aid and engaging actively in the National Defense program. A Science Fair will be held by the members for the Parent Teachers Association in February. The club is sponsored by Sister M. Regina Schneider, head of the science department.

**GARDINER, Mass.**—National recognition and local acclaim has come to members of the Natural Science Club of Gardiner High School for establishing and maintaining a Nature Trail on 47 acres of city land made available to the club by local authorities. With little or no preliminary training the club set out the trail, posted 60 identifying markers, cleared underbrush, planted 450 four-year-old trees, deepened and dammed a small swamp and disposed of brush piles. The club, sponsored by Helen Whittier, biology teacher, has the wholehearted support of Omer H. La-Roche, municipal tree warden.

**PRINCETON, N. J.**—One of the members of the Science and Engineering Club at Princeton High School has almost completed a high-temperature arc furnace with which he and other members will carry on extensive investigations. Such a furnace gives enough heat to melt or volatilize nearly every known metal. The use of the school laboratories and facilities for any phase of investigation in any branch of science or engineering is granted to every member of the club which is sponsored by A. Lewis, head of the chemistry department.

**NEW YORK, N. Y.**—On December 29 and 30 the American Institute Science and Engineering Clubs presented another Annual Science Congress at the American Museum of Natural History. A Science Congress is patterned after the meetings of The American Association for the Advancement of Science except that junior scientists play the leading roles. There were 54 speakers and assistants before an audience of members of Science Clubs of America and The American Institute Science and Engineering Clubs.

Talks and demonstrations were original, unusual and, in many cases, dramatic. Richard Tropus of the Biology Club of Stuyvesant High

School, spoke on "Homing Pigeons," and stressed their use in war. To illustrate his lecture he released a flock of pigeons in the lecture room, opened the windows and let them wing their way to his home on Long Island. Gloria Beddow and Frances Mullen, of the Chem Strand of Girls Commercial High School of Brooklyn, lectured on "Chemicals of 1942," and passed around samples of perfumes they made. Sidney Bludman of the Faraday Chem Club at the High School of Science, Bronx, spoke on the "Preparations of Ethyl Methacrylate" and demonstrated its use for imbedding biological specimens. Seymour Lewis of the Agassiz Club at Lafayette High School, Brooklyn, toyed with a ratensake as he lectured on "Snakes, Unloved Friends of Man." Henry Robert Owen, assisted by Robert Clements of the Engineering Club at Richmond Hill High School, gave a dramatic lecture with home-built apparatus on the subject of "Ultra High Frequency Radiation Measurements"; while Harold Schultz, assisted by Walter Zarse, both of the Biology Club of Benjamin Franklin High School, filled the lecture room with smoke and colored flames during the topic, "Chemical Warfare."

Although this Science Congress is student-conducted, the judges are scientists, educators and social workers. Hairs had to be split to determine the winners. The awards finally went to Irwin Aas teamed with Edwin Sillers for the lecture and demonstration on "Light Transmission Through Modern Plastics." They belong to the Rockville Science Club at Rockville Centre. The award is a trip to the Westinghouse plant and laboratories at East Pittsburgh, Pa.

Second award went to Jack Cook of the A. M. Biology Club of James Madison High School, Brooklyn, for an interesting, and at times exciting, lecture "Experiences With Butterflies and Moths." Jack gets a trip to the laboratories of the Carnegie Institution of Washington, Department of Genetics, Cold Spring Harbor, L. I.

**BETHEL, Maine**—Alfred J. Fortier, head of the science department at Gould Academy, is so enthusiastic about the work of the Camera Club, which he sponsors, that he hopes members will spread their activities into all other fields of science. At present the program includes picture contests, photo exhibits and the making of a pictorial history of school activities.

(Editorial Note: A "Picture of the Month Photo Salon" is a distinctly different activity for photographic clubs. Club members set up an exhibit of the best pictures made by members, or even non-members. Once each month the pictures are changed. How many clubs have undertaken this type of photo exhibit which is sure to remain timely and interesting every month in the year?)

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# •First Glances at New Books

## HISTORY

**A HISTORY OF UKRAINE**—Michael Hrushevsky; O. J. Frederiksen, ed.—*Yale Univ. Press*, 629 p., \$4. The first translation into English of the standard work on Ukrainian history. The author, who died in 1934, made it his life work and eventually compressed a ten-volume history into this one. To bring the account of this European area up to the verge of Nazi invasion, Prof. O. J. Frederiksen of Miami University has added a last chapter, and the final map is as of June 1941.

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## ARCHAEOLOGY—ANTHROPOLOGY

**IRENE MOUND SITE**, Chatham County, Georgia—Joseph Caldwell and Catherine McCann—*University of Georgia Press*, 81 p., 25 pl., \$1.50. Very clearly illustrated and written in this report of intensive excavations at one of the Southeast's ancient centers of Indian life. The archaeologists conclude that this was a political or ceremonial center, for dwellings seem few and ceremonial structures were many. The mound's history is traced through eight stages.

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## HISTORY

**HERNAN CORTES, CONQUEROR OF MEXICO**—Salvador de Madariaga—*Macmillan*, 554 p., \$4. When a scholar and literary critic also has the gift of telling a story, the result is a book to hold attention. Don Salvador de Madariaga has brought to life, not only Cortes, but the Aztec rulers and their Indian subjects. For those who ask reference notes, the author has provided them at the back of the book.

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## BIBLIOGRAPHY

**THE UNIVERSITY OF CHICAGO PRESS CATALOGUE OF BOOKS AND JOURNALS, 1891-1941**—*Univ. of Chicago Press*, 432 p., \$1. An excellent annotated list, by author, subject and title in one alphabetical arrangement, of everything published by the Press since the beginning. Out-of-print material may be obtained in microfilm.

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## METALLURGY

**SURFACE TREATMENT OF METALS**—*American Society for Metals*, 427 p., \$5. This book contains the papers and discussions presented at the Cleveland convention of the American Society for

Metals. Tin plate, diffusion coatings, coloring of stainless steel, surface hardening, shot blasting, corrosion and tarnishing are among the subjects treated.

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## MATHEMATICS

**TABLES OF NATURAL LOGARITHMS**, Vol. I and II—New York. Work Projects Administration—*U. S. National Bureau of Standards*, 501 p., \$2 per vol. These two volumes contain the natural logarithms of the intergers from 1 to 100,000, to sixteen decimals. Extraordinary pains were taken to insure the accuracy of tables. Twenty decimals were used in the computations. The tables are useful not only to engineers but also in the construction of many mathematical tables of other functions which involve natural logarithms.

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## MATHEMATICS

**TABLES OF PROBABILITY FUNCTIONS**, Vol. I—New York. Works Projects Administration—*U. S. National Bureau of Standards*, 302 p., \$2. These tables extend the range of all existing tables and provide a smaller tabular interval. The probability integral and its derivatives are tabulated to fifteen decimal places at intervals of 0.0001 in the range between 0 and 1 and at intervals of 0.001 in the range from 1 to 5.6. Provision has been made to facilitate interpolation, both direct and indirect.

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## METALLURGY

**GLOSSARY OF METALLOGRAPHIC TERMS**—J. Neill Greenwood, comp.—*Chemical Pub. Co.*, 80 p., illus., \$2. This is a valuable compilation for beginners confronted with many new terms and for those who have only occasionally to deal with metallurgical subjects.

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## RADIO

**THE RADIO AMATEUR'S HANDBOOK, 1942** (19th ed.)—*American Radio Relay League*, 446 p., illus., \$1. In this nineteenth edition a radical change has been made. The first ten chapters are now a textbook on the theory of radio, written in a nonmathematical understandable manner and arranged for ready reference. The rest deals in the usual manner with current equipment and operating instructions.

*Science News Letter, January 17, 1942*

## TELEVISION

**AN INTRODUCTION TO TELEVISION**—C. J. Hylander and Robert Harding, Jr.—*Macmillan*, 207 p., illus., \$2. Whoever wishes to gain a quick and easy understanding of television, will find this book an excellent means to that end. He will also be fascinated by the story of its inception, improvements and prospects in the future.

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## CHEMISTRY

**HOW TO SOLVE PROBLEMS IN GENERAL CHEMISTRY**—Joseph A. Babor and Chester B. Kremer—Crowell, 88 p., 75c. Many students, when faced for the first time with a problem in chemistry, either do not know arithmetic or else promptly forget it, the authors state in their preface. Since class time cannot be spared for such instruction, they have tried to make this booklet so clear that no additional instruction from the teacher will be needed. The metric system, significant figures, logarithms and dimensions are stressed as among the principal stumbling blocks to the new student.

*Science News Letter, January 17, 1942*

## PHYSICS

**60 EXPERIMENTS WITH MAGNETS**—Wallace C. Terhell—*Quest, Wellesley, Mass.*, 50c; with 2 Alnico magnets, 1" long, 75c. This little book describes experiments that are both amusing and instructive. Some of them are possible only with the powerful and light Alnico magnets, such as floating a magnet in air. Useful applications are also given. Beauty parlor operators use a magnet to withdraw hairpins, or carry a small magnet on the wrist to hold a supply of them.

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## MEDICINE

**HIPPOCRATIC MEDICINE, Its Spirit and Method**—William Arthur Heidel—*Columbia Univ. Press*, 149 p., \$2. A scholarly and sympathetic account of medicine's golden age when Hippocrates became the first to observe that disease is not a supernatural phenomenon, but the coparallel of health. Herein he laid the scientific basis of modern medicine. But it is notable too, that in this pre-Christian era was determined the moral basis of medicine, memorized by every medical student today as the Hippocratic oath.

*Science News Letter, January 17, 1942*