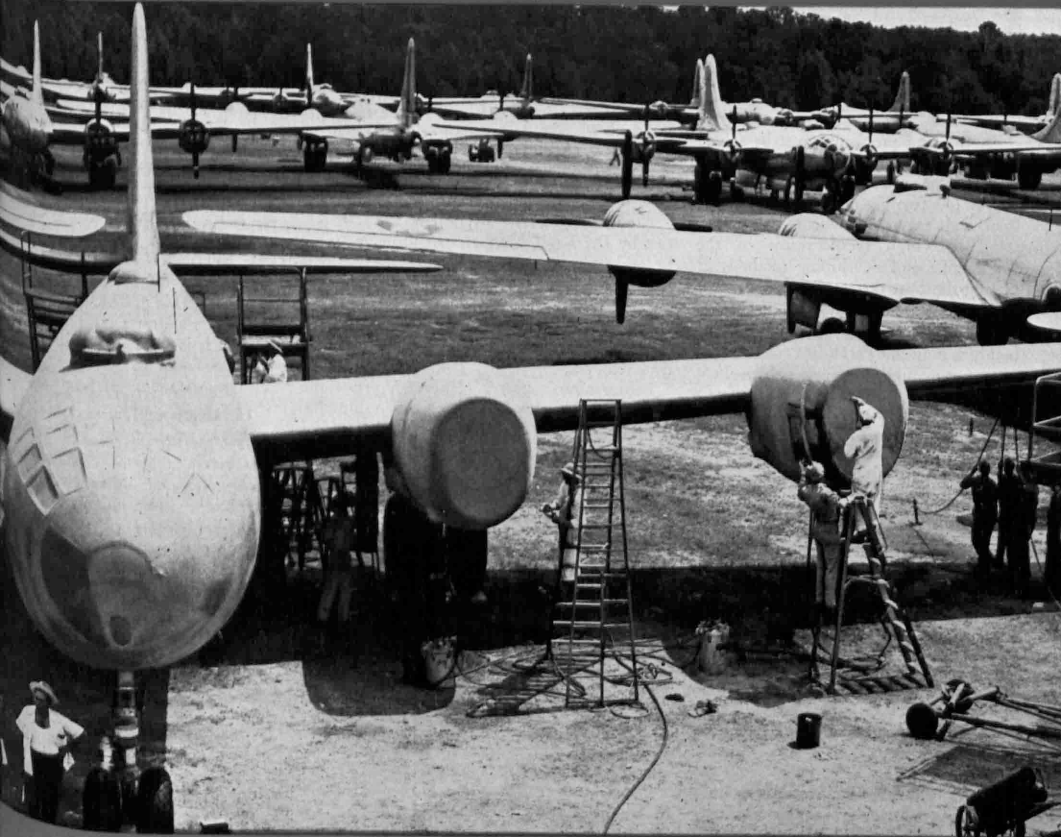


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# SCIENCE NEWS LETTER

Vol. 51, No.

THE WEEKLY SUMMARY OF CURRENT SCIENCE • FEBRUARY 1, 1947



## Cocooning B-29s

See Page 66

A SCIENCE SERVICE PUBLICATION

## NUCLEAR PHYSICS

# Cheap Atomic Power in '60

Engineering problems confront scientists before the atom can be put to power use, say experts in discussing atomic power prospects.

► **LOW-COST** atomic power will not be available before 1960, two War Department atomic experts say.

Dr. Henry T. Wensel, chief of the scientific branch of the research group of the War Department General Staff, and Dr. Ralph E. Lapp, scientific adviser of the scientific branch, described atomic power prospects as guests of Watson Davis, director of Science Service, on Adventures in Science heard over the Columbia Network.

Engineering problems must be solved before the power of the atomic bomb can be turned to power use, the scientists stated. The two big problems are getting structural materials which will withstand the high temperatures of the atomic pile and developing methods of getting the heat out of the system.

Dr. Lapp said that an atomic power pile will not explode like an atomic bomb; but unless the heat is conducted away fast enough, the pile would melt.

"The first practical power piles," Dr. Wensel predicted, "will not compete with coal or oil and they will undoubtedly be used for special applications where the cost of the power does not prohibit use."

Atomic power for naval vessels and for use in out-of-the-way places where other fuels are not available, such as perhaps the Antarctic, were suggested by the atomic scientists as early applications.

Dr. Wensel described the atomic

power plant being built at Oak Ridge, Tenn., as the first model of a nuclear machine to produce useful amounts of power, but added, "We are a long way from realizing a practical nuclear pile that will compete with coal or oil as a source of power."

When atomic power is perfected, the scientists said, a plant big enough to supply a city of 100,000 persons could be housed in a relatively small two-story building. Atomic power piles of the future will use enriched uranium 235 and be much smaller than the massive Hanford, Wash., plant which runs on natural uranium.

Atomic power for aircraft was forecast by Dr. Lapp. Most serious problem, he said, will be shielding against harmful radioactivity.

"I would estimate it would take about 50 or 75 tons of shielding material for a 10,000 horsepower atomic engine," he declared.

Before atomic power plants can produce low-cost power, the scientists said that radioactive isotopes from atomic energy piles will be put to many important uses by scientists.

With radioactive materials, they predicted new knowledge of medicine and biology, mass air movements and weather, food chemistry and packaging techniques, vacuum tubes, food chemistry, ocean currents and other fields.

*Science News Letter, February 1, 1947*

## AERONAUTICS

# Plastic Cocoons Bombers

See Front Cover

► A NEW "cocooning" process to keep idle bombers fit for quick return to service has been revealed by the Army.

The method is even suitable for preserving B-29 Superfortresses, of which the Army now has approximately 1,500 that otherwise would be destined to become spare parts. They are now being preserved by spraying on them an airtight coating so that they will be ready for future use with little reconditioning.

The covering will keep out moisture for about 10 years, it is expected.

These planes are too large to be stored in buildings and therefore must remain in the open where they are subjected to all sorts of weather. In this new process they are stripped of movable equipment, including their engines, thoroughly cleaned, then given five coats of the special plastic spray.

The B-29 pictured in the Army Air Forces photograph on the cover of this SCIENCE NEWS LETTER is a trial horse

for a new method of storage with engines removed; others will be stored with engines in place.

Open spaces and ports are bridged over with synthetic cobwebs, which are then sprayed with a solid coat of plastics. Each coat sprayed on the plane is a different color to enable workers to know when the ship is entirely covered, so as to prevent any leaks. The fourth coating has an asphalt base which excludes all moisture. The final coating is an aluminum color, chosen because it reflects the rays of the sun and keeps the interior at a more even temperature.

De-cocooning a plane is an easy and rapid process. It can be carried out while engines are being removed from storage, reconditioned and installed, and while other equipment is being returned to the bomber. In an emergency, the planes can be put in the air in relatively short order.

*Science News Letter, February 1, 1947*

## MEDICINE

# Meeting to Study Thyroid Gland Action

► **THE FUNDAMENTAL** physiology of the thyroid gland, most familiar to the layman when it is disordered and goiter results, was explored in a conference at the New York Academy of Sciences.

Dr. J. H. Means of Harvard Medical School was chairman of the conference.

Doctors specializing in care of patients with goiter and other gland disorders are joining with anatomists, biochemists, biologists, physiologists, cytologists, pharmacologists and a veterinarian to pool knowledge and set the stage for future research.

Material advances in this field have been made in recent years because of the availability of new methods of study such as those of enzyme chemistry, cytology, tissue culture techniques, microdissection, hormone assays, radioactive iodine and the use of antithyroid drugs.

"Future research in the field," Dr. Means said, "will include such problems as the mechanism of action of the thyroid and pituitary thyrotropic hormones, and particularly how they act on their cellular end-organs."

The thyrotropic hormone is produced by the pituitary gland in the head and has an influence on the thyroid gland.

*Science News Letter, February 1, 1947*

PHYSICS

# Resnatron May Aid Radio

Radar-jamming war veteran, this high-frequency generator tube produces 140 kilowatts at 450 megacycles. It may bring FM radio and television into your home.

ADD THE WORD "resnatron" to your electronics vocabulary. In the future this high-frequency generator tube may bring to your home frequency-modulated radio and television, and it may be a boon to long distance high frequency communications.

Unlike the magnetron, which in radar transmits ultra-high frequency power in short bursts, the resnatron pours out continuous wave power.

Developed at the University of California beginning in 1938, the resnatron was used for the jamming of German radar during the heavy raids of the spring of 1945.

The development of the resnatron is a drama-packed story of a brilliant young scientist whose career was interrupted for several years by a back injury and who returned to his work still lying flat on his back.

## Dr. David H. Sloan

He is Dr. David H. Sloan, associate professor of electrical engineering. Dr. Sloan assisted Prof. Ernest O. Lawrence in the construction of the first successful linear accelerator in 1930, a machine which produced three and a half million electron volt mercury ions.

In 1932, Dr. Sloan designed the world's first million-volt X-ray tube, which, built at the University of California Medical School, still brings relief to victims of cancer. He helped Prof. Lawrence build the first major cyclotron, which was completed in 1934.

Then a back injury forced him to retire from the laboratory, and kept him in bed for years.

In 1938 Dr. Sloan, still unable to move about, discussed with Prof. L. C. Marshall, of the Berkeley engineering staff, the possibility of building a high frequency tube which they could use in a high-powered electron linear accelerator.

At that time the pulsing techniques of radar were not known and there was no method for obtaining ultra-high frequency continuous wave power needed for such an atom-smasher. The original linear accelerator had been abandoned

because of this and because the cyclotron offered a better way of obtaining high energy particles with known methods of acceleration.

With Dr. Sloan still on his back in the early stages of the work, the two scientists worked for two years without result. Then in 1940 they built a tube that worked. In December, 1940, they put into operation a resnatron which set a world's record for that time of high-frequency output; the tube produced 70 kilowatts at about 860 megacycles.

## OSRD Project

The project was one of the first taken under the wing of the Office of Scientific Research and Development after its formation in 1940. In 1942 it was transferred to the Westinghouse laboratories at East Pittsburgh, Pa., for manufacture and development as a radar counter-measure device. Dr. W. W. Salisbury, working with Dr. Sloan and with the advice of Dr. Marshall, supervised this development and later directed its operation in England.

Two resnatrons, sending high-frequency power through a horn fashioned of chicken wire, successfully jammed German radar as far out as 300 miles, as high as 30,000 feet, and for a breadth of about 15 miles at the widest point. The jamming was good for frequencies between 350 and 600 megacycles, which the Allies were most anxious to deny to German radar.

Through this blanked-out sliver of the atmosphere Allied bombers traveled to some of their most devastating raids over Germany.

The resnatron incorporated one of the essential features which made possible Dr. Sloan's million-volt X-ray tube. This was the "explosive burst" firing of electrons from the cathode.

Electrons emitted from filaments in the tube are fired in bursts from the cathode through a focusing grid arrangement across a gap to the anode resonator where they transfer their energy into the radio circuit which conveys power to the radio antenna.



**RADAR JAMMER**—The world's heaviest and most powerful micro-wave tube, the resnatron, is being modified at Westinghouse Laboratories to improve television and ultra-high frequency transmission.

A second major innovation of the tube was the correlation of the time required to cross the gap and the shift in phase of the voltage to permit the voltage in the anode resonant cavity to go through its minimum value just when the electrons arrive, thereby wasting the least power.

## Resonant Cavity

The resnatron was also one of the first tubes in which the traditional coil was abandoned in favor of a resonant cavity.

Drs. Sloan and Marshall say there is no more powerful and efficient source of stable power amplification than the resnatron. It is the only instrument of its sort which has achieved in ultra-high-frequency operation the same efficiency of a high-frequency radio broadcasting station—about 80%. Such steady performance is necessary for broadcast operations, and makes the resnatron particularly applicable to television and frequency-modulated radio.

The highest output achieved by a resnatron is 140 kilowatts at 450 megacycles, by a Westinghouse-developed model. Even then the power output was limited by the direct current supply; no resnatron has yet been pushed to the limit of its output because of this limitation.

MEDICINE

# Lichen as TB Weapon

Material from California Spanish moss appears to retard tuberculosis when given to guinea pigs. Further study will tell whether it can be used on humans.

➤ A NEW WEAPON against tuberculosis may have been found in long yellow crystals extracted from a lichen popularly known as California Spanish moss. This plant is not at all related to the Spanish moss of the Southeast, which is a higher seed plant belonging to the pineapple family.

Announcement of the discovery is made by Dr. Alfred Marshak in *Public Health Reports*, official publication of the U. S. Public Health Service. Dr. Marshak's studies were made under the federal health service's tuberculosis control division at the Hopkins Marine Station and The Rockefeller Institute for Medical Research.

The material "appears to retard the progress of the disease" in guinea pigs, Dr. Marshak cautiously states. Its value in human tuberculosis is not stated and probably will not be known without further study.

"A decisive weapon for the final victory over tuberculosis" will be created cumulatively by such research enterprise, is the editorial comment by Dr. Herman E. Hilleboe, assistant surgeon general, U. S. Public Health Service, under whose division Dr. Marshak's studies were published.

Further studies of the material on animals and, if justified, on human beings later, are in order, it appears from Dr. Hilleboe's comments.

When guinea pigs were infected with human tubercle bacilli, there were twice as many deaths in the control animals as in those treated with the lichen crystals, Dr. Marshak reports.

Untreated animals during the last two weeks of the experiment lost more than twice as much weight as the treated ones. On the basis of these facts and the autopsy findings Dr. Marshak concludes that "the group of animals treated with the crystalline substance showed much less disease than the controls."

The material was given in oil by daily hypodermic injections. No "obvious" toxic effects appeared.

Before the guinea pig trials, tests had showed that the material completely checked human tuberculosis germs in

the test tube in concentrations of 1:50, 000.

Although it also has an inhibiting effect against pneumococci, streptococci and some staphylococci, it did not show any ability to save mice from death when infected with type II pneumonia.

Details of chemical studies of the material, which has an empirical formula of  $C_{15}H_{14}O_6$  are also given in the report.

*Science News Letter, February 1, 1947*

MEDICINE

## Brain Tissue Extract May Rival Penicillin

➤ AN EXTRACT of brain tissue appears as a potential rival to penicillin as a weapon against infection with one kind of germ, *Staphylococcus aureus*, in studies by Dr. Leo G. Nutini and Sister Eva Maria Lynch of the Institutum Divi Thomae.

In tests on mice the brain extract was more effective than penicillin in preventing illness from the staphylococcus infection and in speeding recovery when given after infection had been established, the scientists report in the *Journal of Bacteriology* (Dec., 1946).

*Staphylococcus aureus* is familiar to most persons as the organism causing boils and abscesses but it may also cause more serious conditions such as meningitis, pneumonia and bone infection. The brain material effective against it may be extracted from either beef or human brain.

*Science News Letter, February 1, 1947*

PHYSICS

## Successful V-2 Rocket Has Automatic Pilot

➤ A GERMAN V-2 rocket, equipped with an American-developed automatic pilot system, has made a successful flight over the desert at White Sands, New Mex., Army Ordnance officials revealed.

The automatic pilot, which varied the altitude of the rocket in flight, was hailed as a forerunner of the first remote-controlled rocket.

Army officers said details of the per-

formance of the new system are being tabulated but probably will be placed under military security. The rocket was fired Jan. 23.

The automatic pilot system, developed by the General Electric Company, has a small gadget, called the "wobblulator," which causes the rocket to wobble up and down in flight by varying the gyro steering-control.

Although V-2's are being fired every two weeks, the next test of the new American control system will not be made for several months, Army officers said. Other flights use the steering controls which the Nazis developed for the missile.

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AERONAUTICS

# Crash Not Blamed on GCA

No one system is sufficient for bad-weather landing, authorities state. Radar operators radio directions to pilot who makes actual landing himself.

THE CRASH of a Navy plane at the Oakland, Calif., airport recently while making a radar-directed landing in low-ceiling weather cannot be taken as a condemnation of the radar ground-approach equipment used, authorities in Washington state.

Tens of thousands of safe landings have been made, many in zero-zero weather, with this war-developed type of equipment called GCA for short. Both Army and Navy have used it extensively in America and in Europe, unassisted by any of the other instrument-landing devices. Many of these GCA landings were made by pilots who knew nothing of the method until they approached an overcast airfield and picked up instructions by radio which ordered them to maneuver and land as directed.

## Directions by Radio

Basically, in the ground-control-approach landing system radar operators on the flying field near the runway pick up on scanning radar any approaching plane within some 20 to 30 miles regardless of darkness, clouds or fog, and direct its pilot by ordinary radio into position for landing. While one radar scope shows the position of the moving plane, another shows the end of the runway. By a process of superposing the shadow picture on one scope with that on the other, the relation of plane to runway is noted and instructions can be given the pilot to bring him into line with the runway and to lower him to land. The actual landing he makes on his own, taking over as soon as he can see the landing strip and the runway marker lights.

The GCA is a type of landing aid that will probably play an important part in commercial aviation in the future. The war-developed type of equipment needs adaptation before it can be installed in commercial airports satisfactorily. Already such conversion is being made. Three airports, in Washington, New York and Chicago, will have GCA apparatus in use by the middle of February. This apparatus is being

located in the control tower at each port so that complete air traffic will be directed from one center. It is improved equipment that can be operated by only two men where the earlier types located in trucks on the field required five operators. For 24-hour operation seven days a week, eight operators are required, but this is much less than the 20 needed with the older equipment.

## GCA Is Supplement

The Civil Aeronautics Administration, that has charge of the major commercial airports and is making these installations with the cooperation of the Army and the Navy, believes that the real function of GCA is to supplement its three-element instrument-landing system which is now installed in about 30 ports, with many other installations in the near future.

The three-element system utilizes radio-beam approach paths, glide paths for lowering to the runway, and radio-beam markers to give a pilot his distances from

the runway. These latter are fan-like beams thrown vertically upward, crossing the path of the plane. In connection with this system an electronic automatic pilot is coming into use. This holds a plane on both the approach beam and the downward glider path more accurately, it is claimed, than it can be held by the average human pilot.

Experts are in agreement, it is understood, that no single one of the present bad-weather landing systems is sufficient by itself for all conditions. A combination may be the solution. However, whatever installations are made, they will be costly. With the three-element system, planes must be properly equipped. With GCA, no special equipment in the planes is required, but the ground equipment is expensive to construct, install and operate. The three GCA installations now being made will cost approximately \$100,000 each, merely for conversion and installation.

Improvements in the present GCA are already on their way. A new long-range radar unit has been developed that will have a sweep range of 150 miles. Also a radar scanning unit is under development which will show on the scope only moving objects, eliminating the present confusion on ground-based radar scopes that results from pulse reflections from neighboring towering buildings or other objects.

*Science News Letter, February 1, 1947*



**CONTROL TOWER CONSOLE**—This unit, developed by the Army Air Forces for air safety, incorporates all the utilities necessary to control air traffic that have been scattered throughout the tower.



XC-99—World's largest land-based aircraft, the Army Air Forces' XC-99 cargo and troop transport is nearing completion at Consolidated Vultee's plant in San Diego, Calif.

## ENGINEERING

## Oil Shale Yields Uranium

► URANIUM, used in generating atomic energy, is one of several byproducts obtained in producing oil from shale in Sweden, the American Chemical Society was told by Dr. Gustav Egloff, director of research of the Universal Oil Products Company.

The shale, he said, is radioactive and contains about 220 grams of uranium oxide per ton, or nearly half a pound. It contains also aluminum, vanadium and molybdenum, valuable products for which the Swedish government is seeking profitable uses in an effort to make the shale-processing program self-sustaining.

Progress in producing oil from oil shale in any part of the world is of interest in America because the United States has an estimated 100,000,000,000-barrel oil reserve in its shale which will rapidly come into use as natural petroleum reserves decrease. Industrial production of shale oil in Sweden is centered in a \$25,000,000 plant at Kvarntorp, where 2,000 barrels a day are refined. The residual spent shale is used as fuel in boilers for the generation of electricity.

Heat from electric heaters is used to force oil up out of the shale through pipes in the form of vapors, he stated. Temperatures required are near 1,000 degrees Fahrenheit, and it takes three months to heat the deposit. Two months are then required to distill the underground shale. Normally, about 30 years

would pass before the earth had cooled to its original temperature. While heated, the soil produces vegetation at unusual speeds and of greatly increased size.

*Science News Letter, February 1, 1947*

## AERONAUTICS

## One-Ton Liaison Plane Clears 50-Foot Obstacle

► A ONE-TON plane, one of the first designed especially for liaison work, is revealed by the Army. It will be known as the Boeing L-15A and can clear a 50-foot obstacle within 600 feet of take-off.

The L-15A will be used by the Army principally for reconnaissance, observation, aerial photography and emergency supply operations. It is an all-metal two-place plane, powered with a 125-horsepower Lycoming engine, has a normal cruising speed of 100 miles an hour, and can remain aloft two and a half hours at this speed.

A distinguishing feature of the new plane is its gondola, which houses the powerplant, pilot and observer, and takes up the entire fuselage. A long boom, extending to the rear of the top of the gondola, supports the plane's two rudder controls. With its high wings and boom, full visibility in all directions is available to the pilot and observer. The plane is so constructed that it can be quickly taken apart for shipment by truck.

*Science News Letter, February 1, 1947*

## AERONAUTICS

## B-36 Brother, XC-99, Is Being Completed

► A CARGO brother of the Army's biggest bomber, the B-36, has rolled out of the Consolidated-Vultee shops, is being completed, and will be ready for flight tests in April, it is expected.

Like the B-36, which made its initial flight late in the summer of 1946, the brother plane, the XC-99, can carry a load of 100,000 pounds, or could carry 400 passengers. Both have a wingspan of 230 feet and a length about four-fifths of this distance. Their 57-foot tail surfaces stick up in the air to the fifth-story windows of an ordinary office building.

The XC-99 is designed to carry airborne divisions of the Army as well as cargo. It is powered by six Pratt-Whitney engines of the pusher type, turning 19-foot reversible pitch propellers. With reduced loads, it will have a range of 8,000 miles at a speed in excess of 300 miles an hour.

Both the B-36 and the XC-99 are roughly 40% larger than the famed B-29 Superfortress. The cargo plane has a carrying capacity about 10 times as great as the Army's C-82 flying box car, the Fairchild Packet, into which a loaded truck can be driven up a ramp to its wide rear doors. It has three times the carrying capacity of the C-54, the standard big transport of the war. This is the four-engine Douglas Skymaster, built in several models, one of which was equipped for the personal use of the President of the United States.

*Science News Letter, February 1, 1947*

## AERONAUTICS

## Device Warms up Noses Of Planes for Take-Off

► IT IS a notorious fact that airplanes can't take off when their noses are cold. To speed the warming-up process, especially on muddy, slushy or snowy fields, Thomas F. Spackman of Chicago has devised a highly compact, mobile heater using liquid fuel and delivering hot air to the desired spots through collapsible ducts. It has both wide-tired wheels and broad sled runners, either of which can be swung into action in a moment, according to the condition of the ground. Rights on patent 2,414,214 are assigned to the Stewart-Warner Corporation.

*Science News Letter, February 1, 1947*

MEDICINE

# Caronamide Aids Penicillin

Chemical increases penicillin concentration in blood, and possibly will increase the effectiveness and decrease the frequency of doses of penicillin.

➤ **BETTER RESULTS** in penicillin treatment may result from a new chemical. It causes a three-fold or better increase in penicillin concentration in the blood than is otherwise attained by a dose of the mold chemical.

The new chemical, called caronamide for short, is announced by Dr. Karl H. Beyer of Sharp and Dohme's Medical Research Division in a report in *Science* (Jan. 24).

Caronamide was made to fit specifications for a compound that would check the rapid excretion of penicillin by the kidneys. In drawing the specifications for such a compound, Dr. Beyer took advantage of a known mechanism of kidney cells. One scientist who has made a long study of kidney physiology says it is the first time this mechanism has been taken advantage of for the purpose of treating disease.

The mechanism is the one by which cells lining little tubes in the kidneys, called tubules, can take penicillin out of the blood stream, transport it across the cell and dump it into the lumen or clear space in the tubule. Once in the tubule lumen, penicillin is rapidly excreted from the body. About four-fifths of each dose of penicillin is lost this way within two or three hours.

Previously scientists have tried to stop this rapid excretion of penicillin by giving either diodrast or another chemical, p-aminohippurate, which are excreted by the same mechanism. Giving either of these with penicillin saturates the mechanism by a "mass action."

The penicillin excretion mechanism works through an enzyme. Scientists have been able to check the action of other enzymes by chemicals which successfully competed with the enzyme for other chemicals the enzyme required. So Dr. Beyer wrote his specifications for a chemical that would successfully compete with the kidney tubule penicillin excretion enzyme. Other specifications were for reversibility of the process, lack of effect on any other kidney mechanism and lack of toxicity.

Caronamide, or 4<sup>1</sup>-carboxyphenylmethanesulfonanilide, was synthesized to these specifications by the organic chem-

istry department of the Sharp and Dohme laboratories. Tests on dogs and humans showed that caronamide achieves the purpose for which it was made.

As a result, it is expected that penicillin will be more effective and can perhaps be given in less frequent doses. Typhoid fever, brucellosis and subacute bacterial endocarditis, which is a kind of heart disease, are among the highly resistant infections which may yield to combined treatment with penicillin and caronamide.

*Science News Letter, February 1, 1947*

PHYSICS

## Amplified Radio Frequencies Identify Chemical Elements

➤ **THE NUCLEUS** of an atom is turned into a miniature radio transmitter, sending out a signal that identifies the atom, in a new technique developed by Dr. Felix Bloch in collaboration with Dr. William W. Hansen and Martin

Packard, all of Stanford University.

Amplified radio frequencies reproduced on an oscillograph screen show the observer what frequency the atom responds to. Each element has a characteristic frequency to which it resonates in a magnetic field under the influence of radio-frequency electric current.

Test materials are first placed in tiny glass vials in the field of a powerful electro-magnet. Spinning the vials in the magnetic field induces a radio-frequency current into the nuclei of the atoms. When the nuclei are spinning at right angles to the field, the frequency of the signal from the atom can be determined by a sensitive receiver, revealing the identity of the element.

The nucleus of a hydrogen atom, a proton, will whirl as fast as 42,500,000 times a second in a powerful magnetic field. Dr. Bloch has been using protons in his testing which has revealed the hydrogen in solution or in paraffin.

Dr. Bloch said that the technique is not yet ready for practical scientific work.

*Science News Letter, February 1, 1947*

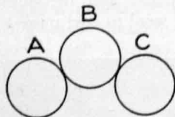
The woolly *coat* of a lamb draws itself more closely about the animal in rainy weather, thus sealing in the natural heat of the body; the increased moisture and the animal's heat cause the wool to curl more tightly.



**CHEMICAL ANALYSIS**—Dr. Felix Bloch (right), professor of physics at Stanford University, and Dr. W. W. Hansen, director of the Stanford Microwave Laboratory, examine the equipment used in their research work on qualitative analysis by radio frequency.

Directions: Four possible answers are given for each question. Put an X in the answer box corresponding to the number of that answer which you think is **most nearly correct**.

- To what does the word *Cassiopeia* refer?
  - a constellation in the northern latitudes
  - a large flightless bird of the Pacific
  - one of the earliest used of all spices
  - the mineral ( $\text{SnO}_2$ ), the principal ore of tin
- Which of the following is NOT a bone?
  - femur
  - humerus
  - thalamus
  - tibia
- All mechanical energy is either
  - electrostatic or potential
  - electrostatic or radioactive
  - kinetic or potential
  - kinetic or radioactive
- Which of these fits least with the other three?
  - larynx
  - pharynx
  - thorax
  - trachea
- Which of the following is the most frequent use of blood typing?
  - aid to physicians in selecting proper antigenic sera for patients
  - establishment of non-paternity in cases of litigation
  - insurance of compatibility of blood of donor and donee in blood transfusions
  - prediction of length of life
- Which of the following planets has the greatest number of known satellites?
  - Mars
  - Pluto
  - Saturn
  - Uranus
- When wheel A turns counterclockwise



- B turns clockwise and C clockwise
  - B turns clockwise and C counterclockwise
  - B turns counterclockwise and C clockwise
  - B turns counterclockwise and C counterclockwise
8. If a situation in which all A is C and all B is C changes to one in which all A is B and all B is C, then
- all A is C
  - all B is A
  - all C is A
  - all C is B

- Which of the following is NOT one of the three great classes of organic compounds in cells?
  - carbohydrates
  - fats
  - proteins
  - salts

**PART A**

- The word *sternum* refers to the
  - breast bone
  - dorsal side
  - lower tip of the spine
  - pelvic girdle
- What is the biological science which deals with the relations of organisms and the environment, including relations to other organisms?
  - botany
  - ecology
  - helminthology
  - zoology
- Bryophytes* are forms of
  - animal life
  - minerals
  - plant life
  - stars
- Containers A, B, and C are of the same height and diameter. A and C are half filled, and B three-quarters filled with a normal salt ( $\text{NaCl}$ ) solution. Which container contains the least water?
 

A

B

C

  - A
  - B
  - C
  - All contain equal amounts

- Which of the following terms does NOT apply to all of the following: manatee, dugong, whale, and seal?
  - aquatic
  - herbivorous
  - mammalian
  - multi-cellular
- Which of the following is an element?
  - salicylate
  - salientia
  - samarium
  - sandine
- In this sketch of a horizontal section of the eyeball, A indicates the
 
  - cornea
  - fovea
  - iris
  - retina

**DIRECTIONS:** Read each Section carefully. The questions following each Section are based on the information given. In other words, the answers to the questions are dependent in some way on the materials of the Section to which they belong. Four possible answers are given for each question. Put an X in the answer box corresponding to the answer which you think is **most nearly correct**.

- While line D is in operation, which clamps must be open and which closed?
  - J open; I, K, and L closed
  - I, J open; K and L closed
  - K, J open; I and L closed
  - L, J open; I and K closed

**PART B**

**SCIENTIST SEARCH**—This sample of the aptitude test given to high school seniors in the Science Talent Search can give you an idea of how much science talent you have. Many competitors reached this examination and gave up, showing they did not have the perseverance to be scientists. Winners had to meet other requirements also, including writing an essay on "My Scientific Project." Answers are on page 76 to help you test your talent in science.

SECTION C. T  
for a series  
baths, while  
above A and  
H are tubes

QUESTIONS

- B
- The chief
    - 1
    - 2
    - 3
    - 4
  - If tube
    - 1
    - 2
    - 3
    - 4

101. The pro  
ject of  
times  
the base  
quantities  
stee in

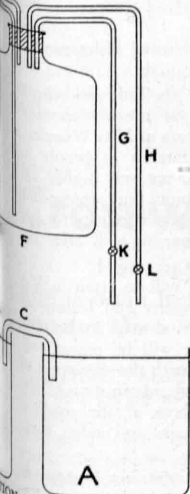
102. Two sta  
equal  
angle of  
draw

103. A sing  
arm  
pulley

104. Where  
and  
by  
it may  
son  
(Answer



shows a water level regulator  
temperature baths. A and B are the  
reservoir bottle, placed on a shelf  
and L are clamps. D. E. G. and



Tube E is to  
from B to F  
from F to B  
flow of water through D

to fill the reservoir bottle,  
it would be unnecessary  
L should be closed  
to be open  
A could not be maintained

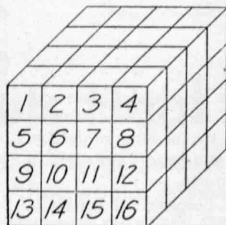
giving a numerical value to an ob-  
ject on the basis of the number of  
quantity is contained in it, or on  
a series of greater and lesser  
words.)

included angle of one triangle are  
to two sides and the included  
triangle. What conclusion can you  
less than 10 words.)

is a form of lever with equal  
in force in the use of a fixed  
less than 15 words.)

reports a rank growth of vegetation,  
gully is greatly hindered and  
entirely prevented. Give one rea-  
40 words.)

SECTION I. Imagine a 4" cube made up of 64 one-inch cubes, each numbered as shown in the diagram. No. 17 is directly back of 1, and 33 is directly behind 17, etc. The location of cubes also can be described in terms of a rectangular coordinate system. For any arrangement of the cubes, the origin of the coordinate system shall be the lower left front corner. For example, as the cubes are arranged in the diagram, cube 13 is located in position 1, 1, 1. Cube 17 is located in position 1, 4, 2 and cube 52, in position 4, 4, 4.



#### QUESTIONS FOR SECTION I:

90. A hole was drilled through the center of cube 10 and on through the intervening cubes through the center of cube 58. Similarly a hole was drilled from cube 34 to cube 46. What cube has thereby two holes drilled through it?  
( ) 1. 38  
( ) 2. 42  
( ) 3. 50  
( ) 4. 66
91. Which of the following pairs of cubes are closest together?  
( ) 1. 3 and 35  
( ) 2. 29 and 45  
( ) 3. 32 and 33  
( ) 4. 59 and 61
92. If all the cubes were thoroughly mixed and only one cube drawn at random, what are the chances that its number would contain the digit 3?  
( ) 1. 1 in 4  
( ) 2. 5 in 16  
( ) 3. 7 in 16

122-126.

Below in Column III are listed the names of some outstanding American scientists. In column IV are listed several fields of science. For each scientist in Column III, put the number of his field of science (Column IV) in the parentheses at the left of his name.

#### Column III

122. ( ) Adams, Roger  
123. ( ) Compton, Arthur H.  
124. ( ) Kettering, C. F.  
125. ( ) Shapley, Harlow  
126. ( ) Thorndike, Edward L.

#### Column IV

1. Astronomy  
2. Botany  
3. Chemistry  
4. Engineering  
5. Geology  
6. Physics  
7. Psychology

Below are a number of statements. Some reflect recent developments or achievements in science, while others are false statements. Mark each true statement with an X. Mark each false statement O.

- ( ) 127. Jets of air are discharged at the tips of rotor blades of helicopters to improve the efficiency of the vertical climb in aircraft.
- ( ) 128. Fighter planes equipped with reversible pitch propellers are enabled to reverse their direction more rapidly than planes without such propellers.
- ( ) 129. Not over one-tenth of the stars in our galaxy are closer to its center than is our sun.
- ( ) 130. Prehistoric skulls with filed teeth have been discovered in the 1940's for the first time in the Mississippi Valley.
- ( ) 131. Crown gall of plants, often called plant cancer, has been cured by the application of crude penicillin.
- ( ) 132. DDT successfully wiped out gypsy-moth caterpillars on a test woodland tract.
- ( ) 133. Manufactured gas, unlike natural gas, has been found harmless to potted plants and cut flowers.
- ( ) 134. Quinine has been synthesized from a coal-tar derivative.

#### GENERAL SCIENCE

## Test Your Scientific Ability with This Sample

► IF YOU HAVE wondered what kind of ability it takes to be a scientist, here is a chance to find out.

Try to answer the questions of this section of a science aptitude test that has just been given to thousands of high school seniors. It will take about 40 minutes to do all the questions, but you can try a few of them for your amusement in less time.

You will have as a result some idea of the kind of problems that a scientist has to tackle and you can decide for yourself whether you have or like to use the reasoning ability scientists must use.

Some of the high school seniors who tried the Science Talent Search aptitude test this year took one look at the questions and decided that they could not do it. They might have had too low an estimate of their ability because the test was made quite difficult by intention to eliminate those students who do not have the perseverance to finish a job, a prime requisite for research.

You, too, can take one look at the questions and then decide not to try them. That is your privilege, of course. But you may be failing on determination to do a job, not potential scientific ability.

More than the aptitude test, sampled here, was used in picking the boys and girls who are judged to be scientifically gifted. The aptitude test was only one hurdle in the selection method.

The questions on this page are reproduced from the aptitude test of the Sixth Annual Science Talent Search. Thousands of boys and girls in their senior year in the nation's secondary schools took the full test as part of their entry in the search. Three hundred were selected for honors and 40 were invited to the Science Talent Institute at Washington, Feb. 28-Mar. 4, to compete for \$11,000 in Westinghouse Science Scholarships.

Try these test questions on a friend—or yourself. Finish all questions in one sitting and do not look at the answers, printed on page 76, until you are through.

In addition, each contestant filled out a personal data blank and wrote an essay describing some scientific project he has done or wishes to do. Teachers filled out a recommendation form and principals reported scholarship. All are used in choosing winners.

(Turn to page 76)

MEDICINE

# Operation Nurse

More use is being made of specialized nursing talents. Under the leadership of VA director of nursing service, nurses will have better opportunities.

By JANE STAFFORD

► THE ATOMIC AGE is giving the nurse a chance to be more than the doctor's handmaiden. The nurse of the future will be a more important member of the medical team. She will be more than a starched white figure moving romantically in hospital wards and operating rooms.

The Florence Nightingales of the atomic age will be assistants to the doctor. They will be specialists, as are doctors, in caring for various kinds of illnesses. They will be vital, active members of the community outside the hospital.

GI Joe in civilian clothes, VA patient, is bringing about this change just as he changed the world in a great many other ways.

## VA Director

The attractive young director of the Veterans Administration's nursing service, probably the highest-paid nurse in the United States, is the spearhead for today's Operation Nurse. She is Missouri-born Dorothy Virginia Wheeler, whose own mother was a nurse and an inspiration to Miss Wheeler in her career.

Determined to make the nursing care given our veterans "second to none in the world," Miss Wheeler, who justifies the phrase "pretty nurse," is equally determined to give nurses a better opportunity than ever before. As boss of the largest nursing service in the world (VA nurses numbered 10,036 in January, 1947), she is in a position to carry out both ambitions.

The nurse of today will give truly sympathetic care to her patients, says Miss Wheeler, but her sympathy will be based on knowledge of the patient and his illness. She is being taught that patients and their relatives are people, not just cases of pneumonia and bringers of flowers and questions.

First to feel and benefit from the atomic age in nursing will be the patients in our Veterans Hospitals. But it will not be long before the changes will

be felt in civilian hospitals, as more and more intelligent, able girls and women are drawn into the nursing profession by the stimulus of a better career which VA nursing promises.

Patients in VA hospitals will get kindness as well as efficient nursing care. And the nurses will have sympathy to spare for anxious relatives and friends.

## Human Interest

"A nurse is never too busy to smile and say two words to waiting, worried relatives," Miss Wheeler insists. And she added: "I won't tolerate from nurses a lack of interest in patients as human beings."

Emphasizing her feeling about the importance of the human spirit in taking care of patients, she said that there has been only an arithmetic increase in recognition of the patient as a human being, with a geometric increase in the nurse's

knowledge and improved techniques in nursing.

The staff nurse, "the little girl who is the backbone of our nursing service," comes in for her share of Miss Wheeler's own sympathetic interest in people as human beings. It is not only higher salary, better opportunity for professional advancement and greater security for her old age that VA nursing will offer the staff nurse.

This "little girl" will be given in VA hospitals a new dignity and feeling of importance. Her vital role in helping the patient recover will be recognized. She will sit down with the directness of nurses, the hospital administrator, the doctors and members of the medical community to discuss and solve their mutual problems.

Nurses in VA hospitals will serve as liaison between the community and the patients. They are expected to be part of the community and interpret to the patient what the community is doing so that when he leaves the hospital he will be in step, instead of feeling like a Rip Van Winkle.

The atomic age has brought another change to nursing. In the past, nurses were expected to do everything in the hospital. In the modern hospital there will be proper utilization of nursing care. This, Miss Wheeler explains, implies various levels of nursing.

## Trained Practical Nurses

There will be greater use made of the trained practical nurse in caring for the sick, particularly in VA hospitals. These licensed, trained practical nurses can do much of the bedside nursing, releasing the more highly trained nurses for specialized duties. In turn, the practical nurses will be relieved from scrubbing floors and dusting and other housekeeping activities which less trained personnel can perform.

VA nurses will have an opportunity for graduate study and for specialization. Like doctors, they can become specialists in tuberculosis, psychiatry, surgery, orthopedics and other branches of nursing.

Some will be able to do research in nursing care. No one, Miss Wheeler pointed out, knows how many nurses it



**VA HEAD NURSE**—Miss Dorothy Virginia Wheeler is the new boss of nurses in the Veterans Administration.

takes to care for a given number of patients. The formula used before the war is no longer useful. It was based on the use of graduate nurses for all kinds of nursing care.

During the war, hospitals found it did not take a graduate nurse with all her technical training to give a bath and make a bed. So there is an opportunity

for someone to work out a new formula, and VA hospitals, with their large number of patients and facilities, offer a good place to do it.

The results of such a study should prove valuable to the entire nation because of the new knowledge it will bring to the economics of hospitalization.

*Science News Letter, February 1, 1947*

MEDICINE

## Crosswise Cuts Heal Fast

Horizontal incisions heal fastest because least damage is done to big muscles. After wound is sewn together, muscles have 40% of their original strength back.

► PATIENTS whose surgeons tell them they can get up and move about the second or third day after an operation need not fear that the wound will break open. The muscles and their sheaths in the abdominal wall will have 40% of their original strength immediately after the wound has been sewed together, Drs. Clarence Dennis, John Fast and Carleton Nelson, of the University of Minnesota Medical School, found in studies with rabbits which they reported at the meeting of the American College of Surgeons.

Surgical incisions were made on one side of the rabbits' bellies and sewed together with fine silk. After the animals' deaths, narrow strips were cut from the abdominal wall on both sides. The tension required to pull apart the strips from the operated side were compared with that needed to pull apart the strips from the unoperated side. The strength of the freshly-closed wound remained at 40% of that of the unoperated tissues for two or three days. Then it gradually increased, reaching 50% in four to five days, 75% in two weeks, and about 80% in six weeks.

Patients can get up earlier and go home from the hospital earlier, and are less likely to have complications such as pneumonia, after operations when the surgeon cuts across the abdomen horizontally instead of vertically, as is generally done. Good results of this new method of cutting open the abdomen for gall-bladder, intestinal and stomach operations were reported by Drs. Kenneth F. MacLean and D. James Thompson of the University of Michigan Medical School.

The reason for better results with this

kind of incision, they pointed out, are that many big muscles and their sheaths and nerves run across the abdomen rather than up and down. Cutting in the direction of these tissues causes less injury to them.

*Science News Letter, February 1, 1947*

NUTRITION

## Keep Orange Juice Cold, Covered to Hold Vitamin C

► IT IS all right to squeeze oranges the night before to save time in breakfast preparations if you are careful to keep the juice cold and covered. The cold and covered precautions are to guard against loss of vitamin C. The less air space between the juice and the container top, the better for saving this vitamin in the juice. With these precautions citrus juice can be stored as long as 24 hours with little loss of its most valuable vitamin, nutritionists of the U. S. Department of Agriculture state.

Heat and air are great enemies of vitamin C. It is important to remember this in preparation of other foods counted on to supply the family with this vitamin. Oranges, tangerines or grapefruit, for example, should be cut or sliced as near to serving time as possible.

Don't forget that grapefruit, lemons and tangerines supply vitamin C as well as oranges. You get about the same amount of the vitamin from each of the following: half a glass, or four ounces, of either orange or grapefruit juice; a whole orange; half a grapefruit; two tangerines; two lemons. Each of these will go far toward supplying the day's needs for the anti-scurvy vitamin C.

Since the pulp as well as the juice of



ROAD TO HEALTH—Specialized nursing care is helping the young man at Mt. Alto Hospital, Washington, D. C., regain strength in his leg.

these fruits contains the vitamin, it is thrifty to serve the juice unstrained and even higher economy, the government nutritionists point out, to eat citrus fruit simply halved, sectioned or sliced.

Two members of the citrus family, oranges and tangerines, can make a double contribution to the family's meals. Besides supplying vitamin C, they are sweet enough to serve as dessert, or in a salad for those who like a sweet one. They also have possibilities as sweeteners. Home economists of the Department suggest, for example: In orange gelatin dessert, if orange sections are used in addition to orange juice, sugar called for may be reduced a third or even a half.

*Science News Letter, February 1, 1947*

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## Do You Know?

Iodine is one of the essential food nutrients required for adequate nutrition of farm livestock and poultry.

Sandblasting metal surfaces before painting is the only method, it is claimed, which thoroughly cleans steel of everything, including mill scale.

Cold-blooded frogs, when they thaw out of hibernation in the spring, immediately break into song, each to his own refrain.

Acetylene black, a chemical powder, when injected into the inner tubes of automobile tires, collects and dissipates the static electricity which is generated in the tire by friction.

Germany, Italy and Japan are the least provided of all large nations with important metals and minerals such as oil, iron ore, copper, tin, bauxite, iron-alloy metals, gold and asbestos; Italy also lacks coal.

to smooth the way for

## DIABETICS



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## From Page 73

The test was devised for the Science Talent Search by Dr. Harold A. Edgerton, professor of psychology, Ohio State University, and Dr. Steuart Henderson Britt, psychologist, New York City.

Of the thousands of boys and girls who have taken the examination, not one made a perfect score. When you try this selection of questions from the examination you should, therefore, not expect to find that you have checked all the right answers.

To save your time, only typical questions out of the original three-hour examination are reproduced on this page. You should be able to answer the 39 questions in about 40 minutes.

Don't read further. Cover up the following paragraph until you have taken the test.

The correct answers to part A are: 1, 1; 2, 3; 3, 3; 4, 3; 5, 3; 6, 3; 7, 2; 8, 1; 9, 4; 10, 1; 11, 2; 12, 3; 13, 2; 14, 2; 15, 3; 16, 1. The right answers to Part B include: 61, 3; 62, 3; 63, 2; 90, 2; 91, 2; 92, 1. In Part C any wording which expresses clearly the following ideas is correct for the first three questions: 101, measurement, or process of measurement; 102, the triangles are congruent, the same or equal; 103, distances moved by the load and applied force are equal.

Either of the following ideas for question 104 is correct: the mass of roots distributed through the soil, together with the mat of organic matter on the surface, holds the soil firmly in place and enables it to resist the pressure of the moving water; or, the mat of vegetation acting like a sponge absorbs the water and permits it to drain off so slowly that the destructively erosive effect of sudden rushes of water after storms is prevented. The items of column III of questions 122 to 126 should have the following numbers beside them in this order: 3, 6, 4, 1, 7. Your true and false marks should appear as follows: 127, X; 128, 0; 129, 0; 130, X; 131, X; 132, X; 133, 0; 134, X.

If you are a man and answered correctly 25 of the questions, or if a woman and gave the correct answer to 21 to 22 of them, you did about as well as the average high school student completing the examination. But remember, all of the youngsters taking the exam are superior students. Those of you who answered 33 to 35 of the questions correctly are probably gifted in science.

Science News Letter, February 1, 1947

RADAR

## Metascope Detects Signals Sent by Infra-Red Rays

► INVISIBLE enemy night signals and communication of spoken messages by infra-red rays were detected by Americans by use of an instrument, details of which are now revealed, that converted the "black light" radiation into visible images.

The instrument, called the metascope, was developed at the American Optical Company by a group of scientists headed by Prof. Brian O'Brien of the University of Rochester. The principal elements of the pocket-sized telescope include a correcting lens, a spherical mirror, a phosphor for converting invisible infra-red rays into visible light, and an eyepiece lens system.

A Schmidt-type correcting lens is an important part of the device. Prior to the war there were less than a dozen lenses of this type in the world, and these were used in high-speed astronomical photography. Production was a slow hand process. American Optical Company scientists, however, developed a method by which lenses for the metascope were rapidly produced. This made the infra-red detector possible.

Science News Letter, February 1, 1947

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# Body Heat Warms Feet

MANY A PERSON tries to escape cold feet in winter by crowding an extra pair of socks or stockings into snug shoes. This is a mistake. If you need extra socks, wear oversized shoes with loose socks inside. Better than concentrating on foot gear, however, is to keep the body as a whole warm, scientists of the climatology and environmental protection section of the Office of the Quartermaster General advise.

Cold hands and feet, they point out, are the first result of general body cooling. When the body begins to cool, the main blood supply to hands and feet is automatically cut off. If the body is kept warm enough by clothing and exercise, the blood must flow to the feet and hands to keep the body cool. This will help keep the hands and feet warm.

Exercise to keep warm is good, but do not let the feet sweat if it can be avoided. This is because moisture greatly increases cooling. So remember to keep shoes and socks dry, protecting them

from both the moisture of wet streets and roads and the moisture of sweat.

Foot covering that will average about an inch thick preferably with resistance to water penetration from rain or snow is advised by the scientists for cold weather.

If the feet do get cold, warm them gradually, massaging them with warm hands. Resist the impulse to rush to the fire or radiator to warm up when you come in from outdoors on a cold day. If you do stand in front of the fire or other heat source, turn your back to it while stamping your feet and clapping or wringing your hands to warm up the body as evenly as possible. Otherwise you may be in for chilblains.

Avoid sitting or lying for long periods with cold feet, the scientists warn. Sick or injured persons who cannot exercise to keep the feet warm should keep them elevated.

Science News Letter, February 1, 1947

## GEOLOGY

### Bomb-Like Meteor Chunks May Have Hit Indiana

DID CHUNKS of a falling meteor burst with atom-bomb-like violence over northern Indiana, a few hundred million years ago? There is some reason to believe that they did, states Robert S. Dietz, Urbana, Ill., geologist, in *Science* (Jan. 10).

A quarry near Kentland, Ind., has exposed evidence of some highly violent kind of disturbance in the St. Peter sandstone, a geological formation of great geologic age. Hitherto it has been assumed that the disruptions of the strata, elsewhere quite flat and even, had been caused by a half-smothered blow-up of a volcanic pocket far below, in some long-gone period.

However, Mr. Dietz points out, the shape and position of the dislocated conical rock masses indicate strongly that the explosion took place above, not below, the disturbed zone. And the only imaginable source for such an explosion would be meteorites, heated to the shattering-point by their passage through the earth's atmosphere, and finally plunging into the ground.

In ages after their fall, the upper levels containing the meteorite craters, as well as the meteorite fragments themselves, were eroded away, leaving only the in-

verted-cone "roots" in the soft sandstone. Later still, during the Ice Age, a new covering of clay and soil was deposited over the eroded surface, burying the evidence until quarrying operations brought it to light again.

Science News Letter, February 1, 1947

Maple wood may take a place along with the black walnut long used in the fabrication of rifle stocks and handguards, tests by the U. S. Army show.

## Atoms, Planets & Stars

A DRAWING TO SCALE  
(Size 23" x 43")

Dr. Albert Einstein Wrote as follows:

"I was extremely pleased to receive your beautiful drawing which gives a vivid representation of our solar system. I have hung it on the wall of my room to look often at it. It should, in my opinion, be printed and made accessible to all elementary and secondary schools in the country.

"If you will permit I will try to interest educators in it.

"Sincerely yours,  
A. Einstein."

"I have never before seen the various features of the solar system and the earth shown so skillfully."—Dr. M. M. Leighton, University of Illinois.

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- 2—A "Time Table" for rocket ships showing arrival times from the planet Earth.
- 3—The Elements, giving the melting and boiling points, density and atomic weights.
- 4—Comparative size of the sun to the orbit of the moon around the earth.
- 5—Comparative size of the star Betelgeuse to the orbits of the planets.
- 6—Sectional view thru the earth showing the pressure at earth's core, etc.
- 7—Twenty of the brightest stars and their distances.
- 8—Our solar system in a nut shell. Shows our relative distance to near stars.
- 9—Our location in the Milky Way Galaxy, and time to reach nearest star.
- 10—Curvature of the earth with comparative heights and depths.
- 11—A drawing showing the way of measuring the distance to near stars.
- 12—Showing movement of comet tails, and their paths thru outer space.
- 13—The Moon, Temperatures, distance, diameter AND OTHER INFORMATION.

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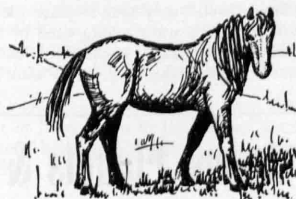
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Equine Evolution

► HORSES became horses because grass began to grow on the earth, Prof. D. M. S. Watson of University College, London, points out. There were primitive horses on the earth before the first grasses appeared. The little *cohippus*, as well as several of his larger successors, never tasted grass. They chewed other forage, probably the green leaves and soft twigs of shrubs, as goats and deer do today. Evolutionary progress toward larger size and more specialized teeth was relatively slow.

Then, about midway through the Age of Mammals, perhaps thirty million years ago, grasses evolved. At the same time, sweeping climatic changes drastically reduced the amount of forest, which was replaced with open lands where grasses

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could move in and take possession.

Ancestral horses quit hovering around the brushy edges of the forests and ventured out onto the developing open plains. They evolved the present complex, high-crowned type of back teeth characteristic of horses, to grind their new food. Horses had become horses.

If grass was a positive factor in the evolution of the horse, bloodthirsty predatory animals served as a negative factor. They necessitated the development of his long, powerful legs and efficient hooves, which enabled him to get away fast when danger threatened. We owe the fleet horses of today largely to the patient selective efforts of long-extinct packs of wolves and similar beasts of prey, which picked off the slow specimens for food and permitted only the fastest to survive.

Science News Letter, February 1, 1947

### CERAMICS

## Glass-Free Porcelain Fills High-Strength Needs

► GLASS-FREE porcelains, of particular value in airplane sparkplugs and radar transformers, have been developed by the National Bureau of Standards. Withstanding heat up to 2,000 degrees Fahrenheit, they will have many applications in high-temperature electrical installations.

In making these new porcelains such materials as alumina, beryllia, zirconia and thoria are used. Also added are minor quantities of other metallic oxides, but they contain no silica.

One is a high-beryllia porcelain containing 84% beryllia, 8% zirconia and small amounts of lime and alumina. Another contains 80% zirconia, 10% beryllia, and 10% magnesia.

The development of glass-free ceramic bodies has been a project of the Bureau since 1940, but it was pushed forward during the war to meet special needs. Modern applications demand a porcelain of high mechanical strength, particularly at elevated temperatures, and good resistance to thermal shock, properties not found in ordinary porcelain.

Conventional porcelains contain feldspar in the mixture which reacts as a flux with the clay and silica to form a certain amount of a liquid glass that fills the tiny spaces between the crystals. This glass softens and deforms under stress at temperatures much lower than those at which the crystalline parts liquefy. The strength of the porcelain is largely dependent upon the matrix of

glass. For this reason a glass-free porcelain was desired.

Science News Letter, February 1, 1947

### AERONAUTICS

## Gas-Turbine, Jet-Propulsion Engines Power Navy XF2R-1

► WITH A GAS-TURBINE engine in front and a jet-propulsion engine in the rear, the new Navy XF2R-1 is a notable addition to speedy combat aircraft. It is an experimental plane and has now completed many tests in the air, the Navy revealed.

This new plane is the second fighter in the Ryan Fireball series. In the first the forward engine was of the conventional reciprocating type. The forward engine in this is a General Electric TG-100 "prop-jet" gas-turbine. The rear thermal jet engine is a General Electric I-16.

The use of the gas-turbine gives the XF2R-1 a long thin bullet-like nose. A large spinner on the hub of the Hamilton-Standard four-bladed propeller increases the streamlined effect. The new plane, with a wing span of 40 feet and an over-all length of 36 feet, will probably be in the 500-mile-an-hour class.

Science News Letter, February 1, 1947



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# Books of the Week

**ADJUSTMENT TO PHYSICAL HANDICAP AND ILLNESS: A Survey of the Social Psychology of Physique and Disability**—Roger Barker, Beatrice Wright and Mollie Gonick—*Social Science Research Council*, 372 p., illus., paper, \$2. Bul. 55, 1946.

**APPLIED PLASTIC PRODUCT DESIGN**—Robert Davis and Ronald Beck—*Prentice-Hall*, 285 p., illus., \$6. Plastic product design principles for use by engineers and students in plastics.

**CAN SCIENCE SAVE US?**—George A. Lundberg—*Longmans*, 122 p., paper, \$1; cloth, \$1.75. A University of Washington sociologist outlines the possibilities that the scientific method, applied to all social problems, presents our best hope of achieving a better society.

**CHEMISTRY FOR OUR TIMES**—Elbert C. Weaver and Laurence S. Foster—*McGraw-Hill*, 738 p., illus., \$2.48. A basic first book for the high school student of chemistry, stressing scientific principles, consumer approach, and the impact of chemistry on everyday life.

**COYOTES**—Wilfrid S. Bronson—*Harcourt, Brace and Co.*, 62 p., illus., \$1.75. A natural science picture book for younger children, describing the habits of this wild, freedom-loving American animal.

**THE EGO AND THE MECHANISMS OF DEFENSE**—Anna Freud—*Int. Univ. Press*, 196 p., \$4. The 1st American edition of a classic contribution to psychoanalytic ego-psychology.

**ELEMENTS OF SOIL CONSERVATION**—Hugh H. Bennett—*McGraw-Hill*, 406 p., illus., \$3.20. Problems of soil erosion and soil exhaustion, and tested methods of solving these problems through modern soil conservation techniques. A condensation of the 1940 edition.

**LADYBEETLES OF THE GENUS EPILACHNA (SENS. LAT.) IN ASIA, EUROPE, AND AUSTRALIA**—G. H. Dieke—*Smithsonian Institution*, 180 p., illus., paper, \$1. Smithsonian Misc. Collections, Publ. 3860.

**RADIANT HEATING**—T. Napier Adam—*Industrial Press*, 472 p., illus., \$6. Information on the use of hot water, steam, warm air, or electricity in radiant heating. Snow melting and radiant cooling are discussed.

**SINGLE-SHOT RIFLES**—James J. Grant—*Morrow*, 385 p., illus., \$5. A study of those masterpieces of the gunsmith's art—the single-shot rifles, together with actual or original photographs.

*Science News Letter, February 1, 1947*

tree genus, Ginkgo or maiden-hair tree, now widely planted as an ornamental in this country, was similarly preserved in Asiatic temple groves.

Curiously enough, the name *Metasequoia* existed before the living trees were known to exist. For the trees found by Mr. Hu are identical with fossil remains of an ancient redwood genus found clear around the northern hemisphere, to which the name had already been given.

*Science News Letter, February 1, 1947*

## ENGINEERING

### Lack of Reservoir Sites Hinders Flood Control

► THE PROBLEM of flood control, particularly when combined with other functions of stored water such as navigation, irrigation, power and conservation, is becoming more difficult because of a lack of suitable reservoir sites. This is the opinion of Albert L. Cochran of the Army Chief of Engineers office, expressed to the American Society of Civil Engineers.

Requirements for storage capacity to control maximum floods cannot be altered simply by combining flood control with other functional uses. In reservoirs for multiple-purpose uses of water, definite schedules of operation are necessary for the best interests of all.

*Science News Letter, February 1, 1947*

## MEDICINE

# Thrombin Stops Bleeding

► PATIENTS with hemorrhage from stomach ulcers or other stomach and intestinal conditions can have the bleeding stopped by swallowing a dose of thrombin, one of the blood's own clotting chemicals. A method of using this material effectively to stop bleeding from the stomach and upper intestinal tract was announced by Dr. Byrne M. Daly of Wayne University College of Medicine at the meeting of the American College of Surgeons.

Before swallowing the thrombin, the patients with hemorrhage swallow a couple of ounces of a phosphate solution and the thrombin is given dissolved in the same solution. The phosphate acts as a buffer to keep the acid in the stomach juices from inactivating the thrombin before it produces a clot at the bleeding point on the ulcer or stomach wall.

In each patient to whom Dr. Daly gave the buffered thrombin, the bleeding stopped, although it had been uncontrolled before and an operation was considered. Each patient had had repeated hemorrhages from ulcers seen in X-ray pictures or by the surgeon at operation.

Dr. Daly does not expect thrombin to

control bleeding from the stomach in all cases, and said that final evaluation can only be based on trial in a long series of cases, but he believes it will be of much value in some cases.

*Science News Letter, February 1, 1947*

## BOTANY

### American Redwood Trees Have Chinese Relatives

► REDWOODS, long supposed to be an American monopoly, have been found growing in central China, Prof. Ralph Chaney, University of California paleobotanist, has disclosed. The information was sent to him by a Chinese botanist, H. H. Hu, who discovered three trees obviously closely related to our Sequoias in a temple grove.

Although the trees are closely akin to American Sequoias, they are sufficiently different to be included in a different genus, which has been named *Metasequoia*. Probably the trees owe their survival to their presence in the temple grove, where they were protected against cutting in a timber-short and fuel-starved land. Another ancient

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# • New Machines and Gadgets •

❁ **WASTE** and garbage incinerator for home basements can be connected to any furnace flue. It has a slotted cast-iron lining in the fire chamber that allows heat and flames to circulate freely and dry the material and burn it quickly. The waste itself is the only fuel needed.

Science News Letter, February 1, 1947

❁ **WALL SAFE**, for home and office, has a one-piece body, solidly cast in high-carbon, drill-proof steel. It is easily mounted between wall-studding by lugs that are a part of the body. Its four-tumbler lock has a three-bolt action, giving 140,000 combination changes.

Science News Letter, February 1, 1947

❁ **PLASTIC-COATED** steel pipe, developed for oil-well drilling to protect the tubing from corrosion, are usable in other industries. The coating is impervious to oil and water, withstands high temperature, and resists mild chemical attack.

Science News Letter, February 1, 1947

❁ **ROTARY SPINDLE** and quench ring are combined for use with any type of induction heating equipment where heat-treating of machine parts requires rotation during treatment. Driven by water power, the speed of this portable unit is controlled by varying the water flow.

Science News Letter, February 1, 1947

❁ **HINGED SEAT**, and a pair of steps on each side of a farm tractor, enable an all-day operator to stand at his work to get relief from constant sitting. The locked-down seat is released by a trigger and quickly raised; the steps are treated with a non-skid material.

Science News Letter, February 1, 1947



❁ **PLASTIC HANDLES**, molded to fit the hand as shown in the picture, feature new carving sets now available. To design the handle, hand and palm impressions were taken with modeling clay.

Science News Letter, February 1, 1947

❁ **FLARES** of the reflector type, to warn approaching motorists of stalled vehicles on the road, have plastic lenses made from a red molding powder. They give a red warning signal visible a half mile. With swivel type legs, the flares can be quickly mounted in the road.

Science News Letter, February 1, 1947

❁ **FIRE DETECTOR** for farm buildings and industrial plants is an electrically controlled watchman that uses a system of strategically placed thermostats. Warning is given on a central dial where a red light is flashed, a bell rung, and the location of a fire indicated.

Science News Letter, February 1, 1947

❁ **MATTRESS** for hospital incubators is made of very fine fiber glass which does not stain, mildew, absorb moisture or retain odors. The fibers are resilient and do not pack down in use, and, being made of inorganic materials, contain no allergy-producing substances.

Science News Letter, February 1, 1947

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