

MILITARY SCIENCE

# New Bombing Technique

The Pathfinder method enables bombers to drop high explosives accurately on targets that cannot be seen with the naked eye. Smoke signals are used.

► **FACTS** about the Pathfinder bombing technique which enables bombers to drop their high explosives accurately on targets that cannot be seen with the naked eye have just been released.

This technique, originally developed by the Royal Air Force, was first used for night bombing on Aug. 18, 1942. Since then it has been used widely by both the British and Americans to put the Nazi war machine out of commission by repeated, deadly accurate bombing of targets through the clouds.

The equipment that makes this bombing possible consists of a Pathfinder device, and smoke signals, which are used to locate and mark the target.

The Pathfinder itself is one of the latest achievements of modern navigational science. It was invented by the Office of Scientific Research and Development. When a bomber is over the target it literally shouts to the bombardier, "Here's your target, drop your bombs." While further details of the actual operation of the instrument are still military secrets, it can be said that the Pathfinder gives the plane eyes to see through clouds and overcast from altitudes as high as 25,000 feet.

One plane, out of a formation of bombers, carries the special Pathfinder equipment, and a technically trained crew to operate it.

When the target is "sighted," the Pathfinder plane drops colored smoke bombs, if it is a daytime operation, or colored smoke flares, if at night. These planes leave a ring of colored smoke in the clouds marking out the target. Regular bombers that follow, release their bombs inside the colored smoke ring.

Two types of smoke bombs are now being used. The first type, known as the T. I. (for "target indicator,") was developed by the R.A.F. This bomb burns as it drops through the air, leaving a trail of colored smoke that will show up through all but the thickest cloud.

The other type of smoke bomb is the "Sky-Marker," developed by Lt. Col. Clarence H. Breedlove, Chemical Warfare Service, U. S. Army. The "Sky-Marker" is a special flare suspended from

a parachute. The parachute descends more slowly than a bomb, leaving a larger cloud of colored smoke at higher altitudes than the target indicator.

The "Sky-Marker" is now a "standing operating procedure" for the Eighth Air Force, and has eliminated the element of doubt and rough estimations made at the time of bomb release by other planes. It has also decreased the size of the group bomb pattern, thereby giving density to the target.

The colors of the flares and smoke are changed each day, so that enemy smoke signals cannot confuse United

Nations planes, and cause them to drop their bomb load on an open field instead of a military objective.

The Pathfinder technique is also used in the landing of paratroopers. Planes equipped with Pathfinder equipment go ahead of the troop carrier aircraft to select a suitable spot for the paratroopers to drop, beyond the range of enemy anti-aircraft fire. It marks this spot with a colored smoke bomb to guide the troop-carrying planes.

British Lancaster, Halifax, Mosquito, and Wellington bombers are equipped with Pathfinder devices. The only American planes, to date, to use this equipment are the B-17 Flying Fortress and the C-47 Skytrain.

It is known that Nazi scientists have been experimenting for a long time to develop a bombing technique similar to the Pathfinder system. However, there is no evidence that they have been able to duplicate it.

*Science News Letter, July 15, 1944*

AERONAUTICS

# Super-Rockets "Fantastic"

► **THE IDEA** of super-rockets aimed at American cities and war industries from the coast of Europe is fantastic to anyone familiar with rockets and jet-propelled aircraft.

The haphazard way in which the robot bombs already launched against England are falling in and near London indicates that the Germans do not have exact control over the range or direction of these bombs.

This lack of control would seem to be the best evidence that the use of rocket bombs to terrorize the United States is impractical, to say the least.

If it were possible to launch rocket bombs from the French coast, have them span the Atlantic, and drop in the United States, they might land almost anywhere. If aimed at New York City, they probably would fall harmlessly in some pasture in Connecticut or New Jersey, doing nothing more than scaring a few cows.

Definite proof that transatlantic rocket bombs are impractical, if not altogether impossible, comes to light when we consider the question of weight. It would require 400 gallons of fuel an hour to carry a 12-ton bomb by jet propulsion across the Atlantic. The flight would take about 17 hours. The fuel weighs eight pounds a gallon. This means that it would take 3,200 pounds of fuel an

hour, or about 55,000 pounds of fuel for the trip. The weight of the fuel would be greater than the weight of the explosive charge. The fact that the weight of the craft as a whole decreases as the fuel is used up would have little or no



**ROBOT PLANE**—Flying over a city Somewhere in Southern England, a pilotless plane heads for its target.

advantage as far as its military effectiveness is concerned.

If the rocket bombs could be flown in the stratosphere there is a slight possibility that they might be effectively used over moderately long distances, since the speed of such projectiles in the stratosphere is greater than at lower altitudes, and the amount of fuel needed is much less.

Should the Germans decide to use radio-controlled rockets to bomb the United States, it would be a simple mat-

ter for us to tune in the rocket frequency and cause them to drop harmlessly into the ocean, or turn about and head back towards Germany like boom-crangs.

The facts seem to show that we have nothing to fear from transatlantic rocket bombs. The present state of progress in the field of rockets, jet propulsion, and aircraft in general does not indicate that such ocean-spanning terrors have been developed, or will be developed before the present war is over.

*Science News Letter, July 15, 1944*

#### HORTICULTURE

## Soilless Farms on Islands

► FRESH VEGETABLES for United States Army Air Force personnel living on barren atolls and islands in the Atlantic and Pacific Oceans, and on isolated tropical posts will be provided by hydroponic or soilless farms now being established by the Air Quartermaster.

Growing vegetables by hydroponics, a system of raising green-stuffs in water with the use of chemicals, on isolated islands is not new. Experiments on Wake Island in the Pacific in 1938, using the system originated by Dr. W. F. Gericke of Berkeley, California, have proved that vegetables can be grown by this method. When the Japs captured Wake they acquired this pioneer installation (*See SNL, May 14, 1938*).

The vegetables are grown in boxes four by 11 feet. These are filled with water in which mineral fertilizer salts are dissolved in the right concentration to feed green plants. Over the tops of the boxes, wire netting is stretched, on which, supported in sawdust, excelsior, or other suitable material, tomatoes, peas, beans, carrots, and other vegetables grow, drawing their water and minor nutrients out of the tanks in which their roots dangle.

In experiments, tomatoes reached their maximum growth in about 2½ months. They were about the size of a baseball, had smooth skin with unbroken surfaces and fine texture as well as excellent flavor.

This water-chemical method of vegetable farming is not practical for a large number of troops, but has application in isolated areas for feeding a small number of men, according to the Air Quartermaster, Colonel H. R. W. Herwig.

"The serious problem of preservation in transportation and storage prevents

men in some isolated areas from getting fresh vegetables," he stated.

Air Force pilots and crews need fresh vegetables rich in vitamins and minerals to keep them in the best condition for carrying out their missions successfully.

Gardens will be set up at Ascension Island in the Atlantic; Canton Island in the Central Pacific; Espiritu Island in the South Pacific; Port Moresby, New Guinea; and Karachi, India. It is expected that trained crews to establish and train other personnel in soilless gardening will leave the United States in 60 days.

*Science News Letter, July 15, 1944*

#### ASTRONOMY

## Faint Double Star Is In Constant Turmoil

► A FAINT double star has been discovered to lead a life of constant turmoil. Material is ejected from the star, known to astronomers as HD 214419, with such force that its composition changes radically in less than twenty-four hours, Dr. William A. Hiltner of the Yerkes and McDonald Observatories of the Universities of Chicago and Texas states.

The greenish-white star is of about the ninth magnitude and therefore invisible without the aid of a telescope. Located near the less-familiar constellation of Lacerta, the Lizard, in the northern hemisphere, the Wolf-Rayet star is very massive and is one of the hottest of heavenly bodies.

Little is known about the companion star, but the more familiar component is made up largely of helium and nitrogen. The system varies periodically in brightness, although the Wolf-Rayet component has never been seen to be eclipsed. The variation is slight, how-

ever, and can be explained as due to reflection of the light of the other star on the Wolf-Rayet component, Dr. Hiltner reports in the *Astrophysical Journal*.

"Since the contribution by the companion star to the total light is appreciable, it is remarkable that no spectral features of the companion have been observed," the astronomer points out.

*Science News Letter, July 15, 1944*

## SCIENCE NEWS LETTER

Vol. 46 JULY 15, 1944 No. 3

The weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N. St., N. W., Washington 6, D. C. North 2255. Edited by WATSON DAVIS.

Subscriptions—\$5.00 a year; two years, \$8.00; 15 cents a copy. Back numbers more than six months old, if still available, 25 cents. Monthly Overseas Edition: By first class mail to members of the U. S. armed forces overseas, \$1.25 a year. To others outside continental U. S. and Canada by first class mail where letter postage is 3 cents, \$1.25; where letter postage is 5 cents, \$1.50; by airmail, \$1.00 plus 12 times the half-ounce airmail rate from U. S. to destination.

Copyright, 1944, by Science Service, Inc. Reproduction of any portion of SCIENCE NEWS LETTER is strictly prohibited. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicate services issued by Science Service.

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

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 393 7th Ave., N. Y. C., Pennsylvania 6-5566; and 360 N. Michigan Ave., Chicago, STAt 4439.

#### SCIENCE SERVICE

The Institution for the Popularization of Science organized 1921 as a non-profit corporation.

**Board of Trustees—Nominated by the American Association for the Advancement of Science:** Edwin G. Conklin, American Philosophical Society; Otis W. Caldwell, Boyce Thompson Institute for Plant Research; Henry B. Ward, University of Illinois. **Nominated by the National Academy of Sciences:** Harlow Shapley, Harvard College Observatory; Warren H. Lewis, Wistar Institute; R. A. Millikan, California Institute of Technology. **Nominated by the National Research Council:** C. G. Abbot Smithsonian Institution; Hugh S. Taylor, Princeton University; Ross G. Harrison, Yale University. **Nominated by the Journalistic Profession:** A. H. Kirchhofer, Buffalo Evening News; Neil H. Swanson, Executive Editor, Sun Papers; O. W. Riegel, Washington and Lee School of Journalism. **Nominated by the E. W. Scripps Estate:** Max B. Cook, Scripps Howard Newspapers; H. L. Smithton, Executive Agent of E. W. Scripps Trust; Frank R. Ford, Evansville Press.

**Officers—President:** Edwin G. Conklin. **Vice President and Chairman of Executive Committee:** Harlow Shapley. **Treasurer:** O. W. Riegel. **Secretary:** Watson Davis.

**Staff—Director:** Watson Davis. **Writers:** Frank Thone, Jane Stafford, Marjorie Van de Water, A. C. Monahan, Martha G. Morrow. **Science Clubs of America:** Joseph H. Kraus, Margaret E. Patterson. **Photography:** Fremont Davis. **Sales and Advertising:** Hallie Jenkins. **Business Manager:** Columbus S. Barber.