Do You Know?

Flying insects have descended from wingless ancestors.

Golden eagles are believed to live to be one hundred years old.

Does of the deer family have an alarm call which warns their young to remain quiet.

Water containing one part per million of *iodine* for two weeks each autumn and spring is sufficient to prevent goiter.

Dill is a native of Mediterranean countries, southern Russia, and grows wild in various parts of Africa and Asia.

Mistletoe is a hemiparasite; it has absorbing organs to obtain materials from the host plant, and at the same time has chlorophyll which enables it to manufacture food.

Calcium carbonate, a paint material now generally known as whiting, was used in fresco paintings and stucco work in ancient Rome, and still earlier in Egypt.

Early Greek *painters,* who used only four pigments in color mixing, got better effects than painters in the days in the height of ancient Greek development who used many pigments, according to prominent modern color authority.

RADIO

Sees Better Than The Eye

Radar development, formerly secret, now revealed in government report on science at war. It adds new dimension to sea warfare, changes "up-sun" advantage.

➤ INSIDE information relative to radar developments, formerly secret but assisting mightily in winning the war, are now revealed, released by the Joint Board on Scientific Information Policy for the Office of Scientific Research and Development, and the War and Navy Departments.

The direction and the range of objects in its field of view are the two basic qualities radar has to offer, the report states.

"The big point about radar is that it can see farther than the eye can, even in the best visibility; and radar's ability to see is relatively unaffected by night, fog, smoke, or rain."

"Radar is the basis of the defense against aircraft attack. This was, historically, its first active role." It alerted ground crews and provided a means of aiming anti-aircraft guns at an unseen target with somewhat greater precision than when visual sighting was relied on.

"Another thing that radar can do and has done is to add a new dimension to sea warfare," the report continues. "It used to be that naval battles were decided by the factor of who happened to be 'up-sun' from the enemy. Now our ships slug through whole engagements in which the enemy may be detected, ranged on, and sunk without a single man having seen him visually."

"Before radar, either of two things could bog down the strategic bombing forces which have been one of our major weapons right through the war," according to the report. "The first was weather at home fields so bad that the planes could not take off or land. The second was cloudy or partly cloudy weather over the target, when the chance of a visual bombing run was too small to justify committing the air force. Base weather, which radar is now helping our planes to defeat, limited operations far less often than target weather did. Now our bombers go out with radar which 'reports' the ground beneath and all around in a faithful and convenient way, emphasizing such features as shorelines, cities, mountains, lakes and rivers."

Not only does radar assist navigation unerringly to the target area, but it also, if target weather precludes a visual bomb run, lines up the target and permits bombing by radar alone.

Successful radio detection was developed independently in America, England, France, and Germany during the 1930's. Back of this discovery lay a half century of radio development in which it was learned that very short radio waves can be reflected, and could be used to detect obstacles in fog or darkness. The fact that radio waves have optical properties —the properties usually associated with visible light—was demonstrated in 1886 by Heinrich Hertz.

"The beginning of interest in radio detection as a military device," the report declares, "can be dated from communications experiments carried on by two civilian scientists working for the U. S. Navy." These two men were Dr. A. Hoyt Taylor and Leo C. Young. In 1922 they observed "a distortion or 'phase shift' in the received signals due to the reflection from a small wooden steamer on the Potomac."

In the summer of 1930, the same men in experimenting with radio direction-finding equipment, made the important observation that reflections of radio waves from an airplane could be similarly detected. The result was the development of a method of detecting the presence of moving objects like aircraft by means of separated sending and receiving stations and the interference of a wave sent directly along the ground and another reflected from the aircraft.

Army officers were shown the Navy equipment in 1930, and in 1932 it was suggested that, as the system could not readily be used on shipboard, that it might be of more value to the Army.

"However," the report says, "the Army carried on developments along other lines which brought about a complete mobile detector at a single site." There has been complete exchange of information between the Army and the Navy in developments.

"Radar was born," declares the report, "when it occurred to different persons independently and in different parts of the world that the pulse technique could be used to detect objects such as aircraft and ships." Scientists in several countries worked secretly on problems of increased power output, shorter pulses, directional antenna systems, and many other practical aspects of the problem.

Robert M. Page, of the U. S. Naval Research Laboratory, was assigned in 1934 to work on these problems. During the next few years he materially assisted in solving in quick succession the difficult problems of generating pulses of the proper length and shape, of building a receiver which would not be blocked by the transmitter pulses and therefore would pick up those extremely short pulses after they are reflected, and of designing cathode ray tube displays for the received pulses.

"The Army's first pulse radar was designed as a complete system at the Signal Corps Laboratories early in 1936," this report states. "By the end of 1936, echoes had been seen from radio pulses directed at commercial planes flying on a regular airway in New Jersey. By May, 1937, a successful demonstration against test bombers was carried on at Fort Monmouth. . . . The equipment not only detected the aircraft but passed an information about their direction, elevation, and range so that searchlights were pointing at precisely the right point when the aircraft came within range."

Science News Letter, August 18, 1945

CHEMISTRY

Toothpaste Tubes Used To Measure Beta Rays

➤ TOOTHPASTE tubes, just beginning to reappear on drug store shelves since their war absence, have been put to a new and unusual use by Burrell W. Brown and L. F. Curtiss of the National Bureau of Standards.

The tubes have been converted by these scientists into Geiger-Muller tube counters for measuring beta rays, one of the three types of rays constantly emitted from radium and other radioactive substances.

This use was not responsible for the war shortage of toothpaste tubes, however. The Bureau of Standards scientists used the thin-walled, collapsible aluminum tubes now commercially available, not the prewar type usually made of tin and lead.

The Geiger-Muller tube counter consists of an insulated wire mounted axially in a metal tube maintained at a potential several hundred volts from that of the wire. Sensitive to very low intensities of beta radiation, it records each beta particle that passes through it by producing an electrical pulse which can be amplified and registered. Since beta rays with energies as high as 1,000,000 volts can penetrate only a fraction of an inch of ordinary materials, the counter tubes must have walls which are very thin and of low density.

Most previous attempts to develop a suitable thin-walled tube counter have been laborious and expensive since the tube container must be gas-tight. The scientists have been successful in making excellent and relatively inexpensive counters by plating thin layers of copper on commercially available aluminum tubes, and soldering metal plugs in the open ends of the tubes. These plugs support the insulators and glass tube for filling and sealing. The walls are only 4/1000 of an inch in thickness, which permits most beta rays to pass through and be recorded.

Science News Letter, August 18, 1945

The suckers of a *squid* are pneumatic in action, though in some species the hold is strengthened by a ring of horn-like teeth.