AERONAUTICS

Airplane-Guidance Beams

Blanket of VHF radio beams will cover America soon from 409 transmitting stations. These omniranges will aid pilots in knowing their exact positions.

➤ AN INVISIBLE blanket of crisscrossing but distinct radio beams for airplane guidance will soon cover the entire United States. They will be the very high frequency type and will originate at 409 transmitting stations which the U. S. Civil Aeronautics Administration has just revealed it is erecting. With their aid, any pilot may know his exact position at any time.

In addition to these CAA stations, there will be others erected by the U. S. Air Force and the Navy. These two government agencies are planning on about 140 of them, but many will be outside the continental United States. Those at home will be at stations of the Armed Services not adequately served by the CAA system.

The air navigation system made possible by these new radio stations requires a new type of radio receiver in all planes. All types of commercial aircraft, and perhaps the majority of private planes, will be equipped with them by 1952, it is expected. Some of these very high frequency transmitting stations are already in use and commercial airliners are already provided with receivers. The new installation is to replace completely the older radio-guidance system which provided radio beams for pilots to follow, but provided only four courses.

This new type of radio range is called the omnirange. A more complete name is very high frequency (VHF) omni-directional range. It derives the title from the fact that each station sends out beams in all directions, or at least in 360 different directions one degree apart.

Being VHF, the beams are static-free and "line-of-sight" type. This latter means reception ordinarily requires a path between the transmitter and receiver uninterrupted by mountains and other obstructions. A plane in the air at high altitude can receive the transmitter signals at much greater distances than one near the ground.

Operating on the static-free VHF radio band, the system permits a pilot to fly by watching a vertical needle on his instrument board instead of listening to blurred and wearying sound signals. The omniranges present many other advantages. Pilots can fly a course either toward or away from an omnirange in any direction. This makes the ranges equally useful on or off an established airway. The system permits travelling across country instead of following beams, where this is desirable.

Distance-measuring equipment (DME for short) when used with the omnirange permits far simpler and safer air navigation than was possible with the old-type four-course radio range and marker beacons. When a pilot tunes his DME at an omnirange site, a pointer on its dial shows him in miles his exact distance to that station.

The combination of omnirange and DME gives the pilot a means of knowing his geographical position at all times. From his omnirange indicator he can read his course to or from the omnirange station, and from his DME dial he knows exactly where he is along the navigation line. The combination brings air navigation close to ultimate simplicity.

Omniranges and DME are designed to make flying high above clouds safe and sure. They are navigation aids, not landing instruments. However, they help bring a plane to the neighborhood of its destination where landing instruments take over and bring the plane down through overcast, sufficiently close to the runway to enable the pilot to make a visual landing. The well-known Instrument Landing System provides the plane with a glide path followed automatically by a properly equipped plane; and precision beam radar, better known as Ground Controlled Approach radar, provides the pilot with voice information as to whether or not his plane is exactly on the glide beam.

Science News Letter, December 11, 1948

BOTANY

Bracket Fungus Wanted

➤ MUSHROOM-HUNTING would seem to be over for the year, now that autumn has faded into winter. But it needn't be, if you've a mind to be helpful to a scientist who needs one kind of fungus and needs it badly. He is broadcasting an appeal over the land for it.

His name is Dr. Robert L. Frank, and he does his research in the William Albert Noyes Laboratory of the University of Illinois. He doesn't want mushrooms to eat. What he wants aren't exactly mushrooms, though they are closely related to mushrooms; they are one particular species of bracket fungi. They aren't fit to eat, not because they are poisonous but because they are so tough and woody that only a billy-goat could relish them.

One kind of bracket fungus, and only one, contains the thing that Dr. Frank is trying to get—a rare compound called polyporic acid, which he needs in his scholarly business. There isn't much of the acid to the ounce of the one-and-only bracket fungus that yields it at all, so he needs a lot of ounces. Hence the appeal.

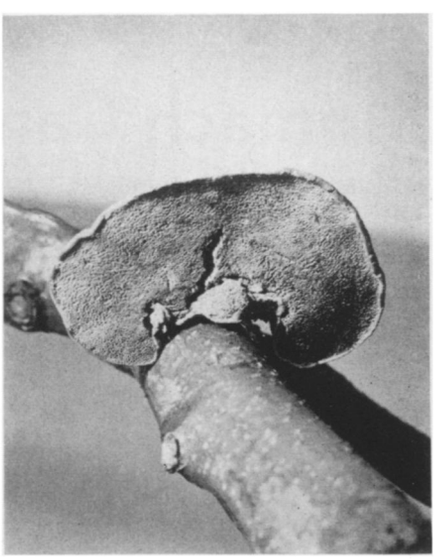
The particular fungus needed belongs to the group known as the polypores, so called because their undersides are completely honeycombed with pin-sized pores or holes. The top surface is mainly smooth, though there may be some bumps and uneven spots. It is not divided into bands or zones, as many other bracket fungi are.

It is not a very big plant, as a rule; four inches long and three inches wide is about as big as it ever gets, and you may find specimens down to the size of your thumbnail. It is a thickish growth, with a definite bulge both above and below.

Color ranges from pale yellow to flesh-color or tawny copper. The whole body of the fungus has the same tint. When fresh, it is soft and fleshy, and is said to smell like anise. Even the dry specimens you will find in the woods now are likely to have a fragrance.

This species is to be found only on dead wood, usually of hickory, though also on poplar, maple, beach, some of the oaks, and a few other trees. It is easiest to hunt at this time of year, when the distractions of flowers and green leaves are out of the way.

In the botany books it is listed as *Polyporus nidulans*. A while back, it had its name changed so that you may find it listed in some of the older reference books



SOURCE OF ACID—This is what the sought-for bracket fungus looks like, viewed from beneath. The crucial test is to moisten it with a drop of ammonia. If it turns purple, you've got it.

as *Polyporus rutilans*.

There are a number of polypore species, some of which are much more abundant than this, which is the only one that is of any use to Dr. Frank. So it is important to get a proper identification on a specimen that might be it.

The crucial test, says Dr. Frank, is quite simple: moisten your specimen with a drop of ordinary household ammonia. If it turns purple, you have the right species.

Dr. Frank says he will welcome anything from a single specimen up to several pounds, and will gladly refund shipping charges.

Science News Letter, December 11, 1948

CHEMISTRY

New Plastic Insulator

➤ A NEW high-temperature, transparent plastic, that can be tempered somewhat as metals are hardened, is now in limited commercial production.

Made up of fluorine and chlorine to the extent of four-fifths of its weight, it is related to the new family of organic compounds, the fluorocarbons, which reached practical development during the war. Chemically it is trifluorochloroethylene.

Produced by M. W. Kellogg Co., of Jersey City, N. J., it came out of the laboratory of Dr. W. T. Miller of Cornell University.

Extremely resistant to chemical action, even to concentrated sulfuric, hydrofluoric and hydrochloric acids, it is nevertheless easily worked into shape. Although strong and hard, it is not brittle. Although suited to use at as high as 390 degrees Fahrenheit, it is also very satisfactory at very low temperatures, even at the cold of liquid nitrogen, 320 degrees Fahrenheit below zero. It is a good insulator for electricity and heat, and water rolls off it like the proverbial duck's back.

Because it withstands weather so well, it is likely to be used in instruments, airplane and ship parts, railroad signals and electrical insulation that get hard outdoors usage. It can substitute for glass in laboratories and chemical plants and handle corrosive gases and liquids.

It will be used at low temperatures and for electrical insulation in corrosive or humid conditions. Because it is not wetted by water or humid atmosphere, one use will be to avoid electrical short circuits due to water film condensation.

Because the new plastic, called commercially Kel-F, can be treated or tempered very much as though it were steel, it can be tailored or processed for use at a predetermined temperature.

Comparing the trifluorochloroethylene chemical structure of the new plastic with its fluorocarbon cousins, some of the fluorine is replaced by chlorine. Fluorocarbons are similar to familiar hydrocarbons of petroleum, but all of their hydrogen is replaced by fluorine, making fluorocarbons more inert.

Science News Letter, December 11, 1948

MEDICINE

Stomach Cancer Detection

➤ HOPE of saving the estimated 40,000 fatal stomach cancer victims in the United States each year by mass X-ray surveys was knocked down with the words "impractical" and "impossible" in a report by two Mayo Clinic radiologists to the AMERICAN JOURNAL OF ROENTGENOLOGY AND RADIUM THERAPY (Nov.).

The radiologists making the gloomy report are Drs. B. R. Kirklin and John R. Hodgson. They stated:

"It would take 1,917.6 roentgenologists examining a stomach every two minutes for eight hours steadily every day of the year, including Sundays and holidays, year after year continuously, to make a satisfactory survey of this group of people (all those over 40 years old) every three months."

All persons over 40 years would have to be examined, they explained, because they estimate that 95% of all the stomach cancers occur in persons in that above-40 age group. This group makes up about 30% of our population.

The survey must be made on each person in the group every three months, they stated, because stomach cancer can develop within that time. If done less often, the purpose for which the examinations are made, detection of the cancer in time to save the patient, will be defeated, they stated.

"We believe that one of the most important parts of the campaign against cancer is the continued education of the public to an awareness of cancer," they stated. "We believe that this should be augmented and that this alone will bring many patients to the physician in time. In any event the public must be educated before any attempt to survey is tried. They should especially know why they have to be examined every three months."

Science News Letter, December 11, 1948

MEDICINE

Ringworm Rated Most Common Skin Disease

➤ RINGWORM, the fungus infection of the scalp and body, is probably the commonest skin disease today, Dr. Everett C. Fox of Dallas reported to the American Medical Association meeting in St. Louis.

He based his report on records of more than a million cases.

Eczema and acne also rate high on his list of the 10 most frequent skin diseases. The other seven on the itchy list are:
1. seborrhea, a scaly skin disease caused by excessive discharge from certain skin glands; 2. contact dermatitis, caused by irritation of the skin from various chemicals or animal or plant life; 3. impetigo, the superficial infection caused by streptococcus or staphylococcus germs; 4. scabies, commonly known as the itch; 5. nettle rash, or hives; 6. psoriasis, a chronic inflammatory skin disease characterized by patches covered with white scales; 7. pityriasis rosea, an inflammatory disease marked by reddish spots and ring-shaped patches upon the body.

Science News Letter, December 11, 1948

ZOOLOGY

Beaching of Pilot Whales Still a Zoological Riddle

➤ ZOOLOGISTS have never been able to find the reason for the suicidal "follow-the-leader" tactics of the pilot whale or blackfish, which caused a school of 44 of them to beach themselves near St. Augustine, Fla. This peculiar behavior is shared by a related species, the false killer whale, stated Dr. Remington Kellogg of the U. S. National Museum.

There used to be a small rendering plant on Nantucket, to salvage the carcasses of pilot-whale schools coming ashore on the North Atlantic coast. Its owner, Howard Wardell, would send a fleet of trucks to pick up the luckless little whales. This plant has now closed down, due to scarcity of raw material.

Scottish fishermen on the Orkney islands, and Danes on the Faroes, still take advantage of these chance harvests, and even help to drive the animals ashore by pounding on cans and tubs held in the water.

Beached whales do not die as fish die. They are air-breathing mammals, depending on lungs, not gills. However, when their bulky bodies are not buoyed up in the water, their own weight crushes them down, making them unable to breathe. So they die of suffocation, as a man might if he lay on the ground with a heavy weight on his chest.

Science News Letter, December 11, 1948

The first American *automobile* powered with gasoline was the Duryea car built in Springfield, Mass., in 1893.