

IS THERE A DEATH RAY?

DURING the last war the Press was full of stories of death rays, and there were even more during the period of preparation for this one. I wish these stories were true. A death ray is just the thing to bring down bombers.

Here is the reason: A searchlight operator may catch an aeroplane on his beam, but it does not follow that an anti-aircraft gunner will hit it. If the bomber is two miles up, the light from the searchlight takes one-hundred-thousandth of a second to reach it; during which time the bomber, if it is going at three hundred miles per hour, has moved one-twentieth of an inch. So the bomber can no more hope to escape the searchlight by mere speed than a snail can escape from a greyhound.

Half a Mile a Second

Now suppose a gunner fires a shell at the bomber, and suppose the average speed of the shell is half a mile a second, which means a muzzle velocity well above this, the shell takes four seconds to reach the 'plane.

During those four seconds the 'plane has moved six hundred yards. To score a hit, the gunner must estimate the 'plane's speed correctly, and if the pilot is dodging, he must be a thought-reader, too.

Even if the shell passes within a foot of the 'plane, it won't hurt it unless it bursts at the right height, which means very careful work with the time fuse.

Now suppose that instead of the searchlight beam the defenders had some kind of ray which, the moment it touched the 'plane, would set it alight, stop its engines, or kill the pilot.

We should, in effect, be giving the gunners a gun with a muzzle velocity increased nearly half a million times, and no need for fuse-setting. No wonder both inventors and journalists who do a little wishful thinking are keen on death rays.

Useful on Land, Too

They would also be an excellent thing for land war. If the infantry were armed with death rays instead of machine-guns, it might be possible to hold the Western Front with, say, ten thousand infantry on each side, and the rest could go home! Unless indeed one death-ray machine could knock out another. And if one got a death ray first, he could concentrate almost all his troops on one sector of the line and attack there, while holding the rest very lightly.

By J. B. S. HALDANE, F.R.S.

The possibilities of the use of death rays in warfare are explained here by a famous bio-chemist. We quote from an English Exchange

"War of the Worlds"

At the time when Wells wrote "The War of the Worlds" physicists were finding out all sorts of invisible rays. Besides visible rays, infra-red rays with heating power, ultra-violet rays with chemical activity, X-



Professor J. B. S. Haldane explaining, not the possibilities of the death ray, but how the *Thetis* submarine victims died. Professor Haldane remained, as an experiment, for a total of 20 hours in a sealed tank, breathing foul air. His listeners are members of the International Brigade back from Spain, who helped him with his dangerous experiment

rays, and radio waves, which can be regarded as rays, were being discovered.

Among all these it was quite natural to think that some were likely to be very deadly, just as, of the thousands of new chemicals which were made each year, a few turned out to be very poisonous.

Death by X-Ray

And, in fact, some of these new rays were rather deadly. Ultra-violet rays blister the skin, and X-rays kill as well as cure. A lot of the first group of surgeons who worked with them were killed. And it wasn't a pleasant death either. Their skins were injured, and the "burns" not only would not heal, but often developed into cancer, which killed them after years of suffering.

This sort of thing would be of little use as a military weapon. A battalion would not be stopped from attacking because they were liable to die painfully five or ten years later.

We know now that all kinds of rays are periodic electro-magnetic disturbances mov-

ing with the speed of light. They differ according to their wave-length, or what comes to the same thing, the number of cycles per second.

Short and Long Radio Waves

Long waves, measured in miles or hundreds of yards, are the ordinary radio waves. Those measured in inches are the short radio waves. All of these are harmless, though a powerful beam of very short waves warms you up if it passes through you.

Then come still shorter waves, measured in thousandths of an inch. These form infra-red rays, which have a decided heating effect but are not dangerous. Nor, of course, are visible rays. Still shorter waves form ultra-violet and X-rays, which are dangerous.

But they cannot be used in war, for a very interesting reason. The air is not quite transparent to them. Most of the ultra-violet rays which start from the sun are stopped by the air. Even at the top of a mountain the sunlight has more sunburning power in relation to its heating effect than at sea level. And the sunburn is due to the ultra-violet components of sunlight.

Natural selection has seen to it that we are not much injured by any rays which will go through even a few hundred feet of air. But animals which live permanently underground are often killed by ordinary sunlight.

There is one kind of death ray which is sometimes thought to be effective on the basis of model experiments. This is a beam of ultra-violet rays so strong that it makes the air conduct electricity. The idea is to shine such a beam on an aeroplane, and then pass a powerful electric current along it.

This is, however, useless, for the reason that such beams are quickly stopped by air.

Scientists Don't Believe in Them

For such reasons as these, scientists will not believe in death rays. One inventor demonstrated one which, he said, killed a sheep. Certainly the sheep died, but the Government department which was offered the ray insisted on doing a post-mortem examination on the sheep, and found a quite ordinary poison. Still, I suppose the present Inventions Board has to examine several specifications for death rays every week, and may even have to test a few.

Finally there are rays which stop engines. How they are to get through even a thin layer of metal we are not told. But about ten years ago the Germans were reported in the Press to have brought down some French aeroplanes by this means. If it were anything but a romance they would be using it now.

An inventor demonstrated a ray of this kind to the Admiralty, and a number of cars suddenly stopped in the street when he turned it on. But as an official car was unaffected, it was thought that these cars must have been driven by his friends.

I wish there was a death ray. But it is going to take a great deal to make me believe in it.