

# The Magic of Modern Science



ANCIENT alchemists and magicians covered their doings with such mystery that early science came to be known as the "black arts." Nothing could be more typical of the change from darkness to light than the invitation lettered on the office door of Dr. Willis R. Whitney, research director for the General Electric Company at Schenectady. "Come in, rain or shine," warmly greeted the sign in bold black letters. So I walked right in.

It was the beginning of a walk into wonders more fascinating than anything ever dreamed of the philosopher's stone. Doctor Whitney, himself a distinguished chemist, is the leader of a group of experimenters who spend their time trying electricity at new tasks—and the work that they have succeeded in getting out of the mysterious genii is truly magical.

Stepping into an adjoining laboratory, I ran into a near-wilderness of glass piping, test-tubes, insulated wiring, and other laboratory accessories. The magic of this room was in a curiously shaped vacuum tube. Wires from it connected two plates which stood upright and parallel on a nearby table, separated by a distance of about a foot. One of the laboratory men picked up a large porcelain insulator. "Looks dry, doesn't it?"

Yes, it seemed as dry as the well-known bone.

He placed it in the space between the plates, turned on a switch and instantly the "dry" porcelain began to steam like a hot wet towel.

"With the old baking methods many hours were required to cook the porcelain dry," he explained, casually. "Now, with this intense radiation—with a frequency of 60,000,000 cycles, five-metre wavelength—the whole job could be done in less than five minutes."

## The Energy of Radio Waves.

THIS simple demonstration of the energy packed into radio waves was only a start. In another room I saw a more powerful tube of the same type. Near it rested an enormous incandescent lamp, rated at 1000 watts. There were no connecting wires or sockets, but the moment the current was turned into the radio valve, the lamp glowed with intense light—a kind of power transmission by wireless.

A fly was put in a glass tube and brought near the mysterious bulb of energy. The fly buzzed around importantly, but, almost as soon as the radiation was turned on, it fell to the bottom of the tube dead.

Then a number of flies were put in a glass jar, and through an inlet by means of tubing, a circulation of air, well below the freezing point, was passed through the container. The effect was that of a blizzard—gradually the flies dropped and lay inert. When it seemed that all the insects were frozen dead in their glass Antarctica, the vacuum tube was set up within a few feet of them, and the electric power turned into it. Presently a fly

*In the following article a visitor to an American research laboratory describes some of the marvels that have been accomplished in the fields of electricity and radio by present-day scientists.*

began to stir, then another, and another. Within a minute there was considerable squirming, and eventually several of the insects were flying around in the freezing temperature, for through it all a thermometer within the jar showed that the air remained at thirty-two degrees Fahrenheit.

Seemingly, the effect of this radiation on living things is internal. The laboratory men themselves found that, while working with the tube, they began to feel feverish. A physician was called. He noted that, after about an hour's continuous exposure, the temperature of the blood rose, and in some cases the fever reached 100 to 101 degrees.

A recent development in medical practice is the use of artificially stimulated fever to combat certain diseases. This suggested to Doctor Whitney that

the new radio valve might be utilised in this field. Accordingly experiments were conducted, and the results so far achieved have given scientists confidence in an ultimate complete success.

Another possible application is the wireless transmission of power, but in this possibility Doctor Whitney has little confidence. "The energy rapidly falls away with distance," he explained, "and about ninety-nine per cent. of the power is used in transmitting the remaining one per cent. This is too great a cost; wires are cheaper. There is, however, a real field for the use of wireless transmission in the remote control of electrical apparatus, and here may develop an important field for the industrial application of this radiation."

Leagued with Doctor Whitney in this many-sided exploration of electricity are Dr. W. D. Coolidge, the physicist, and Dr. Irving Langmuir, the chemist—though one can only wonder where the one's physics leaves off and the other's chemistry begins, so intertwined now are these basic sciences.

## A Super-Power X-Ray Tube.

IN Dr. Coolidge's laboratory the electronic wizards were working with a vacuum tube of a different type—an X-ray tube designed to operate at the enormous pressure of 400,000 volts. Why so powerful?

"Because we want deeper penetration," answered the young scientist who was on the job here. "Our most powerful X-ray tube in use to-day operates at 250,000 volts, and is able to penetrate three and one-half inches of steel. But we make turbine castings many inches thick, and we want an X-ray which will photograph the inner structure of the steel and show up any deep-lying flaws. Our immediate goal is a 400,000-volt unit, and when that is attained we hope eventually to get a controllable X-ray tube at 900,000 volts."

Even now, the radiation from the 250,000-volt tube is so penetrating that men in adjoining rooms would be involuntarily X-rayed through the walls if the tube were operated unshielded. Some of them hung up a jawbone on the wall in front of a holder containing a photographic glass plate. When they developed the plate, hours later, they had a photograph of the bone, though the X-rays in reaching it had travelled more than thirty feet and passed through two walls.

The projected 400,000-volt tube was in process of being exhausted of its air. Three pumps were working in series—a force pump in the basement, an oil-pump in the room, and directly beside the tube a mercury-vapour pump invented by Dr. Langmuir. Before his invention, hours were required to pump a tube down to the lowest vacuum attainable. Now, with the Langmuir mercury pump, it is easy to attain within a few minutes a much more complete vacuum than was possible under the old conditions.

Dr. Langmuir's inventive genius has shown itself in many directions, but nowhere more strikingly than in his atomic-hydrogen flame.


"Just look through that window there," instructed one of the laboratory assistants, "and you'll see what it can do."

"Which window?" I wondered, glancing at the smooth wall of the adjoining partition he had indicated, and which I now saw was heavy glass, black as night. "Can anything be seen through such blackness?"

"You'll see all you want to see," he retorted with a chuckle, as he put on a heavy asbestos helmet and disappeared behind the partition. And in a moment I saw—about all my eyes could stand.

A flame leaped out in the darkness and illuminated the hidden interior. It spurted from a contrivance which the helmeted man held in his right hand.

(Concluded on page 9.)



## DESTINY'S DOOR

### A One Act Radio Play

Written by Doctor  
*de Clive Lowe*

Produced by Mrs.  
*Zoe Bartley-Baxter*

from

*LYA Auckland, Tuesday, April 14.*

An

## All New Zealand Production