MEDICINE

Research May Be Step Toward Anti-Cancer Vaccination

Dream of Research Men May Be Realized or Doomed in Studies With Antigen Substance in Rabbit Tumors

THE DREAM of finding a way to vaccinate against cancer is one step closer to becoming a reality or to being finally and definitely proved to be nothing but a dream. Which way the dream will turn out may be determined by studies now under way at the Rockefeller Institute for Medical Research in New York.

The first step toward making the dream of anti-cancer vaccination either a glorious reality or a lost hope is reported by Dr. John G. Kidd of the Institute. (*Journal of Experimental Medicine,* Nov. 1)

One kind of cancer or tumor, the papillomas of rabbits, is known to be due to a germ of the virus type. This germ or virus, Dr. Kidd has now found, is strikingly similar, in its ability to induce resistance or immunity to itself, to other germs against which vaccination is successful. It acts as do the classical antigens of other disease germs which call up the germ-fighters of the body known as antibodies. It is because of such antigens that vaccination or immunization against smallpox, diphtheria and a few other diseases is possible.

Discovery of such an antigen substance in rabbit papillomas means that scientists should be able to protect rabbits from these tumors by a sort of vaccination.

Whether they can do the same for other kinds of tumors, including human cancer, depends on whether they can find such antigen substances in the tumors. Search in this direction, Dr. Kidd reports, is now being made. The results of this search should provide the final word on the possibility of anti-cancer vaccination.

Science News Letter, November 19, 1938

GENERAL SCIENCE

Defense and Agriculture Take Bulk of Research Funds

Federal Government's Research Confined Almost Entirely to Projects of Immediate Practical Value

RESEARCH for the American farmer and engineering research, mainly for national defense, absorb over $43,000,000 or 75 per cent. of all the $57,700,000 research expenditures of the federal government.

This is the analysis, made by Dr. Lyman J. Briggs, director of the National Bureau of Standards in Washington, after a study of the Federal budget for the fiscal year 1938. Dr. Briggs' report was made to a forum on "Invention and the Engineers' Relation to It" sponsored by the American Engineering Council.

The distribution of research funds, exclusive of statistical agencies and those engaged in social sciences looks like this:

Engineering research, mainly national defense	36%	$21,000,000
Surveys and mapping	16%	9,400,000
Physical sciences	4%	2,200,000
Natural sciences, mainly agricultural research	39%	22,400,000
Public health	5%	2,700,000

The federal government, Dr. Briggs explained, thus confines its research activities almost exclusively to subjects having an immediate practical interest. It has not undertaken long-range research, except in the field of agriculture. Basic research in this country has in the main been carried out by our colleges and universities. In so far as these institutions have been supported by state funds, the various states have borne the responsibility of providing for basic research, upon which new industries are built.

"New industries, which create additional employment, grow out of discoveries made in the laboratory," Dr. Briggs emphasized. "The radio industry is a striking example. To provide more employment we need new facts, new discoveries, upon which new industries may be based—industries that will supply things that people will want in addition to what they already have, not industries which merely compete with those already in operation.

"Discoveries of this kind are not made overnight, but they will continue to be made, as they have been made in the past, if facilities and support are provided for basic research. A steady flow of new discoveries would stabilize economic conditions. Coordinated basic research, directed along lines that may lead to new industries, should be supported by the federal government as long-term insurance against unemployment and economic stagnation."

Science News Letter, November 19, 1938

GENERAL SCIENCE

Forced Peace Brings Disillusion to Science

IN BRITISH scientific circles, as elsewhere in the intellectual world, there was a surge of hope after the costly evasion of precipitate war at Munich. With removal of war's menace, mankind was free to enjoy scientific advances in the future greater than the wonders of the past. Real progress could be made in study and solution of problems at the root of the world's economic and social unrest. That was the hope.

"Disillusion has been rapid, complete and painful," to quote a leading article in the British science journal, *Nature*. "The first task to which we are now bidden to turn of necessity and at redoubled speed is armament and provision for defense. So much the more then are energies and resources withdrawn from the advancement of what we had come to realize were the essential needs of future development in human life. The sole palliation is that our aim is the preservation of the freedom of the spirit which alone consorts with the dignity of man."

If this haunting fear of having sold out science's necessary internationalism to rampant nationalistic ideology is strong in Europe, we may expect it to

be felt here in America. Accompanying the rising conviction that America must protect the Western hemisphere from political, economic and even actual invasion by dictator-led nations, there will be recognized the necessity of guarding anew the universal and world-wide character of science, art, literature, and ethics. If the torch of reason and knowledge is smothered by intolerance and obscurantism in some blighted areas, it must be kept kindled where the mind and spirit are still free.

How to check the epidemic without becoming infected is perhaps the major problem of the intellectual world today. Fire used to fight fire often is turned upon us by the wind of emotions. Defensive war is no more kind to creative science and other intellectual pursuits than aggressive war. Here is a major problem for all who consider themselves intellectually civilized.

Science News Letter, November 19, 1938

PHYSICS

$4,000 Diamond Helps Determine Basic Constant

Flawless Gem Has One Large Surface Ground Smooth To About One Five-Hundred-Thousandth of an Inch

By ROBERT POTTER

See Front Cover

DEEP down in a tiny, sub-basement laboratory at the Johns Hopkins University, scientists are using a large diamond slab—that would cost you $4,000 on the open market—to probe the fundamental constants of the physical world.

Did you ever hold a flawless $4,000 diamond in your hand knowing that if you dropped it to the floor it might chip or shatter? Probably not. But you can realize that you don't hold it, you clutch it.

And yet clutching is difficult, for the Johns Hopkins diamond has a slippery surface because it is ground smoother than ever a diamond has been ground. One surface is plane to within a tenth of the length of a green ray of light; or about one five-hundred-thousandth of an inch.

"Here it is," said young Prof. J. A. Bearden, Hopkins' X-ray expert, as he handed me a test tube filled with a brownish fluid.

And there, floating in the fluid, was a shimmering three-carat diamond slab as big as the nail on a man's little finger. Yes, the diamond was floating.

"You see," explained Prof. Bearden, "we have to know the density of this diamond. One way to determine the density is to make up a special solution just as dense as the diamond so that it will neither float nor rise in the tube.

"So delicate is the balance that if I place my hand on the test tube, and warm the solution slightly, the diamond starts to sink. The heat of my hand expands the liquid, makes it less dense and so the diamond starts to sink because it is relatively more dense.

"If I want to make the diamond rise again I reverse the process, immerse the liquid in cold water, make the liquid more dense so that the diamond becomes relatively lighter than the liquid and rises."

Using a little hook, Prof. Bearden snared the diamond and lifted it out of its brownish bath, washed it out and put it in my hand. Its surface seemed slippery because of its smoothness.

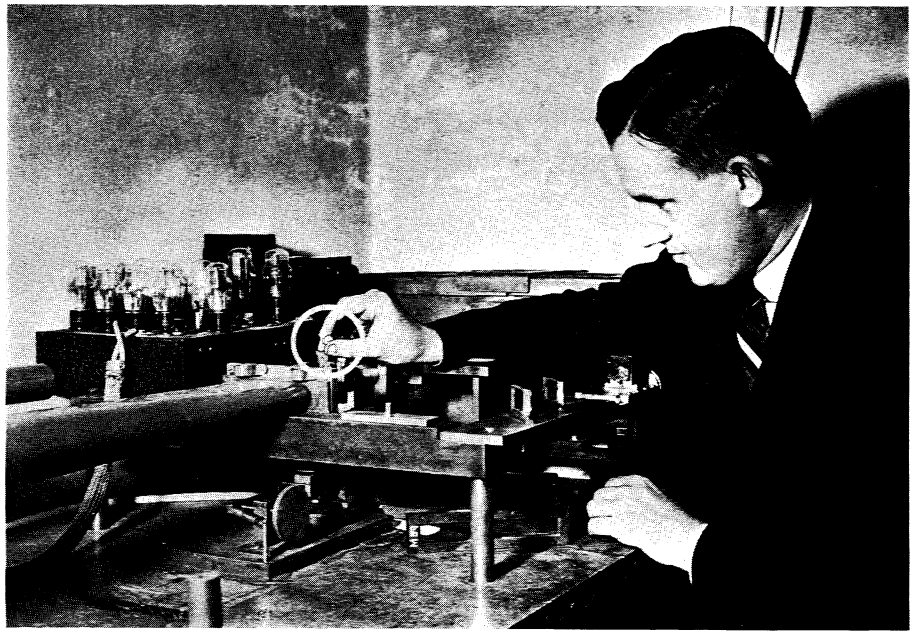
Gingerly I held it up and saw the brilliant gleaming colors of refraction in the flawless gem. And then quickly I laid it down on a convenient black cloth.

One corner of the diamond is used as a tiny prism to bend, or refract, X-rays. By knowing the amount of refraction of the X-rays—and a lot of other details too—Prof. Bearden is able to calculate the value of the very important physical constant known as "e over m": "e" stands for the charge on the electron and "m" for the mass of the electron. As the physicists write it, "e/m," appears again and again in the equations of atomic physics.

So important is the constant that scientists are ever searching for different ways of determining its value. In fact they seek to check measures made by one method against those made by another to get the most exact determination possible.

Prof. Bearden uses the X-ray refraction method to provide a new and more accurate determination. His scientific report, describing his discoveries, appears in the *Physical Review* (Nov. 1).

And you might as well know Prof. Bearden's little secret. Through a research grant from the American Acad-



UTILITARIAN

This three-carat $4,000 stone is not for ornament. Here it is placed in the X-ray defraction apparatus by Dr. J. A. Bearden. For experimental purposes, one surface has been ground flatter than any other diamond known.