

ology (Dr. Haddow has specialized in this field), cytogenetics, immunology and other fields. Through all the research, Dr. Haddow has pointed out, the main purpose is to clarify the physiological mechanisms of growth regulation, their loss in the cancerous process, and the essential differences between normal and cancer cells.

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Curies' Spirit Guides Institute in Paris Today

► PARIS—The Curies would have nodded approval a few weeks ago when the big new Swiss-made betatron machine operating at 35 million electron volts began operation on various types of cancer here at the Radium Institute of the Curie Foundation.

I walked through long basement corridors to see the betatron after lingering outside the old office and laboratory of Madame Curie and seeing the double-bust statue of her and Pierre Curie that had been given by grateful Poles.

A new building is almost ready to open after being built with Canadian donations, and this will house the research laboratories of the Foundation, now crowded with hospital units.

But one of the advantages of the Foundation, which is a part of the University of Paris and a few blocks from the Sorbonne, is that the Curie Hospital with outpatient clinics—all free, of course—is nearby.

Prof. Antoine Lacassagne, the "grand old man of cancer" in France, still maintains a laboratory at the Foundation although his

work as director of the department of medical application has been taken over by Dr. Raymond Laterjet.

On the wall of Dr. Laterjet's office hangs a picture of the Curies, and he keeps a garden near their statue.

"We started with 30 people working here in 1919," Dr. Laterjet told SCIENCE SERVICE, "and now we have 1,000 with laboratories also in the suburbs."

Deep uterine cancer is treated with gamma rays from the betatron, directed from the front, back and either side of the patient.

Electron treatment is given to patients with skin growths, breast and lung cancer. The electrons are accelerated in a circular orbit in a changing magnetic field.

Before such an apparatus was available, large radium units were used, but these were expensive and had some technical disadvantages. Cobalt machines are also in constant use here. A disadvantage of low-voltage X-ray treatment is that it is not possible to get large enough doses to the tumor through the skin and normal tissues. Radiotherapy to be successful must damage the abnormal cells with as little as possible danger to normal ones.

I asked Dr. Laterjet what percentage of "cures" came out of the hospital and he replied that if cancer specialists were honest today they would not claim to cure more than 15% of all types of cancer.

"The incidence of cancer is about the same in most civilized countries," he said, "and cures are about the same."

Cancer of the liver is extremely rare in France, but in Japan it is common, perhaps

due to genetic or dietary differences, Dr. Laterjet said. Lung cancer is going up in France, and although he said air pollution was partly to blame he had a very definite feeling that cigarettes share responsibility for 95% of this type of malignancy.

"We have a state monopoly of tobacco here," he told SCIENCE SERVICE, "and although the scientific research of the monopoly is fairly honest, too much money is paid to the government to stop selling tobacco. If it could be demonstrated that treatment of tobacco would reduce the incidence of lung cancer, of course it would be given. No one here disclaims the bad effects of benzyrene in tobacco."

Prof. Lacassagne believes there should be caution shown in the use of X-rays for diagnosis, both of lungs and of the female pelvis of pregnant women, but in many cases the need for X-ray pictures outweighs any possible danger.

His work has shifted between clinical and experimental in the 50 years of his career.

In 1932 he discovered that the injection of female sex hormone produced cancer of the breast in male mice. His work was the first in which a naturally occurring compound produced cancer.

"I did clinical work in the first part of my life," he said, "but now I am doing basic research. In Moscow at the International Cancer Congress this month, I will discuss work I have been doing on adrenal relationship to carcinoma of the liver and take part in two discussions." He has found that "butter yellow," a dye prohibited in food in the United States as early as 1919 because of its toxicity, exerts the same effect on wild and laboratory rats in producing cancer.

"I am trying to understand the mechanisms by which normal cells become cancerous in animals," he said, adding that "the field of science is never finished, fortunately for human beings."

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TECHNOLOGY

Underwater Sound Source To Be Used in Research

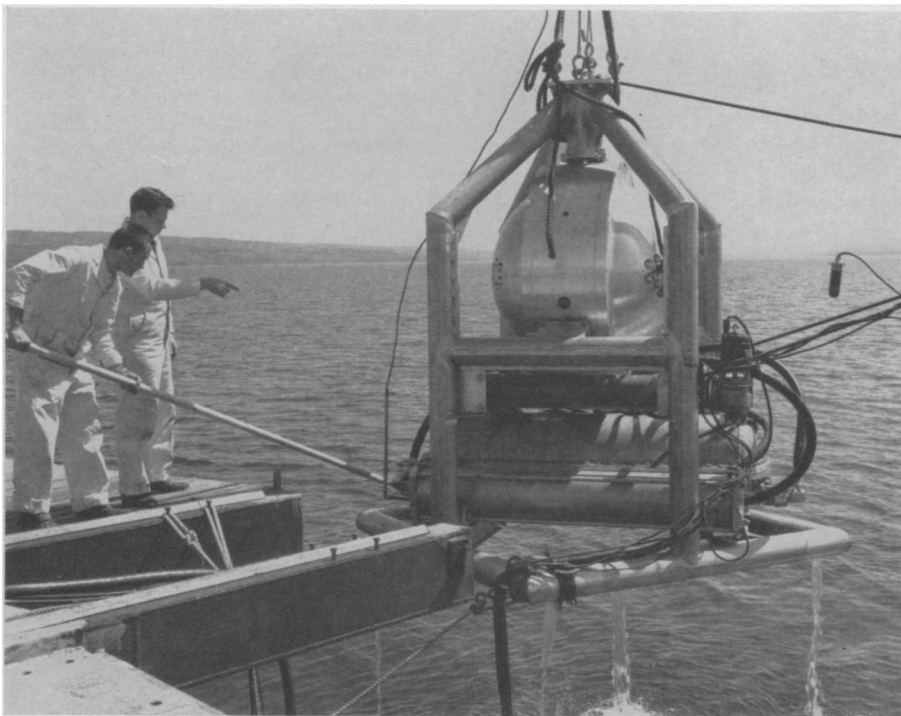
► A POWERFUL UNDERWATER noise-maker is undergoing trials at the test and evaluation center of General Dynamics/Electronics on Seneca Lake, N. Y.

The underwater acoustic system differs from conventional sound generators, which are powered electronically, because it uses hydraulic fluid under pressure as an energy source. It is to be used as a massive source of sound in anti-submarine warfare research.

The hydroacoustic transducer converts hydraulic fluid under pressure into vibratory energy, which is transmitted in the water as acoustic waves. It can be made to operate at any frequency in the audio range. The new transducer is a broadband sound generator made to operate at low frequencies built for the United States Navy Underwater Sound Laboratory.

Transducers using the hydroacoustic principle have a number of advantages over conventional types. They are inexpensive, rugged and require no special materials.

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KING-SIZED KLAXON—Experimental six-ton hydroacoustic transducer, developed by General Dynamics/Electronics-Rochester for U.S. Navy Underwater Sound Laboratory, is hauled from the waters of Seneca Lake, New York, where it is undergoing trials at the company's test and evaluation center on Seneca Lake.