

ment, interest and personality. In this work it saved \$15,000 in labor of scoring alone.

In the coming year it is planned to produce the robot examination machine in quantity and begin its widespread introduction into schools throughout the nation.

Mechanically the testing machine is able to function because a soft lead

pencil mark conducts electricity. The pupil marks his answers on a special blank. This is slipped in the robot tester and covered by a mask that allows only the right answer marks to be recorded electrically on a dial. Since the machine "sees" as many as 150 answers at one time and grades them instantly, it works very fast.

*Science News Letter, January 2, 1937*

animal tumors are killed more readily when they are irradiated within the animal's body than after removal from the body. This, according to the fluid-flow theory, is because tumors removed from the body lack circulation and consequently there is no constant flow of fluid to and from the cells. It takes longer, therefore, for the fatal swelling to take place in the cell.

A new type of inheritance or transmission of cancer from one generation to another which may prove of far-reaching importance in the control of human cancer was reported by Dr. Clarence Cook Little, director of the Roscoe B. Jenkins Memorial Laboratory, Bar Harbor, Maine.

Some influence transmitted directly from a female mouse to her female descendants is of prime importance in determining whether these descendants will have cancer of the breast, Dr. Little found.

"A new type of either transmission or inheritance which is not Mendelian is thus demonstrated for the first time in mammals," Dr. Little said. "If the same situation exists in humans as in mice it should prove to be a most important practical principle for guidance in cancer control. Study of the question should be begun at once to determine whether or not the facts hold true in humans."

*Science News Letter, January 2, 1937*

#### MEDICINE

## Theory Tells How Radiations Kill Cancer and Other Cells

**A** THEORY explaining the fundamental mechanism by which X-rays, gamma rays of radium and the still newer and faster neutron rays destroy cancer and other cells was advanced by Dr. G. Failla, of Memorial Hospital, New York, at the American Association for the Advancement of Science meeting.

A cancer cell that has been irradiated, it appears from the new explanation, is something like a man in a leaky lifeboat without means of bailing out the incoming fluid. "Direct hits" from X-rays, gamma rays and other ionizing radiation further add to the cell's danger by partially puncturing the cell wall as bullets shot at the lifeboat would weaken its hull and add dangerous weight if they collected inside.

Cells have ways of eliminating some kinds of foreign materials that get inside them, but they are not equipped to rid themselves of the ionized particles produced within their walls by radiation. Following irradiation there are at first the same number of ionized particles inside and outside the cells. But the constant flow of fluids bringing food to the cells and removing waste products carries away the ions on the outside, as water might wash off barnacles on the outside of the lifeboat but could not remove any that might grow inside of it.

When the number of ions becomes greater inside the cell than outside it, the flow of fluid into the cell increases. All this causes a more or less permanent swelling and dilutes the substances essential to the life of the cell. Such dilution may injure the cell.

In addition the excessive number of ions and the presence of foreign material may also interfere with the life processes of the cell. If the dose of radiation which brought about these

harmful conditions has been large enough, the cell eventually dies.

Cancer cells and skin cells which are rapidly growing cells are more sensitive to radiation than other cell types. Dr. Failla explained this by pointing out that rapidly growing active cells have a greater flow of fluid bringing food into them and removing waste products.

The fluid flow is essentially and fundamentally the thing that makes irradiation dangerous for cell life. Dr. Failla calls his new theory the "fluid-flow" theory. With its aid he explains many known facts about the effect of radiation on living tissues. For example,



#### EXTRAORDINARY APPARATUS

Dr. Yeager's "mechanocardiograph" is made of a fine-drawn hollow thread of glass, a hair to hook it up to the heart of the insect (the white spot near the head of the insect in the paraffin "bath-tub"), a pair of common bent tweezers to hold it up; a projection lamp on one side, a microscope lens on the other. Movements of a shadow of the glass thread are projected on a screen.