inquiry has almost been incalculable. The renewed study of effects of electric discharge in vacuum tubes has already, in the work of such investigators as Lenard, J. J. Thomson, and others, apparently carried the subdivision of matter far beyond the time-honored chemical atom, and has gone far toward showing the essential unity of all the chemical elements. It is as unlikely that the mystery of the material universe will ever be completely solved as it is that we can gain an adequate conception of infinite space or time. But we can at least extend the range of our mental vision of the processes of nature as we do our real vision into space depths by the telescope and the spectroscope. There can now be no question that electric conditions and actions are more fundamental than many hitherto so regarded.

The nineteenth century closes with many important problems in electrical science as yet unsolved. What great or far-reaching discoveries are yet in store, who can tell? What valuable practical developments are to come, who can predict? The electrical progress has been great—very great—but after all only a part of that grander advance in so many other fields. The hands of man are strengthened by the control of mighty forces. His electric lines traverse the mountain passes as well as the plains. His electric railway scales the Jungfrau. But he still spends his best effort, and has always done so, in the construction and equipment of his engines of destruction, and now exhausts the mines of the world of valuable metals for ships of war, whose ultimate goal is the bottom of the sea. In this, also, electricity is made to play an increasingly important part. It trains the guns, loads them, fires them. It works the signals and searchlights. It ventilates the ship, blows the fires, and lights the dark spaces. Perhaps all this is necessary now, and, if so, well. But if a fraction of the vast expenditure entailed were turned to the encouragement of advance in the arts and employments of peace in the coming century, can it be doubted that, at the close, the nineteenth century might come to be regarded, in spite of its achievements, as a rather wasteful, semibarbarous transition period?

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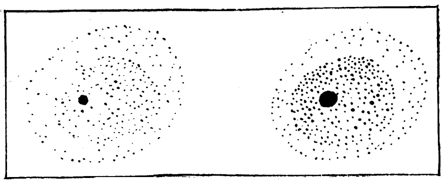

NORMAL CANCEROUS

The dark spot near the center of each cell represents the nucleolus. The larger nucleolus of the cancer cell is suggested as a means of distinguishing it from normal cells with which it might be confused.

MEDICINE

Way Found to Distinguish Cancer Cells From Normal

THE SIZE of the cell nucleolus is the distinguishing feature by which a cancer cell may be told from normal cells, Drs. William Carpenter MacCarty and Eva Haumeder of the Mayo Clinic told members of the American Association for Cancer Research at their meeting in Washington this week.

Medical scientists have long been searching for a method of distinguishing between normal and cancer cells. It is not always possible to tell from its gross appearance whether or not a tumor is malignant.

Surgeons about to remove a tumor generally send a small piece of it down to the hospital laboratory for diagnosis. The pathologist must, within two or three minutes, cut a paper-thin sliver from the piece of tumor tissue, fix it on a glass slide, stain it, examine it under the microscope, and report to the surgical team waiting in the operating room whether or not the tissue is cancerous.

But even when examined in this way, cancer cells sometimes look so much like certain types of normal, non-malignant cells that it is extremely difficult to make an accurate diagnosis.

Drs. MacCarty and Haumeder have found that the area of the nucleolus in the cancer cell is much greater than the area of normal cell nucleoli. They conclude that the cancer cell has at least one differential characteristic and that this must be used by those who expect to reduce the tremendous mortality from cancer.

The nucleolus is a very small but important part of a cell. For their investigations, the Rochester scientists had to devise a special method of measuring this small area, which they described at the meeting.

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GENETICS

Control of Sex in Rabbits Attempted By Electricity

AN ATTEMPT to control the sex of rabbits is reported by Prof. N. K. Koltzov and V. N. Shröder of the Moscow Institute of Animal Breeding in a note to *Nature*. The method involves the use of an electric current and artificial impregnation.

The general theory of geneticists is that spermatozoa carrying the x-chromosomes produce females while those carrying y-chromosomes produce males. The ova all have the x-chromosomes. The Russian investigators reasoned that a method which would separate the spermatozoa carrying x-chromosomes from those carrying y-chromosomes would give a method by which male or female mammals could be bred as desired.

The Russian investigators further believed that the spermatozoa carrying x-chromosomes might carry an electrical charge of opposite sign to those spermatozoa carrying y-chromosomes. Accordingly they tried to separate them by passing an electric current through the sperm suspended in a salt solution. They found that part of the spermatozoa did go to the positive pole, part to the negative pole while the rest remained in the middle of the apparatus.

The Russian investigators artificially impregnated three female rabbits with the different portions of the sperm that had been separated by electricity.

"The female impregnated with the anode spermatozoa produced six young, all of the female sex," they reported; "the second, impregnated with cathode spermatozoa, produced four males and one female; the third, impregnated with the central fraction left between the two poles of the Michaelis apparatus, bore two males and two females."

While the separation of spermatozoa by an electric charge is of interest to scientists, practical application of this method even with lower animals, is considered extremely remote.

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