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The susceptibility of cells to radium radiations.

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Among the various factors which influence the response of cells to radium radiations are (1) the temperature of the cells at the time of radiation, and (2) the permeability of the cell membrane. This statement is based on the results of experiments with paramoecium and some other protozoa. The radium, amounting to 13.4 mg of element, was enclosed in a thin-walled glass capsule, and was held at a distance of 2 mm from the water containing the cells. All the paramoecia used were descendants of a single wild cell.

Paramoecium cells are more susceptible to radiations at the upper limit of their physiological range of temperature than at their lower limit. At 14° C. the lethal dose is about 10 hours; at 37° C. it is 1½ hours. These temperatures in themselves are not injurious to the cells. For each rise of 8° C., the length of the lethal dose is halved. In lower temperatures the lethal dose is somewhat shorter than would be expected. The curve expressing these relations is the same as that which expresses the relation between temperature and the rate of metabolism in paramoecium as shown by the rapidity of cell division and of the pulsating of the contractile vacuole.

Cells whose membranes are relatively permeable are more susceptible to radiations than those whose membranes are relatively impermeable. The permeability of paramoecium and other protozoa is determined by the rate at which dilute NH_4OH enters the cells and decolorizes the neutral red in which they have been stained. At different periods of its life cycle, paramoecium shows varying permeability. During conjugation the cells destain in 7 minutes, when treated with $n/1500$ NH_4OH, while single cells destain in 20 minutes. At 21° C. the lethal dose of radiation for conjugating cells is 3½ hours: that of single cells is 5½ hours. A comparison of the permeability of paramoecium with that of Stylonichia shows that the former cells destain in about one-

fifth of the time required by the latter. The length of the lethal dose of radiations for these two forms is about in the same proportion.

It can be shown that one of the physical effects of the radiations is to increase the permeability of the cells by injuring the cell wall. If the treatment is long enough continued the cells cytolyze completely. From this it follows that when cells are already highly permeable, as they are during growth and division, complete cytolysis quickly ensues: whereas when the cell membrane is relatively impermeable, as it is in resting cells, radiation must be long continued before destructive cytolysis can be observed.

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The effect of increase of blood pressure on the concentration of colloidal dyes in the plasma.

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Great changes in the number or volume of the corpuscles, or in the haemoglobin content of the blood may occur in a very short time. In using corpuscles or their derivatives as the indicator of the concentration of the blood one meets with the objection that there might be hidden masses of corpuscles ready to be put into the circulation in times of stress. No evidence exists for such masses of corpuscles and it is well known that dilution of the blood may take place equally as rapidly as concentration. In the case of the dilution caused by haemorrhage