bibliographic references it is suggested that the following form be used: "Bull. Mt. Desert Is. Biol. Lab., 1934, p ")

## THE GROWTH OF CANCEROUS CELLS IN EGG ALBUMIN

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The malignant cells of the spontaneous mammary gland cancers of the mouse grow in hanging drops of white of egg ( $\triangle -0.43^{\circ}$ C.; pH 9.2) in such a way as to form an extensive thin membrane surrounding the explant, and spreading out onto the coverglass.

The white of egg medium inhibits the growth of the macrophages and of the stroma of the tumor so that most of the tissue cultures contain growths of only malignant epithelial cells.

The egg albumin medium can be removed from the growth by bathing it with Locke's or Tyrode's solution. This procedure leaves the malignant cells free from other substances.

Egg albumin proved to be a favorable medium for the growth of carcinoma cells but not of sarcoma cells.

Yolk of egg and mixtures of yolk and white of egg inhibited the growth of malignant cells, of stroma cells and also of normal cells.

### THE GROWTH OF CARCINOMA CELLS IN DILUTED MEDIA

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The malignant cells of the spontaneous mammary gland carcinoma of the mouse exhibited growth in media having a wide range of osmotic pressure ( $\Delta$  -0.63°C to  $\Delta$  -0.3°C).

The spontaneous tumors appearing in mice of four different strains were studied. All of them grew when explanted into chicken plasma and into diluted forms of plasma. The ratio of dilutions of plasma with distilled water were 1 to 4, 2 to 4, 3 to 4, and 4 to 4.

The growths which took place in a medium of chicken plasma to which had been added equal parts of distilled water were frequently as extensive as those in undiluted chicken plasma; in some instances, however, the growths in the diluted media had fewer cells undergoing mitotic division than those in the undiluted medium.

It has been found that chicken blood has a freezing point of  $-0.63^{\circ}$ C (Bialazewiez) to  $-0.59^{\circ}$ C (Howard) which would be equivalent to about 1.07 to 1 per cent sodium chloride solution. Chicken plasma diluted with equal parts of water is equivalent to 0.53 to 0.5 per cent salt solution which would have a freezing point of approximately  $-0.3^{\circ}$ C.

#### LIVING MALIGNANT SARCOMA CELLS

## WARREN H. LEWIS, Carnegie Institution of Washington

The living malignant cells of five different rat sarcomas, Nos. 10146, 1548, 4337, and 4338, kindly supplied by the Institute for

Cancer Research, Columbia University, New York, were examined in many series of cultures made in chicken plasma and combinations of chicken and rat plasma. The comparison of the living malignant cells with one another and with normal cells revealed visible differences between them. Although the sarcoma cells from the five tumors differ from one another they have the following charactertistics in common which distinguish them from normal ones, (1) their cytoplasm is less transparent and more granular, (2) the fat globules are more refractive, (3) the mitochondria are smaller, (4) fewer neutral red stainable granules accumulate, (5) the nucleus seems to be larger in proportion to the size of the cell, (6) the nuclear membrane is thicker, (7) the nucleolar material is increased, and (8) the nucleus appears to be more granular. Slight variations of these characters together with the size and form of the cells enables one to distinguish the cells of different tumors from one another.

Malignant cells migrate more readily in the cultures than do normal connective tissue cells in cultures of adult tissues. The general characteristics of their outgrowths differ from one another and from those of normal cells. Although the shapes of cells undergo many changes as they move about in the cultures, those from each tumor have certain features in common which distinguish them from one another and from normal ones.

These cytological characteritstics of malignant cells are probably associated in some way with the peculiar functional characteristics which distinguish them from normal ones as they grow in the body, such as uncontrolled growth, transplantability from animal to animal, disorderly growth, lack of useful function, injurious effects on normal tissues, rapid cell death as well as multiplication and acid metabolism.

#### SOME STUDIES ON THE SELACHIAN BLOOD IN VITRO

#### CHUN CHANG,\* National Medical College of Shanghai, China

The blood of the skate (*Raia erinacea*) and of the dogfish (*Acanthias vulgaris*) was taken from the heart, and hanging drop cultures of whole blood and buffy coat were made. Vital stains with neutral red and brilliant cresyl blue were employed to bring out the detailed structure of the blood cells. Wright and Giemsa stains were used in dry spreads made at intervals during the period of cultivation. Chemicals that lower surface tension such as chloroform (three times diluted saturated aqueous solution) or calcium chloride (0.24 gm. to 100 c.c. of sea water) were added to the blood (equal parts) to activate the pseudopod formation and increase the viscosity of the cytoplasm of the leucocytes in the hope that phagocytosis might be produced in the leucocytes other than the monocytic macrophages. Calcium free artificial sea water was also added to some cultures and fresh plasma or old plasma left with blood cells for several days was added to older cultures.

The blood of both skate and dogfish contains erythrocytes, lymphocytes, monocytes, thrombocytes and granulocytes, and in addition in

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