a lower resistance than slowly growing tumors. Similar determinations on plant galls (supplied by Dr. Irvin F. Smith) indicate that plant tumor tissues are uniformly more permeable than normal plant tissues, the tumor tissues frequently exhibiting, under reasonably comparable conditions, a conductivity more than twice that of normal tissues. The observations of McClendon, Gray, etc., that sea urchins' eggs exhibit an increased conductivity during the first stages of development harmonize with the above observations on cancer tissue and lend support to the conclusion previously reached by the writer, as a result of chemical analysis of mouse tumors and blood reactions exhibited in cancer and pregnancy, that both normal and pathological proliferative processes depend upon an increased permeability of the protoplasmic film to water and water-borne food stuffs.

An attempt will be made in the next paper to indicate briefly by means of a physical model, the mechanism whereby changes in protoplasmic permeability may be induced by changes in chemical and physical environment and in a subsequent paper to apply the principles involved to cancer.

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On the action exerted by antagonistic electrolytes on the electrical resistance and permeability of emulsion membranes.

(Preliminary note.)

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Artificial emulsion membranes suitable for electrical conductivity and permeability experiments may be prepared by interposing layers of filter paper saturated with an emulsion of oil in soap between supporting sections of rubber tubing in a glass U-tube of the type commonly employed for electrical conductivity determinations. A thicker layer or film of emulsion is generally preferable and may be prepared by introducing into the U-tube a section of rubber tubing of any desired length which is then filled with emulsion. Retaining layers of filter paper above and below are held in position by additional supporting sections of tightly fitting rubber tubing. Emulsion membranes of this type when exposed to the influence of various antagonistic electrolytes exhibit variations in electrical conductivity and permeability corresponding almost exactly with those observed by Osterhout in the case of laminaria under similar working conditions. For example, .52 M NaCl causes a rapid rise in the conductivity of a saturated filter-paper membrane until the level of the environing solution is almost reached, while .278 M $CaCl_2$ causes first a considerable fall in conductivity which is followed subsequently by a rise to approximately the same level as in the case of NaCl. The most remarkable paralleling of Osterhout's results may be obtained by exposing emulsion layers or films to brief alternating treatments with NaCl and $CaCl_2$. As in the case of laminaria, alternating variations in conductivity within comparatively wide limits may be obtained without any apparent injury to the membrane which may subsequently be returned to sea-water or a balanced solution of NaCl and $CaCl_2$ and exposed to a similar treatment the next day. However, just as in the case of laminaria, too prolonged an exposure to either NaCl or $CaCl_2$ may cause changes in electrical conductivity and permeability beyond the critical point at which recovery is still possible and the membranes subsequently exhibit extremely erratic results or fail entirely to respond to treatment. That electrical conductivity experiments on membranes of this type or living tissues afford an index of their permeability to water and water-borne substances was demonstrated by paralleling the above experiments in the following manner: Layers of emulsion supported between filter paper and rubber tubing were introduced into a series of long glass tubes and the speed with which distilled water, sea-water and solutions of NaCl and $CaCl_2$ and a balanced mixture of NaCl and $CaCl_2$ flowed through the membrane was determined by measuring the fall of the fluid in each tube at given time intervals. The distilled water, sea-water and suitably balanced mixtures of NaCl and $CaCl_2$ flowed through the membranes at approximately equal speed while NaCl flowed through the membrane at a vastly greater speed and $CaCl_2$ at a somewhat reduced speed. The relative speeds of flow of various solutions were found to correspond to an extraordinary degree with data previously accumulated by the writer by means of the capillary pipette drop method regarding the influence exerted by NaCl, $CaCl_2$, etc., on soap films and surface tension. These conductivity and filtration experiments taken in conjunction with the recently published filtration experiments of Hirschfelder and the writer's previous experiments with soap films and emulsions lend strong support to the contention previously advanced by the writer that variations in the permeability of the protoplasmic membrane are attributable to the action of electrolytes and metabolic products on delicately balanced interfacial soap films and emulsion systems and that proteins may play no part in the valve-like mechanism controlling permeability other than to afford a supporting filamentous or mesh-like structure.

Further support of this point of view is found in the fact that when blood plasma is clotted by the addition of $CaCl_2$ no considerable change in electrical resistance is noted while in the transformation of an emulsion of oil in water into one of water in oil by shaking with $CaCl_2$ the resistance suddenly rises to an enormous extent at the critical point at which oil becomes the continuous or external phase.

It is obvious, therefore, that while the clot or jelly formed from fibrinogen is almost as freely permeable to water as the original plasma, the emulsion under similar conditions has been converted from a system which is freely permeable to one which is absolutely impermeable to water. Any intermediate degree of permeability is theoretically obtainable, providing the working conditions are sufficiently delicate. Since the main factor involved is that of surface tension, a finely dispersed emulsion structure contained in the capillary spaces of a jelly or its filter paper analogue would obviously respond with far greater delicacy to those substances which promote or inhibit permeability than would an emulsion in gross form. Since the whole question resolves itself, apparently, into one of the state of dispersion of soaps it is obvious that the dispersing effects exerted by NaCl on soap films and the consequent considerable lowering of the surface tension of the water phase and promotion of the permeability of the emulsion which have already been demonstrated in previous communications by means of the capillary pipette and other methods would be even more pronounced in capillary spaces. Conversely calcium chloride, which causes an aggregating effect on soap films raises surface tension and tends to diminish the permeability of emulsion systems to water, would tend to diminish the permeability of the structure as a whole to an even greater extent when functioning in capillary spaces.

The above data correlates admirably with the well-known fact that alkalis, salts of sodium, potassium, etc., promote the permeability of tissues while salts of calcium, magnesium, and other di- and trivalent cations exert the reverse effect. Also with the observations of Beebe and the writer regarding the high K content and low Ca content of rapidly growing tumors and the low content of K and high Ca content of slow-growing or stationary tumors.

The experimental data on which this paper is based together with a full development of the theoretical aspect of the case from the standpoint of surface tension and tissue permeability will shortly be published.

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The relationship of the leucocyte count and bone-marrow changes in acute lobar pneumonia.

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It is well recognized that the leucocyte count in lobar pneumonia may vary within wide limits. The majority of the cases which end fatally show either a very high or relatively low count, while those with favorable outcome most often have counts between these extremes.

For the low leucocyte count, at least two explanations have been suggested: (1) the bone marrow fails to react, either as the result of some previous injury (chronic alcoholism, for example), or on account of a paralysis of the blood-forming elements from overstimulation by the pneumococcus infection itself; (2) a rapid spread of the pneumonic process takes the leucocytes out of the blood faster than they are thrown into the circulation from the bone-marrow, therefore, the number of circulating leucocytes may