test injection was 80,000. Seven out of 10 experiments were positive, in that the second animal, which received aortic blood from the first animal, subsequently developed leukemia.

It is concluded that cells capable of producing leukemia can pass unarrested through the pulmonary circulation.

A Quantitative Analysis of Time Relationships in the Early Cleavage of Normal Fertilized Eggs of *Echinarachnius parma*, and the effect of Photodynamic Action.

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Quantitative studies of the time relationship in the early cleavage of *Echinarachnius parma* were done according to Method 2 of Blum and Pierce (Jour. Gen. Physiol. 33: '50). In normal fertilized eggs the time from fertilization to first cleavage was 115-130 minutes. The interval from first to second cleavage was 40-43 min. and the second to third cleavage interval was 39-42 minutes. The temperature maintained during the study was 16°C $\pm$ 0.5. A scatter plot for each egg counted from a single female was made. This plotted the time of the interval, fertilization to first cleavage, against the time from fertilization to second and/or third cleavage. The plot indicates no correlation in the order of eggs cleaving for any given cleavage. However, the average time interval between cleavages is fairly constant when taken from different animals.

When sperm were placed in a 1.1 x 10^{-7}M solution of toluidine blue in sea water and exposed to light for two minutes the interval, fertilization to first cleavage, was extended about 25 minutes. Subsequent cleavages were not affected, neither was there any detectable effect on later development. However, if the time of exposure to light was 10 min. cleavage was abnormal. Sodium sulphite would reverse both of the above effects. A dark reaction was not detectable at the concentrations used for the photo dynamic action.

Transfer of Drugs From Blood to Brain, Muscle and Cerebrospinal Fluid of S. Acanthias, Gadus Callarias and R. Catesbiana

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It has previously been established (Zubrod 1953) that the "barrier" to the transfer of sulfanilic acid from blood to the central nervous system of *S. acanthias*, excluded the drug from brain but not from cerebrospinal

fluid (CSF). This is in contrast to the dog, where sulfanilic acid is in large part excluded from both brain and CSF. During the summer of 1954 studies were made in the codfish and *R. catesbiana*. Sulfanilic acid was excluded from the CSF of the frog but not from the CSF of the teleost. The concentration of sulfanilic acid in the CSF of fish is 5-6 fold higher than the concentration reached in brain, whereas in the dog and frog the concentrations in brain and CSF are identical. This is probably related to the primitive meninges of fish, since differentiation into two layers does not occur, no subarachnoid space exists, and the "cerebrospinal fluid" occupies an extradural position.

In 1956 studies were made in *S. acanthias* of the rates of reaching a steady state between plasma and CSF, brain and muscle after administration of sulfanilamide and sulfanilic acid. Tissue-plasma water ratios of drug concentrations were determined at 1, 2, 3, 4, 6, 8 and 24 hours after intramuscular administration of the drugs. The rate constants (one-half the time required to reach steady state ratios) for sulfanilamide were muscle and brain 2 hours and CSF 6 hours. The rate constants for sulfanilic acid were muscle 2 hours, brain 2½ hours and CSF 8 hours. The transfer of these drugs to CSF was therefore quite slow compared to that for tissues. These observations provide additional evidence that the transfer mechanisms or barriers for CSF of the dogfish, have different characteristics from those for brain and muscle.