through the reticular system. The wandering cells are spindle shaped or round and usually contain much pigment. In appearance it resembles the human malignant melanosarcoma, though developmentally it is not identical with this type, as it seems to be of mesodermal origin.

In a just metamorphosed frog which had carried a strongly growing implant for 22 days a metastatic nodule was found in the connective tissue between the heart and the right thyroid gland. It is made up by pigmented round and spindle shaped cells. The main bulk of the heavily infiltrated reticulum of this little frog, was transplanted, together with the attached liver and most of the intestinal tract, into the body cavity of an adult frog.

After fifty days the body of this frog began to swell and at the same time became hard. The animal soon stopped feeding and was dying when it was preserved on the sixty-second day. In the body cavity was found a large tumor which was attached to the peritoneum as well as to the mesentery and was penetrating and destroying the urinary bladder. The closer examination revealed not only a whole network of creeping ramifications through the reticulum but also numerous metastases in the liver and in the propria of the intestine.

The abnormal tissue from the overripe egg, by this double transplantation has attained an age of 92 days, while equally deficient embryos under best care do not live over 2 weeks.

4812

The Barrier Between the Blood and Cerebrospinal Fluid.

WM. MALAMUD. (Introduced by John A. Larson.)

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In a previous communication[1] the results of investigation of this barrier by means of the Walter bromide method were reported. It was found then that the series of mental diseases investigated could be divided into 3 classes according to the distribution ratio of bromides in the blood and cerebrospinal fluid. (1) In some of these diseases the distribution ratio was about normal (about 3 times as much bromide in the blood as there was in the cerebrospinal fluid

[1] Malamud, Wm., Fuchs, D. M., and Malamud, N., *Arch. Neurol. and Psychiat.*, 1928, xx, 780.

and varying from 2.8 to 3.2). (2) In others this distribution ratio was higher. That is, less of the bromides passed into the cerebrospinal fluid. (3) In a third group the ratio was lower; that is, more bromides passed into the cerebrospinal fluid. Most of the diseases belonging to the third group were of the type where one finds affections of the smaller cerebral vessels.

In discussing the nature of this phenomenon the question was brought up as to whether this distribution of bromides could be regarded as due to a process of dialysis. The fact that there was 3 times as much of the bromides in the blood as there was in the cerebrospinal fluid apparently argued against it, for in the case of chlorides, for instance, we find a distribution of 1.0 in the blood to about 1.2 in the cerebrospinal fluid. It was suggested then that some of the bromides may be fixed in some way in the blood and rendered indiffusible. This would mean that the nature of the membrane itself, (whatever it may be) that separates the blood from the cerebrospinal fluid was not the governing factor.

Since then we have been investigating this question and some results obtained apparently argued this possibility.

1. In cases of general paralysis treated with malaria, a definite correlation was found between the distribution ratio and the clinical course of the disease. It was found that in most untreated cases there was an increased passage of bromides into the cerebrospinal fluid. Where the malarial treatment had been successful, the amount of bromides that would pass into the cerebrospinal fluid was decreased. In others it was not affected. Histopathological studies have shown that the factor influenced by malarial treatment was usually the blood vessel disease. Apparently then, the change in the distribution ratio of bromides was very definitely related to the condition of the blood vessel wall rather than the blood itself.

2. Studies on the amount of bromides that would pass into other body fluids were undertaken. Cases of pleuritic and ascitic effusions were studied. It was found in these that whereas the ratio between the blood and cerebrospinal fluid was anywhere from 2.4 to 3.0, the amounts of bromides in the blood and those in the pleuritic or ascitic fluids remained about equal. The amount of protein in these fluids did not seem to affect the ratio.

3. Blood and cerebrospinal fluid were taken from patients who had bromides administered to them. The ratio was determined and then the blood and cerebrospinal fluid were placed in a dialyzing system separated by a membrane which was permeable to bromides and impermeable to colloids. It was found that after 48 hours the

difference in the quantity of bromides in the blood and cerebrospinal fluid had gone down very appreciably. Thus, a case showing a distribution ratio of 3.15 to 1.0 had gone down to 1.21; another one of 3.37 went down to 1.27; a third of 3.52 went down to 1.2, etc. The last two experiments have just been started and are being carried on further.

4813

Studies of Action Currents in Laryngeal Nerves.

ERICH LINDEMANN. (Introduced by Lee E. Travis.)

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In order to increase the information about the neurophysiological mechanism of phonation, action currents were recorded from the inferior and superior laryngeal nerves during voice production in dogs. The whining or barking sound produced when the animal was just coming out of ether anesthesia was picked up by a condensor-microphone and amplified by a one-stage amplifier. Simultaneously with the voice the action currents appearing in the inferior and superior laryngeal nerves were picked up by platinum electrodes (in some experiments as a check-up by non-polarizable electrodes) and amplified by a 3-stage resistance coupled amplifier. The recording of both the voice and the action currents was done by means of a 3-element Westinghouse oscillograph.

The inferior laryngeal nerve was exposed just below the thyroid cartilage and the superior laryngeal nerve a few millimeters towards the entrance into the crico-thyroid membrane.

The records show that when no voice is produced the action current line is practically at rest. During voice production the action current line of the inferior laryngeal nerve shows regular oscillations having the same frequency as the voice line. The frequency of these action current oscillations changes with the pitch of the voice. In order to exclude any influence of a non-physiological source the experiment was frequently repeated with different forms of electrodes and after removing the amplifier completely from the operating room. Furthermore, if one electrode was removed from the nerve and placed upon nearby muscle tissue the regular frequencies disappeared.

In order to determine the direction in which the potential changes were traveling, the inferior laryngeal nerve was transsected and rec-