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The convulsant effect of the removal of the heart upon frogs which had injections of morphin. A demonstration.

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Last April it was reported from this laboratory that (1) substances which are capable of causing a definite biological reaction in frogs cause the characteristic reaction also when injected after the removal of the heart, and (2) that some substances, like morphin and acid fuchsin, appear to be even more effective in cardiectomized than in normal frogs. The first phenomenon was explained by the theory that distribution in frogs deprived of the cardio-vascular circulation is accomplished by a peripheral mechanism, namely, by the tissue spaces, which present a connected system throughout the body. The second phenomenon was interpreted by the hypothesis that the fresh blood in the cardio-vascular mechanism continually antagonizes the convulsant action of such substances as morphin and acid fuchsin. The study of the last mentioned hypothesis and the underlying phenomenon has been hampered by the fact that the distribution by the peripheral mechanism is necessarily a slow one and since, at the warmer seasons, frogs survive cardiectomy only a short time, it happens that the animals die before the convulsant effect could make its appearance. We have therefore tried to study the hypothesis by the reversed method, that is, morphin injected first and the heart removed later. This was carried out in several series, the doses varying from 0.1 to 0.5 mg. of morphin per gram frog, and the intervals between the injection and the subsequent removal of the heart varying from a few minutes to 4 hours. We shall not enter

upon details: we shall merely state that the result was strikingly positive. While the morphin frogs, which were kept with hearts intact, remained normal, all the frogs which received proper doses of morphin and had their hearts removed at different intervals, developed tetanic convulsions, which in many cases had to be characterized as very violent. With doses of 0.25 mg. per gram frog, convulsions developed in practically every case, no matter how soon or how late the heart was removed. After intervals of 60 minutes and longer the result was positive practically with every dose between 0.2 and 0.5 mg. per gram frog. (The essential points were demonstrated before the Society.)

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Intravascular foreign bodies.

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Experiments were performed by introducing sterilized (1) untreated, (2) oiled silk, and (3) human hair into arteries and veins and observing the results. Twelve common carotid arteries and twelve external jugular veins were employed. The number of silk strands varied from the smallest single strands used in blood vessel suture to twenty-four such strands. Where a number were used they were threaded into suitably large needles and were not twisted. Cambric needles were used.

The experiments were performed by exposing the vessels of anesthetized dogs, transversely piercing the vessel with the needle as near the mid-line as possible, drawing the ligatures through and loosely tying the free ends together. Three weeks later specimens were taken and examined.

In no instance was there occlusion of the lumen nor was there any evidence to indicate that the vessels would have subsequently become occluded through thrombus formation. In general the ligatures were found dividing the lumen and coated with a substance closely resembling the intima in gross appearance.