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RESEARCHES ON THE SOUNDS OF THE HEART.

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June 24—Denuded the heart of a large turtle, and examined the action and sounds. Pulsations 36 per minute.

When the ventricle contracted, a dull, prolonged sound, like the first sound of the heart, was heard, through the medium of the stethoscope, placed over the heart, carefully avoiding pressure on the part. This sound was heard just as the ventricle commenced to contract, and propel the blood into the aorta, and it was heard loudest a little above the origin of the aorta, and seemed to terminate there with a sort of small knock, the aorta being rendered more curved and distended where the sound appeared to terminate. As the contraction of the ventricle commenced, the parietes immediately opposite the origin of the aorta became so firm and tense that the aorta appeared to be prolonged deeper into the ventricle, and the ventricle contracted with a strong impulse, pushing as it were the blood into and along the aorta with force. Whilst this contractile energy was exerted, the first sound of the heart was heard, and the parietes of the ventricle became instantly tense, firm and elastic, and this condition increases as the ventricle contracts; but the action was strongest in that part of the ventricle opposite the origin of the aorta, the parietes there being rendered very firm and tense—expanding with force and throwing out the fingers that pressed them, as the fibres rapidly contracted and propelled the blood along the aorta with an impetus. The sound seemed to commence in the ventricle and to terminate at that part of the aorta a little above its origin, where it suddenly, during the contraction of the ventricle, becomes more curved, hard and tense. Immediately after the first sound terminated, a second sound was heard. It was sharper and shorter than the first sound, and seemed to be seated deeper. It occurred during the *dilatation* of the ventricle,

and as the auricles contracted, and projected their blood into its cavity. This was clearly ascertained by listening to the sound through the medium of the stethoscope, and counting 1, 2, 3, 4, 5, 6, etc., as it was heard, whilst a gentleman at the same time carefully observed the action of the auricles, and it was clearly ascertained that the auricles contracted as the second sound was heard. These sounds could be heard during many hours through the medium of the stethoscope; and the first sound could be heard by applying the naked ear over the heart, but both the first and second sounds appeared more distinct when heard through the instrument.

The auricles contracted with great vigor, shooting, as it were, the blood into the foramen of the ventricle, and they commenced to contract immediately after the first sound had terminated, and the pulsation was observed in the aorta. There was no pause in the dilatation of the ventricle—the movement was continuous. The blood from the auricles appeared to open up the ventricle, for its parietes heaved up and swelled out at the auriculo-ventricular foramen, when the blood was entering it, and on being dilated or the parietes distended, the ventricle immediately contracted in the manner we have stated. There were just two movements of the ventricle—that of dilatation and contraction following each other in rapid succession.

July 1st—Took a large turtle, and removed a portion of the sternum, or bone that covers the thorax and abdomen, leaving the thoracic and abdominal muscles uninjured, so that they continued to cover the heart and prevent pressure on the part, when we applied the stethoscope and listened to the sounds. Pulsations 34 to 36 per minute.

The first sound of the heart was distinctly heard through the medium of the stethoscope. It was a dull, prolonged sound, increasing in intensity till it terminated by a sort of small knock, as if it were fully brought out at that point. It was louder sometimes than at others, and could be distinctly heard whilst the animal remained quiet, and we attentively listened to the action of the heart. It occurred during the contraction of the ventricle, and was heard distinctly through the thoracic muscles, when the stethoscope was placed over the cardiac region. We have counted as many as 30 and 40 pulsations without interruption or removing the instrument. The sound could also be heard by the