

The application of this solitary wave in air to the carrying of sound.

Errors of the phrases in general use for the explanation of the conveyance of sound.

My theory of the mode in which sound is propagated as distinguished from the mode of its creation.

Consideration of the aerial wave of sound, its analogy to the solitary wave in water.

The *depth* of the air ocean and its correspondence to that of the water ocean.

The speed of the solitary or carrier wave in each element. The speed is due to the depth. What happens in the interior of the solitary wave in water? The same motions take place in the same nature of aerial wave.

Elucidation by the comparison of three equivalent oceans.

Similarity and dissimilarity between the oscillating waves and the carrier or solitary wave.

Musical sounds in their melodic and harmonic relations to this wave. Numerical nomenclature of sounds.

How the message of the sound wave is delivered to the brain.

VI. "On the Effect of Electrical Stimulation of the Frog's Heart, and its Modification by Cold, Heat, and the Action of Drugs." By T. LAUDER BRUNTON, M.D., F.R.S., and THEODORE CASH, M.D. Received May 16, 1881.

(Abstract.)

From the results of the recorded experiments conducted on the frog's heart in its normal position and still exercising its circulatory function, we have found—

I. That electrical stimulation by a single induced shock has either an obvious effect on the contraction and rhythm of the organ, or no such effect is apparent.

II. That the effect is modified by—

(a.) *The time of the cardiac cycle in which stimulation falls.*—Thus Marey has already shown that a so-called refractory period is demonstrable under certain conditions.* Well-marked variations in latency when the stimulation is potent to induce a systolic contraction are to be recognised.

(b.) *The strength of the stimulation applied.*—Refractory periods possible under minimal stimulation can no longer be demonstrated

* The conditions of this refractory period, or "period of diminished excitability," have been very fully investigated by Dr. Burdon Sanderson and Mr. Page. "Proc. Roy. Soc.," vol. 30, p. 373.

under maximal, whilst a disturbance of the relationship of auricular and ventricular contractions may be induced.

(c.) *The area of the heart to which stimulation is applied.*—A refractory period demonstrable under stimulation of the ventricle may cease to occur when the sinus venosus is the seat of irritation.

(d.) *The action of heat, cold, and drugs.*—Thus cold prolongs the systole, the refractory period, and the latency of an induced contraction; whilst strychnia, leaving the curve of systole unaltered, lengthens the refractory period to a marked degree.

VII. "On the Action of Ammonia and its Salts, and of Hydrocyanic Acid upon Muscle and Nerve." By T. LAUDER BRUNTON, M.D., F.R.S., and THEODORE CASH, M.D. Received May 26, 1881.

(Abstract.)

Ammonia.—The curve caused by stimulating either muscle or nerve is prolonged. Fatigue increases this prolongation much more rapidly than it would do in the case of a healthy muscle. The viscosity, or residual contraction, remaining after active contraction is much more increased in the case of direct (muscle) than of indirect (nerve) stimulation.

Chloride of Ammonium.—A powerful, though slightly lengthened, contraction occurs on direct stimulation. The muscle, as stimulated from the nerve, yields a few (if any) lengthened and feeble contractions, and then ceases to respond altogether to stimulation.

Nitrate of Ammonium.—The nerve, in this case, is not more affected by the poison than the muscle. If the poisoning be very complete, neither direct nor indirect stimulation has any effect; if it is not so, the curve is observed to be prolonged. In the case of both, but especially in that of the directly stimulated muscle, the contraction remaining after stimulation is very extensive.

Nitrite of Ammonium.—If poisoning be complete, no reaction occurs either on direct or indirect stimulation; if not, the curves of both are much prolonged, even more so than in the case of the nitrate. The rapid repetition of stimulation causes the curve to become enormously prolonged, whilst the viscosity after the active contraction is much increased.

Cyanide of Ammonium.—Stimulation of the nerve produces no effect whatever; whilst that of the muscle causes a considerable though prolonged curve. Viscosity is much increased. The curve of hydrocyanic acid alone, yielded by both direct and indirect stimulation, is prolonged, but it neither shows the length nor the viscosity of the