THE FUNCTION OF THE URETHRAL BULB. By F. J. ALLEN, M.A., M.B. Cantab., *Professor of Physiology in Mason College, Birmingham.*

THE urethral bulb is usually understood to assist the action of the bulbo-cavernosus muscle in emptying the urethra; but the *modus operandi* is not explained. A very peculiar feature of the bulb is, that it does not surround the urethra, but is situated behind it. Such a peculiarity may be expected to serve some purpose, and of this purpose I would suggest the following explanation:—

A tube with spongy walls, like the distal portion of the urethra, offers a certain impediment to the passage of fluid. That is to say, the lumen of the tube is usually closed, and if a small quantity of fluid be forced into one end of it, the momentum is expended in opening the tube (or in other words, in pushing aside the blood in the erectile tissue), and the fluid may fail to reach the far end. If the tube were muscular, a peristaltic movement would secure the propulsion of the fluid; but in the case of the urethra, the work is performed by a special action of the erectile tissue with the assistance of the bulb. When the bulbo-cavernosus compresses the bulb, it drives the blood from thence onwards, causing a wave of increased fulness to pass along the corpus spongiosum. *This increased fulness closes the urethra behind any fluid contained therein, and the advancing wave drives the fluid onwards before it to the end of the tube.* It must be remembered that during erection the bulb is largely distended with blood, and therefore specially capable of this action.

The bulb, whence the wave starts, must be placed behind the point where the fluid enters. If the bulb *surrounded* the entrance of the urethra into the corpus spongiosum, the effect would be different. The contraction of the bulbo-cavernosus would then start simultaneously two waves—one in the urethral walls, the other in the urethral tube. The increased pressure in the one would be just balanced by the same in the other, and no advantage would be gained. The blood-wave would not close the urethra behind the fluid contained, or at least would

have an equal tendency to close it either behind or before. In fact, there would be a race between the two waves, and the least impeded would win. If the urethral contents were viscid, they would move with difficulty; while, on the other hand, the blood-wave would always travel unimpeded, since it is a true wave,—the fluid not moving in mass, but communicating its impulse from particle to particle. An evidence of this rapid wave-movement is seen in the suddenness and completeness with which the spongy urethra can empty itself; and herein probably consists the advantage of this mechanism over peristaltic action in the case of the urethra.

The diagrams may help to explain the action. In fig. 1 the actual condition is shown, the blood-wave B starting behind the

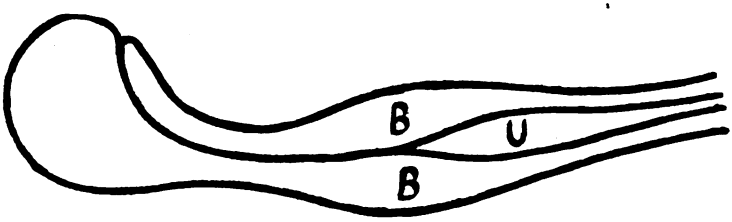

FIG. 1.

intra-urethral wave U, and driving the latter before it. Fig. 2 represents a hypothetical urethra surrounded by the bulb, the

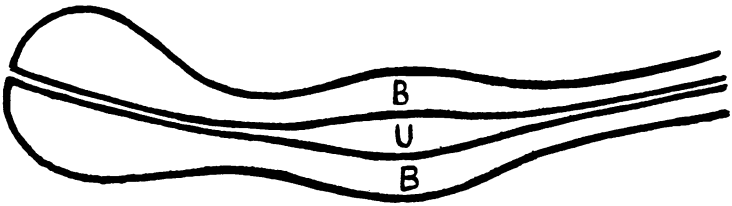

FIG. 2.

two waves starting simultaneously, giving no advantage to the intra-urethral wave, and not necessarily closing the tube behind it.

[For the sake of distinctness, the blood-wave is represented as if occupying only a short section of the length of the urethra, whereas in reality its posterior limit would be at the bulb. In fig. 2, where the waves are simultaneous, this remark applies also to the intra-urethral wave.]