

the time and height of high water, not only at different periods of the moon's age, but also for the different months of the year, for every minute of the moon's parallax, and for every three degrees of her declination. The tables themselves were registered by Mr. Dessiou of the Admiralty: but the arrangement of the tables and the methods employed are due to the author. The tides in the river Thames are extremely regular; and as the rise is considerable, the observations on them are easily made. Those at the London Docks present an uninterrupted series from the opening of the Docks in 1804 to the present time: which is more extensive than any extant, with the exception only of that made at Brest by order of the French Government. Some observations are also given of the tides made during one year at the East India Docks, under the superintendence of Captain Eastfield, and which were undertaken at the suggestion of the author, and made with extreme care.

The author gives an account of the mode by which the several tables were constructed; and enters at length into the various mathematical considerations which the subject involves.

The author was enabled, by the kindness of the Chairman and Directors of the London Dock Company, to present to the Society the books containing the complete series of original observations on the tides referred to in this paper.

A paper was read, "On the Friction of Fluids." By George Rennie, Esq., V.P.R.S.

The object of the author in this paper is to trace the relation subsisting between the different quantities of water discharged by orifices and tubes, and the retardations arising from the friction of the fluid. The results of the experiments hitherto made with a view of ascertaining the effects of the friction attending the mutual motion of solids and fluids, are exceedingly discordant, and therefore undeserving of confidence. Whether, for example, the retardation from friction be proportional to the surfaces, or to the velocities, are points by no means satisfactorily determined.

The experiments of the author were designed to measure the retardations experienced by solids moving in fluids at rest; and of fluids moving over solids. For this purpose, he employed a cylinder of wood, about eleven inches in diameter and two feet in length, traversed by an iron axle, upon the upper part of which a small pulley was fixed. A fine flexible silken cord was wound round the pulley, at one end, and had a weight attached to the other end. A frame was provided, allowing the apparatus to slide up and down; and the cylinder to be immersed at various depths into the river Thames. When the velocities were small, the retardation was found to be nearly as the surface: but with great velocities it appears to have but little relation to the extent of the surface immersed. The resistances of iron discs and wooden globes revolving in water were found to be as the squares of the velocities.

From the experiments made on the quantities of water discharged by orifices of different shapes and sizes from vessels kept constantly

full, the author concludes, that they are in the ratio of the areas of the orifices, independently of their shape ; and nearly as the square roots of the heights. In pipes bent at various angles the retardation occasioned by the flexure was not in proportion to their number.

A paper was read, "On the Sources and Nature of the Powers on which the Circulation of the Blood depends." By A. P. W. Philip, M.D. F.R.S. L. & Ed.

In the first part of this paper the author discusses the opinions which ascribe the powers that maintain the circulation in the veins to the elasticity of the heart, the resilience of the lungs, and the dilatation of the thoracic cavity in the act of inspiration. He shows experimentally that the circulation continues unimpaired when all those causes have ceased to operate ; and that the very structure of the veins, the coats of which are so pliable as to collapse by their own weight, when empty, renders it impossible that the motion of the blood could be maintained in them by any cause corresponding to a power of suction in the heart.

The latter part of the paper is occupied by an inquiry into the sources and nature of the powers which really support the circulation of the blood. The capillaries, he observes, maintain the motion of their blood long after the heart has ceased to beat ; this motion not being immediately affected even by the entire removal of the heart ; but being accelerated, retarded, or arrested, according as the action of the capillaries is increased, impaired, or destroyed, by agents of which the operation is wholly confined to the vessels themselves. As the destruction of the heart does not immediately influence the motion of the blood in the capillaries, so the action of this organ, when in full vigour, can produce no motion of the blood in the capillaries, when these vessels are themselves deprived of power. Experiments are related with the view of proving that the arteries and veins, and more particularly the latter, are also capable of carrying on the blood they contain, even in opposition to the force of gravitation, with the greatest ease, and without the aid of any extraneous power. With regard to the nature of the power exerted by the blood-vessels, the author shows that the capillaries are as readily influenced by stimulants and by sedatives, as the heart itself ; and that the arteries and veins may also be made to obey the action of stimulants ; and further, that the power of the vessels bears the same relation to the nervous system as that of the heart, which is peculiar, and very different from the relation subsisting between that system and the muscles of voluntary motion. From the whole of the facts and experiments stated in this paper, the author deduces the conclusions, that the circulation is maintained by the combined power of the heart and blood-vessels, and that the power of both is a muscular power.

A paper was read, entitled, "A critical and experimental Inquiry into the Relations subsisting between Nerve and Muscle." By