surfaces are still more minutely examined, they are found to be covered with innumerable minute processes, crowded together like the pile of velvet; and on these are distributed myriads of blood vessels, spread like a delicate net-work, over every part of the surface. The whole extent of this surface exposed to the action of the aerated water, by these thickly set filaments, must be exceedingly great.*

A large flap termed the *Operculum*, extends over the whole organ, defending it from injury, and leaving below a wide fissure for the escape of the water, which has performed its office in respiration. For this purpose the water is taken in by the mouth, and forced by the muscles of the throat through the apertures which lead to the branchial cavities: in this action the branchial arches are brought forwards, and separated to a certain distance from each other; and the rush of water through them unfolds and separates each of the thousand minute filaments of the branchiæ, so that they all receive the full action of that fluid as it passes by them. Such appears to be the principal mechanical object of the act of respiration in this class of animals; and it is an object that requires the co-operation of a liquid such as water, capable of acting by its impulsive momentum in expanding every part of the apparatus on which the blood vessels are distributed. When a fish is taken out of the water, this effect can no longer be produced; in vain the animal reiterates its utmost efforts to raise the branchiæ, and relieve the sense of suffocation it experiences in consequence of the general collapse of the filaments of those organs, which adhere together in a mass, and can no longer receive the vivifying influence of oxygen.† Death is, in like manner, the consequence of a ligature passed round the fish, and preventing the expansion of the branchiæ and the motion of the *opercula*.

* Dr. Monro computed that in the skate, the surface of the gills is, at the least, equal to the whole surface of the human body.

† It has been generally stated by physiologists, even of the highest authority, such as Cuvier, that the principal reason why fishes cannot maintain