

by their alternate dilatations and contractions increase or diminish the caliber of the Bronchial tubes; the longitudinal ones, by the same play, lengthen or shorten the same tubes, and the combined action of the two sets of fibres enlarges or reduces the capacity of the tubes. It is very well known that the capacity of a tube or cylinder is the product of its base multiplied by its height or length; and if not a perfect cylinder geometry gives us the means of estimating its capacity.

The expiration of carbonic acid is not a *vital action*. We use that expression in the sense of *inexplicable*; because some men, too presumptuous to own their ignorance of a fact which they cannot explain, shield themselves too often behind this too elastic expression; "*it is a vital action.*" The expiration of carbonic acid is a phenomenon under the influence of the common laws of Physics. What do we observe during both inspiration and expiration? To understand well this process we must first consider the Respiratory system in a state of *rest*, where there is neither dilatation nor contraction. That state, it is true, does not exist during life; but we may conceive it to exist, as well as we may conceive that the square root of 1 is less than the unit, although we have no mathematical means to demonstrate it.

5. When it pleased God to embody the soul, he took matter, blew into it the breath of life, and it was made the first man (Genesis.)

At the same instant, air rushed into his lungs with a force and a volume admirably calculated to overcome the resistance of the pulmonary tissue, but without transcending its expansive force. This first volume of air was destined to serve as *point d'appui* to the parenchyma of the lung which was thereby enabled to return or contract to produce a reaction, not equal to the action of the first volume of air, whose force was necessarily greater than the resistance of the pulmonary tissue, but equal to the dilating force of the tissue minus the resistance of the volume of air which serves as *point d'appui*. If, by a mechanism contrary to the laws of motion, the lungs could *expire* the whole mass of air *inspired*, life would consist of but one *inspiration* and *expiration*. Reaction then acts on a mass of air inferior to the mass *inspired*, and this may be taken as the explanation of the fact, that in children and even healthy adults, the act of *inspiration* is longer than that of *expiration*. All deviations from this rhythm of the Respiration should be carefully noted by the competent observer, because they are certain indications of pathological modifications in the system.

6. The mass of air expired, almost entirely composed of carbonic acid, is the result of the combustion which is henceforth to be kept up in the body, as long as life animates matter. This gas is heavier than atmospheric air. But why, will be asked, is it that the expired air should consist entirely of carbonic acid? Without having recourse to *vitality* or *inexplicability*, we may thus resolve the question. I. The *momentum* of a body is equal to its own weight multiplied by the *impulsion*: II. When two bodies of different specific gravities are submitted to, or receive, the same *impulsion*, the heaviest places itself before the other (see Treatises on Physic); the carbonic acid must then be expelled the first, and that *expulsion* exhausts, at the same time, the force of