mines the amount of chemical change in the muscle or in the mixed gases, and consequently the amount of force (Laws I. and III.) that will be put forth or evolved, but in neither case does the determining agent supply the force thus yielded. But the nerve force as well as the light, (according to the theory here advocated) must have a resultant when it ceases to exist as such, and I would suggest the possibility of that resultant being the heat, or part of it, that is always produced during normal muscular contraction.

If we consider now that on the one hand all the physical forces are mutually convertible into each other, and on the other that nerve force is considered as the highest form of power put forth by organised beings, besides being (as must be granted) probably correlated to all the rest; it must be allowed that the foregoing facts go far towards establishing the relation contended for here, between the vital and physical forces, for if each one of the two groups of force have its own forms of force convertible into each other, then it only requires one connecting link to establish the unity of all the forms of both groups. But because we cannot point out any one link that would fulfil this condition so as not to allow of any cavil, it is necessary that we should have a large number of instances of conversion, each of which should be as reliable as possible under the circumstances, so that by many probabilities, all pointing in one direction, we may establish that which cannot be shown to be absolutely true by any one direct fact.

Instances (or at least seeming instances) of conversion coming under this division of the subject might be multiplied, but it would be tedious to do so, and would serve no purpose, for if those instances already adduced are not received as cases of correlation, any others would hardly be so; and if they are so looked upon there is no need of adding to them, and it must be obvious to every one that if this view be the true one, every vital manifestation must be an example of correlation, since every vital force, in its origin as such, must proceed from a physical one. I shall, however, briefly consider muscular action for the purpose of seeing whether this theory is capable of throwing any light upon it.

Each form of cell, as we have seen above, has its own proper form of "cell force," which it evolves under certain determinate conditions; this force has for its antecedent that set free by the chemical changes going on in the cell itself, the conversion being effected by the particular form of matter (the cell) through which the force passes. Now as the cell is the form of matter (*par excellence*) through the agency of which the physical forces are changed into the vital, so each form of cell has its own form of vital force which must result from the fact of its having its origin *as vital force* in that cell.

As the proximate origin of the force liberated by each cell is to be found in chemical change, so the stimulus that calls that cell into action is something that will determine the taking place of that chemical change, and may be itself exceedingly small in quantity compared with the force which at first sight it might seem to produce.

The cells* of muscle are chemically composed of exceedingly complex bodies;

* I follow Sharpley and Carpenter (Prof. Fraser's lectures on Physiology,) in considering muscles as ultimately composed of cells: in reality it does not appear to me to be of any consequence for our present purpose whether we call them such or fibrillæ.