

are involuntary, that is, are produced by other causes than the will.\*

Muscular contractility, of which there exists no trace in the vegetable kingdom,\* has been established by nature as the primary moving power of the animal machine. This agent is resorted to on all occasions where considerable mechanical force is wanted; just as in a great manufactory, where an immense quantity of machinery is to be set in motion, and a great variety of work is to be executed, the human mechanist avails himself of some constant moving force, such as that derived from a fall of water, or from the expansion of steam. The laws of inorganic matter furnish no force which could conveniently have been applied in the animal body for that purpose; but muscular power, from its high intensity, is adequate to every object, and has been accurately adjusted, by the most refined application of the laws of mechanism, to all the degrees and kinds of effects intended to be produced.

Although the power be the same, yet the mode of its application is exceedingly diversified; and the comparison of these diversities is the more interesting, inasmuch as there are few of the animal functions in which the ends to be answered are so definite, and the operation of the expedients employed is so plain and intelligible. For while the intri-

\* These two classes of muscles do not differ in their outward appearance: but Dr. Hodgkin has lately pointed out a curious difference in the microscopic structure of the fibres of some of the involuntary muscles. See Appendix to his Translation of Edwards on the Influence of Physical Agents on Life, p. 443.

† The principal instances, which have been adduced in support of the opinion that muscularity occasionally exists in vegetable structures, are the alternate movements of the leaflets of the *Hedysarum gyrans*, which have been fancifully compared to the movements of the ribs in respiration; the quick motions of the stamina of the *Berberis*, *Opuntia*, and many plants of the genera *Carduus*, and *Centaurea*; the closing of the leaves of the *Dionæa muscipula*; and the shrinking of those of the *Mimosa pudica*, or sensitive plant. On a superficial view, it must be acknowledged that these motions bear a resemblance to the effects of muscular contractility; but I believe that naturalists are now generally agreed that there is no real analogy between these phenomena, and that there is no substantial evidence for the existence of that property in the vegetable kingdom.