have from thence inferred that they require sleep. We have no proof, however, that they possess any such power; nor that, in the exercise of their ordinary functions, they experience that fatigue and exhaustion which renders sleep necessary to their restoration. All the spontaneous move­ments of vegetables previously described, seem to arise from the operation of physical agents, conjoined with those in­herent properties which belong to them as living beings. These agents act variously on different plants; and hence some close their leaves and flowers from the abstraction of heat or moisture, and others from the exclusion of light; and this at various periods of the day, as well as through the night. Other plants exhibit spontaneous movements only in the flower, and at the season of fecundation, w hen suit­able conditions of the atmosphere prevail; and though, in some instances, these motions continue for a time after the conditions required for their display may have been with­drawn, yet we must ascribe such motions rather to habit than to any thing that partakes of the nature of volition.

The diminution or suspension of action through the night which occurs to plants that inhabit temperate climes, cannot be received as a proof of sleep, induced by the exhaustion of the vegetative powers; for even in such climes, vegetation, in favourable seasons, proceeds often by night as well as by day. In climates still more favourable, the same plants which with us produce fruits only once a-year, yield two or more crops; and in Norway and Lapland, where the sun, at certain periods, continues almost con­stantly above the horizon, the whole period between seed-time and harvest sometimes occupies only about fifty days. In such cases, little or no suspension of the vegetative func­tions can have taken place; nor have we the smallest reason to believe that the continued exercise of them is followed by fatigue or exhaustion sufficient to require sleep. What, therefore, has commonly been denominated the “ sleep of plants,” we can regard only as a diminution or suspension of the vegetative functions, arising from the abstraction, more or less complete, of those external agents, whose presence is essential to their full operation and display.

Art. V.—*Of the Decay and Death of Plants.*

But whether the functions of vegetables unceasingly con­tinue or be occasionally suspended by the abstraction of the conditions necessary to their exercise, all plants submit at length to the same general law, and die, either in whole or in part, when the great purposes of their existence—those, namely, of growth and reproduction—have been accom­plished. Some plants speedily arrive at maturity, and having produced their seeds, die altogether; others flourish for one or two seasons, and then decay and perish ; and others again die only in part, after having produced their seeds, and also a new series of buds to continue their growth and fructification. In the progress of our inquiry, we have seen that, in every stage of vegetation, certain organs fall into decay after having fulfilled their allotted functions. Thus the tunics of the seed perish beneath the soil, after having yielded their nutrient matter to carry on the evolu­tion of the embryo; and those cotyledons which rise into the air, decay also, when the radicle has taken its proper hold of the soil, and the leaves are sufficiently developed to execute their appropriate functions. So likewise the pe­tals, the stamens, and pistils of the flower, rapidly fade and fall as soon as the important function of fecundation is ef­fected; the fruits next drop when they have reached ma­turity; and lastly, the leaves, even of perennials, when their allotted functions have ceased, decay and fall like those of annual plants.

To account for this *fall* of the leaves, many hypotheses have been proposed. Some have ascribed it to defective transpiration, and consequent accumulation of juices in the vessels; others to an inequality of growth between the stem and the petiole of the leaf, during the progress of vegeta­tion; others to the desiccation of cellular tissue, supposed to exist at the insertion of the petiole with the stem; others to a simple sloughing of worn-out parts; and by others, the fall of the old leaf has been attributed to the growth of the new bud. In all the examples enumerated above, of the decay and fall of cotyledons, flowers, and fruits, the organs ceased to execute their functions, when the purposes of their existence were accomplished; and such we must regard as the general law that determines the death of the leaves. In some instances, the death of parts seems to be hastened by the diversion of nutrient matter from the older organs to the new parts which are subsequently developed, as is exemplified in the decline and fall of the stamens and pis­tils from the growth of the ovary after fecundation ; but, in other instances, as in the death of annual plants, no such acting cause is apparent, and nothing remains to account for the event that occurs, except the character of duration, more or less extended, which was impressed on the plant at the era of its formation.

But from whatever cause the deciduous organs of plants cease to perform their functions, the immediate cause of their fall seems to vary in different vegetables, and to de­pend often on accidental circumstances of climate, &c. In some instances, the growth of the young bud seems to oc­casion the fall of the leaf. Thus, though the leaves of the oak die and become dry in autumn, they do not, says Du Hamel, fall till spring, when the buds begin to open, and the new leaves to appear. In other instances, the fall of the leaf seems to be connected with the exercise of the transpiratory function ; for plants which transpire largely, soonest lose their leaves, and hence evergreens, which tran­spire little, retain their leaves longest. Even if an ever­green be engrafted on a deciduous tree. It still retains its leaves after those of the stock have fallen. Sudden changes of temperature and humidity in the atmosphere, frequently promote the fall of leaves. Thus, in autumn, when rain suc­ceeds to a white frost, the leaves sometimes rapidly fall. So, likewise. It sometimes happens, that the too great heats of summer dry up the leaves; and then aiso, if warm rains follow, the dried leaves fall and new ones succeed, which continue longer than those of spring. On the other hand, leaves equally fall, though not so speedily, when the winter is mild ; and in conservatories, where a regular temperature is kept up, deciduous plants lose their leaves in spring, when the new ones shoot forth. Certain accidents or diseases, however, as lightning, or the eruption of the proper juice from its vessels, or a peculiar disease which separates the bark from the wood, sometimes kill a tree suddenly; and then, says Du Hamel, though the leaves become dry, they adhere strongly to the branches. These facts show, that, while the natural *death* of the leaf is to be sought in the specific nature and constitution of the plant to which it belongs. Its *fall* sometimes depends on the growth of new buds; or on variations in the motion of its fluids; or on sudden changes in the temperature and humidity of the atmosphere; and sometimes, probably, the period of the fall is determined by a difference of texture in the fibre of the plant itself.

The duration of the stem or trunk, after the leaves have fallen, is very different in different plants. In many herbs the stem dies at the same time, or shortly after the leaf; but in some trees, the life of the trunk is prolonged through many ages. The Gentleman’s Magazine for 1762 contains an account of the age of a chesnut tree, then growing at Tamworth in Staffordshire. This tree. It is said, was, at that period, probably the oldest, if not the largest, in Eng­land, being fifty-two feet in circumference. Its period of rising from the nut may be fixed at the year 800, in the reign of King Egbert. From that date to the reign of Stephen is 335 years, at which time it was fixed on as a