CHAPTER I.

ON THE NATURAL CONDITIONS OF PLANTS.

"There, fed by food they love, to rankest size,
Around the dwelling docks and wormwood rise;
Here the strong mallow strikes her slimy root;
Here the dull nightshade hangs her deadly fruit;
On hills of dust the henbane's faded green,
And pencilled flower of sickly scent is seen;
At the wall's base the fiery nettle springs,
With fruit globose, and fierce with poisoned stings.
Above, the growth of many a year is spread,
The yellow level of the stonecrop's bed;
In every chink delights the fern to grow,
With glossy leaf and tawny bloom below."

CRABBE.

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To enter into any lengthened detail on the all-important subject of the natural conditions of plants would occupy far too much space; yet to pass it by without special notice, in any work treating of their cultivation, would be impossible.

Without a knowledge of the laws which regulate their growth, all our attempts must be empirical and more or less abortive. If we examine the vegetation on the surface of the globe, we shall find that the circumstances under which plants exist and flourish vary in an endless degree, and that they are all influenced by the atmosphere, heat, light, moisture, varieties of soil and periods of rest.

The purity of the atmosphere most sensibly affects the growth of plants, as evinced in the difference between those which grow in London and other large towns, or within the reach of manufactories evolving noxious gases, and those which grow in the country; but of this more hereafter.

The heat to which plants are subjected varies from 32° to 170°, or 180°. Thus, in some parts of Mexico, the

heat is so intense and the soil and atmosphere so dry, that no vegetation is found at certain seasons, save a species of *Cactus*, and were it not for this plant these tracts would form impassable barriers. Hardy states, in his Travels, that the sole subsistence of himself and party for four days consisted of the fruit of the *Petaya*, which, unlike most other luscious fruits, rather removes than creates thirst, while, at the same time, it satisfies to a certain degree the sensation of hunger. The providence of God is equally manifested in cold countries, as in Lapland, where the rein-deer moss furnishes the sole food, during winter, for the rein-deer, without which the inhabitants could not exist.

It is hardly possible to overrate the influence of light upon plants; but its intensity varies from almost total darkness to a light double that of our brightest summer's day. Upon light depend all the active properties, the color, &c. I am tempted to give an example from Mr. Ellis, of its effects in this last particular:—"In North America the operation of light in colouring the leaves of plants is sometimes exhibited on a great scale, and in a very striking manner. Over the vast forests of that country clouds sometimes spread, and continue for many days, so as almost entirely to intercept the rays of the sun. In one instance, just about the period of vernation, the sun had not shone for twenty days, during which time the leaves of the trees had reached nearly their full size, but were of a pale or whitish color. One forenoon the sun broke through in full brightness, and the color of the leaves changed so fast, that, by the middle of the afternoon, the whole forest for many miles in length exhibited its usual summer's dress."

The states of moisture vary as much as those of heat and light. The late Mr. Allan Cunningham often expressed to me his surprise at the extreme dryness of the atmosphere and soil in which grew many species of New Holland plants, — that in seasons when there was neither dew nor rain, he had dug several feet below their roots without finding a trace of water, and yet Banksias and Acacias would continue to live in this state for a considerable time. There are numerous other plants, independently of those which live in water, which cannot exist unless the atmosphere and soil are continually humid, such as *Trichomanes speciosum*, &c. &c. Plants are affected by soils — sometimes specifically— but more generally in consequence of various soils possessing different powers of imbibing and retaining moisture. All plants require rest, and obtain it in some countries by the rigour of winter; in others by the scorching and arid heat of summer. Some "after short slumber wake to life again," while the sleep of others is unbroken for many months. This is the case with most alpine plants, and is necessary to their well-being. Messrs. Balfour and Babington, whilst recently exploring the lofty mountains of Harris, found the climate to be so modified by the vicinity of the Great Atlantic Ocean, that, notwithstanding their northern latitude (58°), many of the species inhabiting the Highland districts of Scotland were wholly wanting, and that the few which they saw were confined to the coldest and most exposed spots. From the same cause many plants grow there which were not known to grow in so northern a latitude in Britain. In Egypt the blue water-lily obtains rest in a curious way. Mr. Traill, the gardener of Ibrahim Pacha, informed me that this plant abounds in several of the canals at Alexandria,

which at certain seasons become dry; and the beds of these canals, which quickly become burnt as hard as bricks by the action of the sun, are then used as carriage-roads. When the water is again admitted the plant resumes its growth with redoubled vigour.

To suit all the varied conditions to which I have thus briefly alluded, and under which plants are found to exist, they have been formed by their Almighty Creator of different structures and constitutions, to fit them for the stations they severally hold in creation; and so striking are the results, that every different region of the globe is characterized by peculiar forms of vegetation. A practised botanical eye can with certainty, in almost all cases, predict the capabilities of any hitherto unknown country, by an inspection of the plants which it produces. It were much to be wished, that those upon whom the welfare of thousands of their starving emigrant countrymen depends, possessed a little more of this most useful knowledge. But in order to give us a clearer idea of the "strong connexions, nice dependencies," existing between climate and vegetation, let us survey plants in a state of nature. We shall find some restricted to certain situations, while others have a wide range, or greater powers of adaptation. It is not perhaps going too far to assert, that no two plants are alike in this particular, or in other words, that the constitution of every individual plant is different. Of the former, *Trichomanes speciosum* is an example, it not being able to exist, even for a short time, in a dry atmosphere: of the latter, familiar examples are presented to us in the London Pride and the Auricula; these of course grow in greater or less luxuriance, as the conditions are more or less favorable. The *Cerasus Virgi-*

niana affords an interesting illustration of the effects of climate upon vegetation: in the southern states of America it is a noble tree, attaining one hundred feet in height; in the sandy plains of the Saskatchawan it does not exceed twenty feet; and at its northern limit, the Great Slave Lake, in lat. 62°, it is reduced to a shrub of five feet. But we need not travel to America to seek instances of this sort: we have them every where about us. I have gathered, on the chalky borders of a wood in Kent, perfect specimens in full flower of *Erythræa Centaurium*, not more than half an inch in height, consisting of one or two pairs of most minute leaves, with one solitary flower: these were growing on the bare chalk. By tracing the plant towards and in the wood, I found it gradually increasing in size, until its full development was attained in the open parts of the wood, where it became a glorious plant, four or five feet in elevation, and covered with hundreds of flowers. Let us pause here a moment, and reflect deeply on the wonders around us. We shall find a continued succession of beauties throughout the year, beginning with the Primrose, the Violet, and the Anemone; these giving place to the Orchises; and these again to the Mulleins, Campanulas, and various other plants, all in their turn delighting the eye and gladdening the heart: nor is the winter season devoid of interest; the surface of the ground, and every decaying leaf and twig, is inhabited by a world of microscopic beauties. All these have maintained their ground, without interfering with each other, year after year and generation after generation. The same page in the great book of nature, which filled the mind of Ray with the Wisdom of God in Creation, lies open to our view. May we read it aright! Let us ask ourselves,

whether man, with all his boasted wisdom, can realize such a scene as this? He cannot,—and the cause lies in his ignorance of the natural conditions of plants. To sum up in the words of a great philosopher of the present day.—"If the laws of nature, on the one hand, are invincible opponents, on the other they are irresistible auxiliaries; and it will not be amiss if we regard them in each of these characters, and consider the great importance of them to mankind.

"1stly. In showing us how to avoid attempting impossibilities.

"2dly. In securing us from important mistakes in attempting what is in itself possible, by means either inadequate, or actually opposed to the ends in view.

"3dly. In enabling us to accomplish our ends in the easiest, shortest, most economical and most effectual manner.

"4thly. In inducing us to attempt, and enabling us to accomplish objects, which, but for such knowledge, we should never have thought of undertaking."—*Herschel.*

CHAPTER II.

ON THE CAUSES WHICH INTERFERE WITH THE NATURAL CONDITIONS OF PLANTS IN LARGE TOWNS.

"As well might corn, as verse, in cities grow;
In vain the thankless glebe we plough and sow:
Against th' unnatural soil in vain we strive;
'T is not a ground in which these plants will thrive."

COWLEY.