

CHAPTER I

WHAT WEEDS ARE, AND THEIR PLACE IN THE PLANT WORLD

WHEN there were no men, there were no weeds. This statement requires explanation, and the explanation involves the question of what we mean by weeds. To understand this question in all its bearings, we must in the first place consider briefly the general subject of plant-life upon our earth.

The plant-world. One of the most remarkable features of this globe upon which we live is the mantle of vegetation with which the greater part of the land-surface (as well as the shallower waters) is clothed. This vegetation has been evolved during a vast period of time. It has assumed an endless variety of forms—from the towering forest tree down to the microscopic diatom—and it has accommodated itself to a wide range of physical conditions. In varying form, plant-life is found in the intense cold of the Arctic Regions and the fierce heat of the Equator; some plants grow under thirty feet of fresh or salt water, others in deserts where only a few showers fall; and while some species endure the full glare of the tropic sun, others can live in perpetual darkness. But taking the green-leaved flowering plants which we all know so well, and with which we

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shall be mainly concerned in the pages which follow, we find that there are physical limits to their existence. A certain amount of heat and light, and air and water they must have ; and also they need to have access, by means of their roots, to certain mineral substances which they find in the soil. The absence of one or more of these requirements produces a desert—a place where plants are absent. The want of heat produces a dwindling of the vegetation of the far north ; want of water is accountable for the scanty flora of the Sahara, and the absence there of a covering of plants in its turn allows the surface to become disintegrated,

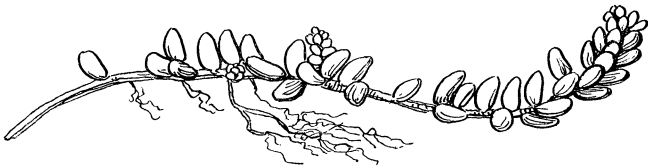


Fig. 1. A Stonecrop (*Sedum album*), showing thickened leaves for the storing up of water. Natural size.

so that the loose soil is tossed to and fro by every wind. Want of light is the cause of the dying out of vegetation in the deeper parts of lakes, and of sea-weeds in the oceans. Want of soil in which the plants can anchor themselves by means of their roots, and from which they can draw their mineral food, accounts for their absence on certain rocky tracts. The too great abundance in the soil of certain common mineral substances, such as common salt or compounds of potash, which in minute quantity are useful to plants, or at least not harmful to them, also cause a dearth of vegetation, as in the alkali deserts of the United States.

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But inside of these extremes, plants usually abound, and cover the earth with their verdure. By slow degrees, too, they have accommodated themselves to special conditions of existence. Plants which grow in very dry places protect themselves from too great loss of water by having small leaves, or often no leaves at all; by having a thick waterproof skin, or by covering themselves with a layer of wax or of dense hairs to keep themselves cool and moist; often by thickening their leaves and stems, and storing up quite a large quantity of water there, to be used in time of drought (Fig. 1). Plants exposed to very strong sunlight often hang their leaves edge-wise, like the gum-trees of Australia, to prevent their being burned up. Plants which grow in shady places on the other hand have mostly large spreading leaves, so as to catch plenty of light. In very cold places plants protect themselves in various ways. Water-plants have limp stems like whipcord, which are less liable to get broken by waves than if they were stiff, and their leaves, which have not to resist wind or rain or hail, are mostly very thin.

The struggle for existence. The number of seeds which plants produce is far greater than the number of seedlings which survive. There are many species which bear so much seed that if every seedling grew, they would in quite a small number of generations cover the whole land-surface of the globe. The effect of the incessant crowding of both young and old plants which is always going on, is that the weaker ones are killed off, while the stronger ones—in other words, the ones which are best fitted for the particular situation in which they grow—tend to survive. Thus any slight variation which

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helps a plant to hold its own will tend to continue, because the plant which possesses it will be more likely to flourish and to produce seed than its neighbours, and the children tend to have the same characters as the parent. This is the simple principle which underlies the theory of Natural Selection, which will be always associated with the name of the great naturalist, Charles Darwin, who first propounded it in 1859.

If we take, then, any area of natural vegetation, we must realize that the different kinds of plants which we find within it are not there by chance. Many kinds of plants from all around are trying to seed themselves there or to creep in, and only those which are in every way best suited for the particular conditions which prevail in any one spot will be able to maintain their hold. In every kind of situation—mountain, river, lake, wood, bog, or sandy shore—the plants which naturally grow there have a long history of struggle and adaptation behind them, and each maintains its place in virtue of its special capacity to do so.

Enter man. Into this beautifully balanced plant-world, many thousands of years ago, entered man. So long as he lived in the forests or on the plains, hunting, fishing and eating wild fruits and roots, he did not affect the natural vegetation as much as did the herds of wild grazing animals which were his prey. When he tamed some of these grazing animals, such as horses, cows, and sheep, and moved about on the natural grass-lands, driving his herds before him, he still affected the vegetation only to a slight degree. But when he learned the art of tillage, and began to dig up the grass-lands, and with the aid of fire to clear away the forests, in order

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that he might grow in their place plants useful to himself, then he attempted to substitute for the old native plant-covering an entirely artificial vegetation, and then he commenced a struggle with the natural flora which has been going on ever since, and still goes on continuously. The native plants are always striving to regain possession of their former home, and man works incessantly to keep them out; these natural invaders of man's territory form a large section of the great group of plants undesired by man which are known to him as **weeds**. Weeds of this kind—old natives which are ever trying to regain their lost empire—are undoubtedly the kind of weeds with which the ancient races of mankind had to deal first, and they are still the most abundant kind in districts which are not wholly reclaimed from a state of nature, or where agriculture is in a backward condition. In the wilder parts of the west of Ireland, for instance, most of the weeds in the farm-land are plants which originally occupied the ground, and which still grow as natives close by; by means of their seeds, or their creeping stems, they are incessantly invading the tilled land, and the farmer is constantly occupied in keeping them out, by weeding, or digging, or ploughing.

There is another class of weeds in our fields, which has been brought there—though unintentionally and unwillingly—by man himself, and which differs widely from the former group inasmuch as it is maintained there *because of*, and not, like the former group, *in spite of* man's operations. To understand this group fully, we must consider briefly the various types of vegetation which occur naturally in Europe, and the peculiarities of climate which produce them.

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The vegetation of Europe. All around the basin of the Mediterranean there is a prevalence of dry north-east winds, blowing from the adjoining masses of land, during the summer months, while in winter wet south-westerly winds, blowing in from the ocean, are frequent. The result is a hot dry summer, and a wet mild winter. The drought and heat of summer appear to be the controlling factors as regards vegetation. The annual plants hurry through their life during the spring months, and are in seed by the time the great heat arrives; the perennials either hurry likewise, and lie dormant during the summer; or if they face the heat, they do so with the aid of the devices which have already been mentioned—small leaves, succulent leaves, long roots, and so on. Annuals are abundant, and tall forest trees are not characteristic. When we go northward of this region, we find the moisture-laden westerly winds prevalent, giving a good supply of rain all the year round. This allows forests to grow, for forests, on account of the great amount of water which the trees use, need a more abundant rainfall than bushes or small-leaved herbs; and in spite of all man's interference with the natural vegetation, forests are still a characteristic feature of middle Europe, often with grass-lands on the hills. To the north of this again, the increasing cold of higher latitudes limits the spread of the forests, and they again degenerate into scrub, and pass into creeping shrubs and grasses. Now, the horde of annual plants of the Mediterranean region was not fitted to compete with the dense population of perennial plants—trees, herbs, and grasses—which occupied the lands to the northward, so long as this dense covering of vegetation remained intact. But when man began to destroy the forests and

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dig up the ground on which they had grown, in order to cultivate grains, then annual plants—both those native to the vicinity and those from the region further south—gained an advantage. This was both because the open ground was more suitable to their habits, and because of their rapid growth, which allowed them to spring up and sow themselves again before the next digging or ploughing rooted them out. And in this way the spread of tillage from the old countries of the Mediterranean northwards and westwards across the former forest-lands was accompanied by a spread of many of the annual plants of the Mediterranean region. Furthermore, much of the seed which was sown in the fields came—as it still does—from the Mediterranean countries, and mixed with this seed were the seeds of many of the annual weeds of the fields there. In this manner man himself helped, and still helps, the spreading of a large number of weeds. As we said at the beginning of this section, man—though unintentionally and unwillingly—himself introduces into his fields many of the most unwelcome weeds.

What weeds are. We are now in a position to explain the statement with which this chapter opened—that when there were no men there were no weeds; and also to define what is meant by weeds. Before man began to interfere with the natural vegetation, plants grew only where they were best fitted to grow; each species and group of species occupied a definite place in the plant societies, and maintained itself there so long as existing conditions remained; and speaking generally, conditions changed only very slowly—owing to alterations in drainage, for instance, such as the silting up of lakes,

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or the cutting down by streams of their channels; or the much slower but much greater changes brought about by alteration of climate.

Man, in his agricultural operations, entirely reverses this order of things. He exterminates, or tries to exterminate, the natural vegetation, and he cultivates instead plants which are specially useful to himself, but which are not natural to the vicinity and which can exist there only under his protection. As has been said already, the native plants all the time strive to break in and re-occupy their old homes, and men are as constantly employed in driving them back; thus agriculture has been defined as “a controversy with weeds.” **Weeds are, in fact, plants growing in places where man does not want them to grow.**

It may be well, at this stage, to refer to a use of the word “weed” which, though commonly used, is not correct. It arises in this way. The plants which man grows are selected for either their use or their beauty. Most of the true weeds which creep in among them, and which man employs himself in combating, are plants of no special use and not particularly showy. Hence the term “weed” comes to be applied to any plant which is not directly useful to man, nor ornamental, even though it may be a native species growing in quite natural surroundings, and not affecting man and his operations in any way. This is not the sense in which the term “weed” is used in the following pages.

The vegetation of Ireland. Ireland, to which frequent reference will be made for illustration, lies within the meteorological influences which have produced the forest region of Europe. Indeed, on account of its

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position on the eastern edge of the North Atlantic, it has a climate which is milder and wetter than that of any other country in Europe. The heavy rainfall has tended to produce not only forests (of which traces only remain now-a-days), but also the great peat-bogs which are so familiar a feature of the Irish landscape. The forests vanished during the last thousand years before the axe and plough of man and his herds of cattle. In some districts, where metallic ores occurred, they were used up largely for the purpose of smelting; no doubt they also long supplied the domestic hearth. The needs of agriculture accounted for the disappearance of the remainder. At the present time we see the plains and hill-slopes laid out in square fields with hedges between; as we go westward, where on account of the high winds trees grow with difficulty, fences of earth or stone replace the hedges of the east. The old forests have passed away. Only here and there, in steep glens, and on ground too rocky or too poor for cultivation, we find remnants of the primitive woodland, and from these remnants we may learn still what the native trees were that formerly occupied so much of the country. Oak was abundant, and with it grew Ash, Elm and Birch, Poplar and Alder, and other smaller trees, such as Hazel, Holly, Mountain Ash, Yew, Hawthorn, and so on. Many of the trees most familiar to us now, such as Sycamore, Horse Chestnut, Beech, Larch, Spruce, were brought into Ireland from other countries by man.

The other great natural plant-formation of Ireland, the bogs, has proved more difficult to deal with than the forests, and much of it remains still. On the forest-land, once the trees were cleared away a rich soil lay

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ready for use. But the bog surface, even when thoroughly drained and dug, is not suitable for the growth of most plants, being charged with injurious substances (humous compounds) derived from the incomplete decay of the plants which form the bog. Were it not for the fact that turf is a valuable fuel, the Irish bog-lands would still extend almost untouched by the hand of man. But during many centuries great areas of bog have been removed and burned, and on the lower layers of the bog which are thus reached, and which are more decayed than the upper layers, crops can be grown, especially when plenty of lime and manure are added to the peaty soil, and when it is sufficiently drained. Near the bottom of the bogs are found, often in great quantity, stumps of the Scotch Fir. In early times this tree and the plants of the bog appear to have struggled for mastery through a long period. Under dry conditions the Fir spread over the country; when the ground became wetter, it died out and the bog plants took its place. This story is told by the bogs themselves, in which we may often see more than one layer of old Fir stumps, with layers of bog in between. What it was that occasioned these fluctuations of vegetation it is not easy to say now. In the end, the bog flora triumphed, and over the top of the old tree-stumps it has in many places built up as much as twenty feet of peat. But at present, owing seemingly to a slight change of climate, the building up of the bogs has in most places ceased, and they are stationary, or in some places, as on the tops and slopes of mountains, are being stripped off by rain and wind. As to the Scotch Fir, unlike the other trees, such as Oak, which often accompany it in the bog deposits, it has as a native entirely died out in this