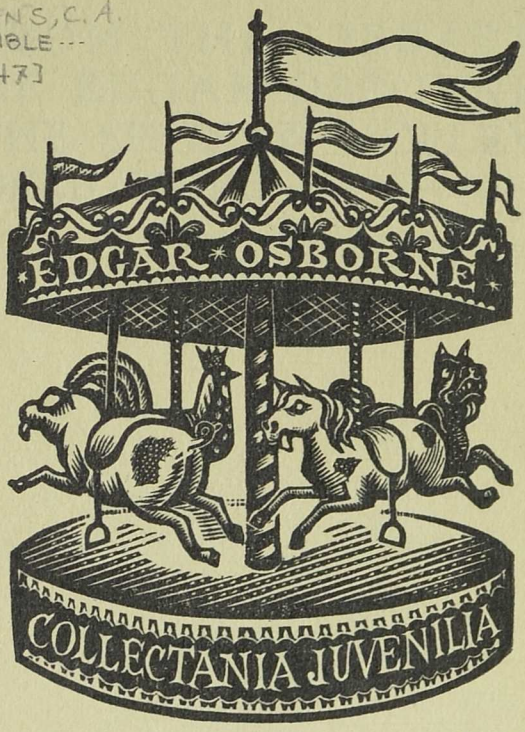


Presented to J. W. Browne,

from

Her affectionate Uncle

G. W. Clarke

September 25th/69.

FELLING AND BARKING OAK.

A

RAMBLE IN SPRING.

BY THE

REV. C. A. JOHNS,

AUTHOR OF "FOREST TREES OF GREAT BRITAIN," "A WEEK AT THE LIZARD," ETC.

PUBLISHED UNDER THE DIRECTION OF
THE COMMITTEE OF GENERAL LITERATURE AND EDUCATION,
APPOINTED BY THE SOCIETY FOR PROMOTING
CHRISTIAN KNOWLEDGE.

LONDON:

PRINTED FOR THE

SOCIETY FOR PROMOTING CHRISTIAN KNOWLEDGE;

SOLD AT THE DEPOSITORY,

GREAT QUEEN STREET, LINCOLN'S INN FIELDS; 4, ROYAL EXCHANGE;
16, HANOVER STREET, HANOVER SQUARE;
AND BY ALL BOOKSELLERS.

LONDON:
Printed by James Truscott, Nelson Square.

A

RAMBLE IN SPRING.

If we were not told in Holy Scripture that "seed time and harvest shall never fail," we might almost have imagined that winter was not to leave us this year. Generally, some few days at least, in the early part of the season, appear to have been borrowed from May, so mild is the air and so bright the sunshine, but the last two months have been very unpromising. When we took our ramble in the first week of April, it was hard to say to what season the day

belonged. The primrose and windflower indeed were beginning to peep forth, and the violet was fully expanded, but they were all powdered with the garniture of winter; and though the sun shone brightly at intervals, "the glory and the gloom" succeeded each other in strong contrast, for the bleak wind hurried along massive clouds, not hung aloft like the fleecy clouds of summer, but lowering and stalking angrily across the valleys, so that at times the thickly falling snow that they brought with them hid from our sight even the outline of the opposite hill. It was pleasant then, when the squall had passed away, to observe that the feathery crystals were but of momentary duration. They were soon converted into little globes of water more like dewdrops than drops of rain; and though the trees and

taller shrubs still bent submissive to the blast, our attention was drawn off from them to the quiet sheltered flower-buds that seemed to be looking up thankfully at the motionless sun, or to the more exposed ones, which were merrily dancing as if confident that they had not come forth uninvited, though not expecting to be so roughly treated. On that day the contest between winter and spring seems to have been decided, for, but a few days afterwards, we recognised the sweet note of the lark, and watched him wheeling upwards in great circles until he became a mere speck in the clouds, and could see as far as his clear unmistakeable voice could reach, announcing the pleasant tidings that "dark, cold, gloomy winter had passed away, and bright leafy spring was come indeed."

The robin did not allow us to forget the sound of his voice during the whole of the cold weather; the thrush and blackbird piped their morning and evening songs when the air was mild, and when the snowdrop was the only flower that had ventured out; but now that vegetable life is springing from every bush and every bank, nearly all our best songsters are in full voice; many are busily engaged in building their nests, and some will soon have their patient industry rewarded by the hatching of their broods.

Let us now, as we stroll along, note the various changes which have taken place in the appearance of Nature since we took our winter ramble a few months back. Even yet, when there is a clear sky at night and a north wind, we may expect to see the meadows powdered

with hoar-frost; and this is sometimes injurious to the blossoms of fruit trees, and even to the tender foliage of plants which have been introduced from warmer climates. Many persons believe that exotics from the warmer regions of the globe may, by long continued care and judicious treatment, be so altered in constitution as to bear the English climate as well as indigenous plants. To a certain extent this opinion is correct, but not nearly so far as is commonly supposed. There are some few plants which will flourish equally well in nearly all climates except the two very extremes. There are others which flourish very well all the summer, but are cut down to the ground by the first severe frost, never forming more than an annual growth above ground, whereas in their native countries they flourished all the year

round, or even ranked among shrubs or trees. Occasionally, when the winter has been a very mild one, these will retain their branches with us for a second year or more; but for the most part, the root is the only part preserved, and this begins to shoot again on the return of warm weather. But if a winter of unusual severity takes place, both roots and branches are destroyed. Nor does it matter for how long a time they have been accustomed to an English climate; a plant which has been established for many years is as little able to contend against a degree of cold beyond its natural power of endurance, as one which has been planted for a comparatively short time.

Gardeners sometimes point to shrubs, natives of hot climates, now growing luxuriantly in our gardens without any protection, which, they

say, when first introduced, were nursed in hot-houses, and even then scarcely kept alive. This argument, though seemingly conclusive, is not worth much, the fact being that the plants in question were wrongly treated on their arrival. It may well be, that they did not thrive in the hot-house; what they wanted was not heat, but air and light, and plenty of soil, and if these had been given to them on their arrival, they would have flourished in the open air as well then as now. The spotted laurel[1] was thus treated when it was first brought over, and the consequence was that it was for a long while a sickly starveling; now, however, it is a hardy evergreen, thriving even within reach of the smoke of London, and enduring the cold of our winters even better

[1] Aucuba Japonica.

than some of our native plants. On the other hand, no exertion has been spared to acclimatize (as it is called) the potato; yet although the number of varieties which have been raised is almost endless, the potato is still a tender herbaceous plant, liable to have its young shoots nipped off by a very slight frost, and it would almost appear, from the repeated failure of the crops, becoming less and less able to bear up against the ungenial climate of the temperate zone.[1] In short, we may conclude that although most plants may by careful

[1] The tenderness of the potato may be owing in some measure to the roughness of the leaf. Rough-leaved plants present a larger radiating surface than those furnished with polished leaves, and are therefore liable to be reduced to a lower temperature. This, however, can only operate to a limited extent, and by no means accounts for the mysterious susceptibility of the potato plant to atmospheric influences.

management be made to grow in a climate more or less different from that in which they were produced, the limits of all are defined; and that although they are all more or less capable of being altered in mode of growth, productiveness, &c., they never entirely forget or lay aside their natural habits.

You now know the cause of the black appearance presented by the young potato plants in yonder field. Last night's hoar-frost, and the sudden thaw produced by the morning's sun, have destroyed some of the leaves on every plant. The frost did not penetrate far, or it would have injured the stems and even the roots as well. The petals of the wild flowers around, though seemingly so much more delicate, have not been affected; and it is very likely that you will find in gardens, plants brought from the

same climate as the potato, already in full leaf, but untouched by the frost; not that they have grown used to the change of circumstances, but they are by their natural habit capable of enduring a much greater degree of cold than they were ever exposed to in their native country.

The ground is now everywhere in a state more adapted to promote rapid growth than at any other season. The effect of frost on the earth was to separate the particles of earth by the agency of the water expanding during its conversion into ice. The clods were left by the thaw saturated with water, like wet sponges. The east winds of March, however, having gained little moisture during their passage across the frozen continent of Europe, produced a wonderful change. Cold and comfortless

though they seemed, they were employed in reducing to an invisible vapour, and carrying away in this form, the superfluous moisture from the surface, thus giving the air free access to the seeds which lay ready to burst into life, and leaving the soil loose and easy to be penetrated by the newly excited roots of plants already growing. Nor is even that vapour lost; it may never perhaps return to the neighbourhood of the place from which it was raised, but having floated through the air till condensed into drops, it will descend somewhere as an April shower, to afford to growing plants a larger supply of nourishment than they needed when first springing into life. Young plants generally require more moisture from rain in spring than at any other season, for this reason. Seeds will germinate only

under the united influence of air, heat and moisture. These three essentials they can only obtain within a moderate distance of the surface. Light is prejudicial to their growth, so that they require to be *covered* with soil; but if they are situated at a considerable distance from the surface, they are beyond the reach of air, and remain unaltered for an indefinite time. If, on the other hand, they happen to lie so near the surface as to be within the influence of air and heat, they are liable to swell, and begin to grow, perhaps to send up their first leaves; but unless they are now supplied with moisture in considerable quantities they will shrivel up and perish. But if they have once got over this critical period they are by no means so liable to suffer from a long drought, because their lengthened

roots are then able to penetrate into a damp layer of soil, which is scarcely affected by atmospheric changes. I shall be able to make myself better understood by supposing the case of two seeds of the same kind of plant buried at equal depths in similar soils. Soon after the sowing of the first, a heavy shower falls, which is followed immediately by warm sunny weather. The looseness of the soil allows a free admission of air, and the presence of moisture and heat excite it to growth. In the course of a few days it rises above the ground, and its root has penetrated to a slight distance downwards; but in the meanwhile the continued warm weather has dried up the earth to such a degree that it cannot absorb as much moisture as is evaporated through the leaves. The consequence is, that it is at first

checked in its growth, and soon dwindles away and perishes. And even if it does not die of itself, it acquires a sickly habit, and remains so long in its infant stage that it runs a more than usual risk of being devoured by some one or other of the many insects which prefer to feed on sickly young plants rather than on stout and vigorous ones. The other seed is at first similarly situated; it is excited to growth by air, heat and moisture, but during the early part of its life is watered by frequent showers with occasional bursts of sunshine, which excite its opening leaves to perform their natural functions. It soon grows beyond the reach of insects, and as it becomes a stout healthy plant, not only sends its stem upwards, but its roots downwards. When it has once arrived at this stage of its growth, it is not nearly so likely to

be injured by a long continued absence of rain as it would have been a few days before. The earth is so bad a conductor of heat, that however brightly the sun may shine, its effects are a long while in penetrating to any considerable depth. Meanwhile the roots are still descending further and further into the moist soil which is entirely beyond the ordinary drying influence of the sun's rays, and when the summer is set in, the plant is fully established, capable of deriving all possible benefit from the action of light and heat on its leaves and flowers, and but little, if at all, injured by the parched condition of the soil at the surface.

Thus we see that the same property of the earth, namely, that of conducting heat slowly, as it was in winter the occasion that the frost did not penetrate to a great depth, so in

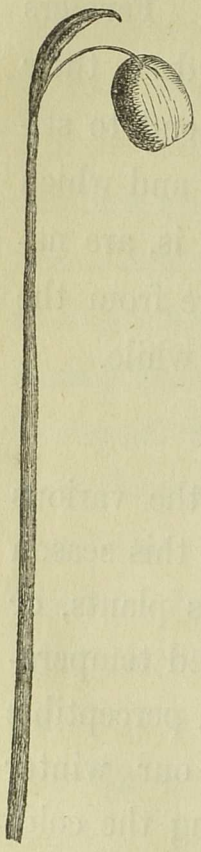
summer it is the cause that the effects of heat do not extend far below the surface.

Few seeds naturally germinate in summer, and the crops which are sown then, and early in autumn, are the most precarious that the farmer has to deal with. The turnip crop especially is so dependent on the state of the weather immediately after sowing, that it is often necessary to repeat the sowing several times, the young plants sometimes perishing from mere exhaustion, but more frequently being attacked when just above the ground by a small beetle called the Turnip-fly, which devours the young leaves in a very short space of time. Heavy rain for a day or two, followed by cloudy weather, generally excites the young turnip plants to such a rapid growth as places them beyond the attacks of the "fly," and enables

them to send down their roots into a soil which is never subject to extreme dryness. Farmers have this object in view when they dress their turnip-fields with manures which tend to stimulate the plants to rapid growth, and which have a great affinity for water, that is, are naturally disposed to attract moisture from the atmosphere, and to retain it a long while.

Let us now take a glance at the various vegetable productions which are at this season either beginning their existence as plants, or are being aroused by the increased temperature to perceptible growth. I say, perceptible growth, for, as we saw during our winter ramble, the torpor of nature during the coldest weather was not real; on the contrary, the inner life was active even in the dry

points of the beech-twig, protecting from the effects of frost the embryo buds which are now casting off their coverings and revelling in the sunshine.



THE SNOWDROP.

Some few plants have already made considerable advance; the snow-drop has shed its petals, which are succeeded by a smooth green seed-vessel; its leaves too have attained their full size, and are busily employed in preparing their proper juices under the action of air, heat and light, and transmitting them to the bulbs at the base. They will soon wither away, and the bulbs themselves will then enjoy their annual rest, till the chills of autumn shall have warned them that it

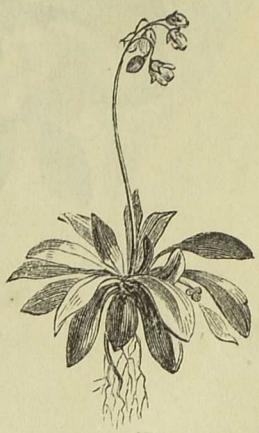
will soon be time for their flowers to reappear. Spring has passed away with the crocus too. The young seed-vessel of this showy flower, unlike that of the snow-drop, cannot bear exposure to great cold. Nature, therefore, has provided this plant with a corolla, the tube of which is so long, that while the whole of the flower seemingly rises above the surface, the seed-vessel remains several inches under ground. Its bright petals, however, have now faded away, and the stem, which, as long as the frost continued, remained concealed within the root, has shot up, bearing on its summit a little flattened case of seeds. The solid little root from which this beautiful apparatus sprung, exhausted with the exertion, is now decaying; but the long grassy leaves, also withering, have already formed another root, which, like the snowdrop, will lie to all appearance idle until its spring returns.

THE HAIRY BITTER-CRESS.

THE SHEPHERD'S PURSE.

The sweet-scented violet is a very early spring flower, ceasing to bloom as soon as the sun begins to gain power, but not bringing its leaves to maturity for some time after, and often producing flowers without petals until late in the season.

On sunny banks, several little plants have already formed their seed-vessels: the whitlow-grass[1] has ceased flowering, and has spent the greater part of its existence; the shepherd's purse[2] has begun to shed the first of its many crops of seeds; and the hairy bitter-cress[3] is so far matured that if touched ever so lightly it will roll



WHITLOW GRASS.

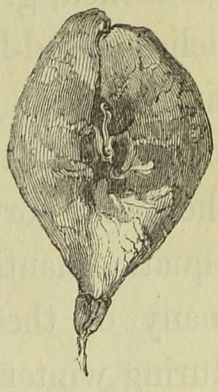
[1] Draba verna. [2] Capsella Bursa-pastoris,
[3] Cardamine hirsuta.

up the valves of its seed-pods with a rapidity that the eye cannot follow, and scatter its tiny seeds to the distance of many feet. The trees

ELM-SEEDS.

in yonder hedge-row, the branches of which are so heavily laden with tufts of green, would seem to be the very first to come into leaf; but this is not the case: gather a twig, and

you will find the leaf-buds just beginning to expand. Each of the thin pale-green plates, which at a distance might well be mistaken for leaves, is a seed-vessel, and the little spot in its centre marks the position of a seed. They are now ripe, and in the course of a few days will all be wafted away, and be succeeded by the delicate foliage of the elm. The flowers of this tree, which are of a purplish hue, and are only conspicuous from their numbers, first appear in March, or at the end of February.

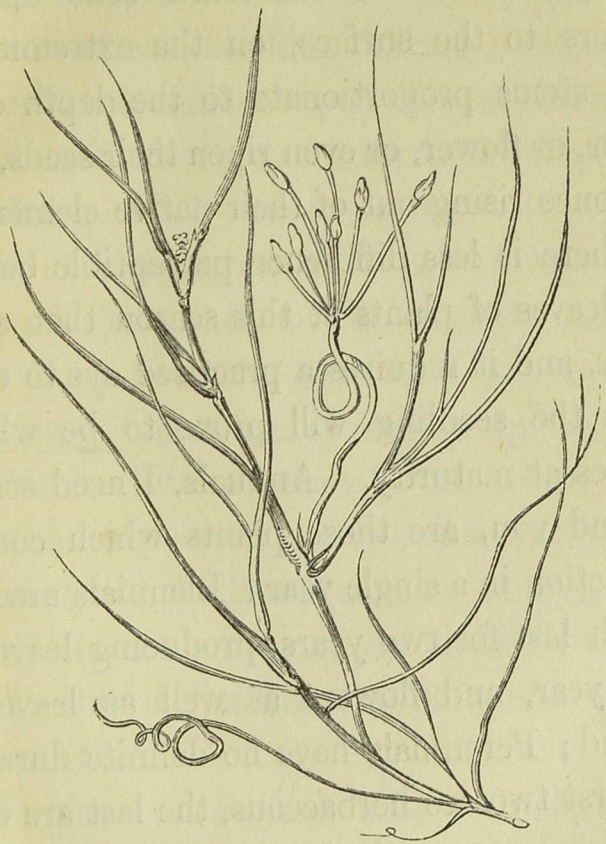


THE SEED-VESSEL.

With the above-mentioned exceptions, and perhaps a few others, the whole vegetable world is in a state from which the season derives its name; look where we will, something is springing into life. Wherever there is soil

enough to cover the smallest seed, or to retain a drop of moisture, some one or other of the myriads of plants with which the bounty of Providence has ordained that the earth shall be gladdened, gives certain promise, with its two delicate seed-leaves, of coming luxuriance. The time of year at which seeds ripen varies considerably in the different species; but by far the larger portion germinate now. The seeds of aquatic plants form the principal exception; many of these remain covered with water during winter and spring, and being incapable of germination until submitted to the action of air, they remain inert until the water has subsided, leaving them buried in mud on the bank. The heat of the sun soon dries the surface of this, and air being thus admitted, they spring up rapidly, frequently lining the edges of ponds with a carpet of tender herbage. Thus we often see the bed of what was during the

winter a shallow pool, filled with a similar vegetation. In such situations the young plants are



Ruppia maritima.

independent of rain, being nourished by the

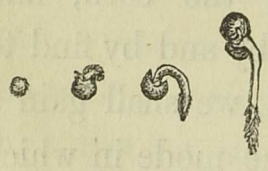
moisture with which the ground is still saturated. Some indeed germinate naturally while wholly submersed, and either send up their flowers to the surface, on the extremities of long stems proportionate to the depth of the water, or flower, or even ripen their seeds, without once rising out of their native element.

There is less difference perceptible between the leaves of plants at this season than at any other, and it requires a practised eye to decide what the seedling will prove to be when it arrives at maturity. Annuals, I need scarcely remind you, are those plants which come to perfection in a single year; Biennials are those which last for two years, producing leaves the first year, and flowers as well as leaves the second; Perennials have no definite duration; the first two are herbaceous, the last are either herbaceous, annually dying down to the ground at the approach of winter; or *woody*, in which

case they every year increase in bulk, eventually becoming shrubs or trees. It is generally very difficult, often impossible, to discover to which of these classes a seedling belongs, unless we have previously had an opportunity of observing it in its various stages of growth, the structure of all being nearly the same until they have made a considerable advance. The early history of almost all is also precisely similar, so that if we trace the growth of one of these little plants which are springing up in such countless multitudes among the corn, and which the farmer will, I fear, by and by find to be cherlock, or wild mustard, we shall gain a tolerably correct notion of the mode in which vegetable life commences in all seeds of the same structure.

This piece of ground has been recently ploughed and sown with corn, so that whatever

weeds are now growing here, must have sprung from seeds which have been lying, perhaps for many years, beneath the surface. Then though favourably situated for germination as it regards moisture and heat, they were beyond the reach of air, and lay inactive. When the ground was turned up in the winter they were thrown up with it, and then wanted nothing but heat to stimulate them to growth. This being supplied, they began to absorb moisture from the surrounding earth, and oxygen from

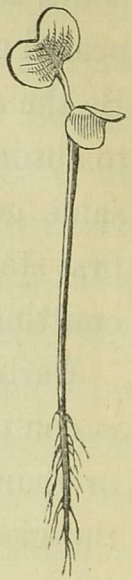


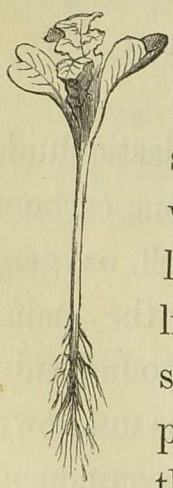
the atmosphere, and at the same time to emit carbonic acid. Meanwhile the covering of the seed stretched from the pressure of its swelling contents, and soon a small white point protruded, which, no matter from what part of the seed it proceeded, that is, whether from the upper or lower, descended

into the earth. The two halves of the seed, which had been only held together by a mere point, also increased in size, and appeared above the surface of the ground. By the action of light they were excited to absorb from the atmosphere the very same gas, carbonic acid, which in the first stage of germination they had been emitting.

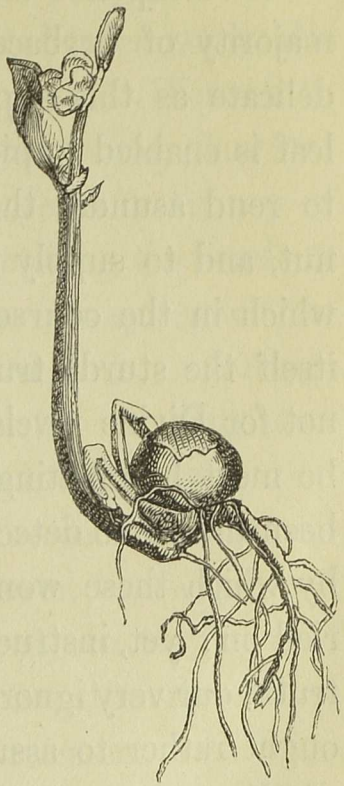
Carbonic acid, itself an invisible elastic fluid, is compounded of two substances, one carbon, or charcoal, the other a fluid like itself, oxygen, the gas which is indispensable for the maintenance of animal life. This compound substance the leaves are, by some means unknown to us, enabled to separate into its component parts. They now no longer need oxygen, and therefore return it, through pores with which the leaves are provided, pure to the air; but the carbon, which is destined to form the bulk

of their substance, they retain, and to its presence is to be attributed the green colour perceptible in the leaves of all healthy plants. The seed-lobes, now converted into leaves, do not attain a large size, and last but for a short time; their office is to prepare the sap which is sent up by the root, and to send it down their stalks to the main stem, from which it is conveyed to the little tuft of leaves which lies concealed between the seed-leaves. These are the proper leaves of the plant, and as they expand, repeat the functions performed by the seed-leaves, besides forming and sending down fibres to the root, which then becomes branched or fibrous. When this communication between the true





leaves and the soil is thoroughly established, the office of the seed-leaves ceases, and they die away.



This is the history of the infant existence not of the wild mustard only, but of all plants the seeds of which are composed of two lobes. In some cases, the pea for instance, the seed-lobes do not rise above the ground, but they nevertheless nourish the young plant till it is able to provide for its own wants, when they too dwindle away and perish. Botanists call these seed-lobes cotyledons, and

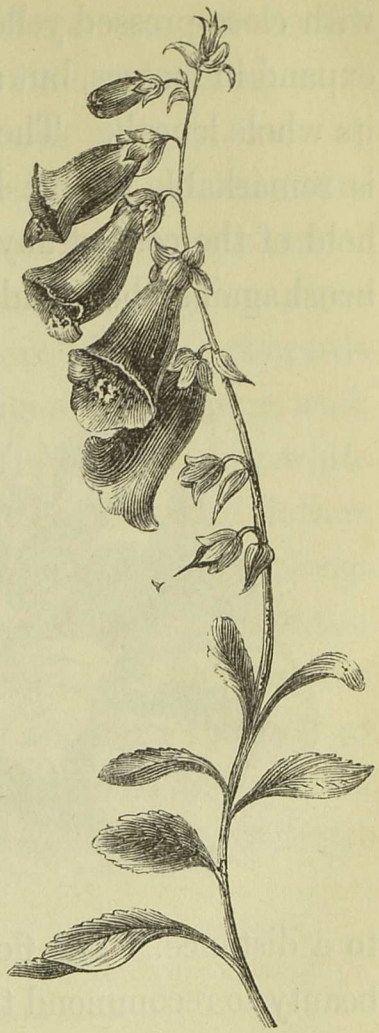
all plants which produce seeds with two such lobes are called dicotyledonous, a class which comprises all British trees, and a vast majority of herbaceous plants. Tender and delicate as this apparatus is, the crisp juicy leaf is enabled to pierce the stiffest clay soil—to rend asunder the hard shell of the hazel-nut, and to supply the first thread of timber, which in the course of years gathers around itself the sturdy trunk of the oak. Were it not for Divine revelation, the reflection would be most humiliating that human science has been unable to detect a trace of the machinery by which these wonderful operations are carried on; yet, instructed as we are in Heavenly truth, our very ignorance of natural phenomena ought rather to assure us of the infinite love of Him, to whom our eternal welfare is of far greater import than the clothing of herbs. If

God so cares for the body of the grass which to-day is, and to-morrow is cast into the oven, in what estimation must he hold the souls of those whom He condescended to create in His own image, after His likeness! Were I to trace the future history of the young plant, we should find at every step fresh testimony of what, if we were contemplating the work of man, we should call extraordinary sagacity in designing, and exquisite skill in executing; but it would be presumptuous to apply such terms to the works of God, the ordinary perfection of which exceeds the limits of our apprehension. I prefer, however, for the present, to direct your attention only to the signs of outward life which are most strongly characteristic of the season. Summer will bring with it its own features, and as we trace them out, we will pursue the subject further.

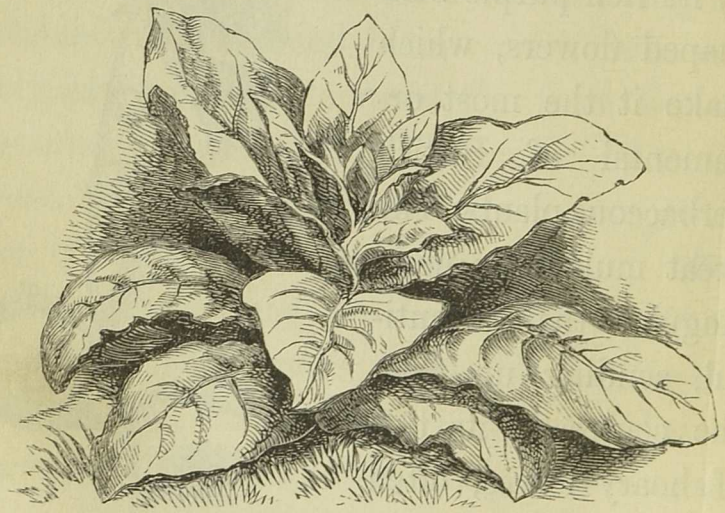
Biennials, or plants which arrive at perfection and die in their second year, are now to be seen in two stages of growth. Some, which have just come up, have no marks by which they can be distinguished from annuals; others, which were increasing all last summer, are now plants, furnished with robust thoroughly established roots, and leaves which were not only hardy enough to resist the frost, but to continue growing during the winter. Among these, the most conspicuous are the foxglove,[1] the burdock,[2] and the great mullein.[3] The first of these may be distinguished by its wrinkled downy leaves, which lie close to the ground; the second, by its large heart-shaped leaves, which grow on rather long stems, and are wavy, toothed at the edges and hoary beneath;

[1] Digitalis purpurea. [2] Arctium Lappa.
[3] Verbascum Thapsus.

the third is unmistakeably marked by its white downy leaves, which to the touch resemble flannel. The foxglove is well known by its rich purple bell-shaped flowers, which make it the most ornamental of British herbaceous plants. The great mullein is more singular than beautiful, sending up from the centre of its tuft of hoary leaves, often much infested by caterpillars, a long club-like stem thickly set



with close-pressed yellow flowers, which do not expand in masses, but are scattered throughout its whole length. The burdock when in flower is remarkable for the hooked scales which lay hold of the coat of any animal that happens to brush against them, and so serve to carry the seeds



to a distance. The flowers have no particular beauty to recommend them; but the leaves are

strikingly picturesque, and are often introduced by artists into the foreground of landscapes.

The perennial herbaceous plants, that is, plants the roots of which are of an indefinite duration, and which do not bear woody stems, are either like the annuals, springing from seed, or are more or less advanced towards their summer growth. Some are in flower, such as the stitchwort,[1] with its starry, snow-white blossoms; the primrose,[2] and cowslip,[3] flowers too well known to need any mark of recognition; others, as the columbine,[4] quaintest and not least pretty of all hedge-flowers, and the buck-bean,[5]—far too smart a flower, one would imagine, for the stagnant marshes that he chooses to frequent,—will not venture forth

[1] Stellaria Holosteum. [2] Primula vulgaris.
[3] Primula veris. [4] Aquilegia vulgaris.
[5] Menyanthes trifoliata.

till summer has thoroughly set in; while others, as the chamomile,[1] satisfied with perfuming the air all the summer with its fruit-like scent, and the purple scabious,[2] kindly reserve their blossoms to cheer the waning year; yet later, a few untiring daisies or hopeful and hope-inspiring primroses come out, and whisper to us before dull, cold, cheerless winter has set in, that the duration of his sway is fixed, and that before his reign has commenced his successor has been appointed.

Before we take notice of the condition of trees and shrubs, let us enter this wood; and here we may first remark how very few leaves lie scattered about compared with the countless number which a few months back hung on every branch. Some of these have been eaten by insects and minute snails; some consumed

[1] Anthemis nobilis. [2] Scabiosa succisa.

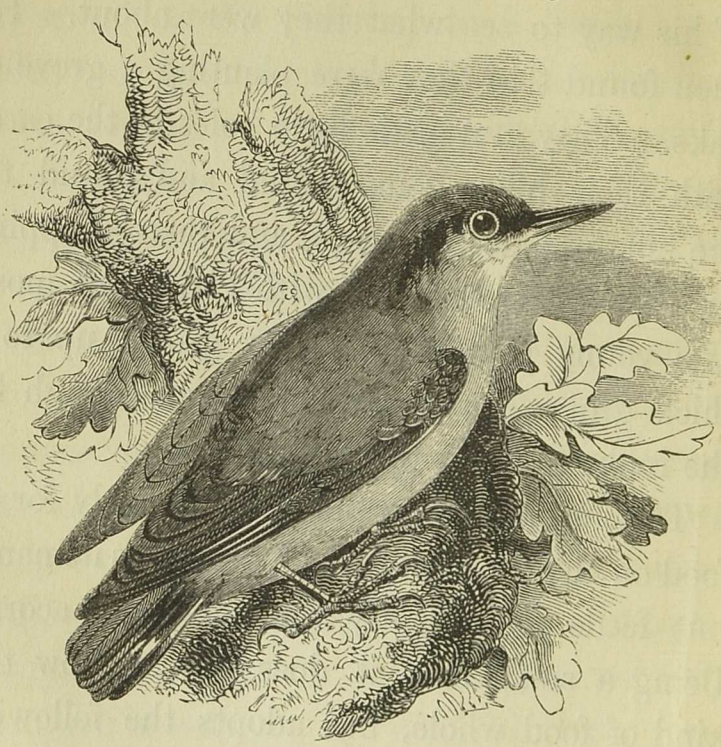
by fungi; a great many have been overgrown and hidden from sight by moss; but by far the larger portion have been swept away by the wind into hollows and ditches, where they lie rotting and forming a rich soil, well adapted for the growth of almost every kind of plant. The ground beneath the oaks is covered with dead twigs and acorn-cups, but you may search a long time before you find a single acorn. What has become of them? Acorns were very abundant last year, and they cannot have rotted, for not being like the leaves, merely of temporary use, they were endowed with an inner life, which preserved them from decay, at least until the season of germination came round again. They have doubtless supplied with food during winter many of the birds and smaller quadrupeds which live on seeds. Among the latter, the squirrel depends

principally on acorns for his winter provision; the field-mouse is so fond of them that he will not scruple to dig them up from the holes in which they have been planted by the forester. So destructive are these little animals to young oak plantations, that it has been found necessary to set traps for them, and it is stated that upwards of 30,000 were caught in the Forest of Dean in a single season. The method adopted was to dig holes in the ground about eighteen inches deep, and wider at the bottom than above. The mice either fell or jumped into these, and were unable to get out. Among birds, pheasants and partridges are said to be very partial to acorns; the rook, too, not only eats them in autumn, but is said to bury them in the ground for a winter store. A naturalist whose veracity is to be depended upon, tells us that early one morning in autumn he ob-

served a great number of rooks very busy at work on a mossy slope, and that he went out of his way to see what they were about. He then found that they were planting a grove of oaks. They first made little holes in the earth with their bills, going round and round till the hole was deep enough, and then, dropping in an acorn, covered it with earth and moss. The young plantation is now grown up to a thick grove, the trees being large enough for the rooks to build their nests in.

The nuthatch does not depend solely for its food on the fruit from which it derives its name, but feeds indifferently on nuts and acorns. Being a small bird it does not swallow this kind of food whole, but adopts the following ingenious method of robbing the shells of their contents. Having gathered its booty from the tree, or picked it up from the ground, it flies

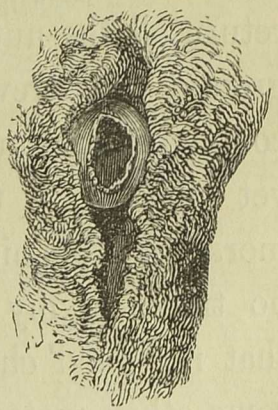
away with it to some rough-barked tree, and fixes its prize in a crack, taking its station



THE NUTHATCH.

above, and, by giving to its head a motion like that of hammering, and by dealing a

number of smart blows on the shell, quickly makes an irregular hole, large enough to allow the contents of the shell to be extracted piecemeal. Its banquet finished, it flies away in quest of more food, often leaving the broken shell firmly wedged into the bark. A notion of the large number of acorns and nuts consumed by this clever little mechanic, may be formed from the following incident. A few weeks since, I was walking in my garden, and suddenly heard the sharp, hurried tapping of a nuthatch. I crept in the direction of the sound, and discovered the bird clinging, head downwards, to the trunk of a walnut-tree, (which had been a favourite place of resort during



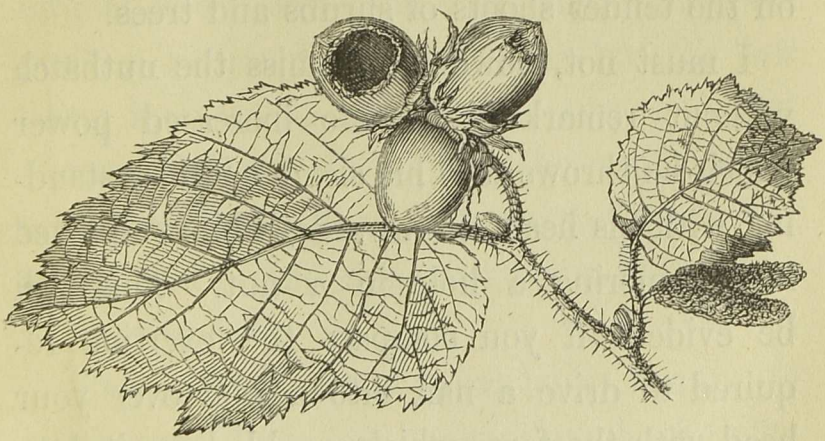
the previous autumn,) and battering away at a nut fixed in a chink below. Busily as he was occupied at his noisy work he was immediately aware of my presence, and flew off, carrying the nut in his bill. Wishing to encourage him to return, I laid a handful of Spanish nuts on the ground beneath the tree, and went away for a short time; but on my return all the nuts were gone, and though the ground was strewed with recent fragments of common hazel-nuts, and several pieces were yet sticking in the bark, I could not see a morsel of a Spanish nut. Surprised at finding no traces of my intended banquet, I fancied that my good cheer had been carried off by some other customer, especially as there was a mouse's hole hard by. I therefore placed some more on a garden seat beneath the tree, and wedged some into the bark, and again

retired. On my next visit, which was paid shortly afterwards, the new supply had disappeared, having in this case also been carried off bodily; the ungracious visitor had not even availed himself of my aid in fixing the nuts for him; they, too, were gone, shell and all. I then abandoned my hope of seeing him at work again, and wasted no more nuts. A few days afterwards I was walking in another part of the garden, and discovered under a tall acacia, (a tree which has a very rugged bark,) a large number of nutshells, and, recollecting my experiment, examined them, and found them to be the shells of Spanish nuts. From finding the shells only in one spot, I conclude that the nuts had all been brought thither by the same bird: but why did he not make the walnut-tree his workshop, in which case he would only have had a yard or two to

fly, and might have regaled himself with all his banquet in view? His reason, perhaps, was this. If he had set to work on the walnut-tree, his repeated tappings would probably have attracted other birds no less hungry than himself, at a season when both nuts and acorns were running short, and so the spoil would have been only partly his own. The nuts disappeared in so short a time, that I am inclined to think he must have made a secret hoard of them in some other place, and visited it whenever he felt hungry, still taking care to avoid working in the neighbourhood of a place likely to yield so rich a harvest. Beneath the acacia stands a fine cob-nut tree, which, long before the nuts are ripe, is visited and pillaged by these birds; but as long as their favourite food is to be found in abundance, they are not so particular in selecting their banqueting room,

and merely fly up to the rough-barked tree overhead. Last summer, for they began their operations so early as August, their frequent tappings attracted a squirrel into the garden, and with his help they considerably reduced my share in the produce of the tree.

The squirrel, it is said, gets at the kernel of



a nut by splitting the shell, the field-mouse by nibbling the shell. If this be the invariable rule, the mouse has the power of climbing trees,

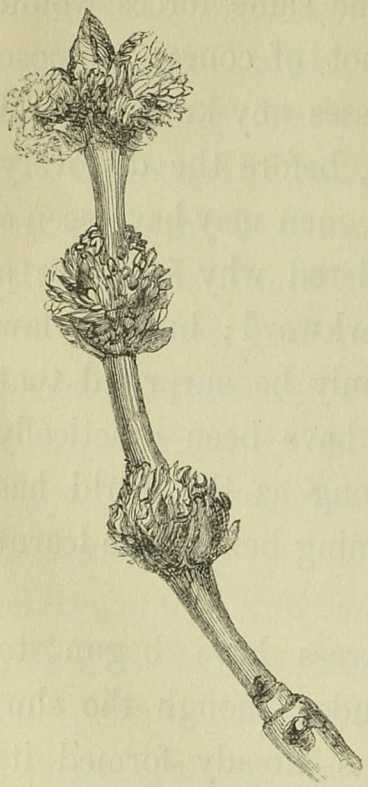
for I have repeatedly found hazel-nuts which have been emptied of their contents through a round hole, still remaining attached to the tree; but whether this little animal or the dormouse was the culprit, I have been unable to ascertain. The dormouse is undoubtedly a good climber, and in spring does much mischief by nibbling off the tender shoots of shrubs and trees.

I must not, however, dismiss the nuthatch without remarking on the increased power which he throws into his slender bill by standing with his head downwards, while employed in hammering a hole in a nut. This will be evident if you compare the exertion required to drive a nail into a wall over your head with the force which would drive it into a board lying on the ground. A single blow in the latter case would probably produce an effect equal to that of three or four in the

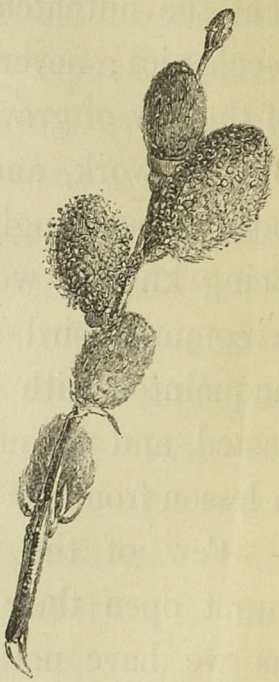
former; for in the first case you would have to overcome the gravity of the hand and the hammer; in the last, the same forces would assist the blow. I do not, of course, suppose that the nuthatch possesses any knowledge of mechanics; nevertheless, before the discovery of the law of gravitation, men may have seen a bird at work, and wondered why it chose a position seemingly so awkward; but the law being known, we can only be surprised that a common bird should have been practically acquainted with it as long as the world has lasted, and yet no reasoning being have learnt a lesson from it.

Few of the forest-trees have begun to burst open their leaf-buds; though the elm, as we have noticed, has already formed its seed-vessels. The flower-buds are beginning, too, to show life on the ends of the ash-

branches; they now have the appearance of purple juicy fruit, but will soon alter con-



FLOWER-BUDS OF THE ASH.



THE WILLOW.

siderably, bearing loose tufts of flowers, which

singly are inconspicuous, but together give a singular character to the tree. The catkins of the willow are in perfection, and afford a welcome repast to the early insects which have been lying torpid during the winter. They are at this season the favourite resort of bees, who swarm to them for pollen as thickly as in a few months hence they will resort to the lime-tree for honey. The catkins of the hazel are hanging from the branches, withered and brown, but no leaf-buds are expanding. The sycamore is among the first to come into leaf; but you will observe that the suckers from the roots and the little twigs which proceed from the main trunk, are much earlier than the rest of the tree in expanding their buds. The leaves on these are of a rich purple red,—a colour which is far from common in spring. The larch, the only one of

the fir tribe which shrinks from the cold of winter, is pushing forth its emerald knots of leaves and showy crimson catkins. The horse-chestnut, which sheds its leaves early in autumn, loses no time in putting on its summer attire; already its large resinous buds are swelling, and it will soon show its cone-like bunches of flower-buds, springing from the bosom of pale-green leaves, which, in their young state, fall back and droop as if blighted.

Some of the shrubs have made yet greater progress. The blackthorn now scarcely deserves its name, so completely is the colour of its branches hid from sight by its profuse snow-white blossom. The hawthorn has nearly finished putting on its mantle of delicate green, and is the first to give shelter and concealment to the birds which build their nests in hedges. Several weeks will elapse before its spray will

whiten with blossom; but the young flower-buds may be discovered, giving promise of an abundant season of "May." The elder-tree began to bud long ago, but the colour of its young foliage is cheerless, nor can it yet be called a leafy tree. The honeysuckle, in spite of its attempt to announce the coming of spring, before winter was well gone, has made no rapid progress; but, though it is inconspicuous now, we must not forget that it budded when no other shrub ventured to show a spot of green, and that it will not only lend its fragrance to the gay summer nosegay, but bloom a second time when the year is far spent.

As yet the vegetable world in general seems to be excited to life, not by the direct rays of the sun, but by the genial heat of the earth. Thus the herbaceous plants are the first to revive, the shrubs follow, and last of all come the trees,

in many of which, moreover, the reappearance of verdure is not simultaneous in all parts, but gradually creeps up the tree from the lower branches to the higher, showing that the general rule is true in individual cases. This peculiarity is strongly marked in the sycamore, and yet more so in the beech, the lower half of which may be seen, if observed at the right time, sprinkled with delicate green, while the upper buds have not begun to peep out. But when the leaves have expanded they intercept the rays of the sun, and the order of growth is then reversed, evaporation from their surface keeping up a continual ascent of sap until their office is completed. This subject, however, belongs rather to summer than to spring.

The plants whose progress we have hitherto been tracing, belong to the class called dcoty-

ledonous, because their seeds are composed of two lobes or cotyledons. We will now turn our attention towards another class, which comprises plants bearing monocotyledonous seeds, or seeds of one cotyledon. They do not differ in any respect from the last as to the conditions under which germination commences, nor in the functions of their principal organs. The seed, however, when placed in a situation favourable for growth, does not form seed leaves, nor does it rise above the ground. As soon as the seed-case has burst, a little root descends into the ground, and a single leaf shoots upwards, nourished at first by the altered substance of the buried seed. This first leaf is followed by another facing it, and this by a third, and so on, every new leaf arising from the base of its predecessor: but there are no leaf-buds, and consequently no branches. This peculiarity of

growth is constant during the whole life of the

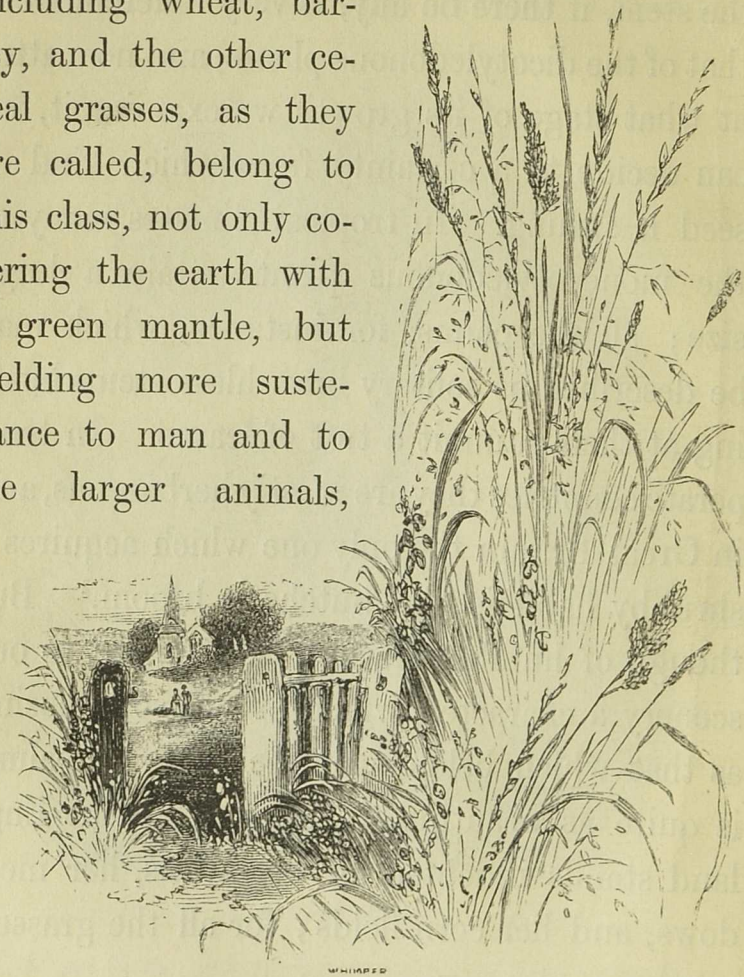
THE DATE-PALM.

plant, so that the arrangement of the vessels in

the stem, if there be any, is very different from that of the dicotyledonous plants, and no matter at what stage of its growth we examine it, we can decide to a certainty from which kind of seed it sprung. In tropical climates many of the monocotyledonous plants attain a large size; all the palms, for instance, which may be described as solitary branchless stems bearing at their summit a tuft of leaves. In temperate countries they are mostly herbaceous, and in Great Britain the only one which acquires a shrubby habit is the butcher's broom.[1] But though of humble stature, they impart to our scenery a character, which, if not so imposing as that which belongs to the clime of palms, is quite as beautiful. To a single tribe England stands indebted for her lawns, her meadows, and her corn-fields; for all the grasses,

[1] Ruscus aculeatus.

including wheat, barley, and the other cereal grasses, as they are called, belong to this class, not only covering the earth with a green mantle, but yielding more sustenance to man and to the larger animals,

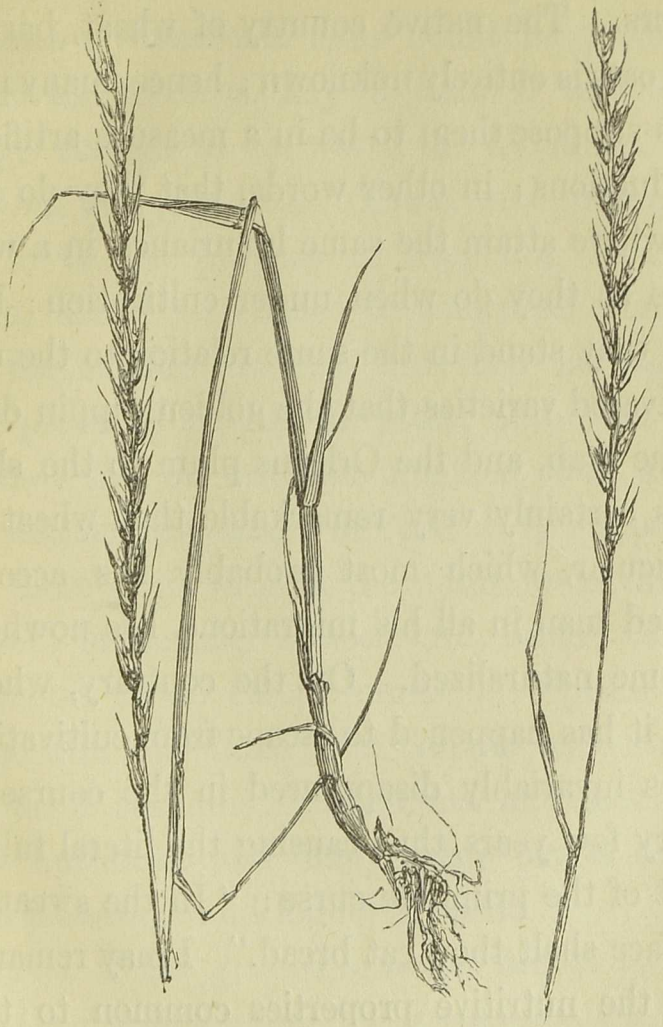


GRASSES.

CEREAL GRASSES.

than all the rest of the vegetable kingdom together. Most of the British grasses agree in bearing long narrow leaves, and cylindrical stems which are tubular and jointed. A great proportion of them are social plants; that is, they grow best when crowded together so as to form a compact turf. In the torrid zone, they are more dispersed, and acquire a much greater height than with us, frequently assuming the appearance of trees, and attaining a height of fifty or sixty feet. With the solitary exception of the darnel,[1] supposed to be the "tare" of Scripture, they produce nutritious seeds, and all abound more or less in sugar; hence arises the value of their herbage, either fresh or dry, as food for cattle. Sugar is more abundant in the sugar-cane than in any other species of grass; but it may be extracted from many

[1] Lolium temulentum.



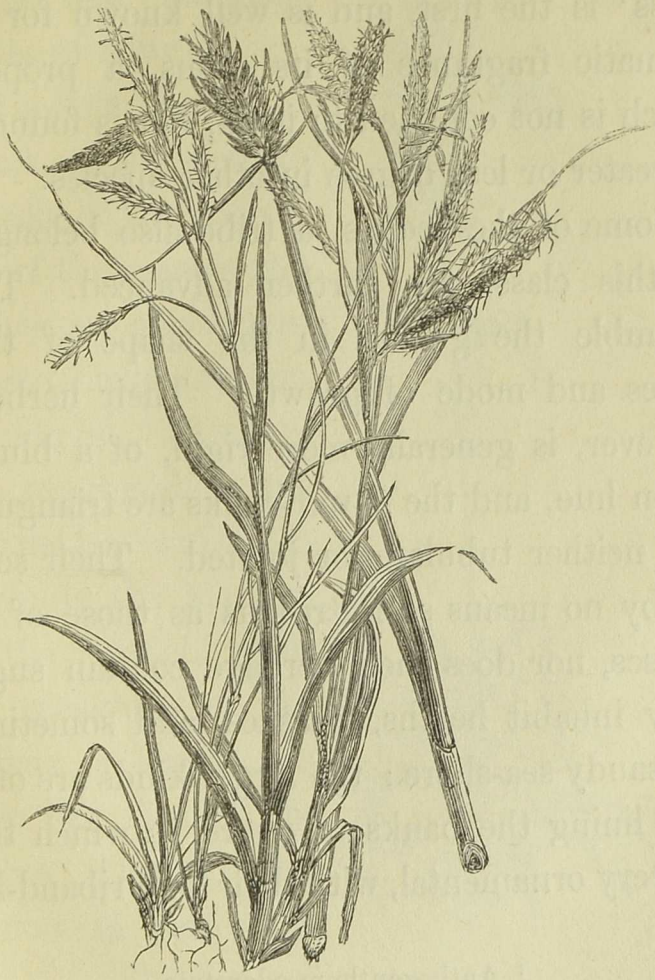
THE DARNEL.

others. The native country of wheat, barley, and oats is entirely unknown; hence, many persons suppose them to be in a measure artificial productions; in other words, that they do not anywhere attain the same luxuriance in a wild state as they do when under cultivation; but that they stand in the same relation to the uncultivated varieties that the golden pippin does to the crab, and the Orleans plum to the sloe. It is certainly very remarkable that wheat in particular, which most probably has accompanied man in all his migrations, has nowhere become naturalized. On the contrary, whenever it has happened to escape from cultivation it has invariably disappeared in the course of a very few years, thus causing the literal fulfilment of the primitive curse: "In the sweat of thy face shalt thou eat bread." I may remark, that the nutritive properties common to the various "grains" reside also in most of the

grasses; wholesome flour could be procured from the seeds of any of these if they were large enough to be worth the labour of collecting and grinding. These, though inapplicable to the purpose of supplying food for man, afford sustenance to countless numbers of the smaller animals, and their herbage is the principal support of cattle; and, "as man cannot live on tasteless unmixed flour alone, so neither can cattle, in general, be supported by mere grass without the addition of various plants in themselves too acrid, bitter, salt, or narcotic to be eaten unmixed. Spices, and a portion of animal food, supply us with the requisite stimulus, or additional nutriment; as the buttercup and many other plants season the pasturage and fodder of cattle."

Few of the grasses have yet begun to send up their flower-stems; the sweet-scented vernal

SWEET-SCENTED VERNAL GRASS.



SEDGES.

grass[1] is the first, and is well known for the aromatic fragrance of its stems, a property which is not confined to itself, but is found in a greater or less degree in other species.

Some of the sedges, a tribe also belonging to this class, are further advanced. They resemble the grasses in the shape of their leaves and mode of growth. Their herbage, however, is generally more rigid, of a bluish-green hue, and the flower-stalks are triangular, and neither tubular nor jointed. Their seeds are by no means so nutritious as those of the grasses, nor does their herbage contain sugar. They inhabit heaths, marshes, and sometimes the sandy sea-shore; the larger kinds are often seen lining the banks of rivers, to which they are very ornamental, with their long riband-like

[1] Anthoxanthum odoratum.

leaves and drooping spikes of flowers.

Another family of plants, which seem to partake of the characters of the grasses and rushes, are also beginning to show signs of returning life. These are the wood-rushes, the thin flat leaves of which resemble the herbage of the former, while the structure of the flowers is almost exactly like that of the rushes. One of these[1] is now in perfection,

[1] Luzula campestris.

and grows abundantly in meadows and pastures, showing its flowers before the grasses begin to shoot. It may readily be distinguished by the scattered silky hairs which clothe its leaves and the joints of its flower-stems, as well as by its drooping heads of grass-like flowers, each of which is composed of six dark brown calyx leaves, enclosing the same number of conspicuous yellow stamens. As the season advances, other larger species, with flowers of similar structure, make their appearance in woods, and one or two are found on the highest mountains of England and Scotland.

If to the above I add the orchideous plants, with their polished and often spotted leaves, and fantastic spikes of flowers,—the bulbous-rooted plants,—the yellow-flag, with its sword-like leaves, and the rushes, I shall have mentioned nearly all the monocotyledonous

plants which have as yet begun to shoot. Many, indeed, of these have made but little progress. The cuckoo-pint, or lords-and-ladies, we reckoned among the plants whose spring began in winter. We dissected its stem, you will recollect, on the 1st of January, and found even then its embryo-flower curiously wrapped up in a tender sheath. It has now shot up, and though it is still encased in its green winding-sheet, it is fully formed, and is well worth the trouble of unrolling, for the sake of admiring the symmetry of its structure, and the rich purple of the club-shaped appendage to the flower. Some plants have their leaves spotted with deep red, and others are of an uniform green, but all belong to the same species.

Another tribe of plants which are now beginning to show life among the withered foliage

of the past year are among the most ornamental in nature, namely, the ferns. In temperate

TREE-FERNS.

climates, the ferns rarely exceed seven or eight feet in height; many, indeed, are not more

than as many inches; but in the tropics they assume the character of trees sometimes forty feet high. They resemble the palms in having solitary undivided stems, with tufted foliage at the summit. They have neither leaf-buds nor flowers; the young leaves are produced from the bosom of the old ones, each being curiously curled up, with the stalk outside and the tip in the centre. While in this state some of the common species are thickly covered with brown chaffy scales, and bear no unfanciful resemblance to large hairy caterpillars, which often roll themselves up into a similar position when disturbed. The larger ones are sometimes called crosiers, from their resembling in shape the pastoral staff so called, which was formerly borne by abbots and bishops. The seed of the ferns is an excessively fine powder, and is usually contained in globular cases,

themselves very minute, which are variously arranged on the under sides of the leaves.

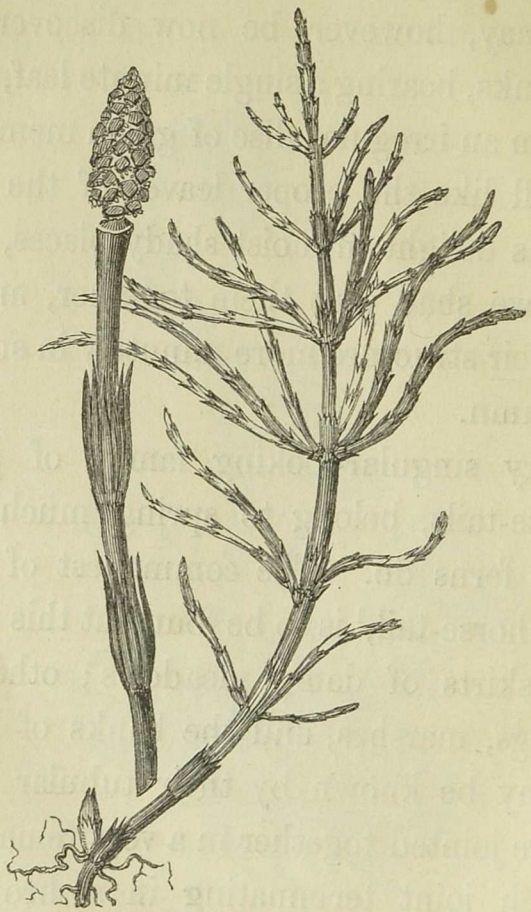
Little is known respecting the changes which

the seed undergoes during germination; young plants may, however, be now discovered on moist banks, bearing a single minute leaf, which rises from an irregular disc of green membrane, not at all like the proper leaves of the plant. The ferns delight in moist shady places, where I hope we shall visit them together, and examine their structure more minutely in summer and autumn.

A very singular-looking family of plants, the horse-tails, belong to spring much more than the ferns do. The commonest of these, the field horse-tail,[1] is to be found at this season on the skirts of damp meadows; others inhabit bogs, marshes, and the banks of rivers. They may be known by their tubular stems, which are jointed together in a very remarkable way, each joint terminating in a brown or

[1] Equisetum arvense.

blackish fringe, which closely invests the base



THE FIELD HORSE-TAIL.

of the next joint above, until the plant termi-

nates in a number of small discs connected into the form of a cone or catkin, and containing a quantity of green powder supposed to be seed. Some species, instead of the fringe just described, bear a number of smaller branches, which are jointed like the main stem, and may be compared to coarse green hair; and other species, that of which we are speaking among them, have two kinds of stems, one unbranched and terminating in a mass of fructification, the other bearing branches only. The stems of these plants are remarkable for containing a large quantity of pure flint, the particles of which are symmetrically arranged, and so abundant, that by careful management all the vegetable matter may be removed without altering the form of the plant. They are hard to the touch, and may be used for polishing furniture, and vessels of brass and

other metals. The crystals of flint in these plants, and the dust contained in the catkins, are beautiful objects for the microscope. The largest British species[1] attains a height of four or five feet, and is a remarkable plant, from the contrast of colour between its bright green branches, greenish-white stem, and the dark brown fringe surrounding the joints. In a fossil state the plants allied to the horse-tails are very abundant, and are sometimes found in an upright position, as if still occupying the spot where they grew. They are most common in oolite and sandstone.

It yet remains that I should direct your attention to the mosses,—a tribe of plants which, without belonging peculiarly to spring, are more conspicuous at this season than at any other, partly because many of them are

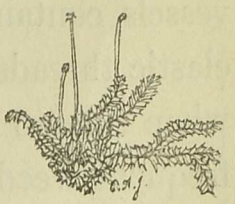
[1] Equisetum fluviatile.

now in perfection, and partly because they are neither hidden by dead leaves as they were in autumn and the greater part of winter, nor by growing foliage as they will be shortly. Many persons talk of "moss" as if there were only one kind, being little aware that there are upwards of four hundred native species, the greater number of which are distinguished from one another by characters as strongly marked as those of the common hedge flowers. Others, again, include, under the general name of moss, all small tufted plants with inconspicuous flowers, the whole tribe of lichens, whether growing on rocks or on trees, and many of the smaller aquatic plants. As the mosses perform very important functions in the economy of nature, especially in temperate and cold climates, I will endeavour, as far as I can without using many technical terms, to give you such

a description of a few of the commonest as will enable you to decide with tolerable certainty whether the plants which you pick up in the course of your walks are mosses or not.

In the first place, you may set aside all plants which bear flowers furnished with petals, stamens, and pistils, or any of these. However moss-like their stems and foliage may be, they belong to one of the two classes described above, either the monocotyledonous or dicotyledonous plants, most probably the latter. Secondly, all the white, yellow, grey, brown, or orange-coloured plants which are found growing on rocks and trees are to be excepted, whether they grow in the form of a thick crust, a dry, uneven, scaly substance, in a branched, or even in a tufted manner, or whether they assume the form of cups. You will scarcely be wrong in referring these to the tribe of lichens.

This description will indeed suit in a measure some few of the fungi; but you may rest satisfied that those answering to it are not mosses. Again, you will find by the sides of water-courses and on moist banks another tribe of plants, called liver-worts. Some of these resemble the lichens, in covering the substance on which they grow with spreading strap-like leaves; others approach nearer to the mosses, in having stems and numerous small leaves. The former may be distinguished from the lichens by their green colour; the latter from the mosses by having their leaves either notched at the extremity or lobed, and by bearing the fructification in a four-valved seed-vessel elevated on a delicate succulent stalk. One which is both common and easy of detection is that which is figured in the next page.



JUNGERMANNIA EXCISA.

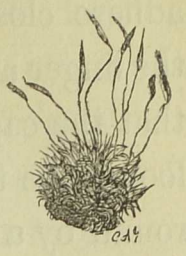
The substance of the plant is green, and adheres to the ground. Here and there rise short

Marchantra polymorpha.

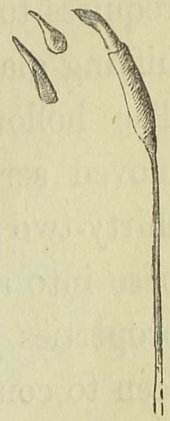
delicate stalks, surmounted by lobed seed-vessels, containing myriads of seeds, and minute elastic threads, which serve to scatter the seeds, when ripe, to their destination. This is a very frequent weed in greenhouses.

Having mentioned the plants belonging to other tribes which are most liable to be confounded with mosses, it remains that I should

point out some of the marks by which the real mosses may be distinguished, and this I can best do by drawing your attention to some of the commoner species, rather than by describing the general characters of the tribe. We will begin with two which are in perfection in spring, and which may be found on the top and sides of nearly every damp brick wall. Adhering closely to the brick itself or the surrounding mortar, are numerous little bunches of minute leaves, each leaf being nearly of the same width throughout, and tipped with a fine white hair. From the centre of some of the bunches rises a fine wiry bristle, called a *seta*, thickened at the summit into an oblong, sharp-pointed seed-



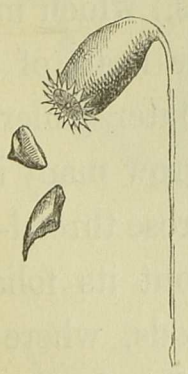
Tort la muralis



vessel, or capsule, and covered with a greenish pellucid cap, called a *calyptra*. This does not adhere closely, but may easily be removed by the finger and thumb. This being done, we find that the capsule is still covered with a *lid*, not loose, like the calyptra, but evenly attached all round by a perceptible joint. When the seed-vessel has arrived at maturity, the lid separates under a slight touch, or falls off of itself, disclosing the mouth of the capsule, which now requires to be examined by the help of a magnifying glass; and a very beautiful object it is. The hollow conical lid which has been removed served as a protection to a fringe of thirty-two scarlet twisted threads, united at the base into a tube. These possess hygrometric properties to such a degree that they may be seen to contract and expand from the action of the moisture contained in the breath, keeping

exact time with it. Their use appears to be to confine the seeds in moist weather, and allow them to escape when the air is dry.

Much more elegant in form and complicated in the structure of its seed-vessel, is another moss which grows in similar situations. Its foliage is more tufted in habit, forming a soft thick cushion. The setæ in their young state are of a beautiful crimson hue, and the capsules as they approach maturity are pear-



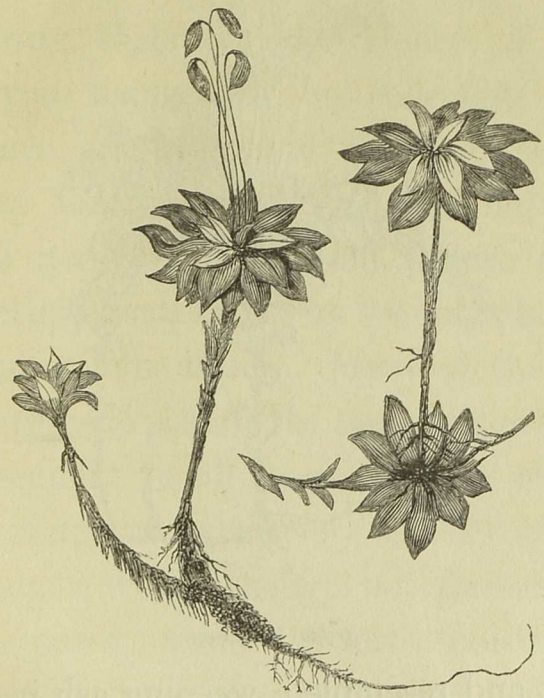
Seta of Bryum.

Bryum cæspititium.

shaped and pendulous. The lid is conical, and when removed discloses two rows of

fringe, each composed of sixteen threads; the inner is usually more or less pressed down on the seeds, the outer in dry weather curved back over the edge. Many other mosses which resemble this in the structure of the capsule are included under the common name of Bryum, or thread-moss; they grow on banks, rocks, mountains, and in woods or in marshes; some are very minute, as the silver thread-moss, (so called from the silvery whiteness of its leaves,) which may be found on walls in the heart of cities, for instance, in the outer galleries of St. Paul's Cathedral; others grow many inches long. The most elegant, the rose thread-moss, is not often found in fruit, but its foliage is not uncommon in moist woods, where it is easily distinguished by its tufts of pale green leaves arranged in the form of a dahlia. A much commoner thread-moss frequently covers

Bryum argenteum.



Bryum roseum.

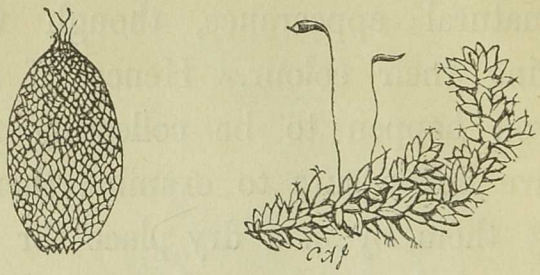
the ground in shady woods with its treelike stems, some of which are branched at the

Bryum ligulatum.

summit and resemble a weeping ash in shape; others send up simple leafy stems, which are curved like the tail of a squirrel. The leaves of mosses either shrivel in the course

of drying, or become spirally twisted, but upon being dipped in water they resume their natural appearance, though without recovering their colour. Hence, if at any time you happen to be collecting mosses, but have not leisure to examine them, you may lay them by in a dry place for an unlimited period of time, and restore them to their original condition by soaking them for a few minutes in water. Many of the lichens and liverworts possess the same property, which is dependent in all cases on their substance being composed exclusively of cells united by their edges, which, though not furnished with visible pores, readily absorb moisture and transmit it from one to another. The moss which is best suited for displaying the cellular structure of the leaves is one which grows in dark wet holes, by the side of running streams. I am not aware that it has any

English name, though it deserves to be well known. It may be distinguished by its nu-

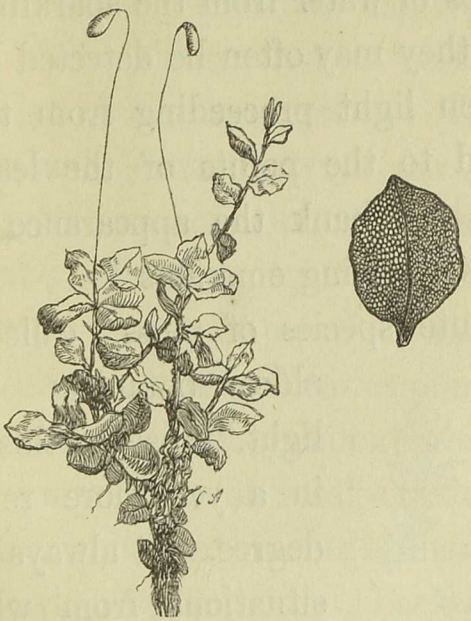


Hookeria lucens.

merous stems, which are, for the most part, prostrate, and by its large egg-shaped leaves, which are all in one place, so that each stem appears to have been pressed flat. They are of a bright green colour, and to the naked eye have the appearance of being slightly frosted, and often bear minute roots at their summits, attaching them either to the ground or to the stems below. The setæ are of a rich purple hue, and the capsule is of the same colour but darker, highly polished, and tipped with a white calyptra. Under a magnifying glass, (one of low power is

all that is requisite,) each leaf is found to be composed of a single layer of irregularly hexagonal cells, formed of a membrane which, when the moss is fresh, is pellucid, and when dry, nearly transparent.

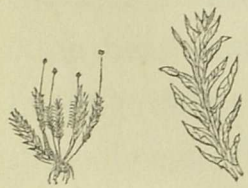
In similar situations, and indeed often



Bryum punctatum.

growing with it, you may find another

thread-moss, with yet larger leaves. They grow on an erect stem, and are nearly circular, thickened at the edge, but having the centre filled by a beautiful net-work of cells like the last. When these mosses grow in situations where they are liable to be sprinkled with drops of water from the sparkling stream beneath, they may often be detected by a brilliant green light proceeding from the drops suspended to the points of the leaves, and giving to the bank the appearance of being studded with living emeralds.



A minute species of moss,[1] called by the older botanists "golden light," possesses this property in a yet more remarkable degree. It always grows in situations from which the rays of the sun are excluded, preferring the

[1] Schistostega pennata.

roofs and sides of caves in sandstone and granitic rocks, where, though not half an inch long, it forms a thick turf. Each stem is a delicate thread, bare of leaves below, having two opposite rows of sword-shaped leaves in its middle portion, and terminating in an exquisitely fine seta, which bears a globular capsule at its extremity. The whole plant is cellular, and as transparent as the finest gauze. The caves which it inhabits being always damp, small drops of water are condensed on the leaves, reflecting and refracting light, which borrows from the green substance on which they rest a metallic green lustre as brilliant as phosphorus. Hence it was formerly thought to possess phosphorescent properties; but that this is not the case is proved by the fact that its brilliancy is apparent only when the spectator's back is turned to the daylight; besides which, if the hand be passed over the moss, so as to destroy the

globular form of the drops condensed in the foliage, the light disappears. Some years since, before I was well aware of the cause of this luminous appearance, I one day entered the adit or gallery of a mine, accompanied by a little dog. I had only advanced a few steps, when I stopped to admire the beautiful golden light which was reflected from the walls and roof of the cave. My little dog, having no such curiosity, went ahead of me, but finding that I had stopped, turned round, when, although it was too dark for me to distinguish him, his great round eyes flashed out of the gloom, tinted with the same golden green, and leading me to the conclusion that the brilliancy of his eyes, and that of the moss above him, proceeded from the same cause. A minute species of liverwort, the structure of which is also cellular, often produces a similar effect.

I must not forget to mention a favourite little

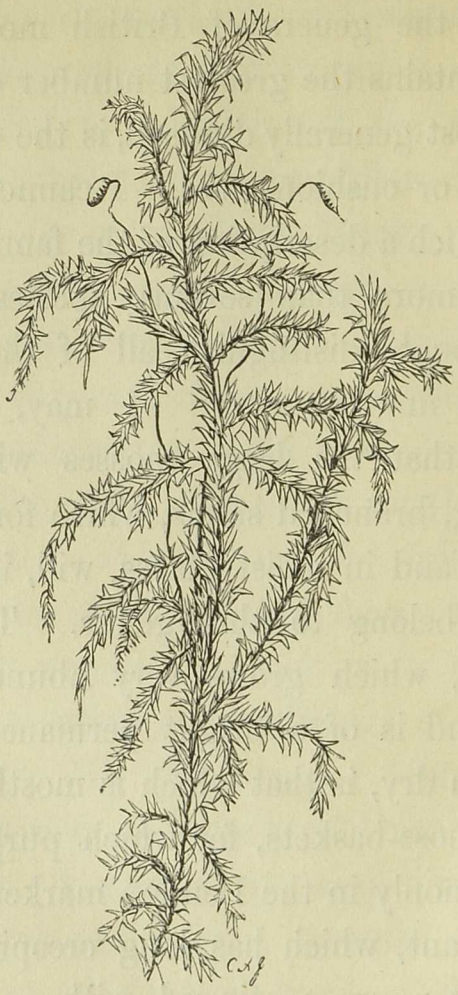
moss,[1] growing on damp shady banks, which in outline is very like the last mentioned, but differs from it in having an oblong capsule, and leaves which are thicker and of a deeper green. It is very common, but is invested with a deep interest from being the plant which reminded Mungo Park in the desert of the providential care bestowed by the Almighty on the very humblest of His creatures. The incident is far more generally known than the exquisite little moss with which it is connected; nevertheless, as the sight of this gem among plants can scarcely fail to excite feelings of sympathy for the forlorn traveller, I cannot forbear repeating it in his own words: "I found myself in the midst of a lonely desert, five hundred miles from the nearest settlement. I was a

[1] Fissidens Bryoides.

stranger in a strange land, yet I was still under the protecting eye of that Providence who has condescended to call Himself the stranger's friend. At this moment, painful as my reflections were, the extraordinary beauty of a small moss irresistibly caught my eye, and though the whole plant was not larger than the tip of one of my fingers, I could not contemplate the delicate conformation of the roots, leaves, &c., without admiration. Can that Being (I thought) Who planted, watered, and brought to perfection, in this obscure part of the world, a thing of so small importance, look with unconcern upon the situation and sufferings of creatures formed after His own image? Surely not! Reflections such as these would not allow me to despair. I started up, and disregarding both hunger and fatigue, travelled forwards, assured that relief was at hand; and was not disappointed."

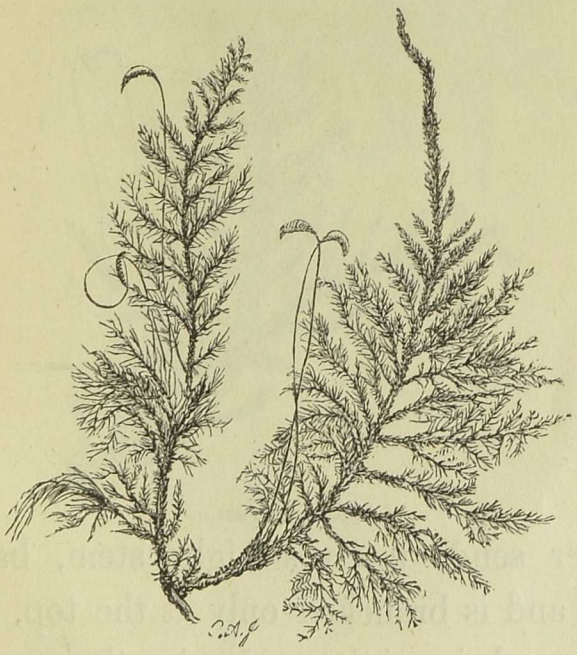
Of all the genera of British mosses, that which contains the greatest number of species, and is most generally diffused, is the one called hypnum, or cushion-moss. I cannot pretend to offer such a description of the family (which contains more than seventy species) as will enable you to distinguish all of them when they fall in your way. I may, however, observe, that the large mosses with loose, straggling, branched stems, which form banks in woods and in moist places, will, in all probability, belong to this genus. The stout erect one, which grows very abundantly in woods, and is of a bright permanent green, even when dry, is that which is mostly used in making moss-baskets, for which purpose it is sold commonly in the London markets.[1] The most elegant, which has long creeping stems of a lighter green, tinged with yellow and

[1] Hypnum triquetrum.



Hypnum triquetrum.

brown, and sends out horizontal branches somewhat after the manner of a fern, and terminates in a curved stem like whip-cord, is also a hypnum.[1] Then there is another which

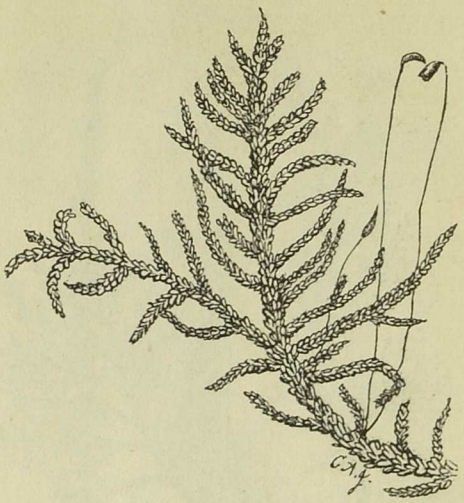


Hypnum proliferum.

grows on every bank, and is also branched like a fern. The leaves of this are large and convex, so that you might almost imagine them

[1] H. proliferum.

to be strings of beads;[1] another grows on the roofs of thatched cottages and on the branches of trees, forming a dense tuft, and having the points of its leaves turned all one way.[2]



Hypnum purum.

Another sends up a straight stem, bare of leaves, and is branched only at the top, like a weeping ash in miniature.[3] Another grows on the trunks of trees, and is best distinguished in dry weather by the bright satin-like hue of

[1] Hypnum purum. [2] H. cupressiforme.
[3] H. alopecurum.

its upper leaves, and the rich green of the

Hypnum alopecurum.

lower ones.[1] Another grows only on wood and

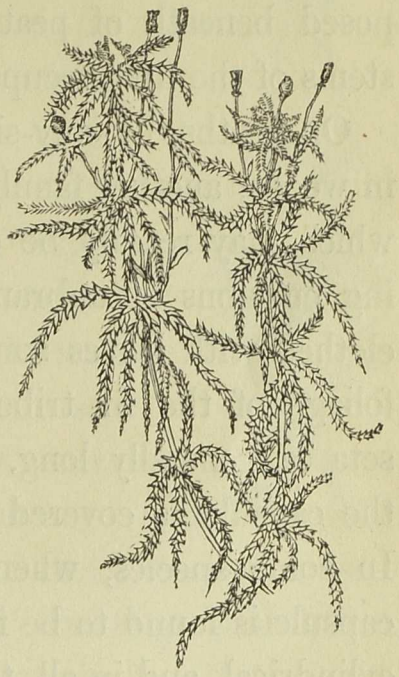
[1] H. sericeum.

stones in running streams, where it has strong wiry stems and rich brown leaves; or in still water, where it grows much larger and has bright green leaves.[1] I might mention many others which are characterised by some one strong feature which would help you to recognise them; but, after all, it would be of little use to you merely to know their names, and you would scarcely ever be sure that you were not mistaken in giving this or that name. With the help of a magnifying glass of moderate power, and a good book on the subject, you may study them scientifically, and both learn all that is known about them, and be introduced daily to some new instances of the wonders of God in creation.

One family of mosses exercises a powerful influence in reclaiming, and rendering fit for cultivation, waste boggy land.[2] Of this there

[1] Hypnum ruscifolium. [2] Sphagnum.

are several species, which agree in growing where they are at all seasons liable to be saturated with moisture, in having long weak stems, which grow erect from the support they derive from one another, and in bearing leaves distinctly cellular and of a light green hue, which in winter is often tinged with yellow or red. When dried, either by the rays of the sun or by artificial means, they turn white. The growth of these is principally at the extremity, and, as they attain a great length, they in time raise the level of the district which they cover, until the summits of their shoots form a



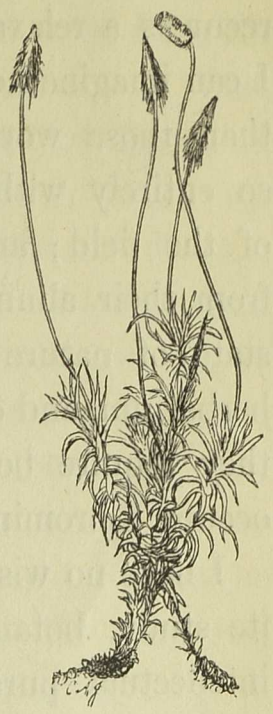
Sphagnum squarrosum.

convenient resting-place for the seeds of other plants, which germinate, and in time overpower the moss, until, finally, the unprofitable swamp is converted into a common, covered above with turf, heath, and furze, but composed beneath of peat, formed of the dead stems of the first occupant.

On heaths, by way-sides, and on dry banks in woods, another family of mosses is common, which may readily be distinguished by forming cushions of unbranched stems, which are clothed with leaves somewhat resembling the foliage of the fir tribe.[1] In this family the seta is generally long, wiry, and elastic, and the capsule is covered with a hairy calyptra. In some species, when this is removed, the capsule is found to be four-cornered instead of cylindrical, and in all, the mouth is closed by a thin membrane, extended like the parchment

[1] Polytrichum.

of a drum. One species, when growing in marshes, frequently attains a size that allows its being used for making brooms. In Lapland, where it abounds, it is said to be pared from the ground in sheets, and to be used, without further preparation, as a bed.



Polytrichum commune

I might mention a large number of mosses besides those already described, which help to cover the earth as with a pleasant mantle; but I would rather pass them by unnoticed, in the hope that I may stimulate your curiosity, and induce you to study them systematically. It is highly desirable that every person should in early

life embrace some one pursuit independent of his future profession, to which he may recur as a relaxation in his hours of leisure. I can imagine no more worthy object of study than those works of God which are placed so entirely within our reach as the flowers of the field; and among them the mosses, from their abundance, their beauty, both in a state of nature and when preserved in the herbarium, and the accurate examination which they require before they can be understood, occupy a prominent place.

I have no wish to claim for my own favourite study, botany, precedence over the other intellectual pursuits which God has placed within our reach. The particular subject chosen should depend upon the individual taste; but whatever the taste may be, it should be cultivated, provided that the end proposed be

unobjectionable, and that the pursuit of it do not interfere with positive duties. Many a young person would have been saved from the temptation of forming vicious, or at least indolent habits, if the energies of the mind had been trained to fall back on some such employment in the hours of leisure. Even if the contemplation of a pebble, a fly, or a dead leaf ended in itself, the occupation would be a harmless one; but it is scarcely possible that it should not be followed by other and deeper thoughts, calculated to excite further reflection and more extensive research into the laws by which God governs the universe. And if this occupation be kept subordinate to the study and practice of revealed religion, no one more worthy of the human intellect can be imagined. There can be no doubt that a well directed study of any one of the natural

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