

## FERNS AND BUTTERFLIES.

JANUARY AND FEBRUARY.

BOTANICAL rambles in the fields in search of wild flowers are now almost impossible; yet to the lover of nature there is much to attract in a country walk on the crisp, hard ground, and even the collector need not leave his vasculum behind him; for there are objects of interest to be found which are certain to be overlooked during the gay time of summer, when the fields wear their most showy attire. During the past dark winter months we may perhaps have discovered that there is something universal in the law that ascribes the highest excellence to many things which are unseen and hidden and have to be sought for to be found. It is not those qualities which attract the eyes or the senses generally that should alone recommend to notice; neither must we forget that the very evident beauties of our summer flowers often obscure from notice the more delicate and unobtrusive charms of the winter denizens of the field and forest. Many of these have been there all the summer long; some only attain their beauty after the heat of the sun is gone; but so busy have we been with the bright colours of the light-loving flowers that we have scarcely observed the delicate forms of the lichen, or the rich colours of the many fungi which now cover every tree, and paling, and bit of old wall we pass. The fungi include some of the most curious of vegetable forms, and it would be difficult to say where they may not be found. Not only are shady woods, mossy dells, secluded lanes, and green pasture the habitats of fungi; but we meet with them in almost every situation where vegetable life is possible, and traces of them where it is not. Wherever decaying vegetable matter exists, we may expect to find a new race flourishing amid the debris, as in the decay of the garden of the sensitive plant described by Shelley—

And plants, at whose name the verse feels loath,  
Fill'd the place with a monstrous undergrowth,  
Prickly, and pulpy, and blistering, and blue,  
Livid and star'd with a lurid hue.

And agarics and fungi with mildew and mould  
Started like mist from the wet ground cold;  
Pale, fleshy, as if the decaying dead  
With a spirit of growth had been animated.

Their mass rotted off them flake by flake,  
Till the thick stalk stuck like a murderer's stake,  
Where rags of loose flesh yet tremble on high,  
Infesting the winds that wander by.

But we must not suppose that all fungi merit this terrible description. One of the commonest is *B. edulis*, which is the fungus represented in our Plate, and which, in the opinion of some, is scarcely inferior to the best mushroom in flavour. Dr. Badham says:—"Its tender, juicy flesh, and delicate, sapid flavour, render it equally acceptable to the plain and to the accomplished cook. It imparts a relish alike to the homely lish and the dainty ragout, and may be said to improve every dish of which it is a constituent." Let us not, however, encourage the rash partaking of these dainties by those who have not studied the differences in the species. Some boleti are very unwholesome and almost poisonous; perhaps those most attractive to the eye are the least fit for food. Whilst looking for fungi we shall be sure to come across lichens of various forms—perennial plants, spreading over rocks, trees, and other dry places. One great distinction between lichens and fungi is, that whilst the latter are found always growing on dead and decayed substances, the former very commonly grow on the living bark of trees, in the midst of active life, and healthy, vigorous plants. In such quiet dells as we hope to find ferns, there we shall probably see lichens; but it is in the winter, chiefly, we observe them. In the early development of ferns we are often reminded of the lichen, and the green membranous mass in which it first appears greatly resembles the form of some of that family. The tiny spore which is the origin of the fern is the representative of the bud in higher plants, although it is often thought to be the seed. If we watch its development we shall find that it does not directly grow up to be a fern, but that, after having attached itself to a damp piece of earth or rock, it begins to expand into the form of a green membrane. This green membranous mass, on account of its resemblance to the fronds of the common *Marchantia polymorpha*, has been called the *Marchantia-like* expansion of the fern. It is also called the *Prothallus*. On the surface of this little body there appears in course of time two sets of organs—the one called *pistillidia*, containing in their interior little ovoid bodies, which are the representatives of the ova, or seed-buds, of higher plants. The other organs are called *archegonia*; they contain little, moveable, worm-like bodies, called spermatozooids, and which are found in many of the lower forms of plants. These bodies represent the pollen or pollen-tube of flowering plants. They find their way to the ova contained in the *pistillidia*; and it is after the mixture of the produce of these two different cells that the young fern shoots forth from the surface of the *prothallus*, and grows up into a new plant, like other plants having roots, stems, and leaves, or fronds. The roots of ferns are composed of small fibres, which are sent down from the stem, and they perform the same functions as in other plants. They serve to keep the plant in the soil in which it grows, and are also endowed with the property of absorbing from the soil, the food which the plant requires for its nutrition.

The stem of a fern consists of a mass of tissue, from which the stalks of the fronds proceed upward and the root downward. In British ferns these stems seldom rise into the air, but are either buried in the earth or lie prostrate on it. In the common polypody and spleenwort they attain a considerable size. When out of the ground they are covered with scales, or hairs, and present a very shaggy appearance. In some cases, as in the brakes and flowery fern, the stem rises erect in the air, and bears its fronds in the same way as other plants bear their leaves. These stems rise from the rhizoma, or root-stock, which may generally be described as a creeping underground or horizontal stem. Sometimes this rhizoma sends out so many shoots that they form a fine network beneath the soil; but more often this portion of the fern occupies little space in the ground. Some root-stocks of ferns are of a deep, rich, red-brown hue. A very common species in our conservatories is the hare's-foot fern (*Davallia canariensis*), which, as its name implies, has been imported from that region of beautiful plants, the Canary Island. It has dark, shaggy masses of root-stock about the base of its fronds, which terminate in a thickened extremity, and, being densely clothed with brown hair, instantly remind us of the leg and foot of the animal after which it is named. None of our native ferns rise more than six feet in height, and these are rare specimens. When growing in large numbers they are sometimes conspicuous on the landscape; but it is in tropical regions only that they give a characteristic feature to the scenery and assume the dimensions of trees. Herbaceous ferns belong chiefly to cold and temperate climates; but in the warmer regions shrubby ferns cover the ground, forming, like our common brake, an underground in woods, while the herbaceous species are found chiefly growing upon

trees, where, clinging to the topmost boughs and investing the rugged trunks with their green sprays, they display a luxuriance and beauty unknown to British ferns. Tree ferns of exquisite grace and form grow in the tropical forest. Whether, however, of humble growth, or rising to the height of twenty or thirty feet or more, they have all the same formation of stem—consisting entirely of a mixture of woody and cellular tissue. An Eastern traveller, when referring to the marvellous fern trees which he saw in an Australian forest, says:—"One might almost fancy that the tall dense forests around it had drawn up the well-known shrub, or rather weed, of our English deer parks into a higher order of the vegetable family. When I left England some of my friends were fern mad, and were nursing little microscopic varieties with vast anxiety and expense. Would that I could place them for a minute beneath the patulous umbrella of this magnificent species of Cryptogamia." On the forks of some of the old timber trees in this favourable region grow also the stag's-horn fern (*Acrosticum alcornocum*), as large as the largest cabbage, the fronds exactly resembling the palmated antlers of the moose and the rein deer. The luxuriant and picturesque growth of other species of ferns, some of which hang on the branches of trees or form a massive undergrowth to the towering ferns from whose tops spring large, waving fronds, are subjects for the pen and the pencil of all travellers in these regions. Baron Humboldt abounds in descriptions of the ferns in the forests of South America, and all writers on New Zealand tell us of the remarkable and luxuriant growth of the ferns of that island. Humboldt remarks that the densest shade is produced by these arborescent ferns in the American forests. He describes some of the old trunks of these ferns as having a metallic lustre, owing to a carbonaceous powder with which they are covered; and he adds that no other plant exhibits this phenomenon.

The nature of the stems of ferns is the same in all cases; but where the stem is perennial, and does not wither down and die with the fronds, it consists of the remains of the successive annual developments of the fronds. The fronds vary very much in form, in size, and also in duration. Sometimes the frond is like a long narrow leaf, with wavy edges, as in the hart's-tongue; but by far the greater number of our native ferns have their fronds divided into numerous branches and segments. When the blade is undivided it is called *entire*. When it is scalloped out and the indentations do not reach the midrib, or central line, running up the frond, it is said to be *pinnatifid*. When the indentations reach the midrib and leave a series of little leaflets, or pinnae, the frond is said to be *pinnate*. The pinnae may be again divided down to their veins, or ribs, and the frond is then called *bipinnate*, or *twice-cut*. When this occurs a third time, it is called *tripinnate*, and when often the frond is said to be *decompound*. The latter does not, however, often occur in British species. The more vigorous specimens of our common brakes occasionally present it. When the fronds are first formed in the bud they are rolled up in a peculiar way, and these singular scroll-like forms must often have been observed by all who notice our hedgebanks in the early spring, for there they may often be seen in company with wild anemones, bluebells, and clumps of primroses. The whole frond is rolled up from the point to the base upon itself. In compound ferns, like the common brakes, the divisions are also each rolled up in the same way, exhibiting, therefore, a number of pale green curves, looking like a shepherd's crook. This arrangement occurs in other plants, and is called *circinate*. All British ferns, with the exception of the adder's-tongue and moonwort, have this circinate arrangement of their fronds. The *veins* or *ribs* of the fronds are variously arranged, forming characteristic tests for classification of species. These veins are never netted, as in the majority of flowering plants, but they are often forked, or dichotomous. Some botanists attach great importance to this variation in ferns as a distinction of species, and in *Hooker's Journal of Botany*, and other works devoted to the subject, the matter is fully discussed. It is on some spot among these veins that the capsules or seed-vessels are placed, and this particular point is called the *receptacle*. The organs of fructification consist of a number of little capsules, called seed-cases, spore-cases, sporangia, or thecae. These, collected together into little clusters, are called *sori*; the sori are placed upon the receptacle. Under the microscope these capsules are beautiful objects, resembling little hollow spheres of crystal tinged with a delicate brown hue, and are discovered in most cases to consist of one cell or cavity, and to be surrounded by a jointed elastic ring, and to be supported below on an exquisitely slender stalk. When the spores are fully matured the elastic nature of this ring causes various quick movements, which brush the spore-case transversely, and scatter the spores about in the form of fine dust. In some ferns, as in the flowering fern (*Osmunda*), the moonwort (*Botrychium*), and the adder's-tongue (*Ophitossium*), the seed-cases have not the elastic ring, but are two-valved. In the greater part of British ferns the sori are covered during the earlier period of their development with a thin membranous covering, which is called an *indusium*. Some ferns possess this organ, which is very evident when they are young. It is, however, cast off as the sori attain maturity. The presence or absence of this indusium is looked upon as an important point in the economy of ferns, and they are divided according to this fact. The operation of spore, as soon as it escapes from its little case and begins a free and independent life for itself, we have already noticed; and the same history applies to each individual spore, which fulfils its round of destiny in the great plan of vegetable life, producing its own kind, and never departing from the great law stamped on it by the Creator of all from the beginning. Many casual observers who have seen and admired the well-known British ferns by the wayside and hedges, or who have, with the aid of a gardener's skill and care, nourished and preserved the more delicate exotic ferns under glass coverings, have noticed, and perhaps felt, the little brown or orange-coloured patches at the back of the fronds, but have never fully understood their nature or functions, and have called them, indifferently, seeds or fruits. Possibly this short explanation of what they really are and what office they perform may increase the interest with which they may be regarded in future by those who happen to read these pages, and to cultivate or to collect ferns for the mere sake of their beauty.

Whilst seeking for the curious fungi and lichens of which we have spoken, we often find the larva or chrysalis state of the gay inhabitants of our summer gardens; and if we have a mind to watch their development we can collect and preserve these unpromising-looking objects until the warm summer sun shall bring them forth in all their radiance. Sometimes the change to a perfect insect occurs much earlier than usual, and we have seen occasionally, on a warm day in February, the advent of one of these lovers of sunshine such as the one represented in our Plate—Cynthia Cardui, the painted lady, looking, as she winged her way over the leafless shrubs and flowerless plants, as desolate and out of place as a Court lady arrayed in her jewels would feel if suddenly transported to an arid wilderness. Some of the last brood of the summer butterflies generally survive during the winter in a perfect state in some sheltered nook, and the first warm rays of a winter's sun may call them forth into life again for a few short hours.

FERNS AND BUTTERFLIES.  
MARCH AND APRIL.

DOES not the old window in our Plate suggest to us the possibility of finding in its niches and crannies, or on its crumbling surface, some of the beautiful lichens of which we spoke last month?

In company with the old-wall lichens, and disputing with them the possession of each weather-beaten and time-worn stone, we may expect to find the three ferns which adorn our Plate. *Asplenium trichomanes*, the common wall spleenwort, or maidenhair spleenwort. It is a pretty little tufted fern, generally from two to six inches high. It has a slender, purplish, black, and glossy stalk, and regularly disposed ovate pinnae forming the fronds. They are of a deep green colour, slightly crenated at the margin. The pinnae are attached to the rachis by a very short stalk forming the attenuation of a wedge-shaped base. When old the pinnae fall off, leaving the black, glossy hairlike stalks naked, mingling with the green fronds. Both this pretty little fern and its variety, *Asplenium viride*, are abundant on shady rocks and in old walls and buildings throughout Great Britain, Europe, Central and Russian Asia, in North and South America, and in Australia.

In the West of England, and especially in Wales, it is a common fern. In Germany there is a legend attached to a well near which this fern grows luxuriantly. A lady keeping tryst with her lover, he was suddenly by some evil spell changed into a wolf. In her terror she fled before him, and in her haste fell over a precipice, her beautiful hair becoming entangled in the bushes. Immediately on the spot a clear well sprang up, and her hair took root and grew into the lovely fern we now call "maidenhair spleenwort." The well is called Wolf's Spring; and after hearing the legend the traveller is expected to take with him as a relic a bunch of "maiden's hair." A tea or syrup made of the fronds of this fern has been recommended in pulmonary affections.

The *Asplenium ruta-muraria*—red-leaved spleenwort—is, according to Newman (a great authority on British ferns), "one of those plants which, like our half-domesticated birds, the sparrow, the swallow, and the martin, seem to have deserted the native wilds and to have taken up their residence amongst the habitations of man, for it is far less frequently found on the wild rock than on the walls which his hands have reared. It has densely tufted, thick, dark green fronds, about two or three inches long. The stalk is more or less pinnately divided. The pinnae are alternate, having pinules variable in form, sometimes long-stalked, wedge-shaped, toothed, or contracted into a roundish point above. The sori are linear, becoming united into broad patches when old. The whole form of the plant resembles the garden rue. This pretty plant grows luxuriantly on Arthur's Seat in Edinburgh, and about the Peak in Derbyshire. It is not very abundant in Scotland. It may almost be called the churchyard fern, for seldom do we visit any old place of this kind and wander among the ancient graves without seeing the pretty bright fronds of this beautiful fern springing from the resting-places of those who have gone before us, and reminding us of the new life which is to come when this shall have passed away. Inside the tower of Morwinstowe Church grew, a few years since, a most luxuriant specimen of this fern. The ancient church stands at the edge of a lofty cliff, round the base of which the wild waves of the Atlantic surge and roar. The churchyard contains more than one monument to shipwrecked and drowned sailors. One is a boat turned upside down, in which the poor fellows had attempted to escape. Another has the broken oars formed into a rude cross—a remnant in themselves. Round about these sad memorials of "those that go down to the sea in ships" grew this little fern, mingling, as it were, the emblems of a new life with the symbols of hope for those that there lie at rest. Those who live in London and are desirous of seeing this pretty fern for themselves need wander no further than Greenwich Park, where it flourishes abundantly on one of the walls surrounding the park, and nothing can be commoner than to see it on the brick walls of fruit gardens, particularly selecting the uppermost line of mortar, which may perhaps be protected by a coping of brick; this is ever a favourite station for cobwebs and wall rue.

Our next fern, the sealy spleenwort (*Ceterach officinalis*) is a downy, ever-green, pretty-looking fern, growing in tufts. It is readily distinguished from any other British plant. It varies very little in form, and the whole of its under surface is thickly clothed with brown scales which completely conceal the sori. The green of the upper surface contrasts prettily with the rust-coloured brown edge formed round the margin by the scales underneath. The outline is long and narrow, very deeply divided into rounded lobes standing in an oblique position towards the midrib. The thick texture of the fern renders the veining indistinct, and it can only be seen in the young fronds, which appear in May. The short, tough roots of this fern insinuate themselves into the crevices and cracks of old walls and ruins in rocky places, and especially in limestone districts in England and Ireland. On the old walls of churches it may often be found in company with the wall rue. It is to be seen on the walls of Jerusalem. At one time its medical reputation was very great, but, like many other such remedies, it has fallen into disuse with the progress of knowledge. It was formerly thought to be a very efficacious application to wounds and ulcers, and is extolled by Gerard in his "Herbal" for many excoriations. He, however, qualifies his praise in this way:—"But this is to be reckoned among the old wife's fables, and that also which Dioscorides tells of touching the gathering of spleenwort in the night, and other most vain things, which are found here and there scattered in old books; from which most of the later writers do not abstain, who many times fill up their pages with lies and frivolous toys, and by so doing do not a little deceive young students."

The common name spleenwort takes its origin in a curious story—that in Cerio there is a river which divides two portions of land, the ceterach growing abundantly on one side the stream and not on the other. On the side where the fern grows the pigs are said to have no spleen, but on the other side they are perfect pigs. Hence the name spleenwort or *Asplenium*. To this day Arabian and other Eastern writers believe in the virtues of this fern in diseases of the liver and spleen.

We may suppose that all who admire ferns in their native haunts may desire to possess them either in a living, growing form in some shady garden nook, or in a closed Ward's case or window, or even dried "pictures of what they were." In a later and less productive month of the year we will go into some details of these latter modes of preserving ferns; and now, while the weather tempts one out of doors into the field and the garden, we will say a little about outdoor cultivation of ferns. To those who are fortunate enough to live away from the smoke and noise of great cities, an open-air fernery will afford much delight. To such we would say, choose a sheltered and shady situation, if under the defence of a wall so much the better, and one looking north or west. Make up a raised bed with light soil largely mixed with rough, porous stones. Front it with rock-work wherein to fix the

smaller or wall kinds, the larger and more feathery being placed behind in the bed itself. Old roots of trees have a very pretty effect in ferneries, and we greatly prefer, if rockwork be used, to see broken pieces of natural stone rather than the refuse of brickmaking or iron-smelting furnaces, as is often the case. Plant your ferns not too closely together, and remember that those which have creeping roots will extend themselves and reappear in adjacent spots. Water before planting, and from time to time, as needed, but be careful that there is the means of drainage, lest your bed become damp and sour, for although some ferns like a marshy soil, and a few others can endure it, to the majority it is injurious if not fatal. Autumn is the best season for transplanting ferns from their wayside homes. In the winter many will have died down and be hardly discernible except to a practised eye. *Asplenium trichomanes* requires to be planted among the upper and dry portions of rockwork. From the experiments of Mr. Wollaston, it was found that a soil of sandy loam best ensured its success, as it requires less moisture than most other ferns; in fact, the crown, or centre of growth, should never be wetted. Those who desire to domesticate the wall rue, *A. ruta-muraria*, will find it difficult to remove it from its native haunts, as its wiry roots seem to intersect the bricks or pieces of rock on which it grows. It should only be removed with a portion of the wall on which it has fixed itself, and then surrounded with brick rubbish, mortar, and sandy peat. In this way it will often thrive if protected from the sun and cold winds. Mr. Newman says, "it seems to disapprove of the attentions of the gardener, to loathe his waterings and syringings, to despise his composts, and utterly to eschew the confinement of a bell-glass." Out of doors, the wall rue succeeds best on a garden wall. Indoors it must be kept in a well-ventilated greenhouse, and planted in a small pot filled with broken brick and old, crumbled mortar; water should be supplied very sparingly. Mr. Newman observes that the want of success which so often accompanies the attempt to cultivate these little ferns arises from the injuries inflicted on their tender radicles and caudices in removing them; it is best, if possible, to remove the substance of the brick or rock itself on which they may be growing. To grow ceterach with any success, its natural habits must be attended to as much as possible. It does best in the interstices of a wall, where the mortar has begun to crumble. In pot-culture, the soil must be prepared with great care—old crumbled mortar, peat earth, and limestone should be well mixed together and placed in the shade. It is generally supposed that it is impossible to grow this fern in the atmosphere of London; yet Mr. Sowerby tells us that the best specimen he ever had flourished in the nook of an old wall in a back area in Hatton-garden for several years, and "may be there still, unless eradicated by repair; sun never reached it, and ancient mortar which, constantly moist, had somewhat the consistence of paste, probably agreed with its constitution, a very necessary point to be studied in planting, as, when left to its own selection or in a wild state, it seems universally to prefer a calcareous habitat." Whether planted in the open fernery or grown in pots, great care must be exercised as to drainage, and in the latter case especially to avoid wetting the fronds in watering.

The insects that make their appearance this month are principally those personally well-known to even the least observant of nature's students, yet many interesting particulars have to be learned even of the ant and the bee, both of whom are very busy at this season of the year. The bees are divided into two kinds, the social and the solitary bees. The social bees consist of the genus *Bombus*, humble bee, and *Apis*, hive bee. The first of these make their nests in various situations, some digging underground, others selecting a crevice in a heap of stones, whilst another places its nest on the surface of the ground, covering it with moss or dried leaves. The hive bee, *Apis*, would require a chapter to itself to describe all its curious and interesting ways; but as we can here only mention it as one of the insects brought into activity by the first warm rays of the spring sunshine, we must refer our readers to such works as those of Messrs. Kirby and Spence for delightful accounts of this interesting little creature. Then there are the ants belonging to the family *Formicidae*, with their curious domestic economy and unweary and patient industry, which seems sometimes more like intelligence than instinct. The Aphides, too, or plant lice, those tiny green creatures that every one who has matured a favourite plant knows and dislikes, begin to stir themselves at this time, and require the watchful care of the gardener to destroy. The Lepidoptera, or butterflies, begin to appear in March and April. The brimstone butterfly is one of the earliest, and the only white butterfly may be seen flitting about, sipping the sweets of the few flowers now in bloom. The less delicate but more brilliant beetle attracts our attention as it runs swiftly from our path, or flies heavily during a warm evening, with its peculiar humming sound. The elegant dragon-fly emerges from the watery bed in which it has passed the first stage of its existence, and hovers over the lake or pond it has so lately quitted as if loth to change its abode. The French call the dragon-flies "demoiselles," a name far more applicable to their harmless and beautiful nature than our inappropriate ones of horse-stinger, dragon-fly, &c. The wall butterfly, *Hipparchia megara*, represented in our Plate, may often be seen during these early months of the year. The anterior wings are orange, inclining to brown, with the hinder margin and several transverse bands of dark brown, each wing with a large ocellus towards the tip, having a black iris and white pupil. The hinder wings are dark brown, with two transverse bands that crest the margin, having a row of ocelli. Beneath, the upper wings are pale, with the brown bands faintly marked, the ocellus being larger; the under pair of an ash grey, with two undulating brown lines; they have also a series of ocelli, and a waved band of pale yellow. To those who preserve and keep insects we would recommend the capture of the first perfect specimens of the year, lest the weather should prove unfavourable and the opportunity be lost. The easiest way to kill the Lepidoptera, or butterflies, is by a pressure of the finger and thumb on the thorax, which is generally sufficient, but sometimes, to the great uneasiness of the humane entomologist, they will be found alive some time after. Other methods of killing are recommended; but it is certainly one great drawback to the formation of collections of this kind that the difficulty is so great in entirely killing the insects without injuring their plumage. It is certain, however, that the amount of pain experienced by these little creatures is very slight, and competent naturalists are of opinion that the size of the brain of any animal determines in a great measure its sensibility to pain. The nervous system of insects, too, is of a very different construction to that of the higher animals, and does not depend on one great centre—the brain—as in them. This consideration may diminish the objection that every lover of nature will feel to any thing that may appear cruel or wanton in the sacrifice of so many little lives in order to perfect his knowledge of their forms and structure. When the insect is killed it must be prepared for the cabinet; a pin (short whites) must be run into the thorax and firmly placed through the cork, which should line the box or drawer. Two of each specimen should, if possible, be procured, so as to exhibit the upper and under surface.

## FERNS AND BUTTERFLIES.

MAY AND JUNE.

THESE are the months when all nature seems to rejoice and to put on her richest attire. May has ever been a favourite month with poets, who sing its praises as uniting all the budding charms of spring with the brightness and radiance of summer. We fear, however, that in our variable climate June may more fairly claim the tribute of all this admiration than May, who frequently has but very scanty garlands to offer to her queens and maypoles. In the latter month the weather is usually less capricious, the trees are in their greenest robes, the sweetest flowers cover the ground, and the increasing heat produces a profusion of insect life which is a never-failing source of instruction and interest to the naturalist. Many of the inhabitants of towns, especially those of our young folk who are supposed to be engaged in study during the previous months of the year, take advantage of the warm weather in the latter part of June, or even earlier, to resort to the seaside, there to enjoy the fresh breezes and that peculiar exhilarating property of sea air known to recent philosophers as ozone. There is much to be enjoyed by the seaside by those of all tastes and tendencies. Our rambles on the sea-beach will be none the less refreshing if we know the names and nature of the plants which fringe its edge. There is the yellow horn poppy, *Glaucium luteum*, an attractive and beautiful plant in itself, but, when associated with the old legend, rendered still more interesting. It is named after Glaucus, the son of Neptune, and Nais, a sea nymph; and his abode was on the seashore, and he was fond of fishing. One day, having been very successful in his sport, he laid his scaly prize on a neighbouring marsh, when, to his great surprise, they began to nibble the green grass, and, spreading their fins, "left their new master and regained the sea." Amazed at what he saw, Glaucus resolved to test the power of the herbage in his own person, and no sooner had he bitten it than his hereditary propensities seized him and he leaped into the sea, where, for his faith and courage, he was received as a denizen among the sea gods. In their domain he still shows his Royal descent by wearing a golden robe; and yet, from old association, he bears high above it his favourite long and curved fishing-rod, with its point bent, as if a captive fish ever strained it. Glaucus never goes far out to sea, but rather frequents the shores and cliffs; for Scylla, whom he loved, was turned into a rock, with howling waves around her, and his faithfulness retains him still close to her side.

On the cliffs above we find the samphire growing (*Crithmum maritimum*), warm and aromatic in its taste and smell, and reminding us of its almost classical associations in "King Lear." The sea holly, too, (*Eryngium maritimum*), which pricks our unwary feet as we tread upon it in the sand, yet with its bluish or seagreen bloom on its leaves, and its pale, lilac, or blue flowers tempting us to gather it. In shady nooks among the cliffs we may chance to find the beautiful fern of our Plate, *Asplenium marinum*, the sea spleenwort. Its fronds are pinnate, the pinnae oblong and blunt, stalked, unequal and wedge-shaped at the base, the upper side or edge being much developed, while the lower portion looks as if a piece had been cut off. The sori are borne on the midrib; they are linear and large. The whole fern is narrow and lanceolate in outline, and its general appearance is so unlike that of any other British fern that it is easily distinguished. Its upper surface is of a deep glossy green, its under surface is paler. In the hothouse it attains much greater luxuriance than in its wild state, where, however, it is extremely beautiful. On all our seacoasts it is abundant, except the eastern side of England. In the south-west of England and in Wales it is most profuse. We have found it at Hastings, at Ilfracombe, and as far north as Scarborough in Yorkshire. In the Channel Islands it is especially luxuriant, and the visitor to the Lakes of Killarney cannot fail to observe this beautiful fern on the almost inaccessible rocks which abound there, where, from its situation, it is tolerably safe from the rapacious hands of the fern-collector. Its favourite positions are in the clefts of rocks or cliffs overhanging the sea, or growing out from the sides of caves dashed by the spray.

Although so common a fern on our sheltered seacoasts, it is very difficult to deal with artificially, and seldom succeeds in the open air—never in the neighbourhood of London. Mr. Sowerby tells us that he tried it several times with great care on rockwork, but never succeeded in keeping it alive through the winter. In some of the caverns where it grows most luxuriantly the light is almost entirely excluded, and it was only by imitating these natural conditions as nearly as possible that Mr. Sowerby was rewarded with anything like success. This careful observer tells us that it is only by close study of the natural conditions of a plant that we can hope to grow it artificially; and he reminds us that this particular fern—the sea spleenwort—will be found almost universally growing sheltered from the wind, and so disposed as to prevent the lodgment of rain upon the fronds. The latter is an essential point in the health of an evergreen fern. These circumstances render it peculiarly suitable for a closed or Ward's case, and in this manner it may be brought into the closest atmosphere or into the densest city without injury. The soil which suits it best is a mixture of turfy peat and silver sand, mixed with friable loam, and pieces of porous sandstone or brick added to it. In a composition of this kind and in one of these glass cases now so commonly used, this beautiful fern will grow with the maidenhair and the lanceolate spleenwort, and form a most charming sight. The ingenious and talented inventor of these glass cases was first led to think of the possibility of growing plants under such circumstances by the accidental appearance of a fern and a blade of grass in an old bottle, in which was some mould containing the chrysalis of a moth. He continued to try experiments, relying on his own conviction that the main conditions necessary to the life of certain delicate plants were, a moist atmosphere, free from soot and other extraneous particles, light, heat, moisture, periods of rest, and change of air. All these conditions were secured in the glass case, and Mr. Ward tells us in his little book, published in 1852, and entitled "On the Growth of Plants in closely glazed Cases," how fully rewarded he was by the luxuriance of his ferns, and even other plants, during his early experiments in one of the closest and dirtiest parts of the city of London. Mr. Ward goes on to tell us how his desires increased, and that, after finding how well his ferns grew in this artificial atmosphere, he extended his operations and enlarged his cases, even to glazing over a London courtyard. Here he introduced rocks and tiny waterfalls, trickling cascades and shaded nooks, so that the ferns he so much loved were almost cheated into the idea that they were in their native wilds, and grew luxuriantly and beautiful accordingly. The suggestion of this skillful adaptation of natural laws to the wants of vegetable life could only have occurred to the mind of a philosopher and a student of nature, and we are struck with the remark of a celebrated mathematician who, after seeing Mr. Ward and his cases full of living plants, left him saying, "Come and see me. I can in some measure repay you in kind. I can make you do what you have made me do—think." The kind heart of the inventor of these cases must often have rejoiced to see how much pleasure his

thought has been the means of carrying into the homes of the poor and the abodes of sickness and misery. We ourselves have often found that in London plants will live a much longer time under a glass shade than when exposed to the fumes of gas and the impurity of the atmosphere. The most simple contrivance will accomplish the purpose; a bell-glass placed so as to fit tightly over on the edge of a large saucer or soup-plate filled with mould, carefully sifted and chosen, with bits of rock built up in a somewhat raised form, will encourage the growth of many common sorts of ferns; and pretty mosses or the delicate *Lycopodium* will cover the surface in a short time with a bright green carpet. The elegance and size of these cases may be according to our means, and we have seen them made of the humblest materials, yet accomplishing all that was desired, and giving great and wholesome delight to the sick and weary, many of whom had not looked upon a bright green growing plant for many a day. In many of our London hospitals, where the long white unfurnished walls must often weary the sick man's restless eye, it would be a gracious gift to place some of these inexpensive cases, filled with the fresh green fronds of our native ferns, mingled with the pretty white blossoms of the lovely wood sorrel (*Oxalis acetosella*), or the dew-tipped starry leaves of the drosera. Very little care do they require, and the removal of any mouldy or decaying leaves, and the occasional supply of extra moisture, would be a pleasant charge for the convalescent patients in the ward. In many of our hospitals we see beautiful engravings, supplied by the generosity of individuals, suspended on the hitherto bare walls, and we would suggest this further addition to the attention of those anxious to contribute to the few objects which gladden the eyes and refresh the senses of the inmates of such institutions. Especially should we like to see a few such cases in the sick wards of our workhouses, where the old and infirm are too often debarred from anything that can cheer the monotony of their life, lead them to remember that there is still a beautiful world around and outside them, and that the same Power which "considers the lily of the field" is assuredly not unmindful of them.

Windows constructed in this way form the most beautiful blinds that can be imagined, as there is not a window in London that cannot command throughout the year the most luxuriant verdure, admitting light into the dwelling and furnishing food to the mind as well as the body. Care must be had, however, not to exclude a due supply of the external air to a room so adorned, and any window so constructed below must be made to open above so as to secure free ventilation, for the loss of which nothing will compensate.

The next species which adorns our Plate, *Adiantum capillus veneris*, the true maidenhair, is particularly well adapted to grow in a Ward's case, and forms a most lovely object. It ought never to be exposed to the sun. It will grow perfectly with the sea spleenwort, in the same case, as the soil recommended is equally adapted for both, and their fronds mingle elegantly and gracefully together. The Maidenhair Fern is easily recognised by its fan-shaped leaflets and the little wiry black stalks which support them, giving rise to its specific name. It grows from nine to fifteen inches high, in circular masses, and is of a light green colour. Its slender creeping rhizome is shaggy, with black hair-like scales, and the base of the stipes is of a rich red brown colour. The pinnae are very irregular in shape, but mostly wedgeshaped, or tapering at the base, with a rounded or egg-shaped apex; and they have generally some variation of a fan-shaped outline. The stalk is usually about half the length of the frond, and is glossy black or deep purple. The veins in all the pinnae are two-branched, or forked from the base, the branches extending in straight lines to the margins, where in the barren fronds they end in the marginal notches; in the fertile fronds, however, they extend to the indusium and become the receptacle for the clusters. This beautiful little fern is evidently a wanderer from warmer climates, and is only very locally distributed in Great Britain. It is peculiarly the fern of Devonshire, but occurs on the south and west coasts of Ireland in great luxuriance. It is found only in moist caves, or the fissures of rocks, most frequently near the seacoast, where the water trickles over the rocks, or where it is exposed to the sea spray. At Ilfracombe it grows beautifully on the face and in the vertical crevice of a rock in White Pebble Bay, commencing at a height of about twenty-five feet and descending to within five feet of the level of the sea. Mr. Henry Newman describes, in a letter, his discovery of this shade-loving beauty in its retreat in Wales growing out of a rock incrustated with a soft deposit of carbonate of lime left by a trickling stream, and looking very much like cream cheese. There are three varieties of this fern, so distinct as to be considered as species by some writers. The first is a stronger, coarser, more robust plant than the others, with thicker stalks and larger fronds; the stipes have also a peculiar purple bloom. The second is the true normal fern, our present species, *Adiantum capillus veneris* of Linnaeus. The third is a looser, less compact variety, with the stocks of pinnae set on acute angles, and the pinnae more deeply divided. It is not so common as the other forms. The medical properties of the true maidenhair have long been extolled. The fronds have been used as a remedy in pulmonary consumption on account of the mucilage they contain. When boiling water is poured on them they yield this mucilage and a slight odour. The American Indians have used it from time immemorial for coughs and difficulty of breathing. John Ray cites it as a cure for innumerable maladies, and later heralds have praised the decoction, not only as a remedy for coughs and other pectoral complaints, but also as a cure for jaundice, swollen joints, and many other complaints; and affirmed that "it stayeth the falling or shedding of the hair, and causeth it to grow thick, fair, and well coloured." As in the case of many other vaunted remedies, faith in its power doubtless was the greatest source of its success. The Canadian species of maidenhair was introduced into this country by John Tradescant, and it grows in such profusion in its native district that it is frequently used as a package for goods. The French chemist uses this species extensively in the manufacture of capillaire, a sweet syrup which is sold very largely both in Paris and London. The true maidenhair is used in England for this purpose, and is a safer plant than the Canadian one, which acts as an emetic when taken in any quantity. The late Dr. Ball, of Dublin, says that the inhabitants of Arran, where the maidenhair grows plentifully, employ it as a substitute for tea. In our Plate we have the clouded yellow butterfly (*Colias edusa*), reminding us that the warm months of May and June develop a few of these beautiful sun worshippers, though we must not expect to find many of them till late in the season. They frequent the coasts, and are never found away from the sea. The male is of pale yellow orange colour, the upper wings with a wide black border, and a rounded spot of the same in the middle of each; the hinder wings are also margined with black, the ground colour slightly mixed with green, and each has a spot of deep yellow. The female is differently marked, and has a few yellow spots on the black band of the upper wings. Examples of this sex are occasionally found in which the parts generally yellow are of a greenish white. This is considered a rarity by the entomologist, and is called *Colias helice*. The pale clouded yellow (*Colias hyale*) is rather larger than the other species, and is less often seen, being chiefly confined to Kent, Sussex, and Suffolk, near the coast.

## FERNS AND BUTTERFLIES.

JULY AND AUGUST.

WHAT can be pleasanter at this season of the year than a ramble in the woods in search of what may turn up, be it a fern, a bramble, a moth, or a butterfly—yes, even a snake, provided it be not a poisonous one; and, as there is but one kind in England at all to be dreaded—namely, the adder, we need not fear that very much. Yet to enjoy such a ramble fully it is necessary to understand in some measure what we see, and this can only be done by some general acquaintance with natural science. If it be thought impossible to include more than one branch of natural history in a general education, perhaps botany will be the most available, and give as much enjoyment to the possessor as any other. In the education of girls especially it seems that botany is of great value. The elevating and refining influence of such a study will not terminate with the individual herself, but will spread in ever-widening circles until it infuse a more healthy tone of feeling and a love of realities rather than forms into every rank of society. This has been sufficiently proved in the village school over which the late Professor of Botany in the University of Cambridge presided in his capacity of parish clergyman. The girls in that school all learned botany—they all knew the plants of their own district; the school-inspector reported that their attainments in other things were above the average, and it was a prize for the mother of a family to get a nursemaid out of that school. Kingsley has well said, "If we wish rural walks to do children any good, we must teach them, and we can teach them, to find wonder in every insect, sublimity in every hedgerow, the records of past worlds in every pebble, and boundless fertility upon the barren shore; and so, by teaching them to make full use of that limited sphere in which they now are, make them faithful in a few things that they may be fit hereafter to be rulers over much." In our country walks during these months we are sure to meet with our commonest British fern, the Polypody (*Polypodium vulgare*). Just as the common brakes seem to show the habitation of man, so does the polypody seem to flourish in his vicinity, establishing itself on church towers, old walls, or waving its bright green fronds above the cottage thatch. It has thick, woody, creeping roots. The fronds are about 6 in. to 1 ft. in height; they are always pendent in maturity, broadly oblong, and lanceolate in their general outline. The fructification is very conspicuous and usually at the upper part of the frond, in large circular patches of a golden yellow colour. It is somewhat parasitic in its habit and rejoices in the perishing trunk of some mighty tree, which it often crowns with joyous green—

A gilded halo hovering round doozy.

If in a sheltered spot, it will retain its verdure till December; but in an exposed situation it is easily destroyed by frosts. The leaves have a faint and somewhat disagreeable odour, and, if tasted, leave a rough and unpleasant feeling in the mouth. Several foreign species of polypody are however aromatic, and the fronds of some are used by the natives of the Sandwich Islands to give a perfume to the cocconut oil with which they anoint themselves. Dr. Joseph Hooker mentions that during his residence in India he frequently partook of shrimp curry into which the young tops of the polypody entered.

Mr. Bennett, in his account of the South Sea Islands, mentions, among other ferns, a species of polypody which he found at Mahiatea, growing in abundance on a high mound built of coral stones. He says that the natives called it *Atua buna*, or pig's god, and believed it to exercise a watchful care over these animals. Like our common brakes and other ferns, the polypody contains a large quantity of carbonate of potash, which in former days was used by glass manufacturers. It had a great reputation in medicine on account of its mucilaginous nature. Mr. Newman says he has seen women collecting it in Herefordshire as a specific in hooping-cough. It is gathered in October and November, when full of seed; the barren fronds are rejected. It is then hung up in cottages to dry, and when required for use is slowly boiled with raw sugar. The poor people call it "maiden's hair," or "golden locks."

In Paris it is used at the present time as a domestic remedy for coughs and colds, and in some county districts there is a sort of superstition connected with its use—that it should be gathered from the oak and not from the shady hedgebank or other tree. The ancient reputation of this fern is very curious. Pliny recommends it for chaps on the toes; and further informs us that the root dried and powdered, if snuffed up the nose, will consume a polypus. It is doubtless the "rheum-purging polypody" of our own Shakespeare.

Several variations occur in the form of the common polypody, the lobes being more or less cleft, or acute, or serrated. In the Welsh polypody—*P. w. Cambriacum*—the lobes are broader, and irregularly lobed or toothed. The Irish polypody, or *P. v. Hibernicum*, has a broader twice or thrice pinnate frond, and is exceedingly handsome. This fern repays all the trouble taken to cultivate it. It is somewhat difficult to remove from its natural positions, as its roots are apt to become firmly entwined with the substances on which it may be growing. In a greenhouse it is a remarkably striking and beautiful object when suspended in a basket, which should be always of wood, and made very open. The basket and suspending wire being prepared, the rhizomes should be arranged therein in such a manner that the fronds may pass through the holes at the bottom, and that the growing points of the rhizomes may also have the opportunity of doing so. The rhizomes should then be covered with a thin layer of sphagnum, a moss always to be found in boggy places, and which never becomes mouldy; next cover the sphagnum with a mixture of well-decayed leaf-mould and silver-sand; then arrange a second layer of sphagnum, then another of rhizomes, on which carefully fasten wooden crossbars, and the basket will be complete. Immerse the whole in soft water until it is thoroughly saturated and then hang it in its final destination. This should be done in April, before any young fronds have appeared. In June and July young fronds will emerge through all the apertures in the basket and arrange themselves gracefully around it. The last year's fronds, which, up to this period, are unsightly, will now fall off. The basket should hang in a free circulation of air. All covering, except that afforded by a greenhouse with open doors and windows, should be avoided; exclude violent draughts of wind, but admit plenty of fresh air. Out of doors, in a rockery or on stumps of trees, the polypody forms a pleasing object, and it is well to neglect no opportunity of securing it early in the year if possible, with the substance on which it is growing, be it rock or the head of some old pollard; it may be thus transplanted uninjured to your garden. To those who indulge in woodland rambles, the inconvenience of a conventional mode of dress must often be apparent; yet we are inclined to think that, troublesome as is the expanded form of female attire now so universal under many circumstances, the possibility of looping the upper dress in graceful festoons, and leaving the feet unfettered and free, was never so great. Who that has trodden a dusty road or a wooded meadow in the days when ladies took especial care to hide their ankles from mortal gaze

does not remember the constant demand to be set free from "lovers," or "lawyers," or whatever might be the chosen name for those straggling, many-hooked bits of bushes which are strewn about from neighbouring hedges? The plant figured in our Plate is the common bramble or blackberry, and often supplies the troublesome "followers" which so pertinaciously cling to long garments. Botanists know the blackberry under the name of *Rubus fruticosus*, and describe it as having long arched angular stems, furnished with strong, hooked prickles, which bear at their extremities, the second year, clusters of pink or white flowers, followed by the well-known fruit, reddish when unripe, but gradually becoming deep purple or black. The varieties are so numerous, and differ so much in appearance that many botanists regard them as distinct species, of which they reckon above forty; but there are almost all gradations between them, and most present such a strong resemblance as scarcely to be distinguished by the ordinary observer. During the months of July and August we find the hedges filled with the blossoms of the bramble, which, mixed with those of the wild rose and the honey-suckle, and with the twining branches of the large white convolvulus and beautiful bryony, form a truly English rural sight, one which, in after life, will often recall to the wayworn and tired citizen of the world thoughts of the peaceful country home and village friends he had wellnigh forgotten in the battle of life. The bramble, we are told, is never planted in Scotland, and is only occasionally found in hedges, in consequence of being sown there by birds. It is later in the year, however, that the true festival of the brambles begins. In September and October, when the fruit has ripened, comes in the blackberry season. Then may be seen parties of bright young faces falling forth with crooked sticks and capacious baskets in hand, to return at the close of day laden with the purple fruit and with mouths and fingers dyed of the same hue. Who has not enjoyed and taken part in such excursions, and who cannot recollect the early lesson of pleasure being mingled and seasoned with pain in the scratched hands and torn dresses consequent on the occasion? Yet who would have willingly given up the next opportunity for a similar enterprise, or have recklessly trodden on cook's toe during the blackberry season, lest—instead of the delicious tarts she condescended to make of the produce of those excursions, delicately mingled with slices of apple, and far more prized than any ordinary dainty—she should have turned crusty herself and voted the black treasures so much "rubbish"? Had she been a Scotch cook, indeed, she might have appropriated the fruit to her own uses, and, boiling it with sugar, have manufactured a delicious preserve, known as "rob," for which, however, the juvenile appetite might be condemned to wait till the winter stores were commenced. In some parts of England the blackberry fruits are called "bumblekites," or "scaldberries," from the notion that they give "scaldhead" to children. We have no such idea, however, as they have certainly been eaten by children ever since the time of Pliny. The berries are sometimes used to make an inferior kind of wine and to colour better sorts. The red muscat of Toulon owes its tint to the juice of the blackberry. The fruit is occasionally used in rural districts for dyeing, and the young shoots of the plant yield a good black dye with salts of iron. The long, flexible shoots are used for binding thatch. Bees were frequently made of them in former times, and it is found that silkworms will feed on the leaves. In the hot summer of 1858 a number of silkworms were hatched on some brambles in Kent, probably from eggs accidentally thrown there. The silk produced by these caterpillars was of good quality. They seemed to have fed on various wild plants in the vicinity besides brambles. It might be worth experiment to try whether these creatures could be successfully reared on bramble leaves during an ordinary season. Ruskin, the great exponent of the connection between Nature and Art, says:—"For one man who is fitted for the study of words, fifty are fitted for the study of things, and were intended to have a perpetual, simple, and religious delight in watching the processes or admiring the creatures of the natural universe."

Not many of the lepidoptera of Great Britain can be said to be of any economical use to man. But shall we say that creatures known only to us for their beauty are devoid of absolute use in the economy of nature? For all the purposes of food which they supply to birds and such creatures, the butterfly would be equally available were it clothed in the dingiest dress imaginable; but colour is of infinite delight to the eyes of man, and we are disposed to think that the great Creator of the universe did not forget this new sense of gratification when he formed the lower creatures to live in the world with man, His highest work. We may fairly rank amongst those gifts of the Creator—not essential to the existence of his works, but bestowed to enhance their enjoyment—those pleasures for the eye which are connected with the colouring properties of light. But for these, what a sombre world should we be in! "If," says Sir David Brewster, "the objects of the material world had been illuminated with white light, all the particles of which possessed the same degree of refrangibility, and were equally acted upon by the bodies on which they fall, all Nature would have shown with a leaden hue, and all the combinations of all external objects, and all the features of the human countenance, could have exhibited no other variety than that which they would possess in a pencil sketch or an Indian-ink drawing; but He who has exhibited such matchless skill in the organisation of material bodies, and such exquisite taste in the forms upon which they are modelled, has superadded the ethereal beauty which enhances their more permanent qualities, and presents them to us in the ever-varying colours of the spectrum." Some naturalists tell us that there is even a deeper meaning in the colouring of the animal creation than appears at first sight, and that the various hues in which they are clothed serves as a shield and protection to them against many of their foes. The delicate-veined leaflet or petal so closely resembles the brilliant wings of some of our lepidoptera that we can understand how they suggested Wordsworth's lines in his garden:—

The butterfly, all green and gold,  
To me has often flown,  
Here in my blossoms to behold  
Wings lovely as his own.

There is the beautiful little butterfly of our Plate known as the corn blue or Clifden blue (*Polyommatus adonis*), with black bordered wings of silvery azure shining with a metallic lustre, and the usual ocellated spots which characterise the genus, the name of which is derived from a Greek word signifying many eyes. The female wears more sombre array, and is of a brown colour, each wing having a pale central spot. This butterfly is nearly related to the lovely little "Corydon," which, like a true shepherd, wears his brown Phyllis on the upland downs.

We have also in our Plate the Burnet moth (*Anthrocera*), of which there are several species. We have the six-spotted Burnet moth, and the five-spotted Burnet moth. They resemble each other, but the latter species, besides having the smallest number of spots, is the smallest in size. They are found on grasses and other common plants, and the smaller one is frequently found on the honey-suckle. Their colours are very brilliant—bluish black and bright red, the latter hue predominating on the lower wings and forming spots on the upper.

FERNS AND BUTTERFLIES,  
SEPTEMBER AND OCTOBER.

IN all rural districts this is surely a busy season, for men and maidens are out with their bended sickles to gather in the yellow harvest. It is an anxious time for the farmer. He is continually on the lookout for the weather, noting every sign, which one so well practised in such matters can easily discern. Unlike the manufacturer, who carries on his business indoors, independent of the weather, the farmer is never safe, however beautiful his crop may look while standing, until it is safe in the garner. Somehow, he seems to live nearer to the Giver of All Good than the busy indweller of cities, for he puts his trust in Him who has promised that "seed-time and harvest shall not fail." In October we begin to feel that the autumn has really come, no longer divided from the summer by the golden sheaf and lingering flowers, but with features of its own, marked with slow decay. Nearly all the singing-birds have departed for sunnier lands, and the swallows are preparing to follow them, while other birds arrive to take their places. The woods never look more beautiful than in September and the beginning of October. Every shade of yellow and crimson tints the trees, and we have the frequent sound of the sportsman's gun reminding us that with the long vacation commences the slaughter of the partridges and pheasants that have so long enjoyed a respite. The stately deer, too, in some of our spacious parks never look so beautiful as when they move about or couch in the russet-coloured fern, with the varying colours of the foliage scattered around and a blue atmosphere in the distance. A walk on the fern and heath covered waste on a crisp, bright, autumnal morning is one of the best remedies for an attack of low spirits. There are the great gorse-bushes in bloom, high as one's head; the bushes with their wild fruits, the sloe, the bullace, or the crab; and here and there are bright open spots on which we may lie for hours on the softest bed of heather, such as the brave Highlander often rests upon; or perhaps we should say used to rest upon, for we fear the refinements of civilisation have reached very remote districts, and there are but few of the genuine "Scots whom Bruce had often led" left in our Highland mountains and glens, and but few who would be content with such a couch as that described by Sir Walter Scott:—

Before the heath had lost the dew  
This morn, a couch was pulled for you  
On yonder mountain's purple head.

The stranger would, doubtless, expect a more luxurious bed than

the stranger's bed  
That was of mountain-heather spread.

The heather here alluded to is figured in our Plate, and is the "Calluna vulgaris." It is the genuine heather, and is distinguished from the heath *Erica tetralix*, with which it grows, by its smaller, more purple blossoms, placed all along the stem in little bunches. Sometimes the flowers are white; but this is rare. The heath *Erica tetralix* is, perhaps, the best known of our native heaths. The leaves are four in a whorl, lanceolate and linear, ciliate, downy above and on the midrib beneath. The stem is bushy at the base, with rather short, erect, flowering branches. The flowers are rose-coloured, forming little clusters or close umbels at the end of the stalks. Both these plants grow together, and extensively, on the mountains of Scotland, and are adopted as the badges of the Highland clans. Although the *Erica tetralix* is not especially a Scotch plant, it was borne by the Macdonalds, the *Erica cinerea* by the Macallisters, and the *Calluna vulgaris* by the Macdonnells. On the moors and fells of the north of England and Scotland, where these pretty plants grow extensively, they give a character to the landscape, and shed, as it were, a purple hue over the distant mountains, causing them to glow in the sunlight and cast a rich coloured shade over them at sunset. There is, perhaps, no plant more useful in the districts where it grows than the heath, or ling, as it is called. In Wales and the Highlands of Scotland it furnishes food to the hill sheep, the mutton of which is peculiarly delicious. The mountaineer often builds his house of alternate layers of heath and mortar, or mud, and thatches it with the same plant. As a fuel it serves well, and it is said to yield a yellow dye, some of the tints of which are brilliant though not very permanent. In Yorkshire the tips are still collected for this purpose, being used in dyeing the inferior kinds of cloth. Moreover, in England, the sprigs of the heath are constantly made into brooms, or besoms, which are very serviceable. As food for moor game and grouse, the heather is almost essential, and it is only where this plant will grow that these birds can be preserved. The red deer crops the young shoots of the heather, and bees extract honey from the flowers, which, though dark in colour, is very rich in flavour. The heather and many other species of heath is sometimes prettily used as a border for flower-beds in gardens. Sir W. Hooker suggested it, and it has been carried out at Kew. By being frequently cut, it grows dense and shrubby, and is livelier and prettier than box. But, when we regard the heath plants as fit for so lowly a purpose, and seldom in our southern regions see them about a foot or two in height, we are surprised to read of

Heather black that wared so high,  
It held the cope in rivalry.

Yet, in wild, peaty districts it is even so; and to judge of it we must travel far north, and see it, as the true Highland men of Marston did, when—

mountains felt the rays,  
And as each heathy top they kiss'd,  
It gleam'd a purple anethyst.

There are six species of *Erica* in Great Britain, somewhat difficult to distinguish. The *Erica cinerea*, or fine-leaved heath, is almost as common as the ling, and grows in some hilly districts quite as abundantly. Some writers make a distinction between the words heath and heather, and contend as to which of these plants constituted the "heather" of Scotch poetry, one affirming it to be calluna, and another one of the *ericas*. Lightfoot, who paid great attention to native names, calls both "hather," and of both, says Sir Wm. Hooker, the Gaelic is "troach." He also says that, after living and botanising in Scotland for upwards of twenty years, he had always understood "heather" to be a generic rather than a specific name, identical with our English word heath.

Many a rambler during this season of the year will gather a bunch of purple heath and "bonnie broom," and, looking round for some green leaves to mingle with it, will chase the bright fronds of the hard fern (*Blechnum spicatum*), which just now arrive at perfection.

Cowper may have had this fern in his mind on such a scene as we have been describing when he wrote of—

The common overgrown with fern, and rough,  
With prickly grass, that shapeless and deformed,  
And dangerous to the touch, has yet its bloom,  
And decks itself with ornaments of gold.

Though occurring in most countries, it is somewhat local in its haunts,

and Mr. Newman does not recollect having seen a specimen from the chalk hills of Kent, Sussex, or Surrey. It is fond of moisture, and prefers clay or gravelly soils. It is a fern readily distinguished, the barren fronds spreading more around the spot whence they arise, sometimes being quite prostrate on the ground, and having the pinne much closer together than in the tall, erect, fertile fronds, which are cut into so many slender divisions as to resemble the teeth of a comb—the barren ones having their segments only cut nearly to the midrib, while the fertile ones are distinctly pinnate. The former are about half the height of the fertile fronds, and have short scaly stalks. The fertile fronds, which are about a foot and a half in height, have a dark brown stalk nearly half their length, with long pointed scales on its surface, and are at once seen by their upright growth. The fertile fronds arrive at perfection in September, shed their seed, and disappear before the winter; the barren ones remain green throughout the year.

The clumps of *Blechnum* are so handsome that we should be sorry to miss them, though we cannot put them to any economical use. Cattle will not eat their stiff leaves; but the old herbalists, who found something wonderful in everything, called it rough spleenwort; and Gerard says, "There be empiricks, or blind practitioners, of this age who teach that with this hearbe not only the hardness and swelling of the spleen, but all infirmities of the liver also, may be effectually and in a very short time removed, inasmuch that the sidden liver of a beast is restored to his former constitution again, that is made like unto a raw liver, if it be boyled again with this hearbe."

The hard fern is worth cultivating on rockwork, its fertile fronds are delicate and beautiful during the summer and autumn, and its barren fronds bright and glossy, green, and persistent during the winter. It does not like glass covering, and shuns protection of any kind, preferring to grow so as to face the north, as in a state of nature.

The season for botanising out of doors is now nearly over—bright days may occasionally be seized, but we instinctively turn to the fire, and the days are too short for evening walks. Now is the time to arrange and garner all we have collected in the bright summer days—to use our hand-books, and to name and classify our plants and our butterflies. Those who have really cared for the ferns which have added so much beauty to their summer rambles will undoubtedly have preserved many of them, and is to be hoped they are carefully dried between several sheets of Bental's drying-paper, the only paper which really well preserves the colours of any plants. It is coarse and of a dark colour, but answers better than the ordinary blotting-paper. If, however, it cannot be obtained, the usual sort or old newspapers will answer the purpose of preserving the plants. Two boards planed by any carpenter, about half an inch thick, a foot wide, and a foot and a half long, two narrow but strong leather straps, which cost about a shilling each, and several quires of drying-paper, constitute all the apparatus necessary for a collection of dried ferns. They are the best of all plants for preservation in the herbarium, for, in addition to their elegant appearance when nicely arranged on sheets of white paper, they are less liable than many plants to the attacks of destructive insects which commit great havoc among dried plants in general. In gathering ferns to dry, cut them as low down the stem as possible, and the smaller kinds in the tufts as they grow. In putting them to dry in the blotting-paper have respect to the natural position of the fern and also to the size of the sheet of paper on which they are to be finally placed. When the fronds are long or the specimen large they may be bent so as to be in a smaller space than they otherwise would, and if dried in a certain position they will easily retain their form. It is best at first to make the pressure lightly, so as to alter the form of the plant, if needful, before it is completely dried. When arranged on the drying-paper place several sheets between each specimen and the paper between the boards, which may now be strapped tightly, increasing the pressure from day to day, care being taken to change the sheets of paper frequently until the process is complete, which will generally be in three or four weeks. When they are finally removed to put down (which operation may be deferred to the autumnal evenings) they should be secured by thin little strips of gummed-paper to a good-sized sheet of white paper. This gummed-paper is best prepared beforehand by covering a sheet of note-paper with a strong solution of gum and allowing it to dry. It may thus be kept ready for use, and thin strips, as required, may be cut from it. This plan is better than gumming the whole plant or any portion of it, as the little slips can at any time be removed with a pen-knife without injuring the book or paper in which they are fixed. The specimens should be fully labelled, giving their names, the locality where gathered, and the date; and the papers to which they are affixed should be inclosed in separate paper covers formed of whole sheets, each genus being kept distinct. These covers may then be placed in a drawer or on the shelves of a cabinet, where they will be free from dust and the attacks of insects. In the first part of the process of drying it is desirable to have two sets of blotting sheets, so that while one is engaged in drying the ferns, the other may be getting rid of its moisture before the fire or in the sunshine. It will be seen how pleasant an occupation the summer rambles thus furnish for the wintry days. The naming of the specimens, comparing them with others, and arranging them carefully and neatly, is a work of time which cannot well be undertaken in the summer months, when all nature invites us into the fields. Certain books must almost necessarily be had by those who would earnestly study this branch of natural history. We would mention Messrs. Bradbury's beautiful but expensive volume of "Nature-printed Ferns," and, as more available for the ordinary student, Miss Pratt's "Ferns of Great Britain," Mr. Moore's little "Handbook of British Ferns," Mrs. Lankester's "Plain and Easy Account of British Ferns," and Mr. Newman's complete and exhaustive work on "British Ferns." Any or all of these volumes will be found to contain much that is interesting and instructive.

In spite of cheerless days, and sometimes the indifferent weather of the latter part of this month, we may expect to see the sombre butterflies known to naturalists as belonging to the genus *Hipparchia*. The one figured in our Plate is *Hipparchia janira*, the heath butterfly, and in autumn days we have often seen it taking advantage of every transient gleam of sunshine to trip from flower to flower, seemingly the last and sole possessor of the sweets of the heath or field. The wings of the male are of a uniform blackish brown, enlivened by a small black eye, with a white pupil. Beneath this ocellus there is in those of the female a large irregular patch of orange buff, and all her pinions are more prettily and somewhat more gaily painted on their under than their upper sides—the foremost with dark orange, the hindmost with shades of light brown. Their caterpillars, usually green, with forked tails, assimilate with the various grasses on which they feed; and even when arrayed in winged attire their prevailing shades of brown and orange bear still a degree of correspondence with the hues of the ripened and sunburnt clothing of their favourite localities, the meadow and the heath. Perhaps it is somewhat late in the season to commence making a collection of moths; but early in September we often find calm, warm, moonless nights when these little creatures are very abundant and may be easily captured.

## FERNS AND BUTTERFLIES.

NOVEMBER AND DECEMBER.

NOVEMBER is the pioneer of winter. He comes with his sharp winds to cut down every blade and leafy bit of green to make room for the coming snow-flakes and form a great bed for Winter to sleep upon. All Nature seems to begin her rest; the hedges and fields that were so lately covered with bright flowers now have a sombre and quiet hue. The summer birds have all gone, and the little animals that make themselves so merry in the woods during the warm days that are past now coil themselves up in their winter nests and take a long, sound sleep, until the rays of the sun shall again awaken them to active life. The shortest day and the longest night soon come upon us, and we find in our homes the real comfort of an English fireside, not forgetting those who, less favoured than ourselves, have to suffer much that we escape from the inclemency of the weather. Who has not sat and gazed into the fire and seen all sorts of fantastic shapes, fairy grottoes or fiery caves, according to the mood of the gazer? One might almost fancy that the coals had reproduced in their structure miniature pictures of the old world forests when they began their existence, and thus our minds are led to think of the trees and plants, ay, and the ferns, too, which contributed in bygone ages to form an inexhaustible store of carbon, in preparation for the comfort and welfare of man, before he appeared on the earth. Coal owes its origin entirely to the decomposition of woody tissue produced under great pressure. On examining sections of coal under the microscope distinct vegetable tissues can be discovered, and certain appearances point to the proportion of ferns being large in this formation. Ferns are the only carboniferous fossil group which present an obvious and recognisable relationship to an order of the present day. While cellular plants and those with lax tissues lose their characters by fossilisation, ferns are more durable, and retain their structure. It is rare, however, to find the stalk of the frond completely preserved down to its base. It is also rare to find the fructification present. We may, however, occasionally trace the form of a fern upon a piece of coal destined for our fireplaces; and in coal-mines large slabs are often secured bearing the distinct impress of portions of the gigantic ferns which abounded in the periods when these beds were formed. The ferns of that age seem to have greatly resembled the tree ferns of the present day, and, like them, rarely to exhibit fructification. This fact increases the difficulty of determining the species or genera of fossil ferns. Circinate venation, so common in modern ferns, is seldom seen in fossil species, and we do not often meet with rhizomes. There is great similarity between the coal ferns of Britain and America. In the English coal measures there have been 140 species made out. The preponderance of ferns once flowering plants is seen at the present day in many tropical islands, such as St. Helena and the Society group, as well as in the extra-tropical islands, as New Zealand. In the latter Hooker picked thirty-six kinds in an area of a few acres; they gave a luxuriant aspect to the vegetation, which presented scarcely twelve flowering plants and trees besides. The presence of this kind of vegetation in the coal-beds favours the idea that at that period there existed a mild, equable, and humid climate, such as there is on islands in the midst of a vast ocean. There are certain ferns found in the coal-beds which greatly resemble many of our recent ferns. Geologists tell us of *Pecopteris*, which is the representative of *Pteris*, and *Neuropteris*, which much resembles our *Osmunda regalis*. A very perfect specimen was found in a coal-field near Edinburgh by the late Hugh Miller, and described by him. There is a good collection of these fossils to be seen in the British Museum. Sir Charles Lyell tells us that it is his conviction that the plants which produced coal were not drifted from a distance, but nearly all of them grew on the spot where they became fossil. "They constituted the vegetation of low regions, chiefly the deltas of large rivers, slightly elevated above the level of the sea, and liable to be submerged beneath the waters of an estuary or sea by the subsidence of the ground to the amount of a few feet." The coal-fields in Great Britain alone have been estimated at 4251 square miles in extent. The beds are often thousands of feet thick, and imply that, for an indefinite number of ages, a great body of water flowed continuously in one direction, submerging the forests of that period. Forms of vegetation doubtless existed at that time of which we have no traces left, as it is only those possessing indestructible tissues that we can remain to us, to believe that the vegetation of the globe has undergone various changes at different periods of its history; and there can be no doubt that there have been successive deposits of stratified rocks and successive modifications of living beings. The thoughts induced, however, by the observation of the coal fossils lead us far back before the existence of man on the earth; for, with the remains of vegetable life that occur in these fossils, we find no indication of man's presence on the earth. We must rather regard these vegetable formations as preparatory for man's creation. Without plants man could not exist. Not only do they constitute his food—for all animals derive their food from the vegetable kingdom—but they generate an atmosphere in which men alone can live. Plants give out oxygen in their growth and take up carbonic acid—man breathes in oxygen and gives out carbonic acid; so that it appears to us as though the Creator had, by the agency of plant life, made ready a suitable atmosphere for man before the special act of creation which placed him in the world, the possessor and master of all that had been prepared for him.

Climate has an immense influence on the development of plants, and, as we all know, there are many that will not live, except under certain conditions, and it is only by the artificial imitation of these natural conditions that we can ever induce them to grow in our northern climate. The art of the gardener teaches him that by the judicious use of heat, light, and moisture he may cultivate many of the most delicate exotic plants under glass-houses with almost as much luxuriance as in their native regions. In the spacious houses at Kew, and the smaller but well-kept conservatories of the Botanical Gardens in Regent's Park, and other places, may be seen in great perfection the stately palms and tree ferns of warmer climates, as well as the smaller and more delicate species which may be reared and cultivated in our hothouses and greenhouses. The ferns given in our Plate are two of the most easily cultivated of the exotic ferns, and require only a very moderate degree of heat to preserve them in good condition in this country. *Cyrtium caryotideum* is a species that is brought chiefly from the mountain regions of India, where it has been met with at an elevation of above 8000 feet. It has pinnate fronds of one to two feet high, the pinnae large, light, but dull opaque green in colour, rather few in number, ovate foliate, much acuminate, and usually auricled, the terminal one auricled on both sides, and of the singularly irregular shape found in the leaflets of the *Caryota palm* (*Caryota urens*). Its name has reference to its resemblance to the foliage of that tree. It has been found in the Sandwich Islands and in South Africa; also in Natal and the forests of Kaffraria. Our other

specimens of greenhouse ferns is the *Pteris cretica albo lineata*, a Java species, but very accommodating, thriving well in cool hothouses in this country, and being almost hardy. It belongs to the same family as our common *Brakes Pteris aquilina*. It has short and broad outside sterile fronds, and tall, narrow, and more erect central fertile ones, about 1 ft. high, pinnate, with but few pinnae, and having the basal one parted on the hinder side, all of them with a broad white band down their centre. Vast numbers of tropical plants are brought to our shores and cultivated with more or less success in the different private and public gardens, which abound in this and other countries. Great difficulty has been experienced in the transit of tropical plants to other regions, numbers dying on the voyage; but the invention of Mr. Ward's closed cases, which we have before mentioned as admirable for the growth and preservation of ferns, have removed these difficulties, and the most delicate exotic plants may now be carried across the ocean with perfect security.

A much larger number of ferns grow in tropical countries than in our own, consequently the skillful gardener who is fortunate enough to bring them directly from their native forests to his own hothouse must bear in mind that heat, moisture, and shade seem to be the circumstances under which they flourish, and the largest number of ferns is therefore to be found where these things exist. It is remarkable that ferns are very numerous on islands in proportion to the corresponding continents. On Falkland Islands the proportion of them, including the *Lycopodia*, is one to fifteen; in New Zealand one to six. Ferns have their peculiar uses in the vegetable kingdom. In common with other cellular plants, they provide mould in situations where plants of a higher order could not at first grow; and this is effected in a twofold manner—by the decay of their fronds and the action of their roots. Mr. Webster, in his "Voyage of the Chanticleer," states that when gathering ferns in the Island of St. Catherine, he was particularly struck by observing that each plant had formed for itself a bed of fine mould several inches in depth and extent, whilst beyond the circle of its own immediate growth was naked rock; and this appeared so general that he could not help attributing the extraordinary circumstance to the disintegrating power of these fibrous roots which penetrated every crevice of the rock, and by expanding in growth, appeared to split it into the smallest fragments. Ferns, likewise, are of the greatest service to man, affording him in various countries supplies of food in time of need and giving protection to numberless animals upon which man subsists. In tropical countries arborescent ferns are the most glorious objects in the vegetable kingdom; and in temperate climes they throw a phoenix-like beauty over the dead and decaying works of nature and art which has a peculiar charm of its own, and reminds the observer that no adornment can be compared with that produced by the natural growth of plants. It is not in the power of all lovers of plants to have conservatories and glass-houses of their own, but the poorest person may, by the aid of a common bell-glass used as a forcing-glass, and made of the coarsest material, nourish and preserve delicate little plants in the closest cottage window. We have lately seen the prettiest and most permanent table ornaments, formed by growing ferns planted carefully in glass dishes with bits of tiny rockwork introduced, and the ferns so arranged as to grow out of these bits of rock, the taller ferns being placed in the middle. To those who possess a conservatory or greenhouse, or even a Ward's case, these table decorations are very convenient and pretty, for they can be replaced in their natural atmosphere after use for a few hours, and retain their freshness and beauty for many months, even in a London house. Possibly there may be some reason for the almost universal custom of gardeners to arrange their plants in hothouses and greenhouses in straight and uniform rows; but we know that such a practice is not a necessary one, and that in beds arranged within the limits of a hothouse so as to inclose pools of water, natural pieces of rock, and winding paths, it is possible to secure the most perfect tropical vegetation, and to form some notion of what it must be to behold the stately palm-tree and luxuriant ferns in their native forests. Any arrangement seems to us better than that which may have, perhaps, the excuse of convenience for removal of long white or green wooden stands with pots of growing plants, ferns or flowers, placed side by side, as if for sale, without any regard to natural position or grouping.

In Mr. Ward's garden at Clapham is exemplified what can be done with a London garden by anyone disposed to consider nature rather than conventional regularity and neatness, and in his glass-houses we have ferns growing naturally out of rockwork, and surrounding little pools of water, on the borders of which flourish bog and other plants, receiving their necessary moisture from the evaporation which takes place, instead of being confined each to its little modicum of earth supplied in a red garden-pot, having the free and undisturbed privilege of spreading themselves in any direction. Such a thing as a garden-pot is not seen on the premises, but every plant is considered, and has a place provided for its growth as much like its natural home as possible. This, we believe, is the true way to cultivate and enjoy a garden.

Our Plate reminds us that all insect life has not quite disappeared with the dull days of November and December. The hummingbird hawkmoth (*Macroglossa stellatarum*) is sometimes found as late in the year still hovering over the scene of its summer sports, and occasionally the warmth of our green and hot houses will attract a late tarrier to their genial shelter.

Moths are generally divided into two divisions—crepuscular, or those that are seen on wing at twilight, and nocturnal or nightfliers, the latter comprising by far the greater number. The twilight family consist chiefly of hawkmoths, or sphinxes—the former name having reference to the moth's hovering mode of flight; the latter to the caterpillar's remarkable form and position when at rest. Many of the hawkmoths are named after the trees and plants which furnish the favourite food of their caterpillar life. The name of the hummingbird hawkmoth of our Plate is derived from the vibratory sound emitted by the wings of this pretty insect as it hovers suspended, morning and evening, above flowers of which the honeyed treasures are never inaccessible to its long, spiral proboscis. The anterior wings of this curious moth are dusky brown, striated and barred, the hinder white or rusty yellow; and the body, which is short, is variegated at the sides with small tufts of black and white, finished by a large black bush at its extremity. The hummingbird-moth is frequently seen in most parts of England, but especially near the seaside. The caterpillar is green, variegated with white. It sports a tail somewhat conspicuous as proportioned to its size. It is a feeder on that rough and trailing climber known as cleavers; also on goosegrass and ladies' bed-straw (galium).

We have now brought our circle of months to a close, and we trust our readers may find, if so inclined, suggestions for natural history thought and study for each month of the year—not by any means strictly arranged, so as to be applicable only to the months in which they appear, but as hints for further research in the direction of that most interesting group of plants which form the chief feature of our Illustrations.