

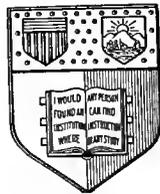
WAYSIDE  
FLOWERS AND
FERNS   

By A·B·Hervey

With Colored Plates from
Original Water Color Drawings
after Nature by Isaac Sprague



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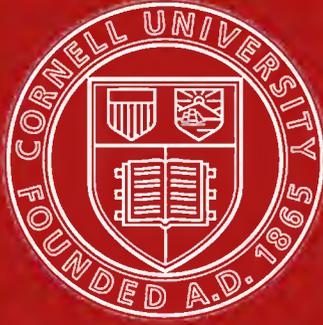
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WAYSIDE FLOWERS AND FERNS.

FROM

ORIGINAL WATER-COLOR DRAWINGS,

By ISAAC SPRAGUE.

Descriptive Text

By THE REV. A. B. HERVEY.

WITH SELECTIONS FROM THE POETS.

BOSTON

L. C. PAGE AND COMPANY

(INCORPORATED)

1899

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BY NIMS AND KNIGHT.

THE ARETHUSA.

THE ARETHUSA.

ARETHUSA BULBOSA L.

Is this a time to be cloudy and sad,
When our Mother Nature laughs around;
When even the deep blue heavens look glad,
And gladness breathes from the blossoming ground?

There are notes of joy from the hang-bird and wren,
And the gossip of swallows through all the sky;
The ground-squirrel gayly chirps by his den,
And the wilding bee hums merrily by.

The clouds are at play in the azure space,
And their shadows at play on the bright-green vale,
And here they stretch to the frolic chase,
And there they roll on the easy gale.

There's a dance of leaves in that aspen bower,
There's a titter of winds in that beechen tree,
There's a smile on the fruit, and a smile on the flower,
And a laugh from the brook that runs to the sea.

Bryant.

THE last line of this song of gladness brings us to the side of the "laughing brook that runs to the sea" and brings us to its floral guardian, the beautiful Arethusa. This interesting and bril-

THE ARETHUSA.

liant summer annual has a habitat limited to the region of our eastern border along the coast of New England and the middle States to Virginia, and the northern parts of Wisconsin and beyond. It is not a common plant anywhere, though I have found it by no means rare in some of the marshy districts about Taunton. It blossoms in May and June, and, as our artist makes clear to all, it is a very beautiful flower. The singular form and position of the petals, its brilliant color of pink and red, with the yellow fringe that ornaments its pendent "labellum," all contribute to the interest and charm of the flower.

It is one of the few representatives which we have in our native flora of the very interesting Orchid family. They are all very highly organized and specialized plants. In most cases they have some ingenious mechanism for soliciting and securing the help of insects in cross-pollenization. In describing the Moccasin Flower and the Calopogon in *Beautiful Wild Flowers*, I had occasion to refer to this interesting matter at some length. The Arethusa secures this outside help in the distribution of its pollen in much the same way as the Calopogon, the principal difference being that the insect carries away the pollen masses upon his head in the case of the Arethusa, while in the Calopogon they adhere to the under-side of the thorax or abdomen.

If the reader will carefully notice the flowers which Mr. Sprague has reproduced with such faithfulness, he will see that the petal which overarches the yellow-headed "labellum" has a slight knob or protuberance on its under side near the end. This is the anther. It consists of a casque-shaped cup with four little masses of powdery pollen packed loosely away in it. The cup lies down upon its side in a little hollow or groove in the petal with its

THE ARETHUSA.

bottom turned toward the end of the petal and fastened to it by a delicate hinge of vegetable tissue. This brings the open top of the cup toward the inner part of the flower. The mouth of the cup is closed up by a thin partition drawn across the little furrow in which it lies. The other or inside of this partition is the stigma of the flower.

It is not difficult to see that the two parts are so adjusted to each other as to make it in the highest degree difficult, if not altogether impossible, for the pollen unaided to come in contact with the stigma. But with the aid of a bee in search of honey it is very easily accomplished. The bee lights upon the downy hanging platform of the "labellum," and proceeds to make his way down the throat of the flower to the nectar. In doing so he might run his head against the projecting anther cup, but of course could not move it, for it is so hinged that it will turn outward and not inward.

But on his way out the bee again knocks his head against the little cup, and this time it responds to his lightest touch. It immediately swings out and opens downward, and spills its little bundles of pollen directly upon the top of the bee's head or back, and they stick fast. The very next Arethusa he visits and comes out of he will be sure to leave some of this pollen upon the stigmatic surface just where it is needed to fructify the flower. He will at the same time carry away more pollen from this flower wherewith to pollenize the next one, and so on. The service rendered by insects in cross-fertilizing plants, thus making them more prolific and more vigorous, is coming to be one of the most interesting and important fields for investigation in the natural history of the vegetable kingdom. One sees, also,

THE ARETHUSA.

how the insect tribes in doing this service to plants also benefit themselves, for the number and vigor of nectar-producing flowers will be the measure of their food supply for the next year. Thus Nature weaves these two humble lives together in a web of mutual dependence and service.

The Arethusa was named in honor of a nymph of Diana or Artemis, as she is often called, and was represented in the Greek mythology to be the presiding genius of springs and fountains. She was the daughter of Nereus and Doris, and was changed into a fountain by her mistress Diana to deliver her from the persistent but unwelcome pursuit of her lover Alpheios, a river-god, and a son of Okeanas. The fountain was at Syracuse, in Sicily, and was famous for the abundance of its waters and the number of its fishes, though now the water is brackish and supports no finny inhabitants. Virgil invokes the inspiration of Arethusa to help him compose his tenth pastoral, addressed to his friend Gallus.

The connection of our plant with wet "springy" places, where it makes its home, suggested its name. Certainly, no one who has seen and admired its rare charms in its native haunts, can feel that it does discredit to the name or memory of the fair goddess of fountains.

Arethusa arose
From her couch of snows
In the Acroceraunian mountains, —
From cloud and from crag,
With many a jag,
Shepherding her bright fountains,
She leaped down the rocks
With her rainbow locks

THE ARETHUSA.

Streaming among the streams;—
Her steps paved with green
The downward ravine
Which slopes to the western gleams
And gliding and springing,
She went ever singing,
In murmurs as soft as sleep:
The earth seemed to love her,
And heaven smiled above her,
As she lingered toward the deep.

Shelley.

INTO the sunshine,
Full of light,
Leaping and flashing
From morn till night!

Into the moonlight,
Whiter than snow,
Waving so flower-like
When the winds blow!

Ever in motion,
Blithesome and cheery,
Still climbing heavenward
Never weary.

Full of a nature
Nothing can tame;
Changed every moment,
Ever the same.

Glorious Fountain!
Let my heart be
Fresh, changeful, constant,
Upward, like thee.

James Russell Lowell.

THE SHORTIA.

GALAX-LEAVED SHORTIA.

SHORTIA GLACIFOLIA Gray.

SPAKE full well, in language quaint and olden
One who dwelleth by the castled Rhine,
When he called the flowers, so blue and golden,
Stars, that in earth's firmament do shine.

Stars they are, wherein we read our history
As astrologers and seers of eld;
Yet not wrapped about with awful mystery,
Like the burning stars, which they beheld.

Wondrous truth, and manifold as wondrous,
God hath written in those stars above ;
But not less in the bright flowerets under us
Stands the revelation of his love.

Bright and glorious is that revelation,
Written all over this great world of ours:
Making evident our own creation,
In those stars of earth, these golden flowers.

Longfellow.

THERE is an interesting, almost romantic, story connected with the discovery and rediscovery of this beautiful plant. About a hundred years ago the French government sent a noted botanist of the time, Mons. André Michaux, to this country to collect useful

THE GALAX-LEAVED SHORTIA.

trees and shrubs for naturalization in France. He remained in this country from 1785 to 1797, making the most of his excellent opportunities for collecting and studying our flora. He established and conducted in the interest of his mission two extensive nurseries for arboriculture, one near New York and another near Charleston, South Carolina. Just before his death in 1802, was published one of the works for which he is principally known, a "Treatise on the Oaks of North America." Paris, 1801.

The year following his death Mons. L. Richard, a celebrated French botanist, prepared a *Flora Boreali Americana*, from Michaux's extensive collections in this country. In this work is mentioned, though not described, the plant now under notice. It was collected somewhere in the mountains of North Carolina, and was out of flower, the corolla and stamens having fallen.

"Early in the year 1839," writes Dr. Gray, "I found and examined this specimen in Michaux's herbarium, and received from the hand of Mons. Decaisne a drawing and some fragments of it. In a paper treating of the botany of these mountains published in January, 1842, I ventured to found a genus upon this plant, under the above name, trusting that diligent search prosecuted by myself and by all botanists visiting the region would duly bring it to light. The protracted failure of these endeavors has thrown an air of doubt over the minds of my associates in the search, as to the actual existence of any such plant. In 1868 I had the pleasure of announcing the discovery of this genus, not indeed where we were looking for it, but where experience had led me to expect that any or every peculiarly Atlantic States type might recur, namely in Japan."

But the Japanese plant also was found without corolla or sta-

THE GALAX-LEAVED SHORTIA.

mens, and its exact floral form could only be conjectured from that of some near relatives and from some rude Japanese pictures of it. Yet from the confidence which Dr. Gray and other eminent botanists felt with regard to its probable form and family relationship, we are reminded of that proverbial reconstruction of a whole animal from the fragments of a tooth which is accredited to Cuvier, and the building up of the form of a fish from a single scale, attributed to the skill of Agassiz.

Another ten years went by with no further light shed upon the vexed question. But at last some additional facts transpired, and in December, 1878, Dr. Gray could write, "Happily I can give the character of the plant from an actual blossom. For I have now received, at first indirectly from Mr. J. W. Congdon, and at length directly from Mr. M. E. Hyams of Statesville, North Carolina, a flowering specimen of the long sought *Shortia glaucifolia*, collected on a hill-side in McDowell county, North Carolina, in the district I had indicated as the most probable locality, namely, east of the Black Mountains. It was collected in May, 1877, but as its remarkable interest was unknown it has only now been communicated to me." It had been rediscovered after almost a century, and after nearly forty years' search.

In 1879 the locality was visited by Dr. Gray and other botanists, one of whom thus speaks of the excursion: "Being now in McDowell county, the *Shortia* locality was visited under the guidance of Mr. George M. Hyams, the actual discoverer. In the secluded and well protected station, well overshadowed by Rhododendrons and Magnolias, was seen the little colony of the plant so long sought and by many so long doubted. The space over which the plant extended was perhaps ten feet by thirty, and

THE GALAX-LEAVED SHORTIA.

in all there may have been from fifty to one hundred plants. As the plant multiplies by stolons it is remarkable that its area should be thus restricted. And since in the struggle for life, of two allied plants the weakest must go, Dr. Gray has suggested the probability that its stronger cousin the *Galax* had crowded out the *Shortia*. And here, indeed, in what may be the last foothold of the rarity, *Galax* appeared to be actually doing so. Yet the plants, though comparatively few, were vigorous and healthy. In June, the fruit of this vernal plant had mainly gone by, but Dr. Gray secured a capsule or two with some seeds."

This rare and charming plant was named for Prof. Short, a noted Kentucky botanist who died in 1863. I did not see how I could do this floral rarity a greater honor than to frame its interesting story with the shining lines of our lamented poet, which now for near half a century have gone up and down the earth like a deathless strain of sweet music, awakening fine echoes in every heart that loves the flowers.

Everywhere about us are they glowing,
Some like stars to tell us spring is born ;
Others, their blue eyes with tears o'erflowing,
Stand like Ruth amid the golden corn ;

Not alone in meadows and green alleys,
On the mountain top, and by the brink
Of sequestered pools in woodland valleys,
Where the slaves of nature stoop to drink ;

In all places, then, and in all seasons,
Flowers expand their light and soul-like wings,
Teaching us, by most persuasive reasons,
How akin they are to human things.

THE GALAX-LEAVED SHORTIA.

And with childlike, credulous affection
We behold their tender buds expand ;
Emblems of our own great resurrection,
Emblems of the bright and better land.

Longfellow.

THE ARROW-HEAD.

THE ARROW-HEAD.

SAGITTARIA VARIABILIS Engelm.

HOMEWARD now went Hiawatha;
Only once his pace he slackened,
Only once he paused or halted,
Paused to purchase heads of arrows
Of the ancient Arrow-maker,
In the land of the Dacotahs,
Where the Falls of Minnehaha
Flash and gleam among the oak-trees,
Laugh and leap into the valley.

There the ancient Arrow-maker
Made his arrow-heads of sandstone,
Arrow-heads of chalcedony,
Arrow-heads of flint and jasper,
Smoothed and sharpened at the edges,
Hard and polished, keen and costly.

With him dwelt his dark-eyed daughter,
Wayward as the Minnehaha,
Feet as rapid as the river,
Tresses flowing like the water,
And as musical a laughter;
And he named her from the river,
From the waterfall he named her
Minnehaha — Laughing Water.

THE ARROW-HEAD.

Was it then for heads of arrows,
Arrow-heads of chalcedony
Arrow-heads of flint and jasper,
That my Hiawatha halted
In the land of the Dacotahs?

Longfellow.

WHAT Hiawatha certainly was not looking after “in the land of the Dacotahs,” arrow-heads, we shall most certainly see, in this excellent portrait of the *Sagittaria*. If we may judge by both the scientific and popular name of the plant, that is what the observer has most distinctly seen when he has met it in nature. The elegant outline and curious veining of the leaf will attract our attention and admiration more than the pure white flower. The pronounced significance of the leaf, both in the picture and in the plant, leads me on to say something about the leaves of plants.

I suppose many readers are accustomed to think that the leaves of plants are of small account. They perhaps recall how in ancient times a certain fig-tree came under severe reproach because it bore “nothing but leaves.” Then, too, “when the summer is past and the harvest is ended,” how the dead leaves cumber the ground, are trodden underfoot of men, and become the sport of wild autumn winds! their greenness is faded, their beauty is gone, and none so poor as to do them reverence. Thus are we in greater things quite too prone to forget past benefits when the benefactor can no longer add new gifts to his old ones.

As much as we make the fallen and faded leaves the emblem of our frailty and nothingness, there are few, I imagine, who do not look with longing for the bare trees to put on their fresh new foliage in the spring-time. And it must be a dull soul indeed

THE ARROW-HEAD.

which can behold unmoved the gorgeous-colored drapery which Autumn throws so lavishly over our American forests.

To the life of the plant the leaves are of the first importance, quite as necessary as its roots. The roots suck up great quantities of water from the soil which holds in solution various chemical elements necessary for the life and upbuilding of the plant. Most of these must be brought in contact with the air and other chemical agents, before they can be assimilated into the woody and other tissues of the plant. The leaves are the principal organs for accomplishing this. They serve indeed in the double function of organs of respiration and digestion.

They are made up of layers of minute cells containing a green substance called chlorophyl, together with bundles of woody tissue which constitute the frame-work or skeleton. Upon the underside of most leaves the microscope reveals thousands of little pores or mouths opening through the cuticle into the interior of the leaf. These openings are for breathing. The air goes freely in through these, and circulates among the interstices of the cells. The carbonic acid of the air is decomposed by contact with the green contents of the cells, the carbon being kept and wrought up into vegetable fibre and the oxygen partly breathed out again, and partly used up in making other chemical compounds with the fluids that have come up from the roots. These fluids then flow back into the body of the plant and enter into various vegetable substances and tissues. So we see that the leaf serves the plant in the double capacity of lungs and stomach.

The different forms of leaves are almost endless, varying from the simple needle of the pine to the elaborate compound leaf of the horse-chestnut, locust, or fern. Almost every conceivable shape

THE ARROW-HEAD.

that can be bounded with curves and angles is seen in the foliage of plants. I often wonder why people who show such industry and perseverance in collecting and preserving business-cards, postage-stamps, and other artificial productions do not make collections of the leaves of plants. I am sure they would furnish a more pleasing variety and a vastly greater originality of design than do the favorite objects. What an excellent opportunity, too, would such a collection furnish for the study of similar but unlike forms, and of the variations, little and great, regular and irregular, which nature is so fond of playing upon her primary themes.

Then, too, the venation of the leaves would open a wide field for study and comparison. Indeed, in this we have a fundamental characteristic of the vegetable kingdom. All plants with what is called "parallel-veined" leaves, such as the present one, the lilies, the grasses, Indian corn, etc., are monocotyledonous, that is, they spring up from the seed with one primary leaf. But all leaves with netted veins like those of the maple, or oak, or bean, or pumpkin, belong to dicotyledonous plants, or plants with two primary or seed leaves. These are the two great divisions of the plant kingdom. This would be of no great moment if the one leaf or the two leaves of its initial life were all. But it is not. These are only the outward signs of great and important differences in the methods of growth, structure, habits, and life-history of the plants. The venation determines the form and size of the leaf. It is what the bones are to the animal, its skeleton.

Naturalists undertake to account for many simple things in nature on the grounds of utility. They tell us that the tawny skin of the lion, the spots of the leopard, and the stripes of the tiger

THE ARROW-HEAD.

help to conceal them from their prey in the various situations where they live and hunt, and so in "the survival of the fittest" these advantages have been developed. I sometimes wonder if it ever occurred to any of them to inquire what, on this or any other grounds, is the reason for the infinite variety in the form, size, appearance and structure of the leaves of plants. Has it come about from some early advantage which attended a given form in a given situation. Or has it been developed as the necessary result of some corresponding peculiarity in the structure of the plant? Or is it a caprice, or blind force? Or shall we say that the Mind in nature is artistic and demands beauty as well as use? The aspen leaf trembles with the greatest agitation when touched with the gentlest zephyr's breath. But there is a physical, not a sentimental or aesthetic, cause for that. The leaf-stalk is flattened thin in a direction perpendicular to the plane of the leaf, so that the slightest movement of the air will set it into these unsteady oscillations. Do all the facts of nature have thus only a physical cause back of them? They probably have that. But that there is nothing beyond the physical reason I am not prepared to believe.

The better demonstration of the presence of Mind in nature which is found in a study of the position of the leaves upon the plants must be deferred to another occasion.

The *Sagittaria* grows with its feet in the "still waters" by the edges of pools and sluggish streams, a near friend and neighbor of the water-lily. It blooms all summer, and is very common. Somehow this interesting plant is associated in my memory with such summer scenes and such a sunny atmosphere as the poet has painted in these exquisite lines.

THE ARROW-HEAD.

I hear the wind among the trees
Playing celestial symphonies;
I see the branches downward bent,
Like keys of some great instrument.

And over me unrolls on high
The splendid scenery of the sky,
Where through a sapphire sea the sun
Sails like a golden galleon,

Towards yonder cloudland in the West,
Towards yonder Islands of the Blest,
Whose steep sierra far uplifts
Its craggy summits white with drifts.

Longfellow.

HAY-SCENTED FERN.



DICKSONIA PILOSIUSCULA, WILLDENOW.

Hay-scented Fern; Hairy Dicksonia.

DICKSONIA PILOSIUSCULA: Root-stock very slender, creeping, much elongated; stalks scattered, erect, sometimes a foot long, greenish in the living plant, fading to brownish-straw-color, slightly puberulent; fronds one to three feet long, ovate-lanceolate in outline, long-pointed, delicately herbaceous, hairy and minutely glandular, pinnate or almost bipinnate; pinnæ numerous, lanceolate, pointed, the second pair a little longer than the first; pinnules adnate to the secondary midrib, and usually decurrent on it, rhomboid-ovate, pinnatifid into oblong and obtuse cut-toothed lobes; sori minute, in cup-like involucre which are seated on minute recurved teeth, usually one at the upper margin of each lobe of the pinnules.

Dicksonia pilosiuscula, WILLDENOW, "Enum. Pl. Hort. Berol., p. 1076; Sp. Fil., v, 484.—PURSH, Fl. Am. Sept., ii, p. 671.—HOOKER, Fl. Bor.-Am., ii, p. 264.—TORREY, Fl. New York, ii, p. 502.—BIGELOW, Fl. Boston., ed. iii, p. 424.—WOOD, Botanist and Florist, p. 376.

Polypodium pilosiusculum, MUHLENBERG "in litt."

Sitobolium (or *Sitobolium*) *pilosiusculum*, DESVAUX, "Prodr., p. 262."

Adectum pilosiusculum, LINK, Fil. Hort. Berol., p. 42.

HAY-SCENTED FERN.

- Dicksonia pubescens*, SWARTZ, in Schkuhr, Krypt. Gew., p. 125, t. 131.—
PRESL, Tent. Pterid., p. 136.
- Dicksonia punctiloba*, HOOKER, Sp. Fil., i, p. 79.—HOOKER & BAKER,
Syn. Fil., p. 55.—FÉE, Gen. Fil., p. 355.
- Aspidium punctilobum*, WILLDENOW, Sp. Pl., v, p. 279.—PURSH, Fl. Am.
Sept., ii, p. 664.
- Sitobium punctilobum*, J. SMITH.
- Dicksonia punctilobula*, GRAY, Manual, ed. i, p. 629, etc.—KUNZE, in
Sill. Journ., July, 1848, p. 87; in Linnæa, xxiii, p. 249.—
DARLINGTON, Fl. Cestr., ed. iii, p. 394.—METTENIUS, Fil. Hort.
Lips., p. 105.—EATON, in Chapman's Flora, p. 597.—WILLIAM-
SON, Ferns of Kentucky, p. 119, t. xlvi.
- Nephrodium punctilobulum*, MICHAUX, Fl. Bor.-Am., ii, p. 268.
- Aspidium punctilobulum*, SWARTZ, Syn. Fil., p. 60.
- Dennstædtia punctilobula*, MOORE, Index Fil., p. xcvi, 307.—LAWSON,
in Canad. Nat., i, p. 287.

HAB.—Moist woods, and often in low grassy places; a common fern in New Brunswick, Canada, New England and the Middle States extending westward to Indiana, and possibly farther, and southward as far as Central Alabama, where it was found on the cliffs of the Cohaba River by Professor EUGENE A. SMITH. It is not mentioned in the catalogues of plants of Wisconsin, nor does Professor HARVEY report it as found in Arkansas. It is probably confined to Eastern North America, although KUNZE claimed to have specimens from the West Indies.

DESCRIPTION:—The root-stock creeps extensively an inch or two below the surface of the ground. It is about a line and a half or two lines thick, perfectly round, and nearly naked, bearing instead of chaff a very scanty covering of

HAY-SCENTED FERN.

slender jointed hairs at its growing extremity. It is irregularly branched, often forked, and emits long and slender rootlets along its whole extent. The section shows a broad exterior ring of light brown parenchyma; inside of this is a broad circle of minute white starch-cells, then the scalariform vessels in a narrow ring, bordered by other minute cells, which are most probably bast-cells; inside of this is another broad circle of the starch-cells, and in the very centre is a roundish mass of brown sclerenchyma. The whole section has such a regular concentric system that it is not only very pretty to look at, but would be very well suited for anatomical study in the class-room.

The stalks are seldom more than two or three to a root-stock, and rise from it several inches back of its apex. In advance of them may be seen the rudiments of next year's stalks. The stalks are roundish on the back and furrowed on the front. They are not articulated to the root-stock, but are continuous with it. Very often the stalk is found to have a short branch just above its base. This branch has the structure of the root-stock, and undoubtedly may grow into a full-sized rhizoma. The section of the stalk shows a thin outer sclerenchymatous sheath, and, within the colored parenchyma, a broad and thin vascular band, its edges turned up almost at right angles with the middle part. The stalk has its peculiar structure below this budding root-stock, and the latter is clearly homologous with similar growths in some *Aspidia*, and with the proliferous buds seen in many ferns.

HAY-SCENTED FERN.

The fronds are singularly feathery and graceful in their appearance. They are rarely less than a foot long, and may attain a length of over three feet. They are green, delicately herbaceous, withering very quickly when plucked, but often bleaching very prettily in the autumn. The upper surface is nearly smooth, but the under-surface is minutely glandular-puberulent, and sometimes finely hairy. In drying they give out a rather pleasant hay-like odor, though by no means so fragrant as two or three of the wood-ferns. They are ovate-lanceolate in outline, tapering very gradually from just above the rather broad base to a long and slender apex.

The pinnæ repeat in miniature the outline of the frond. In all but the lower pinnæ of the very largest fronds the secondary rachises are narrowly wing-margined by the decurrent bases of the adnate segments or pinnules. These segments are oblong-ovate, mostly obtuse, pinnatifid often rather more than half way to the midvein into oblong toothed lobes. The largest pinnæ are from three to six inches long; the pinnules from half an inch to an inch long; the lobes from one to three lines long, and the teeth about the fourth part of a line. The veins and veinlets are all free; the latter so branched that a veinlet runs to every one of the minute lobules or teeth.

A fertile frond, as is very common in ferns, is fertile only in its upper half, the lower pinnæ being usually sterile. The fruit-dots are very minute, and are placed on the lowest tooth on the upper side of the lobes of the segments. Com-

HAY-SCENTED FERN.

monly there is but one fruit-dot to a lobe, but sometimes there are two on the upper side, and rarely a third on the lower. The involucre is like a little cup, and is formed partly from the reflexed tip of the fertile tooth or lobule, and partly of a special true involucre, which meets the other part and is united with it. Inside the cup are found about a dozen sporangia, which have from twenty to twenty-four articulations in the ring. The spores are trigonous with somewhat impressed sides, and three faint vittæ along the angles.

There has been a great deal of confusion respecting the names of this fern, both generic and specific. The genus *Dicksonia* was proposed by L'Heritier in 1788 for two species, *D. Culcita* of the Azores and Madeira, and *D. arborescens* of St. Helena. In these the involucre is very distinctly two-valved, the outer valve formed from the apex of a lobe. About a dozen other species are now known, which are plainly congeners of these two. In 1801, Bernhardt proposed a genus *Dennstædtia* for the *Trichomanes flaccidum* of Forster, a fern much more like our own, and, like it, having a cup-like, and not two-valved, involucre. But the proposed genus was promptly rejected by Swartz, Schkuhr and Willdenow, and the plant referred to *Dicksonia*, which by 1810 was made the recipient of as many as twenty species. Since then *Sitobolium* (or *Sitolobium*), *Patania* and *Adectum* have been proposed for some of these species with cup-like involucre. Some of these names have met with a limited acceptance, but all were rejected by Hooker. The authors of Species

HAY-SCENTED FERN.

Filicum have also added the species of *Cibotium* to *Dicksonia*, but these have the outer half of the involucre separate from the lobule; and this character, with their peculiar habit, is, perhaps, enough to justify their being kept distinct. The oldest name for our plant is *Nephrodium punctilobulum*, of Michaux, published in 1803. In 1806, Swartz called it *Aspidium punctilobulum*. In 1809, Willdenow named it *Dicksonia pilosiuscula*, and in the same year, as nearly as I can discover, Schkuhr figured and described it as *D. pubescens*, although attributing the name to Swartz. It was not till about 1843 that Hooker published the name of *D. punctiloba*, taking the orthography from Willdenow's *Aspidium punctilobum*. In the Spring of 1848, Gray's Manual first gave the name *D. punctilobula*, and Kunze followed in July of the same year with the same name. But if a species is to have the name under which it was first referred to its proper genus, then either Willdenow's or Swartz's name is to be chosen.

The specimen figured was collected on the Peaks of Otter, in Virginia, by Mr. A. H. Curtiss.

BLUE-STEMMED GOLDEN-ROD.

BLUE-STEMMED GOLDEN-ROD.

SOLIDAGO CÆSIA L.

WHEN the wayside tangles blaze,
In the low September sun,
When the flowers of summer days
Droop and wither, one by one,
Reaching up through bush and briar,
Sumptuous brow and heart of fire,
Flaunting high its wind-rocked plume,
Brave with wealth of native bloom,—
Golden-Rod!

In the pasture's rude embrace,
All o'errun with tangled vines,
Where the thistle claims its place,
And the straggling hedge confines,
Bearing still its sweet impress
Of unfettered loveliness,
In the field and by the wall,
Binding, crowning, clasping all,—
Golden-Rod!

Elaine Goodale.

“THE eighty or more species of the genus *Solidago*,” says Prof. Goodale, “are nearly all North American. Like their near of kin, the Asters, the Golden-Rod presents so many intermediate and puzzling forms that the species are difficult to identify. The

THE BLUE-STEMMED GOLDEN-ROD.

points upon which chief reliance is placed for their discrimination, are, for the most part, minute; such as the character of the scales of the involucre, the shape and veining of the leaves, and the relative length of the outer or ray flowers."

This species is common, growing in rich moist thickets and woodlands, flowers from August to October, and is certainly one of the prettiest of the genus. It is easily distinguished from the two other common species, *S. bicolor* and *S. latifolia*, which like this, bear their flowers in the axils of the leaves, by the stem, which is round and smooth, while the stem of the first-named is covered with grayish hairs, and that of the other is distinctly angled.

Though there are upwards of fifty species of Golden-Rod in this country alone, only one may be found native in all Europe, the *S. Virga-aurea*, or the Golden-Rod Solidago of the old herbalists, a native also of our northern regions. All reference to the Golden-Rod in English literature must be applied to that species. This common name of the familiar home plant, which in the old times was found in every cottage door-yard,—

“And golden-rods and tansy running high,
That o'er the pale-tops smiled on passers-by;
Flowers in my time which every one would praise,
Though thrown like weeds from gardens nowadays,”—

would naturally be brought by the English emigrants and applied to the old favorites whose pleasant greetings in the forests of the New World would remind them of the old home across the seas.

I learn from Prof. Meehan that the name of the genus *Solidago* is usually referred to Linnæus, though he credits it to

THE BLUE-STEMMED GOLDEN-ROD.

Vaillant, one of the great botanists of the generation which immediately preceded his. It is said to have been derived from *solidus*, a Latin word meaning to make whole or solid, and originally given to the *Virga-aurea*, for its medicinal reputation. Salmon, an herbalist of the beginning of the seventeenth century, says; "It is one of the most noble wound-herbs; cures wounds and ulcers." It appears, also, to have been famous as a dye. Another old herbalist, Culpeper, says: "Venus rules this herb. It is a balsamic, vulnerary herb, long famous against inward hurts and bruises. No preparation is better than a tea of this herb for this service, and the young leaves, green or dry, have the most virtue." Though Linnæus admits it into his "Materia Medica," and though it was named from its medicinal virtue, yet it is now wholly discarded from medicinal use. The name of our species, *cæsia*, means bluish gray, and refers to the color of the stalk.

The Golden-Rod is a principal element in every picture of an American autumn. It is a chief floral ornament in our truly splendid autumnal landscapes. It matches well with the gorgeous hues which clothe our forests in that season of the year. It is among the last of Nature's bright things to fade out into the sad universal gray of the dead season.

"But on the hills the golden-rod and the aster in the wood,
And the yellow sunflower by the brook in autumn beauty stood,
Till fell the frost from the clear cold heaven, as falls the plague on men,
And the brightness of their smile was gone from upland, glade, and glen."

With flowers as with men, "the time to die" comes at last to all. But the Golden-Rod and the Aster are the crown and

THE BLUE-STEMMED GOLDEN-ROD.

the glory of the season's old age. They wait upon his slow, lingering footsteps in the lengthening shadows, and most gloriously strew his pathway with the brightest floral gems of earth. The poet makes old Autumn sad that he must part with so much that is beautiful.

“There comes, from yonder height,
A soft repining sound,
Where forest-leaves are bright,
And fall like flakes of light,
To the ground.

It is the Autumn breeze,
That, lightly floating on,
Just skims the reedy leas,
Just stirs the glowing trees,
And is gone.

He moans by sedgy brook,
And visits with a sigh,
The last pale flowers that look,
From out their sunny nook
At the sky.”

But it seems to me he ought rather to be glad that the flowers so fill the earth and stay so long, that they bravely face cold, and winds, and sleet, that they may stay to cheer the world with their presence, and that they blossom even by his new made grave, till the wintry winding-sheet of snow covers all. Do not these beautiful creatures of the sun teach us to look on the sunny side of things, on the sunny side even of autumn and of Death? But there are a thousand pleasant scenes of autumn time with which the Golden-Rod is most closely asso-

THE BLUE-STEMMED GOLDEN-ROD.

ciated. The full maturing of Nature's yearly cycle of life, the shortening days, the yellow light, the blue haze in all the air, as though the sky had fallen down close upon the ground, the shorn meadows, the golden harvests of grain, the ripened fruit loading the bending trees, or heaped in dazzling pyramids of color upon the green turf beneath, the leaves of the forest falling one by one silently through the still sunny air till they cover the earth as with sunset clouds,—how are such scenes as these conjured up by the waving of this golden-tipped wand!

The Golden-Rod comes at the end of Nature's floral season. So should it fitly come at the end of our floral book, and I know of none who has more lovingly sung its praises than the author whose lines shall make my good-by to my readers and the Golden-Rod together.

This flower is fuller of the sun
Than any our pale North can show;
It has the heart of August won,
And scatters wide the warmth and glow
Kindled at summer's mid-noon blaze,
Where gentians of September bloom
Along October's leaf-strewn ways,
And through November's paths of gloom.

Herald of Autumn's reign, it sets
Gay bonfires blazing round the fields:
Rich Autumn pays in gold his debts
For tenancy that summer yields.
Beauty's slow harvest now comes in;
New promise with fulfilment won:
The heart's vast hope does but begin,
Filled with ripe seeds of sweetness gone.

THE BLUE-STEMMED GOLDEN-ROD.

Because its myriad glimmering plumes
Like a great army's stir and wave;
Because its gold in billows blooms,
The poor man's barren walks to lave;
Because its sun-shaped blossoms show
How souls receive the light of God,
And unto earth give back that glow—
I thank Him for the Golden-Rod.

Lucy Larcom.

THE FRINGED GENTIAN.

THE PRESSED GENTIAN AT CHRISTMAS.

The time of gifts has come again ;
And on my northern window-pane,
Outlined against the day's brief light,
A Christmas token hangs in sight.
The wayside travellers, as they pass,
Mark the gray disk of clouded glass ;
And the dull blackness seems, perchance,
Folly to their wise ignorance.

They cannot from their outlook see
The perfect grace it has to me ;
For there the flower, whose fringes through
The frosty breath of autumn blew,
Turns from without its face of bloom
To the warm tropic of my room,
As fair as when beside its brook
The hue of bending skies it took.

So, from the trodden ways of earth,
Seem some sweet souls who veil their worth,
And offer to the careless glance
The clouding gray of circumstance :
They blossom best where heart-fires burn,
To loving eyes alone they turn
The flowers of inward grace, that hide
Their beauty from the world outside.

But deeper meanings came to me,
My half immortal flower, from thee !
Man judges from a partial view,
None ever yet his brother knew ;
The Eternal Eye that sees the whole,
May better read the darkened soul,
And find, to outward sense denied,
The flower upon its inmost side.

Whittier.

THE FRINGED GENTIAN.

GENTIANA CRINITA, Frœl.

To him who in the love of Nature holds
Communion with her visible forms, she speaks
A various language; for his gayer hours
She has a voice of gladness, and a smile
And eloquence of beauty, and she glides
Into his darker musings with a mild
And healing sympathy, that steals away
Their sharpness ere he is aware.

[*Bryant.*

IN the great Book of Nature, God has uttered his wondrous and majestic thoughts. The poet and the naturalist, each in his own way, translates them to us out of the "original tongues." The poet, with the vision of a seer and the sympathy of a worshipper, enters the silent heart of Nature, and feeling the pulses of thought and emotion beating there, interprets them to the hearts of other men. He is no true poet who does not find in the facts and physical forms of Nature, in sea or sky, in bird, or tree, or flower, some spirit which is akin to that which glows and throbs in human hearts. "Out of the dust of the earth" the same Hand made us all. "Nature

THE FRINGED GENTIAN.

is loved by what is best in us," says Emerson, and loved, I think, because there is something of the best of Nature in man, and something of the best of man in Nature.

The rounded world is fair to see,
Nine times folded in mystery:
Though baffled seer cannot impart
The secret of its laboring heart,
Throb thine with Nature's throbbing breast,
And all is clear from east to west.
Spirit that lurks each form within
Beckons to spirit of its kin.

[*Emerson.*]

The naturalist interprets to us the exact definable truth of Nature, as that truth is embodied in the physical facts, laws, and relations of things. From him we learn of the causes, methods, reasons, and adjustments of Nature. Sometimes he teaches us what is the physical basis of that beauty of form and color which, in the sunset sky or June landscape, in fern or flower, ravishes the soul with delight. Not seldom he is able to resolve the reason that runs unheard beneath the song of the poet, when he strikes Nature's most melodious key.

"All are but parts of one stupendous whole,
Whose body nature is, and God the soul."

Having then something of that soul in each of us, it is no wonder we should feel a subtile sympathy with the other parts of this great body which Nature is. So when the poet has woven a web of thought and feeling about any of the beautiful forms of Nature, and imparted to them a human interest and sensibility out of his own soul, he has been illustrating the truest philosophy.

THE FRINGED GENTIAN.

“For the Poet, faithful and far-seeing,
Sees, alike in stars and flowers, a part
Of the self-same, universal being,
Which is throbbing in his brain and heart.”

Some day we shall see how closely all this is correlated with the naturalist's most brilliant generalization, the doctrine of Evolution. Then we shall have a scientific reason why “one touch of nature makes all the world akin.” For man, last and completest in Creation's mighty series, repeats in himself the whole world's history, from primeval chaos to the perfected Beauty and Order, which the Greeks called Kosmos. He is the world. Into the tissue of his nature are woven fibres from every living thing. Fine, invisible threads reach downward and tie him to every humblest and grandest form in Nature's great expanse,—to rock and river, to sea and mountain, to the trees of the forest, to the birds flying through the azure air, to the flowers of the field, to the crimson plant whose delicate frond, fine and fragile as a spider's web, is held and nourished all gently in the wavy waters of the sounding sea.

So we will take with us both the poet and the naturalist in our holiday rambles among the beautiful flowers of our forests, meads, and prairies. The naturalist shall guide our feet to their favorite haunts, in green fields, upon the woody hill-sides, or by babbling brooks; and he shall tell us what we care to know of their habits, and forms, and curious histories. But the poet shall have our ear not less, and he shall tell us of the finer and higher meanings of these

“Flowers, so blue and golden,
Stars, that in Earth's firmament do shine.”

He shall rehearse to us the enchanting legends which ancient fancy has wrapped about these fair forms, or tell us of the loves

THE FRINGED GENTIAN.

which children, or tender maidens, or hooded monks, or mailed knights, have had for these —

“Emblems of the bright and better land.”

Our first plate represents, with an unequalled fidelity to both nature and art, one of our most choice and beautiful autumn flowers. Upon the stalks of smooth herbs, from one to two feet high, with leaves set regularly opposite each other, the flowers lift up their sky-blue cups, bordered with four expanding, fringed lobes. In the buds the petals are folded and twisted about each other, as is partly shown in the half-opened flowers at the top of the plate. They may be looked for during September and October, in low places along meadow-brooks and by the edges of swamps. They are rather common from New England to Wisconsin and Kentucky, but rare northward or southward of that region. This genus is a member of a large family of related plants, mostly bearing brilliant and beautiful flowers. Its name is said to have been derived from that of a king of Illyria, Gentius, who lived one hundred and eighty years B. C., and who, Pliny says, greatly prized, for its medicinal virtues, one species of it, which grows in Alpine regions all over Europe.

So beautiful a flower would not escape the appreciative eye of any true lover of Nature. Our American poets have made it the fitting theme of some of their most charming lines. Whittier uses it, as his wont is, to teach a deep lesson of modest worth and gentle charity; Bryant, to paint a picture of autumnal nature, and to find in it inspiration of upward-looking hope for life's autumn days.

THE FRINGED GENTIAN.

THE FRINGED GENTIAN.

Thou blossom bright with autumn dew,
And colored with the heaven's own blue,
Thou openest when the quiet light
Succeeds the keen and frosty night.

Thou comest not when violets lean
O'er wandering brooks and springs unseen,
Or columbines, in purple dressed,
Nod o'er the ground-bird's hidden nest.

Thou waitest late and com'st alone,
When woods are bare and birds are flown,
And frosts and shortening days portend
The aged year is near his end.

Then doth thy sweet and quiet eye
Look through its fringes to the sky,
Blue — blue — as if that sky let fall
A flower from its cerulean wall.

I would that thus, when I shall see
The hour of death draw near to me,
Hope, blossoming within my heart,
May look to heaven as I depart.

Bryant.

THE MOUNTAIN FRINGE.

THE MOUNTAIN FRINGE.

ADLUMIA CIRRHOSA, Raf.

For I have learned
To look on Nature, not as in the hour
Of thoughtless youth; but hearing oftentimes
The still, sad music of humanity,
Nor harsh, nor grating, though of ample power
To chasten and subdue. And I have felt
A presence that disturbs me with the joy
Of elevated thoughts; a sense sublime
Of something far more deeply interfused,
Whose dwelling is the light of setting suns,
And the round ocean and the living air,
And the blue sky, and in the mind of man.

Therefore am I still
A lover of the meadows and the woods,
And mountains; and of all that we behold
From this green earth; of all the mighty world
Of eye, and ear, — both what they half create,
And what perceive; well pleased to recognize
In Nature and the language of the sense,
The anchor of my purest thoughts; the nurse,
The guide, the guardian of my heart, and soul
Of all my moral being. — *Wordsworth.*

THE MOUNTAIN FRINGE.

It would not be strange if sometime we should learn to know that the evolutionist had actually laid bare the fine, mysterious chain, which, as the poet found out long ago, binds all beings in a common kinship and a universal sympathy. There is no fact of nature more obvious even to the casual observer than the great variety of forms existing side by side in the vegetable world. It would task the most vivid and active imagination to conceive of a form of plant-life of which the naturalist does not already know something which would more than parallel it in novelty or strange eccentricity of habit. And there is a place for everything, and a chance for all,—for the feathery fern in the deep shade of the woods, and for the gray lichen upon the bare rock, or the smooth bole of the beech, not less than for the lily and the rose. Even the ugly and uninteresting fungus, great and small, has its place and its opportunity, living though it does, like a human sycophant and parasite, upon the bounty of others. It is certainly a misnomer to call that sort of people sponges, for sponges in nature are an honest folk, and live industrious and useful lives. But the fungus eats what others have earned, and subsists by making the world poorer.

I think it something more than a mere fancy which discovers analogies between the forms and habits of plant-life and the qualities of human nature, or the experiences of human life. The unity of the world might easily furnish grounds for an inner and deeper correspondence. We can easily suppose that there is one spirit in all and through all; that there is one type of architecture, so to say, for the visible and the invisible worlds.

How many meanings might we gather from the whisperings of the winds through the leaves of the trees! How significant

THE MOUNTAIN FRINGE.

the voices of the woods! What grander creation is there among Nature's living things than the great forest-trees?

Father, thy hand
Hath reared these venerable columns, thou
Didst weave this verdant roof.
Grandeur, strength, and grace,
Are here to speak of thee.
This mighty oak — not a prince
In all that proud land beyond the deep,
E'er wore his crown as loftily as he
Wears the green coronal of leaves with which
Thy hand has graced him. — *Bryant.*

How they typify the procession of human life in their grand march, generation after generation, down the countless centuries, far antedating man's most venerable historic memory!

With men, as with trees, —

Lo! all grow old and die, — but see again
How on the faltering footsteps of decay
Youth presses — ever gay and beautiful Youth,
In all its beautiful forms. These lofty trees
Wave not less proudly that their ancestors
Moulder beneath them.

Life mocks the idle hate
Of his arch enemy Death — yea, seats himself
Upon the tyrant's throne — the sepulchre,
And of the triumphs of his ghastly foe
Makes his own nourishment. — *Bryant.*

The great trees! what an emblem are they of strength and stability in the compact, slowly nurtured, manly character, rooted in eternal righteousness, and growing upward and expanding outward, evermore toward light and heaven.

THE MOUNTAIN FRINGE.

“With his gnarled old arms, and his iron form,
Majestic in the wood,
From age to age, in sun and storm,
The live-oak long hath stood.

And the generations come and go,
And still he stands upright,
And he sternly looks on the wood below,
As conscious of his might.”

So stands a strong life and a noble character. And it stands there immortal. “Over such, Death hath no power.” “Being dead,” in respect to this mortal form, “they yet speak.” And such lives and such souls are shade and shelter to the multitude of smaller lives that grow like flowers, or blades of grass, around and beneath. For there are little and great, in the world of men, as in the forest of trees.

But I take note that the greatest men, unlike what the poet has imagined of the “gnarled live-oak,” do not “look sternly on the woods below.” They look kindly down and around. The greatest souls have most of pity, and kindness, and sweet charity, for those who are smaller than they. Mercy is “mightiest in the mighty,” all the way up, from the greatest human souls to the great Over-Soul, who is —

“Immortal Love forever full,
Forever flowing free,
Forever shared, forever whole,
A never-ebbing sea!”

Hate may go up, but Love comes down forever. That is Heaven’s answer to Earth’s cry. The wild discord of human

THE MOUNTAIN FRINGE.

cursings, and mockings, and cruel blows, is echoed from the blue arch in tones of pitying tenderness. "Father, forgive them, for they know not what they do."

Nor can I doubt that there is a teaching of wisdom from the Mountain Fringe,—a delicate twining vine. It is one of a large class of plants, which, while they have a root of their own, and draw their life from the common stock of food and force stored up in earth and air, have not the ability to stand up and face the winds and pelting storms alone. These weak ones must twine themselves about, or lean upon, the strong.

From time immemorial it has been thought the proper and gallant thing in poetry, and in after-dinner speeches, to refer to the fair sex as a vine which twines about the oak, getting support and lending beauty at the same time. But I learn that some of the fair creatures are, in these modern times, quite disposed to repudiate this suggestive simile and all that it implies. They declare their willingness to come down to the platform of "natural selection" in the struggle of life, and abide the verdict, along with the sterner sex, of the inexorable law of "the survival of the fittest." Far be it from me to affirm that even then the angelic partners of our earthly course would not carry off the prizes; for are not they the "fittest" of all sublunary things to achieve, or merit, the best sweets and glories which this poor world of ours can afford?

Still, I am inclined to believe that the discarded simile is not altogether without its worth. I think, with Tennyson, that woman has not quite found her natural place in the world,—

"Till at the last she set herself to man,
Like perfect music unto noble words."

THE MOUNTAIN FRINGE.

Be this as it may, it seems proper to think that at least one important use of the dependent vines, in whatever relation of life, is to call out and develop the gallantry, gentleness, or helpfulness of the strong oaks. I have the memory of an old legend, that once our blessed Lord suffered one of his saints to become a beggar by the roadside, there to sit all day long, to solicit and receive alms. But he who had all his life been a helper of the poor and a giver of alms, by no means liked this hard fortune, and made complaint of it. But the Lord explained that if there were no poor there would be no charity; that the helpless are the best gift of God to the helpful; and that as a beggar he was perhaps doing more to save souls, by keeping them gentle, and unselfish, and thoughtful of the weak, than when he went about strong and self-dependent, giving to the needy.

The artist has given a most admirable representation of one of our most beautiful climbing plants. It is quite common in the woods of New York and the West. It was described in the first years of the century by one of our earliest and most justly celebrated botanists, Professor Rafinesque, who dedicated the genus to Major Adlum, "who is said by Dr. Torrey to have been a distinguished cultivator of the vine." It is sometimes called Climbing Fumatory, from the Latin *fumus*, smoke, on account of the supposed resemblance of the fine sprays of branches and flowers, in this and related plants, to—

"Light-winged Smoke! Icarian bird
Melting thy pinions in thy upward flight,"

—the subtile spirit of which, the blue envelope, that wraps the distant hills about, the poet sings of here:

THE MOUNTAIN FRINGE.

Woof of the fen, ethereal gauze,
Woven of Nature's richest stuffs, —
Visible heat, air-water, and dry sea,
Last conquest of the eye;
Aerial surf upon the shores of earth,
Breakers of air, billows of heat,
Fine summer spray on inland seas.

Thoreau.

THE ARROW-LEAVED VIOLET.

THE
ARROW-LEAVED VIOLET.

VIOLA SAGITATA, Ait.

When beechen buds begin to swell,
And woods the blue-bird's warble know,
The little violet's modest bell
Peeps from the last year's leaves below.

Ere russet fields their green resume,
Sweet flower, I love, in forest bare,
To meet thee, when thy faint perfume
Alone is in the virgin air.

Oft in the sunless April day,
Thy early smile has stayed my walk;
But midst the gorgeous blooms of May,
I passed thee on thy humble stalk.

So they who climb to wealth forget
The friends in darker fortunes tried.
I copied them — but I regret
That I should ape the ways of pride.

And when again the genial hour
Awakes the painted tribes of light,
I'll not o'erlook the modest flower
That made the woods of April bright.

Bryant.

THE ARROW-LEAVED VIOLET.

IF all flowers are thus, thought-awakeners to the thoughtful, there must be a peculiar charm of this sort in the Violet.

Poor crazed Ophelia, offering to Laertes, one by one, the flowers of her wayside gathering, says,—

“There is pansies, that’s for thoughts.”

Pansies and this idea of thought must have got wedded early, for Ophelia’s phrase only translates into English the meaning of the name which is doubtless derived from the French word, *pensee*, thought. But pansies are only civilized and cultivated violets,—*Viola tricolor*,—violets whose environments have been made more favorable to the development of possible beauties, and show what cultivation can do in improving wild nature.

That the pansy and other violets should have been suggestive of thought, or thoughtfulness, is by no means a wonder to me. Indeed, I can hardly see how the modest way it has of hanging down its head, in a quiet, thoughtful, pensive fashion, could have suggested any other association to the mind of a reflective observer.

“I would give you some violets,” Ophelia says, “but they withered all, when my father died;” which gives us a hint of another association connected with the violet. It was early consecrated alike in rural life and poetic imagery to the memory of the departed. In the language of flowers, Shakespeare assures us, “The violet is for faithfulness;” there being, I suppose, some connection between that quality and its “true blue” color. It was adopted by the Bonapartes as their family emblem, perhaps on account of this significance.

The modesty, as well as the beauty, of this charming spring

THE ARROW-LEAVED VIOLET.

wild flower, has made it a favorite with the poets, ever since Homer wrote of it, as he had seen it many a time in the far-off vale, upon the "rushy banks" of the Meles.

"Everywhere appeared
Meadows of softest verdure, purpled o'er
With violets. It was a scene to fill
A god from Heaven with wonder and delight."

If there are no "violets blue," or other flowers in heaven, I greatly wonder how the gods, or anybody else, can be long content there. Truly we may expect the Christian's heaven to be radiant and fragrant with a wealth of flowers, for was not He who is the "King of Heaven" passionately fond of flowers when on earth he made his home, teaching from them many a sweet lesson of trust and patience? And is He not called in the "Elder Scriptures" "The Rose of Sharon" and "The Lily of the Valleys"?

The Wild Violet of England and the continent of Europe, which is the theme and admiration of so many poets, differs from our own by possessing a most exquisite fragrance, as our English garden violets, *Viola odorata*, will abundantly demonstrate. The comparison which the Duke makes in "Twelfth Night," between soft music and the south wind laden with the fragrance of violets, makes mention in a sufficiently poetical way of this attribute of the flower.

"O it came o'er my ear like the sweet south,
That breathes upon a bank of violets,
Stealing and giving odor."

This—as well as its color, form, and modest bearing—has charmed the appreciative senses and won the susceptible hearts of all true poets.

THE ARROW-LEAVED VIOLET.

Beautiful are you in your lowliness;
Bright in your hues, delicious in your scent,
Lovely your modest blossoms, downward bent,
As shrinking from our gaze, yet prompt to bless
The passer-by with fragrance, and express
How gracefully, though mutely eloquent,
Are unobtrusive worth and meek content,
Rejoicing in their own obscure recess.
Delightful flowerets! at the voice of spring
Your buds unfolded to its sunbeams bright;
And though your blossoms soon shall fade from sight,
Above your lowly birthplace birds shall sing,
And from your clustering leaves the glow-worm fling
The emerald glory of his earth-born light.

Barton.

Though the delicate blue has so long been recognized as the characteristic color of these flowers,—

“Blue, blue as if the sky let fall
A flower from its cerulean wall”—

that it has even given the name to the most refrangible ray of the solar spectrum, the extreme blue or violet light; yet the tradition runs that the flower was originally white, as several species of it are now. Indeed, our only native violet which has any noticeable fragrance, is a white one.

Shakespeare has preserved to us a form of the legend which tells how this white flower came to be purple as it is, in the well-known lines from “Midsummer Night’s Dream,” the last of which only shall we be able to make room for here.

It seems that Cupid once had hostile intentions towards

“A fair vestal throned by the West,”—

THE ARROW-LEAVED VIOLET.

supposed to have been famous "Queen Bess," of England's "Seagirt Isle," who, for reasons not far to find, though perhaps not fair to mention, was not an inspirer of the tender passion to any great extent, nor much susceptible to it, either.

Being "all armed" one night, the little god drew such a bow as that it might, Oberon says, "have pierced an hundred thousand hearts." But his aim was poor, or the "fair vestal" was armored with double-plated steel, for unharmed

"The imperial votaress passed on
In maiden meditation, fancy free."

Oberon continues :

"Yet marked I where the bolt of Cupid fell:
It fell upon a little western flower,
Before milk-white; now purple with love's wound,
And maidens call it 'love-in-idleness.'
Fetch me that flower; the herb I showed thee once;
The juice of it on sleeping eyelids laid,
Will make or man or woman madly dote
Upon the next live creature that it sees."

It wrought a most absurd charm upon sprightly Queen Titania, in that fairy world of dreams. But it has not ceased, even to this time, to have a charm, which it can easily cast over the hearts of Nature's worshippers, who go about seeking shrines in woodland and field, by mountain and river.

I think no one reared in the country will ever have the memories of spring rambles through the woods and pastures, in childhood, disassociated from the "blue violets." They were everywhere beneath our feet. We could always find them, and never too many of them. Who does not also remember a

THE ARROW-LEAVED VIOLET.

game of this sort with them. Calling them "roosters," we would lock their heads together by the projecting spur into which the lower petal is extended, and then pull away until one or the other of the heads flew off,—the one whose head stayed on being of course the victor in the contest. It always seemed to me a cruel way to treat these innocent little things, for I always had a feeling that somehow there was sensitive life in them. But after taking our fill of this floral cock-fighting, there were always enough violets left to fill our hands, as we trudged away home.

Before we turn away from the poet to find out what the naturalist has to say for this beautiful flower, which is the delight of childhood and old age alike, we must not miss those tender and plaintive lines, in which Wordsworth twines in an immortal wreath the memory of modest virtue with the modest violet.

She dwelt among the untrodden ways
Beside the springs of Dove,
A maid, whom there was none to praise,
And very few to love.

A violet by a mossy stone,
Half hidden from the eye,
Fair as a star when only one
Is shining in the sky.

She lived unknown, and few could know
When Lucy ceased to be,
But she is in her grave, and oh,
The difference to me.

Professor Meehan assures us that there is some ground for supposing that the old Latin name for this flower, the same that

THE ARROW-LEAVED VIOLET.

the great Linnæus also adopted for it in his system, *Viola*, is from the same root as *via*, a path or road, and refers to the fact that this little "blue beauty" was always found the traveller's constant companion beside every way or path which he might take, through field or forest.

There are three species of blue violets common all over the country, viz., the one given in our plate, *Viola sagitata*, and the "Common blue Violet," *V. cuculata*, and the "Bird's-foot Violet," *V. pedata*. These species are more easily distinguished from each other by their leaves than by anything else. In the first the leaf is not always shaped like an arrow-head, as its name would imply, but more often like the bowl of a teaspoon, while the petiole, or handle of the spoon, which is short, is apt to be somewhat widened by the extension of the narrow margin of the leaf down its sides.

The leaves of the second are much larger, and heart-shaped at the bottom, with the lobes frequently rolled in. The leaf of the last is deeply divided, quite down to the petiole, the parts of the leaf radiating from its extremity as the toes of a bird's foot radiate from the extremity of the leg.

The blossoms of the "Arrow-leaved Violet" are, perhaps, the deepest and richest blue, while those of the "Bird's-foot Violet" are most likely to be variegated in color. They often show, indeed, a near approach to those of the pansy, in the striking contrasts of shade in the same flower, and in the velvety texture of some of the petals.

Though the Violet produces such an abundance of perfect flowers, that is, flowers with fully developed stamens and pistils, yet it has been found that scarcely any of them are ever fertile,

THE ARROW-LEAVED VIOLET.

and it is very rare that one finds a seed vessel produced from these blue blossoms. The reason for this sterility is not exactly known. But if you will carefully observe the Arrow-leaved Violet along into the summer, you will find that it produces flowers without these beautiful blue petals, flowers which, perhaps, it will be difficult to discover, for they will consist only of stamens and pistils enclosed and hid away out of sight in the green envelope which the botanist calls the calyx. This flower is very fertile and always self-fertilized. Plants which have these "secret marriages" are called *cleistogamous*.

By one of those curious and ingenious contrivances for which Nature is so much celebrated, ample provision is made for the wide distribution of the seeds produced from these hidden flowers. When the seed-holder is ripe, the sides contract and press inward upon the smooth inclosed seeds in such a way as to snap them out to a considerable distance, as a bean may be snapped from between the thumb and finger by a smart pressure.

The sudden projection of the seeds in this way has given rise to the belief among the people in some parts of England that the Violet breeds fleas,—they mistaking these darting seeds for the quick spring of that sprightly and enterprising insect.

But we must take leave of our modest little life-long friend somehow; and how better than in the words of one of the sweetest of Mrs. Whitney's always charming poems?

A VIOLET.

God does not send us strange flowers every year.
When the spring winds blow o'er the pleasant places,
The same dear things lift up the same fair faces.
The violet is here.

THE ARROW-LEAVED VIOLET.

It all comes back: the odor, grace, and hue;
Each sweet relation of its life repeated:
No blank is left, no looking-for is cheated;
 It is the thing we knew.

So after the death-winter it must be.
God will not put strange signs in the heavenly places:
The old love shall look out from the old faces.
 Veilchen! I shall have thee!

THE CALOPOGON.

THE CALOPOGON.

CALOPOGON PULCHELLUS, R. Brown.

God might have bade the earth bring forth
Enough for great and small,
The oak-tree and the cedar-tree,
Without a flower at all;
He might have made enough — enough
For every want of ours,
For luxury, medicine, and toil,
And yet have made no flowers.

Mary Howitt.

God made the flowers to beautify
The earth, and cheer man's careful mood,
And he is happier who has power
To gather wisdom from a flower,
And wake his heart in every hour
To pleasant gratitude.

Wordsworth.

THE Calopogon is one of our most interesting native Orchids. And of all the plants that grow, none combine more elements of a strange and weird interest than the Orchids. Their habit is extremely various, some being true "air plants," growing epiphytic upon trees; others have a climbing stem, while others, like our native orchids, grow from a bulb in the ground, annual and

THE CALOPOGON.

herbaceous. Many of them exhale a powerful fragrance. The blossom of most of them takes on some curious or fantastic form, as in the Lady's Slipper, already described, and in the Bee Orchis, and Fly Orchis, and Toad Orchis, and many others, named from their fancied resemblance to these creatures. An old writer comments on this singular likeness in the case of the Bee Orchis in this quaint fashion,—

“At the top grow the flowers, resembling in shape the dead carkasse of a Bee. There is no great use of them in physicke, but they are chiefly regarded for the pleasant and beautiful flowers, wherewith Nature hath seemed to play and disport herself.”

The following lines from Langhorne make note of the same strange deception :—

See on that floweret's velvet breast,
How close the busy vagrant lies!
His thin wrought plume, his downy breast,
The ambrosial gold that swells his thighs.

Perhaps his fragrant load may bind
His limbs; we'll set the captive free!
I sought the living bee to find,
And found the picture of a bee.

But by far the most wonderful distinction of the Orchis family is the elaborate mechanism by which it is enabled to compel the services of the insect world in sending its fertilizing pollen from flower to flower. The studies which Mr. Darwin has made and illustrated in “The Fertilization of Orchids,” read more like the story of a magician, or the doings in some

THE CALOPOGON.

enchanted forest, where Fays and Genii work their strange witchery, than like the plain prose of sober science.

Among the simplest of these is the mechanism of the *Cypripedium*, already described, and of the *Calopogon*, now under notice. If now you study the flower, or Mr. Sprague's admirable portrait of it, you will perceive two floral parts, not regular petals springing from the centre of it. The one which stands up perpendicularly, elegantly bearded with white and yellow hairs upon the inside, hinged at the bottom and widened or winged at top, is called the lip or labellum. The other, which lies down horizontally, also widened or winged near its extremity, is called the column, and bears at its extreme end both the stigma and the anther. The labellum will often be found bent down toward, often almost resting upon, the column.

The *Calopogon* has but one anther, which is two-lobed and bears four pollen masses. The anther is a thin-walled cup, hinged at its back with the extreme end tissues of the column. It lies in a little hollow, and faces inward toward a thin partition-wall which is raised up at that point across the axis of the column. The stigma is on the other surface of this partition, and, of course, still nearer to the centre of the flower. The ripened anther, when touched by a body moving in a direction away from the centre of the flower, will roll upward upon its hinge with the greatest possible ease, exposing its pollen masses to contact with the disturbing body; and contact means that they shall be carried away captive, for they will certainly adhere.

Now the stigmatic surface, which, as just mentioned, lies on the other side of the wall that closes the mouth of the

THE CALOPOGON.

anther in its normal position, and which is in the most unfavorable position to receive the pollen from its own anther, is in exactly the right place and position to be fertilized by pollen brought by an insect from another flower, upon the under surface of his body. And you will see that if he lights upon the flower he will most certainly touch the anther, at the end of the column, with that part of his body. But he will get the pollen only when he makes a backward movement, like that of retiring from his repast of sweets in the centre of the flower. Thence he will carry it to another flower and fertilize it, at the same time that he robs that of its pollen, wherewith to impregnate a third, and so on.

This plant is quite common in bogs, flowering in July. It grows to the height of a foot or more, and bears from two to six brilliant pink or purple flowers upon its scape. It is somewhat fragrant, and is one of the most beautiful ornaments of our lowland flora. It makes a rare picture to please the eye, and teaches, as we have seen, a rare lesson of the mutual interdependence and helpfulness of the creatures of Nature.

Ye bright Mosaics! that with storied beauty,
The floor of Nature's temple tessellate,
What numerous emblems of instructive duty
Your forms create!

'Neath cloistered boughs, each floral bell that swingeth,
And tolls its perfume on the passing air,
Makes Sabbath in the fields, and ever ringeth
A call to prayer.

THE CALOPOGON.

To that Cathedral, boundless as our wonder,
Whose quenchless lamps the sun and moon supply;
Its choir the winds and waves, its organ thunder;
Its dome the sky.

There, as in solitude and shade I wander
Through the green aisles, or stretched upon the sod,
Awed by the silence, reverently ponder
The ways of God,

Your voiceless lips, O flowers! are living preachers,
Each cup a pulpit, every leaf a book,
Supplying to my fancy numerous teachers
From loneliest nook.

Floral apostles! that in dewy splendor
Weep without woe, and blush without a crime,
Oh, may I deeply learn, and ne'er surrender,
Your love sublime!

Horace Smith.

SPINULOSE, OR COMMON WOOD-FERN.

ASPIDIUM SPINULOSUM, SWARTZ.

Spinulose or Common Wood-Fern.

ASPIDIUM SPINULOSUM: — Root-stock stout, assurgent, chaffy, covered with imbricated stalk-bases; stalks a span to a foot and a half long, chaffy, the scales rather large, ovate, pointed, ferruginous, brown or brown with a dark central spot; fronds one to three feet long, all alike, forming a crown, firmly membranaceous, half-evergreen, ovate to ovate-oblong, twice to thrice pinnate; primary pinnæ mostly short-stalked, the lowest pair triangular-ovate or triangular-lanceolate, broadest on the lower side, rather remote from the next pair, the remaining pinnæ gradually narrower in outline and less distant; secondary rachises very narrowly wing-margined; pinnules oblong, sub-acute, pinnate or pinnately incised with oblong obtuse spinulose-serrate lobes; sori rather small, borne on the back of the free veins or either apical or dorsal on the veinlets; indusium flat, delicate, round-reniform, either smooth or glandular.

Aspidium spinulosum, SWARTZ, in Schraders Journal (1800) ii., p. 38; Syn. Fil., p. 54. — HOOKER, Brit. Fl., ed. i., p. 444; Fl. Bor.-Am., ii., p. 261. — GRAY, Manual, ed. ii., p. 597 (excl. var. *Boottii*). — MILDE, Fil. Eur. et Atl., p. 132.

SPINULOSE, OR COMMON WOOD-FERN.

Nephrodium spinulosum, "DESVAUX;" HOOKER, Brit. Ferns, t. 18, 19;

Sp. Fil., iv., p. 127.—HOOKER & BAKER, Syn. Fil., p. 275.

Aspidium dilatatum TORREY, Fl. New York, ii., p. 496.

The forms of this species are very many, the limits by no means agreed upon, and the synonymy inextricably complicated and uncertain. The following appear to be the chief American varieties.

Var. *vulgare*.—Scales thinnish, pale-brown; fronds light green, narrowly oblong-ovate, twice pinnate; pinnæ oblique to the rachis, elongated-triangular, the lowest pair broadly triangular and having the basal pinnules longest; pinnules set obliquely on the midribs, oblong, sub-acute, incisedly serrate or pinnatifid with spinulosely toothed lobes; sori dorsal on the veins or either apical or dorsal on a solitary superior veinlet; indusium commonly smooth and glandless.—*Aspidium spinulosum*, SWARTZ, Syn. Fil., p. 420.—METTENIUS, Fil. Hort. Lips., p. 93.—MILDE, in Nov. Act. Acad. Nat. Cur., xxvi., ii., p. 522.—EATON, in Gray's Manual, ed. v., p. 665 (excl. var.).—DAVENPORT, Catal., p. 28.—WILLIAMSON, Fern-Etchings, t. xxxvii.—*Aspidium spinulosum genuinum*, MILDE, Fil. Eur. et At., p. 132.—*Lastrea spinulosa*, "PRESL;" MOORE, Nat. Pr. Brit. Ferns, t. xxi.—*Polystichum spinulosum*, var. *vulgare*, KOCH, Syn. Fl. Germ. et Helv., ed. ii. (1845) p. 979; ed. iii., p. 734.—*Nephrodium spinulosum*, var. *bipinnatum*, HOOKER, Brit. Ferns, t. 18; Sp. Fil., iv., p. 127.—*Nephrodium spinulosum* (type) HOOKER & BAKER, Syn. Fil., p. 275. (See Milde's work for other synonymes.)

Var. *intermedium*, D. C. EATON:—Scales tawny, fronds oblong-ovate, twice or frequently thrice pinnate; pinnæ spreading obliquely, oblong-lanceolate, the lowest pair broadest and more triangular, having the inferior pinnules moderately elongated, the basal ones a little

SPINULOSE, OR COMMON WOOD-FERN.

shorter than the next; secondary pinnæ or pinnules ovate-oblong, acutish, spreading, pinnately divided or even again pinnate; the oblong lobes spinulose-toothed at the apex and somewhat along the sides; under surface minutely glandular; sori more commonly dorsal on the veinlets; indusium beset with minute stalked and sessile glands.—GRAY'S Manual, ed. v., p. 665.—ROBINSON, in Bull. Essex Inst., vii., p. 50.—WILLIAMSON, Fern-Etchings, t. xxxviii.—*Aspidium intermedium*, WILLDENOW, Sp. Pl., v., p. 262.—PURSH, Fl. Am. Sept., ii., p. 663.—MUHLENBERG, Catal., p. 102.—BARTON, Compend. Fl. Philad., ii., p. 208.—*Polypodium intermedium*, MUHLENBERG, MS.—*Lastrea intermedia*, PRESL, Tent. Pterid., p. 77.—*Dryopteris intermedia*, GRAY, Manual, ed. i., p. 630.—DARLINGTON, Fl. Cestr., ed. iii., p. 396.—*Lastrea spinulosa*, β , MOORE, Index Fil., p. 94.—*Aspidium spinulosum genuinum Americanum*, No. 2, MILDE, Fil. Eur. et Atl., p. 134.—*Aspidium Americanum*, DAVENPORT, in Amer. Naturalist, xii., p. 714; Catal., p. 29.

Var. *dilatatum*, HOOKER:—Scales of the stalk often with a dark central spot; fronds dark-green, broadly ovate or sub-deltoid, nearly or quite thrice pinnate; secondary pinnæ lance-oblong, those on the inferior side of the lowest pinnæ much elongated; indusium smooth in American specimens.—British Flora, ed. i., p. 444.—LINK, Fil. Hort. Berol., p. 106.—HOOKER & ARNOTT, British Flora, ed. vii., p. 586.—GRAY, Manual, ed. ii., p. 597.—EATON, in Chapman's Flora, p. 595, and in Gray's Manual, ed. v., p. 665.—MILDE, Fil. Eur. et Atl., p. 136.—*Aspidium dilatatum*, SWARTZ, Syn. Fil., p. 420.—WILLDENOW, Sp. Pl., v., p. 263.—METTENIUS, Fil. Hort. Lips., p. 93; *Aspidium*, p. 57.—MILDE, in Nov. Act. Acad. Nat. Cur., xxvi., ii., p. 527.—*Polystichum spinulosum*, var. *dilatatum*, KOCH, Syn. Fl. Germ. et Helv., ed. ii., p. 975; ed. iii., p. 734.—*Nephrodium spinulosum* var. *dilatatum*, HOOKER, Brit. Ferns, t. 19; Sp. Fil., iv., p. 127.—HOOKER & BAKER, Syn. Fil., p.

SPINULOSE, OR COMMON WOOD-FERN.

275.—*Lastrea dilatata*. PRESL, Tent. Pterid., p. 77.—MOORE, Nat. Pr. Brit. Ferns, t. xxii—xxvi.—*Dryopteris dilatata*, GRAY, Manual, ed. i., p. 531.—*Aspidium campylopterum*, KUNZE, in Silliman's Journal, July, 1848, p. 84.

HAB.—In shady woods, often in springy places and along shaded rivulets, from Newfoundland to Oregon and North-West America, and extending southward to North Carolina, Tennessee and Arkansas. The typical form, our var. *vulgare*, has been seen in Newfoundland, New Brunswick, Canada, New England, the Middle States, Kentucky, about Lake Superior, and westward to British Columbia. Var. *intermedium* has nearly the same range, but extends to Tennessee and probably to Arkansas, and is not reported from Newfoundland. It is the common form of the species in the northern United States. Var. *dilatatum* is found on the higher mountains of New England, and extends along the Appalachian chain to North Carolina: it is known in Newfoundland, New Brunswick, Canada, and thence westward to Oregon, British Columbia and Alaska. In New England and New York it seems to pass in less mountainous districts into both the other forms. *Aspidium spinulosum*, in several forms, is common in Europe and northern Asia, and is credited to the Cape of Good Hope also. Var. *intermedium* seems to be exclusively North American.

DESCRIPTION:—The root-stock is either creeping or asurgent, or even occasionally erect. It may sometimes be found six or eight inches long, but is usually much shorter. It has an actual diameter of about a quarter of an inch, but as the fleshy bases of the stalk are adherent and continuous with it, and persist unwithered for at least a year after the fronds have gone, the thickness of the whole is considerably greater.

SPINULOSE, OR COMMON WOOD-FERN.

When the root-stock is erect, the stalk bases are loosely imbricated on all sides of it, but when it is assurgent or creeping, the stalk-bases of the lower side are curved upwards towards the light. The root-stock consists mainly of greenish parenchymatous cells filled with starch. The fibro-vascular bundles are very slender, few in number, and placed in an irregular circle.

The stalks are from a span to sometimes nearly two feet long, rather slender, rounded at the back, channelled in front, and lightly furrowed along the sides. They are dark-fuscous at the base, but above the base are greenish, or slightly brownish along the back. When young they are very chaffy, especially near the base, but the chaff gradually wears away, and at length very little of it remains. The character of the chaff varies in different specimens, and to some extent in the varieties. In European examples of var. *dilatatum* the scales have a very conspicuous dark central spot or stripe. This is sometimes lacking in European specimens, and generally so in North American. I notice a little of it in Oregon plants, and Milde speaks of the stalk of American examples as being "*paleis ferrugineis medio atris vestitus*." In the typical *A. spinulosum*, which I follow Koch in naming var. *vulgare*, and in var. *intermedium*, the scales are concolorous, either pale-ferruginous or fuscous-brown. The largest scales are seldom more than half an inch long. They are ovate, acuminate, entire, and composed of narrow linear slightly sinuous cellules. The section of the stalk discloses

SPINULOSE, OR COMMON WOOD-FERN.

two roundish fibro-vascular bundles near the anterior side, and three or four smaller ones near the back.

The fronds always form a crown, and vary from three or four to perhaps eight or ten from a single root-stock. The root-stocks often branch, probably by the formation of adventitious buds at the base of the stalks, and thus a single plant may develop into a large cluster, sending up numerous fronds of all sizes.

The fronds of newly formed root-stocks, whether grown from spores or derived from older plants by proliferous development, are, of course, smaller than those of well-established plants, but are generally also broader at the base, being deltoid-ovate, while the fronds of older plants are either narrowly or broadly ovate, but not deltoid, except in some forms of *var. dilatatum*.

Var. vulgare has fronds usually about twelve or fifteen inches long, and four to seven inches broad in the middle, the shape being oblong-ovate. The texture is firmly membranaceous, and the color light-green, sometimes inclining to yellowish-green. The pinnæ diverge from the rachis at an angle of from forty-five to sixty degrees. The lowest pinnæ are separated from the next pair by an interval of one and a half to two inches, and are triangular-ovate in shape, the pinnules on the lower side being twice as long as the corresponding ones on the upper side, and the basal ones longest of all. The second pair of pinnæ are a trifle narrower and commonly a little longer than the lowest, and the third pair

SPINULOSE, OR COMMON WOOD-FERN.

still narrower, and perhaps a little longer yet. Successive pinnæ are gradually narrower, and less triangular in outline. At about the fifth pair they begin to grow shorter as well as narrower, and so rapidly decrease towards the acute and slightly acuminate apex of the frond. The secondary rachises are very narrowly winged. The pinnules are oblong or oblong-ovate, sub-acute, and set on rather obliquely. They are usually incisely lobed, but sometimes more deeply cut, into oblong lobes which are spinulosely toothed at the apex, and often somewhat so on the sides also. The veins are always free. There are a midvein and from five to seven veins in each lobe, the first vein being always on the superior side. These veins are either simple, or they bear a single short veinlet on the upper side half-way between the midvein and the margin. The sori are seated astride on the middle of the vein, if it be truly simple, but if it be bent at an angle as if trying to branch, the sorus is directed towards the course the branch would take:—if the branch be actually formed, the sorus is seated on it, either near the apex or some distance below it according to the length of the branch. I do not find any good distinction between this variety and the next in the position of the sori, as indicated by Mr. Davenport. The lower surface of the frond is smooth and without glands, as is also the indusium, though most European authors note more or less frequently occurring exceptions to this rule. The spores are slightly reniform, and minutely verrucose.

SPINULOSE, OR COMMON WOOD-FERN.

This plant is usually considered the type of the species; it is very common in Europe, less so in America.¹ It is well represented on Plate xxi of Moore's Nature Printed British Ferns, and on Plate 18 of Hooker's British Ferns. Being obliged to give it some distinctive name as a variety, I have selected what seems to be the oldest, that used by Koch, who, however, placed the species in *Polystichum*.

Var. *intermedium* has fronds a little broader in outline than those of var. *vulgare*, and often larger; measuring not unfrequently twenty-two inches long and nine inches broad. The color is dark-green. The pinnæ diverge from the rachis at an angle of from sixty to ninety degrees, being usually more spreading than in the type of the species. The lowest ones are sometimes nearly three inches distant from the next: they are triangular-ovate in outline, and have the pinnules of the lower side much longer than those on the upper side. The first or basal pinnule is generally a little shorter than the second one, a point noticed by Milde, but apparently hitherto overlooked by American authors. Successive pinnæ are a little narrower and longer, the longest ones being commonly those just below the middle of the frond. The secondary rachises are very narrowly winged. The pinnæ are usually fairly bipinnatifid, being one degree more compound

¹ Milde has as sub-varieties, *exaltatum*, with dark-green glabrous fronds, *elevatum*, with narrower yellowish-green and somewhat glandular fronds, and *Amurense*, with broadly ovate fronds chaffy beneath with little bullate scales. He says that towards the north of Europe the true *spirulosum* becomes scarce and passes gradually into var. *dilatatum*.

SPINULOSE, OR COMMON WOOD-FERN.

than in var. *vulgare*, though there are fronds in which they are only once pinnatifid. The secondary pinnæ are usually distinctly stalked, and are spreading like the primary ones. The tertiary pinnæ, or segments, are oblong-ovate, obtuse, and spinulosely toothed on the sides and at the apex. The under surface of the rachises and pinnules are minutely glandular with unicellular cylindrical or capitate glands. The venation is the same as in var. *vulgare*, and I see no difference in the position of the sori, which are dorsal if on the veins, or either dorsal or sub-apical if they are formed on branches of the veins. The indusium is sprinkled on the surface and at the margin with stalked and sessile glands.

Mr. Davenport has endeavored to elevate this variety to the rank of a species, under the name of *Aspidium Americanum*, rejecting the name of *intermedium* because Willdenow's description "does not contain a word in regard to the glandular indusiums and under surface, while, on the other hand, his description of *A. spinulosum* does, thus exactly reversing the usual arrangement." To the first objection it may be replied that neither does Willdenow speak of the glandular lower surface and indusia of *A. rigidum*, where the glands are much more conspicuous; to the second that *A. spinulosum* is often glandular in European specimens. Willdenow had no American examples of the true *spinulosum*. Milde, who had examined the specimens of *intermedium* sent by Muhlenberg to Willdenow, says it is "nothing but a common form of *A. spinulosum*." But our *intermedium* he refers to his

SPINULOSE, OR COMMON WOOD-FERN.

A. spinulosum genuinum, indicating the fact that the basal pinnules are shorter than the next. Dr. Gray also examined the Willdenovian specimens of *intermedium*, and his notes show that he recognized in them what we now call var. *intermedium*. Willdenow's words "pinnulis pinnatifido-incisis" also point towards var. *intermedium*; since of *A. spinulosum* he says: "pinnulis inciso-dentatis." It is therefore right to keep for this form the time-honored name of *intermedium*; and to consider it a variety of *A. spinulosum*, because neither in the form and details of the frond, the position of the sori, nor the glandulosity of the surface and indusia can any specific distinction be fairly discovered.

Var. *dilatatum* has dark-green deltoid-ovate or broadly ovate fronds often considerably larger than in the other forms: Milde gives three feet as the extreme length, but such fronds are rarely preserved for herbarium specimens. The pinnæ diverge from the rachis at from sixty to eighty degrees. The lowest ones are frequently but not invariably longest, but always broadest: in one example from Mount Mansfield they are eight or nine inches long, and five inches wide at the base. They are broadly triangular, nearly twice pinnate, the secondary rachis wingless and the tertiary very narrowly winged, and the inferior basal pinnules are over three inches long. The inferior basal pinnules are longer than the next ones in this form, but the superior basal pinnules are shorter than the next. The pinnules generally are so deeply pinnatifid as to render the frond

SPINULOSE, OR COMMON WOOD-FERN.

almost tripinnate, and the frond has a generous breadth which distinguishes the variety from those already described. The sori are either apical, sub-terminal or medial, seated on the lowest anterior veins or on short veinlets derived from them, the position varying according to the size of the pinnules. In American specimens the indusium is smooth, so far as I have observed, and the spores are irregularly winged or cristate. In the plant of Europe the indusium is said to be usually glandular. In writing the *Synopsis Filicum*, Swartz at first united this form with *A. spinulosum*, but in the addenda he separated the two, in which he was followed for a long time by most writers. I do not know that the first edition of the British Flora (1830) is the earliest publication in which *A. dilatatum* is made a variety of *A. spinulosum*, but it is the earliest that I can find.

Var. *dumetorum* (*Aspidium dumetorum*, Smith) is a form of var. *dilatatum* having dwarfish deltoid-ovate compactly bipinnate fronds and large pinnules, the inferior basal ones of the lowest pinnæ not much elongated. It is found in mountainous parts of Europe; but I have seen nothing exactly corresponding to it in America. It seems to be only var. *dilatatum* dwarfed and compacted by exposure to the sun, and will probably be found ere long in northern New England or Canada. Other European sub-varieties are mentioned by Moore and Milde, and the student is referred to their writings for descriptions or figures of them.

Var. *Boottii*, Gray, has been variously referred to *A.*

SPINULOSE, OR COMMON WOOD-FERN.

spinulosum and to *A. cristatum*, but, as its claims to specific are considered good by several able botanists, it will be separately figured and described in the following pages of this work.

