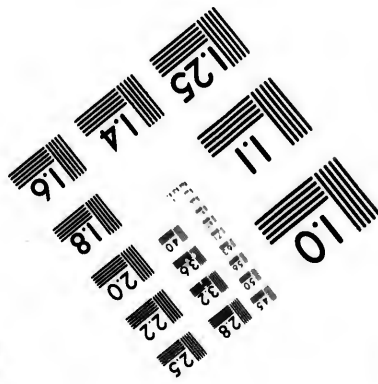
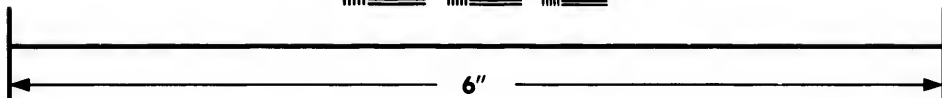
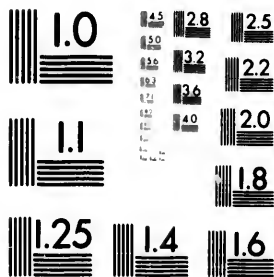


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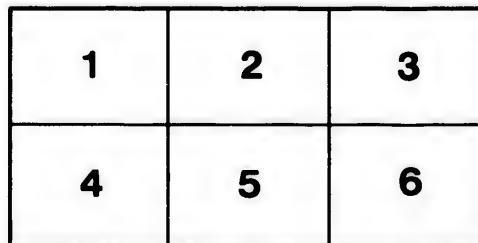
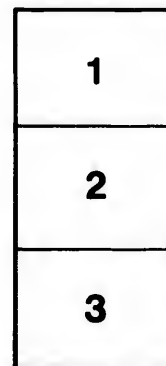
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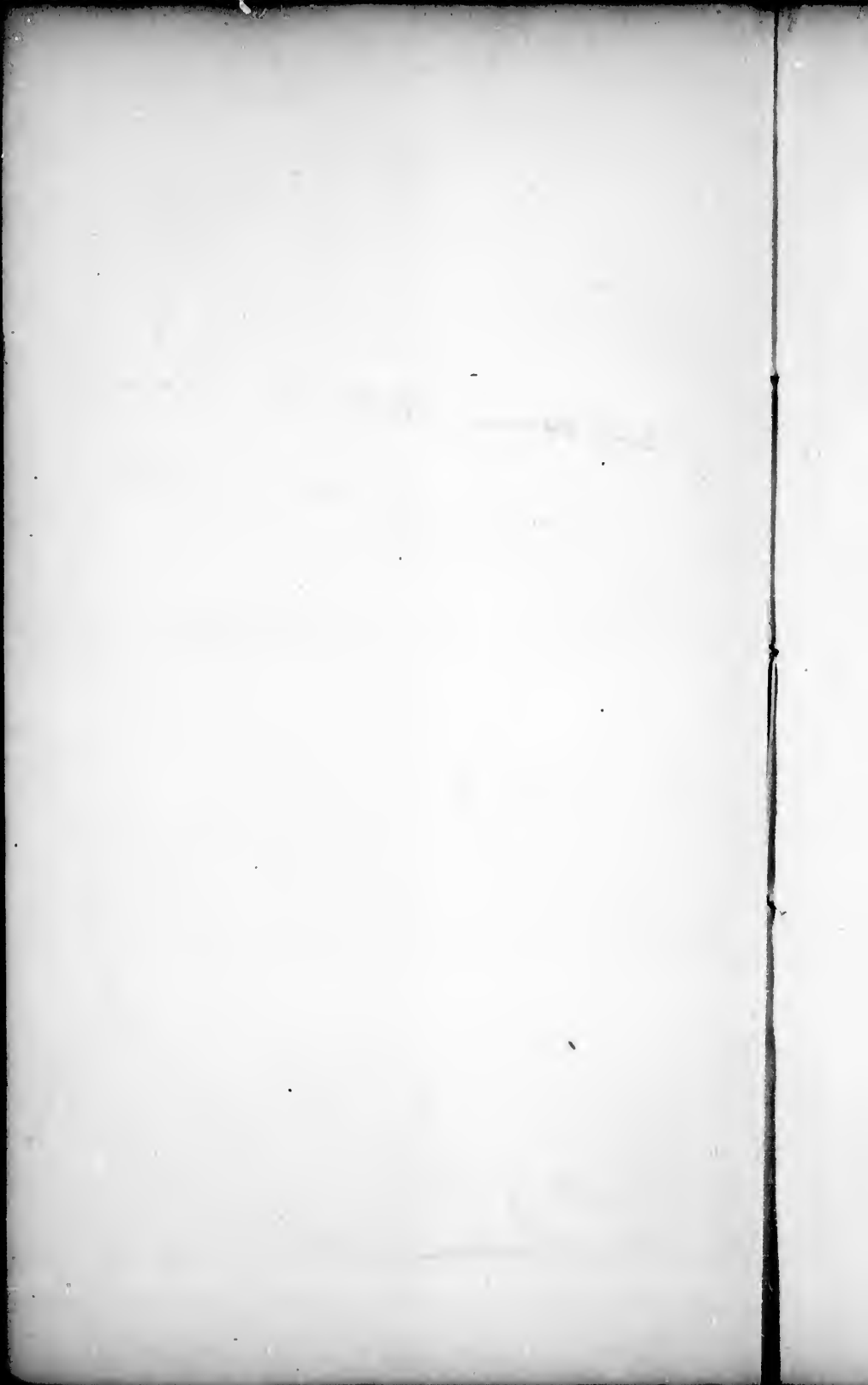
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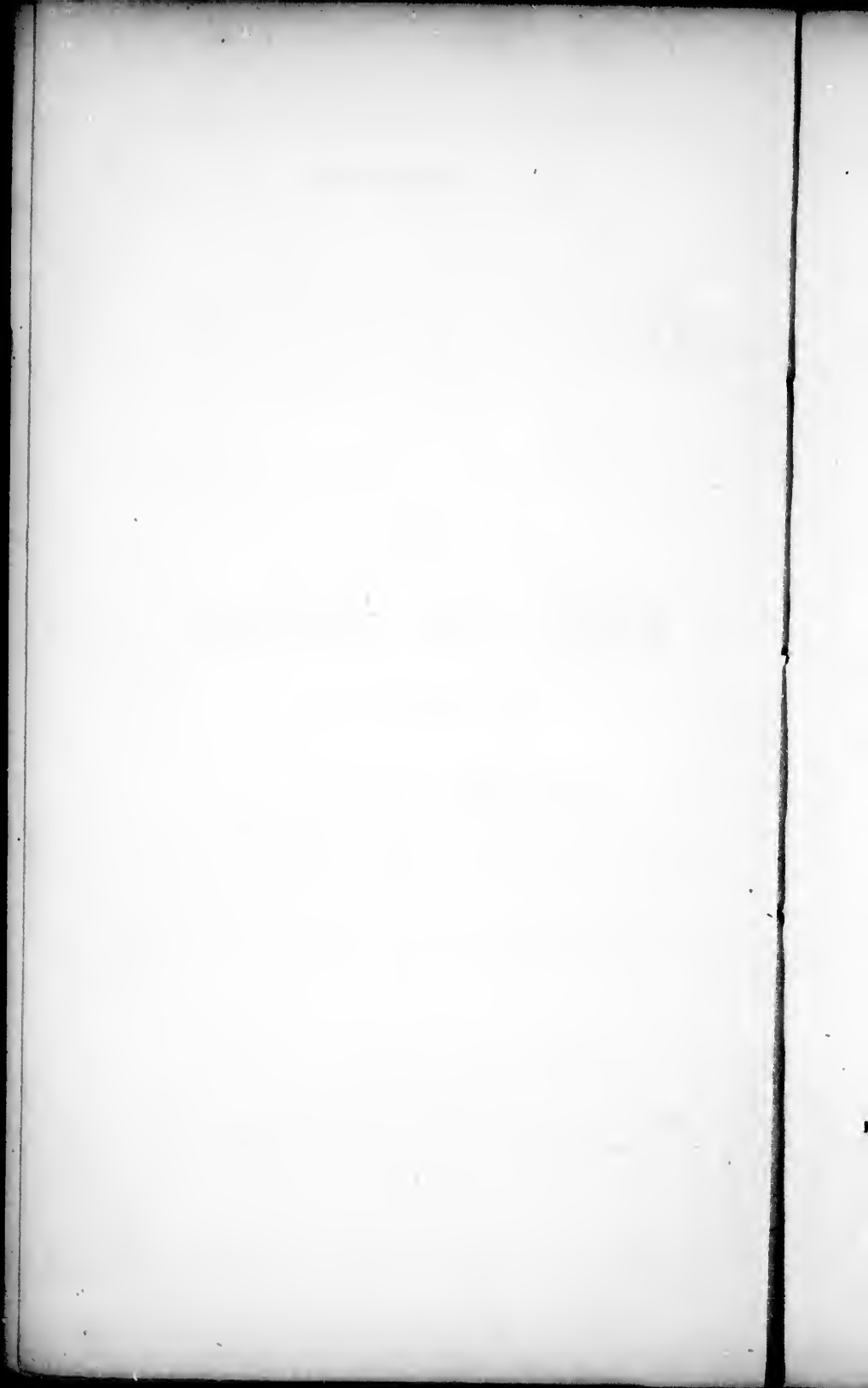
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THE
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Oh, happy, who the city's noise
Can quit for nature's quiet joys.—TOLLENS.

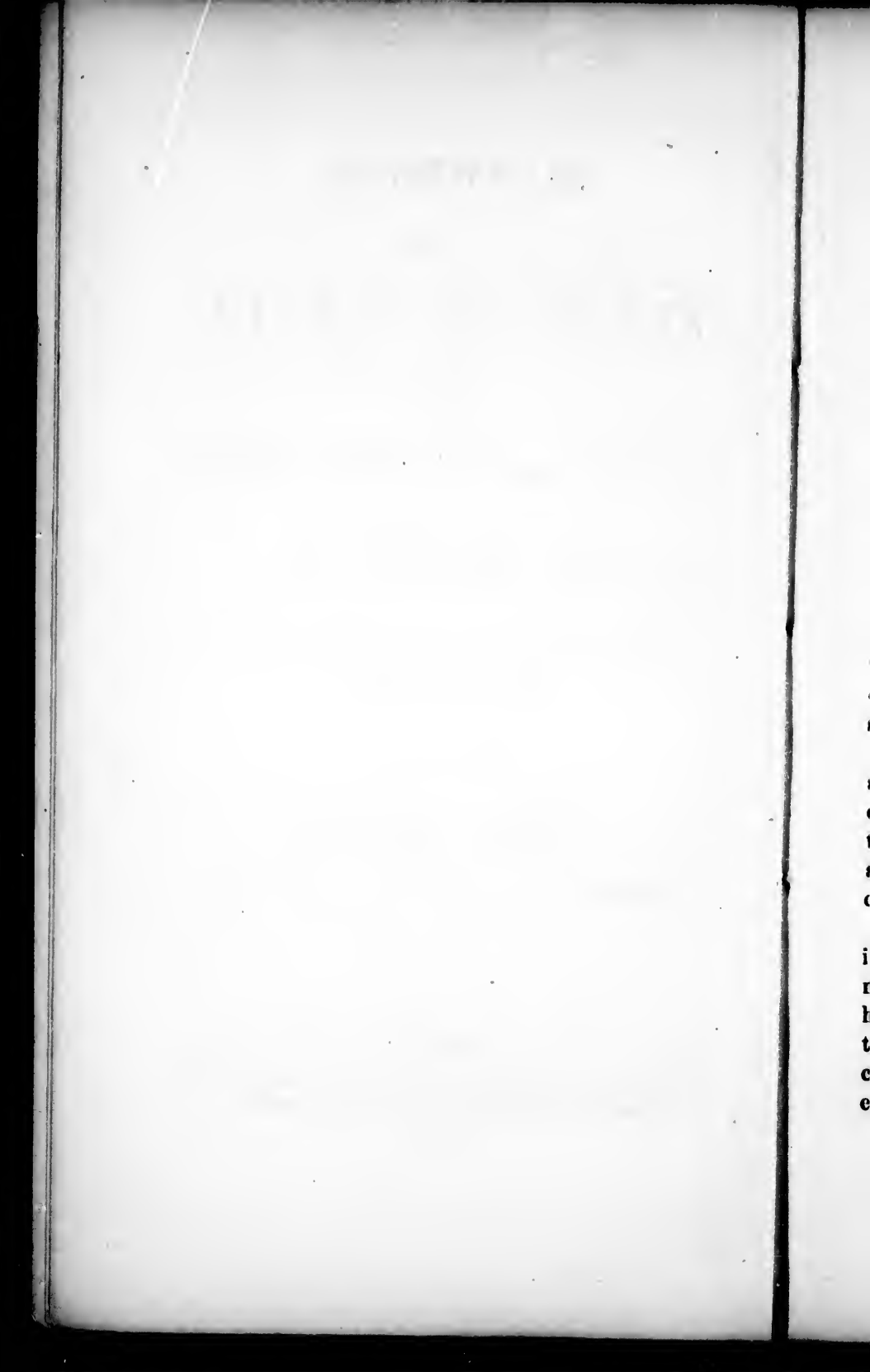


HANDBOOK
OF THE
FERNS OF CANADA;
BEING
A PLAIN AND PRACTICAL GUIDE
TO AMATEURS,
IN THE STUDY AND CULTIVATION OF THE
NATIVE SPECIES.

BY
JOHN PAXTON,
GARDENER TO MRS. J. GIBB, WOODFIELD, QUEBEC.



Quebec :
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1868.



PREFACE.

It is with some diffidence and not a little misgiving that I launch the present little book upon the public. While asking the indulgence of those whose scientific attainments and experience may be much larger than my own, I would express a hope, that my effort now may be the forerunner of some more complete and comprehensive work on the same subject. For many years the study of Pteridology has been eagerly pursued throughout Europe ; and at the present time there is an increasing desire, daily manifested, among our people of Canada, to know more of this interesting science.

While addressing myself to amateurs, and avoiding as far as possible all technical phrases, I have excluded from my little treatise a description of all those abnormal forms of *Ferns*, which, while useless as a study to the beginner, might only serve to confuse, instead of enlightening him.

Thus far my labours may be deemed of a purely introductory nature ; but if they serve to assist the many instead of a local few, whose verbal queries have increased daily, I shall not only be serving them by presenting the information they seek in a concise form, but shall have the satisfaction of having extended a knowledge of the subject.

I have nothing more to add now, than to express my great obligations and gratitude to **MONS. L'ABBÉ BRUNET**, Professor of Botany in the **LAVAL UNIVERSITY, QUEBEC**, for his friendly assistance and kind sympathy with the object I have in view.

Woodfield, Quebec, 1868.

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INTRODUCTION.

THERE is, perhaps, no class of plants more worthy of study or cultivation than Ferns.

The exquisite elegance of their fronds, the minuteness of their construction, and their lovely verdure, recommend them at once to those whose eyes seek that which is beyond the vulgar or the ephemeral.

To speak of the minuteness of their structure, perhaps, inaptly describes a class of plants, the so-called seeds of which are barely discernible to the naked eye.

It is with a feeling akin to rapture that the botanist, whose eye is well practised in nature, observes the noble forms and graceful habits of the Fern, and as he marks its wavy outline either in motion or repose, perchance, his thoughts arise to the great Creator who gave it its delicate mechanism. To those whose ideas of poetry partake of a healthy love for exercise and fresh air, the fascinating study of Pteridology offers food both for mind and body, and gives an object, the pursuit of which is capable of affording no ordinary pleasure.

Although at the height of popularity in Europe, but little is known of Fern culture in the Dominion of Canada.

More than a dozen volumes, by as many different authors, have been written on the British Ferns ;

while no work has as yet issued from our press bearing on the Ferns of Canada, combining a description of each species, with its habits and culture.

There are several purely scientific works which include the Filices of North America, among which is Gray's Manual of Botany; but they are more particularly adapted to the wants of the botanical collector or student.

What the amateur requires is a familiar treatise, which, while avoiding all technical phrases compatible with accuracy of description, insures the identification of the species, directs to its locality, and prescribes its culture.

It is hoped that this little volume will supply this want.

The Ferns of Canada are not numerous, though well diversified; neither are they so inaccessible as many would suppose; and offer to the business man of scanty leisure an opportunity for both mental and physical refreshment, such as thousands now enjoy in England.

The taste for cultivating Ferns began at Berlin, about the year 1820. The Germans have therefore the honor of first introducing them to the notice of botanists and cultivators. The *mania* soon spread to Leipsic, thence to Vienna and Brussels; but did not reach England for several years afterwards.

About that time MR. JOHN SMITH, late Curator of Kew Botanic Garden, entered with ardent zeal into their cultivation, and soon gathered together a

collection which has now few equals. He has recently published the result of his vast experience as a Pteridologist, in a volume called "*Ferns, British and Foreign*," in which he enumerates no fewer than 1071 species of cultivated Ferns. It is, however, computed, that over 3000 species are now known to botanists ; a great number truly, when it is remembered that only 180 were known to the great Swedish botanist, LINNÆUS.

THE STRUCTURE OF FERNS.

"THE fronds of Ferns," observes MR. THOMAS MOORE, Curator of Chelsea Botanic Gardens, in his 'History of British Ferns,' "consist of two parts—the leafy portion, and the stalk, which latter is called the *stipes*. The continuation of the stalk, in the form of a rib, extending through the leafy portion, and becoming branched when the frond is divided, is called the *rachis*. In some species the leafy portion of the frond is undivided—that is to say, the margins are not scalloped or cut away at all ; an example of this occurs in the common Hart's-tongue ; such fronds are called *simple*. In the simplest mode of division which occurs among the British species, the margin of the frond is deeply divided or scalloped

out at short intervals, the divisions extending nearly to the rachis, but not reaching it ; this slightly divided form is called *pinnatifid*.

“ The fronds are sometimes divided quite down to the rachis, which is, as it were, quite bared of the contiguous leafy expansion ; and when this occurs, the frond is said to be *pinnate* ; in this case, each of the distinct leaf-like divisions is called a *pinna*. When these pinnæ are divided again on precisely the same plan, the frond becomes *bipinnate*, or twice-divided ; but if the pinnæ are only deeply lobed, they are, like the frond when simply divided, said to be pinnatifid. When the fronds are thrice pinnate, they are called tripinnate ; and in all the other more intricate forms they are called *decompound*.

“ The young fronds of the Ferns, before being developed, are arranged in a very curious manner, the rachis being rolled inwards volutely, from the point to the base. In the compound sorts, the divisions are again rolled up in a similar way : this arrangement is what is called *circinate*. The substance of the fronds is traversed by veins variously arranged ; in some species forming straight, nearly parallel lines, in others joined together like network. The manner in which the veins are disposed is called the *venation*, and the nature of this venation affords useful data in the divisions of the Ferns into family groups ; it is from some determinate part of these veins that the clusters of fructification proceed, that part to which they are attached being called the *receptacle*. No flowers are produced, but the plants

bear, generally, great abundance of seed-like bodies, which are called *spores*, and are contained in little cases of very singular construction. Collectively, these cases and their contents are called the fructification ; each separate mass or cluster of the seed-cases is called a *sorus*, but as they are generally spoken of collectively, the plural term *sori* becomes much more frequently used. The sori are marginal when they grow out from the margin, and *dorsal* when they occupy some part of the under surface of the frond.

“ The seed-cases—called also *spore-cases*, or *sporangia* or *theca*—are mostly roundish-oval bodies, containing one cavity, and nearly surrounded by a jointed vertical band called a ring, which is continued from the base so as to form a short stalk, by which they are attached. When these have reached maturity, the elasticity of the ring bursts the case by an irregular transverse fissure, and the seeds or spores, in the shape of fine dust, almost invisible, become dispersed.

“ In the majority of Ferns, the sori are covered in the earlier stages of growth by what is commonly called the *indusium*. This is a thin membranous scale of the same general form as the sorus itself, at first completely covering the young seed-cases. Eventually, however, by their growth, its margins are disrupted, and it is thrust back, or frequently even cast off before the maturity of the seeds. Some species, however, never bear any visible indusium, and its presence or absence is consequently one of the technical points by which the large body

of Ferns are divided into groups of moderate extent."

The rootstocks of our *Canadian Ferns* assume three distinct forms. The *caudex* is a semi-upright or decumbent form, which elevates itself above the surface, and is formed of the hard woody bases of the decayed fronds. From the under side of this caudex spring the roots proper; they are mostly dark wiry fibres, which insinuate themselves into the earth or fissures, as the case may be, and seek the nourishment necessary to the full development of all their parts; while from the upper side the fronds arise.

The second form of rootstock, is the *rhizome*, extending horizontally or creeping; subterranean, as in the common braken, and on the surface, as in the common polypody. They are spindle-like, and are mostly branched, and vary in thickness from that of a thread to that of a pencil; their under surface bears small separate roots, while at intervals along the upper side, the fronds arise

In the third form of rootstock, it is fibrous, as in the moonworts, the whole root merely consisting of a mass or bundle of coarse thickish fibres, from which the frond directly arises.

CLASSIFICATION OF FERNS.

THE classification of Ferns in olden times was but a poor guide to their study; long strings of Latin were given them in lieu of better names, derived chiefly from the situation in which they were found,

their size, or the general resemblance of one frond to another. But when the great Swede, LINNÆUS, arose to divide the plants of the earth into groups or classes, he grasped the classification of the Ferns with a masterly hand, and selected the masses of fructification ; their form and situation on the fronds being the leading features in his arrangement. The system of LINNÆUS still prevails, though some improvements have been made on it by modern botanists, namely—the indusium or covering of the spore-cases, and the form of the veins which traverse the fronds ; the whole rendering the recognition of the species easy and very complete.

The following classification is that used by MR. G. W. JOHNSON, in his fourth edition of "The British Ferns," and is here adopted, because of its brevity and great simplicity :—

" POLYPODIACEÆ.

" Fructification placed on the back of the frond, naked, having neither the usual covering nor covered by the margin of the frond. Ring vertical. Venation coiled.

" *POLYPODIUM*.—Masses nearly circular, scattered in spots, without covering ; edge of the frond not bent back.

" ASPIDIACEÆ.

" Fructification placed on the back of the frond, and either furnished with a cover or having the margin of the frond turned back over it. Ring vertical. Venation coiled.

“ **WOODSIA.**—Masses nearly circular, scattered in dots ; receptacle membranaceous, flat, somewhat plate-shaped, fringed with incurved hairs.

“ **POLYSTICHUM.**—Masses circular ; covering circular, fixed to the frond by its centre on the upper branches of the side veins.

“ **LASTREA.**—Masses nearly circular on the back of the side veins ; covering irregularly kidney-shaped, attached to the frond at the indentation of its kidney shape.

“ **CYSTOPTERIS.**—Masses small, nearly circular, seated at the back of the main side veins ; covering hood-like, fixed by its broad base beneath the masses, which it covers when young, the margin where it opens fringed, finally turned back.

“ **ASPLENIUM.**—Masses in lines, placed on the lateral ; cover membranaceous, flat, opening towards the mid-vein.

“ **ATHYRIUM.**—Masses nearly circular, scattered ; covering solitary, circular, peltate, or kidney-shaped, attached to the frond by its centre or side, opening on the side next the mid-vein, the head of opening fringed, the fringe turning back.

“ **SCOLOPENDRIUM.**—Masses line-like, oblique, double, opposite, parallel ; covering membranaceous, opening in the middle over the masses in opposite pairs.

“ **PTERIS.**—Masses on the margin of the leaflet in an uninterrupted line ; covering opening from the bent-in edge of the frond.

" **ALLOSORUS.**—Masses circular, placed on the transverse forked veins, finally covering the back of the contracted leaflet ; cover very narrowed, formed by the rolled-back edge of the leaflet ; seeds triangular.

" **ADIANTUM.**—Masses line-like, or partly round, on the margin of the leaflet, inserted in the covering ; covering being a continuation of the leaflet's outer skin, scale-like, opening on the inner side."

CAMPPOSORUS.—Masses line-like, scattered in pairs opposite each other on each side of the mid-rib. Venation regular.

ONOCLEA.—Masses completely enclosed, or shut up into roundish balls, by the lobes of the fertile frond reflexing back over them.

WOODWARDIA.—Masses in oblong lines, parallel with, and close to the mid-ribs, sunk in the frond ; covering hollow or vaulted, opening from the mid-vein outwards to the margin.

STRUTHIOPTERIS.—Masses enclosed within the divisions of the fertile frond, the margins of the divisions being completely rolled round them.

DICKSONIA.—Masses enclosed in a cup-shaped indusium, and covered at the top with a small lid-like projection of the margin of the frond ; masses situated at the fork of the lobes.

" **OSMUNDA** CEÆ.

" Fructification naked, arranged in a cluster on a stalk at the end of a frond. Venation coiled.

" **OSMUNDA.**—Masses in cases nearly globular, netted, stalked, opening lengthwise from their base

as high as a transparent dorsal projection ; the cases borne in a cluster or panicle.

“ OPHIOGLOSSACEÆ.

“ Fructification naked, arranged in a cluster on a stalk attached to a frond. Venation straight.

“ OPHIOGLOSSUM.—Masses in a jointed two-rowed spike, in cases joined at the base, one-celled, opening at the side.

“ BOTRYCHIUM.—Masses in compound one-sided spike ; capsules globular, stalkless, leathery, half two-valved, opening rather on the side.”

CULTIVATION OF FERNS FROM THE SPORES.

MR. MOORE thus describes the germination and development of the spores :—“ Naturally, Ferns are propagated by means of their spores. These spores, which are somewhat analogous to seeds, being, like them, endowed with that mystery—the vital germ—when placed under fitting conditions, become developed into young plants ; but they differ from seeds in some important particulars. All true seeds have a determinate structure. They have an embryo, provided with special organs, namely, the plumule, or germ of the ascending axis, the origin of the stem, and the radicle, or germ of the descending axis, the origin of the root. When a seed is planted, in whatever position it may chance to have been

deposited in the soil, the young root or radicle strikes downwards, and the young stem or plumule grows upwards.

“The Fern spores have none of these determinate parts, but are, as it were, homogeneous atoms ; and when placed under circumstances which induce germination, that part which lies downwards produces the root, and that part which lies upwards the rudimentary stem. The spores are very minute cells of various shapes, mostly roundish, and often beautifully ornamented with markings on the exterior. They consist merely of a small visicle of cellular tissue, and as they grow, this visicle becomes divided into others, which again multiply and enlarge, until they form a green leaf-like patch, roundish but irregular in outline, and unilateral, forming a primordial scale or germ-frond, technically called *prothallus*, on the under side of which certain germ-cells are produced. One of these, it appears, at length becomes the axis of development, and produces a small leaf or frond, which is usually very different in aspect as well as size from the mature frond, and is succeeded by others, which acquire by degrees the characteristic features peculiar to their species.”

After the above minute description, it will be only necessary to state, briefly, the conditions under which they will germinate ; for there is no mystery whatever in raising Ferns from the spores,—in fact, they often become a nuisance in a Fern-case from self-sown seeds. The spores only require to be kept constantly moist, in a still, warm atmosphere ; where

they readily germinate without any special care or attention.

Prepare a shallow pot or pan, by filling three-fourths of its depth with broken potsherds or brick ; the upper stratum must not exceed the size of peas. Procure, then, some light loam, peat-mould, and fine sand, in equal parts. Put an inch of mould, thus prepared, on the top of the potsherds ; water it thoroughly with a fine-rosed watering pot ; sprinkle the spores upon the surface, and put a bell-glass over it, or a piece of common glass will answer quite as well—the object of the glass being to exclude the external air, and that a still, moist atmosphere may be maintained within. Keep the pan in a well-shaded place, and, if possible, in a warm temperature, and the tiny plants will soon appear like specks on the surface ; and as they advance in growth, a little air must be admitted, else they will assuredly damp off. When the plants are large enough to handle, they may be pricked off into other pans, but with a greater depth of soil ; they must be kept moderately moist, but the glass will no longer be necessary.

Another interesting method of growing the spores, is, to get a piece of rough sandstone, or any other porous substance, which will absorb water, and place it in a dish, containing about an inch of water. Moisten the stone, sprinkle the spores over it, and cover it over with a bell-glass, letting the lower rim of the glass descend among the water ; all air being excluded, the atmosphere within will be favourable to their development. It may be placed anywhere

in a diffused light, and the process of germination watched with the utmost facility. But in attempting to transplant the seedlings from the stone, it will require to be done with the greatest delicacy, for if it be done in a careless manner, the organs of nourishment will be broken, and its death follow.

FORMATION OF ROCKWORK.

In making a rockery for Ferns, the whole material throughout should be massive fragments of old mossy rocks. The necessary points to be kept in view are these:—its general features must be bold, rough, and irregular in outline, with some of its fissures deep, to imitate a solid rock having been torn asunder by a convulsion of nature. At some points large flat ledges must be made, while at others they may be smaller; but in either case, good-sized openings must be left to hold the soil. The most important point, however, is a suitable situation. How often is rockwork introduced on a perfectly level lawn—which is quite at variance with nature, and in many cases exposed to the scorching rays of the sun, which is equally ridiculous.

The most appropriate location, in which to form artificial rockwork, is rather a steep bank, with a north or north-east aspect, and well shaded towards the south with trees. In forming it in such a place, sameness must be avoided—massive grandeur and distinctiveness being the chief aim; advantage being

taken of every spot where ruggedness of outline can be obtained, avoiding too many sharp projections, which look absurd and artificial. The rocky fragments of which it is composed should be covered, but as little as possible, merely giving them the necessary solidity.

Every desirable spot for a plant should be filled with a mixture of peat or bog-mould, light loam from the surface of an old pasture, and the decayed leaves from the surface of a wood, in equal parts ; and where water can be introduced, either dropping over, or surrounding the rockery, it will add an additional attraction to the scene.

FORMATION OF A ROOTERY.

Tree stumps are often a source of great annoyance, where improvements are in progress ; such unsightly objects have often to be removed to some distance at great expense, but which might, with a little taste and trouble, be converted into a rootery for Ferns, which would diversify and add a peculiar beauty to the scenery. The aspect should be similar to that of the rockery, and, perhaps, the best site is against a wall. A mound of loose rubbish is to be thrown up into the desired shape. Then proceed to lay a row of stumps at the base of the mound, keeping in view an irregular outline, filling up the interstices with soil the same as for a rockery ; then add another tier of stumps, and so on, taking care

that some of them are nearly all exposed, while others may be almost buried. Another most interesting feature would be, to have a serpentine walk or passage through the centre, formed by a perpendicular wall of stumps, the sides of which would be an admirable home for such Ferns as the *Woodsias*, *Aspleniums*, and *Polypodiums*.

THE ORIGIN AND CONSTRUCTION OF THE WARDIAN CASE.

By far the most interesting method of growing Ferns in dwellings, is in the Wardian case, whether in the soil or with miniature rockwork introduced—certainly the latter is far preferable. These cases are fast becoming fashionable ornaments to the drawing-room or boudoir, and afford an endless source of amusement and gratification to their owners.

About the year 1830, N. B. WARD, Esq., a resident of London, and an enthusiastic window-gardener, but living in a locality enveloped in smoke, was compelled to give up the cultivation of plants, after many unavailing trials. At length, a simple incident occurred, which led to great results; he buried the chrysalis of a sphinx, in some moist mould, in a wide-mouthed bottle, corked tight. In watching the transformation of the insect, he observed that the moisture which rose from the mould during the heat of the day, condensed on the inner surface of

the glass, returned again to the soil, and kept it in a moist state. A few days prior to the final change of the insect, he noticed a seedling Fern and a grass, like two specks, on the mould ; he watched with great interest the growth of his tiny plants in their novel prison : removing the insect, he placed the bottle in the window of his study. They grew apace, and the Fern turned out to be the *LASTREA FILIX-MAS* (*male Fern*), and the grass, the common annual variety. This incident led to the invention, by MR. WARD, of these mimic conservatories, which bear his name.

In growing plants in the ordinary way, he attributed his failures to the depressing influence of the fuliginous matter with which the atmosphere in which he lived was impregnated. But Doctors TURNER'S and CHRISTISON'S experiments with gases injurious to plants, amply demonstrate, that it was not simply to the diffusion of fuliginous matter, but to the presence of sulphuric acid gas, generated in the combustion of coal, that the mischief was to be ascribed. When added to common air in the proportion of one ten-thousandth part, that gas affected the leaves of plants in twelve hours, and killed them in forty-eight ; against the evils arising from such a vitiated atmosphere, the plan of MR. WARD provided an effectual protection.

These cases are made in an endless variety of size and forms ; but, perhaps, the most useful is that which consists of three parts—the stand, the box,

and the glass cover. The stand is simply a table without a top, with a groove in the upper edge, in which the box is to rest. The box for the soil is made to fit the groove in the stand, and eight inches deep : and to secure drainage, it must slope towards the centre, where a hole is bored, and a tap introduced, which is soldered to a casing of zinc the exact fit of the inside of the box, so that a vessel may be placed under the tap, when necessary, to draw off the excess of moisture ; a groove will also be requisite in the box to receive the glass roof or cover.

The cover is usually made in span-roofed form, and in making which, it must be borne in mind, that the larger the panes of glass, and the smaller the woodwork the better ; for thick clumsy woodwork, not only looks bad, but excludes the light, which is so essential to the well-being of the plants. The skeletons of the best cases are made of zinc, brass, or copper, and present a very neat and chaste appearance. A large door is provided in the cover, to afford ready access to the plants ; it should be well fitted for appearance sake, but all that has been written or said about its being air-tight, is pure nonsense, for there are times when it may be opened with advantage. The elevation of the whole case need not necessarily exceed four feet six inches. When made, proceed to cover the bottom of the box, to the depth of two inches, with soft red brick or charcoal, broken the size of walnuts, being extremely careful in covering the hole through which the excess of moisture is to escape, so that it may not be choked

by the soil falling through into it ; put a layer of moss, previously dried, over the drainage, to prevent the soil mixing with it.

Different Ferns require different soil ; but most of them will thrive in a judicious mixture of the following :—Light, rich sandy loam one-third, peat-mould one-third, leaves rotted to mould one-third— one-tenth of the whole to be composed of coarse sand, broken charcoal, and crumbled mortar from an old building, in equal parts. The whole to be thoroughly amalgamated, but not chopped too fine ; put a layer of the most turfy pieces on the moss, and fill up the box with the rest of the soil. If for rockwork, raise it with a good slope from front to back, and lay on the stones, flints, vitrified conglomerations, or whatever else is used, in a tasteful manner, diversifying it as much as possible.

A miniature lake may be made in the cleft of a hill, in which a small growing water plant, water snails, newt, &c., may be placed, and all will then be complete. In planting, care must be taken to give each species a location suited to its wants : those whose *habitat* is the dry exposed rock, must be placed on the summit, and those whose retreats are moist, must have a less exalted position near the base. Air ought to be admitted on every favourable occasion ; diffused light is an absolute necessity, but sunshine must be avoided ; and water should never be given unless the soil indicate drought.

The "*Bijou Fern-case*" and the "*Gem Jardinets*" are the most modern forms of the Wardian case,

both of which are certainly tasteful and elegant arrangements for the amateur. They are sold by BARR & SUGDEN, 12, King-street, Covent Garden, London.

The "*Fern-window*," as sold by the same firm, combines all the advantages of the aquarium and Fern-case. It is built in instead of the lower half of a window; the outer side being a mirror, doubles the effect. Within it has artistically arranged rockwork, and a small fountain, the grateful spray of which adds freshness and vigour to the Ferns and other plants which clothe the rocks; while the water furnishes a natural home for aquatic plants, gold fish, &c. Such an admirable arrangement is well suited for a staircase, or any other window, which would otherwise look out on some unsightly object; and instead of an eyesore, a "thing of beauty" and animation would meet the gaze. The "*Jardinet*" is simply a small glass or stoneware dish, with a glass dome to cover it; and though diminutive, they are as truly Wardian cases as the other, and look beautiful when placed on a work-table in the drawing-room or parlor.

The transplanting and repotting of Ferns should take place in spring just as they are starting into growth; but in collecting them in their native haunts, the month of September should be chosen, when they have finished their growth, and before the old fronds are destroyed by frost.

THE SPECIES : THEIR LOCALITIES AND CULTIVATION.

ADIANTUM PEDATUM : *Bird's-footed* or *pedate Maidenhair*. The stalk is one foot long, black, and highly polished. The fronds branch at the top of the stalk into five horizontal divisions, resembling the claws of a bird ; which are again divided into segments, oblong in form, at the extremity of which the veins terminate and bear the fruit-dots (sori), which are solitary and oblong. The fronds are herbaceous—that is to say, they decay in autumn, and others take their place in spring. Found generally through the *Dominion*, on moist, loamy banks ; near Quebec—on the banks of Little River valley to Caprouge. This fine Fern is spoken of in England as one of the most elegant and beautiful in cultivation. It presents a fine contrast with the more sombre hues of some of our other natives—its colour being a lovely light green ; it has also a peculiar smoothness, which repels water or rain. In the days of the old herbalists, this Fern was said to possess great virtue as a medicine, the most potent of which was the luxuriance it gave to tresses : hence the name *maidenhair*. The manufacture of the syrup "*Capillaire*," seems to have promoted a good deal of trade between Canada and France in those days. PHILIP MILLER, in his "*Gardener's Dictionary*," published in 1768,

in speaking of the American maidenhair Fern, says:—"This grows naturally in Canada in such quantities, that the French send it from thence in packages for other goods, and the apothecaries at Paris use it for the maidenhair, in all their compositions in which that is ordered."

Culture.—This is rather partial to a shady nook in the rockery; but must be planted on a well drained situation. It may be grown in well drained pots, in a mixed soil of peat-mould, turfy loam, and sandy gravel in equal parts, plenty of water being given, and never exposed to the sun. A well ventilated Fern-case will meet its every requirement.

ASPLENIUM TRICHOMANES : *Common Spleenwort.* From a tufted rootstock arise the evergreen fronds, which are numerous, from three to six inches long, and merely consist of a single stalk, clothed from bottom to top with two rows of tiny roundish leaves or leaflets. These leaflets are dark-green, and the rachis or stem is a dark chesnut colour, wire-like, and has a channel down the front. The fruit-dots are arranged obliquely, in line-like patches, from four to eight on each leaflet; the spore-cover or indusium opening from the vein to which it was attached, exposing the fruit-dots, which are, when mature, very dark brown. This Fern is often called, but without any authority, '*Tom Thumb*;' the name would be appropriate enough, were there no others still more diminutive. This beautiful Fern is found in every quarter of the globe; it will there-

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fore adapt itself to almost any degree of temperature. TURNER, a writer two hundred years ago, says :— “ The juice of the ‘ English Maiden’s heare’ stayeth the heare that falleth off, and if they be fallen off it restoreth them agayne.” In England it is called the Black Maidenhair Spleenwort, and is highly esteemed by cultivators. Found from Quebec westward ; rare.

Culture.—This species being a rock plant, it should occupy an elevated and rather exposed part of the rockery ; where it will require to be planted firmly in a compost of peat, leaf-mould, broken sandstone, and old mortar, in equal parts. But there is no subject more suitable for small pots ; it will flourish in well-drained pots, with the same soil, care being taken to keep it moist, and in a shaded position, for two or three weeks previous to full exposure. It will also succeed well in a Fern-case, provided it be well ventilated.

ASPLENIUM VIRIDE : *Green Spleenwort.* There is such a great resemblance between this and the last, that they have been often confounded with each other by the casual observer. But it can be readily distinguished from it by one permanent characteristic,—its green mid-rib, while the other is black throughout, the leaflets a lighter green and more rhomboidal in shape ; but in all other respects the same.

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ASPLENIUM THELYPTEROIDES : *Silvery Spleenwort*. The fronds are from two to three feet high, pinnate—that is, once divided down to the rachis or stem ; these divisions are again deeply cut into somewhat oblong segments which lay over one another. The fruit-dots are very plentifully borne on both sides of the mid-rib of each division, from eight to twelve on each, oblong or slightly horse-shoe shaped. The whole frond is lanceolate in outline, and has a light-green silvery appearance : hence the popular name. Found in moist, rich woods ; generally distributed from Quebec westwards, and in some places very common. Gomin woods, near Quebec.

Culture.—This will be found too large for in-door cultivation, except in large collections. It will, however, succeed admirably in a damp, shady place in the rockery, where it has plenty of room to develop itself.

ASPLENIUM EBENEUM : *Black-stalked Spleenwort*. Fronds from eight to ten inches long, once-divided ; the divisions three-fourths of an inch long, lance-shaped, blunt at the top, slightly cut, and overlapping each other with a slight curve. The stalks are a shining black colour, and slightly hairy. The usual line-like fruit-dots of the genus are scattered

rather plentiful on each side of the mid-rib. This neat little evergreen species is found in Africa, Mexico, and North America. It is very rare in Quebec, but is not so rare in Ontario, and is said to be very common in the Northern States. Found growing in rocky, open woods.

Culture.—It will thrive with the same treatment as *A. trichomanes*, to which it will make a fine companion.

ASPLENIUM FILIX-FEMINA : *Lady Fern.*

This is the *ATHYRIUM Filix-fœmina* of modern cultivators ; but it may almost be placed in either genus, without violating the laws of botany. Fronds from two to three feet long, the stem usually one-third of its length bare of foliage, and the bare part covered thinly with dark chaffy scales. The frond is broadly lanceolate in outline, twice-divided ; the pinnules of the second division are lance-shaped, and slightly attached to the stem by a little wing, but not enough to say that they are not bipinnate ; they are also slightly toothed, and very thickly placed. The fruit-dots are numerous,—from twelve to fourteen on each pinnule, oblongated, the lower ones inclined to take a horse-shoe shape, but becoming when mature, roundish. This lovely Fern justly claims precedence over all our other natives, for its remarkable feathery, plume-like, graceful habit, and its bright, light green colour ; it is fairly entitled, for that reason, to its popular name—the *Lady Fern*. But so variable is it in its habits, that botanists

cannot agree about its characteristics ; hence it is by some held to be an *Athyrium*, by others an *Asplenium*, while a third contend that it is an *Aspidium*. Found in moist woods, and everywhere common.

Culture.—This plant is rather careless of soil, being found as often on a wet, heavy loam as on a boggy soil, but always on a wet bottom. A boggy peat suits it best ; and no Fern loves shade and moisture better than this. If planted in the rockery, it must have a moist situation at the base ; and plenty of water is indispensable to develop its graceful proportions. It will succeed well in a pot, with a peaty soil mixed with a little loam ; drainage is of less importance than plenty of water ; the pot should be placed in a saucer of water during its season of growth.

ASPLENIUM ANGUSTIFOLIUM : *Narrow-fronded Spleenwort*. Fronds from one to two feet long, lance-shaped, light-green, thin and tender looking, and is, like its congener, the *Lady Fern*, herbaceous, the fronds being killed by the first frosts in the fall. It has both barren and fertile fronds, the latter more contracted than the former. The fronds are only once-divided ; the divisions narrow, lanceolate, and toothed at the edges. The fruit-dots are nearly oblong, but slightly inclined to curve round a little, and very numerous placed on both sides of the mid-rib. Found in rich woods ; rare in Quebec, but generally met with from Montreal westwards.

Culture.—Much similar to the foregoing ; but requires a compost of peat, loam, and leaf-mould, in equal parts, a little sand mixed with it, and a good drainage :

ALLOSORUS ATROPURPUREUS : *Purple-stemmed Rock Brake.* This is the *PLATYLOMA atropurpurea* of modern cultivators. The stem is dark-purple,—as the specific name signifies, and very highly polished, with a dark-green foliage for a contrast. The fronds are twice-divided or bipinnate ; the pinnules entire, longish-oval, and heart-shaped at the base. The fructification extends in an uninterrupted line along the margin of the pinnules—as in the genus *Pteris*, but the band is broader. Found only in Ontario, in the counties of Wentworth, Lincoln, and Welland, but very rare.

Culture.—This Fern is rather tender, considering that it is a native of a cold climate like ours—this no doubt accounts for its rarity ; it is, moreover, very brittle, and consequently too tender to stand the exposure of a rockery. It makes a beautiful plant for a pot, and will flourish in a Fern-case. The soil for pot-culture will require to be peat-mould one-half, fine sand, old mortar, and bruised charcoal, in equal parts, the other half ; if moderately supplied with water, it will thrive either in a window or greenhouse.

ALLOSORUS GRACILIS : *Slender Rock Brake.* Fronds from four to six inches long, smooth, light green, fragile and delicate. The fronds, both barren

and fertile, are divided into four or five sections, which in the sterile are broadly oval and slightly toothed. The fertile fronds are longer and more contracted, their edges reflexing back over the fructification, which are on the margin, as in the previous species. Found in the fissures and clefts of rocks; at Montmorency, and St. Ann's Falls. General but scarce, except northwards.

Culture.—This slender beauty will thrive in a damp corner of the rookery,—moisture and good drainage provided. It makes a fine pot plant, but wants good nursing, the pot half full of drainage, and the soil composed of peat, loam, and broken bricks, in equal parts.

A Fern-case will suit it if it be thoroughly ventilated; but in either case it is good policy to secure a duplicate, as it will often die off with short notice, under the best of care.

BOTRYCHIUM VIRGINICUM : *Rattlesnake Fern.*

This peculiar genus is a very interesting one to the botanical student; but is by no means a favourite with the cultivator, simply because it cannot be grown by artificial means with any degree of success. The root is merely a few coarse, thick fibres, from the prominent crown of which the solitary frond arises to one foot in height, and is clasped about half way up by the barren one, which is twice-divided at the base, but only cut-toothed at the apex. The fertile frond bears the spore-cases at its summit,—which in all this genus resemble a bunch of grapes turned

upside down. Found in rich, moist woods or bogs. A variable species as regards size ; common.

Culture.—This genus only succeeds for a short time ; loamy soil, mixed with sphagnum moss, suits them best.

BOTRYCHIUM LUNARIA : *Common Moonwort.*

The root of this species is composed of a tap-root, around which is the usual bundle of fibres ; the stem, issuing from the crown through some sheathy scales, is from eight to ten inches long, bearing the capsules of fruit-dots in bunch form at the top. The sterile frond springs from the other midway, and consists of a few pairs of fan-shaped leaflets, deeply cut, with very short stalks. Found in open woods, towards the north.

BOTRYCHIUM LUNARIOIDES : *Tall Moonwort.*

The general outline of the barren frond is a broad triangle, and cut into ternate sections of longish, slightly curved lobes. As the specific name indicates, it has a strong resemblance to the last, except in the barren frond. Found in dry woods ; general, from Quebec city westwards.

BOTRYCHIUM SIMPLEX : *Dwarf Moonwort.*

This is generally supposed to be only a dwarf variety of *B. Virginicum*, which it greatly resembles, though only two inches in length. Found in moist woods. Generally distributed, but scarce.

CYSTOPTERIS BULBIFERA : *Common Bladder Fern*. The fronds of this most beautiful Fern are from one to two feet long, lance-shaped, elongated very much towards the top, fragile looking, and very delicate in colour. Fronds twice-divided or bipinnate; the pinnules or leaflets are oblong, pointed, numerous, and deeply toothed. This Fern has one peculiarity by which it is easily recognized,—along the stem towards the top, at intervals, are borne little bulbs a little less in size than peas; these bulblets drop off in autumn and quickly reproduce the plant. The fruit-dots are very small, round, and black.

Found on the shelves, and in the fissures of moist rocks. Generally found throughout Canada. It is very abundant and luxuriant, from the "Falls of Montmorency," up the rocky banks to the "Natural Steps."

Culture.—This handsome plant is worthy of a place anywhere. In the rockery, it should have a well-shaded, moist pocket to itself, with a spadeful of old crumbled mortar mixed in the soil. A well-drained pot, and a soil composed of peat, loam, and leaf-mould, in equal parts, with a good sprinkling of old mortar and sand, will meet its every want. Abundance of water must be given during growth. But to see this beautiful Fern enjoying itself, place it in a Fern-case, with the same soil, admitting plenty of air to keep the foliage dry; and if the roots be kept moist it will develop its brilliant colour to great perfection.

CYSTOPTERIS FRAGILIS : *Slender Bladder Fern*. Fronds from six to twelve inches long, having half the stem bare ; the upper or foliage half spear-head shaped, and of a very delicate light-green colour. The fronds are twice-divided, and again so deeply cut as to appear almost again divided. The stem is brown, smooth, and brittle. The fruit-dots, when young, are pale, but when mature, are nearly jet black, and very numerous.

Culture.—This species is a useful one, adapting itself to almost any situation ; but the moist atmosphere of a case will suit it best. In all other respects the same treatment as the last will be the best.

CAMPTOSORUS RHIZOPHYLLUS : *The Walking Fern*. The fronds of this eccentric fellow are simple—that is to say, neither divided nor scalloped, heart-shaped at the base, tapering away at the top until it resembles the tendril of a vine. The fronds have a downward tendency, and when they touch the ground with their extreme point, it takes root and forms a new plant ; and these in their turn form others :—hence the popular name, which is very appropriate. The fruit-dots are scattered over the back of the frond in line-like, or partly oval patches. Found on shady rocks, from Montreal and Ottawa westward, but very rare anywhere. This Fern has a dwarf compact habit—the fronds from six to nine inches long, and has a very singular appearance in a Fern-case. It does well in a pot half filled with

drainage, with a soil of loam and leaf-mould in equal parts, and peat, broken sandstone and old mortar, the other half, keeping it at all times only moderately moist. If planted outside, it will succeed best on the stump of a tree partly decayed.

DICKSONIA PUNCTILOBULA: (Gray.) *Gossamer Fern*. The frond is from one and a half to two feet long, strong, light-green, and densely covered with minute hairs; they are sweet-scented and herbaceous. The rootstock is creeping, subterranean, a little thicker than a straw, branched, and brownish-buff in colour. In outline, the fronds are a sharp-pointed oval, thrice-divided, or nearly so,—the second divisions very deeply cut, and toothed at the margin. The fructification is contained in little bag-like appendages, and is situated on the very edge of each fork of the segments, part of the leaflet being thrown back over the fruit-dots, in the form of a lid or cover. Found in moist, partly shaded woods; general and common, from Quebec westwards. In the Gomin and Caprouge woods, near Quebec.

This genus was named in commemoration of JAS. DICKSON, an eminent English botanist. It contains the tree Fern of Van Dieman's Land—*DICKSONIA antarctic*, whose rootstock is an upright stem like the trunk of a tree, from the summit of which the fronds arise. But it has been thought advisable to divide our North American *Dicksonia* into another genus—*Sitolobium*; chiefly on account of ours having a creeping rootstock, and herbaceous fronds.

Culture.—This is a first-class subject for a rockery ; it loves distant shade, and a soil of peat, leaf-mould and sand. For pot culture it has few equals. The pots should be deep and well drained, using the same soil as above, not over firmly potted, nor over-watered. Care should be taken when the fronds are growing, not to wet them, for they are of a delicate texture, and easily spoiled.

LASTREA SPINULOSA : *Common Shield or Wood Fern.* The rootstock is a slowly creeping caudex. The frond two feet long, nearly half its entire length bare of foliage, but beset with thin, brown, chaffy scales. The upper half is narrow, lanceolate in outline, of a light-green colour, smooth and perfectly flat. The frond is twice-divided (bipinnate), and again deeply cut-toothed, each lobe ending with a sharp hook. The fruit-dots are small, in a single row on each side of the mid-rib of the leaflets, about half way between the mid-rib and margin. The cover of each mass is kidney-shaped, and is attached to the frond by the indentation of its kidney shape : this is the distinguishing characteristic of the genus **LASTREA.**

This Fern is very variable in its habits, its variations often putting the novice to his wits' ends. Found in moist, rich woods everywhere ; very common.

Culture.—This is a free-growing and bold-looking Fern of the easiest possible culture. It can be grown successfully with less trouble than many other

of our natives, and will bear exposure pretty well ; but it will luxuriate in a damp, shady position in the rockery. It is a plant admirably adapted for a pot ; it should be moderately drained, and have a soil composed of loam, peat, and leaf-mould, in equal parts, and just enough of sand to give it a gritty appearance ; and if placed in a saucer of water during its season of growth, it will enjoy itself amazingly. But, in whatever circumstances it is placed, plenty of water is indispensable.

LASTREA THELYPTERIS : *Swamp Shield Fern.*

This Fern has both sterile and fertile fronds, and is the only one in the genus which has this peculiarity. It has an extensively creeping rootstock, which is glossy black, very slender and subterranean.

The barren fronds are nearly a foot in length. The fertile fronds are longer than the sterile, and more contracted—on account of the lobes bending back at the edges, reflexing a little over the fructification. They stand quite erect, have a lanceolate outline, and are only once-divided, or simply pinnate ; but are again deeply cut into roundish-oval lobes, which bear the crowded rows of fruit-dots. The masses are of a dark-brown colour, and covered with a thin indusium, which is very soon cast off, and the masses then become confluent or run together. Found in marshes and swamps ; everywhere common from Quebec westwards.

Judging from the specific name, this ought to

have been called the *Woman* or *Lady Fern*. It is not a pretty Fern, but may be grown to complete a collection. It will succeed in the wettest part of the rockery, in rough lumpy peat, leaf-mould, and broken bricks.

LASTREA CRISTATA : *Crested Shield Fern*. The thick caudex is decumbent, creeping on the surface. The stem is sparingly furnished with broad, membranous, brown scales. The fronds are about two feet long, very distinct from any other, yellowish-green, narrow, linear lance-shape in general outline. They are once-divided, the divisions short, or rather a long heart-shape ; these are again cut into lobes, which are attached to the mid-rib by the whole breadth of their base, and are toothed round the edge. The fruit-dots are very large and prominent. in two rows on each lobe, midway from the mid-rib to the margin, and often become confluent when mature. The fronds are herbaceous, and die down early in the fall. Found mostly in alder swamps ; generally distributed everywhere, but never in great numbers in one locality.

Culture.—This species prefers a damp, shady part of the rockery, but it is not very particular as regards a location. It is a fine pot Fern, and is worthy of a place in every collection. It has rather a stiff, rigid aspect, but contrasts well with others of less upright habits. The pots require good drainage ; the most suitable soil is light turfy loam, and peat in equal parts, and well mixed with coarse sand. The

pots should, if possible, be plunged in moss or other material during hot weather, to keep the roots cool, and moderately supplied with water at the root, with a sprinkling overhead now and then.

LASTREA MARGINALIS : *Marginal-fruited Shield Fern.*—The very large shaggy rootstocks creep slowly on the surface, with the embryo fronds almost smothered in brown chaffy scales. The fronds are two feet long, oval-lanceolate, and of a peculiar metallic shade of green, twice-divided throughout, and the stalk very scaly. The pinnules, which are deeply cut, are oval and slightly notched on the edge. The fruit-dots are large and conspicuously placed on the margin of the pinnules, and are by this easily recognized. Found on dry rocky banks, and rocky woods; general and very common. Very abundant on the rocky banks of the St. Lawrence from Quebec to Caprouge.

Culture.—This handsome Fern will become a great favourite with the cultivator, not only because of its beauty, but because of its adaptability for dry situations. In the rockery it may be planted anywhere, but will certainly give more satisfaction if partly shaded. But the soil is of great importance, and must consist of loam, leaf-mould, and broken sandstone or crumbled mortar, in equal parts. It is a unique subject for a pot; the most thorough drainage is essential to its welfare, and if potted in the above compost it will be managed without difficulty.

LASTREA NOVEBORACENSIS : *New-York Shield Fern.* The rootstocks creep flat on the ground, and are rather small. Fronds one foot high, slender, delicate, thin, slightly hairy, lance-shaped, and very light green. They are once-divided ; the divisions lance-shaped and deeply divided into oblong lobes. The fruit-dots scattered over the fronds, small and rather indistinct except in mature fronds.

Found on elevations in moist swampy woods ; generally distributed from Quebec westwards.—Bergerville and Charlesbourg, Quebec.

Culture.—Although this species is found in swamps, it is impatient of too much moisture, under artificial cultivation. A rather dry, but deeply shaded part of the rockery will suit it. It will succeed well in pots which are effectually drained ; and the soil it likes best is—rich loam two-thirds, and leaf-mould one-third, with enough of sand to keep it open and porous. It must not be subjected to too much wet at any time. It will thrive in a well-ventilated Fern-case, the same precautions being taken as for pots.

LASTREA GOLDIANA : *Goldie's Shield Fern.* The rootstocks and stems are scaly. Fronds from two to three or more feet long, of a broad lance-shape, the lower half twice-divided, but the upper half is only once-divided. All the divisions are, however, deeply cut and toothed at the edges. The fruit-dots are large, very distinct, and placed nearer the mid-rib than the margin. Found in rich, moist

woods ; generally distributed from Montreal westwards, but not at all common.

Culture.—It is to be regretted that this noble Fern is so scarce, for its gigantic proportions render it a conspicuous rockery plant, where a little shade and moisture would enable it fully to develop itself. A mixture of loam and peat will suit it, if grown in pots ; but for in-door work, it will be found inconvenient from its large size.

ONOCLEA SENSIBILIS : *Sensitive Fern.* The rootstock of this, the only one of the genus, is a creeping rhizome about the thickness of one's finger, lying flat on the ground, from the extremity of which the fronds arise, which are of two sorts—fertile and barren. The barren fronds are triangular in outline, and have very long stems ; they are once-divided, the divisions broad, very much scalloped into lobes, and a lovely green colour. The fertile fronds grow up among the others to the height of one to two feet, but do not appear until midsummer ; much contracted, twice-divided, the pinnules curling themselves over the fruit-dots so as to resemble little balls, green at first but soon turn black.

Found in wet, shady places ; very general and common everywhere.

Culture.—This Fern, it seems, was named sensitive from a supposition that it would not bear handling ; but this is a great mistake, for it can be not only touched, but planted with impunity and success. It is a first-class subject either for the rockery or pots.

The only things essential to its well-being are a compost of loam, peat and leaf-mould, in equal parts, and plenty of water,—a little leaf-mould being thrown on the rootstock to give it some encouragement to throw out roots and keep it cool.

OPHIOGLOSSUM VULGATUM : *Adder's-tongue Fern.* The fertile fronds are from six to eight inches in height, straight, having a row of fruit-dots on each side of the spike, near the top, of a yellowish colour. The barren frond sheaths the stem about half way, entire, spotted, and resembling a tongue at the top. Found in bogs and wet woods ; but not very common.

This is a useless Fern to the cultivator, having no beauty to recommend it, or, if it had, will not succeed with artificial cultivation.

OSMUNDA REGALIS : *Royal Fern.* This is known in England as the *OSMUNDA spectabilis*, but it differs very little from the British variety. It is what is usually called the *flowering Fern* ; but has a host of other popular names, as—Osmund the Waterman,* Osmund Royal, and St. Christopher's Herb, Royal Bracken, &c. The root of this species

* The origin of the name of this genus seems involved in some obscurity. Mr. Moore quotes the following legend in connection with it:—"At Loch Tyne dwelt the waterman, old Osmund. Fairest among maidens was the daughter of Osmund the waterman. Her light-brown hair and glowing cheek told of her

is composed of wiry tubers, which in old plants elevate themselves on the surface, and thus form a little mound. From the centre of this mound spring the fronds, three to four feet in length, long stemmed, and, when young, tinged with purple. The fronds

Saxon origin, and her light step bounded over the green turf like a young fawn in his native glades. Often, in the stillness of the summer's even, did the mother and her fair-haired child sit beside the lake, to watch the dripping and the flashing of the father's oars, as he skimmed right merrily towards them over the deep-blue waters. Sounds, as of hasty steps, were heard one day, and presently a company of breathless fugitives told with haste that the cruel Danes were making way towards the ferry. Osmund heard them with fear. Suddenly the shouts of furious men came remotely on the ear. The fugitives rushed on. Osmund stood for a moment; then snatching up his oars, he rowed his trembling wife and fair-haired child to a small island covered with the great Osmund Royal, and helping them to land, bade them to lie down beneath the tall Ferns. Scarcely had the ferryman returned to his cottage, when a company of Danes rushed in; but they hurt him not, for they knew he could do them service. During the day and night did Osmund row backwards and forwards across the river, ferrying troops of these fierce men. When the last company were put on shore, Osmund, kneeling beside the river's bank, returned heartfelt thanks to heaven for the preservation of his wife and child. Often, in after years, did Osmund speak of that day's peril; and his fair-haired child, grown up to womanhood, called the tall Fern by her father's name."

are twice-divided or bipinnate, the segments or pinnules of the lower divisions oblong ; but the upper part of the frond is suddenly contracted into a spike or panicle of globular capsules, containing the fruit-spores. It is easily recognized by the peculiar manner in which the fructification is placed, being merely a termination of the otherwise barren frond. Found in moist swampy woods ; general and common.

Culture.—This royal subject justly merits its regal honours, for, in truth, when found in situations suitable to its full development, it is a noble sight. Specimens of it found on the banks of the Clyde, in Scotland, measured eleven feet long. This plant will grow best in a moist position at the base of the rockery, and if its roots be placed near a pool or basin of water, it will shoot up with greater vigour. It is also well adapted for pot culture ; a peaty soil, mixed sparingly with leaf-mould, loam and sand, is the compost best suited to its wants. It must never be allowed to become too dry, but will be greatly benefitted if it be placed in a saucer of water during its season of growth.

OSMUNDA CLAYTONIANA : *Clayton's interrupted Flowering Fern.* This is also a noble plant, and is very easily recognized by the fertile parts being placed in the middle of the frond, and interrupting, as it were, the barren leaflets on the rachis or stem. The fronds are once-divided, and again very deeply cut nearly to the base. The colour is a lively

shining green. Found in moist woods and swamps ; very common and abundant everywhere. Generally accompanying *O. regalis*, and therefore the culture is identical.

OSMUNDA CINNAMOMEA : *Cinnamon Fern*. The specific name refers to the lovely cinnamon colour of the fertile fronds, which rise up from the same crown in the midst of the barren ones. The barren fronds are once-divided, and again deeply cut into oblong lobes,—much in the same way as *O. Claytoniana*, but darker in colour and two feet long. The fertile fronds are separate, and form a close spike of fructification, longer than the barren ones, and decay early in the season. Found in moist woods ; general and common, and mostly found in company with the two former species. It must receive the same treatment as the others, with this exception—that it requires a little more leaf-mould incorporated with the soil, and a better drainage. Its roots are a mass of wiry tubers, which seem to revel in the decayed leaves of its native haunts.

POLYPODIUM VULGARE : *Common Polypody*. The rootstock is a creeping rhizome as thick as the little finger, densely covered with brown chaffy scales, much branched, and lies on the surface. The fronds are from six to twelve inches long, lance-shaped, and merely cut into segments nearly to the stem, and almost opposite each other. But it is the fructification of this variety which renders its

recognition so easy. The fruit-dots are arranged in a row on each side of the segments, between the mid-rib and the margin ; they are destitute of any covering or indusium, very large and prominent, circular, and the colour is a very bright golden-orange. Found in mossy rocks and banks ; abundant, and generally distributed. The rocky woods above Victoria Cove, Quebec, are nearly covered with this beautiful Fern.

Culture.—This species is, perhaps, the most useful of all our natives for artificial cultivation, because it will adapt itself to any situation ; but its favourite place is a decayed tree-stump, or the shelf of a dry mossy rock that is partially shaded. It prefers a soil composed of leaf-mould, peat and sand, in equal parts, and is not benefitted by too much water. It is admirably adapted for pots ; they must be drained to one-third their depth, potted in the above compost, and rather sparingly watered. This is also a capital Fern for a Wardian-case, and will be found to grow there without the least difficulty. It is an evergreen if protected from frost.

POLYPODIUM DRYOPTERIS : *Three-branched Polypody.* As the specific name indicates, this Fern is called the Oak Fern, probably on account of its being found on the bases of mossy oak trees. The rootstock is black, no thicker than a thread, creeping extensively. Fronds from five to ten inches long, triangular in outline, pale green, smooth, very brittle, and divided into three branches at the top of the

stalk. These branches are again divided, and again cut into oblong lobes, which slightly reflex back at the edges. The tiny fruit-dots are placed near the margin of the lobes, numerous, and, like all the genus, destitute of covering. Found in rocky woods ; general and common. Abundant on the bank of Little River valley, Quebec.

Culture.—This is a compact, distinct, and very interesting little favourite, and well worthy of cultivation, more particularly for pots or a Wardian case. From its fragile texture, it is very sensitive to too much exposure ; its requirements are—leaf-mould, loam, peat, and sand, in equal parts, thorough drainage, and a shaded situation. It requires a moderate supply of water.

POLYPODIUM PHEGOPTERIS : *Beech or Woodland Polypody.* Rootstock creeping, subterranean, slender, and dark coloured. The fronds have long stems, the leafy portion of a triangular spear-head-shape, very hairy, and divided into lance-shaped sections, only the lower pairs pinnated, all the rest being attached to the rachis by their leafy bases, and these again scalloped or cut. Fruit-dots very small, three to four on each lobe, naked and yellowish-brown. Found in moist woods, and on wet banks ; general and common.

Culture.—This is a free-growing Fern, from twelve to fifteen inches high, and well worth a place. In the rockery it must have a damp, well-shaded spot,

where there is, if possible, percolating moisture. For pot culture, the best soil will be—a mixture of equal parts of loam, peat, leaf-mould, and rough sand to keep it open. Plenty of drainage, and abundance of water pave the way to success ; for anything in the way of stagnated moisture will be its death warrant. It may be grown in a Wardian-case with a fair degree of success—plenty of air being admitted on every favourable occasion.

POLYPODIUM HEXAGONOPTERA : *Winged Polypody.* The rootstocks are creeping. Fronds from one and a half to two feet high, and very much resembling the last species. The divisions are, however, farther apart, the fronds larger, and not so hairy. Found generally distributed from Montreal westwards, in open woods, &c. Not very common.

The culture is the same as for the last ; except that it is much too large for a Wardian-case.

PTERIS AQUILINA : *Common Bracken.* Rootstocks subterranean, dark, extensively creeping ; the fronds arising from it at long intervals, and are from one to four feet high. The leafy portion of the frond is a broad triangle, having a few pairs of primary branches at the bottom, which are once-divided, and again deeply cut into rather narrow lobes. The fructification is in one continuous line round the margin of the lobes, and is covered by a thin membranous expansion of the outer skin of the lobes, which reflexes back and forms an indusium.

Found growing abundantly everywhere ; a well known weed. The only place where it could be officially introduced would be where it was desirable to clothe naked ground : its harsh and uncouth proportions render it unfit for any other place.

POLYSTICHUM ACROSTICHOIDES : *Terminal Shield Fern.* Rootstocks tufted. Stems scaly. Fronds from one to two feet high, simply divided ; the divisions scythe-shaped, narrow, attached to the stem by very short stalks, and are slightly hairy. Fruit-dots on the back of the upper part of the frond, which, at this point, is very much contracted. The large and prominent masses, when mature, become confluent, covering the whole of the fertile lobes. The spore-cover—as in all this genus—is attached by its centre to the frond. Found on the margin of streams in woods. Generally distributed and common. Abundant at the brook on Gratten's Hill, near Quebec.

Culture.—This is a handsome evergreen species, and worthy of room either in or out of doors. It loves a damp, well-sheltered part of the rockery, with a soil of loam, leaf-mould, and sandy gravel. The soil, for pots, will require to be—rich light loam, three parts, leaf-mould one part, and about one-sixth of coarse sand. The pots must be well drained, and plentifully supplied with water. It will make a fine plant for a large Fern-case, but will be too large for a small one.

POLYSTICHUM ACULEATUM : *Prickly Shield Fern.* Rootstock shaggy and tufted, with the fronds rising from its summit in a circle, which, like most of the genus, has a rigid, bold appearance. The general outline of the frond is lanceolate, dark shining green, from one and a half to two feet long, and twice-divided ; the first divisions are placed alternately on the stem ; the second divisions are arrowhead-shaped, and so sharply toothed as to become prickly : hence the popular name. The fruit-dots are numerous, mostly confined to the upper half of the frond, and placed in a parallel line on each side of the mid-rib of the pinnules ; large at the base, but gradually reduce in size towards the point. It has the usual circular spore-cover of the genus, which is fixed to the frond by a depression in its centre. Found in rich mountainous woods. North shore of Lake Huron (Abbé Brunet) to Kamouraska, eastward and northward ; rather rare.

Culture.—This is a beautiful and useful evergreen species for the amateur, because it will flourish without any particular care. It will also grow in any soil ; but will be found to luxuriate with a soil composed of equal parts of loam, peat, and leaf-mould. As sunshine always impairs its rich green colour, it will require to be planted in a shady part of the rockery ; but not under the drip of trees. This is a gem for a window, only requiring a deep, well-drained pot, and plenty of water while growing freely ; but should never be allowed to stand in a saucer of water. It might be introduced into a

Fern-case with fine effect ; but no place will suit it better than the hollow of a tree-stump in a shady retreat.

POLYSTICHUM LONCHITIS : *Holly-leaved Shield Fern.* Rootstock dark, tufted, large and shaggy. The fronds are once-divided, one foot high, dark shining green, and narrow lance-shaped. The whole frond is merely two rows of pointed egg-shaped leaflets, overlapping each other, and very thorny : hence the popular name. The fruit-dots are large and prominent, and placed a little nearer the mid-rib than the margin of the leaflets ; with the cover, as usual, fixed by its centre. Found in rocky mountainous woods ; rather rare.

Culture.—This is a Fern which is rather difficult to cultivate, for this reason—that in artificial culture, it is impossible to give it the pure bracing air of the bleak mountain top. In the rockery, it should have a hillock for itself, and a soil of peat and loam. It will succeed pretty well in a greenhouse, when once well established in a pot ; but any kind of stagnant moisture at its root will be its death. The pots must be nearly half filled with drainage, and the plant potted rather firm, and a good deal of sand added to the above compost, and must be kept moist, but not wet.

POLYSTICHUM FRAGRANS : *Sweet-scented Shield Fern.* The rootstock and stem covered with chaffy dark-coloured scales. Fronds from six to nine

inches long, hairy, narrow lance-shaped, highly aromatic, evergreen, once-divided, but again cut down to the stem into oblong lobes or pinnules. Fruit-dots very large and dark brown when mature, covering the whole of the pinnules.

Found in clefts of shaded rocks ; from Kamou-raska to Lake Superior and northwards ; occurs sparingly as far south as 45 °. Rigaud Mountain, near Montreal.

Culture.—This scarce species has a very neat habit, which makes it invaluable either for pots or Fern-case. But in whatever situation it is placed, thorough drainage is indispensable. The soil must be loam and peat in equal parts, with half a part of broken sandstone or bricks, broken pretty fine. It should be kept moist, but by no means so wet as to make the soil marshy.

STRUTHIOPTERIS PENNSYLVANICA : *Ostrich Fern.* Rootstocks upright, egg-shaped, very large and shaggy, sometimes rising above one foot high. This caudex is formed by the bases of the decayed annual fronds,—thus giving the appearance of a tree Fern. The fertile fronds are shorter, much more contracted, and quite distinct from the barren ones, among which they are quite hidden. The fertile fronds, like the barren ones, are once-divided ; the leaflets of which are rolled back all along their margins, and completely envelope the fruit-dots within them. The whole general appearance of the frond is like the plume of an ostrich : hence the

name of the genus, from struthios, an ostrich, and pteris, a Fern. The barren fronds spring in a circle from the summit of the rootstock ; they have strong angular stems, from three to four feet long, once-divided, the divisions lance-shaped, and again deeply cut into rounded segments. Found in rich, moist, loamy ground ; generally distributed. Common near Montreal and westwards ; at the base of the hill, Little River valley, near Quebec.

Culture.—This is undoubtedly one of our noblest natives, and is most effective in rocky scenery, where there is room for it to develop its glorious fronds. It requires three parts of loam and one part leaf-mould and sand ; but it is not at all particular either as regards a soil or location, provided it has distant shade and abundance of water. It will succeed in a well-drained pot, with the above soil, and placed in a saucer of water during growth ; but will be found rather large for in-door work, particularly where space is limited.

SCOLOPENDRIUM VULGARE : *Hart's-tongue Fern.* This Fern is distinct in appearance from all others, and is readily recognized by the entire, bright shining green, strap-like character of its fronds, which are called simple,—that is, they are neither cut nor divided, though they are slightly wavy along the margin. The conspicuous fruit-dots are arranged in lines, placed at intervals nearly at right angles on each side of the mid-rib. Each of these lines are, however, when young, composed of two distinct

proximate lines, which when mature are united—thus forming what is called a twin sorus ; this alone is the characteristic which distinguishes the genus. In old fronds the lines of fructification very much resemble so many caterpillars on the back of the frond—so much so, that many on turning them up start back in the greatest terror. The fronds are evergreen, and from one to one and a half feet long.

Found in the dripping chasms of limestone rocks ; rare, and only to be found in the upper parts of the Province. Gray says, “ It abounds in a deep ravine at Chittenango Creek, below the Falls, U. S.”

Culture.—A. STANSTEAD & SONS, of Todmorden, Lancashire, England, describe no fewer than one hundred and forty-eight abnormal variations of this one species, in their Fern Catalogue. It is fortunate that this fine Fern is easily managed : indeed it is remarkably tenacious of life ; and if failure should take place, it will be through neglecting the necessary and all-important supply of water,—shade and moisture being indispensable fully to develop its curious and beautiful fronds. Like all rock Ferns, it requires to be effectually drained ; the most suitable soil is two-thirds sandy loam, and one-third leaf-mould and crumbled mortar or broken oyster shells, in equal parts, to be potted rather firmly, and abundantly supplied with water. It will be found a very suitable subject for a Fern-case, the humid atmosphere of which will be quite congenial to it. If it be planted in the rockery, it will require protection in winter, otherwise it will be apt to perish.

WOODWARDIA VIRGINICA : *Common Chain Fern*. This species has both sterile and fertile fronds, which do not differ much in general appearance. They are from one to two feet high, once-divided, and again cut into oblong lobes. But the fruit-dots are the most distinguishing feature in its recognition ; the masses being oblong and placed in a parallel line, in a chain-like arrangement on each side of the mid-ribs, both of the first and second divisions. They soon run together and form a continuous line, almost entirely covering the mid-rib. Found in swampy ground ; general in Ontario, but not common.

Culture.—This is a curious though withal a coarse Fern. A moist part of the rockery will suit it ; shade is not of so much consequence. In pots it will require good drainage, a peaty soil, and must not be stinted with water. It is a good Fern for a large case, but will be too large for one of small dimensions.

WOODSIA ILVENSIS : *Common Downy Hair Fern*. Fronds from one to three inches high, growing in large tufts ; the tiny stem has a joint a short distance from the root, where the frond when mature falls off, but the lower portion remains firmly attached to the caudex for years. The fronds are broadly lanceolate, about one inch broad ; they are once-divided, and have a deeply lobed margin. The fronds are densely covered underneath with fine glossy hairs ; hidden among which are the crowded

fruit-dots. These downy hairs give the fronds the appearance of being dull and thick in texture. Found on dry exposed rocks ; generally distributed through the Province. Very luxuriant near the Saguenay ; and very abundant from the City of Quebec along the cliffs to Caprouge.

Culture.—This diminutive Fern is easily managed, provided it be kept free from stagnant air and stagnated moisture, either of which would be certain death to it. In the rockery it must be built firmly upon a piece of rock, with small stones, mingling some peat and loam with it. It will succeed in pots half filled with drainage, in a soil of peat, loam, broken charcoal and sand, in equal parts, care being taken to elevate the crown well above the pot, and build pieces of sandstone round the crown and over the surface of the soil. Water as often as the soil indicates drought, but be sure the water runs freely away again immediately. It will succeed in a thoroughly ventilated well-drained Fern-case.

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