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On Fundy's Shore.

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THE student and lover of nature who has always resided in inland Ontario can scarcely conceive how greatly he would enjoy a midsummer visit to the Maritime Provinces. Engagements that took the writer to Nova Scotia in the summers of 1908 and 1909 afforded him opportunities of learning something of the natural attractions of that part of Canada. In a general way Ontario offers the student a greater abundance and variety of bird-life and possibly too of insect-life, but in the phenomena and materials that make up the sciences of botany, geology, mineralogy, topography and meteorology, not to speak of the phenomena and organic life of the seashore, no section of Ontario can well compare with certain favored regions of the Provinces by the Sea.

Along the shores of the Bay of Fundy one may easily find the most ancient as well as the most modern geological formations. Not less than a dozen of these horizons outcrop within a radius of that many miles of the City of St. John. These include the Huronian and older pre-Cambrian rocks, stratified gneisses, quartzites, slates and limestones, and even graphite-beds. On the highlands, within the corporation of the city, the observer may stand on presumably one of the earliest islands to emerge from the primeval ocean. Not far distant, on the eastern arms of the Bay, he may witness as rapid and extensive formation and stratification of land as is to be seen in any part of the globe at the present day.

Closely associated with thes features, so interesting to the naturalist, and to a large extent conditioned upon them, are numerous, well-developed and profitable lines of industrial activity. Mining and fishing, farming and fruit-raising, lumbering

and manufacturing, are, each and all, well exemplified in one place or another around the head-waters of the Bay.

Twenty-four hours by rail will take the traveller from Montreal to Truro, the railway center of Nova Scotia. From Truro the naturalist may make a delightful circuit of Minas Basin and its eastern extension, Chedabucto Bay, doing the journey in two or three days' driving, or if so inclined, lingering along the way for a month. Whether he be geologist or botanist, Truro's beautiful, natural park, with its winding, wooded paths, sheer cliffs of rocks full hundred feet in height, and its picturesque falls, will hold him for a day. Then to see the landscape from the heights o'erlooking the town, and stretching for miles towards the west over the dyked meadows bordering the Salmon River, is well worth the effort of climbing that the view costs.

Leaving Truro by the north-west bridge over the Salmon River, a drive or bicycle trip of forty miles along a fairly good road, leads one through a number of shore villages—Folleigh, Grade Village, Bass River, Economy, Five Islands—giving peeps of water and dyked shores, and dashes through rocky woods. It is a constant succession of up-hill and down-dale as one crosses the narrow valleys of the numerous streams that seek their outlet in the muddy tide.

Between Economy and Five Islands the tourist has to climb the Gerrish Mountain. The road is steep, but passable for either carriage or automobile. The view from the Gerrish, covering, as it does, farm, village, water and opposing mountain-side, is, so far as I know, unsurpassed.

Five Islands obtains its name from that number of lofty precipitous rocks that rise like mountain peaks abruptly out of the Bay. A comfortable and homelike hostelry, looking over the restless tide that washes the bases of these mountain islets, will tempt the traveller to linger.

Another stage to Parrsboro, whence by boat he crosses the west end of Minas Basin to Kingsport and Wolfville, passing under the shadow of the Loof-off at Cape Blomidon. This is a bold promontory, affording a view of water, shore line, farms,

orchards and mountains which some well-travelled people have declared the finest their eye ever rested upon.

Here one finds himself in the garden of the Gravenstein. For the most part, compared with S.-W. Ontario, Nova Scotia and New Brunswick are inhospitable to the apple; but one of the several remarkable contrasts that surprise the visitor is the suddenness with which he emerges from a region where there is scarcely a barrel of edible apples to the township, to one that rivals the Grimsby strip itself. I once heard the Director of the National Experimental Farms deny the person's claim to know the apple in perfection until he has eaten ripe Gravensteins in the Annapolis Valley.

As will be seen by consulting the map, the road returning to Truro along the southern shore takes one through the Land of Evangeline, where the little village of Grand Pré, "distant, secluded, still, lay in the fruitful valley." Here he will be shown the stumps of the willows that once lined the ancient road along which Evangeline passed to the ships in the Basin, and the foundation stones of the church in which Father Felician prayed for the oppressor. One can hardly fail to suppose that had Longfellow visited this valley-garden he would have enriched his poem with touches that might have strengthened its truth and beauty.

It would too greatly extend this paper to describe in detail all the interesting biological features of these shores. The range of elevation, rock, soil, moisture and salinity bring into close relation a larger number of plant societies than I have ever seen elsewhere within an equal territory. A list of the upland plants unfamiliar to a resident of Southern Ontario would include the rhodora and the lambkill in their season, "unprofitably gay" but beautiful enough to justify their being.* In later August

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*The purple petals fallen in the pool
Made the black water with their beauty gay;
Here might the red-bird come his plumes to cool;
And court the flower that cheapens his array.
Rhodora! if the sages ask thee why
This charm is wasted on the earth and sky
Tell them, dear, *that if eyes were made for seeing*
Then Beauty is its own excuse for being.—Emerson.

melting blueberries ready to fill the hand outheld for them appeal almost in vain to the passer-by. Eyebright and bartsia, leontodon and matricaria, cadlock and carraway, lady's mantle and yellow-rattle,—now one and now another, catch the attention by their beauty or local abundance.

A curious and interesting wild-plant society springs up in the old, unstirred meadows dyked off from the sea. When these salt marsh lands are well cultivated they produce most luxurious crops of hay — " tall, rank grass that sweep the horse's sides,"—but when untilled for many years, they become the home of a host of sedges, wild-grasses, caryophylls, labiates and vetches. You can easily fill your plant-press on one of these old meadows.

But the most curious of all is the undyked salt-marsh society. These plants, growing in the slippery but compacted mud, receiving daily baths of salty water, and exposed to the direct rays of the sun and the sweep of the wind, have adapted themselves to conditions that are in some respects not unlike that of the desert. Among them are perennials with extensive rooting systems, suggesting the binding grasses of the sand dunes and annuals with small roots and linear succulent leaves. One doesn't know when to stop taking the seashore golden-rod, with its large, handsome, glossy leaves; the candelabral samphires, with their fleshy cylinders of indistinguishable stem, flower and leaf; the marsh rosemary, with its airy, lavender flower-sprays, catching the eye from afar, and the salt-water plantain, whose abundant spear-like leaves make of pot-herbs one of the wholesomest. If the inlander goes botanizing on Fundy's shores, let the salt-marsh be the first and the last he visits, even although of too many of his gatherings, when he brings them home, he will say with Emerson, "they left their beauty on the shore."

Orchids of Ontario.

BY F. J. A. MORRIS, PORT HOPE, ONT.

FIFTEEN years ago the present writer was induced by a colleague in the High School to take up botany. And he cannot now be too grateful for the advice or thankful that he acted on it. After 25 years of English country life he was finding himself hard to acclimatize. Things seemed strange. He had learned (as boys do) without conscious effort to know and name all the birds of his neighborhood by sight or song, by nest or egg; the flowers of the field and wood, the hedgerow and lane, the marsh and hillside were all familiar, and their household names came to mind at the bidding. Now everything was different; the world seemed bewitched—a topsy-turvydom of changelings ; blackbirds had become starlings, robins grown to thrushes, the very rooks turned to crows, and their lazy caw to a sharp, querulous bark, like a fox-terrier's ; he asked for daisies, and they gave him gowans (marguerites); for cowslips, and, behold ! marsh-marigolds. But a month's use of Spotton enabled him to identify plants for himself, and in a few seasons he was on nodding terms with most of the wild flowers of Ontario.

We all have our favorites, but most plant-lovers will admit the attraction of the monocotyledons, especially the charm of the lilies and the peculiar fascination of the orchids. It is the story of how I made friends with the orchids that this paper tries to tell.

In my first season, about the end of May or early in June, I was lucky enough to find a Yellow Lady's-slipper. It was in a hardwood bush, rather low-lying and moist. An elm had been blown down; its roots, welded into a solid mass with soil and turf, stood up 6 or 8 feet from the ground; right on the top of this in a grassy nook stood *Cypripedium parviflorum*, a most graceful object, an upright leafy stem crowned resplendently with a flower in full bloom.

This was a tempting lure to anyone, certainly too tempting for me to withstand, and my eagerness to gain acquaintance

with the orchids in their native haunts became intense. Had I simply been scouring the countryside without any system, my search would probably never have extended to the many inconspicuous forms of orchid. But working with a botany book is a very different thing ; as soon as you find a flower and identify it, there comes the scientific interest of comparing it with kindred forms; the intellectual interest of classification is added to the æsthetic interest in form and color ; the more species of a genus, the more genera of a family you find, the more pleased you feel; and in this systematic botany (however amateurish), beautiful blooms and homely or inconspicuous live on level terms.

Within a day or two of finding this Lady's-slipper I met my first rein-orchid, in another wood, rather more swampy, and bordering on the Rideau River ; it was only half-grown, and the flower spike did not develop fully for a fortnight. It was, however, already recognizable by the pair of large round leaves lying flat on the ground, one on each side of the tall scape with its flower spike; the leaves of a rubbery smoothness were darkish green above and silvery white beneath ; it was the Large Round-leaved Rein-orchid *(Habenaria orbiculata)*.

About a week later I made my way along a half-submerged path through willows and cat-tails into a wooded swamp ; the ground was spongy and of a peaty soil, as was evident from occasional ant-hills and patches of sphagnum moss ; under the trees were several plants of the common Northern Rein-orchid *(Habenaria hyperborea)*, with its leafy stalk and dense spike of inconspicuous green flowers. After struggling some 100 yards into the wood I was surprised to find myself emerge into a sun-bathed clearing, roughly circular in form, with a diameter of perhaps 50 yards ; the floor of it spongy and cool with the peat moss, broken here and there by large ant-hills and straggling patches of huckleberries and Labrador tea.

The silence and the solitude in the heart of the woods fill one with a sense of awe that seems never to pass away. For all the hundreds of times that I have penetrated to the home of those shyest of woodland denizens, the orchids, it is still with

bated breath that I step from the shadow of the trees into the sun-lit space beyond ; there is a feeling of mystery, as though one were entering a fairy ring and might with enchanted eyes see sights elsewhere hidden from mortal gaze. This eerie sense of the supernatural was fed that day by a startling sound from the depths of the wood that made me pause to listen, while my heart thumped out an involuntary echo. At first I thought it was someone at a distance beating the ground with a heavy mallet, but soon the blows became so rapid that this explanation failed, and I was driven to suppose it some strange machinery, as there was a mill dam on the river about a quarter of a mile away. During the hour or more that I wandered about the clearing, the sound was repeated several times at irregular intervals. This was my first summer in the Canadian woods, and you are welcome to your laugh when I tell you I had never heard a partridge drum before !

If the flowers are not fairies, they are the nearest thing to them that the gross eye of man can see. "Where the bee sucks, there suck I." We cannot see Ariel any more, but we may infer his presence where we watch the bee sip his draught of nectar. To a lover of flowers in a new land, this woodland glade was indeed a corner of fairyland, and many an elfish form I found disporting itself within the magic circle : the Dwarf-cornel or Bunchberry, with its petaloid bracts of white ; the coralline spikes of the Pyrola, and (hidden in a thicket of evergreens) the graceful Clintonia, with its down-bent bells ; the delicate vines of the Cranberry and the Twin-flower, Linnaeu's darling god-child. And who should be lords of the revel if not the Lady's-slippers ? For they were there, all about the edges of the ring and in the open; the Yellow Lady's-slipper, with its cup of glistening gold and a petal streaming out in a dark spiral at either side, and—paling all else into insignificance by its resplendent glory—that marvel of our northern swamps, *Cypripedium hirsutum* (spectabile or reginæ), the Purple Lady's-slipper, with its snowy petals and globular cup of delicate purple.

I have never seen anything, even among the exotics of the hothouse, to surpass the magnificence of this flower. It is a

great lover of moisture, and never ventures far from the cool springs it drinks so greedily at ; the stem is thick and succulent, often when you pull a flower the stalk drips water where it has been broken ; it is also very leafy with hirsute foliage, and the leaves form reservoirs at their sheathing base, the rain running down their upper sides into the axils. In open spaces and where the soil inclines to be firm, the plant takes a somewhat stunted form, ranging in height from 8 to 18 inches ; in moist soft moss it will exceed two feet, and in swampy woods deeply shaded I have met giants that stood breast-high as I faced them, the flowers poised on the pedicel well over four feet from the ground. Older and larger plants usually have two blossoms at the top of the stem, one expanding a few days after the other and on a shorter or less erect pedicel. When the blossom first opens, by the upper sepal and side-petals drawing away from the labellum, the lip at the outer edge of the opening into the pouch is often flushed with the richest of purple, a kind of deep magenta, almost wine-dark ; once in a while this rich hue lasts till the bloom is fully out.

Before the close of this my first summer term in a Canadian school, a boy from the country brought in a bunch of the Stemless Lady's-slipper. My eager quest of the orchids had sent me again and again to my Spotton, to con over the species of *Cypripedium*, and in my innocence of botanical terms and the absence of illustrations, I had conjured up a picture of a dwarf among Lady's-slippers with a stalkless bloom resting sessile on the ground between the pair of basal leaves. I now learned that a stalk without leaves was called a scape. *Cypripedium acaule* is stemless in a technical sense, but it has a very obvious stalk, thick and stiff, 10 or 12 inches high; the pair of leaves do not lie flat, but grow upwards at an angle to the scape ; they are oval and shiny green, but not smooth, hirsute and apparently a little sticky, for gnats and small insects are often to be found adhering to the surface. At the top of the scape behind the flower is a green bract, ovate to lanceolate in shape; the perianth is greenish brown, but the lip is pale pink intersected by rose-red veins; the shape of the lip or cup is peculiar; it droops,

pendulous, almost limp, the longest of the Cypripediums from base to tip and somewhat compressed at the sides ; it has not nearly so much of the full inflated appearance of the Yellow and the Showy (purple) Lady's-slippers; it looks as though it had been blown out once to its full distension and had then sunk in on the air escaping from the bladder or pouch, which has a crumpled appearance ; this fancy (idle as it is) is rather strengthened than dissipated by an examination of the top of the labellum, which is fissured down the centre and has the edges turned down as though they had fallen in. I have more than once found a dead bumblebee immured in the prison cell of the pouch, as though the flower had gone a step too far in its anxiety to secure insect fertilization. The *Cypripedium acaule* is more fond of shade than the *C. pubescens*, and is usually found in the immediate neighborhood of evergreens; but, on the other hand, it seems to venture further from moisture than any other species of Lady's-slipper. It will grow abundantly among rock-blueberries, rooting on granite with no foothold but the grey lichen or dry flannelly moss; in such places, however, it demands the shade of evergreens, and probably it gets more moisture than you might suppose; for it blooms early in June, and in such rocky woodland retreats there is plenty of snow and slushy water till well on in May.

By no sort of coaxing could we prevail on our country pupil to disclose the whereabouts of his orchid-swamp. But my colleague in charge of the botany class had tramped the woods about Barrie and the muskegs of the Northwest, and before the term ended we had ferreted out the presence of a mud-lake about 3 miles from the town. No sooner was the school closed than we set off, " bright and early " one July morning, with some sandwiches in our pocket, a Spotton, a botany-can, and hearts big with hope.

A novel experience is not easily forgotten, and the first sight of new flowers makes an impression well-nigh indelible. I know this mud-lake now so well from end to end and from side to side that it is curious to hark back 14 years or more to a time when it was absolutely strange. I remember wondering, by the

way, whether a mud-lake was a lake of mud or a pond of muddy water, or what ? Geologically these mud-lakes appear to be due to the same general formation as ordinary lakes; they represent big shallow pockets or hollows in the rock-strata. In hilly districts where there are plenty of good steep slopes for watersheds, you get ravines traversed by streams and open at the lower end ; but in flat country and on table lands, the ravine has its lower end raised to a level with the upper end and becomes a trough that must be filled before the water can resume its restless search for a lower level ; a mud-lake with its surrounding marshes is a trough of this kind.

The swamp we were heading for was nearly two miles long and perhaps ¾ of a mile across at the widest; the upper end a narrow neck, down which a stream of water flowed to lose itself in the widening marsh, among shrubs and trees that served to weld their spongy bed of peat and sphagnum into a compact mass. Sphagnum is the chief agent in the formation of peat; as it decays below, it grows in layer upon layer above, till it reaches an amazing bulk ; it retains a tremendous amount of moisture and can support great weight on its surface; but it is not a little treacherous, and is beset with man-traps, in the shape of openings and muskrat holes, into which the unwary may easily slip waist-deep or worse. If you jump on it or stamp, you will set cedars and tamaracks rocking quite a number of yards away. At first one has a very uncomfortable sense of insecurity and treads gingerly. As a rule, however, there is not much danger of Carver Doone's fate in these places, or even of serious immersion; for the surface is bountifully grown with sedges, herbaceous plants and shrubs; a majority of these belong to the Heath family, viz.: Cranberries, Huckleberries, Andromeda, Labrador tea and American laurel ; Bog Myrtle or Sweetgale is also a common shrub. The centre of these orchid swamps is rarely visible from the outside, as there is a belt of woodland round it; this has first to be penetrated before you reach the lake. Usually for some distance above and below the lake there are no trees towards the centre where it is wettest; tamaracks venture out furthest from the drier ground and

next to them spruces and cedars; they never grow more than 15 or 20 feet high in such situations. The sides of the lake have a margin varying from 2 or 3 to 30 or more yards where the trees grow only sparsely; these margins are simply sphagnum covered with Huckleberries and other shrubs of the Heath family.

The mud-lake in this swamp was about ½ a mile long and ¼ broad. Too shallow to swim in, it is deep enough to drown you a dozen times over. Apparently it had about two feet of water in it, but without even blinking it swallowed a 20-foot pole at a gulp, and then asked for more. Its bed is nothing but a solution of peat particles in water, with the consistency of gruel and reaching goodness knows how far down. On the lake were beds of Yellow and White Lilies, and at the margin Arum lilies and Pickerel-weed; in the sphagnum near the water a profusion of Cranberries, Buck-beans and Pitcher plants.

Our approach to the swamp had lain across a rocky pasture, then down a steep slope where the rock cropped out, into a moist belt of wood; parts of this were evergreen, and where the pine and hemlock had raised banks of soil with their roots or made them with their fallen foliage, rather above the swamp level, we found lots of *Cypripedium acaule*; further in, where no trees but a few cedars and tamaracks grew, we came on a huge colony of Yellow Lady's-slippers ; in some places they grew so thickly that with the stroke of a scythe you might have gathered in a sheaf of the blossoms ; amazing as this was we saw an even more wonderful growth of *Cypripedium hirsutum* before the day was over ; there were such masses of them that we could have gathered an armful with the sweep of a sickle. These Yellow Lady's-slippers were mostly of the form known as *pubescens*, though many were *parviflorum*. I have found this orchid in many stations, hardwoods and the top of steep ravines, as well as in swamps, and I have never been able to satisfy myself that there were two species; I hold the latest editors of Gray's Manual well advised in calling it one species with a variety. The plant is almost identical with the European *Cypripedium calceolus*.

Under the evergreens where the *acaule* was blooming, I found some green stalks and swollen capsules of another Lady's-slipper, very small, the flower over, though it had evidently been in blossom 2 or 3 weeks before. I had to wait 11 months to satisfy my curiosity; but patience was well rewarded and curiosity more than justified, when, at the beginning of June next year, I made my way with breathless expectation to the stranger's retreat. It was indeed the Ram's-head Lady's-slipper (C. arietinum). Some of the botanists say it is not remarkably pretty, only quaint-looking ; all agree that it is the rarest of its genus. I have found it in 4 or 5 places ; it resembles *acaule* in its preference for shade and evergreens, but it will also grow in wetter ground than *acaule*. I have seen it growing profusely in the slushy moss of a tamarack swamp, and occasionally it may be found immersed in water among the grasses and sedges with few or even no tamaracks to shade it. One station that I know for it is peculiar : on a high table-land, several hundred feet above Lake Ontario, at the upper edge of a pine wood, within a few yards of a clump of brackens and (in their season) orange lilies, stands a large pine tree, one of a score or more of similar outposts at the corner of the wood; its spreading branches begin a foot or two from the ground; under this canopy at the close of every May spring from their bed of pine needles a hundred plants of *Cypripedium arietinum*, blow in early June and disappear again, evanescent as a flight of warblers.

The plant in appearance closely resembles a small Yellow Lady's-slipper, the stem having similar leaves, thinner and smoother in texture than those of *C. hirsutum*. The form of the flower is peculiar; the lip is whitish, streaked with rosy veins; the mouth of the pouch is woolly with white hairs; the pouch itself is oddly shaped, being prolonged downwards on the under side in a gradually narrowing blunt-pointed beak; as the front wall of this beak drops almost sheer while the back wall slopes forward in its descent, the tip of the beak is under the front of the pouch—it is a deep inflated pocket rather than a pouch or cup. Towards the tip the whitish, veined cup assumes

a greenish hue, even when the blossom is fully out. It is certainly diminutive ; but, to my way of thinking, exceedingly pretty. A peculiar interest attaches to this species, from the fact that its 3 sepals are separate. In the other Cypripediums, one sepal stands erect behind the column and the other two lie welded together as one broad sepal underneath the labellum ; in the Yellow Lady's-slippers the suture of this under pair of sepals is incomplete, so that their common apex is split into two tips. In the Ram's-head the two lower sepals are entirely distinct; as these and the side petals are much alike, greenish-brown and narrow, the flower seems to be a labellum with a perianth of 5 similar streamers, one above (the broadest), one at each side and two beneath.

The same swamp added three new species to my beginner's modest little list of *Habenarias*. In the marshy woods at one side of the swamp I found the *Habenaria bracteata*, a green rein-orchid, easily recognized after a little experience; the lowest leaves are much larger than those higher up, smooth, thickish, dull dark green; the plant is about 1 ft. high, with 4 inches of a flower spike; as a rule there are 5 leaves on the stalk (occasionally 4), the lowest is the shortest and broad blunt obvate or spatulate in shape; the next is the largest and longest, but more ovate and sharper pointed; the next is about as long, but broad lanceolate; the next shorter and narrowly lanceolate, similar (though larger) to the long narrow bracts subtending the flowers. The flowers themselves are small and green, the lip a narrow oblong cleft at the apex into 3 teeth, the centre tooth shorter than the lateral pair; the spur is sac-shape, not unlike its analogue in the insect world, the honey bag of a bee; it is whitish, pellucid, almost transparent, and of so delicate a membranous texture that it withers up and shrivels before the rest of the flower shows trace of decay.

In the open near the mud-lake among the Buck-beans and Pitcher-plants were quite a number of stalks of *Habenaria dilatata* ; it is very similar to *hyperborea* in character, though usually more slender and with narrower leaves; the little flowers are snow white and deliciously fragrant ; the smell without

being heavy like that of hyacinths or some of the lilies is yet full-bodied and rich, a pure sweetness, reminding one a little of syringa or basswood at its prime.

A week or two later I found the extremely handsome *Habenaria leucophæa*. I had no illustrations of orchids in those days, and not being familiar with any species like *leucophæa*, I wrongly identified the plant as *Habenaria blephariglottis*. This idea remained fixed till last summer, when I discovered *H. blephariglottis* in great abundance on the margin of a mud-lake north of Muskoka. I had then to rearrange my ideas of the Fringed Orchids, and was for some time doubtful whether this early find of mine was *leucophæa* or *lacera*. Many of my readers are probably amateurs like myself, and doubtless find just such difficulties as have beset me, cropping up all along the orchid-hunter's path; so I shall attempt a description of the orchid and mention some of the points of distinction between it and those I had confused it with.

The plants of *leucophæa* stood up well over two feet in height, some of them over three feet ; they grew in the open swamp close to one corner of the mud-lake ; near them were plants of *H. dilatata*; the stout stem was leafy with several long narrow lanceolate leaves ; the flower spike was loose, on an average 4 inches long and 2 inches wide; the flowers (12 to 16 in number) large with long (1½ inches) somewhat clavellate spurs; the general impression you got was of white flowers with a greenish tinge on the sepals; but the flowers are not white; I have found the plant a dozen times and in swamps 200 miles apart, and the flowers have never been white; to make certain of the color one had only to set side by side a spike of *H. dilatata* and one of this Fringed Orchid; by contrast with the former's snowy gleam, *leucophæa* shows jaundiced yellow ; in point of fact it is of a delicate cream color, something like that of basswood blossom. The flowers are fragrant with a delicate odor suggestive of English meadow-sweet, or of elder, but more faint and subtle. The lip is large, ¾ of an inch wide and about the same length from base to tip, broadly fan-shaped and divided into 3 irregularly wedge-shaped divisions, the middle division

much the largest ; all these divisions are cut to the middle (at the sides almost to the base) into a copious fringe; the spur (1½ inches) is much longer than the ovary, in the lower third of its length thickened (clavellate) and then tapering again to a bluntish tip. It is at its prime about July 15. *Habenaria lacera* I have never found, but it appears to be of a similar color to *leucophæa*; the lip is 3 parted, but the segments are narrow and the fringe of the side segments consists of only 3 or 4 long threads (½ an inch long); the spur is clavellate as in *leucophæa*, but it is shorter than the ovary, being about ¾ of an inch long. *Blephariglottis* has a simple lip ovate in shape, something like a tongue, slightly convex and fringed round the sides and tip; the spur (about ⅞ of an inch in length) is slightly longer than the ovary; it is not clavellate, but tapers evenly to a point ; the blossom is snow-white and conspicuous from a distance; it is not a glistening or waxy white, but dead white like paper without any sizing; it flowers from the latter part of July till the middle of August; the plants are not as large as those of *leucophæa*, ranging from 10 to 20 inches in height; the flower spike is denser and not so wide, ranging in length from 1 inch to 2½ inches, in breadth from 1 inch to 1½ inches; the spurs are straighter and point more directly downwards; in *leucophæa*, the spur is generally boldly curved like a strung bow.

The only other fringed orchid known to me is the Smaller Purple Fringed Orchid *(Habenaria psychodes)*. It is fairly common about the margin of willow swamps near the Rideau and in beaver meadows about sluggish peaty streams; it is a beautiful orchid in its native haunts uprearing its broad raceme of mauve purple among meadow-rue, tall sedges and clumps of spiræa. The lip is fan-shaped and tripartite with the divisions fringed; in this as in its fragrance it resembles *leucophæa*.

We pass from the *Habenarias* of this swamp to a group of 3 orchids that come next in Gray's Manual. I mean the Beard-tongue (Pogonia), the Grass-pink (Calopogon) and the Arethusa. These were all growing in the wet sphagnum near the lake; all are beautiful in various shades of magenta, from deep crimson to pale pink. The Calopogon was conspicuous at a

distance by its height (12—18 inches) and handsome spreading branchlets of 3 to 7 or more bright magenta blossoms. It grows from a hard corm-like bulb, has a single long grass-like leaf, whose base sheathes the stem; it is our only orchid whose ovary is not twisted. The lip of an orchid is really the upper petal, but the ovary is twisted so that the corolla is given a complete turn; the upper petal becomes the lower and so placed develops strange shapes and properties with a view to cross-fertilization through insect agency; the spurs, for instance, at the base of the lip are horns filled with nectar to entice insects to enter the flower, and they are so placed that in reaching them the insect gets dusted or plastered with pollen and then smears the pollen on the stigma of the next flower it visits. The Calopogon has, so far as is known, no store of nectar; and in any case, the lip being above the reproductive parts, a secretion of nectar from any part of the lip would be useless — without some additional modification. If you examine the lip which stands up erect above the column you will see that it is hinged; further, the face of it is adorned with a brush of gaudy yellow and magenta hairs; whether the insect makes for these in the belief that they are stamens from which it may gather pollen, or merely sees a good place to cling to—a bush, as it were, jutting from a steep wall, or what; anyway, it alights there, and its act of settling springs the booby-trap; down goes the lid and dumps the insect-victim backwards on to the column; the column lies more or less prostrate or horizontal and is widened at the outer end like the top of a crutch; the jar of the insect's body starts the pollinia out from their sockets; the insect squeezes forward to get out of the blossom over the end of the stigma, its stickied abdomen touches the pollinia threads which at once adhere tightly; at the next flower the pollinia are left on the stigma. The puzzle (if this process is really verified) remains, how insects as intelligent as bees can continue to be made boobies of by this trap. Darwin practically upset Sprengel's theory that many flowers were "false nectar-producers," by demonstrating that many of the Habenarias supposed to contain no nectar in their spurs had the secretion stored between

the inner and outer walls of tissue; he found moreover the inner wall so delicate that a human hair could pierce it, and it became pretty certain that insects perforated this inner wall and so got at the nectar.

The blossoms of the Calopogon are more or less resupinate, i.e., lying on their back and facing upward; the hinge of the lip works so easily that if the wind sways the stem or if you jar the stalk the lid or lip falls forward and down. You seldom find more than 2 or 3 flowers open at a time, the lower ones fading before the top ones burst open. Its flowering season is the first half of July.

The Pogonia has a single flower of light rose red or more usually pale magenta pink; the stalk is usually 8 or 10 inches long, not quite erect, but bending over its bed of watery moss; midway on the stalk is a sessile lance-shaped leaf and a second (smaller) at the base of the ovary; the sepals and petals droop forward in a kind of loose hood over the lip, which is crested and fringed on the face with yellow and whitish fleshy hairs. The flowers have a characteristic odor, which some liken to the smell of raspberries; I think this goes a good way to prove that our language of smells is still in its infancy; there are a hundred times as many distinct and recognizable smells as there are shades of color, yet we haven't a tenth part the vocabulary of scents that we have of tints. All we can say when we smell a flower is that it's "like such and such another smell — only different." Those who have studied our ferns will recollect that the Fragrant Shield-fern *(Aspidium fragrans)* is described as having a scent "like crushed raspberries"; no one who has smelled the delicious scent of the Fragrant Shield-fern would ever be reminded of Pogonias, or vice versa; the scent from the fern is highly aromatic and suggests a spice; some resiny powder that Puck might fill King Oberon's snuff-box with. A scent like vanilla, I was going to say, which by a curious coincidence makes me seem to be arguing in a circle; for vanilla is a spice derived from an orchid in the same group as Arethusa and Pogonia; but the aroma belongs to the dried capsule, and like all spices suggests dry tissue, whether wood, bark or root. The

fragrance of Pogonia is not aromatic ; while distinctive, it is delicate rather than strong; the reverse of pungent as most spices are; it suggests moisture; and it suggests sphagnum; yes, even the peat bogs with which the flower is associated, as well as mere sweetness. Probably like most smells it is a very complex sensation, for I find in it also a quality peculiar to orchids, it even reminds me a little of the smell of the yellow lady's-slipper—only different.

The Arethusa does not venture out into the open grass and moss so near the water; it prefers the shelter of low huckleberry and other bushes some yards back from the mud-lake. Here, with its bulb safely set in moist sphagnum, it raises its graceful form to a height of 8 or 10 inches; the erect scape sheathed by two or three bracts and bearing at the summit a single erect blossom somewhat like that of the Pogonia, with lip crested and ridged with yellow and whitish fleshy hairs; but the flower is crimson or red magenta in color, not pale, and the perianth is erect; a sepal and two petals upright behind the column, and flanking these but slightly forward of them, two more sepals partly erect but their tips drooping or arched forward. It suggests quaintly to one's fancy a creature startled and listening intently. It is as fugitive as it is shy; the blossom is rarely seen before the middle of June, it is gone by the close. Small as it is, the Arethusa is exquisitely beautiful and matchless in elegant grace of outline.

The total number of species secured in this swamp was about 15, but two years later I was shown a sphagnum swamp of even more wonderful richness in orchids. It is larger and has no mud-lake in the centre ; it forms a rough oblong from two to three miles long and nearly a mile across at the widest. From end to end runs a path, usually half submerged and always boggy and treacherous, but rich in sphagnum. If you keep to this path it will lead you first through a dense wood of small tamaracks growing in wet moss ; then through a beaver meadow or marshy clearing with stumps and scattered shrubs; then through a spruce wood ; then through another beaver meadow, and finally out through pines to higher ground.

At one side of the path near the centre of the swamp's length lies a partly-drained huckleberry marsh shut in on all sides by trees ; pines, spruce and tamarack on the inner sides, poplar at the outer side near the high ground ; it is obscured by rows and clumps of trees scattered over its surface; a difficult place to find, a still more difficult place to lose, and a nightmare to tramp over in the blazing noon of a July day. But everywhere throughout the length and breadth of the swamp there are orchids. I have never had a chance to exhaust the wealth of the swamp throughout the long season at which orchids bloom, but nearly every year for more than 10 years I have spent a few days there, never earlier than the end of May or later than the middle of August. If one lived there the year round and had leisure, I don't doubt as many as 30 species of orchid would be found within its limits. This is really a remarkable range, for all Ontario has very little more than 40 species.

One of the first finds I made on striking into the path through this swamp was the *Liparis loeselii*. Its favorite home is wet thickets and springy banks ; in wet thickets and wooded swamps it seems to have a peculiar fondness for a track of some kind, often growing in the padway or ruts of a grassy winter-road, or the trodden hollows of a footpath, usually in water ; in such stations the plant is of a lax habit, the pair of keeled basal leaves spreading limply out at a wide angle from the scape ; patches of Marsh Marigolds are often its companions in such situations ; but in springy banks where its companion is often the Adder's-tongue Fern it is smaller and more rigid, the leaves more upright and appearing to support the flower stalk as it were in a vase. The leaves are elliptic, pale green and oily smooth, 5 or 6 inches long by an inch or so in width ; the flowers are few, greenish in a loose raceme ; the parts of the perianth are linear, the petals threadlike in their narrowness ; the lip juts forward horizontally and is then deflected in a widened apex of pellucid yellowish green, wavy-crisped or scalloped at the edges. It flowers from June to July.

Close to it I found some spikes of another small green orchid with a single ovate leaf, its petiole sheathing the base of

the stalk, the blade spreading about an inch higher; the whole plant only 5 or 6 inches high; the upper half a narrow spike of tiny whitish green blossoms standing on fairly erect short pedicels (about 1-9 inch long), the spike so strict as hardly to exceed 1-3 of an inch in width; the parts of the perianth acute, the petals narrower than the sepals; the lip ovate and prolonged to a sharp tip; it proved to be *Microstylis (Acroanthes) monophylla*; I have often found it with Loesel's Twayblade in the wet paths and roads of wooded swamps. I have also found it abundant in the leaf-mould of some dark and damp deciduous woods, and once near Jones' Falls, on the Rideau Canal, I found it plentiful on one side of a steep rocky hill (only sparsely shaded with trees) growing in clefts and ledges of rock. From the latter part of June into July is its flowering season.

This same swamp harbors the other species of this genus; round the edges of the partly-drained blueberry-marsh I have found it at the end of July and in August—*Microstylis unifolia (ophioglossoides)*. It is a more delicate-looking plant; about 6 inches high, the leaf sheathing the stem in a loose funnel and spreading out into an oval blade half way up the stem; the flower cluster is a loose raceme about 1½ inches long and 2-3 or 3-4 of an inch wide; the flowers are on long pedicels (1-4 to 1-3 of an inch long), very slender and filiform; the lip of the flower is somewhat truncate and 3-lobed, the lateral lobes longer than the centre; on the lower half of the raceme the flowers are scattered, spreading and distant; at the upper half they become crowded and grow upwards to a flat top; looked at from above the top of the raceme is almost as flat as a tiny umbel—corymbose, you might call it; as the flowers are resupinate and face upwards, it has the curious appearance of having been artificially flattened, as though a sheet of glass had been held over the top of the raceme till the flowers at the summit of their thread-like pedicels had all been checked at the same point in their upward growth. The difference in general outline between *unifolia (ophioglossoides)* and monophylla resembles that between the Tiarella with its short spreading raceme of "foam-flowers"

and the Mitella with its long strict spike of nearly sessile blossoms.

Near the far end of the blueberry marsh were some clumps of fairly tall spruce hemmed in by thickets of straggling shrubs ; in this dense shrubbery I found many plants of the Stemless Lady's-slipper and occasional stalks of the Long-pediceled *Microstylis*; while right in under the spruces along with *C. acaule* was *Goodyera repens (Epipactis ophioides)*, with its little one-sided raceme of white woolly flowers and its spreading tufted rosette of green leaves boldly veined or chequered with white. It flowers in August, and further north in the forests of the Algonquin Park it is abundant; as is the larger one-sided raceme of *Goodyera Menziesii (Epipactis decipiens)*. They are usually under evergreens, and pubescens is found in the same locality, easily distinguished by its raceme not being one-sided.

I found also in this swamp *Habenaria obtusata*, a frequent companion of the Goodyera, but with a much wider range, indeed coextensive with the swamp in wet and dry, but always more or less shaded spots; its single slightly-stalked leaf rises from the base to a height of 4 or 5 inches, the scape reaching twice that height with a few-flowered loose raceme of greenish-white flowers, the lip entire and lanceolate, deflexed, about ¼ of an inch long; the spur about the same length.

Where I first found the Long-pediceled Microstylis at the end of July, I was puzzled by an orchid — for so it seemed — that was only just in bud; it was growing, a few spikes of it here and there in the damp sphagnum at the edge of a ditch serving to drain part of the blueberry marsh. I marked the place carefully, and returning a fortnight later enjoyed the treat of first acquaintance with the Ladies' Tresses. The species was *Romanzoffiana*. Sturdy erect stems, some of them a foot or more in height, a tuft of upright grass-like leaves at the base; a thick crowded spike of white (or sometimes creamy) flowers tinged with green, in a spiral of three ranks; the flowers standing out at right angles to the stem ; the sepals and petals connivent (united) in a hood over the lip ; the lip is described as pandurate (i.e., fiddle-shaped) ; if you follow its roughly oblong

outline from the base to the tip you will see it is slightly contracted or pinched at the sides just forward of the base, and again more strongly just short of the dilated crisped apex. There is a second species very similar that flowers a month later and lasts on into October, *Spiranthes cernua*; the lip is not panduRate, but wavy-crisped at the sides and in front towards the apex; near the base on the upper surface of the lip are two small nipple-shaped callosities ; the two lower sepals are not connivent over the lip with the other parts of the perianth, but free. It is frequently found in moist meadows and springy banks and I have often seen it in such places in company with Liparis, Adder's-tongue Fern, Fringed Gentian, Grass of Parnassus and the Large Blue Lobelia *(L. syphilitica)*. Both these species are deliciously fragrant; one writer says like violets, another like the bloom of the horse-chestnut ; it reminds me (along with its honey sweetness) of the smell of almonds or bruised laurel, and I think there is in the fragrance of the horse-chestnut blossom just a suggestion of almonds. Perhaps all three statements may be partly reconciled if we suppose the first writer to be referring to the scent of the little white violet of the swamps and peaty cedar groves ; its scent is decidedly aromatic, a spicy sweetness, as is the scent of Spiranthes.

There are two more species of Ladies' Tresses that I have found. One *(Spiranthes latifolia* or *plantaginea)* blooming in the middle of June in moist grass and the "stodgy" soil on the margins of running streams; the flowers are smaller and form a narrow tube; the lip has a spot of yellow on the face of it ; the other *(Spiranthes gracilis)* grows in pine barrens and sandy plains; the flower spike is one-sided, but as the stalk is twisted spirally 3 or 4 times, the flowers wind in a slender gradual spiral about the stem. I do not mean, of course, that the stem is spiral like a corkscrew; but if you were to hold the top of the stem taut in a vertical position and then roll it round in one direction a few times between finger and thumb you would produce the effect; imagine a length of string formed of 3 strands, 2 green and 1 white; if you follow the white strand up, your eye will trace a spiral round and round the string ; that white

strand is the one-sided raceme of flowers in *Spiranthes gracilis*. The flowers individually form small very narrow tubes. I have only found it twice, once in High Park (Toronto) and once near the Rideau.

One more orchid remains to be mentioned as found in this extraordinary swamp. It is found in watery moss under the tamaracks within sight of the central path. In those days it was known as *Habenaria rotundifolia*, but it has since been transferred to its true genus of *Orchis*. *Orchis rotundifolia* is decidedly uncommon ; I have never found it anywhere but in this swamp, and it is far from abundant there. It is showy and easily recognized by the single broadly ovate or nearly orbicular fleshy leaf near the base; the parts of the perianth are ovate oblong and of a pale purple or rose color ; the lip is longer than the sepals and petals and longer than the slender depending spur, being from 1-4 to 1-3 of an inch long; it is thick and fleshy, of a waxy white spotted with deep purple or magenta; the shape of the lip is 3-lobed, the lateral lobes near the base, short and acute, the center lobe carried forward in an oblong, dilated and notched or bilobed at the apex.

Our only other species in this genus is much more common, the Showy Orchid; yet all the years I was in Eastern Ontario I never chanced to see *Orchis spectabilis*, though other collectors were more fortunate. When I came to Port Hope, however, I found one of the showy orchid's favorite haunts. This was a hardwood bush of beech and maple, with pine at one corner and hemlock scattered throughout. The soil was peaty and rich with vegetable mould, quite swampy in parts and damp and springy everywhere.

Here at the end of May and early in June, *Orchis spectabilis* is rife, usually in moist situations under the shadow of the hemlocks. Like its congener *rotundifolia* it has a loose 4- to 6-flowered raceme. In place of a single leaf it has a pair of light fleshy green leaves that enfold the scape as it were in a cup ; the lip is entire, long and ovate, fleshy and snow white (as a rule); the perianth is described as magenta in the botanies, but it in no way resembles the magenta of the Calopogon,

or even of the Arethusa, which is lighter than the Calopogon, or yet of the Pogonia, whose magenta varies from bright to pale rose-pink. All purples, of course, are blended of red and blue; in magenta (to my eyes) the dominant color note is red; in the perianth of *Orchis spectabilis*, it seems to me, blue predominates; if I were asked to name its color, I should say pale mauve (or heliotrope ?) of an extremely delicate shade; it conveys to the eye a sense of dreamy softness in which the outline of the flower seems to melt ; as long as one looks at the fleshy white lip the eye seems to find a solid resting-place, well defined; but once the eye travels to the mauve perianth, it is hard to tell where the edge of the flower passes into the shadowy spaces beyond; as though the bloom exhaled a kind of ethereal vapor in which it floated nebulous.

The editor of Gibson's "Our Native Orchids" says of Hooker's Habenaria that it is often found with the Showy Orchid. Curiously enough, rare as Hooker's Orchid is with us, I have found it not uncommon in this one wood so rich in the Showy Orchid. Sometimes it is in damp shade under the hemlocks, but more generally in fairly firm soil near the base of beech trees. It very closely resembles *H. orbiculata*, but there are several points of distinction in structure and appearance as well as in habitat. No one seeing the two together, I imagine, would have any difficulty in separating them and correctly identifying. The real trouble is, one seldom gets a chance to compare the two, as they seldom grow together. *Orbiculata* prefers swamps and the dense shade of low damp woods, usually evergreen ; in general appearance it is larger, lighter green, and looser in its raceme than Hooker's Orchid. The flowers are whitish green on the face and the very long (3-5 of an inch to 1 inch) spur is clavellate towards the apex. The flowers of *H. Hookeri* are decidedly yellow-green on the face ; this is seen on a close view to be caused by two lateral spots of yellow at the throat ; the spurs are not clavellate, but taper uniformly to a slender tip. The stalk of *orbiculata* is bracted, while that of *Hookeri* is always bare ; in both plants the stalk is apt to be twisted so that the parallel lines and grooves running

vertically up the scape form a spiral ; one last point I have noticed : the flowers of *Hookeri* are so poised that the spurs point more or less directly downwards, while in *orbiculata* they hang traversely ; so much so that the tip of the spur sometimes passes behind or in front of the scape and projects beyond. The surest point of distinction is, however, the character of the spur in the two. Hooker's blooms in June, the other in July.

In the same wood and in most of the beech and maple woods in this neighborhood I have found the Downy Rattlesnake Plantain *(Goodyera pubescens)* ; and also wherever the woods are damp and dark enough with plenty of rich vegetable mould you will find the Many-flowered Coralroot *(Corallorhiza multiflora)*. A common companion is the Indian Pipe, a brother parasite among the Heaths.

The Corallorhizas are named for their curious roots, which are much branched into a mass of short fleshy tuberous knobs, whitish and brittle ; the plants are saprophytes, deriving their nourishment from decaying wood and roots; they pay for their degenerate habit by an entire lack of chlorophyll, so that none of them has any trace of foliage or green coloring. Two species are fairly common, one small with a light muddy brown stalk having 2 or 3 sheaths in place of foliage ; the scape 6 or 7 inches high with a spike of 8 or 9 small dull purple or brownish flowers having a white or whitish lip ; it is called *trifida*, from the lip having 2 small lateral lobes above the base ; the old name was *innata* ; it flowers in May or early June and is found in wet shaded places; I have found it in swamps of alder, willow and poplar, and also in marshy woods with Liparis and the Short-pediceled Microstylis. The other common one is *Corallorhiza multiflora (maculata)* ; a much taller, stouter plant, dull purple or madder brown; the flowers dull purple with the lip white spotted with magenta-crimson ; its flowering season is July.

There are besides two rare species in Ontario. One large, larger than *C. maculata*, having very large flowers (for the genus) with a limp drooping habit; the plant is dull purple or madder; the lip conspicuously striate with deep purple lines ;

there are 3 stripes of brighter purple on every part of the perianth ; the plant is a western form and is very local in Ontario. Here in Port Hope about 3 years ago two small children emerged from a wood with their hands full of this orchid ; it has never been seen since. Twice it has been found by a friend of mine near the Rideau Lake, in damp dark woods, once with *Orchis spectabilis*. Last June a plant was sent from Port Sydney (Muskoka) to the late Dr. Brodie. It had been found growing in the grass-border of a road close to a deep dark wood of mixed evergreens and deciduous trees ; the species is called *C. striata (Macræi)* ; its flowering season is June, usually the earlier part of the month. A fourth species comes from the south and is occasional in Southern Ontario; it is as small as *C. innata* but purplish rather than dirty yellow, and its small flowers have some rich purple spots on the whitish lip; the base of the scape is thickened like a corm ; it is called *odontorhiza*, but whether the root is really "toothlike" or not I do not know; it is said to flower from July to August ; I have only once found it and that was at the beginning of July when it was just out in bloom. The genus is almost spurless; most species are gibbous beneath at the base of the lip; the species *multiflora* or *maculata* is peculiar in having a developed spur.

Out of some 40 species of the orchids described in Spotton I had as long as 10 years ago come upon the homes of 28 ; till 3 years ago my list received no extension. But in the last 3 seasons I have been able to add 8 new species ; some of these I have already mentioned in dealing with other species of their several genera. Two or three remain to be named.

The first is the Helleborine, *Epipactis (Serapias) Helleborine* ; it is probably not a native ; in all likelihood it was introduced from Europe in the earlier days of herbalist doctors for its reputed virtue as a medicine. It has been found in three neighborhoods only on the whole continent — Toronto (Ont.), Syracuse and Buffalo (N.Y.) ; this is surely significant ; a true native would not have hung on the outskirts of a city. It was in High Park (Toronto) that I found a colony of these settlers. They were situated on the shady margin of a small stream

among rank grass and alluvial deposit; they were in full bloom at the beginning of September; their season is said to be from July to August. The plants ranged from 12 to 20 inches in height. An average specimen would be 15 inches high. There is a curious symmetry in the growth of the stem and foliage. I will describe an average plant. For 5 inches up from the root the stem is in appearance almost leafless, but really it has 2 (or 3) sheaths; the lowest of these sheaths has no developed blade, the next has a small tag of blade, erect and pointed like a scoop; the upper sheath widens above and spreads away from the stem into an ovate pointed leaf about 1 inch long and more than ½ inch wide; these sheaths are distant, 2 to 3 inches apart. For the next 4 inches the plant is conspicuously leafy with 4 (or 5) alternate leaves an inch apart; the lowest ones sheathing, but passing gradually to sessile (the top one or two being sessile); in shape the lower leaves are broadly ovate, the upper ones are lanceolate carried on to a long narrow acuminate tip; in size, the lowest leaf is little more than ½ the length of the next above it; the 3rd leaf is as wide as the one next below it but longer; the 4th is as long as the 3rd but narrower. This central part of the stem is apt to be slightly zigzag, as though the alternate sheathing leaves altered the stem's axis of growth. Above these leaves the stem is bare for 2 inches; then the one-sided raceme of 4 or 5 inches in length begins; each flower is subtended by a lanceolate bract, each a little smaller than the one below it; these bracts are of course simply the continuation of the stem's alternate leaves; though the lowest bracts are 3 or 4 times as long as the flowers they subtend, they are not very conspicuous owing to the heavy appearance of the ovaries and perianths of the flower spike. The foliage is very thin, of a bluish green hue and strongly nerved. Altogether the plant looks as though it grew from a leafless base through a leafy centre to an almost naked raceme.

The flower is not in any sense showy, but it is of great interest to the botanist from its structure, and from the fact that its British congener *(Epipactis latifolia)* was one of the orchids Darwin examined to see how cross-fertilization by insects was

effected. He has described this and the ingenious mechanism of the flower in his book on orchids, with all that marvellous accuracy and unerring judgment that characterize his writings and mark him intellectually one of the giants of the ages.

The lip, as you know, is that petal of the orchid which has been specially modified to secure insect fertilization. In the Epipactis the perianth is green suffused with dull lilac or mauve; the lip is also dull mauve, darker within. On a larger scale and in a more highly specialized form the lip resembles that of the Rattlesnake Plantain. It juts out horizontally from the flower in the shape of a ladle ; the fore part of the ladle drops abruptly into the form of a narrow U-shaped hinge the outer side of which is lower than the inner ; onto this outer half of the hinge is jointed the prolonged apex of the lip, flat, running to a point and slightly deflected from the horizontal ; in some species this hinge is elastic, but in this orchid it is stiff ; the whole structure of the lip suggests a sauce - boat with its lip pulled out into a slightly-depressed flat-pointed spout; this flat spout is a platform for insects to stand on ; the sauce in the boat is a secretion of nectar distilled by the flower. When the insect withdraws its head after sipping, the pollinia are plastered onto the back of its head from the column above and then smeared on the stigma of the next flower visited.

In the August of 1907, while on a fern-hunting expedition in the Algonquin Park, I was delighted to add 3 new orchids to my list. One of these, the Menzies' Rattlesnake Plantain, I have already spoken of. The second was one of the Listeras or Twayblades, *Listera ovata* ; a tiny plant ranging in height from 4 to 7 inches ; the spike of from 6 to 12 tiny blossoms, varying from 1 to 2 inches in length; the spike is strict, barely ¼ inch wide ; the little ovaries (somewhat globose) on pedicels rather shorter than themselves (about 1-12 inch long). There are 3 species in the genus, which is easily recognized by the pair of sessile more or less ovate leaves borne midway up the stem. In *L. convallarioides*, the lip is narrowly cuneate notched at the apex into 2 rounded lobes, the pedicels 1-4—1-3 inch long. In *ovata*, the lip is narrowly oblong twice length of petals, cleft

to about half way into 2 long tapering spikes. In *australis* the lip is linear, 4 to 8 times length of petals, cleft more than to half way into 2 linear bristles ; the pedicel in this species is longer than the ovary. The blossom was nearly over when I found the plants early in August, and probably the middle of July is their season. They were growing in a densely wooded swamp of tamaracks and spruce among sphagnum moss ; in their immediate neighborhood were the Habenarias *obtusata* and *orbiculata*, and the club moss, *L. annotinum*.

My last find was *Habenaria tridentata (clavellata)* ; it blooms from the middle of July till mid-August ; it was fairly abundant growing always in the open, in wet sandy soil of the shallow troughs skirting the railway, or on the moist floor of shallow gravel pits ; its usual companions were *Lycopodium inundatum* and Romanzoff's Ladies' Tresses. It is very easily recognized, having an appearance peculiar among the Rein-orchids. It grows from 5 to 15 inches high on a pale stiff woody stalk; about 1-3 of the way up the stalk (sometimes nearer the base, occasionally near the middle) is a single well-developed leaf, somewhat sheathing, oblanceolate (occasionally spatulate, rarely ovate), from 2 to 3 inches long and from ½—1 inch wide; above it are one or two small narrow bracts. The flower spike is very short, varying with the height of the plant from 1—2 inches in length ; the raceme is loose and spreading, more or less cylindrical, from ½—1 inch wide ; the flowers are small, creamy white tinged with green ; the lip is oblong and dilated at the tip where it is tridentate or 3-lobed ; the small teeth sometimes merely giving a sinuate outline to the apex of the lip. The spur is longer than the ovary ; clavellate, and curving somewhat in on itself like the slender abdomen of an insect preparing to sting ; the flowers are so poised that the spur is directed back horizontally from the base of the lip to the stem across which the apex passes.

I have never found *Habenaria flava (virescens)* which is common in New England and southward ; it seems to have an appearance similar to our *H. hyperborea*, but the slender spur is twice as long as the lip ; the lip which at the apex is truncate

is at the base auriculate (with a pair of small lateral teeth) and tuberculate (with a raised lump on the upper surface). Have any of my readers ever seen this Rein-orchid ?

This survey of our Ontario orchids comprises all but about 6 species, and in it all the genera but two are represented. These are the Putty-root or Adam-and-Eve and the Calypso, each species *suo genere*.

The Putty-root grows in the rich vegetable mould of our woods and forests. From a solid bulb or corm springs a scape a foot or more in height with one or two sheaths clothing it ; at the top of the scape a loose raceme of dull yellowish-brown or purple flowers develops in May or June; late in the summer the corm throws up a large oval leaf which lasts over the winter. The corms are filled with an exceedingly glutinous matter, used by early settlers to mend their crockery with, hence the name Putty-root ; the quaint nickname of Adam-and-Eve is apparently due to the fact that the corms (2 or more) often remain attached to one another by a ligament of fleshy root, like Siamese twins. The scientific name, *Aplectrum*, means spurless, because the base of the perianth shows no trace of spur or gibbous enlargement.

The Calypso, that entrancing nymph of our northern woodlands or bogs, is still to seek. It is usually found in sphagnum; it is abundant in the forests about Banff, flowering early in June ; it has been found near Toronto in the Don Valley, and only a few years ago a lady in Rosedale found it in one of the ravines near her house and sent it for identification to Dr. Brodie. But it still eludes my search. On the principle of "see Naples and die," I used to think if I could only find such and such a flower Atropos might use " the abhorred shears " when she would. But I have found many a long-sought treasure, and there's always just one more that I want. At present (among orchids) my heart's desire is Calypso. It must be singularly beautiful.

The corm sends up separately a petioled wide-oval leaf and a scape ; this latter is 5 or 6 inches high, crowned with a

solitary showy flower. It appears to resemble a Lady's-slipper, and Linnaeus called it *Cypripedium boreale* ; the perianth is magenta-crimson ; the lip is large and saccate, looking like a wide rounded scoop carried forward to a shovel shape, two parted in front ; it is white, spotted with madder purple and having 3 rows of glassy yellow hairs in front.

We men of grass (to use the Indians' name for Douglas, that pioneer botanist of our North American conifers) are often taxed with the selfishness of our hobby. It may be doubted whether any hobby is unselfish, or indeed any pursuit or passion in the world. Certainly botany is no more selfish than any other mode of enjoyment, and surely a hobby exercised in the field of Natural History has far more purpose and profit than your average hobby. Did you ever think, too, even if the love of flowers is selfish, how pure an affection it must be ? There can be nothing gross about it, for it is quite impersonal. It is not the love of an individual ; strong as it is, it goes out equally to all members of a type; nay, a multitude of types.

In our human loves we must still echo the poet's heart-cry, "Never the time and the place and the loved one all together." But it is not so with our love of the flowers. Every spring at the renewal of the year, how many a trysting place we know of in the hush of the woods or the cool of a mossy hollow, and how well we know, if we sally forth one day at its season, the loved one will be there to greet us, shyly watchful of our coming ! Is this selfish ? Yet no lover could be more eagerly expectant, as we approach the place; more tenderly solicitous as we bend over our woodland fay, holding our very breath, and with gentlest touch, lest we maim the frail life. We commune in spirit, and it seems as though it remembered us ; yet it is not the flower we saw there before, and it too in its turn will vanish away ; all this we know, yet there is no sense of loss; only exquisite sweetness and a purging of the gross.

Present Status of the Prairie Warbler in Canada.

BY A. B. KLUGH.

THE Prairie Warbler *(Dendroica discolor)* is one of those birds which is apparently extending its range into Canada, and it would be well at this time to bring our records together, more especially so because of several errors which have appeared in ornithological literature concerning the status of this species in Canada.

The Prairie Warbler has, up to the present, been taken only in Ontario. By a remarkable coincidence, the first two specimens were taken on the same day—May 11th, 1900—at Toronto, one by Mr. J. Hughes-Samuel, and the other by Mr. J. H. Ames (Auk, Vol. XVIII., p. 106)

Nothing more was heard of this species in Canada until 1905, when Mr. W. E. Saunders took a female near Cameron Lake, Bruce County, on May 28th, and on May 30th heard a Warbler song which was new to him. He found the singer, and identified it as a Prairie Warbler. He subsequently heard at least two more of these strange songsters. Mr. Saunders published an account of his discovery in the Ottawa Naturalist, February, 1906; p. 206.

Meanwhile I had published in the Auk, Vol. XXIII., p. 105, a record of a young male Prairie Warbler which I took on September 5th at Point Pelee, Essex County.

The next record is of a male taken by myself on May 17th, 1908, at Colpoy's Bay, Bruce County, which record appeared in the Ontario Natural Science Bulletin, No. 5, 1909, p. 25.

Next is a record which appeared in the Ottawa Naturalist, September, 1909, of a specimen taken near Eganville, Renfrew County, on May 11th, 1909, by Rev. G. Eifrig.

These are all our published records, but I wish here to add two more, viz., a male and a female Prairie Warbler, which I took at the edge of a cedar swamp at Colpoy's Bay, Bruce County, on May 10th, 1909. Both were shot in the same cedar tree, the male some four hours after the female.

Considering that the migration records of this species in the United States show that it is one of the earlier Warblers to reach its breeding grounds, arriving in the northern tier of States about May 6th—8th, and that the Canadian records, omitting Mr. Saunders' records, run May 11th, 11th, 17th, 11th, 10th, 10th, it appears highly probable that, as Mr. Saunders has previously suggested, there is a colony breeding near Cameron Lake, Bruce County, and also that there are probably colonies at other points in Ontario.

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A List of Butterflies Taken at Toronto, Ont.

BY ARTHUR GIBSON, OTTAWA.

DURING the years 1896, 1897 and 1898, the writer devoted considerable time to a study of the butterflies occurring in the neighborhood of Toronto. This necessitated, of course, much collecting in such well-known localities as "High Park," "Rosedale," "Trout Creek," etc., all of which were, fifteen years ago, excellent hunting grounds for the entomologist. To-day, however, with the rapid growth of the city, conditions are considerably changed, and houses and other buildings have grown up on our former favorite collecting spots. In some districts where we collected largely, nothing whatever of the past now remains to remind us of the happy hours we spent among the trees, shrubs and flowers. The expansion of a large city demands, of course, new streets and roadways, and during a recent visit to Toronto I was much amazed at the many buildings which have taken possession of certain places where I, in company with other collectors, passed many a pleasant afternoon.

When asked for an article for the Ontario Natural Science Bulletin, it occurred to me that a list of the butterflies collected by me in the vicinity of Toronto might not be without interest to lepidopterists. In order to add to the value of the list, I

include several additional species taken by other collectors, records of most of which appear in the Annual Reports of the Entomological Society of Ontario.

1. *Danais plexippus*, Linn.— Abundant almost every year, particularly during the latter part of the season. On Toronto Island I have seen thousands of these butterflies clinging to young willow trees, in autumn.

2. *Euptoieta claudia*, Cram.—A single specimen of this butterfly was taken by me in High Park, in July, 1893. The only other Toronto record which I know of is of a specimen captured by Mr. Paul Hahn on the Humber Road, near the "Old Mill," also in July.

3. *Argynnis cybele*, Fabr.—Common most seasons, appearing as a rule early in July. In 1896, it was flying in numbers on June 27. In 1897 I noticed it abundantly all through July.

4. *Argynnis aphrodite*, Fabr.—This species has often been found by me in company with *cybele*. It is a common species and may generally be collected where thistles grow.

5. *Argynnis atlantis*, Edw. — In 1896, this butterfly was fairly abundant in July and August. As a rule, however, it is uncommon in the Toronto district, frequenting more northern localities, such as Muskoka.

6. *Argynnis myrina*, Cram.—In damp places particularly, this pretty little "silver spot" is found. It is an abundant species, occurring probably more commonly in August. It has been observed from early until late in the season.

7. *Argynnis bellona*, Fabr.—Common in swampy areas. Have collected it as early at May 24; more abundant in June, July and August.

8. *Melitæa phaeton*, Dru.—In the Annual Report of the Entomological Society of Ontario, 1894, p. 31, Dr. Bethune gives Toronto, among the localities where this butterfly has been collected. I have never seen any trace of the insect at Toronto myself. It occurs commonly some years further north. At Ottawa we find it almost every season in June in a large swamp near the Experimental Farm.

9. *Phyciodes nycteis*, Doubl. Hew.—Not uncommon in June and July. I have found it abundantly, particularly about the middle of the latter month.

10. *Phyciodes carlota*, Reak.—The late Capt. Geddes is recorded as having collected this species at Scarborough, near Toronto. This is the only record, I believe, of the insect having been met with in the district. Scudder gives its distribution as follows : "South of Lat. 40°, from the Atlantic to the Rocky Mountains."

11. *Phyciodes batesii*, Reak. — Although this butterfly has not been taken to my knowledge at Toronto, it is more than likely that it occurs there. It has been collected at Hamilton; at Ottawa I have found it on several dates, the last specimen being captured on June 13, 1908.

12. *Phyciodes tharos*, Drury.—A common species throughout the summer months, especially abundant in July.

13. *Grapta interrogationis*, Fabr.—Some years quite common. We have collected many specimens of this and other Graptas near or on trees which had been "sugared" for noctuids, particularly when the trees were visited the following mornings. The form *umbrosa* flies chiefly in June, July and August, and the form *fabricii* in August and September, and occasionally in October, according to Dr. Bethune.

14. *Grapta comma*, Harr.—Also common, especially so in July. The form *harrisi* has been found in larger numbers by me than the form *dryas*.

15. *Grapta faunus*, Edw.—This has been recorded from Hamilton and Cobourg, and doubtless occurs at Toronto, although I have no actual record of it having been met with there. It flies from May to October.

16. *Grapta progne*, Cram. — Abundant ; seen in numbers through the season, from late May till late September. My dates of captures read particularly " July."

17. *Grapta j-album*, Boisd.-Lec.—Common some years in August and September. Often seen in woods during warm days in early spring.

18. *Vanessa antiopa*, Linn. — Occurs throughout the whole summer ; very common towards the end of season. Also seen in early spring on warm days in open places in woods.

19. *Vanessa milberti*, Godt.—A widespread species flying in early spring, and more abundantly in the middle of summer.

20. *Pyrameis atalanta*, Linn. — This widely-distributed butterfly is common almost every year. I have taken it abundantly at Toronto from May 23 to July 28.

21. *Pyrameis huntera*, Fabr. — Very common some years, particularly in late summer, being found mostly wherever late flowering asters were in bloom.

22. *Pyrameis cardui*, Linn. — One of the most widely distributed butterflies. Abundant periodically at Toronto, particularly towards the middle and end of summer.

23. *Pyrameis caryæ*, Hbn.—The only Ontario record which I know of for this butterfly, is of a single specimen taken at Toronto, and given to me by the captor, Mr. Harry Tyers. No date is on the specimen.

24. *Junonia coenia*, Hbn.—In 1895, 2 specimens were taken at Toronto by Mr. Tyers, and in 1896, on May 23, a specimen was taken in the Don River Valley by Mr. C. T. Hills. Mr. Paul Hahn recently reported to me that his sister, Miss F. Hahn, captured a specimen at Toronto, in August. These are the only records I know of for the district.

25. *Limenitis ursula*, Fabr.—This species has been taken at Port Credit, near Toronto, by Mr. C. T. Hills.

26. *Limenitis arthemis*, Drury. — Not uncommon in some years, but more abundant further northward in Ontario. I have seen it in fairly large numbers in High Park and Rosedale. Flies in June, July and August.

27. *Limenitis proserpina*, Edw. — This butterfly has been collected at Hamilton. It is rare in Ontario.

28. *Limenitis archippus*, Cram.—A regularly-occurring species, but one which is never very abundant. There are places

in High Park and Rosedale where I could always find a few specimens. Taken in June, July and August; occasionally seen later than August.

29. *Neonympha canthus*, Boisd.-Lec. — Rather common in damp places, appearing in June and July; also found in August. In 1898 it was abundant in the middle of July.

30. *Neonympha eurytris*, Fabr.—Usually more or less common in June and early July; in 1897 it was abundant all through June in High Park.

31. *Satyrus alope*, Fabr., var. *nephele*, Kirby.—This species occurs a little later than the preceding. It is generally not uncommon along roadways, near woods, in July and August.

32. *Libythea carinenta*, Cram., var. *bachmani*, Kirtl.—Dr. Jas. McDunnough has collected this butterfly on two occasions at Toronto, viz., in 1895 and on June 7th in 1896. It is very rare in Ontario. On August 12th, 1896, I took a specimen at Cæsarea, on Lake Scugog.

33. *Thecla acadica*, Edw.—Found not uncommonly some years in July, especially early in the month. In 1896 it was fairly abundant in the latter half of June and early in July.

34. *Thecla edwardsii*, Saund.—This species I have taken in fair numbers near High Park, on the flowers of milkweed. In 1898 it was very common, particularly on July 9th. I have taken it as late as July 23rd.

35. *Thecla calanus*, Hbn.—Occurs at the same time as *edwardsii*; by some students it is thought to be the same species.

36. *Thecla ontario*, Edw.—The only Toronto records which I know of of this species are of 2 specimens taken by me, one on June 20, 1896, and the other on June 27 of the same year. Both specimens were studied and so named by the late Dr. James Fletcher. The species is very rare.

37. *Thecla liparops*, Boisd.-Lec., var. *strigosa*, Harr. — Not common in my experience at Toronto. Mr. C. T. Hills took it in June and July, in 1896.

38. *Thecla niphon*, Hbn.—I have no actual record of this butterfly having been taken at Toronto, but it doubtless occurs there. It is a widespread species, having been collected at London and Ottawa, in Ontario.

39. *Thecla laeta*, Edw.—This also has a wide range of distribution, but is very rare. It has been found at York Mills, near Toronto. It flies in May.

40. *Thecla titus*, Fabr.—I have taken this species rather abundantly in early July, particularly in High Park. It may also be seen flying in August.

41. *Feniseca tarquinius*, Fabr. — A single specimen is all that I have ever collected of this insect, viz., at Toronto, on June 4, 1898, in High Park. It must, however, occur abundantly wherever the woolly aphis of the alder is present, on which the larvæ feed.

42. *Chrysophanus thoe*, Bdv.—The only dates I have a record of for this butterfly are July 2 and August 8, 1898. The species is abundant some years in some sections; along the River Don, Mr. R. J. Crew has collected it in fair numbers.

43. *Chrysophanus epixanthe*, Bd.-Lec.—I have never seen a Toronto specimen of this insect. Dr. Bethune lists Toronto among the localities where the species has been taken (Ent. Soc. An. Rep., 1894). Near Ottawa the butterfly is common about July 1st.

44. *Chrysophanus hypophlæas*, Bdv.—Common almost every year. Many specimens have been collected by me from May 24, through June, into July. The species flies as late as September.

45. *Lycæna scudderii*, Edw.—Very abundant in High Park where lupin grows. Flies from about May 20 to middle of June, another brood appearing about July 15.

46. *Lycæna pseudargiolus*, Bd.-Lec. — Not uncommon, the forms *lucia*, *marginata* and *violacea* appearing in spring, and the form *neglecta* in summer. In 1898, the latter was seen in fair numbers early in July.

47. *Lycæna comyntas*, Godt.—Not common at Toronto, in my experience. On June 26, 1897, I took one specimen. Mr. C. T. Hills has also collected the species in June.

48. *Pieris protodice*, Bd.-Lec. — Very rare now in Ontario. It has been taken formerly in numbers at Toronto, Hamilton, etc., from May to October.

49. *Pieris napi*, Linn.—The summer form *oleracea-æstiva* has been taken by me in July. There is also another form which has been found in small numbers about May 24.

50. *Pieris rapæ*, Linn.—Only too common everywhere in Ontario from early spring to autumn. One of the worst pests of the market gardener.

51. *Colias cæsonia*, Stoll.—In 1896 this butterfly was taken in numbers at Toronto from June 11 to the end of the month. Besides a good series collected by the writer, specimens were also captured by Messrs. Hills and Tyers. This is the only year, I think, that it has ever been taken at Toronto.

52. *Colias eurytheme*, Bdv. — Occasionally met with in Southern Ontario. I know of no actual Toronto record, but specimens have been collected at St. Catharines and Port Hope, which are not very far from Toronto.

53. *Colias philodice*, Godt.—Abundant all through Ontario from May till autumn. It has been seen flying in late October.

54. *Terias lisa*, Bdv.—This southern butterfly has been found at Hamilton, 39 miles from Toronto. A few years ago I took a single specimen at Ottawa.

55. *Papilio ajax*, Linn.—Uncommon at Toronto. On June 14, 1896, I saw a specimen in High Park flying very slowly. On June 20 I captured a worn example, and on June 23 saw a further specimen. It was also seen on 1st and 11th July. In the same year, Mr. C. T. Hills took four specimens in June.

56. *Papilio philenor*, Linn.—As mentioned by me in the Annual Report of the Entomological Society for 1896, I am satisfied that I saw this butterfly in High Park on June 20. It had already been recorded from Toronto previous to 1896.

57. *Papilio polyxenes*, Fabr.—Not so abundant at Toronto as it is further east. I have taken specimens as early as May 24. It flies throughout the summer.

58. *Papilio troilus*, Linn. — Generally common at Toronto. In 1896, on June 12, it was plentiful. In 1898, I collected it in fair numbers on May 15 and 24, and on June 4. I found it chiefly in High Park.

59. *Papilio glaucus*, Linn., var. *turnus*, Linn. — A common insect in most places in Eastern Canada, flying about the time lilacs are in bloom. In 1898, it was abundant from May 24 till June 26.

60. *Papilio thoas*, Linn., var. *cresphontes*, Cram. — A rare butterfly in Ontario. Specimens have been occasionally collected at Toronto, even within the city. In 1897 a worn specimen was taken by Mr. D. Wilby.

61. *Ancyloxypha numitor*, Fabr. — Mr. R. J. Crew, of Toronto, has taken this butterfly in numbers along the River Don, and along the Humber River Mr. C. T. Hills has found it in June, July and August.

62. *Pamphila hobomok*, Harris.—Common towards the end of May, and in June. I have never found the variety *pocohontas* abundantly at Toronto; in fact, this form is rare in my experience.

63. *Pamphila leonardus*, Edw.—Some seasons this species is abundant in High Park, in low, damp places; I have collected it in numbers towards the end of August.

64. *Pamphila brettus*, Bd.-Lec.—The only Toronto specimen I know of is one taken by me; unfortunately, I have not the date. It was identified by Dr. Henry Skinner.

65. *Pamphila otho*, S. & A., var. *egeremet*, Scudd. — Not abundant at Toronto. Dr. Fletcher determined a Toronto specimen for me in 1898. Mr. Crew, I think, has also taken this butterfly at Toronto.

66. *Pamphila peckius*, Kirby.—Very abundant some years. In 1898 it was flying in large numbers early in July. It first appears in June; specimens have been noticed in August.

67. *Pamphila mystic*, Scudd.—This species is found at the same time as *peckius*, and is also common. It occurs all through Ontario, Quebec and the Maritime Provinces.

68. *Pamphila cernes*, Bd.-Lec.—Abundant in June and July, frequenting the same localities as the two last-mentioned species.

69. *Pamphila baracoa*, Lucas. — A specimen of this species was taken by me at Toronto, but I have no record of the date of capture. Dr. Henry Skinner determined it.

70. *Pamphila metacomet*, Harris.—I have never taken this butterfly in numbers at Toronto. In 1898, I found it on July 2; in 1896, Mr. C. T. Hills collected it in July.

71. *Pamphila viator*, Edw.—This is very rare in the Toronto district. Mr. R. J. Crew took a single specimen many years ago, and Dr. Bethune records the species having been collected on the Humber Plains, near Toronto, by the late Capt. Geddes.

72. *Nisoniades brizo*, Bd.-Lec.— Not common. Specimens have been collected in the latter end of May and early June.

73. *Nisoniades icelus*, Lint.—This has been collected by me at Toronto, the specimens having been named by the late Dr. Fletcher. It may be found also in June.

74. *Nisoniades persius*, Scudd. — In 1898 I collected this butterfly on May 24th. It is not, I think, abundant at Toronto.

75. *Nisoniades martialis*, Scudd. — This has been taken in Southern Ontario, at London, Hamilton and Toronto, according to Dr. Bethune.

76. *Nisoniades juvenalis*, Fabr. — Found in fair numbers some years, in May and June. Taken in Rosedale and High Park.

77. *Pholisora catullus*, Fabr. — Dr. Bethune, in the Annual Report of the Entomological Society of Ontario, for 1894, states that this butterfly has been collected at Toronto.

78. *Eudamus electra*, Lint.—This butterfly has been found at

Hamilton, by the late J. A. Moffat. It has not, I think, been met with nearer to Toronto.

79. *Eudamus pylades*, Scudd.—A very common species, particularly in May and June. In 1897 it was abundant from May 24 to June 26.

80. *Eudamus bathyllus*, S. & A. — Dr. Bethune, in 1894, listed Toronto as one of the Canadian localities where this southern butterfly has been collected. In recording this species in the Entomological Record for 1901 (Rep. Ent. Soc. Ont., 1901), the late Dr. Fletcher says : " Three specimens of this butterfly, which differs from the somewhat similar *E. pylades*, Scud., by the absence of the sexual costal fold in the males, were taken by Mr. James Johnston at Hamilton, last year. Although frequently recorded from Canada, I believe that these are the first specimens which have been examined critically."

81. *Eudamus tityrus*, Fabr. — Usually fairly common, the first specimens being seen about May 24. It flies through June and well into July.

School-garden Experiments with Potatoes.

BY S. B. McCREADY, PROF. OF BOTANY, O. A. C., GUELPH.

SOME simple experiments with potatoes were carried on in the spring of 1909 by four of the teacher students in the Spring Normal Class. The problems were concerning the relative values of large and small potatoes used as " seed," or pieces of different weights and with different numbers of eyes.

The work was carried on in small plots, 5 ft. x 10 ft. in size. In most cases only three or four hills of each kind were planted. The results tabulated below may be of interest ; at the same time, they must not be accepted as final conclusions on the problems :—

EXPERIMENT 1.—To Compare the Yields of Potato "Seed" of Different Sizes. (Four hills of each weight were planted in 5 ft. x 10 ft. plot.)

Weight of Seed.	No. of Potatoes.	Weights.	Total Weight.
2 ozs.	17 small 13 large	6 ozs.) 30 ozs.)	36 ozs.
4 ozs.	21 small 21 large	8 ozs.) 41½ ozs.)	49½ ozs.
8 ozs.	12 small 19 large	5½ ozs.) 52 ozs.)	57½ ozs.

EXPERIMENT 2.—To Find the Result of Planting Pieces of Potatoes of Different Weights, but With One Eye Each.

Size of Sets.	Product.	Weights.	Total.
⅛ oz.....	3 small 4 large	¼ oz.) 3¼ ozs.)	3½ ozs.
½ oz.....	5 small 7 large	½ oz.) 16½ ozs.)	17 ozs.
2 ozs.	8 small 16 large	½ oz.) 33½ ozs.)	34 ozs.

EXPERIMENT 3.—To Compare the Yields of Pieces of the Same Weight, but with Different Numbers of Eyes.

Size of Piece.	No. of Potatoes.	Weight.
1 oz. (one eye).....	1 small) 12 large)	35¾ ozs.
1 oz. (three eyes).....	6 small) 11 large)	35¾ ozs.
1 oz. (five eyes).....	3 small) 13 large)	41 ozs.

EXPERIMENT 4.—To Find if Cutting Up Equal-sized Potatoes into Different Numbers of Pieces Makes a Difference in the Yield.

Size of Seed.	Yield.
2 ozs. (one piece)	27¾ ozs.
2 ozs. (two pieces)	31½ ozs.
2 ozs. (four pieces)	31½ ozs.

List of the Cynipidæ of Ontario.

BY R. FRASER, '10, O.A.C.

FAMILIAR to all observers of Nature's phenomena are the galls produced by the *Family Cynipidæ*, *Order Hymenoptera*. The host plants affected are principally species of Quercus, Rosa, Rubus, Vaccinium, and Potentilla. The beautiful and varied characteristics of the different hypertrophies are too well known to need any particular comment here, but it might be said that cecidology, as the study of galls is termed, is yet in its infancy, and that there is a rich field for investigation in such matters as the alternation of generations, the relation of parasites and inquilines to both gall and gall-producer, and the histological structure o the gall tissues.

The mystery of gall formation is still to be satisfactorily solved, and here too is a wide field for experimental research and observation. The writer submits the following list of Ontario Cynipidæ, compiled from the collection and observations of Mr. T. D. Jarvis, O.A.C., and from the writer's own collection and observations.

The list is not as yet complete, but up to the present time the occurrence of the following species in Ontario has been recorded :—

Amphibolips :

A. confluens (spongifica), O. S.
A. inanis, O. S.

Andricus :

A. piger, Bass.
A. petiolicola, Bass.
A. futilis, O. S.
A. punctatus, Bass.
A. papillatus, O. S.
A. topiarius, Ashm.
A. lana, Fitch.
A. clavula, Bass.
A. palustris, O. S.
A. singularis, Bass.
A. seminator, Harr.
A. ventricosus, Bass.

Aulax :

A. tumidus, Bass.
A. nabali, Brodie.

Cynips :

C. strobilana, O. S.

Diastrophus :

D. cuscutæformis, O. S.
D. radicum, Bass.
D. turgidus, Bass.
D. nebulosus, O. S.

Gonaspis :

G. potentillæ, Bass.
(var. scutellaris, Gillette ?)

Holcaspis :

H. globulus, Fitch.
H. mamma, Walsh.

Neuroterus :

N. umbilicatus, Bass.
N. floccosus, Bass.

Philonix :

P. pezomachoides, O. S.
P. erinacei, Beut.
P. macrocarpæ, Bass.

Rhodites :

R. bicolor, Harr.
R. rosæ, Linn.
R. arefactus, Gill.
R. multispinosus Gill.
R. nebulosus, Bass.
R. radicum, O. S.
R. rosæfolii, Ckll.
R. gracilis, Ashm.
R. globulus, Beut.
R. ignotus, O. S.

Solenozopheria :

S. vaccinii, Ashm.

The following are of probable occurrence, but I would prefer to keep them separate from the rest until more definite information is obtained concerning them :—

Amphibolips :

A. nublipennis, Harr.

Biorhiza :

B. nigra, Fitch.

Diastrophus :

D. piceus, Provancher.

Rhodites :

R. lenticularis, Bass.
R. dichlocerus Harr.

Zopheröteras :

Z. vaccinii, Ashm.

Notes on Local Orchids.

BY F. MITCHELL, INNERKIP, ONT.

TO look back it does not seem so long ago when a portion of Blandford and Blenheim Townships was the ideal home of the orchid. Many spruce-girt lakes with sphagnum margins offered perfect conditions for Pogonias, Calopogons, Arethusa, and some of the Habenarias and Spiranthes; while back a little in partial shade among the tamarack, the Cypripedium in all its species found a perfect home. In cool hemlock woods Goodyeras of three species flourished, and even Calypse borealis could frequently be met with. And so it was with all other native orchids; for all there was some suitable place, but axe, and fire, and drainage have done their work, and now but few places remain where orchids can exist, and even the few remaining places are ravaged by vandals who call themselves *nature-students*, who pull up all they can; so it is no wonder that some species are becoming exceedingly rare, or perhaps altogether extinct.

I may digress and mention that I have made a little effort to preserve some of our orchids and other native plants. I have a few acres of natural woodland, into which no stock is allowed to enter, and I am adding to the plants already there other plants for which the conditions are suitable. I now have a pretty complete list of the ferns of the district well established, and I have a number of orchids, but I have no lake, so I only plant those to which I can offer suitable conditions.

But to return more directly to my subject, I may say that last summer I had particular opportunities to form conclusions as to the orchids still existing in the district; as an artist friend who had undertaken to paint our native orchids asked me to accompany him, and assist him in securing specimens of all existing species, I will proceed to note the different species as we found them in our search.

Pogonia ophioglossoides is seemingly as abundant as ever. It is to be found in quantity in every sphagnum bog.

Calopogon pulchellus is in many bogs, but not in such abundance as it was some years ago.

Cypripedium spectabile was in abundance in a few places, and in magnificent form. As we saw it in one swamp it was worth going many miles to see. Weather conditions appeared to have been particularly favorable for this and other orchids the past season.

Cypripedium acaule was also abundant in a few limited areas, and in good form. In many places where it was plentiful a few years ago it has now entirely disappeared.

Cypripedium pubescens, with its variety parviflorum, could be found in a few places. Wherever seen the development was perfect.

Habenaria hyperborea is quite plentiful in moist, cool swamps. It seemed to vary much in appearance, sometimes slender and sometimes stout, under the same conditions of soil or shade.

H. psycodes is common in low woodlands or in open places which never become exceedingly dry.

H. lacera is by no means universal, but where conditions are entirely favorable it is fairly plentiful.

H. dilatata is nowhere abundant, but there are many bogs in which a few plants may be found.

H. tridentata may also be found frequently, but never in much quantity.

H. orbiculata is becoming very rare. I have a few plants in my own woods, and I know of only one other place where plants of this species may be found.

H. leucophea is becoming extremely rare. In my search for it last summer I began to fear that it had become entirely extinct, but was at last rewarded by the discovery of a small colony of six plants. This is our finest Habenaria. The flowers are larger than those of any others, and it is wonderfully fragrant.

Orchis spectabilis bloomed freely in my own woods, but is becoming very scarce where not protected.

Arethusa bulbosa I found fairly abundant in one bog, and I believe is yet existing in one other place at least.

Microstylis monophylla I saw in several places.

Goodyera pubescus bloomed sparingly in my woodland, but the plants are vigorous and increasing in number; while in other places, where a few years ago there were large patches of it, it has now entirely disappeared.

Other orchids which existed a few years ago, and some of which may yet exist, are Goodyeras, repens and Menziesii ; Corallorhizas, innata, multiflora and Macraeii ; Spiranthes, plantaginea, gracilis and Romanzoffiana, and Aplectrum hyemale.

The Amelanchiers or Juneberries.

With Particular Reference to Ontario Species.

BY HERBERT GROH.

IN the hope, not so much of adding anything to our knowledge concerning them, as of possibly stirring up an interest in them, on the part of field naturalists, I have chosen to devote this opportunity of contributing to the Ontario Natural Science Bulletin, to offering a few brief remarks upon the attractive trees and shrubs named above.

Regarding their attractiveness alone enough will have been said to Ontario naturalists, who all must know them well, if we recall their admirable virtue of blooming in early spring when we are still waiting for the advent of orchard blossoms to light up the landscape; and recall too, the sumptuous effect of their banks of bloom at a distance, or at nearer view, the wonderfully elegant and airy character of the sprays of flowers. Regarding their interest botanically, I hope to show that even though they may not offer to the seeker after new species such rich reward as some of their cousins and neighbors, they

are nevertheless perplexing enough to suit the most fastidious. Any group of plants of which this much can be truthfully said ought to be of sufficient interest to engage our attention.

The Amelanchiers are distributed widely throughout the north temperate zone; Asia, Europe and North America all having their species. In Europe they are not only native and growing wild, but are valued for their serviceableness in landscape gardening. In America they are a constant feature of the flora, right across the continent. The Indians, it is said, prized them highly for their sweet, pulpy, if somewhat small fruits. Anyone fortunate enough to share with the birds in partaking of these so-called berries, must agree that they are no mean dessert.

With respect to habitat, the Amelanchiers as a genus are not particularly restricted in range. They are thoroughly at home in dry open woodlands, especially in the shrubby borders of such woods. They are to be found too in comparatively wet situations; in the open country along the edges of fields, where they often become shapely trees of thirty feet or more in height; and there are forms which occur in rocky places, in which event they are commonly dwarfed. I have in mind one locality of the latter sort where the species *spicata* is growing in several areas on limestone strata, having a turf covering of only a few inches. Each patch is some square rods in extent, like a thicket of raspberry or osier dogwood, and the closely-crowded stems composing it are only from one to three feet in height, and when found were flowering profusely, regardless of size.

It is rather a far cry from trees of thirty feet in height to the diminutive shrubs just referred to ; and this suggests what may now be discussed, namely, the matter of discrimination between species. Before attempting to list species, however, it is necessary to point out, as was hinted above, that this phase of our subject is not so amenable to ready treatment as might seem to be the case. Like other genera of the Rosaceæ, the Amelanchiers are almost hopelessly variable. It is true they have not demanded any such prodigality of species making as even conservative - minded botanists find necessary in

Crataegus and *Rubus* ; but even the few forms which have been characterized have received most various interpretations.

Examine any collection of Amelanchiers made during past years, and the truth of this statement is forcibly apparent. Many names will be found altered, or would be at once altered if the attempt were made to bring them in line with our present views. As an illustration of what the nomenclature has undergone, it is interesting to notice that the *Index Kewensis* (published 1895) has brought together some thirty names, and of this number has been content to retain only four with the status of species, the American representatives being *canadensis* and *alnifolia*. American botanists have never stopped at that; but while they have been united in further splitting up our species, they have seldom been wholly agreed as to the values to be given their types, whether that of variety or species. The most recently issued work, Gray's Manual, seventh edition, treats the genus within its range, under four species and two varieties, besides recognizing the existence of forms of some of the species, these types all being presumably the *canadensis* of the Kew Index. The territory westward adds to these *alnifolia*, and several others which will probably be accepted as good species. Whether this latest word upon the subject is destined to be the last remains to be seen; but is hardly to be expected, in view of all the intergradient forms which remain as a source of confusion.

The species which I have found at Ottawa in my not very extensive collecting are *canadensis*, with its variety *botryapium*, and *spicata*. The latter has been observed in a number of its variations, some of which were to be accounted for by the differences in the conditions of growth, while others seemed to indicate nothing more than instability of type in the species, or perhaps hybridization with other species. The specimens growing on rock, for instance, were markedly different in habit, size and general appearance from shrubs otherwise conforming to the same description, and growing on dry clay hillsides. These differences, due to environment, seem to be the principal ones responsible for the former separation from it, as a species, of

rotundifolia. Speaking generally, *spicata* is smaller than the other species; and at Ottawa it is probably as common as any.

Individuals of *canadensis* vary from small shrubby trees to well-developed, clean-trunked examples, which are the largest in the genus. As a rule they are fairly well distinguished by foliage characters, as given in manuals, which need not be repeated here. The size of the flowers (petals) in my specimens is in most cases less than the measurements given in Gray's Manual, so that I have found them of little value as a distinguishing feature. The remaining Amelanchier, *botryapium*, differs from typical *canadensis* principally in its pubescent leaves; and both are common at Ottawa. It is probable that these three are all present throughout Old Ontario.

Of the other members of this genus occurring in Eastern America, I have neither collected nor seen Ottawa specimens of *oligocarpa*. It occurs only where it finds its required conditions of cold wet swamps or woods. In the herbarium of the Geological Survey at Ottawa there are specimens from Wingham, in the north of Huron County, and from the Petawawa River in Algonquin Park; the latter specimen being scarcely typical as regards foliage. Beyond the evidence of these two sheets, I can find nothing to indicate the distribution of the species in Ontario.

The collections which I have had the privilege of examining, namely, those at the Geological Survey and of the Central Experimental Farm, have yielded no Ontario specimens, which I could place without doubt in the species *oblongifolia*. Some so labelled had to be referred to *spicata*, and others to *botryapium*. Some in the absence of young specimens could not be safely identified. One from Toronto, and one also from Wingham, may be correctly named and the species may well be looked for, at any rate.

There remains to be merely mentioned another species, *alnifolia*, which has been frequently referred to Eastern localities, but is not so credited in the recent edition of Gray. In the collections examined there are several specimens which would

seem to establish its occurrence in Ontario, but unfortunately they are not sufficiently complete to be conclusive.

In concluding this brief summary of what I have been able to learn about our Amelanchiers, I wish simply to emphasize, what the account has aimed to point out, that here is a piece of work in field botany which ought to make its appeal to some of our naturalists. The points waiting to be cleared up can only be satisfactorily dealt with after material from as many localities as possible has been brought together. To be of the greatest value such material should show both the young flowering and the later fruiting conditions, since some of the most essential foliage characters change materially in the course of the season. Plants from which specimens are taken in the spring should therefore be marked and numbered to preclude the possibility of mistakes in the fall. Such specimens should be supplemented by careful notes of habit, environment, and other information not preserved in the specimens.

These members of our sylvan flora, while of minor economic importance, fill a place of such prominence in the æsthetic features of our surroundings that we can hardly afford to ignore their claims to notice botanically while there is anything to be learned.

The Compositæ of Galt, Ont., and Vicinity.

BY W. HERRIOT.

THE Composites form the largest order of flowering plants, numbering in the neighborhood of 12,000 species, of wide geographic distribution, chiefly herbaceous, but occasionally shrubby, or in a few tropical species, trees.

Many of our native species have gorgeous flowers, while the adventive species from Europe are amongst our most pernicious weeds. The flora of the Grand River valley around Galt is remarkable, as shown by the great number of species of this order which it contains, indicating a wonderful diversity of soil and

other conditions within a very limited area, for within a radius of ten miles from town all of the 119 species mentioned below were collected. As is usually the case with large orders of plants, many of the genera of Composites give rise to a number of variable species, and of these the Golden-rods and Asters are amongst the most prominent, especially the latter, for I doubt if any genus of plants is more difficult of segregation than Aster, as several of the species, besides being extremely variable, undoubtedly hybridize, producing a host of most perplexing forms. In dealing with these genera, I mention only those species that are well established, and omit nearly all varieties which are of interest chiefly to the specialist.

Of the 119 species mentioned, 84 are indigenous, 28 are naturalized from Europe, 1 from Asia, and 6 are migrants from the Western prairie region.

Eupatorium purpureum, L. (Joe-Pye Weed).—Common around ponds and moist places generally. Var. *maculatum* (L.), Darl. —Common with the type.

Eupatorium perfoliatum, L. (Boneset). — Common along streams and in moist situations.

Eupatorium urticæfolium, Reichard (White Snakeroot). — In rich woods and ravines. Common.

Liatris cylindracea, Michx., (Blazing Star). — Dry open woods. Rare.

Grindelia squarrosa (Pursh.), Dunal (Gum-plant).—A migrant from the West lately appearing in fields, but not troublesome as a weed. Infrequent.

Solidago squarrosa, Muhl. (Ragged Golden-rod).—Dry woods and ravines. Common.

Solidago cæsia (L.) (Wreath Golden-rod).—Rich woods and ravines. Common.

Solidago latifolia, L. (Broad-leaved Golden-rod).—Rich woods and ravines. Common.

Solidago bicolor (L.) (White Golden-rod). — Dry open woods and clearings. Not common.

Solidago hispida (Muhl.) (Hairy Golden-rod).—Open woods, fields and waysides. Common.

Solidago uliginosa, Nutt. (Bog Golden-rod).—A beautiful species, growing in sphagnum bogs and swamps. Frequent.

Solidago patula, Muhl. (Rough-leaved Golden-rod).—Swamps and bogs. Common.

Solidago juncea, Ait. (Early Golden-rod).—Our earliest flowering species. Fields, roadsides and open places generally. Nearly all our plants are referable to the variety Scabrella.

Solidago neglecta, T. & G. (Swamp Golden-rod). — Swamps and bogs. Frequent.

Solidago uniligulata (D. C.), Porter (Few-rayed Golden-rod). —Bogs and swamps. Frequent Intergrading with the last.

Solidago rugosa, Mill. (Wrinkle-leaved Golden-rod)—Swamps, meadows and open moist places Common.

Solidago nemoralis, Ait. (Gray Golden-rod). — A beautiful dwarf species, growing in dry fields and banks. Common.

Solidago Canadensis, L. (Canada Golden-rod). — An extremely variable species, found in its various forms in all situations. Our largest and most abundant species.

Solidago serotina, Ait. (Smooth-stemmed Golden-rod). — Thickets and open moist places. Common.

Solidago Ohioensis (Riddell) (Ohio Golden-rod).—A beautiful flat-topped species, growing in marshes around ponds. At two stations quite plentiful.

Solidago graminifolia (L.), Salisb. (Fragrant Golden-rod).— The least conspicuous of our Golden-rods, growing in moist, open situations. Common.

Aster divaricatus, L. (White Wood Aster).—Dry open woods. Rare.

Aster macrophyllus (L.) (Large-leaved Aster).—An extremely variable species, growing in woods and clearings everywhere, several forms having been separated by some authors as species.

Aster novæ angliæ, L. (New England Aster). — Our latest and most handsome species; growing in moist or dry, open situations. Common.

Aster azureus, Lindl. (Sky-blue Aster).—Dry fields, waysides and open woods. Common.

Aster cordifolius, L. (Common Blue Aster). — Dry woods, fields and banks. Common.

Aster Lowrieanus, Porter (Lowrie's Aster). — Woods and thickets; closely allied to the last.

Aster sagettifolius, Wedemeyer (Arrow-leaved Aster)—All our plants have the leaves more or less pilose beneath and the stem often 5 ft. in height, and referable to the variety Urophyllus (Lindl.), Burgess. Infrequent.

Aster Lindleyanus, T. & G. (Lindley's Aster).—Thickets and open places. Scarce.

Aster laevis, L. (Smooth Aster).—Our earliest flowering species, growing on dry banks and fields. Handsome. Frequent.

Aster multiflorus, Ait. (White Wreath Aster).—Dry, open fields and banks. Locally abundant.

Aster lateriflorus (L.), Britton (Starved Aster). — An extremely variable species, growing in swamps and moist, open places everywhere. Besides several extreme forms, apparent hybrids with other species are found.

Aster Tradescanti, L. (Tradescant's Aster). — Low grounds and marshes, variable, and approaching in some of its forms the next. An abundant species.

Aster paniculatus, Lam. (Tall Panicled Aster).—Low grounds and marshes. Common. Extremely variable and difficult to determine from the preceding and two following species, into which it appears to intergrade.

Aster junceus, Ait. (Rush-leaved Aster).—Bogs and marshes. Common.

Aster longifolius, Lam. (Long-leaved Aster).—Low grounds. Not common. Variable.

Aster puniceus, L. (Purple-stem Aster).—Low grounds and wet open places. Common. A very variable but easily distinguished species.

Aster umbellatus, Mill. (Double-bristled Aster).—Moist open places. Not common.

Aster ptarmicoides, T. & G. (Upland White Aster). — Dry, open woods. Rather rare. A unique species.

Erigeron pulchellus, Michx. (Robin's Plantain).—Open woods and fields. Common.

Erigeron Philadelphicus, L. (Daisy Fleabane).—Open woods, fields and meadows. Common.

Erigeron annuus (L.), Pers. (Sweet Scabious). — Fields and waysides. Often as a weed. Common.

Erigeron ramosus (Walt.), B. S. P. (Lesser Daisy Fleabane). —Fields and open places. Common.

Erigeron Canadensis (L.) (Canada Fleabane). — Fields and waste places. Abundant as a weed.

Antennaria fallax, Greene (Larger Cat's-foot).—Open woods and copses. Frequent.

Antennaria neodioica, Greene (Smaller Cat's-foot). — Open woods, fields and hillsides. Common.

Antennaria neglecta, Greene (Field Cat's-foot).—Growing with the last. Common.

Antennaria petaloidea, Fernald (Tall Cat's-foot). — Open woods, fields and banks. Frequent.

Anaphalis margaritacea (L.), B. & H. (Pearly Everlasting). —Dry open woods, clearings and hillsides. Frequent.

Gnaphalium polycephalum, Michx. (Common Everlasting). — Open woods and fields. Common.

Gnaphalium decurrens, Ives (Clammy Everlasting).—Similar situation as the last, but less common.

Gnaphalium uliginosum, L. (Low Cudweed). — Fields, roadsides and moist ditches; often as a weed.

Inula Helenium, L. (Elecampane). — Roadsides and fields. Frequent.

Polymnia Canadensis, L. (Leafcup).—Rich rocky woods and ravines. Infrequent.

Silphium terebinthinaceum, Jacq. (Prairie Dock).—Found only along the G. T. Railway at Blue Lake, between Galt and Paris.

Ambrosia trifida, L. (Great Ragweed). — In waste places along the Grand River. Infrequent. Var. integrifolia (Muhl.), T. & G., occasional with the type.

Ambrosia artemisifolia, L. (Common Ragweed). — Abundant as a weed by roadsides, fields and waste places everywhere.

Ambrosia psilostachya, D. C. (Western Ragweed). — Lately appearing around the C.P.R. station. A migrant from the West.

Xanthium Canadense, Mill. (Clotbur). — Moist places, especially along the river. Common.

Xanthium echinatum, Murr. (Hairy Clotbur).—Growing with the preceding, but less common.

Heliopsis scabra, Dunal (Rough Ox-eye).—Moist places and banks along the Grand River. Infrequent.

Rudbeckia hirta, L. (Black-eyed Susan).—Open woods, dry fields and moist places. Common.

Rudbeckia laciniata, L. (Tall Coneflower).—Damp thickets and river banks. Frequent.

Helianthus giganteus, L. (Giant Sunflower). — Dry or moist places. Rare.

Helianthus divaricatus, L. (Rough Sunflower).—Open woods, fields and dry exposed places. Common.

Helianthus strumosus, L. (Smooth Sunflower)—Open woods, fields and banks. Common.

Helianthus decapetalus, L. (Thin-leaved Sunflower). — Rich, open woods. Rare.

Helianthus tuberosus, L. (Jerusalem Artichoke).—Old fields and waysides. Infrequent. A relic of cultivation by the Indians.

Bidens frondosa, L. (Beggar's Ticks).—Moist ditches, along streams and in waste places. Common.

Bidens connata, Muhl. (Swamp Beggar's Ticks.)—Common. Swamps and along streams. Frequent.

Bidens cernua, L. (Stick-tight). — Wet places. Common everywhere.

Bidens laevis (L.), B. S. P. (Bur Marigold). — Wet places, especially along streams. Common.

Helenium autumnale, L. (Sneezeweed). — Alluvial soil along the Grand River. Rare.

Gaillardia aristata, Pursh. (Great-flowered Gaillardia). — Fields and roadsides. A migrant from the West. Scarce.

Achillea millefolium, L. (Common Yarrow). — Fields, roadsides and open places everywhere. The crimson-flowered form somewhat rare.

Anthemis cotula, L. (Mayweed). — A weed by roadsides and waste places everywhere.

Anthemis arvensis, L. (Corn Chamomile).—Lately appearing in fields. Infrequent.

Matricaria inodora, L. (Wild Chamomile).—Roadsides. Rare.

Chrysanthemum Leucanthemum, L. (Ox-eye Daisy). — Fields and waste places. Common.

Chrysanthemum Balsamita, L. (Costmary). — Roadsides and old gardens. Escaped from cultivation.

Tanacetum vulgare, L. (Tansy).—Escaped from gardens to roadsides and waste places.

Artemisia caudata, Michx. (Wild Wormwood).—A few plants found along the Grand River in 1895. Likely an import from the West.

Artemisia vulgaris, L. (Common Mugwort).—Roadsides and waste places. Occasional.

Artemisia biennis, Willd. (Biennial Wormwood)—Waste places and along railways; becoming frequent. A migrant from the West.

Artemisia frigida, Willd. (Wormwood Sage).—An occasional plant found along the C. P. Railway. A native of the far West.

Petasites palmata (Ait.), Gray (Palmate-leaved Sweet Coltsfoot).—Low woods and cedar swamps. Rare.

Erectites hieracefolia (L.), Raf. (Fireweed). — Woods and clearings, especially on burned-over ground. Frequent.

Senecio vulgaris, L. (Common Groundsel).—A weed in gardens and waste ground. Frequent.

Senecio aureus, L. (Golden Ragwort)—Under its many forms found growing in moist places and swamps throughout our area.

Arctium Lappa, L. (Burdock).—Waste places and cultivated ground. Common.

Cirsium lanceolatum (L.), Hill (Bull Thistle). — Roadsides and fields everywhere. Common.

Cirsium discolor (Muhl.), Spreng. (Field Thistle). — Open woods and fields. Frequent.

Cirsium muticum, Michx. (Swamp Thistle)—Low woods and swamps. Frequent.

Cirsium arvense (L.), Scop. (Canada Thistle).—A pernicious weed in fields and cultivated ground. Common.

Onopordum Acanthium, L. (Scotch Thistle). — Roadsides, fields and waste places. Frequent.

Centaurea Cyanus, L. (Bluebottle). — Occasional in cultivated fields, but not persistent.

Centaurea nigra, L. (Knapweed). — Along railways and in waste places. Infrequent.

Centaurea Jacea, L. (Rayed Knapweed).—Fields. Rare.

Lapsana communis, L. (Nipplewort). — Waste places and banks along the Grand River. Frequent.

Cichorium Intybus, L. (Chicory).—Roadsides and fields; especially common on flats along the Grand River.

Leontodon hispidus, L. (Hairy Fall Dandelion). — Abundant in a moist meadow south of the Galt Waterworks, where it was first noticed about 25 years ago; then quite plentiful, and has since spread to roadsides and other places.

Tragopogon porrifolius, L. (Vegetable Oyster). — Escaped from cultivation along the railway lines. Frequent.

Tragopogon pratensis, L. (Goat's Beard).—Found in a rocky field, the only station.

Taraxacum officinale, Weber. (Dandelion)—Abundant in fields, roadsides and cultivated ground.

Taraxacum erythrospermum, Andry. (Red-seeded Dandelion). —Growing with the preceding, but less common.

Sonchus arvensis, L. (Field Sow Thistle).—Fields and waste places. Infrequent.

Sonchus oleraceus, L. (Common Sow Thistle).—Waste places and cultivated soil and around dwellings.

Sonchus asper (L.), Hill (Spiny-leaved Sow Thistle)—Waste places and cultivated soil, sometimes in woods.

Lactuca Scariola, L., var. integrata, Greene & Godr. (Prickly Lettuce).—Waste places, fields and along railway lines. Common.

Lactuca Canadensis, L. (Wild Lettuce).—Open woods, copses and clearings. Common.

Lactuca hirsuta, Muhl. (Red Wood Lettuce). — Dry, open woods and clearings. Frequent.

Lactuca spicata (Lam.), Hitchc. (Tall Blue Lettuce).—Moist and dry woods and clearings. Common.

Crepis capillaris (L.), Wallr. (Smooth Hawksbeard)—A weed in cultivated fields. Rare.

Prenanthes alba, L. (Rattlesnake-root). — Rich woods and ravines. Common.

Prenanthes altissimus, L. (Tall White Lettuce). — Woods, thickets and clearings. Common.

Hieracium aurantiacum, L. (Orange Hawkweed).—Fields and pastures. Rare.

Hieracium scabrum, Michx. (Rough Hawkweed).—Dry, open woods and clearings. Frequent.

Hieracium Gronovii, L. (Hairy Hawkweed). — Open sandy woods. Infrequent.

Hieracium Canadense, Michx. (Canada Hawkweed). — Open woods, clearings and copse land. Frequent.

Galt, Ont., Jan. 15th, 1910.

Cruciferæ of County Peel.

BY J. WHITE, SNELGROVE, ONT.

THE nomenclature used in the following list is that of Gray's Manual, Edition VII.

Alyssum alyssoides, L. Rare.
Arabis Canadensis, L. Rare.
Arabis hirsuta (L.), Scop. Rare.
Barbarea stricta, Andrz. Frequent.
Brassica alba (L.), Boiss. Rare.
Brassica arvensis (L.), Kotze. Common.
Cakile edentula (Bigel.), Hook. Not common.
Camelina sativa, Crantz. Common.
Capsella Bursa-pastoris (L.), Medic. Abundant.
Cardamine bulbosa (Schreb.), B.S.P. Rare.
Cardamine Douglasii (Torr.), Britton. Frequent.
Cardamine Pennsylvanica, Muhl. Common.
Conringia orientalis (L.), Dumort. Frequent.
Dentaria diphylla, L. Common.
Dentaria laciniata, Muhl. Frequent.
Erysimum cheiranthoides, L. Common.
Hesperis matronalis, L. Occasional.
Lepidium apetalum, Willd. Common.
Lepidium campestre (L.), R. Br. Occasional.
Lepidium sativum. Rare.
Neslia paniculata (L.), Desv. Frequent.
Radicula Armoracia (L.), Robinson. Rare.
Radicula Nasturtium-aquaticum (L.), Britten & Rendle. Common.
Radicula palustris (L.), Moench. Common.
Radicula palustris (L.), Moench, var. hispida (Desv.), Robinson. Rare.
Sisymbrium altissimum, L. Frequent.
Sisymbrium officinale (L.), Scop. Common.
Thlaspi arvense, L. Frequent.

Plant Immigrants of 1909.

BY F. MITCHELL.

NOT a season passes but we find that one or more species of plants have migrated from other lands or other places to locate with us.

I noticed as new arrivals the past season in this district :

Eruca sativa, in quantity in fields of alfalfa seeded in the spring. The plants, which were cut off with the grain at harvest time, bloomed and seeded again throughout the fall.

Silene dichotoma, in a field of red clover in considerable quantity.

Conringia orientalis, one plant in a village lot.

Anthyllis vulneraria, scattered sparingly throughout a field of red clover. This plant is not listed in Britton and Brown, or Grey or other botanies in common use here, although it is fully described in British and other lists, even of rather remote time. Pliny, among others, makes special mention of the Anthyllis. It is a legume, of noticeable appearance, and I would assume would never become a troublesome weed.

Innerkip, Jan. 24th, 1910.

Notes and Observations.

MORCHELLA BISPORA IN CANADA.

Morchella bispora is a very common fungus on the Bruce Peninsula, Ontario. It grows abundantly in damp woods, appearing in May, and lasting till early in June. Some of the sporophores attain a very large size. As an edible species it ranks high, as it is tender and of excellent flavor.

Dr. Dearness informs me that this species has not been previously recorded from Canada.

A. B. KLUGH.

Botanical Department, Queen's University,
Kingston, Ontario.

AN INTRODUCED CAREX NEW TO CANADA.

On July 3rd, 1909, beside the steps leading to the north door of the old Arts Building, Queen's University, I found a patch of *Carex muricata*, L. This is, I believe, the first time that this European species has been recorded from Canada.

Botanical Department, A. B. KLUGH.
Queen's University,
Kingston, Ontario.

PINEAPPLE WEED

(*Matricaria suaveolens* (Pursh) Buchenau).

Although a native of the Pacific slope, this plant has recently become established in the vicinity of Guelph, and is now of very common occurrence, especially in the neighborhood of the O. A. College. Its insignificant appearance and close resemblance to Anthemis cotula, L.—from which it is readily distinguished by its rayless heads—are probably responsible for the fact that it had not been noticed prior to last year. A. E.

LINARIA MINOR (L.), Desf.

It is now some years since this small European species was first noticed in Ontario. Although still apparently confined to railway tracks, it appears to be spreading rapidly throughout Ontario, as during the past summer it was noticed in a number of new localities, especially east of Toronto. Around Guelph it is now quite common, especially on the G.T.R. track between Guelph and Hespeler. A. E.

SPURRED GENTIAN

(*Halenia deflexa* (Sm.), Griseb).

Although this plant is not new to Wellington County, yet it is very rare in the vicinity of Guelph, and it was consequently a source of much pleasure to Mr. Howitt and the writer to find it growing in a damp, shady spot along the G.T.R. track, just outside Hespeler. Only a few specimens of this curious and interesting species were, however, discovered. A. E.

Publications Received.

BIRD LORE : Vol. XI., Nos. 3, 4, 5, 6 ; Vol. XII., No. 1.

While the reading matter of this magazine is decidedly interesting, it is the great excellence and usefulness of its illustrations which render it most attractive to the ornithologist. In each number there are not only numerous photographs of birds in their natural haunts, but colored plates of high excellence—probably the finest plates of North American birds which have ever appeared. With Vol. XI., No. 6, begin the plates of sparrows, which series will undoubtedly prove highly useful to bird students, in aiding them to recognize the various species of this difficult group. The Christmas bird-census in Vol. XII., No. 1, gives a good index as to the status of bird-life in North America this year, and shows that during this winter northern migrants and winter residents have been rare. A. B. K.

WILSON BULLETIN : Vol. XXI., Nos. 1, 2, 3, 4.

This excellent quarterly is of interest to Ontario ornithologists, because in it appear most of the contributions from the Great Lakes Ornithological Club, which organization has made Point Pelee, Ontario, its first territory for a complete ornithological survey.

In this volume the editor, Prof. Lynds Jones, begins his notes on "The Birds of Cedar Point." This point is just across Lake Erie from Point Pelee, and this fact renders these notes of great interest to Ontario bird-students. A. B. K.

JOURNAL OF THE MAINE ORNITHOLOGICAL SOCIETY : Vol. XI., Nos. 1, 2, 3, 4.

This quarterly of the Maine bird-students is always improving in quality, and the increasing number of short notes from various observers shows the widespread interest in bird study which it is creating in its State.

It is with the deepest regret that we record the death on September 6th, 1909, of Mr. W. H. Brownson, the talented and cordial editor of the Journal. A. B. K.

RHODORA : Vol. 11, Nos. 122–132 ; Vol. 12, No. 133.

Rhodora is a magazine which is of inestimable value to all botanists who reside within the range of Gray's Manual, for in it appear nearly all the systematic revisions of the families and genera within that area.

Many articles and notes of much ecological and distributional value are also published in this journal; among those in these numbers being :—" The Habitat of *Rhodora*," by D. P. Penhallow; "*Corylus rostrata* and *C. Americana*," by K. M. Wiegand; "On the Flora of Lower Cape Cod," by F. S. Collins, and "Submarine Bog at Woods' Hole," by H. H. Bartlett.

A. B. K.

THE FERN BULLETIN : Vol. XVII., Nos. 1–4.

This excellent Quarterly, which, by the way, is the only journal in North America devoted exclusively to *Pteridophyta*, still maintains its high standard. The success of this publication is very largely due to the untiring energy of its able editor, Mr. Willard N. Clute. Its articles and shorter notes are of the greatest interest to fern students; among the former appearing in this volume being :—" *Ophioglossum vulgatum* in Ontario," by F. J. A. Morris ; "Notes on Nephrodium Hybrids," by E. J. Winslow ; " *Polystichum acrostichoides multifida*," by W. N. Clute, and "Collecting in the Everglades," by C. T. Simpson.

A. B. K.

Wellington Field Naturalists' Club.

During the past year, as in previous years, the regular fortnightly meetings of the Field Naturalists' Club have been held. This year, however, it was thought advisable to hold the meetings in the Carnegie Library Hall, Guelph, this being more convenient for the city members of the Club. The meetings were very successful, all the papers being of a most interesting

character and much appreciated by the attending members. The following is a list of the papers read during the past year :

1909		
Nov. 3	Notes on the Natural History of Southern India	Mr. G. J. Spencer
	Mars	Mr. Scrimiegour
Nov. 17	Fertilization of Orchids	Mr. J. D. Tothill
	The Evolution of the Chrysanthemum	Mr. Hunt
1910		
Jan. 26	Game Birds of Ontario	Mr. R. Fraser
	Wild Flowers of Saskatchewan	Mr. S. J. Neville
Feb. 10	A Naturalist's Meal	Mr. A. C. Baker
	External Parasites	Mr. A. W. Baker
Feb. 24	The Balance of Nature	Mr. T. D. Jarvis
Mar. 10	Observations in Halton County.	Mr. C. A. Galbraith
Mar. 24	Ferns and Their Haunts	Mr. J. E. Howitt
April 7	Comets	Mr. Asbury