



THE traveler, who seeks for exhibitions of the grander forces of nature, will find his wishes abundantly gratified at Niagara. The fall of the waters of one of the greatest rivers of the world over a precipice of more than one hundred and fifty feet in height, and the constantly growing record of their power to channel through the enduring rock, will prove to him an absorbing, yet perplexing, subject for study. But the tourist, who takes enjoyment in the shadows of a forest, almost unchanged from its natural condition, in the stateliness and symmetry of individual trees, planted by the hand of Nature herself, in the beauty and fragrance of many species of flowers, growing without cultivation and in countless numbers, in the ever-varying forms and hues of foliage, and in the continually shifting panorama of the animated creation so near the scenes of human activity and occupation and yet so free from their usual effects, will find upon the borders of the river, within its chasm and on the islands, which hang upon the brink of the great cataract, an abundant gratification of his taste and an exhaustless field for study.

To such a person—to all, in fact, who realize how ennobling it is to the heart of man to be brought at times face to face with Nature, whether in her beauty or her sublimity—it must always be the source of profound satisfaction to know that by the wise and liberal policy of the State of New York and the Dominion of Canada, so large an area of country, contiguous to the river and the Falls, has been made a public property, and, placed forever beyond the reach of vandal hands, is now dedicated, for all time, to the highest and most exalted purposes.

Although in this volume a chapter has been devoted to the geology of Niagara, by one abundantly qualified for the task, nevertheless, for a proper presentation of the Natural History of the Falls and of the region of which it is the centre, a passing glance should here be bestowed upon the geological record of Goat Island and the river, within whose embrace it lies, to bring out more clearly the relation to it of its Fauna and Flora. For this purpose it is not necessary to explore the measureless periods of time in which the imagination of the geologist is accustomed to range at will. It is demonstrable that in a scientific sense the Island itself is of a trifling antiquity. In fact it would be difficult to point out in the western world any considerable tract of land more recent in its origin.

There is every evidence to believe that the Niagara River has excavated its enormous chasm since the close

of the period known to geologists as the Glacial Age. Whether before the coming on of the Glacial Age the upper lakes were connected or not with Lake Ontario (a proposition which seems to be well received in the geological world), it seems very certain that thereafter Lake Erie, Lake Huron and Lake Superior sent their waters to the sea through an outlet which Lake Michigan then had into the Mississippi. A barrier not greater than fifty feet in height would suffice, even to-day, to reverse the current of Lake Erie and Lake Huron and compel the discharge of their contents into the Mississippi, either by re-opening the old, abandoned channel at the head of Lake Michigan or by forming a new one. The barrier, which was broken down at the time, when in fact the physical history of the Niagara River began, may be pointed out with reasonable certainty to-day. A ridge near the foot of Lake Erie, which at one time extended in an eastward and westward course, crossing the present channel of the Niagara River, was that barrier. On either side of the river it attains a height of sixty or seventy feet above the present level of Lake Erie. It is almost unnecessary to say that this barrier was of glacial origin—an immense moraine. From its base, on the northerly side, to the verge of the cliff at Lewiston and Queenston, where the cataract began its work of erosion, the surface of the underlying rock rises steadily. At the summit of the cliff at Lewiston

and Queenston, it has an elevation of thirty-two feet above the present level of Lake Erie.

It is fair to assume that although the lake (or river), after its irruption through this barrier, spread widely, yet that the beginning of the excavation of the chasm at Lewiston was not long delayed.

Along the entire length of the river from Lake Erie to Lewiston and Queenston, the terraces, left by the river, as from time to time it deepened and narrowed its channel, may be easily recognized. Often they show evidence that they were formed at the bottom of the river before the chasm had been excavated, being very largely composed of water-worn stones and materials, brought and deposited by the river itself from more southerly localities.

Goat Island is of this origin. It is in fact a portion of such a terrace. In a single place upon the Island there is to be seen a small quantity of clay, possibly deposited by the glacier where it is found, but more likely to have been brought by the current of the river along with the other materials which make up the soil. Mixed with the soil of Goat Island and with that of the river terraces in other places, there may be seen an abundance of the half-decomposed remains of fluviatile and lacustrine Mollusca—shell-fish, univalve and bivalve, identical in species with those still living in the lake and river.

The period which has been employed by the river

in the excavation of the chasm, below the Falls, has, for more than half a century, been a most interesting study of the geologist. As early as 1841, Sir Charles Lyell, pre-eminent in his day as a geologist, from such data as he was then able to command, computed the time necessary for the work at no less than 35,000 years. Later geologists have sought, but unsuccessfully, to reduce the period. When, however, the Island appeared above the river, substantially as it now is, presents a more difficult problem. But that the deposit of the materials, of which its soil is composed, began as soon as the irruption of the river through the moraine, at the foot of Lake Erie, was accomplished, can scarcely be doubted. That 35,000 years have passed, since the shells, found on the Island and in the terraces on either side of the river, were deposited, and that no specific difference is to be discovered, between them and their existing representatives and progeny, are facts full of interest to the evolutionist.

A calcareous soil, enriched with an abundance of organic matter, like that of Goat Island, would necessarily be one of great fertility. For the growth and sustentation of a forest, and of such plants as prefer the woods to the openings, it would far excel the deep and exhaustless alluvions of the Prairie States.

For the preservation of so large a part of the native vegetation of the Island, we must be thankful to the policy of its former owners, who, through so many



The Horse Shoe Falls from Canada—Looking towards the Three Sisters.

years, kept it mainly in the condition in which Nature left it. To the naturalist, the hand of cultivation is often the hand of devastation. It has happily been spared, to a large extent, from the ravage of the axe and plough, and from the still more complete spoliation which comes from the pasturage of horses and cattle. It would be very difficult to find within another territory, so restricted in its limits, so great a diversity of trees and shrubs—still more difficult to find, in so small an area, such examples of arboreal symmetry and perfection, as the Island has to exhibit.

From the geological history of the Island, as has thus been told, it would be inferred that it had received its Flora from the mainland. This, no doubt, is true. In fact the botanist is unable to point out a single instance of tree, or shrub, or herb, now growing upon the Island, not also to be found upon the mainland. But, as has been remarked, the distinguishing characteristic of its Flora is not the possession of any plant, elsewhere unknown, but the abundance of individuals and species, which the Island displays.

There are to be found in Western New York about one hundred and seventy species of trees and shrubs. Goat Island and the immediate vicinity of the river near the Falls can show of these no less than one hundred and forty.

Of our trees, producing conspicuous flowers, such as the Cucumber-tree (*Magnolia acuminata*), and the

Tulip-tree (*Liriodendron tulipifera*), there are but few specimens in the vicinity of the Falls. Abbe Provancher found the former growing at or near Clifton, and one magnificent specimen of the latter may be pointed out on Goat Island. In the re-forestation of the denuded portions of the Island due observance to the planting of these beautiful American trees should be had.

Four Maples are represented upon the Island:—*Acer saccharinum*, *A. rubrum*, *A. dasycarpum* and *A. spicatum*. The first of these, the Sugar-maple, is perhaps the most abundant tree upon the Island. Five species of Sumach (*Rhus*) grow upon the Island or along the margin of the river. Our native Plum (*Prunus Americana*) and two Cherries (*Prunus Virginiana* and *P. serotina*) belong either to the Island or the mainland, the latter, the Black-cherry of the lumberman, attaining upon the Island a wonderful development. Near the gorge of the river, on either side, but not upon the Island, the Crab-apple (*Pyrus coronaria*) abounds, diffusing in the early days of June its unequalled fragrance upon the air.

Three species of Thorn (*Crataegus coccinea*, *C. tomentosa* and *C. Crus-galli*), are to be met with upon Goat Island, adding in May and June, no small part to the floral magnificence of the season. Six species of Cornel, including the flowering Dog-wood (*Cornus florida*), two elders (*Sambucus Canadensis* and *S.*

*pubens*) and six Viburnums (*V. Opulus*, *V. acerifolium*, *V. pubescens*, *V. dentatum*, *V. nudum*, and *V. Lentogo*) either on the Island or the mainland, contribute greatly, in the spring and summer months, to enlarge and diversify the display.

To find the Sassafras one must go down along the river as far as the whirlpool. He will there meet with it, but not in profusion, on either side of the river. Our other native laurel, the Spice-wood (*Lindera Benzion*) is to be found handsomely represented on Goat Island.

Two species of Ash, the white and black, (*Fraxinus Americana* and *F. sambucifolia*) are among the trees of the Island, and are to be met elsewhere in abundance.

The only species of Linden or Bass-wood, which belongs to the vicinity, is the familiar one, *Tilia Americana*. It is plentiful upon the Island and of extraordinary size and beauty.

Of nut-producing trees the following occur :

The Butternut (*Juglans cinerea*), the Black walnut (*J. nigra*), the white Hickory (*Carya alba*), the hairy Hickory (*C. tomentosa*), the pignut Hickory (*C. porcina*), and the bitter Hickory (*C. amara*), the Beech (*Fagus ferruginea*), the Chestnut (*Castanea vulgaris*), the white Oak (*Quercus alba*), the post Oak (*Q. obtusiloba*), the Chestnut-oak (*Q. Muhlenbergii*), the Bur-oak (*Q. macrocarpa*), the dwarf Chestnut-oak (*Q. prinoides*), the red Oak (*Q. rubra*), the scarlet Oak (*Q. coccinea*),

the Quercitron-oak (*Q. tinctoria*), and the Pin-oak (*Q. palustris*).

Two species of Elm (*Ulmus Americana* and *U. fulva*), three Birches (*Betula lenta*, *B. lutea* and *B. papyracea*), one Alder (*Alnus incana*), six native Willows (*Salix nigra*, *S. lucida*, *S. discolor*, *S. rostrata*, *S. petiolaris* and *cordata*), and four Poplars (*Populus tremuloides*, *P. grandidentata*, *P. monilifera* and *P. balsamifera v. candicans*), are embraced within the Sylva of Niagara.

Of the cone-bearing family the number of species is not as great as might be expected. They are only six, distributed in five genera, as follows :

The White-cedar (*Thuja occidentalis*), the most abundant of the evergreens at Niagara, the Red-cedar (*Juniperus Virginiana*), unfortunately disappearing, the Juniper (*J. communis*), the American Yew or Ground-hemlock (*Taxus baccata v. Canadensis*), the White-pine (*Pinus Strobus*), and the common Hemlock-spruce, (*Tsuga Canadensis*). The two last named species are not so plentiful upon the Island as their beauty demands. They should be at once and largely replanted.

Of the herbs, producing showy flowers, which are to be found upon the Island, the following may be mentioned, which by their profusion as well as beauty, make it in spring time and early summer, a natural flower-garden, wild indeed, but wonderfully beautiful:—

Our two Liverworts or Squirrel-cups (*Hepatica acutiloba* and *H. triloba*), scarcely distinguishable from one another, except by the leaf, but of an infinite variety of color.

The diœcious Meadow Rue (*Thalictrum dioicum*), more noticable because of the peculiar beauty of its foliage than its conspicuousness of flower. As graceful as a fern.

The wild Columbine (*Aquilegia Canadensis*), to be found on the Island, yet more abundantly along the chasm, where it displays its elegant blossoms of scarlet and gold, far beyond the reach of the most venturesome.

The May Apple (*Podophyllum peltatum*), a plant singular both in flower and leaf, but beautiful and always arresting attention.

The Blood-root (*Sanguinaria Canadensis*), a plant lifting up its large, clear white flower and its solitary leaf in the early days of spring.

Squirrel-corn and Dutchman's breeches (*Diclytra Canadensis* and *D. cucullaria*). Strange plants, but of great gracefulness and beauty. Abundant on the Island early in May. The former species, rich with the odor of hyacinths.

Of the spring-flowering *Cruciferæ*, to be found upon the Island, the following deserve to be mentioned as notable for their abundance and beauty:—  
The Crinkle-root (*Dentaria diphylla*), the Spring-cress

(*Cardamine rhomboidea*, v. *purpurea*), and the Rock-  
cress (*Arabis lyrata*).

As many as four violets abound upon the Island and its vicinity, adding their charms to the beauty of the month of May—*Viola cucullata*, *V. rostrata*, *V. pubescens*, and *V. Canadensis*, the last, remarkable among the American species, for its fragrance as well as gracefulness.

The Spring-beauty (*Claytonia Caroliniana*), the large, native Cranesbill (*Geranium maculatum*), the Virginian Saxifrage (*Saxifraga Virginicensis*, the two Mitre-worts (*Tiarella cordifolia* and *Mitella diphylla*), the spreading Phlox (*P. divaricata*), the creeping Greek Valerian (*Polemonium reptans*), now rather rare, the American Dog-tooth Violet or Adder's-tongue (*Erythronium Americanum*), the large-flowered Bell-wort (*Uvularia grandiflora*), the Indian Turnip (*Arisæma triphylla*, and the two Trilliums (*T. grandiflorum* and *T. erectum*), add largely to the spring contingent of attractive and conspicuous plants.

Later in the season, one may find the shrubby St. John's Wort (*Hypericum Kalmianum*), and one of the most graceful species of Lobelia (*L. Kalmii*), each rejoicing in a damp situation, and each, quite probably, discovered at the Falls, by Bishop Kalm, nearly a century and a half ago, and introduced by him, from that locality, to the notice of the botanical world. The name of the discoverer of these interest-

ing plants is worthily commemorated in those which the great Linnæus bestowed upon them.

The summer time brings forward many attractive forms—the Grass of Parnassus (*Parnassia Caroliniana*), the Painted-Cup (*Castilleja coccinea*), an occasional lily, an orchid or two, but of no great beauty, the Hare-bell (*Campanula rotundifolia*), and a large array of annuals.

Nor is the autumnal Flora of Goat Island uninteresting. Golden-rods (*Solidago* sp.), Sun-flowers (*Helianthus* sp.), Star-flowers (*Aster* sp.), the Downy Thistle (*Cnicus discolor*), and, at last, the triumph of October and the dying year, the shorn Gentian (*Gentiana detonsa*), its graceful blossoms as blue as the summer skies.

In the region of the Falls, but not upon Goat Island itself, some plants of great beauty have been detected. Below the Whirlpool, two species of Bluets or Innocence (*Houstonia cærulca* and *H. purpurea*), are to be observed, the rare *Liatris cylindracea*, *Apocynum androsæmifolium*, the orange-colored Milkweed (*Asclepias tuberosa*), the Fire-lily (*Lilium Philadelphicum*), the large, yellow Lady's slipper (*Cypripedium pubescens*), the beautiful, low-growing Morning Glory (*Convolvulus spithameus*), and wild Roses, as fragrant as beautiful.

The ferns of Goat Island and the region of the Falls are numerous. Among them may be men-

tioned :—The Ostrich-fern (*Onoclea Struthiopteris*), the Sensitive-fern (*O. sensibilis*), the Royal-fern (*Osmunda regalis*), the Interrupted-fern (*O. interrupta*), the Cinnamon-fern (*O. cinnamomea*), the Bladder-fern (*Cystopteris bulbifera*), Shield-ferns, of various species (*Aspidium Novæboracense*, *A. Thelypteris*, *A. spinulosum*, *A. cristatum*, *A. Goldianum*, *A. marginale*, *A. Lonchitis*), and the Christmas-fern (*A. achrostichoides*), the Beech-fern (*Phegopteris Dryopteris*), only found at the Devil's Hole, the Walking-fern (*Camptosorus rhyzophyllus*), four Spleen-worts (*Asplenium Trichomanes*, *A. eburneum*, abundant at Lewiston, *A. achrostichoides* and *A. Filix-femina*), scarcely to be excelled in grace by any species, two Cliff-brakes (*Pellæa gracilis* and *P. atropurpurea*), the Common-brake, world-wide in its distribution (*Pteris aquilina*), the American Maiden-hair (*Adiantum pedatum*), and the common Polypody (*Polypodium vulgare*), peering, in many places, over the edge of the chasm into the depths below.

Of the Fauna of Niagara very much cannot be said. All the larger Mammalia, which abounded in the region whilst it was still the possession of the red man, have long since disappeared. It seems almost as though they could never have resorted, habitually, to Goat Island. The access to it of the elk, the red deer, the bear, the panther, the lynx, the fox and the wolf, common enough in the neighborhood, must always have been difficult, and their return

to the mainland almost impossible. At the present time the quadrupeds inhabiting the Island are probably only three, the Black-squirrel, the Red-squirrel and the Striped Squirrel or Chipmunk. These may be seen, almost any spring or summer day, disporting themselves, without regard to the presence of man, in their leafy coverts.

The birds affecting the Island and the gorge are not to be distinguished, in species, from those of the mainland. But, as would be expected, environment makes some species rare and others plentiful. The Robin (*Turdus migratorius*), the Oriole (*Icterus Baltimore*), the Blue-bird (*Sialia Wilsonii*) and the Goldfinch (*Carduelis tristis*), find so much of their food supply in door yards and cultivated land, that they are to be seen less frequently upon the Island or within the gorge, than elsewhere in the neighborhood. On the other hand, birds of the deep and silent woods, like the Vireos, Wilson's Thrush (*Turdus fuscescens*), the Wood-thrush (*Turdus mustelinus*), and the Cat-bird, (*Mimus Carolinensis*), are almost always to be seen and heard in the vicinity of the Falls or river.

Birds of the crow family, such as the common Crow, the Purple Grackle and the Blue-jay were probably, at one time, plentiful; but they are now rarely seen, except as they are passing over from one side of the river to the other. Our common hawks may be included in the same remark.



Summer or winter, numerous gulls may be seen hovering over the river, between its high banks, below the Falls.

Late in the autumn, after other birds have taken their flight, in the thick spray of the Red-cedars, great flocks of Cedar-birds (*Amphelis cedrorum*) are to be noticed, feeding socially upon the plentiful sweet berries of the tree. Probably they remain until the supply of food is exhausted.

The Bald-headed Eagle (*Haliaeetus leucocephalus*) was once a frequenter of the region of the cataract, but is now seldom seen. Probably he has learned to be wary and not unnecessarily to expose himself to the aim of the collecting naturalist. But, however that may be, without doubt the waters below the Falls were once a favorite resort to him. He was a devourer of fish, and, although powerful of claw and pinion, he did not disdain to save his strength by feeding upon such as had been killed or stunned in their passage over the Falls.

Of the birds of our region, which seem to fear the presence of man, and therefore retire to the unfrequented woods, it may be said that they are really plentiful in the shady nooks and recesses with which the gorge of the river abounds. The naturalist, who would wish to make them a study, can do so, satisfactorily, if he will but enter the woods at the Whirlpool or at Foster's Flat and patiently and quietly await their

appearance. It is hardly possible that such a retiring species as the Indigo-bird (*Cyanospiza cyanea*) will fail to reward his watchfulness, or that a Scarlet Tanager (*Pyrranga rubra*) will not soon flash like a meteor before his eyes. Likely enough the Kingfisher (*Ceryle Alcyon*), will leave his silent perch and with a harsh cry dart down upon his scaly prey. Here, where the thick leaves make a twilight, even at mid-day, the attentive ear of the student of our birds will listen, with delight, to the bell-like notes of the Wood-thrush, or to the sweet cadences of the Cat-bird's real song.