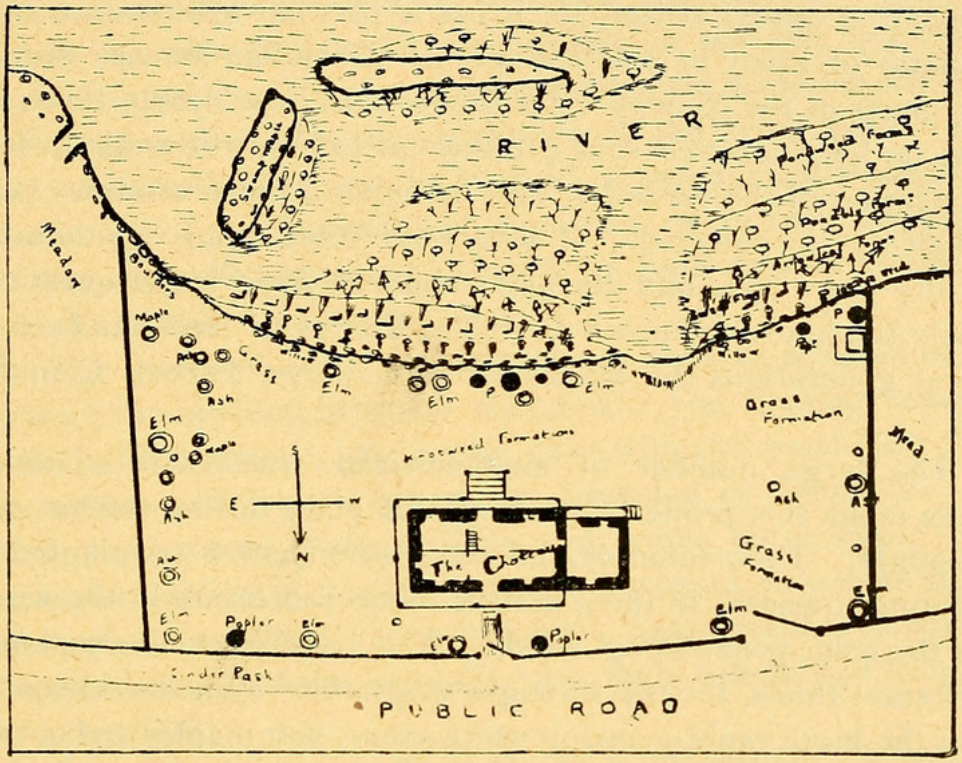
# NATURE STUDY No. XXX.

## NATURE OBSERVATIONS AT HOME.[1]

By Prof. W. LOCHHEAD, Biologist, Macdonald College, St. Anne de Bellevue, Que.




The observations and suggestions for study indicated in this article have special reference to a well-known property on the banks of a well-known river. This plot of ground, however, is not very unlike other plots of ground, and similar studies may be carried out in nearly all home grounds, more especially those that border on lakes, rivers or smaller streams. By referring to diagram, one will note that the property lies between the public road and the river; that there is a large number of middle-sized, shade-giving trees, most of them along the borders of the lot; that a stone house stands near the middle of the grounds; and that the shallow shore is fringed with plants, while farther out are two small islands, fringed also with plants standing knee-deep in the water.

It may be observed, also, that the property stands at the head of a little bay, or bayou, of the river, where the currents are

not as strong as those farther out, and which the sediment and silt are rapidly filling up. The two small islands stand at the mouth of this bayou and have been formed as bars by the currents of the river.

The white-washed stone house is the first object to attract the eye of a casual visitor, for it has a peculiar appearance, characteristic of many of the old French Canadian houses seen in many parts of the country. Its stone walls are nearly three feet thick, its long concave roof projects far beyond the walls to form the covering of the verandah, and its upper dormer windows stand out half-way up the roof. It was built more than one hundred and fifty years ago, and its age should of itself invite questions. Locally the house is known as "The Chateau," and has been for several generations the homestead of a large French Canadian farm.

The large number of medium-sized trees with abundant foliage make this property a delightful place during the hot days in summer. Unfortunately, no evergreens had been planted by the former owners, so there is little or no protection in the winter from the cold, penetrating winds. The trees were likely planted at different times, for the slow-growing white elms are almost as tall as the more rapid-growing white ashes, soft maples and cotton-woods or poplars. Here are good opportunities for a comparison of the habits of these common trees:—their general appearance from a distance, their manner of branching, their bark, their leaves and leaf arrangement, their fruits, and also their insect and fungous enemies, etc.

Perhaps the most interesting plants flourish in the shallow water along the river bank. There the plants are plainly grouped into formations, or zones, running parallel with the shore, each characterized by certain dominant species. For example, on the low bank are low willows and swamp maples; nearer the water, yet on the sandy beach, are joe-pye weed, elodes and water horehound. In the water along the shore are sweet-flags, cat-tails, bulrushes and arrow-leafs; in deeper water are pond lilies and Indian rice; and in yet deeper water are the pond-weeds and bass-weeds (see diagram where each zone is called after its dominant plant). Such a shore plant-society deserves and well repays care-

ful study, for it is evident that its members must possess special adaptations for such an aquatic life. What are some of these adaptations? In the first place, we observe that most of them are perennial, and have well-developed rootstock systems in the loose soil below the surface of the water. From the rootstocks arise vertical branches bearing the leaves and flowers. Again, the tissues of such rootstocks are spongy in texture, and contain many air cavities, for some provision must be made for the supply of oxygen requisite for the respiration of the living cells. Moreover, the stems have but little need of mechanical woody tissue on account of the buoyancy of the water, or of cork because the plant is compelled mainly to absorb its food directly through the walls in contact with the water.

The leaves of these aquatic plants are also adapted in many ways to the medium in which they live. The floating leaves are oval or shield-shaped, as is the case with the pond-lilies; while the submerged leaves are either dissected or ribbon-like, as in some pond-weeds, water-milfoils and water butter-cups. Often the under surface of floating leaves is purple to absorb as much of the heat as possible. The arrow-leafs have peculiar arrow-head shaped leaves, but occasionally one finds submerged forms that are grass-like.

The reproduction of these plants is interesting. The flowers are all borne on or above the surface of the water, and the pollen is carried by winds, currents of water, or by insects in the case of conspicuous flowers like the pond-lilies. Moreover, the seeds of most of these plants are able to float on account of the presence of air cavities, and are scattered by currents. Bud propagation also is very common. Special buds containing much food drop off into the mud and develop into new plants the following season.

Further, it will be observed that the intricate net work of upright and horizontal branches at the edge of the water collect silt and entangle fallen dead plants. In a short time the mud accumulates to such an extent that the water becomes sufficiently shallow to allow flags and rushes to develop and oust the former owners. These in turn will give place to joe-pye weeds and willows, and so the struggle goes on for possession of the shallow waters and an extension of the shore.

Here are a few additional questions relating to water lilies which the nature student should try to answer. In what respects are the leaves. flowers, and rootstocks of the white and yellow water-lilies alike? In what respects do they differ? What is the function of the air-canals in the petioles and peduncles? Why is the upper suface of the leaf waxy? Determine on which surface of the leaf the stomates or breathing pores are placed. Do the submerged rootstocks bear leaves? What hold the rootstalks at the bottom? Account for the numerous scars on a rootstock. What is the color of the rootstock? In what part of the rootstock are the strengthening tissues located? What differences in the habits of the flowers of the two species? What changes occur to the pistil when it is mature? What insects visit the flowers? What are the insect enemies of pond-lilies?

Other plant formations may be studied in the ground around the house. At the back door where there is abundant nitrogenous waste are knot-weeds, lamb's quarters, chickweeds, large-leafed plantains, burdocks, ragweeds, shepherd's purse, docks, and nettles. All are hardy, quick-growing, and prolific in seeding.

Here again are special adaptations. The stem of the large-leaved plantain is actually pulled down a short distance into the ground by its many contractile roots, and the plant is better preserved from injury than if it lifted its stem into the air. The chickweed leaves have lines of hairs which direct the rain which falls on them down the stem to the roots. The pointed leaf of the nettle, on the other hand, directs the rain away from the stem, and allows it to drip from the tips of the outside leaves to the ground. The roots of the nettle spread widely, and the rain falls where it will be most refreshing. The docks and burdocks have deeply penetrating roots, and they seldom suffer from lack of moisture.

Beneath the trees the plants are mainly blue grasses. There the vegetation is so rank and close that other plants have but little chance to make headway. Sometimes rib-grass, yarrow, and ox-eye daisy establish themselves, but these, it will be noted, have leaves either narrow like the grasses themselves, or dissected so that they can compete with the grasses. The grass leaf shows an daptation to rain. When rain falls the water running down the

leaf is prevented from passing within the leaf sheath by the ligule, the small scale at the junction of leaf and sheath.

Much could be learned about the insect life of *The Chateau*, but space will allow only a brief notice of a few forms, not to mention the always interesting common white and sulphur butterflies, the swallow-tails, the red-admirals, fritillaries, meadow-browns, and the bluets, which flit here and there and from meadow to meadow, or the bees, wasps, flies and beetles which are on the flowers at the water's edge. Many yellowish maggot leaf-miners inhabit the leaves of joe-pye weed and feed on the soft tissues between the two outer layers.

Plant-lice are abundant on the stems of some of the plants. Those that cluster on the stems of lamb's-quarters are of a greenish color, those on the Canada thistle black, and those on small Balm of Gilead spotted. Ants, too, are there feeding on the sweet honey-dew secreted by their "cows." Small caterpillars form nests on the umbels of the wild parsnips by drawing the flowers together with silken webs, and large black-and-white, plumed caterpillars feed on the leaves of the ash trees, and often make themselves too friendly when they drop from the leaves to the hats and coats of the passers-by.

Insect life is varied enough to allow the close observer a wide choice of subject, and blind he must be who can not find in this great field many and interesting studies.

Down along the shore is a low wall of large stones built by a former owner for a breakwater. To a student with an interest in minerals and rocks, these stones are instructive objects; for there are boulders of gneiss rocks and granite, sandstone almost changed to quartz rock, quartz conglomerate, and dark grey limestone. All of these have stories to tell, and some of them are miles away from their original home, having been carried by the great glacier. All show traces of the action of water and ice; their rough edges are rounded, and their sides are scratched and sometimes flattened.

The public road occupies the summit of the old beach, where the river was both wider and deeper than now. Away across the river the old beach may be seen quite plainly at the same height.

Just as if these evidences were not sufficient to convince us of the fact, another is near at hand, for there are stratified deposits of clay, sand, and gravel exposed in the sides of a small gully which has been made by a little stream flowing across the road not five rods away.

In this home property bird-life, too, is abundant and readily studied. During July and August the warbling vireos whistled delightfully from the tops of the trees, the swallows darted swiftly after the numerous insects which filled the air above the shallow waters, the nuthatches and the black-and-white warblers searched the tree trunks for insect food, and the flycatchers made sallies from their perches on the lowest cottonwood limbs to catch insects on the wing. Besides these were several kinds of water fowl and shore birds down by the river, the woodpeckers, the kingfishers, the catbirds, the American goldfinches, the yellow warblers, the red-winged blackbirds down among the reeds, the phœbes, the chickadees, the domestic sparrows, the song sparrows, the chipping sparrows, and many others, all within a few rods of the observer.

Space forbids further notice of the many other interesting objects of study, and problems which the young student finds awaiting solution about his own home.

This paper is practically a plea for a closer study of our home surroundings, a study too often neglected by our nature students under the impression that nothing interesting or instructive can be found there. As a matter of fact, the home with its garden and lawn is the very best field for Nature study. We require to give more attention to the commonplace things and to understand their real significence in everyday life. And how many commonplace things there are to study when we actually *see* with our eyes and *hear* with our ears, and when we realize that every detail of the structure of a plant, animal or landscape has a history and a meaning, and how few of our commonplace studies are beyond the comprehension of the smallest child!

When we know the things close at hand, we shall understand the things at a distance. When we understand the life-relations of the inhabitants of our yards and gardens, we put ourselves

into a right relationship with the big Nature world about us.—Study our home surroundings.

Down in a low corner of the grounds the soil is covered with much decaying vegetable matter. Ferns and mosses grow there and the leaf-screen of the trees allows but little sunlight to reach the damp soil. Year after year the organic matter accumulates in this corner, for pieces of limbs and bark are added to the leaf-mould, and year after year the decay continues. It is worth our while sometimes to observe the disintegrating agents at work. The leaves and twigs are often eaten by borers, sow-bugs, and centipedes, and the fungi continue the work on the stems which they have made to fall. Rupturing the bark of the dead limbs black pustules of many kinds of "sac-fungi" may be seen. The fine threads of these fungi have already penetrated the wood of the limb in all directions, and have come to the surface to produce their spores. On many limbs are slimy masses of the "slime-fungi," which also sends fine threads through the wood in search of food.

We may observe, moreover, that the bark breaks down less rapidly than the wood, for bark, we know, is largely composed of corky matter, which absorbs water but slowly; and as the destructive agents require moisture, its break-down is quite slow. The lichens, mosses and algæ that live on the bark, no doubt, hasten the operation, but the main agents are certain larger fungi and the bark-beetles. Moulds and bacteria follow and break down the tissues much farther. Soon this vegetable matter becomes mixed with the soil, forming a new soil from which mushrooms and other similar forms get their food-material. The decay continues through the activity of other delicate underground fungi attached to the rootlets of trees, whose threads explore the ground in every direction. In a few years the vegetable tissue, therefore, is completely broken down and incorporated with the mineral matter to form humus soil.