MARCH, 1911

VOL. XXIV, No. 12

THE OTTAWA NATURALIST

Published by The Ottawa Field-Naturalists' Club.

CONTENTS:

THE ROLLA L. CRAIN CO., LIMITED

ISSUED MARCH 11, 1911.

Entered at the Ottawa Post Office as second class matter.

THE OTTAWA NATURALIST

VOL. XXIV. OTTAWA, MARCH, 1911 No. 12

CONSERVATION, OR THE PROTECTION OF NATURE.*

By C. Gordon Hewitt, D.Sc., F.E.S.,
Dominion Entomologist, Ottawa.

The most vital problem to be solved by Canada, at the present time, is to know how we can insure the prosperity of the country and the consequent and incident prosperity of her people. An enormous country is entrusted to our care as a people, a vast heritage of Nature abounding in untold wealth and productive of the greatest good. Nature is not ours to squander, to amass wealth at her expense and enjoy a transient prosperity; it is ours to protect, and the protection of Nature is nothing more or less than the insuring of a national happiness. Through the foresight of the representatives of the people who are charged with the country's weal, that question has been answered, regardless of political creed, and in such a way as to place Canada in the front rank of those nations upon whom the future existence of the world will depend. We must conserve those resources of Nature in which are bound up the very life of this country and its future, and Canada enjoys the privilege of having the first Commission appointed by a national government to promote the conservation of our natural resources.

But it must not be supposed, in fact it is the greatest mistake to suppose, that this is a question which concerns those alone who are charged with the governing of the country. It is one which concerns every Canadian, whether he be an owner of thousands of acres or the rude pioneer blazing the path of progress through the wild unknown: it concerns every citizen.

To the naturalist, however, it should and does appeal with especial force, and it is on this account, because conservation means nothing more or less than the protection of Nature, the prevention of destruction without perpetuation, and because the work of the biologist must form the basis of a large proportion

*An address delivered before the Ottawa Field-Naturalists' Club on January 10th, 1911.

of the principles that will guide us in attaining the end for which we are working, that I have chosen this as the subject of my address this evening. I will endeavour to indicate, somewhat briefly I am afraid, a few of the problems which depend for their solution upon the results of biological investigation. As His Excellency Earl Grey truly said in his address to the Conservation Commission on the occasion of its first meeting: "The future well-being of Canada depends upon the loyal acceptance by its people of the principles which aim at the profitable and scientific development and conservation of your natural resources. I recognize that the future prosperity of Canada depends upon scientific research and upon the efficient application of the results of that research to the industrial and physical life of the people."

We must take a broad view and regard the problem from its æsthetic and ethical side as well as from its practical. We are a practical nation, but there is a growing danger that success and material prosperity may be taken as synonymous with, and as the criterion of, a national happiness, than which there is no mistake more profoundly erroneous.

THE SOIL.

The greatest need of man is food, and his food, directly or indirectly, is a product of the soil. On the producing power of the soil, therefore, the lives of the people as well as the future existence of the nation depend. It will be understood then how important a question the conservation of this great producing power, the fertility of the soil, is to so essentially an agricultural nation as Canada. The supply of the organic constituents of the food of plants is inexhaustible, but this is not the case with the inorganic chemical constituents of the plant food—nitrogen, potassium and phosphorous: and when we speak of the conservation of the essential elements of the soil we refer to these elements, of which the most important is nitrogen. Since 1660 this element has been regarded as one of the sources of the fertility of the soil, and after many years of careful inquiry we have come to the conclusion that the fertility of the soil can be attributed to no one cause: nevertheless, the available nitrogen is one of the chief factors in this fertility. It will naturally be inferred that this is a question of a chemical nature which does not concern the biologist. The day has passed when one branch of science can stand aloof from the rest, as the history of the present problem will indicate. In 1886, Hellreigel and Wilfarth discovered that the nodular growths found on the roots of the leguminous plants, such as peas, clover, alfalfa, etc., contained bacteria which were capable of drawing nitrogen from that large reservoir of other-

wise almost unavailable nitrogen—the air. Plants cannot use the free nitrogen, but require it in the form of nitrates, and this transformation is brought about by the root bacteria found in association with these plants. This discovery afforded an explanation of the long known fact that such leguminous crops enriched the soil. Since that discovery, other bacteria living free in the soil have been found that are capable of fixing the essential nitrogen, and Hall has recently stated that "We may with some confidence attribute the vast stores of combined nitrogen contained in the black virgin soils of places like Manitoba and the Russian steppes to one of these organisms." Humus is rich in nitrogen, and the bacterial organisms, together with the oxygen of the air, convert this into available plant food. It is owing to the nitrogen-enriching power of such leguminous crops as clover and alfalfa that they are of so great value in enriching soil which has been depleted of nitrogen by other crops. It is on this single fact that the system of the rotation of crops is based, that is, the alternate planting of leguminous crops which increase the amount of available nitrogen in the soil with crops, such as cereals, which use up the nitrogen. This rotation, therefore, is one of the most important means of maintaining the fertility of the soil. Furthermore, by the planting of these leguminous crops we are enabled to inoculate soils previously deficient in nitrogen and accordingly increase their productive power.

Recently, at the Rothamsted laboratory in England, Russell and Hutchinson have made some investigations of more than ordinary interest upon this question of the relation of soil bacteria to fertility. Subsequent to the discovery of the nitrogen-fixing bacteria, the inexplicable fact was discovered that when the soil was heated or treated with an antiseptic such as chloroform to render it sterile, the fertility increased in an astonishing manner. Heating the soil to a temperature of 70 to 100 degrees for two hours doubled the size of the crop. This fact has been known since the time of the Romans and is practised in intensive cultural systems, but the cause of the increased productivity was unknown. These authors find that this increased fertility appears to be due to the fact that when the soil is heated or treated with an antiseptic, all the bacteria are not destroyed, but larger protozoal organisms, akin to Amœba, which normally feed upon the bacteria, are killed. In consequence, the bacteria released from their enemies increase and multiply at a rapid rate, which results in an increase in the amount of available nitrogen in the soil.

These investigations will serve to indicate how these questions of the fertility of the soil and the maintenance of that

fertility could not be considered without reference to their biological aspects which are really the fundaments.

THE PREVENTION OF LOSSES INCIDENT TO THE PRODUCTS OF THE SOIL.

Having taken all the means that are necessary to conserve the fertility of the soil, we are faced, in the production of our crops, whether they may be farm or fruit crops, with serious factors which, if not contended, will more than counterbalance the advantage gained in such conservation. Therefore the combatting of those factors adverse to successful cultivation and production is an integral and essential part of conservation. Of such adverse factors, the chief are plant diseases and insect pests, and I shall consider the latter more particularly as we have at present more accurate data and statistics with regard to their depredations. The immense losses which insects and plant diseases incur are chiefly due to the disturbance of natural conditions brought about when man cultivates the soil and provides large quantities of eminently suitable food for insects often previously subsisting on wild plants. It is generally conceded that a ten per cent. basis may be taken as the average loss on farm crops due to injurious insects, and those who have given their continued attention to the question consider that this is the minimum. On that basis Marlatt estimates that the annual loss in plant products of the farm in the United States, due to insects, is $650,000,000, and on the same basis our annual loss in Canada would be over $50,000,000 worth of farm crops. In fruit production insects make a tax of at least thirty per cent. and Chittenden puts the total losses, plus the cost of treatment, at over $66,000,000 in the United States. To the ordinary person these figures seem incomprehensible, but this loss is capable of estimation on the basis of experience, and those of us who are dealing with these losses daily have no hesitation in maintaining that ten per cent. is a minimum average loss. This is omitting the losses which are no less serious, due to plant diseases, and those which are due to weeds. It is safe to say that, even with our present knowledge of the methods of combatting these pests, we can effect a saving of at least thirty per cent., and with the increase of such knowledge, which can only be gained by scientific investigation, that percentage will gradually increase. It is necessary that it shall increase, for the soil of Canada supplies the food not only of our own people but of other nations who are looking to the new world and the west for their food supplies.

The conservation of the soil, therefore, rests on two principles

—the maintenance of the soil-fertility, accomplished by scientific methods of cultivation, and the combatting of those factors which reduce the productivity by destroying the soil products, namely insects, plant diseases and weeds. We must put an end to exploitive farming, the taking out and not putting back the equivalent, which is nothing more or less than stealing the nation's wealth; and the farmer who exploits the fertile soil of Canada must be shown that he is criminally taking away the future subsistence of the generations to come.

FORESTS.

The forests of Canada were responsible for the foundation and the early history of the nation, for without the forests there would never have been that great natural resource of fur-bearing animals which lured the first wealth seekers and pioneers to this land rich in forest, river and lake. The forests will be responsible for the future prosperity of Canada, for upon their conservation depends the conservation of the land and water. They conserve the land in virtue of their great function as natural filters, allowing the gradual running away of rainstorms and melting snow, and in the place of wash-outs and floods sweeping away the fertile soil by erosion, a continuous steady flow of water is provided and maintained, and thus the water which we shall require more and more as our natural fuel supplies become more exhausted, is regulated in the best possible manner for the purposes of obtaining power. The maintenance and conservation of our natural water supplies is primarily dependent upon the conservation of the forests, and on the conservation of the water supplies depends the productivity of the land. What would our great western provinces produce if they were not watered by the rivers having their origin on the eastern slope of the Rocky Mountains, the origin and flow of which rivers is directly due to the forests covering those mountains? The setting aside of the greater part of those forests on the eastern slope of the Rocky Mountains as a reserve is one of the greatest prospective actions ever taken by a government. In addition to the intimate relation between forests and the land and water, their effect upon the climate and also upon the health of the people are to be considered. By the majority of people one of the chief functions of the forests is, of course, their utilization. The varied industries which depend upon forest products, from the publishing of a newspaper to the building of a railway, render it still further necessary that we shall not only conserve but utilize in the most economical manner possible and, by afforestation of deforested areas and of areas unsuitable for agriculture, shall

insure the timber needs of the future. The total forest area of Canada is estimated at over 1,250,000 square miles, of which about 400,000 square miles may be considered to be covered with merchantable timber.

Two of the three factors which are chiefly responsible for the destruction of our forests depend for their solution upon the results of biological investigation. The three chief forest destroying agencies are fire, insects and plant diseases, and all are interdependent. Naturally the first appears to be the most important on account of the extremely apparent and ravaging devastation. Nevertheless the destruction caused by insects and plant diseases, though usually working for a long time, insidiously and unseen, is enormous. It is estimated by Hopkins that for a ten-year period, during which investigations were made, the average amount of timber in the forests of the United States killed and reduced in value by insects would represent a loss of $62,500,000 annually. It is impossible to estimate in the absence of the necessary statistics the extent of the annual loss in Canada to the growing forests, but on a conservative estimate the loss on the annual cut of timber due to insects in Canada would be more than $2,000,000. The injury to forests by fire receives the serious consideration which it merits on account of its very noticeable character, but insects and fungi carrying on their destruction in apparent secrecy are unobserved until their depredations assume a magnitude such as to render their control almost impossible.

Forest insects are injurious in a number of ways: they may attack and kill the mature growing trees; they destroy the second growth and thus hinder or prevent natural regeneration; they attack the cut timber and the finished products to a serious extent; in a word, from the seed to the finished product they exact no inconsiderable toll of this important and valuable resource. There are two classes of insects injurious to forests: those which defoliate the trees, and the boring insects which attack both living trees and the cut products. Of the former class we have two examples in Canada to which I may briefly refer. The Larch Sawfly (*Nematus erichsonii*), which destroyed all the mature larch or tamarack in eastern Canada in the outbreak of 1881-1885, is now repeating its depredations. The second is the Spruce Budworm (*Tortrix fumiferana*), which is distributed throughout Quebec, and in many localities has effected serious defoliation of the spruce and balsam during the last two years. In British Columbia it is also attacking the Douglas Fir and has already shown its ability to kill the young second growth. The seriousness of this outbreak of the Spruce Budworm is not only due to the probable effect on the trees of the repeated

defoliation, but also to the fact that this defoliation by weakening the vitality of the trees will render them more susceptible to the attacks of the worst forest pests, the bark beetles. These latter insects attack healthy and unhealthy trees and, by the boring of the adult beetles and their larvæ in the growth layer beneath the bark, the trees are girdled and in consequence killed. A species of bark beetle (*Dendroctonus piceaperda*) attacking the spruce has caused considerable destruction among the spruce forests of eastern Canada and the United States. The activities of these bark beetles are inter-related with those of the timber boring beetles, which attack the standing trees which have been killed or are dying as a result of the infestation of the bark beetles, and thus render them useless for timber.

Fire, insects and fungal diseases as I have already stated, are all closely inter-related. Abundant evidence has been gathered to show that trees killed by insects have more readily acted as fuel for forest fires, and also that insects may bring about the final destruction of trees which might otherwise have recovered from the effects of fire. By their borings and tunnellings in the bark and wood, these beetles provide means of entrance for the spores of fungi which by their rapid growth hasten the destruction and decay of the timber. It will be realized, then, that any system of forest conservation and afforestation will fail in its object if it leaves out of consideration the immense losses entailed by the attacks of insects and fungi, the aggregate losses due to which I have no hesitation in affirming, as others who have investigated these matters maintain, exceeds even the total loss due to fires. In most cases these losses can be prevented and the methods to be adopted for the prevention of losses due to insects and plant diseases are almost identical with those to be employed against the prevention of forest fires: constant supervision and prompt action immediately the outbreak is observed, which will be in an early and controllable stage, if the supervision is sufficiently adequate to be effective.

THE PROTECTION OF BIRDS.

The majority of people fail to appreciate the part which birds play in the economy of Nature and the untold benefits resulting from their protection and encouragement. In combatting those factors which are responsible for so great a loss to the agriculture of this country—injurious insects, weeds and small mammals, such as mice and gophers—and to the forests, we shall be compelled to an increasing extent to rely on the natural enemies of these pests, especially the birds which are the most

powerful insecticides which we have. Reference has already been made to the change in the balance of Nature which man makes by interfering with the pre-existing natural conditions through the cultivation of the soil and its products, and this disturbance has a serious effect on bird life by changing their environment. But more serious than this is the effect of the wantonness and inherent barbaric traits of man. One of the most appalling facts in relation to Canadian agriculture and the enjoyment of the people is the wanton destruction of bird life, especially in the West. Small wonder that the visitations of grasshoppers and of other insects proceed uncontrolled when the farmer has killed off his best friends. Is it a matter for surprise that one of the most serious questions affecting the farmer of Canada to-day is the increase in the number of weeds and their spread, when the greatest weed destroyers are not only not encouraged and protected, but are killed, because they have the misfortune to be living creatures and so provide a target? Legislation is not the only remedy to seek; we must employ the greatest of weapons—enlightenment by education, and not rest until we make those who are dependent upon the products of the land understand that they should treat their bird friends as they would their human friends, and in this way increase the pleasures of life and their allies in combatting such foes as destructive insects, mammals and weeds.

A few instances may be mentioned to illustrate the unpaid and usually discouraged assistance of these friends of ours. That large family of our native sparrows—I do not refer to the English sparrow, which does its best to drive away most useful native birds, but to such birds as the tree sparrow, the song sparrow, the junco and the dickcissel, etc.—as weed destroyers they are unrivalled. Dr. Judd, of the Biological Survey of the United States Department of Agriculture, has made a comprehensive study of the food of about twenty species of sparrows, and has examined over 4,000 stomachs of the birds at different periods of the year from different localities. As a result it was found that weed seeds form more than half their food for the entire year, and during the colder half of the year these seeds constituted about four-fifths of the food of many species. A single bird will often be found to have eaten 300 seeds of pigeon grass, or 500 seeds of lamb's quarters or pigweed. As they feed in flocks they are most efficient consumers of these and other weeds. Beal estimated that the tree sparrow may consume one-quarter ounce of weed seed per day, and, on that basis, in a State the size of Iowa, this species would consume 800 tons of seed annually.

McAtee has given the results of an examination of the

stomachs of 1.154 Horned Larks collected in all parts of the United States and southern Canada. It was found that insects constituted 20.6 per cent., and vegetable matter, six-sevenths of which consisted of weeds, was 79.4 per cent. They occasionally eat grain, but this is far outweighed by their destruction of weed seeds and insects, and the destruction of such birds is criminal as affecting conservation.

Everyone appreciates the utility of the titmice and chicadees as insect destroyers, but few regard the hawks and owls in their proper light. Such species as the Sharp-shinned and Cooper Hawks and the Great Horned Owl are certainly inimical to farmers, but the majority of hawks and owls are either wholly or partially beneficial. Of those which are wholly beneficial, common, and destroyed on almost every occasion, one might mention the American Sparrow Hawk (*Falco sparverius* L.) which feeds chiefly upon grasshoppers and also destroys such noxious rodents as gophers and field mice. One of the best gopher and grasshopper destroying hawks is Swainson's Hawk (*Buteo swainsoni*) common on the prairies of the West. Merriam records three whose stomachs were examined and found to contain no other food but grasshoppers; one contained 88, another 96, and the third 156.

These facts, a few of a very large number which might be quoted, indicate the practical value of such birds and the importance of not only protecting them but encouraging them. In forests this is specially desirable, and it will be necessary for us to pay far greater attention to this aspect of forestry in the future than is the case at the present time. We shall be well advised to follow the guidance of those European countries who regard the encouragement of birds by the provision of nest boxes as an essential element in forestry systems. In good forests there is little natural provision for the nesting of birds, and accordingly these must be supplied. Many instances might be quoted of the success of these measures in controlling insect attacks, but a single one must suffice. Baron von Berlepsch, the greatest European advocate of bird encouragement, gives the following example: The Hainich wood, south of Eisenach, which covers several square miles, was stripped entirely bare, in the spring of 1905, by the caterpillars of a little moth (*Tortrix viridana*). His wood, in which there had long been nest boxes, and of which there are now more than 2,000, was untouched. It actually stood out among the remaining woods like a green oasis. At a distance of a little more than a quarter of a mile farther the first traces of the plague were apparent, and at the same distance farther on still it was in full force. It was a plain proof of the distance the tits and their companions had gone during the

winter and after their breeding time. In many of the German states and other parts of Europe bird encouragement by means of nest boxes is undertaken by the State, Hungary being one of the foremost in this respect, at the instigation of Otto Hermann. The value of encouragement in increasing the number of birds is further illustrated by the use made of these means when they are employed. On and near Baron Berlepsch's estate, 90% of 2,000 nest boxes in one wood were occupied and nearly all of 500 and 2,100 in other localities. Of 9,300 boxes hung up by the Government of the State of Hesse 70 to 80% were occupied during the first year, and in 1907 all had occupants.

It will be seen, therefore, that this question of bird protection and encouragement is one in which all lovers of Nature and of our forests, and especially those who are dependent upon forests and agriculture for their subsistence, as we are all indirectly, should be deeply concerned. Our native birds are a resource of inestimable value, practical and æsthetic.

PUBLIC HEALTH.

If the conservation of natural resources is for the benefit of man and of the future generations, it naturally follows that for such benefits, as may accrue from this policy of conservation, to be utilized and enjoyed to their fullest extent, man himself must be conserved. In other words, the public health must be an object of conservation. It is useless to colonize if care is not taken of the people. Of what use are these resources if there is not a healthy nation to enjoy them? I may be accused of wandering beyond the appointed limit in my treatment of this subject and asked how the question of public health comes within the domain of the naturalist. This question could certainly not be asked in any of those countries where such diseases as malaria, yellow fever, sleeping sickness and other insect-borne diseases are prevalent. Fifty thousand deaths from yellow fever was the price paid by the French in cutting a portion of the Panama Canal; the annual mortality in the Indian peninsula from malaria is over a million human beings. The methods adopted for the prevention of these devastating diseases are based upon entomological knowledge. As Lord Robson recently said in London: "It is the man of science who is to decide the fate of the tropics, not the soldier or the statesman with his programmes and perorations, but the quiet entomologist. He is the man of science who of all others strikes the popular imagination the least and gets less of popular prestige; but he has begun a fascinating campaign for the sanitary conquest of those enormous tracts of the earth, and before long he will have added their intensely fertile soil almost a free gift to the productive

resources of the human race." All who have followed the recent progress of the war against those diseases which have kept the tropics closed to civilization will perceive the truth of Lord Robson's statement. In Canada, however, we have not these dread diseases, but we have others serious enough. It is to one only that reference will be made as it is one in which the naturalist is concerned. Next to tuberculosis the most serious of the preventable diseases is infantile diarrhœa. This disease is responsible for a greater mortality among infants than any other preventable disease, and the importance therefore of its prevention is apparent. The high rate of mortality among children in Canada may be realized from the fact that for the four years 1904–7 the average infantile mortality per 1,000 births in Ontario was 149.53, compared with 130.75 in England and Wales, where there is a far greater and more congested population. The greatest factor responsible for the spread of this disease is the house-fly. In my address before this Society twelve months ago I considered at length the relation of house-flies to public health and the means of controlling these insects. In consequence, I shall refer but briefly to this subject which illustrates the bearing entomological knowledge has upon this aspect of public health. Careful investigations by Niven and others have shown that there is a close correspondence between the aggregate number of house-flies in houses and the aggregate number of deaths from diarrhœa week by week and that there is a closer correspondence of diarrhœal mortality with the number of flies than with any other varying seasonal fact, and that these seasonal facts are capable of interpretation in the number of house-flies. Observations also have shown that flies cluster especially about the noses and mouths of infants suffering from diarrhœa, and their predilection for milk and sugar is well-known. Even though the specific cause of this disease which carries off the lives of thousands of infants in Canada each year is not known, it is enough to know that the house fly is the chief agent in the dissemination of the disease. Milk is also a factor in the spread of the disease and the infection of the milk with the disease germs is largely due to the agency of flies, as it has been shown that the bacterial infection of milk can be reduced about 50% by protecting it from flies. The relation of flies to typhoid fever is now becoming an accepted fact and the house-fly is regarded as one of the most serious menaces to the health of the civilized communities; its abolition and control is rightly coming to be considered a necessary step in the improvement of the sanitary conditions of our cities and towns. Legislation is needed to prevent the exposing of fruit, confectionery and other food supplies to the contact of flies; to ensure that they cannot breed in the usual breeding

places, such as exposed manure and garbage heaps, but that proper care shall be taken of such temporarily necessary nuisances. The medical inspection of school children and their education in the principles of hygiene are measures which will result in a healthier and happier youth of Canada.

An enlightened public is essential for the bringing about of these necessary sanitary reforms, which will result in a decreased death rate especially among children and a healthier environment and the conservation of the people's greatest asset.

WATER.

The question is naturally asked, in what way is the naturalist concerned in the question of conservation as affecting this extensive natural resource? Many replies might be given to this inquiry. There is one aspect in which not only the naturalist but every citizen as a food consumer is concerned, namely, the importance of the inhabitants of the water. As the problem of supplying the people with food becomes increasingly important, the value of fish as food will be generally appreciated to a greater extent than it is at the present time. It is a matter which is receiving and must necessarily receive careful consideration. Our enormous areas of water and great extent of river and stream are capable of providing, with proper care, a large amount of valuable food, and the question is how to provide, conserve and utilize that food in the most judicious manner possible. First we must prevent the pollution of the streams and waters, this is not only a problem which seriously affects the public health, but also the fish supply in the waters. The pollution of streams and rivers is a biological problem, for contamination with sewage renders the water bacteriologically unfit without treatment: and commercial pollution, the emptying of commercial waste products into the water, renders it useless as a sustainer of life and so cuts off this important item of our food supply which is under consideration. The provision of hatcheries where the eggs are carried through those stages in which there is so great a mortality in a state of nature will ensure a larger supply of young fish; but, unless the water is suitable and the young fish can obtain an abundance of food, it will be labour wasted. This leads to a subject the import of which is hardly yet realized, namely, the food available in the water for the fish. For a number of years this problem has been receiving the attention of investigators with regard to the marine fishes, and to a small extent in the United States in reference to fresh water fishes. Recently, however, a real beginning has been made by Prof. Needham, of Cornell University, of the study of

the food of fresh-water fishes and the possibility of its artificial cultivation. This food consists largely of the larvæ of certain insects such as the May Flies or Ephemerids, part of whose life-history is spent in water. At first sight this line of work would appear to be somewhat impracticable, but when the importance of utilizing so great a natural resource as our inland waters for the production of a valuable form of food is realized, as will be essential, then the relation which this question, of the scientific provision of suitable food for the fishes, bear to the whole problem of fish-culture will be fully appreciated. You may compare it to the growing of a crop; by the provision of hatcheries good seed is provided, but does any farmer expect his seed to produce a good crop if the available plant food in the soil is insufficient? How then can we expect good fisheries if attention is not paid to the available fish food in the waters devoted to pisciculture? Fish flesh is a highly nutritious food, in fact it is said to be an excellent brain food; we may find that the conservation of this natural resource may influence the clear thinking of the people!

In these few random remarks an attempt has been made to show why the naturalist and the lover of nature should be especially concerned in this great question of the conservation of the natural resources of Canada. Conservation is nothing more than a gospel of unselfishness, a lesson on our duty to future generations of Canadians; no true citizen of this country can fail in that duty by keeping silent if these great sources of natural wealth are plundered, not only injudiciously for the use of the people, but wastefully by those who consider not the present needs and future requirements, but their own personal gain. Conservation, however, does not mean, as many wrongly suppose, the hoarding up of our national resources, such as our forests, and the prevention of their full utilization. It means use without waste, or with as little waste as possible. The significance of this will be understood if you will remember that at present only three-eighths of the timber cut is in the final product; conservation is the saving of the other five-eighths. Cut the forests, but see that for every tree cut another is growing to take its place and fulfil its function. We are fortunate in being able to begin at an early stage and to learn the lessons which other nations have learned too late. Let each so work that Canada may truly say:

"Carry the word to my sisters—
To the Queens of the east and south.
I have proven faith in the heritage,
By more than the word of the mouth."

THE BIRDS OF OTTAWA.

BY C. W. G. EIFRIG.

(Continued from page 206.)

204. *Dendroica tigrina*, Cape May Warbler. A moderately sometimes fairly common migrant. The first have been noticed May 12th, but they should be looked for between May 20th and 24th. In a clump of fine black spruces west of Blueberry Point they are then to be found, if anywhere; but they also occur in Beaver Meadow, and in gardens, planted with evergreens, in the city. As some were seen as late as June 7th (1885), they may possibly breed in some of the thick evergreen woods in the northern part of the district. Their song is, *whee de de, whee de de, whee de de, whee.*

205. *Dendroica æstiva*, Yellow Warbler. A very common migrant and summer resident. This, like the Least Flycatcher, Warbling Vireo, etc., breeds numerously in the city in trees and shrubs. It begins to arrive May 4th. By June 12th its nest and eggs may be found. The local birds leave before August 17th, but the more northerly contingent passes through till September 21st.

206. *Dendroica cærulescens*, Black-throated Blue Warbler. This fine warbler in its striking livery of blue, black and white is a common migrant and moderately common breeder. In the woods on the east side of Beaver Meadow, or on the waterfront nearby, a pair or two may be seen throughout the summer. Their stay extends from May 6th to October 7th. Its song is a rasping, rapidly ascending, *dill dill dill dill dreer*, or a harsh, *tsreeeeeee.*

207. *Dendroica coronata*, Myrtle Warbler. Abundant migrant and rare breeder. This is our hardiest warbler, coming first of all and staying longest. It begins to arrive April 24th, becoming abundant early in May, and thinning out again before the end of that month. In a spruce thicket at Blueberry Point several were found singing lustily in June, 1909, indicating breeding. The migrants from farther north pass through in fall from September 10th to November 3rd. Song, a rapid, *dee dee dee dee dee dee trrrr*, like the Nashville Warbler.

208. *Dendroica magnolia*, Magnolia Warbler. A moderately common migrant and breeder. In the already mentioned spruce thicket at Blueberry Point; on the waterfront, Hull; in the Mer Bleue, they may be seen and heard throughout the summer. Their presence with us falls in the time between May 7th and September 19th. Their song is much like that of the Redstart, *dewee dewee deweetsi*, or *ree deree di.*

209. *Dendroica pensylvanica*, Chestnut-sided Warbler. A moderately common migrant and breeder. It is found in deciduous second growth, and such spots in evergreen woods. In Dow's Swamp they breed yearly. Extreme dates are: May 6th to October 1st. The highwater mark in their migration is reached May 17th.

210. *Dendroica castanea*, Bay-breasted Warbler. An abundant migrant. It passes through from May 16th to June 7th (1907) and again August 28th to September 26th. This and the next species, and some of the Flycatchers, are our last migrants in spring. Its song is scarcely heard here; it is almost identical with that of the Redstart.

211. *Dendroica striata*, Blackpoll Warbler. An abundant migrant. Its chief travelling companion is the Bay-breasted. It passes through from May 17th to June 12th (1907), and again August 28th to September 26th. Song, a high, dry *tsit tsit*, repeated six to ten times.

212. *Dendroica fusca*, Blackburnian Warbler. A very common migrant and moderately common breeder. In Beaver Meadow, Dow's Swamp, Mer Bleue, Chelsea, etc., they may be seen all summer. In spring they come from the 4th to the 25th of May, reaching their climax on about the 17th; and in fall the last are seen September 9th.

213. *Dendroica virens*, Black-throated Green Warbler. A very common migrant and moderately common breeder. The habitat of this species is in mixed woods, where some hemlock occurs. Its song, *dee dee deeah dee*, announces its presence long before one sees the bird. They begin to come May 1st, attaining their highest numbers about the 17th. In fact they are most common September 10th to 27th. October 2nd marks the latest date. The Beaver Meadow waterfront is the place near Ottawa where one may look for it with the certainty of finding it in summer.

214. *Dendroica vigorsi*, Pine Warbler. A moderately common migrant and rather rare breeder. True to its name it is found in evergreens only, and nine times out of ten in pines. It breeds in the stand of somewhat taller pines along the rivershore of Blueberry Point, and in similar locations, but owing to its habitat, is rarely seen. It is found here from May 7th on.

215. *Dendroica palmarum*, Palm Warbler. The status of this Warbler will have to be revised from that given in the last list. It is a moderately common migrant only. I have taken typical examples of it only on May 10th, 1905, at Blueberry Point Aylmer, and September 20th, 1905, near Hurdman's Bridge. The breeding birds found in our district and reported at various times in THE OTTAWA NATURALIST must go under the following

sub-species. Song, *whe che, whe che, whe che de de.*

216. *Dendroica palmarum hypochrysea*, Yellow Palm Warbler. This is an abundant summer resident, in the Mer Bleue only so far as is known, but probably also in other similar localities in the district. I have taken them June 3rd, 1904; June 13th, 1909; August 5th, 1910, when the young were full-grown. They probably arrive here before *palmarum*, as a nest with four eggs was found as early as May 23rd (1908). The song is like that of the Chipping Sparrow.

217. *Seiurus aurocapillus*, Oven-bird. A common migrant and summer resident. In deciduous woods, as Beechwood, Beaver Meadow, etc., one or two may nearly always be heard. Extreme dates of stay: May 6th to September 19th.

218. *Seiurus noveboracensis*, Water-Thrush. A moderately common migrant and summer resident. At the pools in the waterfront, west of Eddy's mills, Hull, several pairs may be seen and heard throughout the summer, as also on the eastern side of Beaver Meadow. Extreme dates: May 8th to September 6th. One of their loud, liquid songs may be represented, *whitla whit-cher, watch watch watch watch.*

219. *Oporornis agilis*, Connecticut Warbler. A rare migrant. I have seen it twice at a range of 5-10 feet, at Rockcliffe Park May 5th, 1906, and at High Falls, Quebec, October 3rd, 1907.

220. *Oporornis philadelphia*, Mourning Warbler. A rather rare migrant and breeder. It is a swamp-loving species; where cedar, spruce and alder bushes, especially the last, are found growing in or near water, it must be looked for. A pair usually breeds in each of the following places: alders near Slattery's slaughter house, Ottawa East; Dow's Swamp; alder fringe in Beaver Meadow, and west of Blueberry Point. Time of stay: May 19th to September 9th.

221. *Geothlypis trichas*, Maryland Yellow-throat. A very common migrant and summer resident. In willow, alder and cat-tail swamps, down to the smallest, it is usually to be seen. Its call, *whitchedy, whitchedy, whitchedy*, announces its presence long before one sees the bird. It has also quite a repertoire of other songs. By June 7th its nest with three eggs has been found. It first arrives May 5th; our locally breeding birds go by August 1st, but their place is soon taken by migrants from farther north, of which the last is seen September 25th.

222. *Wilsonia pulsilla*, Wilson's Warbler. A moderately common migrant only, not breeder, although it may yet be found as such. It is one of the later comers in May, not arriving before the 15th. As late as June 2nd, 1907, they were abundant at Ottawa East. The last have been seen September 15th. The song, rarely heard, is, *tsit sit sit dreer idididee.*

223. *Wilsonia canadensis*, Canadian Warbler. A moderately common migrant and breeder. In Dow's Swamp it may be found all summer. Places like that are its characteristic habitat. Extreme dates: May 12th to September 10th.

224. *Setophaga ruticilla*, Redstart. A common migrant and summer resident. It often builds its nest in vines and bushes on and near houses, or *e.g.*, in bushes along "Lovers' Walk," Parliament Hill. They first come May 5th, and the last usually depart before September 10th, but in the extraordinary mild fall of 1909, some were seen as late as October 9th (G. White).

MOTACILLIDÆ—WAGTAILS.

225. *Anthus rubescens*, Pipit. A migrant to and from the Hudson Bay and Arctic regions. It passes through about May 14th, and again from September 28th to about October 7th, and probably later. As it frequents plowed fields, walking leisurely and not flushing readily, it may by reason of its neutral tints easily be overlooked.

MIMIDÆ—THRASHERS, MOCKINGBIRDS, ETC.

226. *Dumetella carolinensis*, Catbird. A common summer resident. It stays from May 3rd to October 7th.

227. *Toxostoma rufum*, Brown Thrasher. A moderately common summer resident, one that is evidently on the increase, as in 1909 pairs of them could be seen in places where formerly none were seen. Formerly one to two pairs nested on the Experimental Farm, now five to six. It arrives about April 27th and is last seen September 13th. It is one of our finest singers.

TROGLODYTIDÆ—WRENS.

228. *Troglodytes aedon*, House Wren. A very common summer resident. Its nests are placed in cavities in posts and trees, and in boxes in yards of houses put out for it, and is prospering and increasing. It arrives about May 1st (earliest April 21st, 1897), and the last are seen October 16th.

229. *Nannus hiemalis*, Winter Wren. A moderately common summer resident. Its habitat is the northern silent, moist coniferous forest. There its song, like a long silver thread entwining the dark green foliage of the trees, may be heard to best advantage, especially early in the morning and in the evening. In certain spots in the Beaver Meadow a few pairs breed, also in the woods east of the Rifle Range. Time: March 26th to October 18th.

230. *Cistothorus stellaris*, Short-billed Marsh Wren. This species, once put on our list, and then removed again, certainly belongs there. It was first found by Mr. F. A. Saunders on June 17th, 1898. On June 16th, 1905, one was taken in the

coarse grass and weeds along a wet meadow adjoining the Mer Bleue at Carlsbad Springs, and on August 8th, 1907, one was seen in a similar place along the railway ditch near Blackburn. Another one was seen in the little swamp hole at the entrance to Beaver Meadow from the Aylmer Road. Its coarse note is unmistakable.

231. *Telmatodytes palustris*, Long-billed Marsh Wren. A common summer resident in larger cat-tail swamps. Along Cranberry Creek near Osgoode, many of its globular nests are to be seen in the cat-tails. On June 23rd, 1905, two out of twelve nests investigated contained six eggs each.

CERTHIIDÆ—CREEPERS.

232. *Certhia familiaris americana*, Brown Creeper. A common migrant and rare breeder. On certain days, as on April 17th, 1908, many may be seen on the trees in the city, laboriously clambering upward. Such days mark the climax in their migration, which in some years starts March 12th. They breed in swampy woods, where there are large trees. The south-bound migration ends about October 18th. Winter records are: December 8th, 1883; February 18th, and December 5th, 1885.

SITTIDÆ—NUTHATCHES.

233. *Sitta carolinensis*, White-breasted Nuthatch. This well known bird, so common in most places, is far from common in our district, although it would be difficult to assign a satisfactory reason for this. It is a resident species, which does not preclude a certain amount of roaming about; they may be commoner for a day or two, even in the city. In summer they must be called rare. At the "Pines," Ottawa East, they were seen 23 times from November 1st, 1908, to March 21st, 1909, whereas only three times in the three summer months of 1907.

234. *Sitta canadensis*, Red-breasted Nuthatch. Of about the same status as its congener. But, whereas *carolinensis* prefers deciduous woods, *canadensis* frequents the evergreen forests, and is therefore more numerous in the northern part of our district. The bulk of the species migrate.

PARIDÆ—TITMICE.

235. *Penthestes atricapillus*, Chickadee. This jolly little bunch of feathers is a common permanent resident with us, although often strangely rare in summer. It is commonest at migration time and in some winters, when it will even come into the city. During the winter of 1907-08 Mrs. Brown saw the Chickadee seventy times, while only nine times in the following winter. During mild winters this and similar species are often strangely absent, and common in severe winters.

236. *Penthestes hudsonicus*, Hudsonian Chickadee. A rare fall migrant. Early fall records for this species are: October 31st, 1883, and October 20th, 1889.

SYLVIIDÆ—KINGLETS, GNATCATCHERS, ETC.

237. *Regulus satrapa*, Golden-crowned Kinglet. A common migrant and undoubted breeder. On June 3rd, 1909, Mr. Kingston and I found it in song in a black spruce thicket in the Mer Bleue. This is a very thin, wiry performance, something like the song of the Blackpoll and Black and White Warblers, becoming higher and more rapid towards the end, as though the bird was rapidly running from the centre of the tree out along a branch to its end. I found it in June and August, also, at Inlet, Quebec. The earliest date for its arrival in spring is March 26th, becoming most plentiful in April; in fall it comes again from September 17th to November 12th.

238. *Regulus calendula*, Ruby-crowned Kinglet. An abundant migrant. Although much like *satrapa* in every way excepting song, it, to a great extent, keeps apart from it in migration. It passes through here from April 15th to May 23rd, which latter date would seem to indicate that some do not breed far north of here. About May 1st their fine sonorous song can be heard on all sides in Rockcliffe Park. They return through here from September 15th to October 23rd.

239. *Polioptila cærulea*, Blue-gray Gnat-catcher. This southerly form has been taken once by Mr. G. R. White previous to 1881. Since there is an unmistakable tendency in some southern birds to extend their range northward, perhaps this will also become more common here in time.

TURDIDÆ—THRUSHES, BLUEBIRDS, ETC.

240. *Hylocichla mustelina*, Wood Thrush. This fine songster is a rare summer resident. The Ottawa River is undoubtedly the northern boundary for it in this part of Canada. On May 10th, 1908, one was singing all day in Mr. A. G. Kingston's garden; on June 13th, 1904, I saw one in the Mer Bleue.

241. *Hylocichla fuscescens*, Veery; Wilson's Thrush. A common summer resident. In Beaver Meadow, at Chelsea, etc., it is usually to be found in summer. Time of stay: May 3rd (earliest April 21st) to September 19th.

242. *Hylocichla aliciæ*, Gray-cheeked Thrush. A rare migrant. I have seen it in the woods beyond Beechwood, May 16th, 1905, and 23rd, 1907. It is the most elusive of thrushes and will undoubtedly eventually be found to be commoner than supposed.

243. *Hylocichla ustulata swainsoni*, Olive-backed Thrush. A moderately common migrant and undoubted breeder in the northern part of the district. It passes through here from May

13th to June 7th (1907), when they are plentiful on the waterfront, Hull; in fall from October 1st to 12th.

244. *Hylocichla guttata pallasi*, Hermit Thrush. A common summer resident. One is sure to find it at Blueberry Point, Mer Bleue, Chelsea, and similar localities. Extreme dates of stay are: April 10th to October 19th.

245. *Planesticus migratorius*, Robin. This old friend under a new scientific name is an abundant summer resident and is increasing in the city. Almost its only enemy there is the domestic cat, which yearly kills untold thousands of this and other species. Something should be done to limit their numbers in and near the city. The Robin may almost be called a permanent resident, since dates in every month of the year are not rare. A small flock of about four birds stayed in the city from December 21st to March 4th (see THE OTTAWA NATURALIST, vol. XXII., p. 265). The usual date for their appearance in spring is March 23rd, sometimes a week or more before, sometimes one or several days later, according to the season. In fall many linger around throughout October, as if loath to go, but all have usually gone by the end of the month, excepting a few stragglers in November.

246. *Sialia sialis*, Bluebird. A common migrant and moderately common breeder. Late in summer it often becomes strangely rare, where it was common earlier in summer, and later on becomes common once more. It arrives as early as the Robin, about March 23rd (earliest 12th), and is as loath to go as that species. I have seen some as late as November 19th at High Falls, Quebec, where it had to associate with Snow Buntings (*Plectrophenax nivalis*) at that time. North and South in close proximity!

BOOK NOTICE.

THE NATURE PHOTOGRAPHER, January, 1911.—The first number of this quarterly, the official organ of the Nature Photographic Society has been received. Some of the objects of the Society, which has its headquarters in England, are to cultivate the study of Nature Photography in all its branches; to protect the copyright of amateurs and assist them in placing their work to advantage, and to protect wild life. In the journal, favourite photographs will be reproduced, and experiences of popular Nature Photographers given. Apparatus, material and books will be reviewed—from the nature photographic point of view—from time to time. The Hon. Corresponding Secretary for Canada, Mr. C. Macnamara, of Arnprior, Ont., will be glad to correspond with anyone interested in such work.—A.G.

INDEX

TO THE

OTTAWA NATURALIST, VOL. XXIV, 1910-11

The Ottawa Field-Naturalists' Club.

Patron:
THE RIGHT HONOURABLE EARL GREY.
GOVERNOR-GENERAL OF CANADA.

Council 1910-1911

President:
Mr. Andrew Halkett.

Vice-Presidents:
Mr. A. G. Kingston. Mr. L. H. Newman, B.S.A.

Secretary:
Mr. J. J. Carter.
(521 Som

Treasurer:
Mr. Herbert Groh, B.S.A.
(Experimental Farm)

Editor:
Mr. Arthur Gibson.
(Experimental Farm)

Librarian:
Mr. C. H. Young.
(Geological Survey)

Mr. Alex. McNeill.
Mr. T. E. Clarke, B.A.
Mr. J. W. Gibson, M.A.
Mr. W. T. Macoun.
Mr. W. J. Wilson, Ph.B.
Miss McKay Scott.
Miss A. L. Matthews.
Miss Q. Jackson.

Past President:
Mr. A. E. Attwood, M.A.

Standing Committees of Council:

Publications: L. H. Newman, Alex. McNeill, C. H. Young, A. Gibson, Miss McKay Scott.

Excursions: A. Halkett, W. J. Wilson, J. W. Gibson, A. G. Kingston, H. Groh, Miss A. L. Matthews.

Lectures: A. G. Kingston, T. E. Clarke, L. H. Newman, J. J. Carter, Miss Q. Jackson.

Leaders at Excursions:

Archæology: T. W. E. Sowter, J. Ballantyne.

Botany: W. T. Macoun, John Macoun, D. A. Campbell, L. H. Newman, T. E. Clarke, H. Groh.

Conchology: S. E. O'Brien.

Entomology: W. H. Harrington, A. Gibson, C. H. Young, J. W. Baldwin.

Geology: H. M. Ami, W. J. Wilson, T. W. E. Sowter, W. A. Johnston.

Meteorology: A. McNeill, Otto Klotz., D. A. Campbell.

Ornithology: A. G. Kingston, A. H. Gallup, H. Groh, H. U. Morris.

Zoology: E. E. Prince, A. Halkett, E. E. Lemieux, E. LeSueur.

Auditors:
R. B. Whyte. J. Ballantyne.

Membership Fee to O.F.N.C., with "Ottawa Naturalist," $1.00 per annum.