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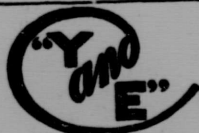
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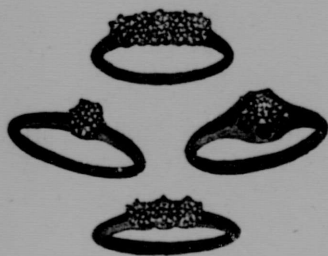
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THE OTTAWA NATURALIST

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OTTAWA, SEPTEMBER, 1909

No. 6

CERTAIN BIOLOGICAL PRINCIPLES AND THEIR PRACTICAL APPLICATION IN THE IMPROVEMENT OF THE FIELD CROPS OF CANADA.

By L. H. NEWMAN, B.S.A., Secretary, Canadian Seed Growers' Association, Ottawa.

(CONTINUED FROM PAGE 91)

THE MUTATION THEORY.

From the evidence brought forth in connection with the theories held by biologists since Darwin's time, it is apparent that the efficacy of natural selection and of the use of fluctuating variations in explaining the facts of evolution, have been steadily losing ground. On the other hand there has been a gradual tendency to regard the part played by "discontinuous" variations or "mutations" as being of more importance in this connection. The supporters of the latter idea have received much encouragement from the work of DeVries of Amsterdam, which work with that of Mendel has served to place the problems of heredity in an entirely new light. The law of Mendel respecting the transmission of characters when two plants are crossed is a large subject in itself and shall not be discussed now. Suffice it to say that the hybridization of varieties as effected in the light of this law is probably the most potent means of producing new varieties that is now within the reach of the expert breeder. The work of DeVries is worthy of special consideration since his discoveries may be said to have marked a new epoch in the long line of investigations of the factors in evolution.

DeVries' idea is that plants and animals are made up of "distinct units" which correspond to atoms in chemistry. By crossing one individual with another the units involved may be combined but never split, just as combinations may be made in chemistry. Transitional forms do not exist between the elements themselves, which assumption goes to support the theory of

descent rather than that of transmutation as applied by Darwin and his followers. According to this theory it is possible for new forms to arise suddenly without passing through a transitional stage. The theory of DeVries has the support of certain evidence deduced from results gained from experiments with *Oenothera Lamarckiana*. At least 50,000 plants were cultivated by DeVries in his garden for a number of generations, and out of this number about 800 were found to possess characters distinct from those peculiar to the parent forms. These new forms, moreover, proved to be constant by breeding true in succeeding generations. The occurrence of these forms under domestication may account for the numerous "elementary species" that are found in nature.

The theory of DeVries is not new. We have noticed how the idea of the creating of new species by the sudden variation of organisms prevailed among some writers of a comparatively early period. In 1864 Von Kolliker, convinced of the weakness of the natural selection theory, promulgated the theory that new and distinct species are born suddenly by leaps. In 1899, Korschinsky, a Russian botanist, as the result of certain observations and study, formulated the mutation theory. The publication in 1901 by DeVries of his first book on "Die Mutations-theorie" was the first public recognition of importance which this theory received. DeVries' theory is alternative with that of Darwin's as regards the formation of new species, but as regards the general course of evolution and the great principles which govern it the mutation theory is not in contradiction to the descent theory through natural selection, but is rather supplementary to it.

After considering the main principles which are associated with the various theories we have outlined we are forced to make the following conclusions, viz. :—

- (1) That no two plants are exactly alike.
- (2) That while "like begets like" in the main yet there is a constant and continual variation going on within the species.
- (3) That some of these variations are fluctuating and unstable while others are discontinuous and determinate.
- (4) That artificial selection of desirable fluctuating variations may raise the standard above the average of the race at least, although the limitations of this method of selection are recognized.
- (5) That the artificial selection of discontinuous variations may result in the development of superior new strains.
- (6) That a combination of desirable characters through hybridization may result in the creation of hybrids possessed of special merit.

With these conclusions in mind it is a comparatively simple matter to draw up a plan whereby man may systematically and scientifically utilize the forces of nature to his own advantage. The systematic selection of what we are now pleased to call fluctuating variations in field crops with a view to preventing deterioration is a very ancient practise. The idea of actually improving our crops is, however, of comparatively recent origin. Once improvement was considered possible several systems were devised. The Germans followed Darwin's enunciation that improvement was a gradual process resulting in the accumulation of slight favorable variations, hence, we have "The German system of plant improvement." We have a concrete example of the improvement that may be effected by this system in the famous Schlanstedt rye originated or developed by Rimpau. This system is practised largely in Canada at the present time by members of the Canadian Seed Growers' Association.

Le Couteur, an Englishman who worked during the beginning of the 19th century is said to be the first to apply the principle of selection to the improvement of cereals by selecting elementary types from the growing crop. One of his most noted selections is the Bellevue de Talavera wheat which originated from a single plant selected from the regular field. This was apparently a mutation as it continues to breed true and to show very slight deviation.

Patrick Sherriff, another Englishman, working about the middle of the 19th century produced the Mungoswell's wheat after making many attempts to isolate superior plants. This wheat is still said to be popular in certain parts of Great Britain.

In 1857, F. T. Hallett, of Brighton, England, began a line of work from another point of view. He believed that each plant had one best head and that each head had one best kernel. By making repeated selections through several generations the yield was materially increased when suddenly the maximum seemed to be reached and further improvement ceased.

During the last 20 years Dr. Nilsson, of Svalöf, Sweden, has been engaged in the breeding and improving of cereals and has secured some remarkable results. At first Nilsson practised the selection of such apparent fluctuating variations as appeared in the field sown in the ordinary way. He found, however, that his results by this method were not very satisfactory, so he changed his system and adopted the plan of selecting and propagating individual plants and, by a process of elimination, finally isolating those which were most desirable. This system enabled him to discover and take advantage of some of the mutations which might appear from time to time, and at the

same time to choose a pure, superior elementary type as the foundation for a better strain, believing as he does with DeVries that our ordinary strains are composed of what the latter calls "a motley mixture of types."

This idea seems to have taken root in the minds of the majority of our scientific breeders of to-day who recognize, in the various methods they have adopted, the underlying principles which have been so ably demonstrated by these men. At the same time there is undoubtedly a very practical advantage in following the simpler practice of selecting fluctuating variations, a practice which the ordinary farmer can easily follow on his own farm.

THE CANADIAN SEED GROWERS' ASSOCIATION AND ITS WORK.

Realizing the great national importance of the use of "better-bred" seed on the farms of Canada as a whole, and recognizing the fact that much might and should be done by way of producing such seed on the individual farms throughout the country, the promoters of this work, notably Dr. Jas. W. Robertson, took certain steps which led up to the organization of the Canadian Seed Growers' Association as a means of encouraging its advancement.

The basic principle upon which the work of the Association is founded is that the artificial selection of the best seed from the best plants year after year without interruption is likely to result in a definite improvement within the ordinary strain, although the limitations of this method of selection as a means of improvement are recognized.

As to the exact course which is followed by each member of the Association who desires to improve any one or more of his crops through giving special attention to the matter of "breeding" in his seed this in brief is as follows: The grower first decides upon the variety which is likely to do best on his farm. This is done by testing two or three leading varieties in plots under similar conditions for the first year. The next step is to prepare a special area of land of about one-quarter acre in size and to sow thereon a good clean sample of seed of the chosen variety. When the crop on this plot becomes thoroughly ripe the grower goes through the plot with a basket or sack, picking here a head and there a head, his choice being based upon the vigor and general type, first of the mother plant and secondly of the head which it bears. Enough seed is secured by the selection of these specially desirable heads each year to give a sufficient quantity of seed to sow another plot the following year while the remainder of the plot is harvested in the usual way and the seed used for the main crop.

The above practise is, in essence, the selecting of fluctuating variations which, if continued, results in raising the "mean" of the ordinary strain to a higher plain. Some authorities such as Johannsen, Pearson and DeVries contend that the selecting of fluctuating characters can do little by way of improving the race. They admit, in part at least, that the average or "mean" of the race or strain may be raised by this means, but claim that once selection ceases the erst-while improved strain will return to its original condition. Of this contention Plate says: "This theory is based on forms which have been highly modified within a few years, so that there has not been a sufficient time to modify the original hereditary tendency established by centuries. Many facts indicate that the intensity of heredity depends upon the number of generations during which selection has been practised. Long inherited characters are difficult to eradicate; recent ones easy. Many gradually selected races of doves are now almost entirely constant. A race developed artificially by slow, persistent selection for a great number of years would show the same relative fixity of types as do our natural species." The results realized thus far by the Association through this method of selection strongly show that a definite improvement has been made in the original strain. This improvement has taken the form of increased yields, better quality, greater uniformity and purity, greater vigor and greater ability to resist disease. Though it may be necessary to continue the selection from year to year in order to maintain the standard yet such seems to be justified by the results accruing therefrom.

In the past certain specially progressive and observant growers have found heads of grain in their fields which were so distinctly different from any others that they kept them separate and sowed the seed secured therefrom in their garden with the result that in many cases new varieties have been developed. These strange plants were undoubtedly mutations. As examples of these we have the Dawson's Golden Chaff wheat, Goldthorpe barley and many other well known varieties. This is a line of work which should be encouraged as much as possible.

Other members of the Association have found time to follow the more complicated system of selecting and propagating individual plants separately, and by a process of elimination finally isolating pure so-called "elementary" types. This latter method which is based on the DeVriesian theory, is probably the quickest and safest to follow, but on account of the amount of careful work and detail which is involved it is not a system which the Association is strongly recommending at present for the average farmer in the improvement of his smaller grain crops.

In the case of corn and potatoes, however, this method is being followed with most gratifying success.

This article is designed to correlate the practical and the scientific side of plant improvement. Once the creation and development of forms of plant life become associated with recognized laws and principles, the prosaic element quickly disappears and we regard these things in an entirely new light. Then it is that real progress is possible. The associating of natural law with the every-day industry of crop raising is the primary aim of the Canadian Seed Growers' Association.

FIELD NOTES OF CANADIAN BOTANY. I.

BY EDWARD L. GREENE.

Twenty years ago I had botanized a little in the beautiful woodland wilderness that then lay within an hour's walk of Victoria, Vancouver Island; also at several points on the British Columbian mainland, and even on the prairies of Manitoba. Never, however, until this season of 1909, had I done any field work in any part of the Dominion lying eastward of the Great Lakes.

Such readers of the OTTAWA NATURALIST as may have noted my rather numerous botanical papers published herein during at least a dozen years past, and may have observed that these contributions were all made upon specimens communicated to me by mail, supplemented by the field notes of those who had sent them—such readers will easily imagine that I would be likely to enter upon field studies of Ontario vegetation myself with keenest interest, not to say with some enthusiasm.

It was a little before the middle of June that from Port Huron, Michigan, I crossed into Ontario. Certain critical observations on the surpassingly rich flora of the Port Huron district—where my herborizings were greatly helped and furthered by Mr. Charles K. Dodge, the resident botanist—had induced me to make my first halt within Ontario at a distance of only some fifty miles to the eastward of Port Huron and Sarnia. At Sarnia, just on the Canadian border, Mr. Dodge had done much field work, and, as he informed me, he had once had the happiness of conducting to its richest botanical garden spots, the veteran Professor John Macoun. I sought, as I always prefer to do, newer ground, and had fixed upon Strathroy in Middlesex as a first stopping place; this without having taken counsel of any one except the maker of my pocket map of Ontario, and partly because I had never heard that any one had botanized there.

However, Strathroy was indicated as one of the small towns, and from such, good botanizing is apt to be found at the end of very short walks. Also, according to the map a river—the Sydenham—seemed to course near this town; an augury of more diversity in the flora and silva than strictly prairie or mere upland districts are favored with.

Landing at the railway station of this pleasant village a half-hour before noon of June 12th, less than two hours later, portfolio in hand, I walked forth on my first herborizing stroll in Ontario. Having reached within a few minutes the furthest-most and half meadowy outskirts of the town, I beheld close at hand a depression in the open landscape, out of the midst of which arose the familiar narrowly cone-shaped heads of larches and arbor vitæ. No prospect could have pleased me more; and within a very few minutes I was in the midst of this tamarack marsh. The arboreal vegetation of this I found to be quite different from that of such tamarack swamps of southern Wisconsin as I had been familiar with long years ago. There the larches had been the only trees, and these so closely set as to form a thicket hard to penetrate. Here there was no density of arboreal growth. The larches stood somewhat apart from one another, and there was arbor vitæ freely interspersed; and there was no dearth of deciduous trees, red maple, ash, basswood and some others; but these small for their kind and slender; and the habitat of them all was subaquatic; for everywhere one had to pick his way along tufts of sedge, and the superficial roots of trees, to avoid sinking over shoe in water.

Between the dry bank that encircles the swamp and its wooded portion one crosses in most places a narrow belt or rim of *Carices* without shrubs or even much other herbaceous vegetation; usually more or less of marsh marigold and skunk cabbage. Here the ground is firmer and less aqueous.

Another treeless and shrubless portion of the tract is central, and consists of a somewhat sinuously outlined shallow pond, occupied mostly by yellow pond lilies, the muddy shore of it beset with *Calla palustris*, this not yet in flower in the middle of June.

Bounded on the outside by the narrow rim of the caricetum, and within by the considerable expanse of the calla-nymphæa pond, the main body of the marsh, where grow the hydrophile trees already listed, is the really paradisiacal part of it, as viewed by the botanical eye; for here, the woods being quite open, the open spaces are filled with a rich diversity of herbaceous plants,

Geum rivale, *Spathyema fetidum* and *Caltha parnassifolia** in a particularly tall and robust form being among the largest. In one place only I saw a colony of *Smilacina trifolia*, this just past flowering; and there were observed several groups of *Clintonia borealis*, some of the plants still in flower; but *Unifolium canadense* was almost everywhere, as also *Trientalis americana*. *Naumburgia thyrsiflora* was frequent, also larger than I am used to seeing it, but *Comarum palustre* was not seen, neither *Menyanthes*. No cranberry was seen, or any orchids whatsoever. In these particulars this Ontario larch swamp was in marked contrast with those I had become acquainted with in regions lying to the westward of Lake Michigan.

On my first entrance to the swamp I was delighted by the sight of a large decaying stump beautifully mantled with *Linnæa borealis* in full bloom. I did not again meet with the plant in this bog, or even in the Strathroy district anywhere.

On account of my deep interest in northern violets I regretted the lateness of my arrival in western Ontario, for I knew that by the middle of June all the earlier species would have passed their season of petaliferous flowering. In the caricetum border of this marsh I observed what seemed to be *V. cucullata*, growing as usual among the tufts of hydrophile sedges, but no flowers were seen. It was quite too late for them. At this moment, however, and scarcely two rods away, though now hidden from view by the trees and shrubbery intervening, there was blooming beautifully and almost copiously my *V. prionosepala*, as I shortly discovered. Within this sparsely wooded and bushy portion of the marsh all sorts of very wet spaces not occupied by larger herbaceous plants were quite filled with the combination of a small galium, a slender stellaria, and this particular violet, and there was no other violet associated with it. This was the first time I had seen the species growing; at least the first time since my publication of it. I had described it from very excellent herbarium specimens, supplemented by full, intelligible and most satisfactory notes, all supplied by valued correspondents.† As I now revert to my original account of this fine species, it is something of a gratification to read how perfectly, even if mainly by the light of the mere dried specimens, I had divined the nature of this plant's habitat as compared with that of *V. cucullata*. The plants of *V. priono-*

*During some years past I have been convinced that we have no *Caltha palustris* in North America; and that our plant is specifically distinct from the European type of the genus was seen by Rafinesque more than a hundred years since. It was in 1807 that he published our plant as *C. parnassifolia*, indicating, among other characters the important one of its elliptic sepals. Those of the Old World plant are broadly round-obovate.

†*VIOLA PRIONOSEPALA*, Greene, Pittonia, V. 99 (1902).

sepala grow singly as I had said, never like the other in tufts; and it would be difficult to name another acaulescent purple violet the leaves of which are so far from being describable as cucullate. Their almost absolute flatness contrasts strongly with the constantly involute foliage of the other. Not one of the marks at first attributed to *V. prionosepala* seems thus far to fail; but not until I had seen the two flourishing in their native haunts, and on the same acre of wild land, did I apprehend the matter of the difference in their respective times of flowering.

At one or two points in this Strathroy swamp I observed colonies of *V. blanda*. Over and above these two I saw here no other stemless violets.

THE PRAIRIE WARBLER (*DENDROICA DISCOLOR*) IN NORTHERN ONTARIO AND OTHER NOTES.

BY G. EIFRIG, OTTAWA.

On May 11th of this year the writer found a specimen of the Prairie Warbler on the edge of Lake Doré, near Eganville, Renfrew County. This is a distinctly southern form, whose metropolis is, say in the latitude of the State of Maryland. The northernmost points at which it has been taken so far are at Mt. Forest, Wellington County—and that once only, if I mistake not—and at Toronto, twice. So its finding in Renfrew County means quite an extension northward of its hitherto known range. Its occurrence there proved all the more remarkable, since it was a single female seen and taken, whereas in nearly all species of birds, if the two sexes do not migrate together, it is always the males that arrive first. Besides, the weather before the 11th had been so uninviting, cold and rainy—the thermometer stood at 35°-45° for more than a week previously, with the exception of two warmer days—that there were very few of even the hardy northern warblers to be seen, only one Myrtle Warbler and one Black and White Creeping Warbler being seen in a stay of hours at the edge of the lake and in the vicinity. Furthermore, whereas in its true home it is a bird that confines itself strictly to warm, dry hillsides and similar dry localities, this one was laboriously clambering about in the alder bushes at the water's edge, sometimes over the water. The bird was taken and is now in the writer's collection.

The occurrence of this southern species so far north seems to lend weight to a theory the writer has held for several years past, viz., that there is a distinct movement northward discernible on the part of the birds. Thus, the Chewink (*Pipilo*

erythrophthalmus), otherwise almost unknown at Ottawa, has been seen and taken here for two or three years past, even at Buckingham, Quebec. This spring, already, it has been noted twice on Parliament Hill and at Marshall's Bay near Arnprior. Likewise the Mourning Dove (*Zenaidura macroura*) seemingly is forging northward, as it has been seen the past three summers at Shirley's Bay, near Ottawa. And it is interesting to note how the Carolina Wren (*Thryothorus ludovicianus*) is becoming commoner all the time in southern Ontario and advancing a little further northward each year. If this apparent tendency in birds is a fact and will remain and increase in strength, it is certainly a state of things much to be wished for by all nature-lovers in this vicinity.

It may be of interest to ornithologists generally, that the flock of Evening Grosbeaks (*Hesperiphona vespertina*), which took up their abode in Ottawa, February 7th (see OTTAWA NATURALIST, Vol. xxii, p. 263), and were not seen after the end of March, were rediscovered by Mr. H. Groh in swampy woods at the end of the dump, Patterson's Creek, on April 29th, and the next day made their appearance again at the home of Mr. Odell, corner Cartier and Somerset Streets, who had reported them first and on whose trees they stayed the greater part of the time during their first stay in the city. And then they remained in the Patterson Creek woods in ever diminishing number until May 15th, when the last two were seen by Mr. Groh. That is a remarkably long stay for this bird, which, when it comes southward into civilization at all, usually departs again to its northern haunts in March. It may also be added here, what had been forgotten in the article in the March number, that already in November an Evening Grosbeak had been seen and taken by Mr. Wm. McComber, of Bouchette, in the Gatineau Valley, Quebec, who upon being asked for more information, wrote that the specimen had been alone, seemed dazed and lost and did not feed while under observation, a fact borne out by the stomach examination made by the writer.

Last spring was an unusually backward one hereabouts. March, April and the first part of May were unusually cold and wet. There were few nights in April without frost. As might be expected the birds were also late in their coming. The first migrants that come in a wave about March 21st to 27th, like the Song Sparrow, Junco, Redwings, Bronzed Grackles, Robins and Bluebirds, were, as a wave, more than a week late. And this lateness kept on during April. Some species, however, do not let any cold, etc., bring them out of their usual time, like the Crow and Killdeer, the former of which were even earlier

this year than in others. Of course, when anything like the usual amount of warmth comes, the lateness of arrival stops with most species, some even coming earlier than their usual average time, and several interesting anomalies are thus produced. This year, the Blackpoll Warbler (*D. striata*) and the Baybreasted Warbler, (*D. castanea*) as a wave, apparently keep up the late setting in of the first migrants, for the former have so far not been observed by the writer and the latter only in a few stray individuals.

There was also an unusual abundance of Redpolls (*Acanthis linaria*) here last spring, a condition reported also from many places in the New England and Middle Atlantic States. They were more common here than other seasons throughout the winter, but in April they appeared in veritable clouds. On April 15th, the writer saw two to three large flocks near the Rifle Range, and on the same day an immense flock covered as it were a large part of Rideauville, individuals being seen on every branch and twig of every tree for quite a distance. And strange to say, these flocks at this time were flying south. On April 27th, Mr. Bedard, the Rifle Range Keeper, saw a flock he estimated at 2,000. And these large flocks were coming and going up to May 6th.

Ottawa, 26th May, 1909.

A REMARKABLE MIGRATION OF YELLOW-BELLIED SAPSUCKERS.

BY A. B. KLUGH, KINGSTON, ONT.

On the morning of April 17th, 1909, the city of Kingston, Ontario, was alive with Yellow-bellied Sapsuckers.

From my study window I saw some twenty of them on the trees at the lodge of the park and on going out to investigate I found from one to four on nearly every tree. As a conservative estimate I placed the number of birds in the park at three hundred.

In the grounds of Queen's University I found the same conditions prevailing.

Mr. Edwin Beaupre informed me that the birds were abundant in Princess Street (the main thoroughfare of Kingston) on the telegraph poles and woodwork of the doors and windows of the stores.

Mr. C. L. Hays of the Queen's University Naturalist's Club told me that every tree along University Avenue had at least one bird on it and that on one tree he counted seven.

Mr. R. F. Kelso, another member of the Club, said that every tree along Johnston Street had its Sapsucker, and from various sources I learned that the birds were equally abundant all over the city. The great majority of the birds were males, though here and there a female was to be seen.

A very conservative estimate of the number of Yellow-bellied Sapsuckers in the city would be five thousand; in fact Mr. Beaupre believes that there were far more than this present on the morning of April 17th.

For the next few days the Sapsuckers were still very common in the city, and were still so when I left on April 22nd. After this they decreased rapidly in numbers as my father wrote me a few days later and said that only a few were then to be seen.

The Sapsuckers were very busy on the maple trees (mostly *Acer saccharinum*), and in many cases trees which I examined had rings of holes completely round them, but the holes were not close enough together to "girdle" the trees.

The probable cause of this immense wave of Yellow-bellied Sapsuckers striking Kingston lies in the strong gale from the north which was blowing on the night of April 16th, the birds apparently dropping as soon as they had crossed the lake.

THE RAPID EXTERMINATION OF THE BALD EAGLE.

BY W. E. SAUNDERS, LONDON, ONT.

There has been a good deal of discussion during the past decade or two concerning the usefulness or otherwise of the various species of birds of prey. As regards the diurnal birds of prey, debate has usually ended in a favorable verdict towards all those that spend the summer in Ontario, with the exception of two species. With reference to this small number which has fallen under the ban, I must say that my faith in the wisdom of the Creator in placing such birds on the earth is too strong to be shaken by any evidence that may be produced to show that somebody has lost a few dollars by these birds in any particular year. However that may be, the subject of this article has never, I think, been condemned as injurious. His daily fare is gleaned mostly from the edges of the large waters, and while his scavenging habits cannot be held up for admiration, yet a substantial plea may be made for the protection of the Bald Eagle on the ground of the added picturesqueness which he gives to the landscape. It is to be deplored that every large bird is a mark for the wanton gunner, and under this head I am sorry to say most of our sportsmen fall, when

judged on the basis of the needless slaughter of large birds for which they have no use.

Of course, the Eagle is wary. Were it not so he would long since have become extinct as far as Ontario is concerned, but even with all his craft, the bird is far less numerous to-day than twenty years ago and is yearly suffering a steady diminution in numbers. He is usually to be seen along the larger bodies of water, and there is no wild thing in which as much interest is taken by the tourist on the steamers, or persons along the lake shore, than the presence of this great bird. "There is an Eagle" is an exclamation that instantly draws the attention of every person within hearing, during travel by boat in the summer, and everyone enjoys seeing these great birds wing their easy way. How splendid it would be if legislation could be enacted giving protection which would eventually restore this species to something like its former numbers. In years gone by every lake of more than a few acres had its pair of nesting Eagles and along the big lakes every few miles would disclose a nest. Within the writer's recollection, in fact within fifteen years, there was along the north shore of Lake Erie a nest more frequently than every ten miles.

Most hunters and farmers regard big things solely as something to be shot and consequently the Eagle is growing scarcer and scarcer with each succeeding year.

It seems necessary for every nature lover to take this matter to heart and to make it his personal business to propagate the idea of protection for large birds.

BOOK REVIEW.

OUR INSECT FRIENDS AND ENEMIES—The Relation of Insects to man, to other animals, to one another, and to plants, with a chapter on the War Against Insects. By John B. Smith, Sc.D. Philadelphia and London, J. B. Lippincott Company, 1909. This splendid work of 314 pp., by the above recognized authority, is a very welcome addition to the literature of Entomology. Dr. Smith has divided the book into 12 chapters, viz.: (I) Insects in their Relation to the Animal Kingdom; (II) Insects in their Relation to Plants as Benefactors; (III) Insects in their Relation to Plants as Destroyers; (IV) Insects in their Relation to each other; (V) Insects in their Relation to the Animals that feed on them; (VI) Insects in their Relation to Weather and Diseases that affect them; (VII) Insects in their Relation to other Animals; (VIII) Insects in their Relation to Man as Benefactors;

(IX) Insects in their Relation to Man, as Carriers of Diseases; (X) Insects in their Relation to the Household; (XI) Insects in their Relation to the Farmer and Fruit Grower; (XII) The War on Insects.

From the above titles it will be seen that the work is of a very wide nature. It is impossible in the space here available to refer at any length to any portions of the book. It is one which will be found of much value, not only to the student of insects, but to anyone who is at all interested in the lower forms of animals. Chapter IX on Insects as Carriers of Diseases, will be found of special interest just now, in view of the wide-spread investigations which are being held in this direction. The whole work is full of information and will doubtless have a very wide sale. It is illustrated by many figures in the text, and at the beginning there is a full-paged coloured plate of some of the commoner insects which are troublesome in houses. The work is well printed, and we congratulate the author on this latest of his many publications.

A. G.

OBITUARY NOTICE.

J. F. WHITEAVES, LL.D., F.G.S., F.R.S.C.

It is difficult to realize that the distinguished Palæontologist of the Geological Survey, Joseph Frederick Whiteaves, has passed from amongst us! By his death, which occurred on Sunday, the 8th of August, after an illness of some months' duration, the Geological Survey has lost one of the ablest of its members, and Canada one of her best known workers in geological science.

Dr. Whiteaves was born in Oxford, England, in 1835, and first came to this country in 1861 on a short visit. The following year he again crossed the Atlantic, this time to remain in Canada, taking up his residence in Montreal. Here he was for twelve years officially connected with the Montreal Natural History Society as its recording secretary and scientific curator of its museum.

In 1876 he was appointed to the staff of the Geological Survey as Palæontologist in succession to the late Mr. E. Billings, the first palæontologist to the Survey. How wise a selection this was, after years amply proved. He was made one of the Assistant Directors in 1877, and Zoologist in 1883.

As a boy he attended private schools in Oxford and London, and early developed a liking for natural science. Following the bent of his inclinations he studied the fauna and flora of Ox-

fordshire and became deeply interested in the geology of the neighbourhood of Oxford. At this time he took advantage of lectures to advanced students delivered by eminent professors of the day in the university of his native town.

At the age of twenty-two his first paper "On the Land and Fresh Water Mollusca inhabiting the neighbourhood of Oxford," was published by the Ashmolean Society, of which society he was shortly after made an honorary member. In 1859 he was elected a Fellow of the Geological Society of London. Two years later, as the result of his study of fossils of his own collecting, during a period of several years, near Oxford, he published two palæontological papers, one "On the Invertebrate Fauna of the Lower Oölites," the other on the fossils of the Coralline Oölites. These contributions established his reputation as a palæontologist, and served as an index to what might be expected of him in the future.

Coming to Canada and residing in Montreal he continued zoölogical and palæontological studies in a vastly enlarged field. Between the years 1863 and 1875 whilst connected with the Natural History Society of Montreal, besides publishing papers on the fossils of the formations of the island of Montreal and vicinity, he was the author of a number of valuable reports on the results of deep-sea dredging operations conducted by him, in the Gulf of St. Lawrence, the cost of which were defrayed by the Dominion Government.

It was, however, when he was appointed Palæontologist to the Geological Survey, in 1876, that his mental energy and natural aptitude for palæontological research found full scope. He then had ample opportunity to prove himself a most worthy successor to the distinguished scientist who preceded him in office. That this opportunity was fully utilized is proved by the long list of his official reports, and papers, contributed to scientific journals, during the last thirty-three years of his career. His volume of "Contributions to Canadian Palæontology," his monumental works on the Palæozoic and Mesozoic Fossils of Canada, and his splendid descriptions of the fossil fishes of Quebec and New Brunswick would alone have earned for him a world-wide reputation as a careful observer, a close reasoner, and a lucid writer. Space admits only of a brief reference to the published results of his studies of the recent marine invertebrata of the Atlantic and Pacific coasts of the Dominion. The wide scope of his palæontological and zoölogical writings can be fully realized only after reading through a list of his many publications. These number nearly one hundred

and fifty, in which over four hundred and fifty genera, species, and varieties are described as new to science.

The benefit resulting from the application of his palæontological knowledge to the solving of geological problems in this country cannot be overestimated. His untiring industry, backed by a clear perception and thorough grasp of the essentials of palæontology in its relation to geology, has given us enduring results which will carry his name down to posterity inseparably linked with those of Logan, Selwyn, Dawson, George Dawson and Billings. His scientific reputation was world-wide.

Dr. Whiteaves was one of the original Fellows of the Royal Society of Canada. He was also a Fellow of the Geological Society of London, an honorary member of the Yorkshire Philosophical Society, England, a member of the Manitoba Historical and Scientific Society, of the Montreal Natural History Society, and of the American Association for the Advancement of Science. In 1900, the honorary degree of LL.D. was conferred on him by McGill University, and in 1907 he was awarded the "Lyell Medal" by the Geological Society of London.

He was a member of the Church of England and was twice married. He leaves a widow, a son and two daughters, resident in Ottawa.

Of a generous and kindly disposition and always ready to impart information when his aid was invoked, Dr. Whiteaves was an ideal type of a man imbued with the professional spirit, striving for the best results, not satisfied with half measure, and ever urged on by the love of his work. With a keen sense of humour, well versed in literature, and an ardent admirer of all that is best in art, his companionship was sought after and much appreciated by all who were fortunate enough to be brought into contact with him. His life was indeed an example of intellectual culture founded on a sound moral basis.

His death is a national loss; the Geological Survey of Canada in particular will feel the adverse effect of his removal; his name will ever remain emblematic of all that is honourable, true and upright in a man.

L. M. L.

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