APRIL, 1905.

VOL. XIX, No. 1

THE OTTAWA NATURALIST.

Published by the Ottawa Field-Naturalists' Club.

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(ISSUED APRIL 10, 1905.)

OTTAWA, CANADA.
OTTAWA PRINTING COMPANY (LIMITED),
3 & 5 MOSGROVE ST.

Entered at the Ottawa Post Office as second class matter.

1905. VOL. XIX. 1906

THE

OTTAWA NATURALIST,

Being Vol. XXI. of the

TRANSACTIONS

OF THE

OTTAWA FIELD-NATURALISTS' CLUB,

Organized March, 1879. Incorporated March, 1884.

OTTAWA, CANADA:
OTTAWA PRINTING COMPANY (LIMITED)
1905.

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THE OTTAWA NATURALIST.

VOL. XIX. OTTAWA, APRIL, 1905. No. 1

THE REPORT OF THE COUNCIL OF THE OTTAWA FIELD-NATURALISTS' CLUB FOR THE YEAR ENDING MARCH 19TH, 1905.

During the year twenty-nine ordinary members were added to the Club. The total membership is now 265, composed of 257 ordinary and eight corresponding members.

SOIRÉES.

The programme of Winter Soirées was published in the December number of THE OTTAWA NATURALIST, where the following announcement appears :

"The Soirée Committee considered it advisable to substitute for the formal lectures of the past a number of short popular talks each evening on the various branches of the Club's work, and the gentlemen named below have consented to speak on the subjects specified. More detailed particulars will be given through the public press before each meeting. On Zoology descriptions will be given of the life history, habits, etc., of the polar bear, fur seal, whales, star-fish, frogs, sea-urchins and other animals. The characteristic features of the Geology of the Ottawa district will be dealt with and special attention will be given to structural features as well as the history of the abundant fauna found in the rocks and clays. Ornithology, Entomology and Botany will be treated in a similar manner, each speaker giving the results of his personal observations."

Thus far the meetings have been held as published in the programme, and the successful soirées of this winter have fully justified the departure made by the Committee. Entertaining addresses have been given ; much new material has been presented ; and interesting discussions have always been provoked. One point strongly emphasized by several of the speakers is the great amount of work remaining to be done, even in the Ottawa district.

EXCURSIONS.

Sub-excursions were held as usual during the spring and early summer to localities in the immediate vicinity of Ottawa, viz :— Beechwood, Blueberry Point, Beaver Meadow, and Rockliffe. Sub-excursions were arranged for the fall months also, but were cancelled because of heavy rains or cold weather. Two general excursions were held during the season, the first to Casselman on May 21st, and the second to Chelsea a week later. The heavy rain of the preceding days was responsible for the small number who attended the excursion to Casselman. Those who went, however, represented almost all branches of the Club's work, and spent a very profitable field day. The excursion to Chelsea was attended by about 200 members and friends of the Club, who spent an ideal day in this most interesting locality. More detailed accounts of these outings have appeared in THE OTTAWA NATURALIST from time to time.

THE OTTAWA NATURALIST.

Volume XVIII of THE OTTAWA NATURALIST has been completed. It consists of twelve numbers which contain in all 227 pages and five plates.

The following are among the papers that appear in this volume :

The Canadian Species of Trocholites, by Dr. J. F. Whiteaves.

Warbler Songs and Notes, by Rev. G. Eifrig.

The Evening Grosbeak, by Rev. C. J. Young.

The Grasping Power of the Manus of Ornithomimus altus, by Lawrence M. Lambe.

Some Canadian Antennarias, by Edw. L. Greene.

Relationship between Weather and Plant Growth, by Dr. C. Guillet.

Nesting of Some Canadian Warblers, by Wm. F. Kells.

A White Pelican at Manotick, by Dr. J. F. Whiteaves.

On the Squamoso-parietal Crest of two species of Horned Dinosaurs from the Cretaceous of Alberta, by Lawrence M. Lambe.

The Mountain Bluebird in Manitoba, by Norman Criddle.

The Food Value of certain Mushrooms, by Prof. F. T. Shutt.

New Brunswick Warblers, by Wm. H. Moore.

Description of a new genus and species of Rugose Corals from the Silurian Rocks of Manitoba, by Dr. J. F. Whiteaves.

The Flora of the Peace River Region, by J. M. Macoun.

The British Association President's Address, by Prof. Prince.

Discovery of Eggs of Solitary Sandpiper, by Walter Raine.

Summer Warblers in Compton Co., by Lewis M. Terrill.

The Winter Fringillidæ of New Brunswick, by Wm. H. Moore.

Landslide on the Lièvre River, by Dr. A. E. Barlow.

Canine Intelligence, by Sir James Grant.

President's Address, by W. T. Macoun.

New British Columbia Rosaceæ, by Edw. L. Greene.

Some of the Rarer Plants of Wellington Co., collected by A. B. Klugh.

In addition to these there have been published several short notes, book reviews, accounts of branch meetings, etc.

The series of articles on Nature Study, edited by Dr. James Fletcher, has been continued, and 1,000 copies of each article have been printed and distributed among teachers throughout Canada. The papers have been contributed by Inspector Cowley; J. B. Wallis, Supervisor of Nature Study, Winnipeg; Rev. G. Eifrig; W. T. Macoun (two papers); Arthur Gibson; F. T. Shutt, M.A.; Dr. MacKay, Superintendent of Education for Nova Scotia, and A. E. Attwood, M.A. The subject of Nature Study is receiving a great deal of attention at the present day, and the articles that have appeared in THE OTTAWA NATURALIST during the past two years constitute a valuable contribution to the literature on this subject.

REPORTS OF BRANCHES.

The Geological Branch reports that the Leaders have attended the various excursions organized by the Council and assisted in pointing out and explaining the salient geological features to be seen in the various localities visited.

Several collections made by amateur collectors in the city and its environs have been brought from time to time to different members of the Geological Branch, and the specimens, whether minerals, rocks, or fossils have been determined so far as the time

and mode of preservation of the material brought allowed. In this way lists have been made and kept for future reference and use. Amongst the interesting localities from which fossils were obtained during the past year, Mackay's or Hemlock Lake may be mentioned. From the marine sands underlying the shell-marl deposit as well as the fresh-water gravels immediately underneath the shell-marl deposit, a number of *Portlandia arctica*, have been obtained. The specimens are usually small and in some respects suggest *Portlandia minuta*. However this boreal variety of *Portlandia arctica*, would scarcely be obtained in a series of sediments which were deposited at the close of the period of marine submergence, it would rather be found in the earliest deposit of the same period.

The Utica shales which were excavated in the vicinity of the Isolation Hospital have yielded an abundance of interesting forms, whilst the Trenton bluffs about Ottawa still teem with organic remains, many of which are no doubt undescribed. There is a great need now of a series of continuous sections carefully measured and described, prepared from the numerous and varied outcrops of these formations within the Ottawa district.

At the excursion to Casselman, along the line of the Canada Atlantic Railway, the Geological section descended the valley of of the South Nation River below the railway bridge to a point where the river takes the turn westward, and specimens of Trenton (Ordovician) fossils were obtained from the numerous outcrops of the limestones along the right bank. The species have been determined and lists kept for reference. Besides these about thirty small pieces and fragments of pottery were obtained from the old camping ground and village site of the aborigines of this country. Portions of pots and also of celts were collected with bits of charred wood and bark and charcoal, together with numerous bones, or rather fragments of bones, probably of some of the deer tribe. Some of the charred wood and bark found buried in the newest formation just below the turf, or even held within the interlacing fibres of the roots of the turf growing at this locality along the riverside, appear to indicate some forest fire that took place long ago whose charred remains are now found buried quite as deep as the sherds or bits of pottery. It would lead one to

suppose further or draw the conclusion that this forest fire must have taken place at some period when the aborigines were settled in the locality visited, a time probably remote from the present by several hundreds of years.

The markings on the pottery are very similar to those observed on the pots from the township of Eardley, in Quebec, north of Lake Deschênes, which area was inhabited during pre-historic times by the Hurons as well as the Iroquois, as various writers on the subject admit. (Consult Parkman, Sulte, Gérin, Sowter and other writers.) I have been informed that at the time when the Castleman family moved from the United States to Canada after the Revolution of 1776, a number of Iroquois Indians accompanied them and were faithful to their lord and master, to the point of strong rivalry and even engagements between them and the Hurons dwelling on the Papineau estates on the north shore of the Ottawa river, in the vicinity of the North Nation river.

The Ornithological Branch reports that several of the leaders of this branch have been active during the last year making observations of our birds in the field and duly recording their observations. It has been found, that the local breeding shrike is the newly made subspecies "Migrant Shrike" *Lanivs migrans*, the habits and nests of which have been studied. Among the rarer birds to be recorded from this neighborhood may be mentioned a Golden Eagle, captured near High Falls, Que., a Cormorant and a White Pelican, the latter two taken within a radius of several miles from Ottawa. The rare Bohemian Waxwing (*Ampelis garrulus*) has once again been seen by the Messrs. G. and E. White.

The Botanical Branch has done excellent work during the year. The semi-monthly meetings of the Branch began in the autumn and have been continued during the winter. Reports of these meetings, published in THE NATURALIST, are abundant evidence of the activity of the botanical members of the Club and of the value of their work. Botanical leaders were present at all the Club's excursions and as usual were kept busy determining specimens and explaining difficult points to students.

The Entomologists of the Club have been active and some of the leaders always took part in the various excursions, helping

those who wished to study insects and giving addresses at the close of each outing. Sub-excursions were held regularly throughout the season at which many desirable specimens were collected. The winter meetings of the Branch have been held regularly and have been successful. A large number of insects new to the Ottawa lists, or rarely collected, have been taken during the year. As in the past special attention has been directed to the working out of the life-histories of insects, and several important additions have been made to the known food plants of some species.

The leaders in Zoology report a most successful year. Their report which is too long for insertion here, will appear in the next number of THE OTTAWA NATURALIST.

The Treasurer's report shows a balance of $53.43.

The Club has had printed 250 copies in English and a like number in French of the clause in the Ontario statutes referring to the destruction of insectivorous birds and the penalty therefor. These are to be posted in conspicuous places at the outskirts of the city, and it is the intention of the Club to aid in enforcing the law.

The following tribute to the late Miss A. M. Harmon appears in the report of the President's address :

"It is with feelings of deep regret that we have to record the loss of a member of the Ottawa Field-Naturalists' Club who was always during the last twenty-two years of her lifetime one of the Club's most valued and best friends. I refer to Miss A. M. Harmon, whose sad death startled us not many weeks ago. If there was ever one who felt the thrill which Nature gives at times to those who know and feel her charms, Miss Harmon was one. She was one of the most faithful members of the Club, and attended regularly its excursions, soiriées and annual meetings. The Club will miss her kind face this winter, and I am sure will trust that her love for Nature is expanding in that broader field beyond the grave."

The thanks of the Club are due to Principal White of the Normal School for so kindly placing the rooms and lantern of the school at the disposal of the Club and his active interest in the Club's work, also to the press of the city for kindly inserting notices of meetings and excursions gratuitously.

T. E. CLARKE,
Secretary.

THE OTTAWA FIELD-NATURALISTS' CLUB.

The Treasurer's Statement for the year ending 21 March, 1905.

RECEIPTS.			EXPENDITURE.		
Balance from previous year..	$39 18		Printing OTTAWA NATURALIST, Vol. XVIII, 12 Nos., 227 pp....	$285 80	
Subscriptions, 1904-05... $159			Illustrations	46 40	
Arrears. 71			Authors' Extras.	32 45	
	230 00		Nature Study Leaflets	24 00	
Advertisements	51 00		Miscellaneous printing: Wrappers, Post cards, etc....	37 75	
Authors' Extras sold.....	2 00			426 40	
OTTAWA NATURALISTS sold .	13 55		Postage	20 42	
Map of Ottawa sold	05		Editor	50 00	
Net proceeds, General Excursion No. 2, to Chelsea	16 80			496 82	
Government grant	200 00		Less 5 % for cash on printers' accounts..	21 04	
					475 78
			Soirée expenses.....		8 75
			Sundry expenses, postage, etc		14 62
			Balance.		53 43
	$552 58				$552 58

I regret to state that many members of the Club have allowed themselves to get into the habit of not paying their subscriptions until the receipt of a special appeal asking for funds. This costs the Club money, gives a great deal of trouble, and should not be necessary.

I, also, again draw the attention of the members to the advertisements on the cover of the NATURALIST, many of which appear in this number of Vol. XIX for the first time. It is hoped that members of the Club will bear these in mind, and make a point, as far as they conveniently can, of dealing with those who have been good enough to help the Club by advertising in our magazine.

ARTHUR GIBSON,
Treasurer.

Statement examined and found correct.

R. B. WHYTE,
J. BALLANTYNE, } *Auditors.*

A NEW RECENT MARINE SPONGE (*ESPERELLA BELLA-BELLENSIS*) FROM THE PACIFIC COAST OF CANADA. *

By LAWRENCE M. LAMBE, F.G.S., F.R.S.C., of the Geological Survey of Canada.

(With one plate.)

The Geological Survey of Canada has lately received from British Columbia a large cup-shaped sponge that is a welcome addition to its very representative collection of Canadian recent marine sponges from the Atlantic, Arctic and Pacific oceans. The specimen is interesting not only on account of its size but also because it belongs to an apparently undescribed species of the Monaxonid genus *Esperella*. It was obtained by purchase from Mr. F. Landsberg of Victoria, B.C., who states, in a letter to the writer, that it was brought to the surface in August of 1904, from a depth of about 300 fathoms, off Bella Bella, an indian village on the British Columbian coast, situated on Campbell island, and about 350 miles north of Victoria.

The sponge is large, cup-shaped, and expands widely above the short, stout stalk, the diameter of the almost circular rim exceeding the total height. The wall of the cup is relatively thin and the outer surface, in the dried state, the condition in which the specimen has been received, is rough.

The skeleton consists of an open irregular reticulation of coarse fibres that terminate outwardly, in the wall of the cup, at right angles to the surface. Within the cup the fibres lie quite evenly in the plane of the surface so that the inside surface is comparatively smooth. The fibres are much stouter in the lower part of the sponge, particularly in the stalk where they are disposed in a more nearly vertical direction.

The fibres are composed of stylote spicules with a fair proportion of spongin present. The surface membrane within the cup is strengthened by spicules lying in the plane of the membrane and forming at times loose fibres, the membrane of the outer surface holds similarly disposed spicules that more generally form, how-

* Communicated by permission of the Acting Director of the Geological Survey of Canada.

ever, definite fibres. The outer surface of the sponge is considerably abraded and little of the dermal membrane remains, but within the cup the membrane for the most part is preserved and exhibits numerous openings, from 1 to over 20 mm. across, leading from the interior of the wall.

The total height of the sponge is 407 mm. (16 inches), with a diameter at the rim above of 560 mm. (22 inches). The wall of the cup grows somewhat thinner as the rim is approached; it varies from nearly 30 to about 15 mm. through. The stalk is roughly lenticular in transverse section, and measures about 115 mm. (4½ inches) in the longer and about 65 mm. (2½ inches) in the shorter diameter.

The spicules are as follows: (*a*) *Megasclera*, of one kind, viz., stout, straight, smooth, sharply and rather abruptly pointed styli, thickest at mid-length; varying in length from .432 to .491 mm. with a maximum thickness of about .013 mm. (*b*) *Microsclera*, of two kinds. (1) Large palmate anisochelæ occurring abundantly in all parts of the sponge and often together in the form of rosettes particularly in the surface membrane; length varying from .085 to .091 mm. Numerous immature spicules of this kind are present. (2) Sigmata, simple and rather small; in length about .019 mm. Only a few examples of this form of spicule have been observed.

The most interesting features of this sponge are its symmetrical shape and its large size. As regards the spiculation it conforms to the general *Esperella* type of structure but the spicules are not of exactly the same size and shape as those of any species of the genus known to the writer. Bella Bella the village near which the sponge was obtained suggests the name by which the species may be known.

EXPLANATION OF PLATE.

Figure 1.—Side view of *Esperella bellabellensis;* slightly less than one-fifth natural size.

Figure 2.—Stylus; × 136.

Figures 3, 3*a*.—Anisochelæ; × 272.

Figure 4.—Sigmata; × 272.

NOTES ON FRESH-WATER RHIZOPODS.

By W. S. ODELL.

Rhiozpods take rank in the *Protozoa*, the simplest and lowest of the grand divisions of the animal kingdom ; and are themselves divided into the following orders: *Protoplasta*, *Heliozoa*, *Radiolaria*, *Foraminifera* and *Monera*. The genera *Radiolaria* and *Foraminifera* are marine, and are of great geological importance. Chalk is composed largely of shells of the latter; while deep-sea ooze is mainly formed of shells of *Radiolaria* and *Foraminifera*. But these notes deal only with fresh-water forms, so it is unnecessary to consider others here.

"What are Rizopods?" many will ask. They are the lowest animals in the scale of life, and are mostly microscopic, the largest forms being just visible to the naked eye or with a good pocket lens.

They consist of a soft mass of clear or granular jelly-like substance called protoplasm (the primitive material from which organic bodies are moulded) endowed with powers of motion, ingestion, digestion, secretion, excretion and reproduction: functions which ordinarily distinguish animal life of a higher order. The simplest kinds have no shell, but by far the greater number are provided with a shell-covering, frequently composed of grains of quartz sand, diatom cases, or sponge spicules, cemented together, exhibiting great variety in form, construction, and arrangement of stucture, often remarkable for great beauty. A description of a species of Amœba, viz., *A. proteus*, Rösel, the earliest described, and familiar to students of Natural History, only can be given here.

Amoeba is invisible to the naked eye, rarely exceeding ¼mm. ($\frac{1}{100}$ in.) in diameter. Under the microscope it appears as a shapeless mass of jelly, nearly colorless ; composed of two parts, the central granular, called the endosarc, and containing the nuclei and contractile vesicles. Completely surrounding this is a transparent layer, or ectosarc. The animal is constantly changing its form. Often the changes are so slow as to be almost imperceptible but by examining at intervals, it will have altered so much

at the end of half an hour as to be hardly like the original. This movement is peculiar. At any part of the body the ectosarc is pushed out in the form of small finger-like processes called pseudopods: these increase in size, still consisting of ectosarc only; granules from the endosarc stream into it, and the projection comes to have the same construction as the rest of the Amoeba: every pseudopod protruded from one part of the body necessitates the withdrawal of an equal volume from some other part. The peculiar movements of Amœba may be imitated by taking a lump of dough or putty and squeezing it between the fingers; as it is compressed in one direction it will elongate in another; regulating the pressure so as to cause the protrusion of narrow portions when the resemblance to the movement described, will be fairly close, but with this radical difference—the one is acted on, the other acts for itself. In the granular mass are darker spots which do not change their form while the protoplasm is flowing all around them. These are called "nuclei." "They are usually large, spherical, hyaline corpuscles, in most cases situated back of the middle of the animal" and are essential to life and reproduction. "In the clear space surrounding the granular matter is a space which widens slowly and then rapidly contracts. This is called the contractile vesicle, and probably serves for respiration by taking water laden with oxygen into the body; and for excretion, by forcing water laden with waste products out of the body;" but its true nature is not fully understood. Not only do Rhizopods move by means of pseudopods, but they capture food with them as well. This food consists of diatoms, desmids and other algæ, rotifers—in fact anything they can hold. Within the body the food is usually seen as small spherical masses, green, brownish or red. In capturing food the jelly mass spreads itself over the organism so as to envelop it, (protoplasm can unite with itself whenever the parts come into contact) closing over it thus bringing it into its midst. The digestible portions of the prey are extracted, digested, and then the insoluble parts are gradually squeezed to some part of the exterior and gradually forced out. This is the earliest condition in which the progress of digestion can be recognized.

The process of reproduction is by division, and is very simple. The nucleus first divides into two: the whole organism elongates,

the two nuclei at the same time travelling away from one another: next a slit appears in the drawn-out portion between the nuclei, this continues until the animal has become two seperate Amoebæ, each like the parent, but henceforth independent of each other; and leading a separate existence.

Rhizopods are more common than is generally supposed; they are to be found in the slime of submerged rocks, on pieces of wood, leaves etc., and especially in moist sphagnum; in fact in moist places almost everywhere.

The method of finding I have usually adopted is to plant a few sprays of *Anacharis* or *Myriophyllum* in a glass jar, in about an inch of slimy ooze from a pond or stream. After a week of so the shell-producing species will be found clinging to the sides of the jar near the top; the naked kind usually in the muddy bottom.

The study of the Rhizopods was first brought to the writer's notice while examining some water plants on which are usually found one or more species of Rotifers. At the base of a spray planted in a jar, was seen a layer ⅛ in. thick, of a milky, cloudy substance which, examined under the microscope contained vast numbers of one of the largest and most beautiful of the Rhizopods, viz. *Actinosphaerium Eichornii*.

The scrapings off slimy logs or rocks if placed in a saucer in water and allowed to settle, will be found also to contain many specimens.

In examining sphagnum strain through a fine sieve under a running water-tap, only collecting the sediment which passes through. If allowed to settle for half an hour, the material for examination falls to the bottom. The surplus water is drawn off and sediment placed in saucers covered with a piece of glass. This supply will afford ample material for microscopical examination all winter.

Of what use are Rizopods? They undoubtedly furnish food material for slightly higher organisms, Trumpet Animalcules *Stentors*, Annelids or water worms and wheel animalcules or Rotifers are repeatedly found containing them in their food. "They share with algæ and diatoms the important function of furnishing food for Crustacea, which in turn are eaten by fish." "They are

thus an indispensible factor in the economy of the organic life of fresh-water fishes."

These notes were made from work done only during winter months; from material collected before cold weather, preserved as before described. If work were done in summer when material is abundant everywhere, doubtless all the species, described by Dr. Leidy in his work on Rizopods, could be identified; and probably many new species added to it. This work opens up a fertile field for investigation to any one interested in microscopy.

The appended list is from species found at Ottawa: the classification that adopted by Dr Leidy.

RHIZOPODA.

HELIOZOA

Actinophrys
- Sol, Ehr.

Actinosphærium
- Eichornii, (Ehr.) Stein.

Clathrulina
- elegans, Cienk.

Raphidiophrys
- elegans, Hert & Less.

FILOSA.

PROTOPLASTA

Assulina
- seminulua, (Ehr.) Leidy.

Cyphoderia
- ampulla, (Ehr.) Leidy.

Euglypha
- alveolata, Duj.
- brachiata, Leidy.
- ciliata, (Ehr.) Leidy.
- cristata, Leidy.
- mucronata, Leidy.

Placocysta
- spinosa, (Carter) Leidy.

Sphenoderia
- lenta, Schlumb.

Trinema
- enchelys, (Ehr.) Leidy.

LOBOSA.

Amoeba
proteus, Rösel.
radiosa, Ehr.
varrucosa, Ehr.
Arcella
dentata, Ehr.
discoides, Ehr.
mitrata, Leidy.
vulgaris, Ehr.
Centropyxis
aculeata, (Ehr.) Stein.
Diffulgia
acuminata, Ehr.
arcula
corona, Wallich.
constricta, (Ehr.) Leidy.
globulosa, Duj.
lobostoma, Leidy.
spiralis, Ehr.
pyriformis, Perty, var. vas, Leidy.
Hyalosphenia
elegans, Leidy.
papilio, Leidy.
Nebela
carinata, (Archer) Leidy.
collaris, (Ehr.) Leidy.
flabellulum, Leidy.
Quadrula
symmetrica, (Wallich) Schulze.

MEETING OF COUNCIL.—The first meeting of the new Council of the Club was held in the Normal School, March 30th, when the Standing Committees of Council for the year were struck and Leaders and Editors elected. Every member of the Council was present and several important matters relative to the Club's work during the coming year were discussed. The following new members were elected: Mr John A. Grossbeck, Patterson, N.J., Miss Ross, Miss Wylie, Miss M. Wylie, and Miss F. Wright.

NATURE STUDY—No. XXII.

S. B. SINCLAIR, Ph. D.

THE SCHOOL TIME REQUIRED FOR NATURE STUDY.

One of the most serious objections urged against the introduction of Nature Study in Public Schools is that there is "no time for it."

Let us first consider ONE HOUR PER WEEK, the amount of time required. One of the most historic responsible pronouncements on the subject, is that made in 1892, in the report made by the famous Committee of Ten, p. 139, where the Natural History section recommend that "No less than one hour per week, divided into at least two periods per week, should be devoted throughout the whole school course below the High School to the study of plants and animals: that in this study no text books should be used, and that these observation lessons should, as far possible, be made the basis of or correlated with work in language, drawing and literature."

Twenty years ago the writer of this article made a somewhat careful observation and study of a number of schools in the United States, England and France, in which courses in Nature Study similar to those recently prescribed for Ontario Schools had been for years and still are in operation.

Since that time he has had opportunity for more extended observation and experiment, and his opinion is that an average of one hour of school time per week for Nature Study during the entire Public School course forms a satisfactory working hypothesis. Many of the most successful teachers of Nature Study give but few set lessons on the subject and vary the time and emphasis to accord with external conditions. For example, in the Spring when Nature seems to awaken from her winter sleep, more time may be devoted to the subject than during the winter months. Then too it is necessary to adjust the lessons to the school room conditions. For example, in a large rural school with many classes in charge of but one teacher, most of the work must be taken with combined classes or incidentally in connection with

other subjects. Speaking generally one half hour lesson per week may profitably be devoted in every class to some definite, sequential, subject of investigation, and the other half to general unrelated observation made as occasion demands. For example, yesterday in the Ottawa Model School a number of boys of about nine years of age, in the second grade, had a half hour lesson on seed planting and at its conclusion undertook to make the seeds which they had planted grow. During the next three or four weeks they will have a half hour lesson each week, devoted to a statement of the discoveries they have made regarding their plants and the difficulties they have met with, and also to a consideration of ways of overcoming these difficulties and to a fuller investigation of heat, light, soil and moisture conditions in relation to plant development. Another half hour per week will probably be occupied in the discussion of such phenomena as the coming of the birds and the melting of the snow, and to the explanation of Nature references found in the current class literature.

It may be urged that such work has always been done in schools. In reply it may be said that where such is the case the requirements of the new regulations are being carried out, and this is no doubt being done in an unostentatious and effective way in many schools. It is probable, however, that most readers of the NATURALIST have cause to remember with regret schools which they themselves attended, where more than one hour per week was wasted in memorizing abstract and meaningless definitions and records which have since been found to be incorrect, where no attention was ever paid to birds or plants, trees or flowers, the glory of the sunset or the matchless grandeur of the heavens or indeed to any of the living realities of existence outside the school room, and where instead of forming habits of observation and appreciation of the objects about them, the pupils formed habits which caused them to ignore all material things as commonplace and to move through realms of profoundest mystery and intense attractiveness with blind eyes and dormant sensibilities. It is to be feared also that such schools have not yet entirely disappeared from Ontario.

THE EDUCATIONAL VALUE OF NATURE STUDY JUSTIFIES RECOGNITION.

Let us next briefly inquire what Nature Study has to offer in consideration of the granting of time (even though it be but one hour per week) which is much needed for other important subjects. In this connection it is important to remember that Natural Science during the past fifty years has undergone a complete transformation as regards the attitude of the investigator, the methods of investigation, the nature of the facts learned, and the relative importance of the subject to the welfare of humanity. This is the fundamental reason why Nature Study has come to stay, and eventually to receive educational recognition even though all its present advocates were to keep silent. The time must come when all thinking men will agree that at every stage education must be naturalistic as well as humanistic if the best results are to be achieved. The advantages of Nature Study have been fully dealt with in previous articles, and I shall refer only briefly to them in passing. From the standpoint of physical health Nature Study has much to commend it. On the side of discipline the subject when properly treated affords an excellent gymnasium for the formation of desirable habits, of sense perception, memory, imagination and thought, and for emotional and volitional development. As a preparation for citizenship the knowledge, insight and power of appreciation gained from such study is indispensible. The theory that "the highest study of man is that which relates to his own nature and destiny and that the investigations of physical science are presumptuous and sterile," has given place to a more rational conception which realizes that man can be studied in the best way only when he is viewed in relation to his environment and to the needs of his fellow men. It is no longer considered *infra dig.* for an educated man to have a practical knowledge of manual activities and to take a lively interest in every day affairs.

PUBLIC SENTIMENT IN FAVOR OF NATURE STUDY.

While public sentiment is wisely conservative regarding the necessity of giving proper time and attention to the humanities and the mathematics and is opposed to extreme views, superficial

attainment and irrational methods, a careful study of various educational systems will reveal that there has been a steadily increasing public demand for a fair amount of Nature Study in elementary schools.

In England there are definite courses outlined for the various grades of the Board schools. The care and attention bestowed on the work is well exemplified in the Murché series of science readers and corresponding object lesson books, which contain a carefully elaborated sequence adapted to the respective grades.

Those who investigated the educational exhibits at the World's Fair expositions in Paris in 1890 and 1900 must have noted (as the writer did) the great improvement in the content and form of Nature Study in public schools in France and elsewhere during the intervening ten years.

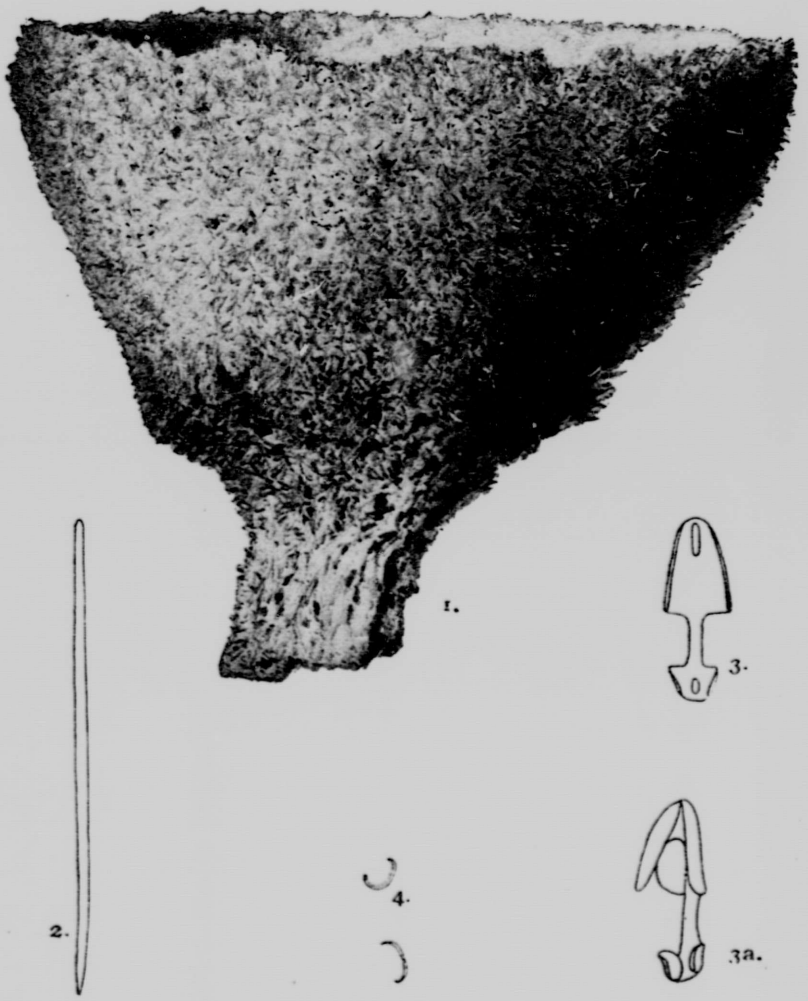
The recommendation of the Committee of Ten quoted above shows the view held by the largest and most representative body of educators in the United States in 1892, and there is no general evidence of a disposition to reverse this decision.

At the Ontario Educational Association meeting held in Toronto last Easter, the course of Nature Study outlined in Paper No. 18 of THE OTTAWA NATURALIST for October, '04, was *unanimously* adopted. This association is composed of representatives from every department of educational work in Ontario.

NATURE STUDY REINFORCES OTHER STUDIES.

It will be found that one hour per week occupied in Nature Study is not really taken from other subjects if the work be properly correlated. For example, in objective drawing, the first step is to gain an accurate knowledge of the object to be drawn, and the time usually occupied in doing this is saved if the object has already been investigated in Nature Study lessons, and experience shows that children prefer to draw such objects rather than those with no previous interest.

In conclusion it may be said that there is good reason for the assertion that all things being equal a class which devotes an hour per week to Nature Study will do better work in other subjects and make more rapid progress than if they devoted their entire time to these subjects.



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