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THE OTTAWA NATURALIST.

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NOTES ON SOME FRESH-WATER SHELLS FROM THE YUKON TERRITORY.

By J. F. WHITEAVES.*

Among the zoological collections in the Museum of the Geological Survey of Canada, there are a few fresh-water shells from the Yukon Territory, which have not yet been reported upon, though they are by no means devoid of interest to the student of the geographical distribution of the mollusca.

Most of these shells were collected by the late Dr. G. M. Dawson, in 1887, at four localities, viz., from Frances Lake at the head of the Liard River; from Finlayson Lake, between Frances Lake and the Pelly River; at the Lewes River; and from Lake Marsh or "Mud Lake," one of the tributaries of the Lewes River. The remainder were collected by Mr. Joseph Keele in 1904, from the Stewart River, near Mayo River.

The Cycladidæ in these collections have been kindly determined by Dr. V. Sterki, and most of the Gasteropoda by Dr. W. H. Dall. The species represented in them are apparently as follows.

PELECYPODA.

Sphærium Walkeri Sterki.

Frances Lake, one valve; and Finlayson Lake, two perfect specimens. In 1904 Mr. W. McInnes collected a few living shells, which were referred to this species by Dr. Sterki, from the Attawapiskat River, Keewatin. The types of *S. Walkeri* are from Lake Michigan.

* This paper and the following one are reprinted from 'The Nautilus' for May, 1905.

Pisidium Idahoense Roper.

Stewart River, near Mayo River; one dead but perfect specimen and an odd valve. Dr. Sterki writes that the "anterior part of the hinge of the former is reversed."

Pisidium compressum Prime.

Stewart River, near Mayo River; one specimen. Mr. McInnes has recently collected specimens of this species at Ozhiski Lake, Attawapiskat River; at Kawinogans River, a branch of the Attawapiskat; and at the Winisk River, Keewatin.

Pisidium variabile Prime, var.

Stewart River, near Mayo River; two specimens. Mr. McInnes has recently collected three specimens on the Kawinogans River, which Dr. Sterki has identified with this species.

Pisidium scutellatum Sterki.

Frances Lake, fry only; one specimen. Dr. Sterki has recognized a few specimens of *P. scutellatum* in collections made by Mr. McInnes last year at Ozhiski Lake, and the Kawinogans River, Keewatin.

GASTEROPODA.

Valvata mergella Westerlund (Dall).

Stewart River, near Mayo River; two specimens.

Valvata Lewisii Currier (Dall).

Valvata sincera of Haldeman, C. B. Adams, Dekay, W. G. Binney, and many subsequent American writers, but, according to Dall, not *V. sincera* of Say.

Valvata striata of Lewis, but not of Philippi.

Frances Lake, ten specimens, and Finlayson Lake, two specimens. Presumably similar specimens were previously recorded by W. G. Binney, in 1865, under the name *V. sincera*, as having been collected by Major Kennicott from the Peace River, Upper Mackenzie, and Great Slave Lake. Frances and Finlayson lakes both belong to the Upper Mackenzie drainage system.

Elsewhere in Canada, *V. Lewisii*, as recently identified by Dall, is now known to occur at many localities from Gaspé to Alberta, and as far to the north-eastward as Fort Chimo, Ungava.

A few specimens in the Museum of the Canadian Survey, which Dall thinks are "probably the true *V. sincera* of Say, or a variety of it," were collected on the island of Anticosti by Professor Macoun in 1884, and on the Attawapiskat and Kawinogans rivers by Mr. McInnes in 1904. Those from the Kawinogans River have the outer half of the last volution free and partially uncoiled.

Limnæa stagnalis appressa Say.

Stewart River, near Mayo River; two specimens.

Limnæa Randolphii Baker.

Frances Lake, eleven fine and large specimens; Finlayson Lake, eleven specimens, mostly immature; Lewes River, one small specimen; and Lake Marsh, Lewes River, seventeen fine and mostly adult shells.

Limnæa palustris Muller.

Frances Lake, two specimens.

Limnæa Vahlii Beck (Dall).

Frances Lane, nine specimens; Finlayson Lake, twelve specimens.

Limnæa arctica Lea (Dall).

= *Limnæa Pingelii* Beck, var. (Dall).

Stewart River, near Mayo River, two specimens.

Planorbis trivolvis Say.

Stewart River, near Mayo River, seven specimens of a rather large, depressed and thin-shelled form of this species, with the spiral angulation obsolete.

Segmentina armigera Say.

Stewart River, near Mayo River; one specimen.

Physa sp. indet.

Finlayson Lake; one very immature specimen.

Ottawa, April 5, 1905.

LISTS OF A FEW SPECIES OF LAND AND FRESH-WATER SHELLS FROM THE IMMEDIATE VICINITY OF JAMES BAY, HUDSON BAY.

By J. F. WHITEAVES.

The shells referred to in the following lists were collected by Messrs. O. O'Sullivan and W. Spreadborough, at three localities near James Bay, on behalf of the Geological Survey of Canada, and are now in its Museum:

1. From two miles above the mouth of the Harricanaw River, Hannah Bay, collected July 1, 1904.

(A. *Land Shells.*)

Cochlicopa lubrica (Muller). Several specimens.
Vitrina limpida Gould. Eight specimens.
Zonitoides arboreus (Say). Two specimens.
Pyramidula striatella (Anthony). Four specimens.
Succinea retusa Lea (*S. ovalis* Gould non Say). Several specimens.

(B. *Fresh-water Shells.*)

Limnæa stagnalis appressa. Ten specimens.
Limnæa Vahlii Beck (teste Dall). Eleven specimens.
Limnæa truncatula Muller (teste Dall). Several specimens.
Bulinus hypnorum (L.). Eight specimens.
Planorbis trivolvis Say. Two specimens.

2. From the mouth of the Moose River, about a mile below Moose Factory, collected July 15, 1904.

Lampsilis luteolus (Lamarck). Two specimens.
Anodonta marginata Say (= *A fragilis* Lamarck). Three specimens.

3. From the mouth of the Albany River, about a mile below Fort Albany, collected July 25, 1904.

Planorbis albus Muller (= *P. hirsutus* Gould). Several specimens

Ottawa, April 8, 1905.

NATURE'S METHOD OF RE-SEEDING TO WHITE AND RED PINE.

By P. Cox, Chatham, N.B.

The discussion on "Conifers" at the meeting of the Botanical Branch of the Ottawa Field-Naturalists' Club, as published in the February number of THE NATURALIST, was very interesting. For many years I have observed the methods of Nature in the work of re-forestation, and in a few words shall give you the results.

White and Red Pine do not spring up immediately after a fire. Other plants, such as the birches, maples, poplars, willows, cherry *(Prunus pennsylvanica)*, shrubbery of various kinds, trailing plants, grasses, mosses, liverworts, etc., soon take possession of the fire-swept area, to be followed in a few years by the Conifers, including the pines. The Northern or Scrub Pine *(Pinus Banksiana)* is, to a certain extent, an exception; for in some districts, especially "barrens" more or less sodden in spring and early summer, it follows almost on the heels of a fire, and its foliage is generally, on such a soil, yellowish, as remarked by Mr. Hamilton in the discussion,—a character I have failed to notice in the case of the White and Red Pine.

How are burnt areas re-seeded to the latter? Under ordinary forest conditions, Prof. Macoun is, I believe, quite right in ascribing to seed-bearing cones, buried by squirrels and other animals, a share in the work; but the re-seeding of burnt districts can hardly be thus explained; for, the surface mould and soil being swept off, the seeds of buried cones brought near the surface would be apt to germinate under the influence of light and heat, and re-seeding on the heels of the fire would be expected. Such, according to my observation, does not happen. It would seem as if the White and Red Pine are not alkali-loving plants, and their seeds do not germinate and thrive in a soil impregnated with the soluble constituents of ashes, but require much vegetable mould and half decomposed wood—a fact observed by Messrs. W. T. Macoun and Elwes in the traverse from Kingsmere to the Gatineau. This view seems further strengthened by the fact that the first young White and Red Pines appearing on a burnt district are

almost invariably found growing on rotten trunks and stumps which had in part escaped the conflagration.

The leaching of the surface soil, the gradual consumption of the alkaline constituents by the first growth, and the resulting addition of the necessary vegetable matter will, in a few years, prepare the burnt area for the pines, whose seeds are doubtless wind-sown. Some such conditions seem to regulate the reappearance of the spruces also, and I once observed the Hemlock *(Tsuga Canadensis)* re-occupying its old site after a period of ten or twelve years.

BOTANICAL NOTE.

Erythronium albidum. A nice specimen of this flower has been received from an anonymous correspondent, "E. U. O. M," of Belleville, Ont., who states that the root was originally collected at Massassaga Point, Bay of Quinte, in 1896. Every year since one flower and two leaves only have been produced. The flower in this species is white, faintly tinged with violet or blue. It is smaller than the common American Dog's-tooth Violet or Adder's Tongue *(Erythronium americanum)* and the leaves are not prettily mottled with brown, as in that species. In Macoun's Catalogue of Canadian Plants it is recorded that, although the species is apparently rare in Ontario, it was abundant in 1878 in a rich low wood two miles east of Belleville, between the Grand Trunk Railway and the Bay of Quinte. Dr. Burgess also found the species on steep clay banks of the River Thames at the "Cove," London, Ont.

J. F.

BOTANICAL CLUB OF CANADA.—The undersigned will be obliged to any botanists who have taken exact dates of the flowering of native plants in the Ottawa district this spring, if they will communicate to him, with a view of making the Ottawa Report to the Botanical Club as complete as possible.

J. FLETCHER, *Sec'y for the Province of Ontario.*

ZOOLOGY.

THE BANDED POCKET-MOUSE.

(Perognathus fasciatus.)

A good specimen of a small rodent, which Dr. C. H. Merriam has identified with this species, has recently been presented to the Museum of the Geological Survey of Canada by Mr. Norman Criddle, who caught it at Aweme, Manitoba, in June, 1904.

The pocket-mice are not very dissimilar to the common house mice, in size and shape; but the former, as their name implies, are provided with cheek pouches, which open externally, and their fur also is very distinctive both in its coloration and texture. Beddard places the pocket-mice next to the kangaroo rats, in the family *Heteromyidæ*; but Lyddeker says that they can be distinguished therefrom "by the presence of roots to their molar teeth," and adds that most of the pocket-mice are "brownish above and white beneath, with a tawny stripe on the flanks, dividing the dark from the light area." Their hind limbs are described as "scarcely saltatorial," and their fur as "coarse and bristly."

The type of the genus *Perognathus* (*pera*, pouch; and *gnathos*, jaw) is *P. fasciatus;* both the genus and its genotype were first described by Maximilian, Prince of Wied, in 1839.

Audubon and Bachman's brief and altogether unsatisfactory Latin diagnosis of the specific characters of *P. fasciatus*, published in 1856, when freely translated, reads—yellowish gray, white below, with a pale yellow lateral stripe. Baird's definition of its specific characters, published in 1857, is as follows: "Considerably larger than the house mouse. Tail as long as body without the head. Antitragus" (the inner lobe of the ear, opposite the tragus) "conspicuously lobed. Soles naked. Above reddish yellow closely lined with black; fore legs all round, feet and under parts white; a pale reddish yellow immaculate band on each side."

P. fasciatus is said to occur in Mexico, Dakota, Kansas and Manitoba. At least six species of this genus are now known, most of which are inhabitants of the western parts of North America.

Ottawa, April 26, 1905. J. F. WHITEAVES.

REPORT OF THE ZOOLOGICAL BRANCH, 1904.

The leaders in Zoology have again to report that, while much useful work in this branch of biological science has been done by various members of the Club, there is little of such novelty or importance to record as to justify detailed notice in this annual report. The fact that Ornithology, Entomology and Conchology are dealt with in separate reports, precluding reference to them in the Zoological report, seriously confines the field, so far as important seasonal observations go, as the mammals, fishes, etc., offer themselves less readily to continuous study by naturalists resident in a city. Still the field is a most inviting and promising one, and, as pointed out in previous reports, there are many lines of work which are open to those desirous of adding to our stock of zoological knowledge.

The Hudson's Bay expedition which returned last fall, after fifteen months' exploration in the Arctic waters of Canada, made some interesting contributions to Dominion zoology.

In the Report of the Department of Marine and Fisheries just issued the following resumé is given of the preliminary account furnished by Mr. Andrew Halkett, naturalist on board the SS. "Neptune."

Mammals.—The mammals observed were limited to four orders, the Carnivora, the Rodentia, the Ruminantia, and the Cetacea; and embrace the Atlantic Walrus (*Odobanus rosmarus*), the Ringed Seal (*Pagomys fœtidus*), the Harp Seal (*Pagophilus groenlandicus*), the Hooded Seal (*Crystophora cristata*), the Polar Bear (*Thalartos maritimus*), the Barren-ground Wolf (*Canis albus*), the Esquimo Dog (*Canis familiaris borealis*), the Arctic Fox, (*Vulpes lagopus*), the Polar Hare (*Lepus arcticus*), certain small rodents, such as Marmots and Lemmings, the Musk Ox (*Ovibos moschatus*), the Barren-ground Caribou (*Rangifer arcticus*), the Right Whale (*Balæna mysticetus*), and the Beluga or White Whale (*Delphinapterus catadon*).

Specimens of the skins of several of the mammals, suitable for mounting, were preserved, with a series of skulls, bones, teeth, etc.

Birds.—The skins of about thirty species of birds, embracing over one hundred specimens, were preserved; these include, among others, the Lapland Longspur (*Calcarius lapponicus*), the Snow Bunting (*Passerina nivalis*), the Red Poll (*Acanthis linarius*), the American Raven (*Corvus corax principalis*), the Horned or Shore Lark (*Octocoris alpestris*), birds of prey, various shore birds, including the Red Phalarope (*Crymophilus fulicarius*), the Whistling Swan (*Olor columbianus*), Hutchin's Goose (*Branta canadensis hutchinsii*), the Snow Goose or Wavy (*Chen hyperborea*), the Eider Duck (*Somateria mollisima*), the King Eider (*S. spectabitis*), the Long-tailed Duck or Souwester (*Harelda hyemalis*), the Arctic Tern (*Sterna paradisæa*), various gulls (*Laridæ*), Jægers (*Stercorarius*), the Murre or Brunnich's Guillemot, (*Uria lomvia*), the Sea Pigeon (*Cepphus mandti*), the Red-throated Diver (*Urinator lumme*), and the Black-throated Diver (*U. arcticus*).

Numerous birds' eggs, some of them in sets, a series of birds' nests and avian anatomical preparations were also collected.

Various other species of birds were observed, such as the American Titlark (*Anthus pensilvanicus*), the Rock Ptarmigan (*Lagopus rupestris*), and the Dovekie (*Alle alle*).

Fishes.—The fishes observed, or collected, were various Salmonoids and Codfish (*Gadus callarius*), together with a specimen each of *Lycodes* and *Gymnelis* (dredged), two specimens each of two species of Blennioids (dredged), a Sand-launce (*Ammodytes*). Cottoids or Sculpins, a species of fresh water Stickleback (*Pygosteus*) and a Basking Shark (*Somniosus microcephalus*).

Specimens of various species of insects and of marine invertebrates were obtained, and, when determined, these will form a peculiurly interesting collection.

In this connection, it is appropriate to note that this season and during the last two or three seasons specimens of the Swingletail or Thresher Shark (*Alopias vulpes*, Gmelin), have been captured in the waters of eastern Nova Scotia. The species has been hitherto uncommon or unrecorded in these more northerly waters. The Great White Shark or Man eater (*Carcharodon carcharias*, Linn.,) has also been observed more frequently by the sealers in the Gulf of St. Lawrence in recent years. The Mackerel Shark (*Lamna cornubica*, Gmelin,) and the Sand Shark (*Carcharias*

littoralis, Mitchell) have been taken, and unprecedentedly vast schools of Picked Dog-fish or Bone-dogs (*Squalus acanthias*, Linn.) have infested the whole of our Atlantic coast from Gaspé southward. Can it be that our eastern shores are undergoing some change rendering the sea warmer and more attractive to these fishes which usually prefer more southerly habitats? The distribution of species is a most fascinating study and one to which our local zoologists might profitably devote more attention in the future.

E. E. PRINCE.
ANDREW HALKETT,
W. S. ODELL.

CORRESPONDENCE.

The Editor OTTAWA NATURALIST.

SIR,—I am making a special study of the Carices (sedges) of Ontario, and should be very grateful for the co-operation of all Ontario botanists.

It would greatly advance our knowledge, if everybody at all interested in plants would collect all the sedges they come across this summer and fall. They should collect the whole plant, roots and all in duplicate, place a label bearing a number, the locality, date of collection and collector's name in each paper, and press for about four days. This is all the drying sedges need.

At the end of the season mail one lot of duplicates to me (flat, not rolled) marked "Sample Post." I shall be glad to refund the postage and will, upon determining the specimens, send a list of the numbers with the name of the species against them.

One important point to be borne in mind about sedges is that they must be collected in full fruit, that is, when the achene (seed) is fully formed and hardening.

All specimens received will be fully credited to their collector in anything I publish on them.

Yours truly,

A. B. KLUGH.

Guelph, Ont.

The Editor OTTAWA NATURALIST.

SIR,—My attention has just been drawn to an article in the last number of THE NATURALIST by R. Chalmers, LL.D., on "The Glaciation of Mount Orford." This article is in the form of a reply to our recent paper by Professor C. H. Hitchcock, Dartmouth College, Hanover, N.H., on "The Glaciation of the Green Mountain Range" (Report of the State Geologist of Vermont, 1903-4, Burlington, Vt.), and to a brief note on the subject of Mount Orford by the present writer (Canadian Record of Science, July, 1900). Unfortunately, it is the writers, rather than the subject, that receive the greater share of attention in this article. Yet a few words of explanation may help to remove any misapprehension regarding the latter.

In the annual report of the Geological Survey of Canada Dr. Chalmers advanced the view that Mount Orford and other hills in south-eastern Quebec were not glaciated above an altitude of eighteen hundred feet. In 1898 Professor Hitchcock reported to the American Association for the Advancement of Science that glacial markings and drift were found by him at the summit of Mount Orford in the previous season.

On the appearance of Dr. Chalmers' report, early in 1900, the writer, quite unaware of Professor Hitchcock's investigation, wrote the short paper above referred to, expressing the opinion that the mountain had been glaciated to the top, and that, consequently, the extreme height reached by the ice in south-eastern Quebec is not yet known. When in manuscript, this note was sent to the late Dr. G. M. Dawson, then Director of the Geological Survey, with the request that it should be also submitted to Dr. Chalmers. Dr. Dawson's reply was to the effect that, the writer's view being probably the correct one, there was no objection to its publication. Accordingly, after again visiting the summit of the mountain, the article was published in July, 1900. It is, therefore, only after five years that Dr. Chalmers first expresses his dissent, and that, apparently, without having in the meantime re-visited the field. It is still more inexplicable that his criticism should now be so largely a personal one.

Dr. Chalmers' ground for discrediting the evidences of the

glaciation of Mount Orford seem to be, 1st, that he did not see any himself; 2nd, that Professor Hitchcock—in short, like Cæsar's untrustworthy lieutenant, reported "*pro viso quod non vidisset*"; 3rd, that the writer, not being a glacialist, would not know what he saw, or be able to reason from it correctly if he did.

To the soft impeachment against himself the writer may be excused from reply. But to the suggestion that Professor Hitchcock reported what he did not see, it is only just to say that Dr. Chalmers omits to mention a very important part of that gentleman's observations. In order to remove any doubt as to the source of the boulders which he found on the higher portions of Mount Orford, Professor Hitchcock submitted a specimen for lithologic determination to Dr. F. D. Adams of McGill University, who found it to be a Laurentian erratic which must have come from the north side of the St. Lawrence river. Yet, Dr. Chalmers makes no reference to this in his criticism of Professor Hitchcock's article. Had he, on the other hand, exercised equal care to inform himself of the character of the loose rock material on the summit of the mountain, Dr. Chalmers doubtless would never have reached his present conclusion. Serpentine from the northwestern base of the mountain, slates from the palæozoic rocks beyond, and Laurentian gneiss are so plentiful that any ordinarily careful observer cannot but see them. The soil which supports the scanty timber growth contains a large admixture of drift. A petrographic study of the mountain made by the writer a few years ago did not show a noticeably greater decomposition in surface specimens from the top, than from the base, of the mountain.

Therefore, until Dr. Chalmers has other evidence than he has yet adduced, the writer, while always open to conviction by information, must respectfully decline to accept his present views on the subject.

Yours respectfully,

JOHN A. DRESSER.

St. Henri de Montreal, May 17, 1905.

NATURE STUDY—No. XXIV.

Apparatus Required For Nature Study.

S. B. Sinclair.

It is often urged that "A Nature Study laboratory is necessary for the successful teaching of elementary science and that without expensive apparatus the work done will be of little or no value." If this view be entirely correct it is prohibitive as regards the introduction of Nature Study into the primary grades of elementary schools, for the general public are not likely to sanction any large expenditure for such a purpose. A brief investigation of this argument therefore may not be out of place.

Nature Study versus Laboratory Method.—The method of the laboratory is usually artificial, technical, abstract. In a laboratory experiment the conditions set up are different from the natural conditions and are established with the purpose in view of discovering or proving certain facts or laws by eliminating irrelevant factors and gaining control of others.

Now, a study of genetic psychology reveals the fact that, speaking generally, it is only when the child has reached the period of youth (beginning at the age of from 12 to 14 years) that the mind takes on the more reflective laboratory attitude which is interested in law, abstraction and generalization, seeks truth for its own sake, desires to probe into the hidden meaning of things and to develop technique in a scientific way.

Previous to this age and during the period of childhood (from about 6 to 12 or 13 years) when the child is in the primary classes of the Public School, the attitude is quite different. During this period the unity of interest is found in serial order, a relation of means and ends, a history or scheme. The child likes to observe the process from one stage to another and see how it is going to come out. He also finds his greatest pleasure in the development of skill in the attainment of some life purpose. It is a delight to him to find that he has gained a power to cause the process to come out differently from the way in which it otherwise would. He is not content with mere play as he was in the previous stage of infancy, but begins to look ahead, make plans for the future

and work for the achievement of his purpose, and he is willing to take considerable pains in gaining skill which will enable him to attain his end quickly and effectively.

With such an attitude the child naturally finds the laboratory work of the High School distasteful, but he takes to certain forms of Nature Study as instinctively as the duck to the water. The life-history of birds, trees and insects, the adaptation of each to its environment, the relation of each to his own life, the care of animals and plants—these and similar subjects, if presented in the right way possess an irresistible charm to him.

These characteristics of child-nature furnish a key to the material and the method of study which should be selected during those early years.

It may be noted in this connection that such study may be quite as scientific as laboratory work. If we accept the dynamic definition of Science as that which furnishes insight to interpret a new situation, we must admit that the child who intelligently and perseveringly studies the life history of a bird or plant and acquires skill in the control of the life process, is proceeding scientifically even though he never perform a laboratory experiment. Further, there is reason to believe that if the child omits such study during childhood when the impulse is at its height he will never again be able to atone for his neglect.

As the attitude, during this entire period constantly progresses toward the more thoughtful attitude of youth there should similarly be a constantly increasing emphasis upon the conventional side and particularly upon the development of skill. The need for such experimental investigation will be realized most readily by the child when there is a selection of material which lies very close to his own life interest, for example, the study of the effects of various kinds of food upon pet animals, of heat, light and moisture upon plants, or the humane extinction of injurious insects. These subjects may be treated from the functional standpoint without any tendency to commercialism. Such studies enlist the interest of the parent in the work of the school. They prevent and cure habits of vandalism and cruelty, and develop in the child a spirit of co-operation and helpfulness, which is the highest aim of education.

Character of Presentative Material—As regards the materials of Nature Study, it may be noted in the first place that many of the models offered for sale are very poor substitutes for the original object. The study of the singing bird in its natural habitat is likely to prove a much more attractive and helpful exercise (especially with beginners) than the investigation of the mounted specimen or the inaccurately colored picture "11-17 of the original size." However, in some cases, after he has failed repeatedly to obtain a close and continuous view of the flitting object of his investigation, the learner turns to a study of the school model with a due appreciation of its special advantages. At the beginning, out-door study is most valuable, and with proper preparation and care an occasional field excursion presents the best form of non-conventional Nature Study for the little child, and the most lasting results will be those gained from such outdoor study by the pupil without any immediate assistance from the teacher. Fields and woods are always accessible, the domestic animals, garden plants and flowers, birds and insects, the wonders of water, earth, air, forest and sky, are available in every locality, and all that is required is a sympathetic attitude toward nature, a genuine desire to investigate, and a few simple suggestions regarding the mode of procedure. I know a boy of 12 years of age who, with very slight preliminary instruction, has acquired a good working knowledge of all of our common local birds, their appearance, migration, nesting, song, adaptation etc., and has formed a close acquaintance with several of them. His interest in the subject is normal and wholesome, and his method of study quite ingenious, e. g., he never takes an egg except from a deserted nest and yet he has a fairly good collection. Making out-door investigation the starting point, the teacher soon finds that the children themselves bring specimens to the school for examination. Thus a collection of specimens for a cabinet is begun. As a rule children enjoy making collections, and there is a sense of proprietorship about such a possession which is a desirable factor and cannot be gained from bought specimens. The materials for definite study can very often be brought by the children, e. g., each child may bring a sample of the flower to be studied. There is no difficulty in securing a number of pet animals in a similar way.

For the highest type of work, books and other kinds of materials must be secured, but at the outset the cost will not be great, and these should succeed and not precede the collection of natural specimens. Under such conditions the purchased materials will be wisely selected, carefully studied and properly cared for.

Experimental Apparatus.—As has been pointed out, the experiments at this period are not of a vigorous analytic type, and consequently little apparatus is required, and that of a most elementary character, easily constructed by the teacher or pupil, or procured at trifling expense. A twenty-five cent lens may be of more value in such work than a compound microscope. The life-history of a plant, together with such phenomena as appeal to the child can be studied from a single specimen, the only expense involved being the cost of the seed and the crock. One of the most scientific and fruitful investigations of insects made in recent years is a study of ants, extending over six years, conducted by Miss Fielde of New York City, and reported to the members of the Philadelphia Academy of Natural Sciences. The following is a description of the apparatus used: "An ant nest can be made in an hour or two with two pieces of glass 3 in. by 4 in. and strips of Turkish towelling glued around for walls. A partition with a door is necessary to make a separate room for the food, a wet sponge in the living room, a few dead flies, and the home is quite satisfactory to your little guests. A sheet of orange tinted glass over the nest enables you to study them without any offensive publicity."

In no other subject is it so true as in Nature Study that "half a loaf is better than no bread." The teacher who waits for gilt-edged apparatus, a well-prepared school garden, a sympathetic public and other ideal conditions, will always find good and sufficient reason for postponing the introduction of the subject. On the other hand, the teacher who makes a wise selection of material, is content to begin with the day of small things and to make the best of the present situation, will find that in Nature Study, as in every other activity, "Perfection consists not in a having and a resting but in a growing and a becoming."

THE OTTAWA FIELD-NATURALISTS' CLUB, 1905-1906.

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