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THE OTTAWA NATURALIST

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GEOLOGICAL SURVEY MUSEUM WORK ON POINT PELEE, ONT.*

By P. A. Taverner.

In following out a scheme for illustrating the various faunal areas of the Dominion in the Museum of the Geological Survey, Ottawa, by large landscape groups showing the characteristic plants, animals, etc., of each marked division, it was decided to begin the work in southern Ontario, which from its striking characteristics and accessibility was obviously a natural starting point for the work.

Point Pelee, Essex County, near the western end of Lake Erie, was the chosen point of operation and on May 15th a Museum party, composed of Messrs. C. H. Young, C. L. Patch, and the writer arrived on the Point. Delayed by unavoidable circumstances our arrival was too late to catch the early migrants but, as the season was cold and the migrations delayed, this was not as serious as it might have been in a more normal year.

A considerable amount of work has been done and results published† relative to this region, by various ornithologists, mostly since 1905, but no continuous series of observations have been carried on there hitherto in summer months.

Owing to the fact that our attention had to be turned principally to collecting, for our exhibition group, a great amount of strictly scientific work was precluded, but general conditions proved so interesting that the most salient features seem worthy of record.

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†See P. A. Taverner and B. H. Swales—Birds of Point Pelee, Bull. Wilson Ornithological Club, 1907-08. Nos. 59-62, and various notes and short papers by the above and W. E. Saunders, in the pages of the Ottawa Naturalist.

We remained until July 24th, when the fall migrations were just commencing. We regretted greatly not being able to continue our observations during the early part of the fall migrations, as they would have completed and rounded out the work previously done in the locality in a most satisfactory manner.

The most striking feature of the summer bird population was the scarcity or total absence of several species common in the surrounding country and of expected occurrence here.

Some of the most noticeable of these species were:—

Wood Thrush, Wilson's Thrush, Ovenbird, Least Flycatcher, Scarlet Tanager, Rose-breasted Grosbeak, Warbling Vireo, White-breasted Nuthatch, Blue-grey Gnatcatcher.

All these species are conspicuous either by their plumage or notes and could scarcely have been overlooked by us. The cause of their absence raises an interesting question, as there are seemingly good habitats for them on the Point, and no obvious reasons for their absence.

On the other hand, the breeding populations of Chipping Sparrow, Wood Pewee and the Baltimore and Orchard Orioles were unusually large. Chipping Sparrows haunted almost every corner of the dry land of the Point throughout the summer and constituted perhaps a quarter of the total bird population. Wood Pewees could be heard nearly every minute of the day in every suitable locality. The two Orioles, Orchard and Baltimore, were more than common, approaching abundant. Their rich varied songs made every daylight moment delightful.

From reports received we had been prepared for a large falling off in the number of Cardinals, but were agreeably surprised to find them in their old numbers. Like reports of the Carolina Wren, however, were only too true. This species, after being common ever since regular study has been given to Point Pelee bird life, i.e., since 1905, have, apparently at least, succumbed to the rigors of the climate and not one was found or heard during our stay*. This species is resident wherever found and undoubtedly the past winter or the past two winters were too severe for it. Its loss will be keenly felt by those who remember its far carrying liquid notes that added such a charm to the locality. The writer remembers one 22nd of February, a bright sunshiny morning, the ground white with snow, but the air carrying the greatest flood of bird music he ever heard.

*Mr. W. E. Saunders tells me that since our visit a few Carolina Wrens have again put in an appearance and promise to rejoin their old numbers.

Cardinals and Carolina Wrens answered each other back and forth in almost continuous strains to a running melodic background from flocks of Purple Finches and underlying all, a low, sweet monotone accompaniment from the combined efforts of innumerable Redpolls. It is to be hoped that the Carolina Wren will re-establish itself on the Point.

Though the Carolina Wren has gone we were delighted to find the Mockingbird still doing well. We failed to either see or hear them for a considerable time after our arrival, but on June 13th one lit in the top of a red cedar in front of the camp and serenaded us for several minutes. Later we found that a pair had established themselves in the vicinity of a farm house not far away and, as the local inhabitants are beginning to take pride in having the only genuine wild Mockingbirds in Canada, they undoubtedly had favorable conditions for raising a nestful of young.

Among other interesting nestings was that of the Lark Sparrow. There were at least three pairs established not far from our camp, at least one of which raised a brood, as we saw the fledglings just after they had left the nest.

The Dickcissel was also observed after many years of absence from Point Pelee notes. About half a dozen pairs were found on the reclaimed ground at the base of the Point. They were evidently breeding in the clover fields but the rank luxuriance of the growth prevented our finding the nests.

On June 5th, two Least Bitterns got up from the edge of a small pond in the marsh and crossed together to the far side, where they were both, shortly after, secured by Mr. C. H. Young. One proved to be a Cory's Bittern, *Ixobrychus neoxenus*, female. In view of its apparent close association with an individual of the closely allied species, from which there is even yet some doubt as to its specific distinction the bird's genitalia was examined with some interest. The ovaries were but slightly developed and there could be no question as to its non-breeding condition. The specimen under question is a normally colored individual showing the usual albinism of the species in but a single white feather on the left leg close to the joint.

Lincoln Sparrow has been taken regularly enough at Point Pelee to be classed as a regular migrant, but the great number of this usually rare bird that were present on May 23rd and 24th warrants special mention. These two days we positively indentified 15 and 10 specimens respectively and then gave up scrutinizing the omnipresent Song and other ground

sparrows. Without doubt, careful attention to this one secretive species would have revealed several times as many more.

May 29th was notable for the number of Philadelphia Vireos; twelve were positively separated from the Warbling Vireo also present, after which no special pains was taken to distinguish the species. They were too common to arouse interest.

The taking of a male Prothonotory Warbler, *Prothonotoria citrea*, on May 19th, was one of the events of the season. There are some few records of the species for Canada but they are poorly supported by extant specimens. This appears to be the third record for the Dominion, the first being Boardman's New Brunswick record and the second McIlwraith's, Hamilton, Ontario, bird.

The Orange Crowned Warbler is one of the rarest of the regular warblers in Ontario. Though the past few years has seen more of this species taken at Point Pelee than, perhaps, all the remainder of eastern Canada together, it was a matter of some congratulation to secure one on May 16th.

The last record of the Short-billed Marsh Wren at the Point was May, 1905, when a small colony of them were observed near the base of the Point. It was, therefore, with considerable pleasure that we located several pairs of them, along the west side of the marsh not far from camp. On May 29th and June 2nd they were again observed; though we searched carefully no nest could be discovered.

It is to be regretted that circumstances recalled us to Ottawa when they did as we missed the early part of the fall migrations thereby. The waders were just returning as we left and the following return species were noted, Least Sandpiper, Semipalmated Plover, Yellow-legs and Hudsonian Curlew. No one has so far recorded the opening days of the fall migrations at this famous migration station and we regretted not being able to take advantage of the opportunity.

Among the plants a number of interesting species were collected for reproduction in the intended group. Not quite all species required were to be found on the Point itself and some searching of the adjoining main land was necessary to secure them.

Near Leamington were found considerable numbers of Sweet Chestnuts, *Castonea dentata*, and some magnificent specimens of Tulip Tree, *Liriodendron Tulipifera*. It was a little late in the season before we found these latter and it may be of

interest to state that we were forced to shoot with a rifle the blossoms we wanted from the tips of the high branches.

The Pawpaw, *Asimina triloba*, also required some searching for but at last was found on the main land nearby. The trees found were, comparatively speaking, small saplings, but we heard of one, not far away, with a trunk eight inches in diameter.

Sycamore, *Platonus occidentalus*, also grows to great size on the Point, but the gnarled state of the branches show that it has reached the northern limit of its range. An occurence just before we arrived showed the cause of the dense clumps of twisted twigs, withches brooms, and the strange irregular twists and angles of growth, that adorn the branches of most of these trees on the Point. A frost came after the first leaves had opened, blighting them and the delicate twigs they were giving rise to. For some time thereafter all appearance of terminal growth stopped but later shoots were thrown out at the sides, which being in new directions, formed fresh angles in the crooked growth of the limbs and bunches of bushy sprouts about the joints. This injures the appearance of the trees but evidently has but little effect on its general health. From the appearance of most of the trees it would seem that these late frosts blight the sycamore, on Point Pelee, in this manner most years.

One of the most common trees is the Hackberry, *Celtis occidentalis*, which grows to great size. Its bark is deeply and closely longitudinally ribbed. The ribs sometimes being an inch high, and a quarter of an inch apart. It has a small fruit, black when ripe, much liked by birds, especially the Evening Grosbeak and the Waxings.

The Poison Ivy, *Rhus Toxicodendron*, var. *radicans*, is also interesting to the visitor from other parts of Canada who knows the plant only as a low growing or trailing vine. Here it assumes great size and we brought home a trunk four inches in diameter and fourteen feet long. In one case we saw where an ivy vine had grown to even larger proportions about a tree which subsequently died and rotted away, leaving the clinging vine standing like a tree with great forked branches reaching out in true limb-like pose.

The Wild Grape, *Vitis bicolor*, grows to great size. One old and decayed vine measured eight inches in diameter at base, and must have run up thirty feet from the ground without branch or foliage.

In the marsh grows the Marsh Mallow, *Malva moscheutos*, a pink hybiscus of hollyhock-like aspect and striking beauty. Another plant not growing on the Point but found in some of the streams emptying into the Detroit River nearby is the American Lotus, *Nelumbo lutea*, a plant of such tropical characteristics as to seem quite out of place in our Canadian flora. Its leaves stand up some eighteen inches or more from the water on stiff round stems, each surmounted with a circular pad nearly two feet in diameter, balanced in the center like a spinning plate on a juggler's wand. The flower is like a large water lily six inches in diameter and of a rich cream color, having a yellow green seed pod in the center, of curious form, studded with the projecting heads of acorn-like seeds.

The Red Mulberry, *Morus rubra*, is not an uncommon tree and occurs in scattered individuals throughout the hardwood section, growing in some instances into large forest trees. Evidently they do not bear fruit every year, as some that we were informed bore profusely the previous year were this season barren and others were well laden that had not been observed fruiting before. Though the habit of growth at the ends of the branches of large trees makes the fruit difficult of gathering, we secured several lots of berries for the table and found them delicious. The great variety in shape of the leaves is surprising and seems to be largely characteristic of individual trees, though partially an effect of age. Young trees always show much variety of leafage shape, and old ones frequently do so.

Sassafras, *Sassafras variifolium*, is very common and occurs to considerable size. A like variation of leaf shape is shown in the species, variation always appearing in young shoots and frequently in the old trees.

The most striking plant on the Point, however, is the Prickly Pear, *Opuntia Rafinesquii*, a cactus growing low on the ground, but of typical cactus form and shape and more than usually well armed with many clusters of minute hair-like prickers and a few scattered thorns of heavier growth. It occurs in more or less circular beds on the driest soil and blossoms profusely. The flowers are some two and a half inches across and of a bright lemon-yellow color. A bed in full bloom is a most striking sight. The plant is very hardy and can stand the extremest aestivation. Bits and lobes that we brought home without earth and never watered remained fresh and solid looking for several months, and some belated blossoms opened out nearly seven weeks after being collected.

We also found some interesting reptile life. Melanism, the occurrence of black individuals in a species normally otherwise colored, and the opposite of albinism, occurs in many species, but is usually very rare. There appears, however, to be on Point Pelee a race of Garter Snakes specially prone to this color aberration. We have taken black Garter Snakes here on other visits and obtained several this trip. On our return to Ottawa we brought with us quite a number of live snakes. Among them was a normal colored Garter Snake which shortly afterwards brought forth 35 young. Of these two were perfectly black or melanitic specimens, all the rest being of the usual striped coloration of the mother.

The Hognosed snake, *Heterodon platyrhinus*, is common on the dunes of east beach, where it usually spends the day under drift wood and logs, coming out at night to forage. The species seems to occur in two forms, a bright yellow and black one, and another form dusty gray with the bright yellow and black markings, veiled and but dimly visible. Though the most harmless of reptiles it has a most venemous aspect when aroused and cornered. It is popularly called "Blowing Adder" and generally regarded so deadly that even its breath is poisonous. When unable to escape an enemy, it coils at bay with its head and body raised from the ground about one-third its length, the head flattened and the chops protruded. Gradually the flatness and protrusion extends down the sides until the whole upraised portion assumes a ribbon-like aspect, perhaps an inch and a half across and less than half an inch through at the center, thining out to almost nothing at the edges. In this attitude, as it faces its enemy, it is indeed a threatening sight, the more so as it "blows" with a distinctly obvious sound and makes passes, as if to strike with wide open mouth. But, to use a colloquial phrase, this is but a bluff, and if the enemy stands its ground the strike so determindly initiated ends with a futile stroke of a soft mouth that can not scratch the tenderest skin.

An occasional individual will carry the game into a still higher form of deception. Finding that its threatenings fail to alarm the aggressor it falls into an apparent fit. Writhing and squirming on the ground, it twists and bites the dust, filling its mouth with sand as it bores its head helplessly into the ground. Gradually the writhings grow fainter and weaker until they cease and the snake lies, belly upward and to all appearances dead. The simulation is close but careful examination shows it slightly over done; for instance, the snake refuses to lie right side up and every attempt at making it do so calls forth a weak spasm which throws it on its back again. Also the limp body will

not balance over a stick or on the hand, however carefully the adjustment is made as to weight; unless it is forcibly held, one end always seems a little heavier than the other and the body slides off to the ground. This comatose condition lasts until the snake thinks the coast clear, when with a sudden jerk it rights itself and if not again molested glides off quickly to the nearest safe retreat; but should it find that the attack is renewed it goes through the whole process of dying over again.

Fox Snakes, *Elaphe vulpinus*, were also common on the same sand dunes. They are colored much like the Adder, but are a slenderer and more gracefully-shaped snake. We found them easily by following up their winding tracks in the sand from willow clump to willow clump, and at last usually discovered them under rotten logs. About the middle of July we found three females under one log with almost a peck of eggs. The eggs are elliptical in shape and covered with a tough leatherly shell that seems to stick together as fast as laid, making clusters like bunches of grapes.

In turning over the logs on the beach for snakes and mice we also found considerable numbers of Blue-tailed skinks, *Eumeces quinquilineatus*. These are locally called Swifts and on a bright warm day the reason of this name is obvious, for they run very rapidly, and it takes considerable agility to catch them, especially as care must be taken to grasping them by the body and not by the tail for the latter breaks off at the least strain, leaving the tailless lizard free to vanish into the debris. The young and half-grown individuals are most beautiful little creatures. All are of the most clean and shapely form with pointed head, slender body, dainty limbs and long, gracefully-tapering tail, but the younger ones have the added beauty of color. The body is coal-black with bright yellow stripes, hence another popular name—and one from which its scientific cognomen is derived—Five-lined Skink. The tail at these ages is a bright sky blue almost irridescent in tone. The adult animals are much soberer, a dull olive-green, with slight bronze reflections to the scales and vague yellowish stripes along the back and sides.

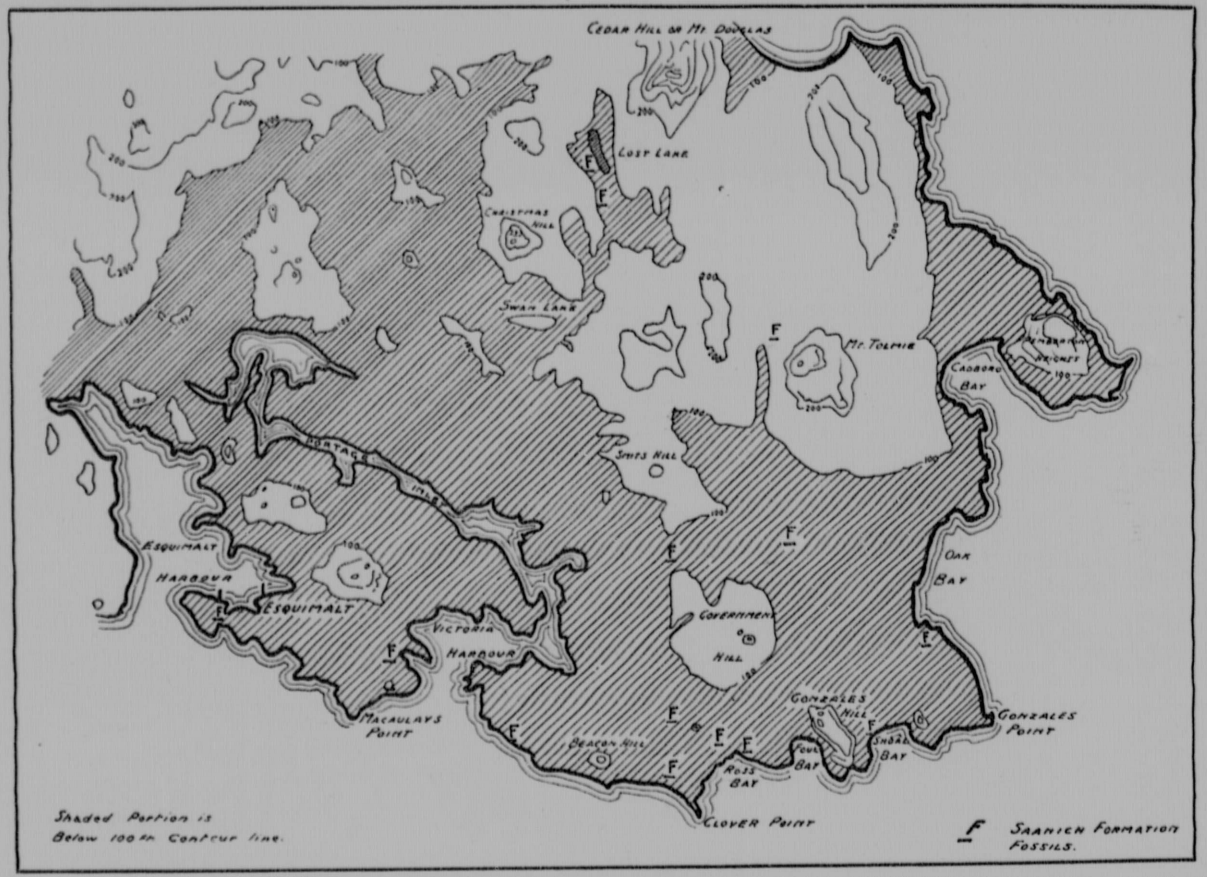
We found several sets of eggs in the cavities of well rotted logs. In all cases an adult was present with them, so it is likely that the mother takes more care of her young than is common among the reptilia. Other specimens captured alive laid eggs in captivity and we managed to hatch out a number of them. Our captives ate ant pupae and flies greedily, which gives us a suggestion as to the nature of their food.

With fish very little was done but to collect some Gar Pike, *Lepidosteus osseus* and *L. platostomus* and Dog Fish, *Amia calva*. We found an adult of the latter in shallow water at the end of the drainage ditch with a school of young.

They schooled close together and occupied a space when closely massed about the size of a bushel basket, while the old one swam about near by, occasionally vanishing for a few minutes but always reappearing again shortly. The Dog fish is one of our most interesting forms, being a survival of a very ancient type with the tail formed from the ventral fin. This peculiar tail formation shows very plainly in the young, of which we collected quite a number.

Among insects a little more was done. The beautiful Olive Hair-streak, *Theda damon*, was very common the latter end of May on the Red Cedar and a considerable series was collected. One of the most interesting occurrences, however, in this line was the comparative abundance of *Papilio ajax*. The commonly given food plant for this showy butterfly is the Pawpaw. This, however, does not occur on the Point and the nearest clump of it is more than six miles away across a wide marsh, yet we saw the species nearly every day and often from two to six. They flew swiftly and were difficult to capture. Those we managed to take were in almost unworn condition and the majority of those seen were perfect even to the ends of their long swallow tails. It hardly seems possible that all of these should be wanderers from the little clump of Pawpaw in the main land and probably the species has another food plant on the Point. *Terias lisa* was quite common. *Colias eurytheme* was seen several times and taken once. Specimens of *Libythea bachmanni* and *Junonia coenea* were observed and indentified as certainly as possible by eye sight, but no specimens were taken.

Among the mammals of course the work was limited, by the species remaining after many years of hunting and extermination. All the larger land forms have disappeared, even to Skunks and Raccoons, and at present the Muskrat is the largest native mammal inhabiting the Point. We trapped mice extensively, and found the rare Michigan or Baird's Deer Mouse, common on the beaches. The Common Mole is abundant everywhere in the sandy fields. The Flying Squirrels taken proved to be of the small southern form, and the rabbit is the common Cottontail of southern Ontario, and no hares are to be found.



From Topographical Map 20A., Geol. Sur., Can., Victoria Sheet.

Illustrating article on Pleistocene Raised Beaches at Victoria, B.C., by C. F. Newcombe.

PLEISTOCENE RAISED BEACHES AT VICTORIA, B.C.

BY C. F. NEWCOMBE, VICTORIA, B.C.

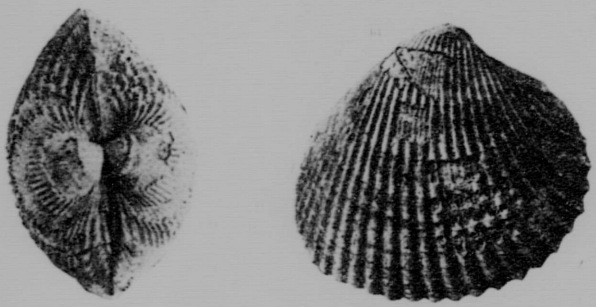
Dr. C. H. Clapp's recently issued article on the Geology of the Victoria and Saanich Map-Areas, Vanc. I., B.C., Memoir No. 36, of the Geological Survey of Canada, includes a very notable contribution to the classification of the superficial deposits in the district treated of.

He makes no distinct mention, however, of certain features which have long been of great interest to local amateur geologists,—the numerous deposits containing marine shells found near the present surface, but usually underlying a peaty layer of no great depth. These, so far as I can make out, are superimposed on the Maywood clays of Clapp, lying in shallow depressions in places where, at the time of their deposition, they were little exposed to disturbance by tides or storms.

The peaty layers contain freshwater shells of species still living in this neighborhood, and some of the localities have only been drained quite recently, and are margined by swamps with sphagnum, *Betula glandulosa*, *Ledum*, etc. The marine shells frequently retain their valves in apposition, and in many cases even the cartilaginous hinge is entire.

The earliest notice I can find of these interior raised beaches is a note by Mr. James Richardson in the Report of the Geological Survey for 1871-2, p. 94, where he reports a shell-bed to the east of the Saanich road, at a height of about three hundred feet above the sea.

The first beach of the kind examined by the writer was one to which attention was called by Mr. F. Pemberton, of Victoria in 1889. He told me that during the removal of black soil from the family estate, near Ross Bay Cemetery, for the late Mr. Robert Dunsmuir's new grounds at Craigdarroch, a large quantity of shells were being exposed under the peat. I found that under a foot or two of decayed vegetable matter containing freshwater shells were the following marine species: *Cardium corbis* Mart., *Macoma calcarea* Gmel., *Mya truncata* L., *Mytilus edulis* L., *Saxicava arctica* L., and *Saxidomus giganteus* Desh.



Cardium decoratum Grnk.

Three years later, in company with Dr. Hasell, of Victoria, I collected at Mount Tolmie all of these species and an additional *Cardium* now no longer living in these waters, *C. decoratum* Grnk. (My diagnosis was confirmed by Dr. Dall, of Washington). The first locality is at an elevation of about thirty feet above present sea-level; that of the second at about one hundred and ten, according to the new contour map of the Saanich Peninsula, —the greatest height at which I have found similar marine shells.

Passing over many minor localities mention may now be made of a typical one at the shallow and much diminished Lost Lake, near the foot of the prominent monadnock called Cedar Hill or Mount Douglas.

This lake lies at an elevation of eighty-three feet at a distance of about four miles from the Victoria post office. In 1894, when Mr. Nicholson, the owner of a large farm bordering on the lake, was extending his drains, a typical condition of things was found, as described at the beginning of this note, with all of the species of marine shells mentioned, lying under a thick layer of imperfectly formed peat.

At the present time the Canadian Northern Railway is endeavoring to find a footing for their road-bed through the lake by driving piles through the shallow bottom. At the last time of my visit they had reached a depth of more than one hundred feet without finding sufficiently firm ground. On the side of a shallow cut here I noticed *Macoma nasuta* and *inquinata*, in addition to the species already noted. It was in this region, though not clearly identified, that Mr. Richardson collected his specimens referred to.

But the most productive area that has come to my notice is one much nearer to Victoria, and which I explored early in this year on behalf of General de Lamothe, of Paris, who visited Victoria in company with several Canadian geologists last year after the meeting of the International Congress. Following along the line of a hollow between Spring Ridge and the Protestant Orphanage, where I had previously made many finds, I at length found a recently constructed main sewer passing through an abandoned vegetable garden, bounded on the west by Cook Street.

Again, after digging through an extensive peat bed, containing freshwater shells in perfect condition, at about four feet from the surface vast quantities of marine shells had been exposed, together with two species of barnacle and a few fragments of elk-horn, apparently cut by a blunt instrument.

Here I added to my list the following Gastropods: *Natica clausa* B. & S. (of immense size), *Natica pallida* B. & S., *Margarita pupilla* Gld., and *Acmaea alveus* Conr., a species which lives on eel grass growing in shallow, quiet waters. To the bivalves were added a *Macoma* like *balthica* L., *Paphia staminea* Conr., *Schizothaerus nutallii* Conr., and *Zirphaea crispata* L.

About three years ago Mr. Harold Hannibal, of Stanford University, Cal., visited Victoria and accompanied me to the Pemberton locality first noted above, and, later, examined alone, the Lost Lake region. The results of these examinations and of explorations in the Puget Sound country is given in a report by Dr. Ralph Arnold and himself entitled "The Marine Tertiary Stratigraphy of the North Pacific Coast of America," contributed by them to the Proceedings of the American Philosophical Society, Vol. LII, No. 212, 1913. To the raised beach formations just mentioned and to similar ones in Puget Sound and the Strait of Georgia, the authors, on page 597, apply the name The Saanich Formation (Pleistocene).

A partial list of fossils collected by various geologists and by myself in Victoria, and on the shores of various places to the north and east was published by me in the Catalogue of the Provincial Museum, Victoria, in 1898. This list will require considerable revision in the light of later knowledge. The species named include many which were found in the lower clays forming steep cliffs here and near Comox, and islands in the Strait of Georgia, and also from the sandy layers superimposed on Cretaceous rocks at Sucia Island. Mr. Bauerman, Dr. G. M. Dawson and Mr. Lamplugh, of the Geological Survey of Great

Britain, were the most noteworthy collectors, and I was able to add a few species to their lists in after years. The relationship of these clays, in which are *Ledas*, *Buccinums* and other species indicating deeper water than those noted in the Saanich formation, has not, to my mind, been satisfactorily determined.

THE SNOW-FLEA.

BY CHARLES MACNAMARA, ARNPRIOR, ONTARIO.

In this part of Canada the coming of winter practically marks the seasonable close of visible insect life, and with the first snow most collectors put up their nets, forceps and bottles. But to this general rule there are exceptions, and occasionally one finds on the snow a torpid fly or spider that the winter winds have blown out of some crevice, or sometimes on a mild day a woolly-bear caterpillar is seen hurrying along as if late for an appointment. These, however, are merely accidental apparitions, and the only insect that can be said to occur regularly during the winter months is the springtail.

These tiny insects belong to the order Thysanura, and form the sub-order Collembola. They are the most widely distributed hexapods in the world, having a range from the Arctic to the Antarctic and are found high up on mountains and down in the deepest caves. Excluding parasites on penguins and seals, which may be regarded as importations, the only indigenous insect in the Antarctic continent is said to be a springtail. Only in view of their absolutely wingless condition, the wide distribution of these small and delicate insects points to the great antiquity of the order, and they are thought to represent a very early offshoot of the ancestral stock of Hexapoda. All the species are very small, ranging from one-half a millimeter to five millimeters in length, but those of the latter size are the giants of the race; most of them are from one to two millimeters long. They frequent dark damp places, as under moss and rotten wood, and owing to their minute size are difficult to discover.

They gain their common name from their peculiar springing organ. Towards the caudal end of the abdomen are attached a pair of tail-like appendages, together called the furcula, which are normally bent forward, under tension, beneath the insect, and the ends are held in a little catch known as the tenaculum. When released from the tenaculum, the furcula kicks forcibly downwards and backwards and jerks the insect into the air. Anyone who remembers the goose bone jumping-jack—a homely toy unknown, I fear, by the present sophisticated generation of children—will readily understand the springtail's leaping apparatus.

At least four species of Collembola occur in the vicinity of Arnprior during the winter:—*Isotoma nigra* Macg., *Achorutes nivicola* Fitch, and two unidentified species. *I. nigra* is fairly common, and sometimes forms the majority of the springtails found on the snow, but generally *A. nivicola* is in excess, and towards spring often appears in such vast numbers that the most casual observer cannot fail to notice it. From its jumping habit it is popularly known as the "snow-flea," although, of course, it is not related in any way to the real fleas, (Siphonaptera).

A. nivicola, which Dr. J. W. Folsom identifies with the *A. socialis* of Europe, may be described untechnically as a blue-black insect two millimeters long by one-quarter millimeter wide at its broadest part. It has a well marked head, bearing two somewhat divergent short antennae which it keeps in constant motion. Its mouth parts are sunk in the head, a peculiarity characteristic of all the Collembola. Its sixteen simple eyes are arranged in two groups of eight each on either side of the head. It has an elongated but stout segmented body, the thorax consisting of three segments each bearing a pair of short legs on which the insect runs very actively. The abdomen has six segments and tapers rapidly towards the tail. The jumping apparatus is as already described. The whole insect is sparsely covered with short fine hairs.

Any day of the winter, from November to March, when the temperature is not below 30° F., *A. nivicola* can be found on the snow near old log fences, and along roads and clearings. They seem always to occur along the edge of open spaces of some kind, and I have never observed them in the middle of a wood of any extent. Although they sometimes come out in considerable numbers in November and December, the really great swarms do not appear until the first mild days of spring. Towards the end of March one often sees them like thickly

scattered grains of gunpowder on the snow near the foci from which they spread. They tumble into every slight depression, and as their movements are rather aimless they do not readily escape from such situations, and every little hollow in the snow is black with them. A friend tells me that he once saw them near the Deschenes Rapids in such quantities that they could have been scooped up in spoonfuls. Of course, as they spread out they become much more thinly scattered. Their progress is slow and apparently rather haphazard, and their distribution is influenced a good deal by the wind, but their general movement is always towards open spaces. A day or two of favorable weather enables them to spread over a large area of country. I have seen them extending to a distance of a half mile from the shore on the ice of the Ottawa River, and on an eight-mile walk on the 26th March, 1914, they were found scattered everywhere over fields, clearings, beaver-meadows and lake.

The object of these migrations is not very apparent, and there is no doubt that the vast majority of the migrants perish in the snow before reaching any goal; but possibly inter-breeding is thus prevented and the racial benefit so derived more than counterbalances the immense destruction of individuals.

On the 24th April, 1914, by which date the snow had all gone, I found large numbers of *A. nivicola* under chips in a damp place on the shore of Chats Lake. The insects were gathered in masses, and to the naked eye, looked like patches of dark blue powder. I collected some in a vial, loosely filled with damp moss, and on the 27th, they laid from seventy-five to one hundred tiny, spherical, yellowish, eggs in lots of fifteen or twenty, something like bunches of grape . These hatched out on the 9th May, an incubation period of twelve days. The young emerged perfect, (none of the Collembola undergo any metamorphosis), but instead of the blue-black of the adult, they were yellowish-white in color with conspicuous dark eye spots. They were exceedingly active, and kept continually running and jumping about in their bottle. The adults all died about this time and the young survived them only a few days. *A. nivicola* disappears from its winter haunts during the summer, and is very hard to find between May and November, but this is not surprising, as the insect is so small that unless it occurs in very large numbers, it is difficult to discover without the white background of the snow to betray it.

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