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## MAMMALS OF THE CHILLIWACK DISTRICT, B.C.

By ALLAN BROOKS.

Chilliwack lies on the south bank of the Fraser River, the valley proper being a very level stretch of alluvial land some seventy feet above sea level. On the east, the Cascades rise sheer from the flat land to the height of from 5,000 to 8,000 feet, Mt. Baker to the southward being over 14,000 feet. The fauna of the lower levels is typical of the coast district, the higher peaks extending into the boreal and alpine zones, which give a great diversity of fauna and flora for so small an area.

Most of my mammal collecting was done between 1894 and 1900, prior to that time my attention being devoted mainly to birds.

I made many trips into the mountains, including the Mt. Baker range on 49th parallel, Tami Hy peak, Chilliwack Lake, and mountains to the southeast of this lake, mountains at head of Stave lake, Cheam peak, and many of the smaller mountains; so the district was very fairly covered by me. Most of my collections were sent to, and identified by, Mr. Outram Bangs and Mr. Senit S. Miller, Jr. I have also supplied skins to the Biological Survey collection and a few to Mr. S. Rhoads, as well as skins of a pair of most of the species enumerated to the Provincial Museum, Victoria, B.C.

Many of the rodents may be intergrades with the forms occurring to the east of Cascade Range. One or two bats not enumerated may occur, for instance *Atalapha cinerea* and *Myotis longicrus*; I am pretty sure I have taken the last. The wolverine occurs in the mountains to the north and may be found in the district.

1. *Cervus Canadensis*. Wapiti, or Elk.

The elk, once numerous, is now extinct south of the Fraser, but I have many reliable reports that a bunch still holds out in the mountains at the head of Harrison Lake.

2. *Cariacus columbianus*. Black-tailed Deer.

Common in some localities and very scarce in others; the mule-deer overlaps the range of this species on the summit east of Hope.

3. *Mazama montana*. White Goat.

Irregular in its distribution on the highest peaks.

4. *Sciuropterus oregonensis*. Pacific Flying Squirrel.

Generally distributed both on the mountains and lowlands.

5. *Sciurus douglassi*. Douglas' Squirrel.

Abundant at all elevations.

6. *Eutamias townsendi*. Townsend's Chipmunk.

Common in the valley, and ascending the mountains to the park-like glades near timber line at about 5,000 feet.

7. *Eutamias quadrivittatus felix*. Cascade Chipmunk.

Abundant from about 5,000 feet to summits of the high rocky peaks above timber line.

The locality where I collected the type specimens was Lumsden Mountain on 49th parallel, due north of Mount Baker.

8. *Arctomys caligatus*. Hoary Marmot.

On all the alpine peaks, very rarely descending into the valleys.

9. *Aplodontia rufa*. Sewellel.

Very rarely seen in the valley, but more or less common on all the foothills and higher mountains; very abundant on the southern slopes of all the higher mountains, where the ground is in some places completely honeycombed with their underground runways. It is never found away from water or small springs, and does not ascend above timber line. Locally known as "Mountain Beaver."

10. *Castor canadensis*. Beaver.

I have taken specimens as late as 1900, and a few still hold out in the mountain streams, and occasionally in the Fraser itself.

11. *Mus decumanus*. Norway Rat.

Introduced.

12. *Mus musculus*. House Mouse.

Introduced and driving the indigenous white-footed mouse from most of the houses and barns.

13. *Peromyscus austrus*. White-footed Mouse.  
Abundant at low elevations.
14. *Peromyscus oreas*. Bang's White-footed Mouse.  
Abundant on mountains and in heavily timbered foothills. I took the type specimens on Lumsden Mountain at an elevation of about 5,500 feet.
15. *Neotoma cinerea columbiana*. Wood Rat.  
Rare in the valley, common in the mountains; for several years prior to 1897 wood rats were extremely scarce.
16. *Evotomys saturatus*. Western Red-backed Vole.  
I have never taken this species in the valley, but from the foothills to timber line it is common. I took some very pale *Evotomys* at Stave Lake in '96, which Mr. Miller identified as differing but slightly from *saturatus*; Stave Lake lies between Agassiz and Port Moody, at both of which points has been taken another species of *Evotomys*, described by Mr. Vernon Bailey in his monograph of the genus.
17. *Phenacomys orophilus*. Mountain Lemming Vole.  
Taken only on Lumsden, Mt. Baker Range, at an altitude of about 5,500 feet, described by Mr. Rhoads as a new species ("*oramontis*") from these specimens.
18. *Microtus mordax*. Cantankerous Vole.  
Mr. Vernon Bailey in his excellent "Revision of the North American Voles." states that no form of the *longicaudus* group occurs on the high Cascades. I took three specimens of either *mordax* or *macrourus* on Lumsden Mountain at an altitude of 5,500 feet in August '95. These I sent to Mr. Senit S. Miller, in size they resembled *marourus* but in coloration were nearer *mordax*.
19. *Microtus richardsoni arvicoloides*. Giant Vole.  
Common on all the higher peaks, being especially abundant in the dense growth of pink flowered *Mimulus* which fringes the little snow-fed streams. Like other voles, it is subject to epidemics which thin them out when they become too numerous; in '99 I noticed numbers of dead ones on the mountain tops.
20. *Microtus townsendi*. Townsend's Vole.  
In the fields and meadows of the valleys only, some times abundant, at others scarce.
21. *Microtus oregoni serpens*. Creeping Vole.  
Abundant in the valleys, where nearly every log in the woods has one of their underground runways beneath it. I have also taken it at timber line in the mountains (6,500 feet.)  
Not often noticed on account of its subteranean habits.

22. *Fiber osoyosensis*. Pacific Muskrat.  
Common.
23. *Zapus trionotus*. Western Jumping Mouse.  
Found in suitable localities from sea level to 7,000 feet. Most abundant on the mountain tops.
24. *Erithizon epixanthus*. Western Porcupine.  
Very scarce.
25. *Lagomys minimus*. Least Pika.  
Mr. Bangs has re-instated Lord's species from specimens I sent him taken near the type locality. Found in nearly all rock-slides from 100 feet to summits of highest peaks.
26. *Lepus washingtoni*. Washington Hare.  
Common in the bottom lands.
27. *Lepus columbiensis*. Columbian Varying Hare.  
This is one of the only mammals that are found in this locality I have never succeeded in taking specimens of. The hares north of the Fraser and in the mountains all turn white.
28. *Felis oregonensis*. Pacific Cougar.  
Not uncommon and very destructive to both game and stock. In some localities they have about exterminated the deer. I have then noticed the bones and teeth of *Aplodontia* in their dung. The young ones are handsomely spotted, differing in this respect from the form found east of the Cascades.
29. *Lynx canadensis*. Canada Lynx.  
Now very scarce, used to be not uncommon.
30. *Lynx fasciatus*. Coast Wildcat.  
Not uncommon, used to be abundant.
31. *Canis occidentalis*. Wolf.  
Very scarce, both the black and gray forms occur.
32. *Canis latrans*. Coyote.  
Coyotes of late years have made their appearance in the Chilliwack Valley.
33. *Vulpes vulpes*. Red Fox.  
I have heard one or two reports of foxes, and saw the remains of a red one that was killed at Pitt meadows.
34. *Ursus horribilis*. Grizzly Bear.  
Found in the mountains only. I saw one shot near Summit Lake, of an almost uniform drab gray, almost white.
35. *Ursus americanus*. Black Bear.  
Once abundant but getting scarcer—still does great damage to raisers of hogs. Both black and "cinnamon" forms occur and intergrade.

36. *Procyon psora pacifica*. Pacific Racoon.  
Common at low elevations.
37. *Rutra canadensis*. Otter.  
Fairly common.
38. *Mephitis spissigrada*. Pacific Skunk.  
Common. Described by Mr. Bangs from specimens sent to him by me from Sumas.
39. *Spilogale phenax latifrons*. Little Stupid Skunk.  
"Civets" are found from the lowest levels at all events up to 4000 feet, and probably higher.  
Scarce in the late winter and spring, but numbers can be taken in the fall and early winter months.
40. *Lutreola energumenos*. Pacific Mink.  
Common. Mr. W. H. Osgood has lately described the Alaskan mink as a new species, larger and paler than *energumenos*. In this connection I may state that the type specimen of *energumenos* was very much smaller than those I took later. The color is generally very dark, but sometimes much paler—a warm reddish umber.
41. *Putorius longicaudus saturatus*. Long-tailed Weasel.  
Very scarce. I have only noticed it at low elevations and have only taken one. Unlike the next species, I think it always turns white in winter.
42. *Putorius cicognani*. Bonaparte's Weasel.  
Common. In the valley this weasel rarely turns white in winter, at high elevations always does so.
43. *Putorius cicognani streator*. Puget Sound Weasel.  
One or two typical examples taken.
44. *Mustela caurina*. North Western Marten.  
Scarce. *Mustela americana* also probably occurs.
45. *Mustela pennanti*. Fisher.  
At one time frequently seen throughout the district, now very rare.
- 46-47. *Vespertilio fuscus*. Brown Bat.  
Rather scarce.
48. *Vesperugo noctivagans*. Silvery Bat.  
Common.
49. *Myotis evotis*. Large-eared Bat.  
I have several times taken a medium sized dark brown bat which must be this species, though the ears seemed too short; what I took to be the young were uniformly blackish.

50. *Myotis californicus*. California Bat.  
Common. Most specimens are dark enough for the form *caurinus*.
51. *Myotis saturatus*.  
This little bat is the most numerous of the genus.
52. *Sorex personatus*. Masked Shrew.  
I have only taken this at very high elevations.
53. *Sorex trowbridgi*. Trowbridge's Shew.  
Common in the thick woods ; I have not taken it above 2,000 feet.  
Very hard to get good specimens, as the fur on abdomen slips within an hour after death. *S. vagrans* and *obscurus* taken in same localities will keep for eight hours or more.
54. *Sorex vagrans*. Wandering Shrew.  
Abundant in the valley, and once taken at 6,000 feet elevation.
55. *Sorex obscurus*. Dusky Shrew.  
Abundant, replaced on mountain tops by next species.
56. *Sorex longicaudus*. Long-tailed Shrew.  
Common at high elevations.
57. *Sorex vancouverensis*. Vancouver Island Shrew.  
I have several times taken very dark seal-brown shrews with the size and teeth formation of *vagrans* which must be this species. Specimens taken on the foothill between the Chilliwack river and Chilliwack valley were all of this race.
58. *Sorex (Atophyrax) bendirei*. Bendire's Shrew.  
This fine shrew is fairly common in thick woods and swamps in the valley.
59. *Neurotrichus gibbsi*. Shrew Mole.  
Abundant in the valley in thick woods, and I took one specimen at timber line near 49th parallel when trapping for *Phenacomys* among the short juniper and heather, with banks of eternal snow all around.
60. *Scapanus townsendi*. Townsend's Mole.  
Common in the portions of the valley not affected by Fraser floods, and exceedingly hard to trap, more so than a Beaver or Otter.

## SYNOPSIS OF THE BIRDS OF THE SASKATCHEWAN VALLEYS AND TRIBUTARIES.

By EUG. COUBEAUX, Prince Albert, Sask., N.W.T.

The present key is based on the recent catalogue of Canadian Birds by Professor John Macoun, M.A., F.R.S.C. (Ottawa, 1900, Part I), and on my own collection and observations.

It includes all the species commonly found or more or less frequently met with in the two valleys of the Saskatchewan and in those of their tributaries.

In order to find the name of a bird with this key, see whether the characters of the bird agree with those described in the key, beginning with No. 1 in the first column of figures and following the numbers of this column consecutively (1, 2, 3, etc.) as long as the characters agree until the name of the bird is reached.

If a character does not agree, see what the number in the second column of figures is; then find the same number in the first column lower down, and proceed as above.

This key is based on conspicuous characters only, without regard to the genus, the family and the orders. It is above all for field use and mainly made with fresh birds.

## ANSERES.

## LAMELLIROSTRAL SWIMMERS.

Three toes directed forwards, webbed. Bill flat, broad, laminated on sides.

- |   |    |   |
|---|----|---|
| 1 | 17 | Hind toe not lobed.   |
| 2 | 5  | Neck rather long, bill with a soft cere extending to eye.   |
| 3 | 4  | Bill entirely yellow or yellowish. Length 4-5 feet.<br><i>Olor Buccinator</i> (Rich.) Wagler. Trumpeter Swan. |
| 4 | 3  | Bill having the tip black. Length 4½ feet.<br><i>Olor Columbianus</i> (Ord.) Stephn. Whistling Swan.          |
| 5 | 2  | Neck shorter, bill without cere.  |
| 6 | 12 | Bill shorter than head.   |
| 7 | 13 | Hind toe very short and elevated.   |
| 8 | 11 | Neck entirely black.  |
| 9 | 10 | Tail of 18 to 20 quills. Length 35 in.<br><i>Branta Canadensis</i> (Linn.) Bannister. Canada Goose.           |

- 10 11 Tail of 16 quills. Smaller, 30 in.  
*Branta Canadensis hutchinsii* (Rich.) Coues. Hutchins's  
 Goose.
- 11 9 Neck with a white patch on each side. Length 23 to  
 24 in.  
*Branta bernicla* (Linn.) Scopoli. Brant.
- 12 6 Bill as long as head.
- 13 7 Hind toe reaching the ground.
- 14 15 Forehead white. 26-27 in.  
*Anser albifrons gambeli* (Hartl.) Coues. American  
 White-fronted Goose. Laughing Goose.
- 15 14 No white on the forehead. Entirely bluish.  
*Chen caerulescens* (Linn.) Gundl. Blue Goose.
- 16 15 Adult white, bill reddish. Young more or less mottled  
 with gray. About 30 in.  
*Chen hyperborea nivalis* (Forst.) Ridgw. Greater Snow  
 Goose.<sup>1</sup>
- 17 1 Hind toe long and lobed.
- 18 33 Lobe of the hind toe narrow and not more than  $\frac{1}{3}$  of an  
 inch. Nostril at base of bill.
- 19 20 Bill narrowed at base and much enlarged at tip  
*Spatula clypeata* (Linn.) Boie. Shoveller. Spoon-bill.
- 20 19 Bill equally broad throughout or nearly so.
- 21 24 Bill conspicuously shorter than head and the middle toe  
 and claw.
- 22 23 First and second quills longest; bill blue black at tip.  
 Length 20-22 inches.  
*Mareca Americana* (Gmel.) Stephens. American Widgeon.  
 Baldpate.
- 23 22 Second quill longest, bill green, olive. Length 19 in.  
*Aix sponsa* (Linn.) Bonap. Wood Duck.
- 24 21 Bill longer or as long as head, and longer or as long as  
 the middle toe and claw.
- 25 30 First quill longest; of large size, 19 to 24 inches.

<sup>1</sup> I do not mention the typical species, the *Chen hyperborea* (Pall.), as it seems to be only an accidental species in the west (*vide* Macoun, *l. c.*, p. 114).

- 27 27 Speculum white or whitish, or dusky speckled with white.  
Length 19-22 inches.

*Chaulelasmus strepera* (Linn.) Bonap. Grey Duck.

- 27 26 Speculum glossy green or greenish, purple and blue.

- 28 29 Male, head and neck dark, neck with a white ring.

*Anas Boschas* Linn. Mallard.

- 29 28 Head dusky, fore part of the neck white; middle rectrices longer than the other quills.

*Dafila acuta* (Linn.) Bonap. Pintail. Springtail.

Females.

With the wings as in the male; head, neck and under parts pale ochrey, speckled and streaked with dusky. About 24 inches.

*Anas boschas*.

With only a trace of the speculum between the white or whitish tips of the greater coverts and secondaries. The whole head and neck speckled or finely streaked with dark brown, and grayish or yellowish-brown; below, dusky freckled; above, blackish; all the feathers pale-edged.

*Dafila acuta*.<sup>1</sup>

- 30 25 Second quill longest. Of small size, 13-17 inches.

- 31 32 Wing coverts pale blue; bill slightly enlarged.

*Querquedula discors* (Linn.) Stephens. Blue-winged Teal.

- 32 31 Wing coverts dusky.

*Nettion Carolinensis* (Gm.) Baird. Green-winged Teal.<sup>2</sup>

- 33 18 Hind toe short, broadly lobed; lobe broader than  $\frac{1}{2}$  of an inch.

- 34 51 Bill elevated at base, flat and broad towards tip which has a strong horny nail.

<sup>1</sup> I put off the *Anas obscura* Gmel., the black duck, which is the common wild duck of the Maritime Provinces, though a few stragglers reach sometimes Manitoba (*vide* Macoun, *l. c.* p. 76.)

<sup>2</sup> I do not include the *Querquedula cyanoptera*, the Cinnamon teal, a southern species, which is only a very rare straggler in Manitoba (*vide* Macoun, *l. c.* p. 83).

- 35 49 Nail small, holding only the middle of the tip of bill.
- 36 37 Rectrices very narrow, pointed and stiff, 18 in number.  
*Erismatura Jamaicensis* (Gmel.) Salv. Ruddy Duck.
- 37 36 Rectrices softer.
- 38 44 Of small size, less than 20 inches.
- 39 42 Bill keel hollow, slightly enlarged towards tip; nail  $\frac{1}{2}$  to  $\frac{1}{4}$  of an inch.
- 40 41 Speculum white, bill blue. About 16 inches.  
*Aythya affinis* (Eyt.) Stepn. Lesser Scaup Duck. Blue-bill.
- 41 40 Speculum gray ash. About 18 inches.  
*Aythya collaris* (Donov.) Ridgw. Ring-necked Duck.<sup>1</sup>
- 42 39 Bill keel round and smooth, equally broad throughout, blue, with a very small nail. Length 15 inches.  
*Charitonetta albeola* (Linn.) Stepu. Buffle-head. Spirit Duck.
- 43 42 Bill black with above white at base. 18-19 inches.  
*Clangula clangula Americana* Faxon. American Golden-eye. Whistler.
- 44 38 Of large size, 20 to 24 inches.
- 45 46 Head and neck black.  
*Aythya americana* (Linn.) Boie. American Scaup Duck. Big Black-head.
- 46 45 Head and neck rich chestnut or ruddy chestnut.
- 47 48 Bill shorter than head (two or less), dull blue with a black belt at end. Nostrils within its basal half.  
*Aythya americana* (Eyt.) Baird. Red-head. Pochard.
- 48 47 Bill not shorter than head (two and a half or more), blackish with nostrils at its middle.  
*Aythya Vallisneria* (Wils.) Boie. Canvas-back Duck.
- 49 35 Nail very large, larger than  $\frac{1}{2}$  of an inch, and holding the whole of the end of the bill.

<sup>1</sup> I include that Manitoban species, as a few stragglers may reach the eastern part of the partly wooded prairie in Saskatchewan.

- 50 51 Bill gibbous at base, nostril nearly at its middle ; birds black or dusky.  
*Oidemia Deglandi* Bonap. White-winged Scoter.
- 51 34 Bill straight, tip hooked. Rectrices stiff.
- 52 53 Of small size, less than 20 inches, from 17 to 20.  
*Lophodytes cucullatus* (Linn.) Reich. Hooded Merganser.
- 53 52 Larger, from 20 to 27 inches.
- 54 55 Wing with one black bar. 26-26 $\frac{3}{4}$  inches.  
*Merganser Americanus* (Cass.) Stepn. American Merganser. Goosander.
- 55 54 Wing with two black bars. 23-23 $\frac{1}{2}$  inches.  
*Merganser Serrator* (Linn.) Schaff. Red-breasted Merganser.

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 ORNITHOLOGICAL NOTES.
 

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 THE GOLDEN EAGLE (*Aquila chrysaetos*) IN ONTARIO.

Through the kind exertions of Mr. Edwin Beaupré, of Kingston, two specimens of this fine species have recently been acquired for the Museum of the Geological Survey. One of these, which is said to be a female, was shot November 11th, 1901, flying over Mud Lake, Odessa, Lennox Co., by Mr. Smith. Odessa, it may be added, is ten miles from Kingston. The other, which is said to be a male, was shot November 15th, 1901, at Westbrooke, Frontenac Co., by Mr. Redden. Westbrooke is seven miles from Kingston and three from Odessa.

In the Museum of the Survey there were previously two specimens of the Golden Eagle, both of which are from Ontario. One, which is said to be a female, was shot near Woodbridge, York Co., in November, 1897, and the other, which is said to be a male, was shot near Brampton, some twenty-five years ago.

It has long been known that in this species the sexes are so similar, in colour, size, &c., that it is scarcely possible to distinguish them without dissection.

Although circumpolar in its range the Golden Eagle is nowhere very common, and it seems desirable to place upon record these four instances of its occurrence in the Province of Ontario.

J. F. WHITEAVES,

Ottawa, Jan. 20, 1902.

## SOME NEW CANADIAN SENECIOS.

---

By EDW. L. GREENE.

The following members of the genus *Senecio*, all apparently hitherto undescribed, form a part of a most rich and valuable collection of plants made by Mr. James M. Macoun in the Chilliwack Valley, B.C., during the summer of 1901.

*SENECIO CREPIDINEUS*. Perennial, low but rather stout and very leafy, allied to *S. taraxacoides* and *S. Holmii*, commonly 4 to 7 inches high, lightly somewhat arachnoid or floccose-pubescent, or often almost glabrous: leaves mostly basal and supra-basal, the one or two properly cauline quite similar to, and scarcely smaller than the others, all obovate-lanceolate,  $1\frac{1}{2}$  to 4 inches long, tapering to a broad petiole, acutish, saliently and sharply dentate: corymbose panicle of large more or less nodding heads little or not at all surpassing the leaves: involucre nearly  $\frac{1}{2}$  inch high, subcylindric, the linear bracts about 10; rays about as many, light-yellow, about 5-nerved.

Collected at an altitude of 6,000 feet; closely allied to several alpine and subalpine species of the more southerly Rocky Mountains, the whole forming a group of which *S. Soldanella* may be considered typical. The heads in this new one are much more numerous and notably narrower than in any of the allied species. Its number in the Geol. Surv. collection is 26,678. Its habitat, as given by Mr. Macoun is "damp debris on a snow-slide."

*SENECIO PRIONOPHYLLUS*. Resembling *S. triangularis*, but leaves on shorter petioles and distinctly hastate, more gradually acuminate, much more deeply and sharply serrate-dentate, in texture much firmer and dark-green, with venation pale or whitish, underneath whitish tomentulose, above obscurely and sparsely short-hairy, but the stem densely villous-tomentulose from base almost to summit, this indument subfuscous: inflorescence denser and more fastigate than in *S. triangularis*; the rays longer and very narrow: achenes short and slender-columnar, not narrowed under the pappus, this very fine and promptly deciduous.

The type of this is Mr. Macoun's No. 26,675, collected 8 Aug., on the southern slope of the Cheam Range, with *Bromus marginatus* and *Castilleja miniata*, at 4,000 feet. Number 26,676, collected Aug. 12th within a few yards of No. 26,675, I also refer to it though it is far less notably pubescent, while at the same time it exhibits quite as strongly all those peculiarities of inflorescence, ray-flowers, etc., by which the species stands in contrast with *S. triangularis*.

*SENECIO DILEPTIFOLIUS*. Allied to *S. aureus*, the rather stoutish stems a foot high, from a firm short-jointed nearly horizontal rootstock; herbage deep-green and glabrous, small tufts of white wool occupying almost the axils of the leaves and pedicels: lowest leaves with broadly oblanceolate incisely serrate blade an inch long or more, and a slender petiole about as long; the lower and middle cauline considerably larger and more deeply incised but also petiolate, only the uppermost more nearly lanceolate or linear and sessile, these merely serrate-toothed: cyme of middle sized or smallish narrow heads distinctly subumbellate; bracts of the cylindric involucre few and broad, oblong-linear and merely acutish: rays about 5 or 6, long and light-yellow:

Mr. Macoun's label for this bears the number 26,679, and indicated that the plant was collected 29 August at an altitude of 6,000 feet, growing with *Epilobium spicatum*, *Eucephalus Engelmannii* and *Mimulus Lewisii* on a mountain slope, from the upper part of which water trickled through the roots of these plants. I name the species in allusion to the general likeness which its leaves bear to those of *Lepidium Virginicum*, the type of a genus *Dileptium* with some authors.

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#### SOIRÉES.

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The second soirée of the season was held in the Y. M. C. A. Assembly Hall, Jan. 14th. The lecture of the evening, by Dr. R. A. Daly on "The Relation of Geology to Geography," was mainly devoted to the illustration of the developmental idea in geographical study. A table showing the great scope of the geographical sciences was exhibited, and the conclusion stated that a

physical study of the earth furnishes a natural and necessary introduction to the study of distributions which is the largest division of the whole subject. But we must go to geology for information as to the real nature of the forms of the earth's surface. The application of geology is gradually placing physical geography among the true sciences. Living organic species have no more surely been evolved from earlier types than have the present forms of the land been developed from pre-existing forms. This recognition of streams of influence from past geological ages has a salutary effect on the method of the geographer; it makes clear to him that many apparently similar land-forms should be clearly differentiated and others of unlike outward appearance should be closely associated. The lacustrine plain of southwestern Ontario, the marine plain of the St. Lawrence and the old denuded plain of Russia can only be finally and rigorously described by referring to their difference of origin. Similarly, valleys of stream erosion, fault-troughs and glaciated valleys should not be classified together simply on account of their possessing the common attribute of being linear depressions. On the other hand, the Selkirk mountains, the Laurentian highlands and the rolling plateau of Nova Scotia, at first sight utterly dissimilar, are yet most fruitfully treated of under the one class of complex mountains at different stages in the process of earth-sculpture. Repetition of types form one of the most interesting characteristics of the new physical geography, greatly aiding the memory and the understanding of land-forms. Thus a thorough discussion of the fiords of Norway renders intelligible and easily retainable in the memory the physiography of the ragged coasts of Greenland, Labrador, Alaska, New Zealand and Patagonia; the fault-trough of the Rhine is paralleled by the fault-trough of Palestine; the delicate topography associated with the vanished glacial lobes of North America, once recognized in this country as having that origin, suggested explanation for similar reliefs in Germany which have been moulded in sympathy with similar lobes.

A few indications of the influence of his physical surroundings on the life of man were given during the exhibition of lantern slides. The geological history of the earth, the physical environ-

ment of life and the actual distribution of the activities of life, form a continuous series of considerations, no term of which can be omitted without impairing the interest and value of the whole series.

The third soirée of the Ottawa Field-Naturalists' Club was held in the Y. M. C. A. building on the evening of Jan. 28th, when Mr. Percy H. Selwyn gave an address on the "Natural History of the Honey Bee." Attention was first called to the difference between the regular and uniform frames composed almost entirely of worker comb, which are to be found in the modern hive, as compared with those constructed by the bees when living in a state of nature. The latter are of all shapes and sizes with usually an abnormal proportion of drone-comb. The queen bee was then spoken of at some length, and it was shown that while being hatched from an egg which under ordinary conditions would have produced a worker bee, stimulative feeding during the larval period combined with increased accommodation to allow for growth, made wonderful changes in the perfect insect. Notice was also taken of the fact that while the worker bees are most solicitous for the welfare of the drones during the time of natural increase, viz., swarming, no sooner has this time passed and their services are no longer required than the bees turn them all out of the hives to perish. It was also shown that while it is now possible with the aid of comb foundation to reduce the amount of drone comb in each hive to a minimum, in no case can it be entirely dispensed with. The natural instinct for the reproduction of the race is so strong within the bees that before swarming takes place a certain number of drones must be present in the hive, and consequently if only worker combs are provided, the bees will either cut out portions of this comb and replace with drone comb of their own building, or, as is generally the case, will build cells suitable for rearing drones along the bottoms of the frames.

The report of the Entomological Branch was read by Dr. Fletcher and will be printed in an early number of THE NATURALIST.

ANNUAL REPORT OF THE GEOLOGICAL SECTION OF  
THE OTTAWA FIELD-NATURALISTS' CLUB,  
FOR THE YEAR 1901-1902.

Addressed to the Council of the Ottawa Field-Naturalists' Club.

In presenting to the Council the Report of the work done by the members of the Geological Branch of the Club during the past year, the latter desire to state that considerable progress has been made, much additional material has been obtained, and reports as well as papers published during the past year bearing on the geology of the Ottawa district, and that though there were not many excursions held, the number of small working parties and sub-excursions did not fall very short of any previous year in the history of the Club.

The numerous excavations and openings for drainage and sewage purposes have continued to give to the student of geology in our midst a fine opportunity to obtain excellent material, especially of fossils.

A pleasurable feature of the sub-excursions has been the good attendance of members as well as of student of different educational institutions in our city. Several new members were elected from amongst occasional attendants at our geological sub-excursions in former years. Some of the ladies and gentlemen present at the outings have been able to secure quite a series of interesting specimens, most of which have been named by one or other of the leaders of the Geological Branch of our Club, and they now form part of private or public cabinets where geological collections are kept.

Amongst those who took a prominent part in the work of this section last year may be mentioned: Mr. W. J. Wilson, Ph.B., of the Geological Survey Department, who never fails to be present and usually brings with him quite a following; Mr. I. Kendall, of the Macdonald School of Manual Training, and also Dr. F. Slater Jackson, late assistant in Biology at McGill University, who, on several occasions last summer, accompanied our branch and obtained interesting suites of fossils which were all determined for him before he left the city. A number of younger members of the

Club and their friends have also done excellent work. George Lewis Burland, Herbert Maingy, Douglas McLean, Percy Wilson, Willie Herridge and Otis Whelen all deserve special mention for the industry and care they exhibited in the collections made and the anxiety they evinced to have them named and labelled. An enthusiastic class of youthful geologists was composed of the boy pupils of our fellow member Dr. Cephas Guillet. The work done by this class is most creditable indeed.

Besides collections of the fossils which were obtained on several of these sub-excursions, at some of which the president and other officers of the Club and leaders in Geology were present, notes bearing upon the stratigraphy and character of the rock formation were taken and a number of interesting photographs prepared which serve to show the nature of the strata at many points where they had never previously been observed. Some of the photographs taken during the sub-excursions of the Club are used in illustrating points of interest in the geology of Ottawa and its surroundings in Dr. Ells's forthcoming Report of the Geology of the Ottawa District.

Among the more salient and important features noted may be mentioned the occurrence along the eastern extension of Somerset street, in the centre of that valley of erosion which formerly was used as a rifle range—the Rideau rifle range—a well-defined fault or dislocation in the earth's crust. This is only one of many faults which must exist hidden by pleistocene or drift deposits, and except for the artificial cuttings made and the notes taken during the excavations it would have been practically impossible to say that there existed one there.

This fault occurs in the Utica formation and presents the two limbs of a normal dislocation, in juxtaposition, the strata being scarcely disturbed at all, yet, both from the studies that have been previously made of the characters of the Utica of the Ottawa district and from the characters of the fauna obtained by the writer on each side of the fault it is evident that the lower as well as the upper beds of the Utica occur in the exposure.

There was no topographic feature or indication on the surface of the ground or trace whatever evident to even suspect the exist-

ence of a fault in that locality, but in the trench cut along Somerset street east between Chapel street and Goulborne avenue the dislocation was clearly visible. Mineralization along the line of fault, as is customarily the case, had taken place resulting in the segregation of a considerable quantity of calcite associated with iron pyrites.

This fault was seen to trend in an almost due east and west direction heading for the western end of Sparks's rapids on the Rideau river. On each side of the fault and in the neighbourhood of the same the strata were strikingly dissimilar; on the east side thin bedded limestones with interstratified black bituminous shales were exposed, whilst an almost compact and homogeneous mass of fissile and black bituminous shales holding but few fossils, compared with the lower beds of the series occurred on the east side of the fault.

Lists of the fossils noted during these sub-excursions were prepared and will accompany this report. They will serve to emphasize the facts already noted of the existence at that point of an upper and a lower outcrop of the beds of the Utica formation.

*New Edinburgh.*—At the C. P. R. crossing along the Dufferin road in New Edinburgh, the main drain excavations revealed fine sections in the Utica formation also. On the occasion of the first excursion of the Club to Beechwood (see p. 94 of the Trans. of the O. F. N. C.) the geological section examined the exposures as well as the dumps, and a large quantity of fossils were obtained. Your leaders were kept busy identifying and determining specimens from the time the excursionists reached the spot until time was called to meet at the rendezvous near the Cemetery gate, where the addresses were given on the finds of the day. Seventeen species of fossils typical of the Utica were listed on that occasion from specimens obtained by one or other of the following persons present for whom they were named. Leaders: Dr. R. Bell, Mr. W. J. Wilson, Dr. H. M. Ami; Members, &c.: Mr. Clark, Mr. Kendall, Miss McQuestion, Miss Ross, Mr. Baldwin, besides the following younger but enthusiastic collectors: Alexander Anderson, Herbert Maingy, Lloyd Blackadar, Otis Whelen and Gordon Gullock.

List of the fossils of the Utica formation found in the excavations made for the Main Drain of Ottawa, April 27th, 1901, on the occasion of the first excursion of the Ottawa Field-Naturalists' Club.

1. Leptograptus flaccidus, Hall.
2. Orthograptus quadrimocronatus, Hall.
3. Climacograptus bicornis, Hall.
4. Leptobolus insignis, Hall.
5. Lingula Progne, Billings.
6. „ Cobourgensis, Billings.
7. „ cuta, Hall.
8. „ obtusa, Conrad.
9. Orthis testudinaria, Dalman.
10. Zygospira modesta, Say.
11. Trorholites ammonius, Emmons. (Large, fine specimen.)
12. Orthoceras tenuistriatum, Hall.
13. Orthoceras lamellosum, Hall.
14. Modiolopsis, sp. indt.
15. Asaphus latimarginatus, Hall. (= A. Canadensis, Chapman.)
16. Triarthrus spinosus, Billings.
17. „ Becki, Green, (both in the nepionic and adult stages).

Amongst the most interesting finds made on that occasion was one of the embryonic forms of *Triarthrus Becki*, a characteristic trilobite of the Utica formation. Primordial features present in the specimen indicate clearly the remote origin of this generic form whose nearest relatives so far known belong to the Cambrian period, and whilst its pygidium or tail appendage is quite diminutive, its head or cephalic shield is comparatively large. Such larval forms of this trilobite are rather scarce, but deserve special attention. The writer has found a number of them during his researches in the Utica of the Ottawa district, and hopes to be able to put the material together some day. It may be added here that considerable progress was made during the past year in the study of the fauna of the Utica, and as soon as drawings can be prepared which will serve to illustrate the fine Utica fossils of this region a much needed contribution to the palæontology of a portion of the Ordovician succession about Ottawa will soon follow.

*Britannia.* The second excursion of the season was held at Britannia. The geological section visited the extensive excavations made by the Metropolitan Light, Heat and Power Company,

and obtained there on the huge blocks of sandstone and shale a series of interesting tracks and trails of marine organisms, together with one or two rare fossils preserved as casts of the interior of the animal.

*Hull, Que.* About the end of May, whilst there were a few members of the Royal Society of Canada still in our city, some of the members of the geological section, acting as guides, visited the "Heap" in Hull, as well as the excavations for the main drain, in Ottawa, where the Utica formation was well exposed. The species collected were subsequently determined and will serve to illustrate the geology of our district in remote portions of the Dominion.

*Besserers, Ont.* The exceedingly low state of the water in the rivers and streams about Ottawa afforded an unusually fine opportunity to collect nodules from the fossiliferous clays of the Green's Creek period or formation (as Prof. Penhallow styles it) and though considerably incapacitated from doing much work during the autumn owing to an accident which had befallen the writer, a number of collections were made.

*Rideau Sand Quarry.* About two miles up the Rideau River above Hog's Back, along with Mr. W. J. Wilson, also a leader of the Club and a foremost student in Pleistocene geology in our midst, we visited this interesting locality and obtained four species of drift fossils preserved in a matrix of coarse sand. These comprise the well known *Saxicava rugosa*, Linnæus, *Macoma Balthica*, Linnæus, *Mytilus edulis*, Linnæus, and a species of *Balanus* which is difficult to identify with any of the forms now living in the waters of the Lower St. Lawrence or shores of the Western Atlantic. Its characters ally the form more closely to *Balanus porcatus* de Costa than to any other. I am indebted to Dr. Whiteaves, who was shown the specimens in question, and he thinks that this as well as most of the species of *Balanus* from Canada need revision and careful study.

Below the residence of Mr. T. C. Keefer, Rockcliff, along the shore of the Ottawa river, an excellent section of the Chazy formation may be seen especially in its most arenaceous development.

Some of the lower strata consist of coarse sandstones with occasional films of shaly or argillaceous materials interstratified. Amongst the forms observed and not hitherto recorded from this locality was the *Lingula Lyelli*, Billings, described originally from the Chazy of Allumette Island. A number of new tracks and trails of marine organisms were also noted and a large suite of specimens secured which will add considerable information to the fauna of those seas whenever figured and described.

*Publications.* As stated at the outset, a number of contributions on the geology of the Ottawa district have been prepared and published during the past year which will enable the student of Geology in our midst to prosecute his researches with greater facility.

*A Geological Map.* I scarcely think that I am giving out a state secret when I say that there is hope that before this season is over the Geological Survey Department will have issued from its press the long-looked-for map of the "Ottawa District."

Thanks to the energy of Dr. A. R. C. Selwyn and of his successor Dr. Dawson, as directors of the Geological Survey of Canada, the plan of issuing geological maps for the leading cities or centres of activity and thought in Canada will find its expression in the issue of the first of the series in "A Geological Map of Ottawa and its environs;" but whilst the initial steps were taken, as remarked above, by Drs. Selwyn and Dawson during their terms of office, it was reserved to Dr. Bell, acting Director of the same Survey and also the President of the O. F. N. Club, to see the practical completion of the work.

The Club hails with special pleasure the publication of the map in question, especially the Geological branch, for, within the area covered by the map many of the geological phenomena recorded and described in the Transactions of the Club for the past twenty-two years are therein embodied. There is nothing like a map on which one can lay down statements and facts in geology and geography which is, according to the latest definition, only a branch of geology, after all. Not only in the department of Geology will the said map be of use, but also for the Botanical, the Zoological and other sections of the Club. Faunal and floral

maps can now be prepared and maps showing the distribution of any species, whether of plant or animal. For this purpose it is hoped that the Council of the Club will endeavour to secure from the Department of the Geological Survey at least 200 black and white prints or copies of the map of this district to be kept on sale by our Club Librarian for the use of the members of the Club. They may, however, be purchased from the Geological Survey at a nominal price.

The report by Dr. Ells which is to accompany the map will no doubt be hailed with great pleasure by all who will read it. I should advise the members of the Club to secure copies of this report early if they do not wish to find the edition exhausted from the demands that may be made upon it when issued.

*Catalogue of the Marine Invertebrata of Eastern Canada*, by Dr. Whiteaves, also of the Geological Survey, is a report which is of special interest to the members of our Club, as it deals with the marine invertebrates of the Lower St. Lawrence, a goodly proportion of which are to be found in the sands, clays and gravels of our Pleistocene deposits in the Ottawa valley. Every year sees new forms added to the lists of the Pleistocene fossils, and these find their living representatives in the salt waters of the St. Lawrence and adjoining basins of to-day. An excellent review of this most important work of Dr. Whiteaves has already appeared in THE OTTAWA NATURALIST, p. 165 by Prof. E. E. Prince, and I shall not trouble you with a notice of it from a geological standpoint further than to state that the volume is most welcome and timely and represents the work of a life-time, the accumulation of vast amount of useful information all condensed for the use of naturalists, fishermen and others interested both in the economic as well as the scientific side of the subject.

"*Ancient Channels of the Ottawa River*" is the title of another paper by Dr. R. W. Ells, F.R.S.C. It appeared in the April number of THE OTTAWA NATURALIST, pp. 17-30 with map accompanying the same, and forms a contribution which ought to stimulate the members of the Club to carry on the work there delineated, with special reference to the immediate vicinity of the Capital. The ancient or now abandoned river valleys are quite

common about this city, and the numerous accompanying phenomena which these valleys invariably present, afford fertile subjects for future study and research. There is a proposal to prepare at no distant date a contour map of Ottawa and vicinity, so that when this is an accomplished fact the interpretation of many phenomena, especially in Pleistocene geology, will be greatly facilitated and their correlation made easy. Such a map would fill another long-felt want.

*Pleistocene plants.* The fossil plants collected by different members of the Club and others at different times, were some time ago forwarded to Prof. D. P. Penhallow of the Botanical Laboratories at McGill University, and he has kindly determined them, and these are now all labelled by that eminent authority, so that as soon as there is room to exhibit them in the National Museum on Sussex street or in the new Museum to which we are all looking with earnest hope, the extinct flora of the Green's Creek period will be seen to advantage. From the last collections sent to Prof. Penhallow by the writer he has determined no less than nineteen species of plants from the marine fossiliferous clays of Besserers Springs and adjacent shores of the Ottawa River.

"*Geology of the Principal Cities of Eastern Canada,*" by the writer. In this paper, published by the Royal Society of Canada last year, I have endeavoured to put together in condensed form the results of twenty-four years' work in the neighbourhood of Ottawa. A table containing lists of the formations and of the systems under which these fall, of the characteristic fossils they contain, as well as of the thicknesses of the strata, constituting each as known to date, are given, together with lists of the localities where these formations may be studied to advantage. This will, it is hoped, save much time and labour on the part of those who will come after us in studying the geology of this part of Canada. Similar lists and tables are also prepared for the cities of Montreal, Toronto and Quebec by the writer, and by Dr. G. F. Matthew for St. John City, N.B. Attention is called to this paper on account of the reference to the Ottawa formations therein contained.

*The late Dr. G. M. Dawson.* This report cannot conclude without a slight reference to the great loss which the geological section of the Club has sustained in the death of one who for three years was the President of the Club and the foremost Canadian geologist. In Dr. Dawson the Club and the members of the geological section had one who was ever ready to give them the benefit of his judgment, criticism and experience in the discussion of points of interest in the geological structure of our district. He never failed to encourage and stimulate our members to unravel and describe the geology of this interesting section.

The following list of fossil sponges from the geological formations about Ottawa has been taken from among my notes on the palæontology of this district taken during the past twenty years, and may not be uninteresting to local geologists.

QUATERNARY.

*Pleistocene System.*

Green's Creek formation (Marine fossiliferous clays, "Leda clay").

1. Craniella Logani, Dawson. Odell's brickyard, Ottawa East, Ont.

PALÆOZOIC.

*Ordovician System.*

Utica formation.

2. Stephanella sancta, Hinde. Porter's Island, Montreal Road, Albert Street, near Bank Street, Ottawa City, Ont.
3. Cyathophycus reticulatus, Walcott. Gloucester, Ont.
4. " nidiformis, nobis. MS. Somerset Street East, City.
5. " subsphericus, Walcott. " " "

Trenton formation.

6. Astylospongia parvula, Billings. Concession and Division Streets.
7. Brachiospongia digitata, Marsh. Foot of Parliament Hill.
8. Steliella crassa, Hinde. Division Street, Ottawa.
9. " Billingsii, Hinde. " "
10. Palæospongia Trentonensis, var. Ottawaensis, n. var. Division Street, Ottawa.

Birdseye and Black River formation.

11. Stromatocerium rugosum, Hall. Hull and Ottawa quarries; also found at base of the Trenton formation.

Beekmantown or Calciferous formation.

12. Cryptozoon calciferum, Dawson. March, Ont.; on Ottawa, Arnprior & Parry Sound Railway.

H. M. AMI, *Leader.*

Ottawa, Jan. 14th, 1902.

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