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PROCEEDINGS

OF

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TORONTO

BEING A CONTINUATION OF THE "CANADIAN JOURNAL" OF
SCIENCE, LITERATURE AND HISTORY.

APRIL, 1890.

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PROCEEDINGS OF THE ORNITHOLOGICAL SUB-
SECTION OF THE BIOLOGICAL SECTION
OF THE CANADIAN INSTITUTE.

EDITED BY ERNEST E. THOMPSON.

(First Meeting, December 21, 1888).

The members of the Biological Section, who were desirous of forming the Sub-section, met at the house of Dr. Wm. Brodie, Parliament Street, Toronto, at the above date, and having formulated a code and constitution, the following officers were elected for the ensuing year,—Dr. Wm. Brodie, Chairman; Mr. Geo. E. Atkinson, Recording Secretary; and Mr. J. B. Williams, Corresponding Secretary. Mr. Ernest E. Thompson being Editor, *ex officio*.

(The nomenclature in use throughout these papers is that of the American Ornithologist's Union, as published in 1886).

1. After the completion of business Mr. Williams shewed a number of mounted specimens of Ontarian Woodpeckers, and remarked on their distribution and habits.

2. Dr. Brodie exhibited a Fox Sparrow (*Passerella iliaca*), taken at Toronto, 4th of October, 1888, and remarked on its rarity in this region. He also exhibited a specimen of the Longeared Owl (*Asio wilsonianus*).

(Second Meeting, January 8, 1889).

3. Robins wintering at Toronto.—On January 1, I observed four American Robins (*Merula migratoria*) in Rosedale.—
J. B. WILLIAMS.

4. American Goldfinches wintering at Toronto.—On January 1, I observed several large flocks of Goldfinches (*Spinus*

tristis); two specimens were procured so that the identification is beyond question.—DANIEL G. COX.

5. Pine Siskins at Lorne Park.—I procured two specimens of this species (*Spinus pinus*) out of five or six hundred, on December 31, 1888, several other flocks were seen.—ERNEST E. THOMPSON.

6. Note on Butcher-bird (*Lanius borealis*).—While passing through the University grounds on New Year's day, I picked up the body of an English Sparrow that had been beheaded I suppose by a Butcher-bird, as I saw one of that species flying about close at hand.—HUBERT H. BROWN.

7. Spruce Partridge in Grey County.—While resident in Melancthon Township, Grey County, Ontario, two years ago I met with a single living specimen of this grouse (*Dendragapus canadensis*). I also saw several specimens that were fresh killed and was informed that it was quite common in some of the more extensive swamps. This record greatly extends the known range of the species in the Ontarian Peninsula.—JAMES R. THURSTON.

8. Bald Eagle near Toronto.—At Victoria Park on January 1, I saw a large Bald Eagle (*Haliaeetus leucocephalus*). The species is said to be a common winter resident in open seasons, frequenting the shores of the lake on account of the food supply afforded by numerous dead fish that are washed up on the beach.—HUBERT H. BROWN.

9. After the handing in of the above reports, Mr. Ernest E. Thompson advanced a scheme for the systematic recording of the geographical distribution of each of our species of birds. He proposed first to prepare and have lithographed a large map of the Province of Ontario; the political features to be omitted, but all the main geographical and topographical features to be carefully entered; all watersheds; all escarpments; each fifty feet of elevation; each main botanic area—as, the limits of White Pine, Jack Pine, Chestnut, etc.; the main geographical features; the main areas of slope exposure; the areas of disease as indicated on the charts of the Health Department; and, of course, the rivers, mountains, etc. One copy of this he proposed to set apart for each species, and to enter

on the map each authentic occurrence of the species in question, much as is being done at Washington by the Department of Agriculture, for the Birds of the United States. It was proposed to indicate breeding, migrating and winter localities by spots of different colors, until sufficient details had been procured to justify a generalization of the facts.

The scheme was favorably received by the meeting, and a committee appointed to collect existing materials for the map, and to ascertain cost, etc., of preparing the same.

(Third Meeting, January 22, 1889).

10. American Crow and Goldfinch wintering.—While out on January 12, to the north of the Woodbine Race Track, I saw a solitary Goldfinch (*Spinus tristis*) and two Crows (*Coryus americanus*). Later in the day I saw three other Goldfinches.—GEO. E. ATKINSON.

11. Golden crested Wren wintering near Toronto.—On January 16, I noticed a solitary Golden crested Wren (*Regulus satrapa*) at Lorne Park. It was flitting about among the pine tassels in its characteristic manner. Although given by McIlwraith as an abundant winter resident, this is the first that I have observed wintering in this locality. There are, however, one or two mid-winter records for Toronto.—ERNEST E. THOMPSON.

12. Yellow-billed Cuckoo at Toronto.—In the summer of 1884, while collecting insects on the Don flats, I chanced to discover a pair of Yellow-billed Cuckoos (*Coccyzus americanus*) in the little alder swamp that used to be under the Jail Hill. I soon satisfied myself that they had a nest there and indeed found it in the following fall; but on my next visit I learnt that the male bird had been shot by a man named Fox, and the female had disappeared, however I again discovered the latter, she had found a new mate and was now engrossed with domestic cares in the ravine of the third creek. I did not find their nest here nor had I much opportunity of further observing them, for a band of wretched boys came along shortly afterwards and slaughtered both birds one afternoon.—WILLIAM BRODIE.

13. **Shrike carrying food in its claws.**—While at Toronto marsh on January 17, I saw a Shrike (*Lanius borealis*) flying over with some dark object in its claws, that might have been either a mouse or a sparrow.—ERNEST E. THOMPSON.

14. **Rare birds at Toronto.**—As a result of an examination recently made of the mounted collection of Hon. Geo. W. Allan, I am, through the courtesy of that gentleman, enabled to publish the following unusual occurrences at Toronto :

15. **Northern Phalarope** (*Phalaropus lobatus*).

16. **Wilson's Phalarope** (*P. tricolor*).

17. **Great Gray Owl** (*Urochelidon cinereus*).

18. **Hawk Owl** (*Surnia ulula caparoch*).

19. **Yellow-billed Cuckoo** (*Coccyzus americanus*).

20. **Canada Jay** (*Perisoreus canadensis*).—Taken in Toronto in the winter of 1837. Previously the species was unknown, but in that winter a great host suddenly appeared in the town and continued all winter as common in the streets as House Sparrows are now. In the spring these Jays all disappeared and have not since been seen anywhere near this city.

21. **Orchard Oriole** (*Icterus spurius*).—This bird has also been taken by Dr. Brodie, see "Auk" 1888, p. 211.

22. **White-winged Crossbill** (*Loxia leucoptera*).

23. **Woodthrush** (*Turdus mustelinus*).

24. Also a **Cardinal** (*Cardinalis cardinalis*) taken near Sandwich, Ontario.—ERNEST E. THOMPSON.

25. **More rare birds at Toronto.**—I find in my collection the following birds taken in the vicinity of Toronto.

26. **Wood Thrush** (*Turdus mustelinus*) shot, east of the Don, in May, 1888.

27. **Pine Grosbeak** (*Pinicola enucleator*) shot, in North Toronto, January 18, 1889. This specimen is remarkable in being the only bird of the species observed here this year, usually they are quite common in winter, but owing, no doubt, to the exceptional mildness of the season they have not made their appearance in numbers.

28. **Yellowbilled Cuckoo** (*Coccyzus americanus*).—Taken at the Humber, June, 1886.

29. Richardson's Owl (*Nyctala tengmalmi richardsoni*).—Taken April, 1888.—WM. CROSS.

30. Red-breasted Nuthatch, wintering at Toronto.—According to McIlwraith this bird is found here only in the spring and fall, but my experience is that it is a common winter resident about Toronto. I procured three on Christmas day 1888, and two on January 1st, 1889. I do not agree with the authority quoted, that they frequent pine trees, as I have almost invariably seen them about the hardwoods.—DANIEL G. COX.

31. Crows wintering.—On January 1, I saw numbers of crows in various parts of Toronto. Messrs. Cox and Thompson observed the same rather unusual occurrence.—J. B. WILLIAMS.

32. Kinglets migrating.—On the 15th of October great numbers of golden-crested Kinglets (*Regulus satrapa*) appeared in the woods to the east of Toronto; the migration was evidently at its height.—WM. BRODIE.

33. After the above reports were handed in Dr. Brodie proposed that an effort be made to provide printed labels for the use of the members; he suggests that the scientific name should be in bold type, the English names smaller, with ruled blanks for locality, date, size, etc. The matter was discussed at some length but no definite action was taken.

(Fourth Meeting, February 5, 1889).

34. Bald Eagle in Muskoka.—While in Muskoka during the summer of 1888, I discovered three nests of the Bald Eagle (*Haliaeetus leucocephalus*) near Lake Rosseau; and have just learnt that Mr. Cross subsequently received a pair of adult birds that were trapped in exactly the same locality.—JAS. H. FLEMING.

35. Note on winter-birds.—The following have just been received at Mr. Cross' taxidermist store:

Two Hairy Woodpeckers (*Dryobates villosus*) shot at Finger-board, north shore of Lake Superior.

Four Snowbirds (*Plectrophenax nivalis*) shot near Oakville, February 2, all males.

Thirteen Snowbirds, shot near Norway, February 2, all males.

Four Snowbirds shot near north Toronto February 3, all males. The fact is very remarkable that not only these, but also a number more that were received about the same time from the North-West, were all males.

Long-eared Owl (*Asio wilsonianus*).—One specimen taken just west of the Humber River, Toronto.—JAMES R. THURSTON.

36. Birds wintering.—The following birds were observed since last meeting, about January 10, a Tree Sparrow (*S. monticola*); on February 2, large flocks of Shorelarks, Pine Siskins (*Spinus pinus*), Redpolls American Goldfinches (*Spinus tristis*) and Crows.—ERNEST E. THOMPSON.

37. Pine Siskins still numerous.—While out in company with Mr. Williams on January 29, I saw several flocks of Siskins (*Spinus pinus*) and secured one specimen.—JAS. A. VARLEY.

38. Notes on habits of Nighthawk.—I would like to ask if the members have noticed or can explain the peculiar habit the Nighthawk (*Chordeiles virginianus*) has of flying silently for four slow steady beats of its wing, then giving five very fast beats after which it utters its scream, and beginning at the slow beats again, it repeats the performance indefinitely and with surprising regularity.—GEO. E. ATKINSON.

39. Bird notes in Toronto Marsh, January 25, 1889.—About ten a.m. I reached the marsh, and as the immediate object of my visit was the capture of field mice, I walked across the frozen bog towards the higher reeds 100 yards south of the byres. My attention was almost immediately arrested by the sight of two large dark hawks that were quartering the marsh, and presently down they pounced on something in the reeds. I concluded at once that they were Rough-legged Buzzards (*Archibuteo lagopus sancti-johannis*) and that they were here for the same purpose as myself viz. : the capture

of arvicolæ. By a practical application of theoretical ornithology, I concluded that the best place for the mice, was the part where the hawks had been seeking, and very soon I found the truth of the conclusion; as I drew near the hawks left, and I began to see mouse tracks everywhere. A dark object in the top of a reed bush attracted my attention, I found it to be a mouse (*A. riparius*), it was too firmly fixed to have been dropped by a hawk, and I was at a loss to account for its presence in such a situation until presently I descried a Northern Shrike (*Lanius borealis*) watching me from a distant cat-tail. I tried to get a shot at the butcher, for undoubtedly it was he who had fixed the mouse on the reed top, but he was too shy, each time I drew near he dropped off nearly to the earth, skimmed so low that it seemed he must graze the ground, until the base of the next perch was reached when up at right angles to the top he would bound with one sudden spreading of his piebald wings and tail. I followed in vain for some time till the Shrike became more alarmed and flew away out of sight. The Roughlegs meanwhile had been sailing about the distant reed-beds when suddenly they were set upon by a flock of a dozen Crows, the latter kept up a noisy persecution that induced the Hawks to move off to some distance, whereupon the Crows satisfied to have scored a great moral victory flew on and all parties concerned renewed their former occupations. Mice proved fairly common but hard to catch alive, two dead specimens including the one stolen from the Shrike's larder, being all I had to show for a morning's work.

Another Shrike was observed near the Don, and this, with numerous English Sparrows, completed the list of birds observed on this occasion.—ERNEST E. THOMPSON.

(Fifth Meeting, February 19, 1889).

40. **Early spring birds.**—While at Milne's Hollow, eight miles north-east of Toronto, on February 16, I saw numbers of Shore Larks and Bluejays.—WM. BRODIE.

41. **American Goldfinches still with us.**—On February 16, my friend Mr. Gray shot five of the above species.—DANIEL G. COX.

42. **Purple Finch arrived.**—On February 17, I observed a flock of Purple Finches (*Carpodacus purpureus*), the first of the season.—GEO. E. ATKINSON.

43. **Note on winter birds.**—The following have been received by Mr. Cross since last meeting :

One Snowy Owl (*Nyctea nyctea*), shot at Port Hope on February 16.

One male Black-backed Gull (*Larus marinus*), shot on Lake Ontario ; length, 2 ft. 7 in. ; wing, 20 ; tarsus, $3\frac{1}{2}$; middle toe, $3\frac{1}{2}$ inches ; extent, 4 ft. 7 in. ; weight, $4\frac{1}{2}$ lbs.

One Great Horned Owl (*Bubo virginianus*) a male, from Weston, on February 7.

Four Snowbirds (*Plectrophenax nivalis*), from West Toronto on February 8.

On the 8th of February also I saw a flock of thirty snowbirds on the sandbar.—JAMES R. THURSTON.

44. **Albino Robin.**—Last summer I was shown a white Robin (*Merula migratoria*) that had been shot in North Toronto by Mr. R. Nurse.—GEO. E. ATKINSON.

(Sixth Meeting, March 5, 1889).

45. **Saw-whet and other early birds.**—A little Saw-whet Owl (*Nyctala acadica*), was brought into the store from west of the Humber, it was found lying dead but still grasping a mouse, its latest victim, in its claws. It was in good condition and no cause could be assigned for its death.

46. **A Screech Owl** (*Megascops asio*) was received on February 27 ; like the majority of specimens taken in this region, it was in the gray phase of plumage.

47. **Purple Finches** (*C. purpureus*) were noted in the Queen's Park on March 3.—JAMES R. THURSTON.

48. **Red Crossbills at Toronto.**—I observed a flock of these birds in the Queen's Park on March 3.—HUBERT H. BROWN.

49. **Redpolls in the city.**—On March 3, I noticed a flock of these birds (*Acanthis linaria*) on Wellesley Street, Toronto. Owing to the unusual mildness of the winter they have not been as common as usual this season.—J. B. WILLIAMS.

(Seventh Meeting, March 19, 1889).

50. **Spring arrivals.**—On March 16, Bluebirds (*Sialia sialis*), Robins (*Merula migratoria*), Cedar birds (*Ampelis cedrorum*), Song Sparrows (*Melospiza fasciata*), Chipping Sparrow (*Spizella socialis*), arrived in considerable numbers. One Bluebird, three Cedarbirds, and eight Purple Finches were shot in Rosedale by Mr. Cox the same day.—WM. METCALF.

51. **Spring arrivals.**—On March 16, while at Ayr, Ontario, I saw numbers of Blackbirds, Bluebirds (*Sialia sialis*) Robins (*Merula migratoria*), Purple Finches (*Carpodacus purpureus*), Grosbeaks, Hawks, and Owls.—HUBERT H. BROWN.

52. **Spring arrivals, etc.**—On March 16, at Toronto, I collected three Siskins (*Spinus pinus*), one Shore Lark (*Otocorys alpestris*), and one Bluebird (*Sialia sialis*).—J. B. WILLIAMS.

53. **Spring arrivals, etc.**—On March 16, Mr. Cross received from Weston another Great Horned Owl (*Bubo virginianus*). On March 17, I observed flocks of Purple Finches (*Carpodacus purpureus*) and Rosebreasted Grosbeaks (*Habia ludoviciana*) feeding on the berries of the mountain ash, on Beverley Street, Toronto.—JAMES R. THURSTON.

54. After the presentation of reports Mr. Williams showed a picture of the **Hoatzin** (*Opisthocomus cristatus*), an anomalous bird of South America. It is so peculiar in both its anatomy and habits that it has been made the type and sole representative of a separate group. Mr. Williams described the finger that is found on the wing of this, and after a discussion of its probable uses, and a comparison with the similar organ that is found in our Coots and Gallinules, the meeting closed.

(Eighth Meeting, April 2, 1889).

55. **A Rare Gull, etc.**—On March 25, a fine female specimen of the Glaucous Gull (*Larus glaucus*), was brought into Mr. Cross store; it was in the pure white plumage of the young in the second winter. This is the second record for the species at Toronto. It was shot on the Island. The following are its dimensions:—Length, 27; extent, 55; wing, 17; tarsus, $2\frac{1}{2}$; middle toe and claw, $2\frac{5}{8}$; culmen, 2; gape, $3\frac{1}{4}$; tail, $7\frac{1}{2}$ inches.

56. **Two Kittiwakes** (*Rissa tridactyla*) were brought in at the same time, and on the 30th of March a female Great Horned Owl (*Bubo virginianus*); this specimen was taken at Vaughan, and had evidently begun to incubate.—JAMES R. THURSTON.

57. **Arrivals.**—March 20, Crow Blackbirds (*Quiscalus quiscula ceneus*), arrived; Bluejays (*Cyanocitta cristata*) seen on 23rd; Red-winged Blackbirds (*Agelaius phoeniceus*) arrived March 30.

58. **Loiterers.**—Pine Siskin (*Spinus pinus*) taken on 23rd; Tree Sparrow (*Spizella monticola*) on 30th of March.—HUBERT H. BROWN.

59. **The first Geese.**—A large flock of wild geese was observed flying south-west on March 30.—JOHN MAUGHAN, JR.

60. **Kingfisher arrived.**—The first of this species (*Ceryle alcyon*) was observed on the Don River, Toronto, on April 1.—WM. METCALF.

(Ninth Meeting, April 18, 1889).

61. **Arrivals.**—April 5, Brown Creeper (*Certhia familiaris americana*); April 6, Ruby-crowned Kinglet (*Regulus calendula*); April 8, Wood Pewee (*Contopus virens*), and Meadow Lark (*Sturnella magna*); April 10, Highholer (*Colaptes auratus*); April 11, Vesper Sparrow (*Pooecetes gramineus*), and Savanna Sparrow (*Ammodramus sandwichensis savanna*); April 13, Cowbird (*Molothrus ater*), Golden-crowned Kinglet (*Regulus satrapa*), Wilson's Thrush (*Turdus fuscescens*); April 14, Hermit Thrush (*Turdus aonalaschke-pallasii*).—GEO. E. ATKINSON.

62. **Winter birds of Muskoka.**—In Muskoka district where

I spent the past winter (88-9), Pine Grosbeaks (*Pinicola enucleator*) were abundant, but so remarkably shy that but few were procured. American Goldfinches (*Spinus tristis*) were also abundant; all the summer residents of this species went South in the fall, those that stayed over winter seemed to come from farther north. Canada Jays (*Perisoreus canadensis*) were not uncommon, and Three-toed Woodpeckers (*Picoides arcticus*) were abundant. The Meadow Lark (*Sturnella magna*), is said to be quite unknown at Bracebridge. The Pileated Woodpecker (*Ceophleus pileatus*) is fast disappearing from this region where once it was quite common.—W. M. MELVILLE.

63. **Hawk Owl at Toronto.**—On April 14, while walking in St. James Cemetery, I came across what I believe was a Hawk Owl (*Surnia ulula caparoch*), I saw it clearly and am satisfied of its identity, although no means were at hand for collecting it.—JAMES R. THURSTON.

64. **Arrivals on April 17.**—Greater Yellow-leg (*Totanus melanoleucus*); White-crowned Sparrow (*Zonotrichia leucophrys*); White-throated Sparrow (*Z. albicollis*); Field Sparrow (*Spizella pusilla*); Swamp Sparrow (*Melospiza georgiana*); Tree Swallow (*Tachycineta bicolor*); Winter Wren (*Troglodytes hiemalis*).—JAMES H. FLEMING.

(Tenth Meeting, May 7, 1889).

65. **Arrivals, April 19.**—Phoebe (*Sayornis phoebe*); Red-headed Woodpecker (*Melanerpes erythrocephalus*); Towhee (*Pipilo erythrophthalmus*); Bobolink (*Dolichonyx oryzivorus*); Purple Martin (*Progne subis*); Whippoorwill (*A. vociferus*), arrived 14th.

66. **April 27.**—Spotted Sandpiper (*Actitis macularia*); Ring Plover (*Ægialitis semipalmata*); Chimney Swift (*Chætura pelagica*); Barn Swallow (*Chelidon erythrogaster*); Cliff Swallow (*Petrochelidon lunifrons*); Bank Swallow (*Clivicola riparia*).

67. **May 2.**—Scarlet Tanager (*Piranga erythromelas*).

68. **May 3.**—Pine Warbler (*Dendroica vigosii*).

69. **May 6.**—Baltimore Oriole (*Icterus galbula*); Red-eyed Vireo (*Vireo olivaceus*); Ovenbird (*Seiurus aurocapillus*).

70. **May 7.**—Chestnut-sided Warbler (*Dendroica pennsylvanica*). Observed by the SUBSECTION.

(Eleventh Meeting, May 21, 1889).

71. Arrivals, May 8.—Redstart (*Setophaga ruticilla*); Yellow Warbler (*Dendroica aestiva*); Blackburnian Warbler (*D. blackburniae*); Nashville Warbler (*Helminthophila ruficapilla*).

72. May 9.—Crested Flycatcher (*Myiarchus crinitus*); Kingbird (*Tyrannus tyrannus*); Catbird (*Galeoscoptes carolinensis*).

73. May 10.—Nighthawk (*Chordeiles virginianus*); Rose breasted Grosbeak (*Habia ludoviciana*); Black and White Creeper (*Mniotilta varia*); Wood Thrush (*Turdus mustelinus*).

74. May 16.—Canadian Warbler (*Sylvania canadensis*).

75. May 18.—Indigo Bunting (*Passerina cyanea*); Wilson's Warbler (*Sylvania pusilla*); Baybreasted Warbler (*Dendroica castanea*). Observed by the SUBSECTION.

76. Olive-sided Flycatcher at Toronto. — On May 18 while out shooting I secured a Flycatcher which proved to be of the above rare species (*Contopus borealis*). This is the second record for Toronto.—JAMES H. FLEMING.

77. A supposed Loggerhead at Toronto.—On May 18, while out west of the city, in a scrubby corner of an open field, I found a Shrike's nest with three eggs in it, and afterwards shot both birds, finding in the female a fully formed egg. These birds did not seem to be our usual form *Lanius ludovicianus excubitorides*, but rather the true *ludovicianus* of the South.—JAMES R. THURSTON.

(Twelfth Meeting, June 4, 1889).

78. Cowbird's egg in Vesperbird's nest.—On May 24, I found a nest of *Pooecetes gramineus* with one cowbird's (*Molothrus ater*) egg, and three eggs of the owner.—J. B. WILLIAMS.

79. Arrivals, May 24.—Blackheart Sandpiper (*Tringa alpina pacifica*); Semipalmated Sandpiper (*Ereunetes pusillus*); and Curlews.

80. May 27.—Caspian Tern (*Sterna tschegrava*); Common Tern (*Sterna hirundo*).

81. May 31.—Red-breasted Snipe (*Macrorhamphus griseus*).

82. **June 2.**—Found nest of common Junco (*Junco hiemalis*) on a hillside at Rosedale, Toronto; it contained five young ones.—JAMES R. THURSTON.

83. **Arrivals, June 1.**—Tennessee Warbler (*Helminthophila peregrina*); Magnolia Warbler (*Dendroica maculosa*); Black-cap (*D. striata*); Maryland Yellow-throat (*Geothlypis trichas*).—JAMES H. FLEMING.

84. **Blackbilled Cuckoo nesting.**—On June 2, I found the nest of *Coccyzus erythrophthalmus*, in the woods to the north of Toronto; it was a very flimsy affair and placed on a fallen branch which was lodged in the fork of a sapling about thirty inches from the ground. It contained two eggs.—WM. BRODIE.

85. **A Pair of Olive-sided Flycatchers.**—On June 2, Mr. S. Mitchell while shooting near Toronto observed a pair of Flycatchers, they were a good deal on the ground and kept so close together that he killed them both with one barrel, one was shattered, the other he brought to me, but unfortunately it was spoilt before it could be skinned. It was a *Contopus borealis*.—WM. BRODIE.

86. **Another Olive-side.**—On June 3, I collected a specimen of *Contopus borealis*, making the fifth example taken at Toronto.—J. B. WILLIAMS.

87. **Field Sparrow-nesting.**—On May 23, I found a nest of Field Sparrow (*Spizella pusilla*) with four eggs. Is not this early for the species?—JAMES H. FLEMING.

(Thirteenth Meeting, June 18, 1889).

88. **Pileated Woodpeckers nesting.**—On June 4, during my recent trip to Muskoka, I was fortunate enough to discover the nesting place of a pair of these birds (*Geophloxus pileatus*). The nest was about 50 feet from the ground in a hemlock tree about ten miles north of Bracebridge. The head of the female was visible in the entrance to the nest, and the male bird was sitting on a branch close by. A heap of chips lay at the foot of the tree.—C. W. ARMSTRONG.

89. Nesting of Baltimore Oriole.—On June 14, I found three nests of this species (*Icterus galbula*), one with two young and two eggs; each of the others with four eggs.—GEORGE E. ATKINSON.

90. Arrivals of Interest.—On June 12, Mr. Cross received two Yellow-billed Cuckoos (*Coccyzus americanus*), and on the 17th another, all were shot near Toronto. These, together with a pair shot by Mr. Jacobs of Centre Street, as Mr. Thompson informs me, make seven records for this locality, and show that the species is a regular though far from common summer resident.

91. June 14.—Virginian Rail (*Rallus virginianus*), first taken.

92. June 16.—Black Tern (*Hydrochelidon nigra surinamensis*), shot.—JAMES R. THURSTON.

(Fourteenth Meeting, October 1, 1889).

93. Nesting of Screech Owl.—On June 20, we received a brood of four young Screech Owls (*Megascops asio*) taken from the nest; one was in the red plumage, three in the gray.—JAMES R. THURSTON.

94. Strange behaviour of Kingbird.—On July 1, while out with my catapult, I was followed and scolded so persistently by a Bluebird (*Sialia sialis*) that I fired a charge of shot at it, it seemed to be hit on the head for at once it fluttered and began to soar straight up. When about a hundred feet up it was suddenly attacked by a Kingbird (*Tyrannus tyrannus*) which seized it by the neck and fluttered downward with it, retaining its hold till both were close to my feet when the Kingbird flew off and I captured the Bluebird in my insect net.

95. Another Yellow-billed Cuckoo.—On July 29, at Wells' Hill, North Toronto, I shot another Yellow-billed Cuckoo (*Coccyzus americanus*).—GEORGE E. ATKINSON.

96. Rare birds at Toronto.—A Least Tern (*Sterna antillarum*) was shot here by Mr. Wm. Loane on September 5. This with Dr. Brodie's record for Toronto, and Mr. McIlwraith's for Hamilton, makes the third for Lake Ontario.

97. **Baird's Sandpiper** (*Tringa bairdii*).—Mr. McIlwraith considers this species a rare one in Ontario, mentioning that he knows of but four having been taken. On September 24, a specimen was received at the store and several others on previous seasons. Mr. Ernest E. Thompson informs me that on September 10, 1887, he procured two on Ashbridge Bay, and saw several others. On September 16, 1889, he got another at the same place, so that we may consider this bird a regular, though not a common fall migrant.

98. **Stilt Sandpiper** (*Micropalama himantopus*).—On September 26, we received three of these rare Sandpipers, all shot at Toronto.

99. **White-rumped Sandpiper** (*Tringa fuscicollis*).—Taken September 24. A late capture.

100. **Buff-breasted Sandpiper** (*Tryngites subruficollis*).—One shot by Mr. Wm. Loane, September 5.

101. **Peregrine Falcon** (*Falco peregrinus anatum*).—Killed here September 25; stomach distended with grasshoppers.

102. **Fall birds**.—Night-hawk (*Chordeiles virginianus*) last seen September 30; Rusty Grackle (*Scolecophagus carolinus*) shot on Don Flats September 30; Sparrow Hawks (*Falco sparverius*), Broad-winged Hawks (*Buteo latissimus*), and Sharpshins (*Accipiter velox*) very abundant, October 1; the stomachs of nearly all these last were full of grasshoppers.

103. **Late nesting of Cuckoo**.—On August 12, I found the nest of a Black-billed Cuckoo (*Coccyzus erythrophthalmus*) in Rosedale, North Toronto; it contained two eggs.—JAMES R. THURSTON.

104. **Fall Migrants**.—On September 28, I collected one Black-throated Blue Warbler (*Dendroica cerulescens*), and on the 22nd, one Winter Wren (*Troglodytes hiemalis*); on September 28, straggling flocks of White-crowned (*Zonotrichia leucophrys*), White-throated (*Z. albicollis*), Swamp (*Melospiza georgiana*), Song (*M. fasciata*) and Vesper (*Pooecetes gramineus*) Sparrows; also Myrtle Warblers (*Dendroica coronata*) and Vireos, were observed moving southward.—HUBERT H. BROWN.

(Fifteenth Meeting, October 15, 1889).

105. **Last Migrants**.—October 3, I shot a Solitary Vireo (*Vireo*

solitarius) on Spadina Avenue, Toronto; on October 5, noted the last White-crowned Sparrow (*Zonotrichia leucophrys*) and the last Highholder (*Colaptes auratus*).—GEORGE E. ATKINSON.

106. **Fall Migrants, etc.**—On October 7, I collected one Pigeon Hawk (*Falco columbarius*); one Swamp Sparrow (*Melospiza georgiana*) found dead on the street; and one Brown Creeper (*Certhia familiaris americana*). On October 10, I shot one Snowbird (*Plectrophenax nivalis*) out of a flock of four on the sandbar.—HUBERT H. BROWN.

107. **General Notes.**—On October 10, we received at Mr. Cross' store:—one Horned Owl (*Bubo virginianus*) shot near Toronto; its stomach contained one Deer-mouse (*Hesperomys leucopus*). Also four Short-eared Owls (*Asio accipitrinus*), one Barred Owl (*Syrnium nebulosum*), several Saw-whets (*Nyctala acadica*), and one Wood Duck (*Aix sponsa*). On October 11, one Redtailed Hawk (*Buteo borealis*), its stomach contained several field mice (*Arvicola riparius*); one Sharpshin (*Accipiter velox*); one American Pipit (*Anthus pensilvanicus*), shot on the Island out of a large flock with Shorelarks. On the 12th, large numbers of Gulls were observed gathering about the Bay as usual to winter. On October 14, a male Goshawk (*Accipiter atricapillus*) in immature plumage, was taken.

108. **Cooper's Hawk at Toronto.**—On October 12, I received a fine hawk that had been disabled by flying against the wires in the city. It proved to be a male *Accipiter cooperi*, the first of the species ever observed in Toronto or vicinity by any of our members.—JAMES R. THURSTON.

(Sixteenth Meeting, October 29, 1889).

109. **Northern Shrike arrived.**—While at Lorne Park, Peel County, Ont., on October 19, I noticed a northern Shrike (*Lanius borealis*) the first observed this fall. It was in the immature plumage, and was pursued at a respectful distance by a flock of noisy Chickadees (*Parus articapillus*) of which, however, it took no notice so far as I could see.—ERNEST E. THOMPSON.

110. General notes.—On October 19, we received at Mr. Cross' store:—two Barred Owls (*Syrnium nebulosum*) and one Screech Owl (*Megascops asio*) from near Toronto.

111. Spruce Partridge in Haliburton County.—On October 19, we received one of this species (*Dendragapus canadensis*) from Haliburton.

112. October 22.—Received at the store one Black Hawk (*Archibuteo lagopus sancti-johannis*), one Redshouldered Hawk (*Buteo lineatus*), one Screech Owl (*Megascops asio*), one Blackheart Sandpiper (*Tringa alpina pacifica*) all taken at Toronto.

113. October 23.—Received from Colborne, one Richardson's Owl (*Nyctala tenuimulmi richardsoni*).

114. October 24.—Received a Bald Eagle (*Haliaeetus leucocephalus*) shot on the 5th concession of York, W.

115. October 25.—Received Green-winged Teal (*Anas carolinensis*), one Wilson's Snipe (*Gallinago delicata*), shot at Toronto.

116. October 26.—Received a Spruce Partridge (*Dendragapus canadensis*) from Haliburton and one Black Duck (*Anas obscura*) from Toronto.

117. Oct. 29. Great Gray Owl.—A fine specimen of this northern bird (*Ulula cinerea*) was sent to day to the store from North Bay, Lake Nipissing. Its stomach contained, one entire Shrew—apparently *Sorex cooperi*, and the remains of some field mice (*Arvicola riparius*?).—JAMES R. THURSTON.

118. Fox Sparrow arrived.—On Oct. 26, while at Well's Hill, North Toronto, I shot a Fox Sparrow (*Passerella iliaca*). This is the only specimen reported this year.—GEORGE E. ATKINSON.

119. Fall migration and habits of the Pine Linnet or Siskin.—On October 2, I observed three Pine Linnets (*Spinus pinus*), the first of the season. They were flying high in the air near Springfield, on the Credit. Their numbers increased in this neighborhood through October, and now, October 29, the species is extremely abundant. They are observed chiefly in flocks of various sizes among the silver-birch trees on whose catkins principally they subsist at this season. While on the wing each member of the flock utters its loud twitter, so that the presence of the birds is noticeable from a great distance; but as soon as they alight, each one sets about collecting

food, in silence, and usually no sound is uttered by them until some member of the company takes wing to reach a more inviting bunch of catkins, and utters his chirrup, as he does so. The Pigeon Falcon (*Falco columbarius*) seems to be their chief enemy at this time; one of the species was observed darting after a flock of the Linnets on October 28.—ERNEST E. THOMPSON.

(Seventeenth Meeting, November 12, 1889).

120. **Purple Sandpiper at Toronto.**—A specimen of this species (*Tringa maritima*) was brought into my store. It was killed on Toronto Bay, October 30. This makes the second record for Ontario, the other being that in McIlwraith's Birds of Ontario.

121. **Double-crested Cormorant.**—A specimen of *Phalacrocorax dilophus*, shot near Toronto was brought to me October 31.

122. **Cinereus Owl.**—A specimen of *Syrnium cinereum*, reached me from Powassan, Muskoka. Its stomach was distended with *Arvicolae*.

123. **Winter birds.**—The following winter birds have been observed already:—*Archibuteo lagopus sancti-johannis*, October 31, and twice since, both black and buff phases; *Nyctala tengmalmi richardsoni*, November 8; *Nyctea nyctea*, November 8, this, like the Great Gray Owl, seems unusually numerous this year; also taken November 9. *Urinator lumme*, *Larus franklinii*, *Larus philadelphia*, and *Larus delawarensis*, taken November 11, at Toronto.—Wm. Cross.

124. **Horned Owl devouring skunk.**—The stomach herewith shown is that of a *Bubo virginianus*, and is crammed with the flesh of a skunk, which doubtless to judge from the odor of the feathers was killed by the Owl itself.

125. **General notes.**—On November 8, I observed the following species, Northern Shrike (*Lanius borealis*); Bluebird, male, (*Sialia sialis*); and White-breasted Nuthatch (*Sitta carolinensis*).—JAMES R. THURSTON.

126. **Winter-birds arriving.**—On November 8, I shot three Redpolls (*Acanthis linaria*) in Rosedale, and on the 9th I saw a

Snowy Owl (*Nyctea nyctea*) sitting on the top of a flagstaff at the corner of Yonge and Wellesley Streets, in the city.—J. B. WILLIAMS.

127. Late summer birds.—On November 8, I shot a male Canada Flycatcher (*Sylvania canadensis*); on the 10th I saw a flock of Red-shouldered Blackbirds (*Agelaius phoeniceus*).—JOHN EDMONDS.

128. Migrants.—On November 3, I saw two Hermit Thrushes, (*Turdus aonalaschkae pollasii*); and one Bronze Blackbird (*Quiscalus purpureus ceneus*).—GEORGE E. ATKINSON.

(Eighteenth Meeting, December 10, 1889).

129. A late Plover.—On November 9, I collected a specimen of Golden Plover (*Charadrius dominica*) on the Ashbridge sand-bar, it was in good condition and apparently in full possession of all its powers.—JOHN EDMONDS.

130. Pine Grosbeaks, arrived.—While at Georgetown in the County of Halton, on November 15, I noted a small flock of *Pinicola enucleator* feeding on the berries of the mountain ash.—WM. BRODIE.

131. A late Towhee.—I collected a male *Pipilo erythrophthalmus*, on the Don Flats, November 16; it was in good condition. Mr. Thompson informs me that the bulk of this species went south during the first week of October.

132. King Eider at Toronto.—A fine male specimen of *Somateria spectabilis* was collected in Toronto Bay, November 25. This is the first positive record of the species for the Province.

133. Great Gray Owls.—A second specimen of *Syrnium cinereum* was received from the Nipissing region on the 22nd of November; and on December 2, I received a specimen that had been shot at Victoria Park near Toronto; on December 7, I received another from Lorne Park, Peel County, Ontario; and on December 4, another from Port Arthur. This species is more abundant this year than ever I have known it before; a taxidermist in Quebec informs me that he has received nearly a dozen this winter already, which is more than he obtained in the previous seven years that he

has been in business. I can say much the same myself, for this year already I have had six fine specimens more than all put together that I have had in the previous years I have been in Toronto.

134. **A flock of Short-eared Owls.**—A flock of over fifty of this species (*Asio accipitrinus*) was seen on the sand-bar of Ashbridge Bay, December 5. Seven specimens were killed at three shots and brought to me.

135. **Razor-billed Auk at Toronto.**—The capture of this species (*Alca torda*), on Toronto Bay on December 10, is one of the most interesting bird events of this fall. The specimen answers exactly to the description in Ridgway's "Manual," except that it has the white line from the eye to the base of the culmen, and this should be absent at this season. The following are the measurements:—length, $16\frac{1}{2}$ inches; extent, $25\frac{5}{8}$; wing, $7\frac{1}{4}$; tail, $3\frac{1}{4}$; tarsus, $1\frac{3}{8}$; culmen, $1\frac{1}{2}$; depth of bill, $\frac{5}{8}$. Back, black; secondaries, tipped with white; under parts, pure white; space behind the eye, dusky white.

136. **Snowy Owls.**—This species (*Nyctea nycteu*) is very plentiful this year, eighteen having been brought to me already. I have been struck by the fact, not generally known I believe, that this bird has "horns" or "ears." I have paid particular attention to this fact this season, and find that the feathers of the horns are fully one-eighth of an inch longer than the surrounding feathers, and very much darker in colouring or spots. I find them in every specimen I examine, though they may easily escape notice in a dried skin. Three of my specimens were collected on Toronto Island on December 10, and all were from the neighborhood of Toronto city.

137. **General notes.**—The following have been received at the store since last meeting:—*Lophodytes cucullatus*, male, Toronto, November 9; *Bubo virginianus*, Davisville, November 22; another, Harrietsville, December 5; *Nyctala acadica*, Todmorden, December 10; *Falco columbarius*, male, Ashbridge Bay, December 6; a pair of *Ceophlæus pileatus*, male and female from Haliburton, November 29; *Picoides arcticus*, from Parry Sound, December 2; *Pinicola enucleator*, Wells' Hill, Toronto, December 3; *Lanius borealis*, Toronto, December 10, remarkable for the dull faded brown of its plumage.—W. M. Cross.

138. **White-breasted Nuthatch, wintering at Toronto.**

—On December 1, I observed a pair of this species (*Sitta carolinensis*), and make record of the same as the question of their wintering here has been raised.—J. B. WILLIAMS.

(Nineteenth Meeting, December 31, 1889).

139. **Pine Grosbeaks at Toronto.**—December 23, met with a flock of nine or ten Pine Grosbeaks (*Pinicola enucleator*); three or four were males; procured a male and female; when fired at, the flock flew away uttering a shrill cry. They were in the woods north of Rosedale. It is five years since I last met with any close to the city.

140. **Nuthatch wintering.**—December 19, saw two White-breasted Nuthatches (*Sitta carolinensis*) in Queen's Park.—J. B. WILLIAMS.

141. **Bohemian Waxwing at Toronto.**—On Parliament Street, December 22, I saw one of this species (*Ampelis garrulus*) feeding on the berries of the mountain ash.

142. **Shrike capturing Goldfinch.**—In Rosedale on Dec. 15, I watched a Shrike (*Lanius borealis*) in pursuit of a Goldfinch (*Spinus tristis*); it captured the latter on the wing and disappeared with it into the bushes.—JAMES R. THURSTON.

143. **Flicker wintering in Ontario.**—A specimen of *Colaptes auratus*, shot at Chatham a few days ago, has come into my possession.

144. **Northern Shrike.**—A fine specimen of this bird (*Lanius borealis*) has just reached me, it is in the clear bluish ash plumage. It is remarkable that all the specimens taken in the early part of the season, are in the dull brown stage, and those that come later are in the bluish. Is this due to the wearing off of the brown on the feathers, or to the fact that the younger birds arrive first?—WM. CROSS.

145. **Yellow-bellied Woodpecker.**—Reference was made to this species as a true Sapsucker—Dr. Brodie objected, that he did not accept all the current stories about its sap-sucking propensities. Mr.

Williams mentioned some interesting facts that had come under his observation, which proved the bird to be a habitual borer for sap. Mr. Thompson cited another similar instance and referred to the fact that the species arrived in the spring when the sap began to move. Dr. Brodie believed that the bird would occasionally be found wintering here, and read numerous records of gizzard contents to show that the bird did not subsist on the inner bark of trees, but that it was an omnivorous feeder like the *Colaptes auratus*. Mr. Williams promised to present his observation on paper at a future meeting.—THE SECRETARY.

144. After the handing in of reports, Mr. Williams exhibited specimens of the Pine Grosbeak (*Pinicola enucleator*). Mr. Thompson referred to their feeding on the scale-like seeds of Conifers, and remarked that there were several competitors for this class of food in the winter, and that three distinct forms of beak were adapted for extracting the seeds from the cone—these three are represented by the beaks of *Pinicola enucleator*, *Spinus pinus*, *Loxia curvirostra*. The first secures the coveted morsels by main force, being a remarkably massive, strong bill; the second the Pine Linnet's, is an exceedingly sharp pointed probe-like forceps, adapted for insertion between the scales; but the last, the bill of the Crossbill, though so odd-looking, is the most perfect instrument of all, and by its help the scales are bent outwards and the seed extracted with remarkable celerity.

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December 31st, 1889.

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THE "FLYING PROAS" OF THE LADRONE ISLANDS.

BY CAPT. STUPART, R. N.

Lord Anson in his voyage round the world in 1740-44, speaks thus of these boats :

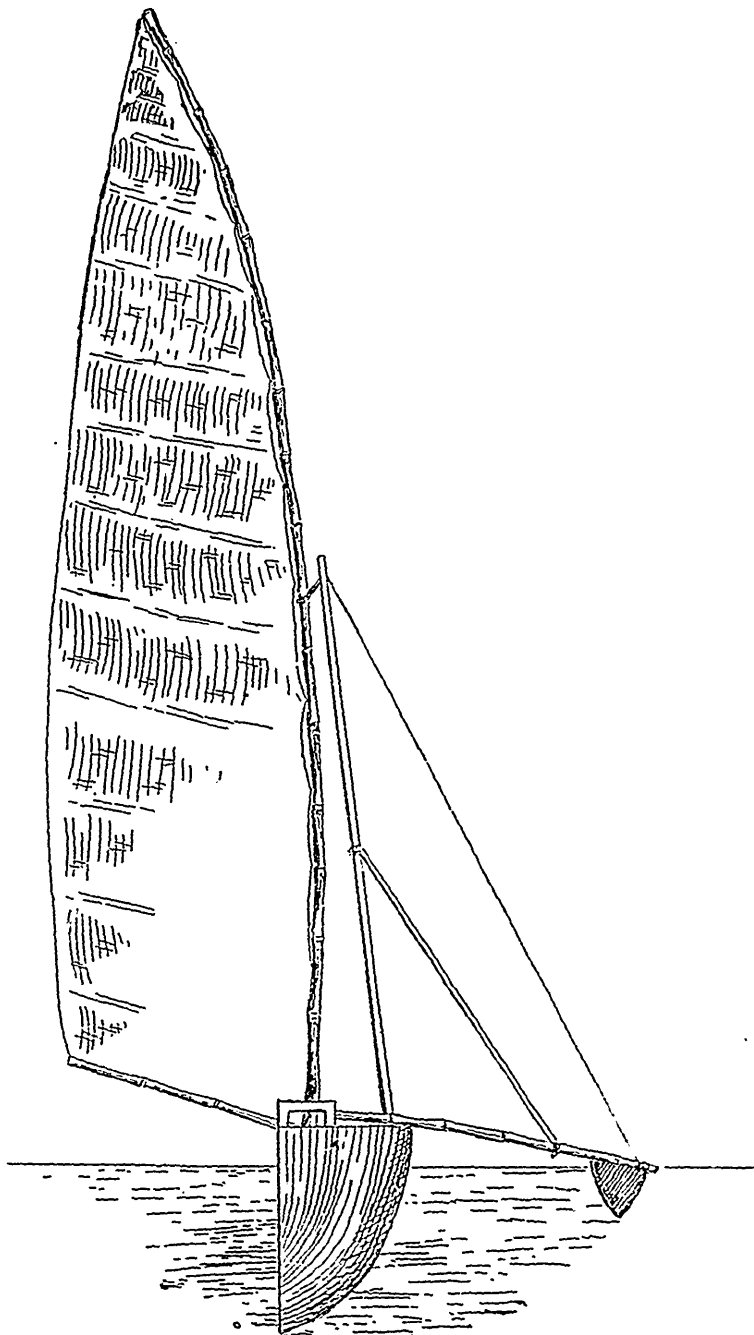
"If we examine the simplicity and ingenuity of its construction and the extraordinary velocity with which it moves, we shall find it worthy of our admiration and deserving a place amongst the mechanical productions of the most civilized nations, where arts and sciences have flourished ; hence these boats deserve our attention."

The Islands are situated between 10° and 20° north latitude, and in longitude 145° East ; they were first made known to the world in 1521, by Magellan.

Dampier (who has always been considered a most accurate observer and a good describer) followed in 1686 ; he writes : "The natives were very ingenious beyond any people in making boats or proas, as they are called in India, and therein they take great delight. I did for my own satisfaction try the swiftness of one of them ; sailing by our log we had 12 knots on our reel, and she ran it all out before the minute glass was half out, which if it had been no more, is at the rate of 12 miles an hour, but I do believe she would have run 24 miles an hour."

There is another point which gives a more correct idea of "Pacific" navigation than I have met elsewhere. Mr. Walter Coote, F. R. G. S., accompanied Bishop Selwyn in his periodical visit to the Pacific Islands in the yacht Southern Cross, in 1882, and he thus speaks of the navigating knowledge of the "Santa Cruz" natives.

"The natives of Santa Cruz do not hesitate to make cruises far out of sight of land, their knowledge of the stars being very considerable." "I have noticed the elder of the three boys whom we subsequently brought away from here, teaching the names of various stars to his younger companions," and they knew the *direction* of their native island however distant it might be.



PROA OF THE LADRONE ISLANDS.

Length, 27 ft. ; Depth, 5 ft. ; Width, 4 ft. 6 in. ; Yard, bamboo Outrigger bamboo
Sails, matting. The flat perpendicular is always the lee side

PRISON REFORM.

BY A. M. ROSEBRUGH, M. D.

[*Abstract of a paper read before the Canadian Institute, 1889*].

The claim that prison reform had its origin in the bosom of the church is not an idle claim. Pope Clement XI., in 1703, wrote over the door of the Roman prison of St. Michele: *Parum est improbos coercere pœnâ, nisi probos efficias disciplinâ*.^{*} But prison reform has been a plant of slow growth, and it was not until long after the death of John Howard, the prison philanthropist, that prison reform took practical shape. Howard was the means of inaugurating a more humane treatment of prisoners, but the principle enunciated by Clement XI., is not even yet fully recognized. Penologists believe that while incorrigible criminals should be permanently incarcerated, the corrigible ones should be reformed by discipline, by labour, secular and religious instruction, etc., and that short of this our penal institutions are a failure—crime is not diminished, and society is not protected.

Among the means that have been found to be of most service in effecting the reformation of prisoners, the following are considered the most important, namely—Classification, Industrial Employment, Indeterminate Sentences, Conditional Liberation, Secular and Religious Education, and Prisoners' Aid Societies.

1. CLASSIFICATION.—The most important requirement in the reformation of prisoners is classification. Very little can be accomplished in the reformation of prisoners while old offenders are allowed to associate with other prisoners. There is but one remedy and that is the absolute separation of the prisoners, so that no prisoner shall come in contact with any other prisoner. No half measures will suffice; no grouping into classes is of any avail; the choice must be between separation and contamination.

As about $\frac{2}{3}$ of all prisoners, on an average, are kept in county jails,

^{*} It is useless to imprison criminals unless you reform them by discipline.

it seems the height of folly to allow the free range among them of old offenders. "Any advance in the reform of prisoners," says Gen. Brinkerhoff, "must commence with the county jails, and such separation must be secured as shall not allow any one prisoner to associate with any other prisoner during the period of his incarceration in such jail."

This system is called the separate, cellular, or individual system. The separate system was recommended in England by a select committee of the House of Lords as far back as in 1835; again in 1847, and still again in 1850. The committee in their report in 1850, state that "they entertain a very decided opinion on this head—that the separate system must be accepted as the foundation of prison discipline, and that its rigid maintenance is a vital principle in the efficiency of county and borough jails."

Copies of this report were transmitted to the Governor General of Canada in 1865, strongly urging the adoption of the separate system in Canada, and adding: "You will bear in mind that no ordinary difficulties, nor indeed any difficulties should be allowed to stand in the way of the establishment of the system."

In the International Prison Congress held in London, in 1872, the delegates from Russia, Germany and Belgium, reported that they were satisfied with their prison system so far as it was cellular or separate and no further.

In Great Britain the cellular system is in operation in all the local prisons, and these prisons are now under the absolute and undivided control of the Home office. Convicts who are under sentences of five years or more, spend the first nine months in cellular confinement. After the first nine months they are allowed to work in association, but at other times they are kept separate. It is found that short sentences with cellular confinement in the local prisons has a much greater deterrent effect than longer sentences without such cellular confinement. The cost of the construction of the jails on the cellular plan is greater, but it is good economy, firstly, because the prisoners receive shorter sentences, and, secondly, because there are fewer re-committals.

INDUSTRIAL EMPLOYMENT.—Regarding the necessity for industrial employment for prisoners, there is no difference of opinion among prison managers. There can be no reformation or proper discipline without it. Prison experts also believe that prison labour has no ap-

preciable effect on free labour either in the prices of products or wages. In the United States it is claimed that the total product of convict labour as compared with the total product of free labour, is less than $\frac{2}{3}$ per cent. In reformatories and other institutions where reformation is the principal end in view, such industries should be engaged in as will best tend to make the prisoners self-supporting after their discharge. In penitentiaries where life prisoners and incorrigibles are imprisoned, that system of labour may be adopted which will tend to make the prison self-sustaining—care being taken of course, to reduce the competition with free labour to a minimum. "Labour," says Warden Massie, "in its several pursuits, stands next to Christianity, first and indispensable; without it reformation of character may be said to be impossible."

Master Workman Powderly says, very properly :

"Do not keep criminals in idleness, but do not throw their labor on the market for a less price than that paid to honest labor; reform the imprisoned as well as punish them; give them work for the brain to do as well as for the hands; teach them how to be Christians while teaching them how to work; take what is given to the contractor of their earnings and give it to themselves when they leave prison, or allow their earnings to go to the support of their families, if they have any, instead of throwing these families on the charities of the town, while the prison contractor reaps a reward from the crime that causes him to wish that the crop of criminals may grow larger."

THE INDETERMINATE SENTENCE.—An indeterminate sentence is one which has no maximum limit. The criminal is simply convicted and sentenced for the crime of which he is charged. On indeterminate sentences prisoners can earn their discharge by good conduct, but if they are incorrigible they may be held for life. In the reformatory at Elmira, N. Y., the young men must earn their discharge by mastering a trade and passing a thorough examination in certain studies. The indeterminate sentence is in operation in some of the work houses in the United States where tramps and habitual drunkards are incarcerated. The Hon. Frederick Hill, Inspector-General of Scotland was the first to recommend the indeterminate sentence. It assumes that a person convicted of crime is morally diseased and should be imprisoned as an insane patient is confined, and that he should not be discharged until cured.

CONDITIONAL LIBERATION.—Conditional liberation or the parole system is almost a necessary accompaniment of the indeterminate sentence system. It is a modification of, and an improvement upon, the English ticket-of-leave system. The prisoner is not released until employment is found for him and he is required to report periodically to some officer designated by the prison authorities. Failing this he is recommitted. So long as his conduct is good he is encouraged and given substantial aid if necessary. In 1864 a new Penal Servitude Act was passed in England embodying the Crofton system which includes indeterminate sentences and conditional liberation. Since then crime has steadily decreased in Great Britain. At Elmira, N. Y., it is claimed that fully 80 per cent. of all prisoners who are discharged on parole are permanently reformed.

EDUCATION.—Another important requirement in prison reform is education. A large proportion of incarcerated criminals are quite illiterate. It is from the illiterate and the idle classes that a very large percentage of the criminal class is recruited. Industrial training should be incorporated with our education system and attendance at school should be made compulsory. In industrial schools and reformatories, a good common school education should be given, and proficiency both in studies and in acquiring a trade should be made both an incentive and a *sine qua non* to a discharge. At the reformatory for young men at Elmira, N. Y., no one is discharged until he has thoroughly mastered a trade and passed the required examination in his studies. The discharge is quite independent of outside influence.

RELIGION.—For the reformation of prisoners religion is the highest motive power that can be brought to bear. No permanent progress in prison reform can be expected without it. The religious influence of the chaplain or Sunday-school teacher should be supplemented by that of God-fearing prison officers and employes, otherwise all efforts in this direction may be completely neutralized. No reformation can be expected in a prison where there is a profane or intemperate official.

PRISONERS' AID ASSOCIATIONS.—The cause of prison reform has also been promoted by Prisoners' Aid Associations. These societies extend a helping hand to prisoners on their discharge from prison. Employment is found for them, and, when necessary, tools or money is

supplied. This critical period in the prisoner's history is thus tided over and every effort in the direction of reformation of character is encouraged. The Prisoners' Aid Association of Canada is doing a good work in this direction, and the managers are now making an effort to establish branches in all the cities and larger towns of Ontario.

PRISON REFORM IN ONTARIO.—In the Province of Ontario the Prisoners' Aid Association of Canada has memorialized the Local Government on the question of prison reform. This society has asked the Ontario Government to appoint a Commission of competent gentlemen to collect information regarding Prisons, Reformatories, Houses of Correction, Work-Houses, etc., with a view to the adoption of the most approved methods of dealing with the criminal classes, suggesting to the Government the propriety of erecting sufficient Prison and Reformatory accommodation in the Province to completely relieve the gaols of criminals convicted of crime and under sentence, and asking for a report on the following, viz. :—(1) The causes of crime, such as drink, over-crowding, immoral literature, Sabbath-breaking, truants from school, etc. : (2) the best means of rescuing destitute children from a criminal career : (3) the best means of providing and conducting Industrial schools : (4) the propriety of the Government assuming larger control of County Gaols : (5) industrial employment of prisoners : (6) indeterminate sentences : (7) the best method of dealing with tramps and habitual drunkards.

This Association has also commended the following resolutions to the favorable consideration of the Government :*

1. County Jails should be maintained only as places of detention for persons charged with offences and awaiting trial, and should not be used for prisoners after trial and conviction.

2. County Jails should be conducted strictly on the separate or cellular system.

3. Persons convicted of crime should not be detained in county jails, but should be dealt with according to the age and natural proclivities of the criminal.

*Since this paper was read before the Canadian Institute these resolutions have been endorsed by church courts, county judges, sheriffs, wardens, gaolers, etc., by the religious and secular press, by eminent American penologists such as Gen. Brinkerhoff of Ohio, Brockway of Elmira Reformatory, Brush, of Sing-Sing, etc., and also by the Canadian Institute and other societies.

4. A boy under fourteen years of age, not previously vicious, should be restored to his parents upon their giving a guarantee of his future good conduct. Failing this he should be sent to an Industrial School.

5. A boy under sixteen years of age, having a natural tendency toward crime, or being convicted of a second offence, should be sent either to a Reformatory direct, or to an Industrial School on trial, according to circumstances; and a special court should be organized to deal with these cases, as well as with females charged with light offences. A boy should never be brought to open Police Court nor be sent to a county jail.

6. Industrial Schools and Reformatories should not be considered as places for punishment, but should be utilized wholly for the reformation of character. The young persons sent to these institutions should not be committed for any definite period, but they should be detained until reformation is attained, irrespective of the time required. The officers of these institutions should be carefully selected, preferably by a system of examination and promotion, and without reference to party or social influence.

7. As industrial employment is a necessary step towards reformation, and as this cannot be supplied by the county jails, the necessity arises for prisons and reformatories of ample dimensions, where such employment can be provided, and where other influences of a reformatory character may be utilized, and where a system of classification may be carried on.

8. The expense and management of such persons in such institutions should be borne by the county from which they are sent, when such expense exceeds the proceeds of the industrial labor of the persons so sent.

9. Tramps and habitual drunkards should be sent to an institution where they can be provided with productive industrial employment, and where they can be brought under reformatory influences, and they should be detained in said institution under indeterminate sentences. Incurables should be sentenced to penitentiary for life. They should be considered as having forfeited all right to regain their liberty unless reformation takes place.

10. In order to meet the requirements of the case there should be sufficient prison accommodation in Ontario to relieve the county jails of all persons undergoing sentence. This accommodation should be provided either by enlarging the Central Prison or by erecting two additional prisons, one in the east and the other in the west. There should be unification in our prison system. The prisons should be graded, and the reformatory principle in its most improved form and after the best models should be incorporated with said system.

11. The question of prison labor should be removed from the arena of party politics, and members of labor organizations should look at this question from a patriotic rather than from a trades standpoint.

A practical difficulty in the way of prison reform in this Province is the divided control of the county gaols. The gaols are under the inspection of the local Government, but the construction and maintenance is under the control of the county councils. Prison reform requires unification and centralization of the prison system of the state. Without it true prison reform is impossible. Unification and centralization is necessary in our education system. It is quite as necessary in our penal system. In Belgium and in Great Britain all the local prisons are constructed on the same system (the cellular system). This was not effected in England until the Central Government assumed absolute control of all the local prisons. Previous to this, every effort was made by the Government to induce, and even to compel, the local authorities to make the change but without avail. We should profit by the experience of the Mother Country.

THE LANGUAGE OF THE MISSISSAGUAS OF
SCUGOG. [Abstract]

BY A. F. CHAMBERLAIN, M.A.

In the course of a visit paid to the Indians of Scugog in August, 1888, the writer was enabled to collect a vocabulary of some 700 words, besides personal and place names. The vocabulary shows the Mississagua to be almost pure Ojebway, there being, however, several points in which it seems to possess dialectic peculiarities, such as the use (more frequent than in Ojebway) of the *o*—so often elided or absent in other Algonkin dialects, as recorded by travellers; it is very difficult to catch this *o*-sound, and it is perhaps more often indistinctly sounded than omitted altogether. A few words also seem peculiarly Mississagua and to differ from those in use by other Ojebway tribes. The language which the Mississagua most closely resembles is that of the Algonkins of the Lake of the Two Mountains, as recorded by Cuoq (Lexique Algonquin, 1886). The following words are not to be found in Wilson's and Baraga's Dictionaries, or different words are given :

Ash (Black)	<i>wisidjak.</i>	Hell-diver	<i>shingibis.</i>
Bald-headed Eagle	<i>amigijikwani.</i>	Heron	<i>moshkóosi.</i>
Bark-dish (for win- nowing rice. }	<i>noshkátshigan.</i>	Iron-wood	<i>máneh.</i>
Bulrush	<i>anókanashk.</i>	Landing (for boats)	<i>kapskoin.</i>
Burdock	<i>osákatábuwug,</i> (sticky thing).	Maple (hard)	<i>aninátik.</i>
Chisel	<i>éshkon</i> (horn).	“ (soft)	<i>chigimanish.</i>
Chickadee	<i>gújji konéshi.</i>	Meat-bird	<i>gwingwish.</i>
Chipmunk	<i>ogwingwis.</i>	Milky Way	<i>namehpakweh- hikamítowut,</i> (the sturgeon making rily water).
Clam	<i>ássens.</i>	Mat (for drying rice on) ..	<i>opódjigan.</i>
Currant (wild black)	<i>amikowomin.</i>	Mudturtle	<i>nishúka.</i>
Ear-fish (of Lake Huron) ..	<i>otáwgamek.</i>	Moth (night-flying)	<i>nitos.</i>
Fox-bird	<i>ánuk.</i>	Parched rice	<i>kawpsigan.</i>
Hemlock	<i>kákamish.</i>	Sarsaparilla	<i>okúdak</i> (leg-root.)

Sassafras	<i>menagwákomis</i> , (scented tree).	Stove	<i>piwabikísikon</i>
Spruce	<i>kowándak</i> .	Sun-fish	<i>okwatashi</i> .
Sticks (for beating rice).	<i>pawáymatak</i> .	Trolling-line	<i>odádjigókon</i> .
		Water-lily	<i>okitabuk</i> .

The Mississagua vocabulary appears to contain but few non-Algonkin words. *Owistoiia* (blacksmith) appears to be an Iroquois loan-word; *nápané* (flour) is but the French *la farine* Indianised; *bojou* (good day) the ordinary salutation, is the French *bon jour*. At Seugog, however, very many English words such as knife, fork, table, buttons, spoon, etc., are used by the Indians in ordinary conversation, and they have forgotten many of their own words formerly in use. One Indian said they had no word for "tree," and several of them had hard work in recollecting the words asked from them. In response to enquiries as to the existence of a "children's language," the writer succeeded in discovering only two words (used by the children) which differed from the ordinary speech, viz. : *tehteh* (father) and *dodon* (mother). The words, as a rule, are strongly accented especially when a monosyllabic, and there is sometimes a peculiar drawl, as e.g. in the word for porcupine *ka k' k'*. The short *ä* and *ö* are not very distinct, and both tend to become the *u* of *but*; *d* and *t* are indistinct, the sound really made being a medial between these, the same holding of *p* and *b*, and *g* and *k*. A peculiar sound is that of the pronominal prefix *n'* as in *n'teh* (my heart). The vocabulary contains a fair proportion of monosyllables and dissyllables, the former being radical words (in most cases) the meaning and etymology not being apparent; this holds also of many dissyllables. Such are :—*múkwa* (bear), *amík* (beaver), *múkuk* (box), *ondék* (crow), *ódjig* (fisher), *áki* (earth, etc.), *min* (blueberry), *n'os* (my father), *n'teh* (my heart), *nin* (I), *mang'k* (loon), *moons* (moose). Like other Indian language the Mississagua contains many of those descriptive names which are of interest to the student of Onomatology. Such are :—*Debikisis* (moon = night sun), *muskegamin* (cranberry = marsh-fruit), *okadak* (sarsaparilla = leg-root), *menagwakomis* (sassafras = scented tree), *manistavis* (sheep = hide not durable), *shishibanwing* (shot = duck-stones), *omúkaki* (frog = devoid of hair, or fur), *pewábik* (iron = it crumbles off), *wabimotchéchagwun* (looking-glass = where they see ghosts), *otagwanibisan* [*r'* = inbow = he (*i.e.*, the Manitou) covers the rain with a mantle], etc. But few words appear to be of

onomatopœic origin. To this category belong most probably:—*shiship* (duck), *kokosh* (pig), *papi*, (laugh), *kokoko* (owl), *kakaki* (raven) and perhaps a few others. The change that has taken place in the vocabulary, judging from a comparison with the "Old Algonkin of La Hontan," and a Ms. vocabulary of Mississagua (1805), does not seem extensive, *e.g.*:

- 1805 makwa, amik, chichip, wikiouam, pouacan, chipi, cema, nipi, etc.
 (bear) (beaver) (duck) (house) (pipe) (river) (tobacco) (water).
- 1838 mukwa, amik, shiship, wikiwam, poagan, sipi, sema, nipi, etc.
- 1703 ———, amic, chichib, oukiouam, poagan, sipin, sema, nipi, etc.
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THE ORIGIN AND DEVELOPMENT OF GRAMMATICAL GENDER. [Abstract]

BY A. F. CHAMBERLAIN, M.A.

The ordinary view of the origin of Grammatical Gender is expressed by Prof. Whitney (*Language and the study of Language*, 1803, p. 78) in these words:—"The whole language was the scene of an immense personification, whereby sexual qualities were attributed to everything in the world, both of nature and of mind; often on the ground of conceptions and analogies which we find it excessively difficult to recognize and appreciate." Canon Farrar attributes it to the domination of the imagination (*Chapters on Language*, 1873, p. 188). Paul expresses a similar opinion (*Princip. der Sprachgesch.*, 1886, p. 220). The common ground taken by those who try to explain Grammatical Gender is that it arose from the fundamental distinction of sex, through the medium of personification.

The principal languages possessing Grammatical Gender are the Indo-European, Semitic, Hamitic, Bantu (*Hottentot*, etc.), Oigob, Caucasian (some only), the Khasia (of S. E. Asia) and perhaps a few others. In an able essay (*Das Nominalgeschlecht in den indog. Sprachen*, *Internat. Zeitschrift f. allgem. Sprachwissenschaft* IV, 100-109) the eminent philologist and grammarian, Karl Brugmann, endeavours with some success to prove that personification will not explain the phenomena of Grammatical Gender in Indo-European speech. Bleek's numerous essays on the Bantu languages are very valuable, as also is the work of M. Lucien Adam (*Du Genre dans les diverses Langues*, Paris, 1887), and much of value is to be gleaned from the encyclopædic volumes of F. Müller. Regarding the American group of speech, Dr. Brinton says:—"A grammatical sex-distinction, which is the prevailing one in the grammars of the Aryan tongues does not exist in any American dialect known to me" (*Lang. of Palæolithic Man*, 1888, p. 14). Along with the American stand the Australian, Melanesian, Polynesian, Malayan, Mongolian (*Samoyed*, Uralian, Altaic, Japanese, Corean, etc.), Monosyllabic of S. E. Asia.

{some only, as Burmese, Chinese, Siamese, Annamese), some African tongues (as Fulah, Nuba, Kunama, Barea, Somali, Niam-niam), Dravidian (except where Sanskrit has influenced), Caucasian (some only as Lezghi, Ude, Georgian, Mingrelian, Lazic, Suanic), Basque, Negro Languages of W. Africa (as Serer, Nupe, Soninké, Mandingo, Serechule, Basa, Grebo, Kuru etc.), Kham-Bushman, Nicobarese and Andamanese. The distinction of *animate* and *inanimate* so characteristic of American tongues appears also in several old-world languages, as :—Caucasian (Abchas, Kasikumuk, Artschi, Hürkan, Tschetschenz, Thusi, etc.), Dravidian, etc. The Khasia, Tibetan, and Hürkan and Avar are of especial value for our study of this subject. It is in the American languages taken in connection with these that the solution of the problem is to be found. To the American tongues, considered in this respect, M. Lucien Adam and M. Raoul de la Grasserie, have devoted considerable attention. The probability of the distinction between animate and inanimate having preceded that of male and female is very great. The able essay of M. de La Grasserie (Revue de Linguistique, XIX, 96-102) throws considerable light upon the subject. The following scheme shows the ideas of M. de La Grasserie, regarding the origin and development of Grammatical Gender :

I. Ego (animal)—non-ego. II. animate (homo)—inanimate (vitalistic distinction). III. rational — irrational (rationalistic). IV. andric—metandric (conception of man as superior in intelligence and dignity to woman). V. Meidzobiotic—meiobiotic (conception of greater or less intensity of vitality). VI. Masculine—Feminine.

Man first distinguished the *ego* and the *non-ego*, and along with this the *like-me* and the *unlike-me*. Then he separated the animate and the inanimate into two great groups, himself included in the first. The next step was to discover the rationalistic distinction between himself and the other animals ; this led to his esteeming himself higher in dignity and intelligence to woman, and again to a distinction based upon the degree of intensity of vitality which finally led up to the differentiation of masculine and feminine. Instead of there having been one original sex-distinction from which grammatical gender and all other genders arose, there have been many more, more in some languages than others, and not until all these categories have been examined and searched into can the problem of the origin of Grammatical Gender be solved.



Lines of the Giant range—West of Silver Mountain.

BROAD OUTLINES OF THE GEOLOGY OF THE NORTH- WEST OF LAKE SUPERIOR.*

BY ARTHUR HARVEY.

So little serious Geological work has been done to the north of Lake Superior that it is almost a virgin territory, yet this is surely one of the pivotal points of the geology and geography of the continent. If we look for the governing range, the key to the formation of North-Eastern America, we shall find it in the height of land which runs from a little N. W. of Lake Superior to Labrador. There is no exception to the rule that great heights and depths produce great geologic and geographic features; the capes and palisades around Thunder Bay and its vicinity are lofty still—McKay Mountain rises 1000 feet, and Thunder Cape 1200 above the water—but this is not nearly all their story; the great lake near them suddenly deepens, and if one could look up, even now, from the bed of Lake Superior near these points, we should see over 2000 feet of a coast range towering above us, cliff upon cliff; nor can one doubt that this was less than half, probably less than a fourth of the original height of the Laurentian country there. A map is offered, giving a conjectural outline of the Archæan continent, and rising upon this base we may well imagine more than one range of mountains—as lofty, as rugged, as the Rocky Mountains of to-day. †

* This paper was written with special reference to the mining industry of the north shore, and plans of all the working mines and some of the abandoned ones were submitted; also statistics of production. These the author omits in this abstract, as being of evanescent interest.

† This map showed a continent extending from the Lake of the Woods to Newfoundland. The southern boundary ran through the lake country, crossing from Lake Huron to the foot of Lake Ontario, *via* Lake Simcoe. There was an extension southward from this point through New Jersey. It covered most of the country north of the lakes and River St. Lawrence, and the principal mountain chains had an east and west trend.

This land quite possibly existed in truly pre-glacial days. It requires no great daring to imagine the time when ice was not. But as soon as the globe had cooled so far as to admit of the existence of water, ice would begin to show in winter at the poles, and slowly extend from the regions within which the nights are four and three months long to those in which they last but two and one. When it reached from the north the confines of this primitive continent, glaciers having meanwhile formed upon the mountain ranges, the ice action, uniting with unchecked sub-aerial influences, would increase in power and effect. So, age after age, the assault of the elements would naturally degrade the whole extensive area, dispersing its materials. Sooner or later barrier after barrier must go; finally (after several oscillations of level) even that one north of Lake Superior—and so, we may be persuaded, the Great Laurentian Continent came to an end as such—by the effects of warm airs and softening rains from the south and west, and the persistent attacks of Polar cold from the north and east.

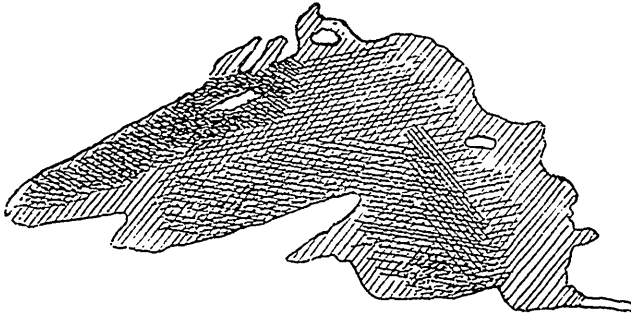
Until the last great barrier of lofty hills had been overcome, the general temperature south of it was probably quite mild, in spite of latitude, but the breach having once been made, the waves of cold would resistlessly pour through—and thus, perhaps, we may comprehend the extension of an ice age over a great adjoining area, and the planing down of the heights to something near their monotony of today. Thus too we can readily understand how the great plains north of the height of land behind us were formed, very gradually sloping to the Hudson's Bay; how the James' Bay mudflats came to exist; how the lands and islands of our Arctic Ocean came to be shaped as the map shows them—with forms familiar to all who have observed the glaciated regions of Muskoka and the northern shores of the upper lakes. And if we wish to form an adequate idea of the vastness of these forces, the length of time during which they operated, the height of the old mountains, and the thickness of the strata worn away, we have only to consider that from the ruins of this continent came the tens of thousands of feet in thickness of the Cambrian, Silurian, Devonian formations, and what others not, in great variety, extending over a quarter of million of square miles south of it, and perhaps more yet to the north.

It seems not unlikely that one chief breach of the rampart against

cold occurred where Lake Superior is, and that great icebergs streamed from that point into a southern sea. The great depth of the lake, even now, gives color to this supposition. With thousands of feet of newer formations distributed over its bed, it is yet the deepest depression on the continent, and the belts of greatest depth—survivals, so to speak, of its former greater profundity—run southerly and south-westerly. Along its westerly shores, from Thunder Cape to near Duluth, embracing the Isle Royale, the present depth is from 800 to 1000 feet, and as the level of the lake is 602 feet above tide water, its floor is here from 200 to 400 feet lower than the level of the sea. At the early epoch we are now considering, the lake was perhaps many thousand feet deeper still, and there was an uninterrupted stretch of ocean all the way to the present Gulf of Mexico. As the detritus from the primitive formations settled in this sea—as the Alleghanies grew and the Rocky Mountains developed—this ocean contracted into a gulf, running south from Lake Superior. As the area of the gulf became restricted by the continuance of these processes, it would assume a shape not unlike that of the Baltic of to-day; one arm running up from the present position of St. Louis, by Duluth, to Black and Thunder Bays; the other from the same point up the valley of the Ohio, and by Chicago north and east. Then might well follow the period spoken of in "The Geology of Minnesota," Vol. I., p. 35, when the lake region was cut off from the salt water, when Lake Superior was 500 feet above its present level, but the water still ran by the St. Louis valley (Duluth) to the Mississippi. Afterwards the southerly out-flow stopped, the regions between the lake and the gulf rising further yet, and a new eastward channel to the Atlantic grew into being—this comparatively recent system now under many names having an outlet to the ocean by the noble St. Lawrence. Gen. Warren's map, showing a stream connecting Lake Winnipeg with the Mississippi, while an arm of the Gulf of Mexico brings salt water as far up the great valley as the parallel of Chicago, the Ohio and the Missouri being extensions of this arm, represents a very probable late stage of the transformations referred to. The scenes are still shifting, the secular change now going on is doubtless on the lines of the past, the basin of Lake Superior is still filling up, though as ever, very slowly; soundings almost everywhere disclose a bottom of clay, brought down by the rains and rivers from its rim, still being

degraded. The Gulf of Mexico is being further filled up, along its northern border. The banks of Newfoundland are still being added to by the cargoes of northern icebergs. The impediments to the outflow of inland waters by the St. Lawrence are still being removed, for the St. Lawrence rapids, Niagara, the Sault Ste. Marie, are still wearing away. In due time there will be only rivers where some of the lakes now are ; Erie and St. Clair being the first to disappear.

Mr. A. T. Drummond, I perceive, has been treating of this subject in the Record of Science—and as that periodical has to a certain extent the *imprimatur* of Sir William Dawson, no paper in it should be disregarded. But from Mr. Drummond's special view, I cannot but dissent. He treats the lakes as mere expansions of pre-glacial rivers, and he marks on his map the lines in which those rivers ran. He makes his principal river run north-east from Duluth. Now that Lake Superior was a gulf and not a mere river is shown by the soundings ; the deep belts are from 25 to 100 miles broad, which precludes the fluvial idea, and they are scarcely in the line he traces. I show a copy of the United States hydrographical map, adding to it Bayfield's soundings, and a smaller shaded map exhibiting graphi-



cally, though imperfectly, the arithmetical facts, the darkest being the deepest part of the lake. Again, the geological strata are newer as one proceeds south-westerly ; that was therefore the direction of the earliest currents and iceberg streams. Mr. Drummond notes that Lake Superior is on an axis of depression, but he does not seem to recognize that this axis is not in the line of his valley as marked, but on the contrary runs from east to west, far to the southward of his line nor does he consider the lateness of the synclinal folding—which

must of course have taken place after the deposition of the strata folded. Mr. Drummond's views offer no explanation of the south-westerly *debouchment* of the Nepigon, Black and Thunder Bays, which is south and a little west, not eastward as by his theory it ought to be; they do not elucidate the problem how the lakes became contracted, how their overflow was turned from the old direct line to the Gulf of Mexico, to that by way of Chicago; then in succession to that by Niagara or the Trent down the Mohawk and Hudson valleys; these closing, to the Richelieu and Champlain valleys, and finally to the Gulf of St. Lawrence. If my supposition is correct, Lakes Erie and St. Clair cannot be recent lakes, in the sense Mr. Drummond states, but are the shrunken remains of one that covered all Western Ontario and the lower peninsula of Michigan, in times quite recent, I admit, compared with the antiquity of some lake basins; and I regard it as almost trifling to talk of the Straits of Mackinaw as existing in those old days, for the level alluvial soil stretching broadly from west of the Sault Ste. Marie to Lake Michigan precludes the idea that there were any such straits until a very recent epoch. I think, moreover, that Mr. Drummond must form a grander conception of the forces at work in framing continents before he can comprehend the wide distribution of precisely similar forms of life, or the great superficial extent of many strata, *e.g.*, the Potsdam sandstone, which he may trace from Gaspé to Missouri.

Another imposing feature of the old Laurentian shore may have been a great volcanic range. By analogy, it must have been near the water; allowing for the wearing of the cliffs, we may suppose it southward of the present Lake Superior coast, but there are no data yet for locating it with precision. The only guess I have come across as to the locality of any volcanoes about Lake Superior, is one attributed to Dr. Selwyn, that there was a great burning mountain where Lake Nepigon now is, which, in blowing itself away, made the basin of Lake Nepigon. I see nothing to confirm that theory. Lake Nepigon is not in a deep basin or immense crater; it seems to be simply a bit of Lake Agassiz (the former extended Lake Superior when it stood at a high level) left when the level of Lake Superior fell—as the Georgian Bay might be left an independent lake if Lake Huron were to be lowered. The locality where I have been able to give most study to the eruptive traps, lies between the Current and

Kamanistiquia Rivers on one side, and the Pigeon River on the other—for 50 or 75 miles inland. Near the Current River, the chloritic slates of the eastern part of that district are over-laid by black slates (argillites), under and between these being several layers of chert. All such were deposited in a quiet time upon the Archæan granites; red Huronians. Their stratification is regular, as even as that of the North Toronto clays, and very like it. But the whole country was afterwards shattered by earthquakes; great cracks would form, as it was cooling, or being folded by differing distribution of pressure, or swelled up by volcanic gases; and through these cracks—50 to 200 feet in width, and miles in length—up rushed lava streams, over flowing the slates for miles around, to a depth varying with the slope of the surface and the distance from the fissure. I do not know of over 50 feet in depth of lava, but I have heard of 200 feet. Where this lava sheet has been glaciated or otherwise worn away, the matter which filled the cracks often shows above the level, like a wall—so markedly that these features have received the local name of “rampykes.” I have found several of them, and hundreds of miles of country, perhaps thousands, have been deluged with lava through their agency, but I have found no volcanic pipes—round or nearly so—cores of old burning mountains. The Michigan geologists have remarked several intercalated lava beds; also ash beds. The fact that these are volcanic formations is so well established that there seems no room left for other theories: it does however appear extraordinary that from the Lake of the Woods eastward to North of Lake Huron, you are constantly finding this capping of diorite, evidence of the fiery time, and that yet you find no round volcanic vents.

Then follows another period; the natural forces locally at work become less imposing, and the earthquake fissures no longer emit molten lava. They are, however, still occasionally formed, tearing through granite and chert and slate and trap, but they are from 2 to 10 feet only in breadth, and appear to have become mere drains for the surrounding country; these are now the rich silver bearing veins of the Thunder Bay district—having become filled up with quartz and spar, and in many cases with quantities of native silver and sulphide, with zinc blende, a little galena and some iron pyrites.

In other neighbouring regions, the trap or lava seems to have aided much in the segregation of copper. When it overflowed a later

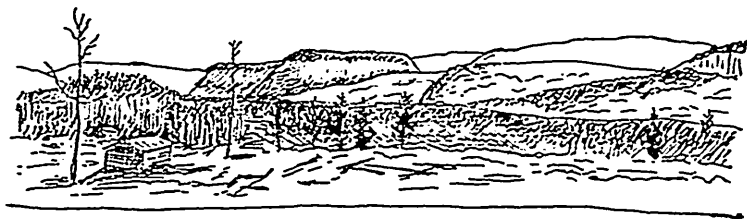
formation (in places easily traced on both sides of the great synclinal trough of Lake Superior) the vapours or gases formed bubbles which rose to near the surface of this viscous mass, and the resulting cavities have through processes obscurely known and lengthy to describe, become filled up with native copper. These are the well known amygdaloidal beds. They are well developed on the south shore, but there too we have the copper and sand-stone conglomerate of the Keweenaw formation, in which are the Calumet and Hekla and Red Jacket Mines, which is more profitable to work. On the north side the copper is altogether in the amygdaloidal formations, and their principal exposure is on the American Isle Royale—the old Minong Island.*

This paper should not be closed without some reference to what is called "the granite country" to the north and west of the Kaministiquia slates. You pass through it on the C. P. R., between Port Arthur and Rat Portage. It bears the plainest marks of the most terrible glaciation—long, and I dare think oft repeated. Bare rounded hummocks of rock, like a sea with crossing swells, lie all around you. Lakelets without number, scooped out by departed bergs, dot the great monotonous expanse. The Lake of the Woods

* This was the principal source of the copper the Indians used, though they had extensive mines at Ontonagon and other places. These fellows had a great eye for surface indications, they had to be observant because of the great labor involved in their work, and the terrible loss if it should be wasted. When the whites took to mining on Lake Superior, they used to look for the Indian mining pits, and if they had not been finished there would surely be copper within a short distance of the bottom. The Indians mined by making fires on the rock, throwing water on the heated surface to break it, then pounding it with their green-stone hammers. One pit was found on Isle Royale in 1870, filled up with the accumulations of leaf mould for centuries on which pine trees 2 feet in diameter were growing. It was 100 feet across, nearly circular, 20 feet deep. At the bottom was a mass of copper, raised upon skids, and weighing over 16 tons. Lying in the hole were handspikes, 7 or 8 feet long. Both skids and bars were thoroughly impregnated with copper solutions. The two skids were 10 or 12 feet long, 8 or 9 inches thick; the marks of knife or hatchet were visible on them, and on the handspikes which are now in the Detroit Museum. The copper mass showed signs of having been hammered all over with stone hammers, of which dozens were lying around. This mass was raised, sent by steamer to Detroit, and offered to the Council to be put up as a monumental base in front of the City Hall, but the proposition was not entertained and it was sent to Wyandotte to be smelted. Mr. Shortess of this city saw it on Isle Royale, and saw it with the stamp mark of its weight at Wyandotte. It has been a theory of some archaeologists that the men who did this work were Toltecs from Mexico, but I think it was the work of ordinary Indian tribes. No mining colony would live on Isle Royale during winter; I have found the trail by which they came to a point about a dozen miles from Grand Marais where they crossed in canoes; they were therefore canoe Indians, inhabitants of the forest regions, not of the prairie or of the cultivated lands of Mexico. I have examined also into the reports of ancient silver diggings, but only to discredit them.

is so full of islands that it almost loses its lacustrine character. In this granite country you have gold, with a considerable portion of silver in alloy with it. Metals of various kinds seem to "carry" the gold with them—in some places iron pyrites seem the main associate of the precious metal, in others copper, while at the Huronian mine there is a quantity of telluride of gold. The country is, however, a *terra incognita*, but little is known of the thickness of the strata or their special characters. One may say that the pioneers of geology, the mining explorers, have only touched the fringe of the district; specimens obtained from Indians seem to prove that great riches may be found. I hope to give it further study next season.

One of the great difficulties in geological work in the Lake Superior country is that one must depend for classification on the petrological character of the rocks; they seem to contain no fossils, unless the "cannon balls" of the Animikie slates be such. Doubtless the great heat, the enormous pressure, the infiltration of metallic solutions, the violence of the agencies existing when the Huronian and Keeweenaw rocks were formed, were reasons why life should not exist or why traces of it should be destroyed, but the presence of particles of graphite and phosphate and the collection of iron into enormous beds seem to lead to the belief that the epoch of their formation was not anterior to the existence of life upon the world. It would add another charm, could we find any fossils in the 10,000 feet of Animikie, or the 50,000 of Keeweenaw rocks. Yet even without them, there is a weird fascination about the great lake and its neighborhood, felt by the Indian, the Jesuit, the modern traveller, as well as the geologist, which makes frequent visits there in the highest degree enjoyable.



Lines of the Giant range—East of Silver Mountain.

THE CRUEL PLANT—(*PHYSIANTHUS ALBENS*).

BY ARTHUR HARVEY.

I find that a specimen of this plant was exhibited to the Linnean Society in 1867-68, to show the seed-vessel, and this is the only reference to it I have seen in Scientific Societies' proceedings. It is a little curious that both Mr. Charles Armstrong and myself should have independently of each other prepared a paper about it for the Canadian Institute. Mr. Armstrong's note, read before our Biological Section, dealt with the genus *Asclepias* of which it is a member; I shall not repeat his statements, but at once draw attention to the *Physianthus albens*, of which I have a specimen for your inspection. The plant I have is two years old; it is a climber which covers a trellis about four feet square. I keep it in a cellar in winter, and set it in the open air in the end of May. It begins to flower in August, and no sooner do the flowers open than moths, attracted by the perfume, (which is not unlike that of the hyacinth, but not so strong) visit the plant and find that excursion their last. The specimen before you shows a moth caught in the trap by its proboscis, and you can see dozens of them in the same unfortunate "fix" throughout the flowering season. This moth is the "Silver Y" (*Noctia gamma*), and by far the greater number of moths caught are of this kind. I have, however, noticed an occasional cabbage butterfly (*pieris rapæ*) and a few wild bees and ants—the latter caught by the leg. We will now investigate (1) the machinery which catches the moths, and (2) the *raison d'être* of the trap.

The *Physianthus* (bladder flower) is named from the shape of the corolla, which swells near the base into a sort of bulb, enclosing the following machinery—two ovaries and a pistil, covered by a sort of cap which fits upon them, around which are five eyes, from which points five pairs of recurved jaws extend. Under these jaws are two anthers, closely pressed between the jaws and the seed-vessel.

Perhaps the point and the jaws may be considered part of the anther, covering two pollinia. The drawing presented will make the structure clear to you.

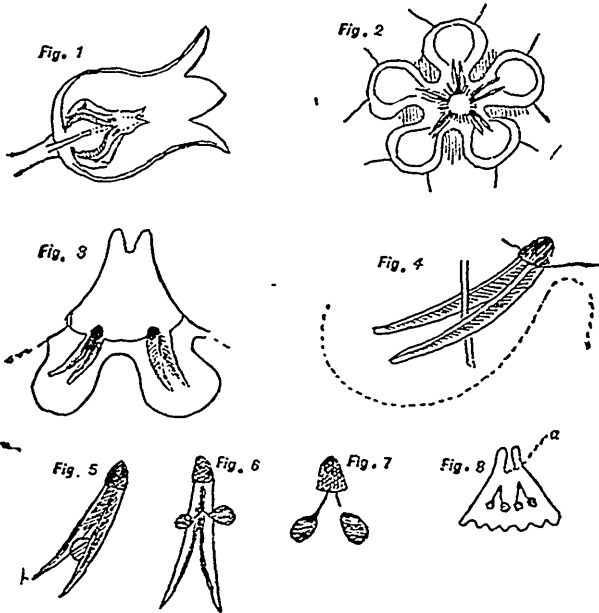


Fig. 1.—Section through middle of flower; imbricated passages at the base, around the incipient seed-vessel.

Fig. 2.—Plan—looking into the flower, showing the arrangement of the "jaws." Petals removed. Enlarged two and a half diameters.

Fig. 3.—The "jaws," showing their inclination.

Fig. 4.—How the proboscis of a moth is caught and held.

Figs. 5 and 6.—Escaped Pollinia, protruding from between the jaws.

Figs. 7 and 8.—The Pollinia, after removal of the jaws. The tip of the style is at *a*., Fig. 8.

Now when the flower is immature, these jaws are soft, but as it comes into full bloom, they harden and become woody. At this time the proboscis of a moth, thrust towards the nectaries, slides into the little groove between the jaws, and when once inserted, is caught like a boot in a boot-jack. The "Silver Y" tugs hard and long, but tugs in vain, and in a few hours dies.

You will at once perceive that a plant which catches a moth by the proboscis and lets it dangle and dry up, is not insectivorous. It

seems also contrary to law to slaughter insects aimlessly, and upon close examination I have found that in a few cases where a moth's proboscis seems to have widened the cleft between the jaws, but ever so little, the *pollinia* have found their way up through the orifice. (Fig. 5 and 6) I have seen pollinia where no moth hung dead, but so rarely that I think some insect must have been at work to separate the jaws. This however does not satisfy me, it is waste of life to have so many insects killed for such few results. My son Charles (one of our associates, and by far the youngest of them) tells me that if you carefully pull the moth from the flower, the jaws break away. And there is a beautiful sort of hinge or socket to them, set at such an angle that if they are raised from their recurved position by such a force they diverge, and do easily become detached. In the former case the pollinia can protrude without difficulty; in the latter they become uncovered; in either case fertilization becomes easy by means of spiders, ants, small plant-lice, or other insects which frequent flowers by hazard or by choice. This leads me to believe that in Brazil and Central America, where the *Physianthus* I am told is native, it is frequented by stronger moths than we have here, or possibly by humming birds, which without difficulty break away the jaws, liberate the pollinia, and perhaps even carry them away to other flowers, so to bring about cross fertilization. The plant here is a very shy seeder; I had but three well formed seed-vessels on mine. The ovary, as I said, is double; one part falls away, the other swells to the size of a pigeon's egg. In its native woods there must be more seed-vessels, and this gives strength to my inference, but we may very fairly call upon our kindred Societies in Central and South America, with whom we exchange Proceedings, to take up the enquiry, and substitute fact for hypothesis.

We have a member of the genus *Asclepias* in our every field, called the silk-weed. Its behaviour in connection with the setting of its seeds is very singular; I hope to be able to make a close study of it next season. I should be glad if this paper invites the attention of others in distant lands to the methods by which the seeds of other plants of the family *Asclepias* are fertilized.

I can scarcely think this *Physianthus* has become adapted to the catching of moths or humming birds' tongues by, so to call it, the first intent. If the jaws were in any sense less complete, a moth's

proboscis could scarcely be caught at all. There may have been some other cause for the special form of anther-covering and the protection of the pollinia while reaching maturity—and when the existing form had been reached as to its main points, it was probably found that it served for uncovering them too by insect agency, when concealment was no longer desirable—and then further specialisation would ensue. Perhaps many of the complex peculiarities of plants and animals, *e.g.*, the dimorphism and dioecism of parasites—may have grown into existing types by successive stages—a form evolved for one simple purpose proving useful for a second, and advancing upon that new line.

PHYSIANTHUS ALBENS.

BY CHARLES ARMSTRONG.

Read before the Biological Section November 4th, 1889.

The plant which I bring before your notice to-night belongs to the Order *Asclepiadaceæ*, a large order of more than 600 species, nearly all of them very beautiful climbing plants, some of the rest very curious.

Periploca Græca is I think the only hardy shrub in the order. All the rest are natives of hot climates. The genus *Hoya* (the wax-plant of our greenhouses) are fleshy-leaved creeping or climbing plants with umbels of sweet wax-like flowers. The *Pergularias*, climbing yellow flowered plants, are also beautifully sweet. Sap of *Gymnema Lactiferum*, a native of Ceylon, is used instead of milk where milk is scarce. Some others are used for food. On the other hand this plant on the table, a *Stapelia* (you would think it a cactus) with *Duvalia*, *Orbea*, *Obesia*, *Tridentia* and others in which the stems are fleshy, with small points or bracts instead of leaves, have flowers rich in colours and markings, but so offensive in odor that they almost make you sick; I might say that they smell like rotten meat. A few of the order are natives of our own country. You know them by the names of *A. Cornuti* (milk-weed), *A. Tuberosa*, (pleurisy root), etc.

I have thus far trespassed on your time in order to give you some idea of the strange difference which may exist in an order. The plant before us is the *Physianthus Albens*. The calyx is large, five-parted; corolla, companulately urceolate with five swellings outside at the base, and a corresponding number of cavities inside; limb, spreading a little, five-cleft; column, inclosed; stamineous corona of five leaves; leaflets, cucullate, furnished each with a horizontal scale outside; anthers, terminated by a membrane; pollen, masses pendulous, fixed by their tapering tops; stigma, ovate, two-horned at the apex; follicles, ovate, ventricose, bent downwards, semi-bilocular;

seeds, comose, adhering to the lamellæ of the dissepiment ; twining, herbaceous plants ; leaves, opposite, cordate ; racemes, interpetiolar, few-flowered, cymose, flowers white.

It was first introduced about 1830 from the Province of St. Paul, Brazil, but did not become popular. About three years ago it was brought forward by the enterprising seedsman Peter Henderson as the "cruel plant." It well deserves the name, for the moths observed (about sixty) were all caught by their proboscis. They were all of one species (*Plusia Gemma*) and remained hanging till they died of starvation.

The hard edges of the cucullate leaflets are pressed together at the top and are open at the base, and I think have a slight contractive movement when touched; certain it is that when the moths try to withdraw their tongue from the nectaries it is caught in the wedge formed by the meeting of the two edges. If the insect was stronger it might withdraw its tongue, and in so doing the pollen masses would stick to it, and on penetrating the next flower, would leave the mass on the stile. My conclusions, so far as I have gone, are that the insects so caught cannot aid in cross fertilization. In its native state it is possibly done by humming birds or very large insects. Future observation may show the few pods we get are fertilized in the earlier part of the season by humming-birds or *Sphingidæ*, and I would ask you during the coming season to note carefully our native *A. Cornuti* and *Tuberosa* and obtain as many specimens as possible.

CITY SANITATION AND SEWAGE DISPOSAL.

BY L. J. CLARK.

It gives me great pleasure to have the opportunity of again bringing before your attention a subject fraught with so much interest to the people of Toronto, as the safe and economic disposal of its sewage. This is a subject that is engaging the attention and taxing to the utmost the ingenuity of all urban municipalities where the health of the community is held in any regard.

It is also with a good deal of diffidence that I take up a subject we might naturally look for the solution of, at the hands of medical men and civil engineers. Perhaps you will say that it is on the theory that "fools rush in where angels fear to tread," but I would ask you to reserve judgment till you hear what I have to say on the subject, and then render your verdict according to the facts submitted.

City sanitation in its broader sense applies to water supply, house construction, plumbing, street cleaning, meat and milk inspection, etc., as well as sewage disposal, but as those departments are in competent hands, I shall on the present occasion confine myself to the latter subject.

Before entering into the particular scheme I advocate I shall briefly refer to some of the schemes already in the field.

They may be designated: 1st, as Messrs. McAlpine and Tully's; 2nd, Mr. C. Sproat's; 3rd, Messrs. Herring and Gray's; 4th, Porous Carbon System; and 5th, The Iron deodorizing process. The two latter methods may do very well in small towns and inland cities where there is only a choice between these ways and land filtration or sewage farms. But where there is such a cheap and effectual way of getting rid of the trouble, as obtains in Toronto, they are quite uncalled for.

Mr. Emil Knichling has collected some valuable information as to the cost of the various ways of disposing of city sewage. He was employed for one whole year by the civic authorities of Rochester to devise a scheme for meeting the sewage difficulty of the east side of the city, and after a careful comparison of the various methods he makes the following comparative statements :

1. By Chemical Treatment	\$595,000
2. By Filtration without cultivation	620,000
3. By Sewage Farming with cultivation	860,000
4. By Discharge of crude sewage into Lake	300,000

The above is the estimated cost for the purification of sewage for 63,000 population.

When we consider that Rochester is 6 or 7 miles from the lake we can see how immensely this tells in favor of the City of Toronto discharging its crude sewage into the Lake, situated as it is on the lake shore.

Furthermore, Prof. Laut Carpenter, in his recent report, says : "The value for manure of the sediment obtained by subsidence is 'nil,' and that the deposit obtained by any of the so-called precipitation processes is almost 'nil.' I do not say that they do not in some cases produce a clear effluent, but at considerable cost, and there are *no returns* from the sale of manure."

Another writer says : "That the titles of the companies that have been chartered to convert sewage into manure and failed would fill a good sized volume." And in Messrs. McAlpine and Tully's report they quote authority stating "that *farmers would not haul it away for nothing.*"

The cheap and effectual method I referred to a short time ago is to send it out into the Lake into deep water by the force of gravity, the cheapest and most effectual *mode* in the market.

This brings me back to consider Messrs. Herring and Gray's scheme as well as Mr. Sproat's, as both these schemes require a large *annual outlay for pumping.*

This is the first objection, and not only on account of its expensiveness but also its offensiveness, as the following quotation from the Minutes of Civil Engineering, Vol. 94, referring to the Cheswick Sewage System will show :

“The smell of the sewage is, as a rule, most offensive on Sundays, especially in the evening, when it is often so bad as to make the engine-room *intolerable* even to men accustomed to sewage smells.”

Mr. Baldwin Latham says :—“It may be said in the generality of places, if due provision be made for storage, and if the principle of interception be also taken into account, there are few places in this country that need to resort to the expensive process of pumping the sewage in order to secure a free out-fall.”

In the face of all this, why, I ask, should a system be adopted that is both expensive and offensive till the most thorough investigation has proved beyond a doubt that *gravity* is unequal to the task?

The second objection I take to the aforesaid scheme (H. and G.'s) is the syphons across the Don. The wells of these, they admit, will have to be cleaned. But they give us no indication how it is to be done, nor have they included in their estimates anything to meet it. This would be no small item if the same precautions be taken to keep these syphons free that are taken with the Boston syphon.

My third objection to the scheme is the location of its outlet pipe, together with the screening station proposed at Balmy Beach and Victoria Park. What an *unmitigated nuisance* would thus be created along that beautiful part of the lake front! All chances of its ever becoming a pleasure resort would be nipped in the bud. It would certainly prove a millstone around its neck.

But last and greatest of all objections is the insecurity of its outlet pipe from becoming choked, or I may rather say the certainty of its becoming choked. It stands to reason that the amount of sewage is dependant on the amount of the city water supply, and as that averages about 12,000,000 gallons per day, we cannot look for a greater amount than that to flow through our outlet pipe; and, indeed, in the dry season of the year, after deducting what is used for sprinkling lawns and streets, for building purposes, and what is converted into

steam in our many steam-boilers, we shall find that we will have a much less amount than that.

Now, as Messrs. Herring and Gray propose to have an outlet pipe 2,000 feet long and 6 feet in diameter, running out into the lake, the simplest arithmetical calculation will show the velocity with which a given quantity of water will flow through said pipe :—

12,000,000	per day	will give vel. of	9.4	inches	per sec.
9,000,000	“	“	7.0	“	“
8,000,000	“	“	6.25	“	“

This last I consider all we could count on in dry weather for flushing the outlet pipe, viz., $6\frac{1}{4}$ inches per second.

Now it was proved beyond any question by such men as Beardmore, Neville, Latham and Knichling that a velocity of $2\frac{1}{4}$, $2\frac{1}{2}$ and 3 feet per second is necessary to make them self-cleaning. By reference to the table we find that under the most favorable circumstances, viz., 12,000,000 galls. per day, we only get a velocity of about 9 inches per second, or just one-third of what it should be. The inevitable consequence will be that the heavy parts of the sewage that have been carried along in the sewers where the fall has been sufficient will immediately begin to subside when it reaches the submerged part of the pipe, and where the velocity will be as before stated. I venture to predict that if such a scheme were carried out it would not continue in working order one season through.

An instance in point has recently occurred at the Orillia Asylum, where the sewage emptied into the lake through a pipe 200 feet long. Some of the property owners along the water-front complained and 200 feet more was added on. The result was a blockade, and the pipe had to be opened at the former place.

Now let us turn to a brighter prospect. I believe I have a sovereign balm for every evil I have pointed out in the foregoing schemes. It consists in attaching a flushing tank arrangement to an intercepting system somewhat similar to Messrs. McAlpine and Tully's which I shall briefly describe as follows :—

For the sake of analogy we may compare it to a tree-trunk, its roots and branches. Beginning at the top of the trunk we would

start at say the intersection of Gerrard Street and Yonge Street, thence along Gerrard Street East, intercepting Church and Jarvis Street sewers until we meet Parliament Street. Thence down Parliament Street to a little South of King Street, where a flushing tank would be situated. From the flushing tank we would continue South to Front Street, then turn East along Front Street till we meet the Don River. Then sink under the bed of the river to the Eastern side, then follow down the angle made by the bed of the river with its East bank to its new outlet, then turn a little to the East out of the current of the stream and continue out to deep water. Starting from the corner of Parliament and Gerrard, a part of the present Parliament Street sewer may be utilized as far south as Shuter Street. We would there tap the present sewer and take a branch to our flushing tank. The flushing tank and the approach to it would be capable of containing about 500,000 gals. of water and would have an *elevation of 32 feet*. The outlet pipe from the tank out into the Lake would require to be a steel one 6 ft. in diameter, and this would constitute the root of the tree.

The main branch would be an intercepting sewer along Front Street from the Garrison Creek sewer to Parliament Street, where it would connect with our outlet pipe. The second branch would be a similar intercepting sewer on the east side of the Don from about Pape Avenue and running west to join the outlet pipe at the east bank of the Don. Then when the present King Street West sewer is completed from the Subway to Dufferin Street we would have the whole city from west of Dufferin Street to east of Pape Avenue provided for.

The junction of the branches on Front Street East and West would be provided with check valves so hinged that they would offer no resistance to the flow of water towards the outlet, but as soon as the pressure came in the opposite direction they would close and prevent regurgitation in the sewer.

This would then be the working of the system. All the sewage in that part of the city north of Gerrard Street would be brought down the Parliament Street sewer and into the flushing tank, which would be furnished with an automatic flushing arrangement so that when

the sewage in the tank rises to a height of 32 feet it would open the check valve and allow the whole contents to rush out into the Lake. As soon as the tank would be empty the valve would close again and allow it to fill and again empty, etc., etc., "as long as grass grows and water runs," according to the old adage. The time required for the tank to empty would be less than 7 minutes. The time to fill would depend on the supply. If 4,000,000 gallons of sewage were intercepted in 24 hours the tank would be filled eight times or once in 3 hours. If less the time would be longer.

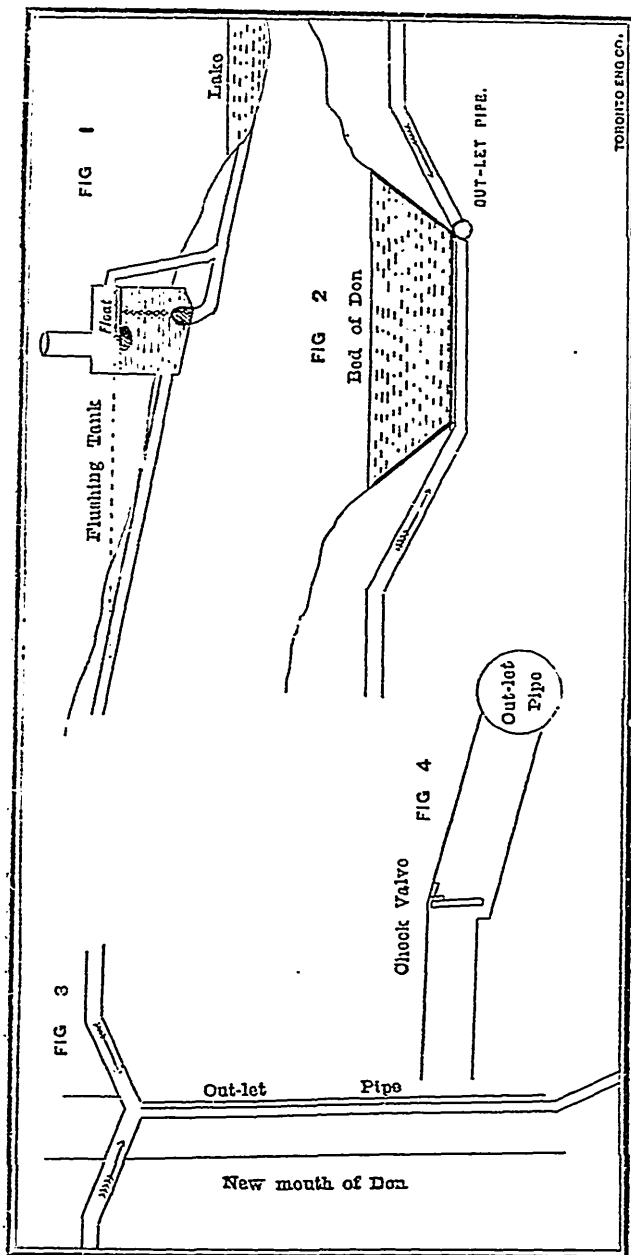
Four flushes per day would be quite sufficient to keep the outlet pipe free, as that is the object of the tank. The velocity of the outlet pipe would be from 6 to 10 feet per second, and would carry along bricks, stones, pieces of iron or lead.

During the interval between the flushings the sewage from Front Street East and West would keep up a constant flow through the outlet pipe, only being checked by the closing of the valves when the tank was in operation.

This short cessation, instead of being a disadvantage to the system, would be a decided advantage to it, as it would produce a slight ebb and flow at each flushing of the tank, which would help to scour it in its lower levels. The fall in Front Street from the bottom of Garrison Creek sewer to the level of the water at Parliament Street, a distance of 11,000 feet is 9.3 feet or 1 foot in 1,193 feet, a very good fall and capable of giving a velocity of $4\frac{1}{2}$ feet per second flowing two-thirds full. Buffalo is projecting a sewer now with a fall of only 1 foot in 4,650 feet. I am afraid they will have trouble there. A reference to the map and drawings will help to make the above description clear.

The map shows probably the best location for the flushing tank. It is provided with a ball and float as shown in Fig. I. This is not an essential part of the system, as a syphon or any other device might be used to open and shut the tank.

Fig. II. shows the bed of the Don with outlet pipe sunk in the angle formed by the bottom with the East bank. The intercepting



sewers of Front Street—West and East—join here in the outlet pipe.

Fig. III. shows a plan of the same.

Fig. IV. is a check valve to be placed in the branches to prevent regurgitation when the flush is on. It is so constructed that it always remains open and offers no obstruction to the flow of sewage towards the outlet, but when the pressure comes in the opposite direction it closes. Their position is indicated in the map, at letter *a, a*. The several outlets indicated on the map by *b, b, b, b* will be referred to later on.

I wish now to call your attention to the capacity of the system and show how it will be able to meet the requirements of the city when it contains 1,000,000 people. A five foot sewer on Front Street West, running $\frac{2}{3}$ full would deliver 32,000,000 gals. per day; allow $\frac{1}{4}$ as much for the East of the Don, 8,000,000. Then supposing the tank fills every 15 minutes, it will deliver 2,000,000 per hour, equal to 48,000,000 per day, making a total of 88,000,000 gals. This is a very liberal allowance, being 88 gal. per head. The Waterworks will have to wake up before that time comes.

I come now to the consideration of that part of the subject that has exercised men's minds perhaps more than anything else, namely, the contamination of the city's water supply by allowing the crude sewage to discharge into the Lake. I think that I can show that such a fear is quite groundless. Prof. Laut Carpenter says in his communication with our Mayor and the Board of Health as follows: "With much that has been said both in Chemical and Engineering reports on the self-purification of water, first by discharge into running water of some miles in length and shallow, and second by discharge into a large volume of water containing oxygen I am disposed to agree. I know of many cases in which the first is relied on, for example the Thames (England) receives the sewage of many towns on its banks, such as Reading, Windsor, etc. And yet the water drawn lower down the river for supplying the City of London still passes the test very well. London is considered a healthy city."

During the past summer I visited several American cities for the

purpose of acquiring information on the sewage problem. I found the City of Cleveland more nearly circumstanced like Toronto in that respect than any other place I visited. It has its Cuyahoga River, which is an intensification or aggravated form of our Don. Then they have an artificial harbor much less in size than our bay, into which this river with its discharge from twenty sewers runs, giving a concentrated condition of our own water front. Now, when we consider their intake of water is only one mile from the outlet of their harbor, what need have we to fear when we put five miles between our intake of water and the discharge of sewage? The danger in our case would be just one twenty-fifth of theirs. I was curious to know what an analysis of their water would reveal, so procured a copy of their Water Works report. A very comprehensive series of tests had been made on samples taken at distances of $\frac{1}{2}$ mile, 1 mile, $1\frac{1}{2}$ miles and 2 miles from the shore, a sample was taken 15 miles from the shore at a depth of 75 feet for a standard of comparison, and the following quotation contains the opinion of the "Water Works trustees:"—"It will be a source of general public satisfaction to know that there is no material difference in the water at the present inlet and at other points, and that the supply now furnished is almost equal in purity to that obtained 15 miles from the shore, and that in but few cities in the country are the people so fortunate in having an abundant supply of pure water and at so little cost."

To satisfy myself still further I obtained a report of the Medical Health Officer, Dr. Ashman, which I also found to be very complete. It gave a general death rate of 18.78 per 1000, and of diphtheria and typhoid fever of about 14 in 10,000. These statements indicate that Cleveland is a very healthy city notwithstanding the nearness of its intake of city water to the harbor outlet. I notice that the general death rate for the seven cities of Quebec rises to 31 per 1000 and that the infantile mortality is almost incredible. Through the kindness of Dr. Canniff I obtained statistics which enabled me to deduce the general death-rate of Toronto, which I found to be a little over 19 per 1000, and of diphtheria and typhoid fever to be 13 per 10,000, so that we stand about par with Cleveland. There is not the shadow of a doubt but that there would be perfect immunity from danger in Toronto with the sewage discharge five miles from the city water intake. With regard to the self-purification of impure

water I have a theory which I would recommend to the members of our Biological Section for further investigation. I think it is conceded by all scientists that vegetable life precedes animal life, and also that animal life—fish for instance—cannot live in pure distilled water.

Then it follows that water capable of supporting animal life must contain nitrogenous sub-marine vegetation to be maintained by the nitrogenous production of plants or animals being conveyed into it from the land. It appears to me that if the sewage of the City of Toronto was allowed to flow well out into the Lake and was well distributed, its noxious elements would be disposed of in the following ways. A large amount of it would become oxidized by the free oxygen of the water and another portion would enter into new compounds, promoting vegetable growth, and whatever might be left would be so utterly weakened by dilution as to be entirely harmless. I believe no more harm to our water would arise from a moderate amount of sewage going into the lake than would be done to vegetables and grains, by the application of manure to the soil. The latter is often overdone by our market gardeners, and the result is an unhealthy production of garden "sass." The former is often overdone, as may be witnessed any day at the foot of Yonge Street.

In order to secure a better distribution of the sewage at the outlet, I would recommend that openings be made at three or four different places in the pipe, so that each one might be used a year at a time and then rest for two or three years. I believe that by this method in process of time there would become established in the immediate neighborhood one of the best fish feeding grounds in the lake. It is worth looking into.

The biological analysis of various samples of water made by Prof. Ramsay Wright bears out my contention that no danger to the city water can arise from depositing the sewage in the Lake at a sufficient distance from the intake. He says, "The following are the results obtained on the 8th and 22nd of June respectively. In most cases the number of bacteria given is an average of two and sometimes three samples taken in different bottles."

No. 1. Eastern Gap, June 8th	5000
No. 2. Bell Buoy	0
No. 3. Western Gap	1000
No. 4. Pumping Well	519
No. 5. Reservoir (Rosehill)	10
No. 6. Tap, School of Science	17

A number of other tests was made, but the above is sufficient to show that bacteria do not find their proper environment and necessary pabulum out in the free waters of Lake Ontario.

The analyses that have been made by Dr. Ellis are quite as satisfactory as those of Prof. Wright. I would strongly recommend that these analyses be made periodically and published in the city papers. It would also be well to make a special analysis at the present time of the sewage at the foot of Yonge Street to prove the effectiveness of the Conder system.

I now come to my last consideration and that is, what will it cost to bring about this desirable state of affairs? And here I may say that no city that I have seen or know anything about can be drained so cheaply as Toronto.

While Brockville, Kingston and Ottawa, or Rochester on the other side of the line, have to drift their way through rock and contend with ravines we have nothing of the kind in the city proper, and the slope to the south and east is all that could be desired.

Our largest expenditure would be for the outlet pipe. I have based the cost of this on the price paid to Mr. J. Abell by the city for the water works extension, 12,500 feet of steel pipe, 6 feet in diameter, at \$12 per foot would cost \$150,000. For laying the same I have made an estimate of \$80,000, and as Mr. McNamee, of Montreal, gets \$40,00 for laying the water works pipe nearly the same distance, viz., 10,600 feet, with a lot of rock excavation to make, I must surely be on the safe side. For Front Street sewer Messrs. Herring and Gray estimated \$57,212 from Garrison Creek to Parliament Street, I allow \$120,000 as I require a larger sewer. For making connections with the present sewers, \$20,000. These are Messrs. Herring and Gray's figures for all the connections from Garrison Creek to Pape Avenue:—4,000 feet on Gerrard Street, at \$10 per

foot, \$40,000; 1,500 feet on Parliament Street, \$15,000; flushing tank, \$20,000; and finally 10 per cent. margin for contingencies, \$48,500,—making a total of \$533,500.

CONDENSED STATEMENT OF COST.

1. Outlet pipe, 12,500 ft. by 6 ft. dia., \$12	\$150,000
2. Laying same.....	80,000
3. Front Street sewer, 11,000 ft.....	120,000
4. Connections with present sewers	20,000
5. Gerrard Street sewer, 4,000 ft.	40,000
6. Parliament Street sewer, 1,500 ft.	15,000
7. Flushing Tank.....	20,000
8. East of the Don.....	40,000
	\$485,000
9. Engineer's expenses and contingencies, 10%..	48,500
	\$533,500

I have increased some of these items from my first estimate, on the advice of a friend who has had a large experience in works of this kind.

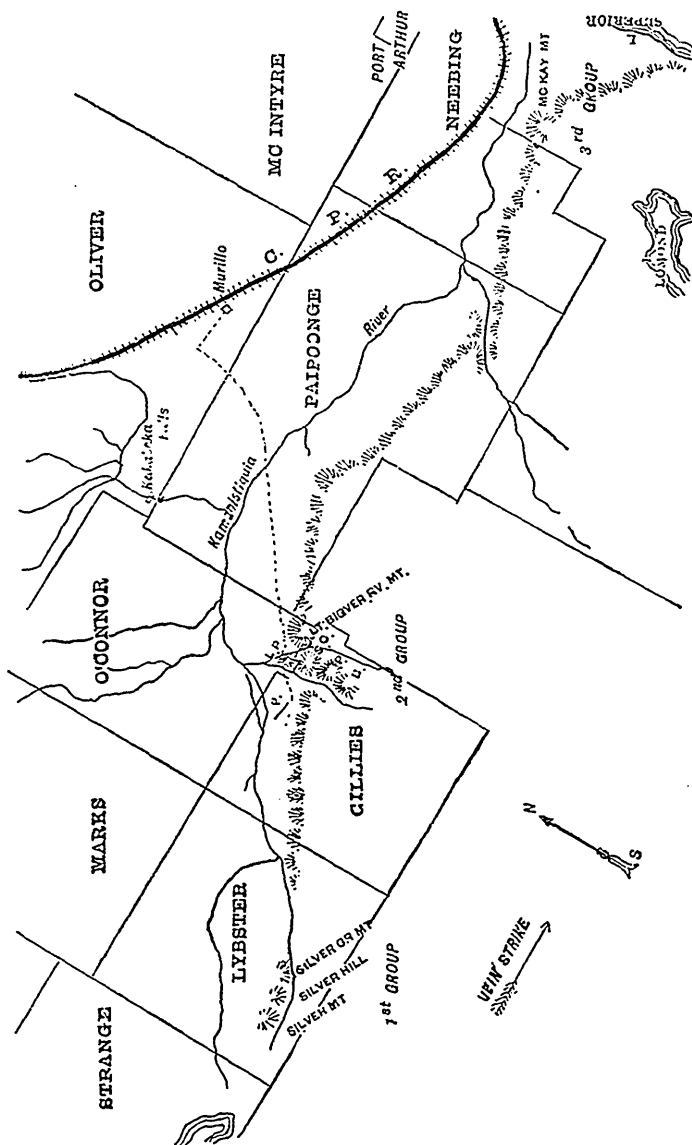
And now, gentlemen, I have laid before you a scheme which I believe to be entirely unique, and which I believe will pass the most crucial test. Indeed I consider that in laying it before the professional acumen of the society I am submitting it to the most competent tribunal in this city, and if it meets with your approval I shall be satisfied.

KAMANISTIQUIA SILVER-BEARING BELT.

BY HERBERT R. WOOD, *Fellow of Toronto University.*

1. Descriptive *Geology* and *Topography*.
2. *Mineralogy* of *Veins*.
3. *Geology* of veins and brief notices of *Mines*.
4. *Prospects* as a *Mining District*.

The Kamanistiquia Silver Belt, or that portion of country extending along the south bank of the Kamanistiquia, beginning, roughly speaking, at McKay Mountain, and trending nearly direct west to Whitefish River, is from a geological and mineralogical point of view of great interest. It consists of a series of trap-covered bluffs and hills, the base and sides of which are formed by the silver-bearing slates (Animikie slates of Sterry Hunt) of pre-Cambrian age. The entire region about Port Arthur lying both to the east and the west, including Thunder Cape and Pie Island, while subjected at some remote age to volcanic overflow, presents in its facial features as well as in the character of the trap evidences of six separate and distinct periods of eruption. The trap-rock taken from Little Pig Mountain, lying about midway of the belt, is on the surface porphyritic in character holding crystals of *diallage* in a black matrix, while taken from a depth of 30 or 40 feet is a compact hard rock of even texture. The trap rock taken from McKay Mountain seems to lie in three or at least two bands; the upper trap layer, lying at the top of the mountain one thousand feet high, differs considerably from second layer; between these siliceous slates are situated, grey and black or dark grey. These series of coarse grained trap layers indicate two periods of overflow, the middle or lower trap layer being in all probability coeval with the trap covering the bluffs and hills of the belt to the westward. Five miles to the north-east of Port Arthur in the vicinity of the Shuniah Mine, the trap again seems to present a different



The shaded portion very roughly represents the Silver Belt's limit on the north.

character, underneath the fine-grained trap diabase or siliceous like slate is found, while in the town of Port Arthur itself along the lake shore, another layer of coarse-grained trap is found. There seems to be only the one solution to these layers—different periods of overflow and subsequent cooling. Or, it may be possible that a fault or slip may have extended along the country from McKay Mountain to White Fish Lake, but of this I have no satisfactory evidence. Some of the trap contains Magnetic Iron Ore and it all holds water, some Manganese also Fe O, and large percentage of silica.

Through the valleys at the foot of the bluffs a heavy layer of hard pan or clay lies ; this has been formed no doubt from the fallen trap which has gradually become disintegrated or decomposed. It is in places sixty or seventy feet deep ; underneath this lies the trap again which would look as if depressions or faults had indeed occurred in the country. The thickness of the trap varies from ten to a hundred feet or more, and it rests unconformably on the slates. These slates vary in hardness as I am informed by the miners who drill every little distance very markedly. They are dark black, holding considerable free carbon, so that where slakensides or slips are observed the free carbon rubs off on the hand. Iron pyrites is scattered through them to some extent and a very singular occurrence are the nodules, boulders, or concretions of a hard crystalline character occurring through them. These are usually crystalline and hard resembling trap and having frequently in their centre iron pyrites, or a more coarsely crystalline mineral resembling asbestos. While they are usually crystalline I have observed them of a laminated texture resembling the slates as well. Sometimes the iron pyrites is disseminated irregularly through them. They weigh from a few ounces upwards to two or three tons. I am unable to offer any satisfactory theory regarding their formation.

Small nodules of iron pyrites are also quite common, presenting no radial structure as observed in the iron pyrites nodules occurring in the chalk in the South of England. These slates are laminated or bedded, they present no slaty cleavage, nor are they very often thrown up or distorted, usually lying horizontally. There are three groups of veins situated in this belt—one at Whitefish Lake, constituting the Silver Mountain group ; another at the Beaver Mine, 15

miles east of the Silver Mountain, and about twenty-five miles west of the McKay Mountain; the third lying in a group of Islands along the shore of Lake Superior, in Jarvis Island, and McKellar Island.

These veins with hardly an exception run north-west and south-east. But that they should occur in only three groups or localities seems very improbable, and further prospecting will no doubt develop a complete series of fissures throughout the belt. They vary in width from mere formation stringers a finger's breadth, and not properly speaking a vein, to 16 feet in width. I have only been able to make observations in the second group of veins comprising some ten or twelve as yet discovered veins. With regard to the veins generally speaking they are true fissures filled no doubt from below. They belong to the class of ribanded veins, the vein matter being most large calcspar quartz, accompanied by fluorspar, heavy spar, zinc blende, iron or copper pyrites, argentite, native silver, galena, and traces of pyrrargyrite. They vary in width at different depths, pinching in frequently to a hand's breadth and often splitting, sending out branches enclosing large quantities of slate. Though the order of occurrence of the vein matter is usually zinc blende or galena lying next to the walls of the vein followed by quartz or calcspar, these are frequently reversed and often no blende or galena is observed (see drawings) whatever. The Silver-bearing minerals are found only in zones or streaks, and while the centre vein may assay satisfactory mill returns, the ore ready for smelting is only in pockets.

The Native Silver occurs in five conditions :

A. In wire-like forms thickly disseminated through the quartz.

1. This may be coarse and without pieces radiating, or attached.
2. Very fine closely knit, making the gangue of which little is present indistinguishable. May be mixed with some sulphide, or alone.

B. Occasionally mixed with nuggets of sulphide, but this is rare.

C. In coarse strings, in coarse-grained calcite, which if the calcspar

be detached are six or seven inches long, twisted, and usually tarnished.

D. In fine hair or moss-like masses associated it may be with a little wire silver in a vug in the quartz.

E. Associated with iron pyrites in vug in calcite—Beaver Mine.

NOTE.—One specimen of native silver taken 75 feet underground, Badger Mine, the silver seems to be in thin sheets along the cleavage planes of calcite. This is an interesting specimen and a section of which under microscope would fully explain. The silver seems almost in the character of a pseudo-morph after the calcite.

NOTE 2.—Occasionally in leaf in the neighboring slate or in the quartz of the vein.

The *Argentite*, *Silver Glance*, *Black Sulphide of Silver* occurs under four conditions :

1. *As leaf* in the seams of the quartz, or coating calcite crystals, and also in the slate contiguous to the vein. Frequently a thin seam or leaf coats the slate next to the vein matter, and from this apparently little stringers are observed running in to the vein between the quartz crystals, filling small cavities and forming nuggets.

2. *As strings* closely mixed with the quartz gangue giving it all a uniformly dark color.

3. *As nuggets*, or massive, from an ounce or less in weight to six or seven pounds, chiefly found in coarse-grained drusy calcite, also in vugs in the quartz.

4. In *feather-like forms*, as is seen in native silver, filling the gangue entirely so that it is scarcely discernible.

NOTE (a). A great deal of the darker zinc-blende has argentite intimately associated with it. Thin folia-like pieces of sulphide lying between the cleavage planes of the blende or coating it on the surface.

(b). The argentite is frequently associated with iron pyrites.

(c). Galena is frequently closely associated with the argentite, but I am informed that it does not carry silver.

The *Argentite* is malleable, of lead grey and almost black color, frequently iridescent and brittle, thus resembling stephanite. It exhibits a radiating fibrous structure in botryoidal nuggets. Perfect crystallization is very rare, though I have observed rhombic dodecahedrons, cubes, and cubo-octohedrons and combinations of dodecahedron cube and octohedron.

Zinc Blende.

1. *Light yellow*, called *resin blende* by the miners.

2. *Dark brown, liver-colored blende* brown SPR.

3. *Dark or black (black jack)* with which the argentite is very commonly associated either as thin foil coating the blende, or interpenetrating it in the cleavage planes. Some of this blende assays as high as \$300 per ton.

a. As regards its position in the vein it usually lies next the walls associated with galena in some of the veins, or about the detached pieces of slate which are frequently present in the quartz matrix.

b. It is also occasionally scattered through the vein matter.

In the linings of blast furnaces I have seen the same order as (a) the zinc blende lying next to the firebrick and mixed with it, then followed by galena coating it.

Native silver when associated with the blende is usually mixed with the light colored variety, and very rarely with the liver colored variety.

It is occasionally crystallized. I have observed tetrahedrons and combinations of tetrahedron and rh. dodecahedron associated with crystals of fluorspar.

NOTE.—Very frequently thin seams of liver colored blende lie in the slate next to the vein.

Fluorspar.

The amethystine colored which is considered a good indication of silver by miners and which is more or less common in all these veins.

The green colored is very plentiful in some veins and usually found in the central portion of vein coating quartz crystals.

It is crystallized in cubes and octohedrons and cubo-octohedrons.



One specimen in my possession shows an amethystine colored cube within a green one.

An interesting mineral is *mountain tallow* as called by the miners that which is a decomposed *talc* or *steatite*. Its formula $3MgO, SiO_2, H_2O$. It is very common in these veins frequently associated with asbestos or a *tremolite*. In the Beaver Mine it occurred in masses a foot or more in width, almost filling the entire vein. It is undoubtedly an alteration product of the slates which frequently present seams of *talc* in their structure. It is very soft cutting like tallow and of a variety of colors, green, bluish-green, and turning brick red. It holds considerable mechanically combined water which on evaporation destroys the color, leaving the green and bluish-green varieties a dirty white color resembling in its physical properties meerschaum. It is frequently associated, in fact usually associated with the nuggets of argentite occurring in the coarse-grained calcite.

Calcite.

This occurs usually coarse-grained and free from *met. silver*, though thin folia of sulphide of silver underlying the crystal faces are common.

The various crystal forms which the calcite assumes are interesting.

The following forms I have observed :



1. *Hexag. prism—pentag. rhomb. planes.*



2. *Hexag. prism—three rhomb. planes.*



3. *Hexag. prism—rhomb. and basal plane.*



4. *Hexag. prism—the hemi form predominating, and rhomb. planes.*



5. *Hemi hexag. prism—and three rhomb. planes.*



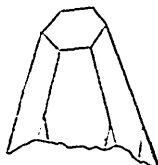
6. *N.B.—These few figures roughly drawn are simply given to illustrate the variety of forms occurring in these veins.*



7.



8. *Hexag. prism.*

9. *Hexag. tables*—rare.10. *Hexag. pyramid* with basal plane, and prism planes, rare.11. *Hexag. prism* and *hexag. pyramid*.

Many other forms including several twin forms—rhombohedrons and others.

The calcite at times occupies the vein entirely. It is then usually drusy and accompanied by nuggets of *argentite*.



Quartz.



Usually massive white crystallized in short hexagonal pyramids, the prism planes being very short—*amethyst* smoky brown, pink. I observed one twin form as figured.

NOTE.—Frequently the vugs in the massive quartz contain nodules of *argentite* to which seams lead and through which evidently the sulphide has penetrated.

Iron Pyrites.

Present in considerable quantities in some veins, associated often with the *argentite*, and also with the mountain tallow. It is frequently plentiful in the slate lying next to the vein.

Crystallized cubes—cubo-octohedrons.

Baryta.

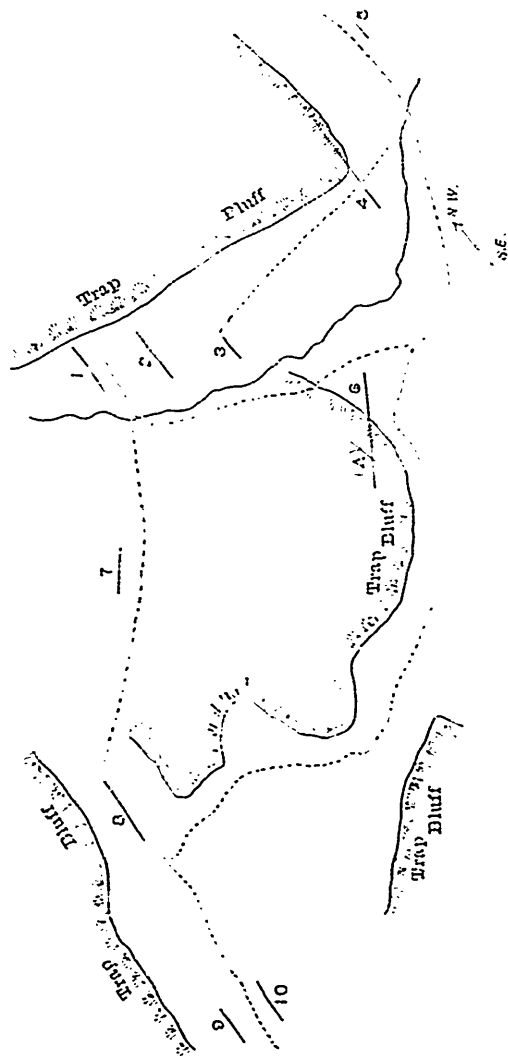
This not present in any great quantities in any of these veins.

Galena.

Usually present in all these veins in a greater or less degree.

1. Associated with the blende the darker varieties along vein wall.
2. In cubes and grains disseminated through portions of quartz.
3. Associated with the argentite but yielding no silver, so I am informed by the present assayer Mr. Brent, at the Badger Mine.

NOTE.—Crystallized in *cubes*, *cubo-octohedrons*, the latter frequently predominating—also *octohedrons*.



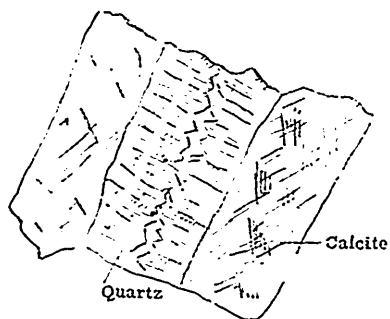
SECOND GROUP VEINS.

The dotted lines represent trails.

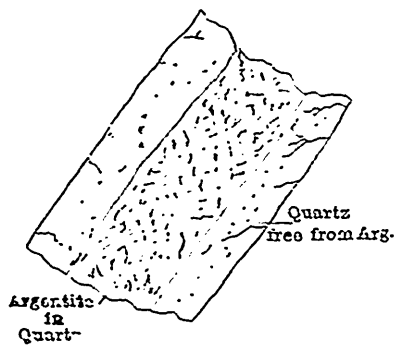
- | | |
|--------------------|-------------------------------|
| 1. = Badger. | 6. = Beaver (A) = cross vein. |
| 2. = Porcupine. | 7. = Ontario. |
| 3. = Silver Creek. | 8. = Rabbit Mountain. |
| 4. = Little Pig | 9. = Big Bear. |
| 5. = Peerless. | 10. = Caribou. |

VEIN ROCK.

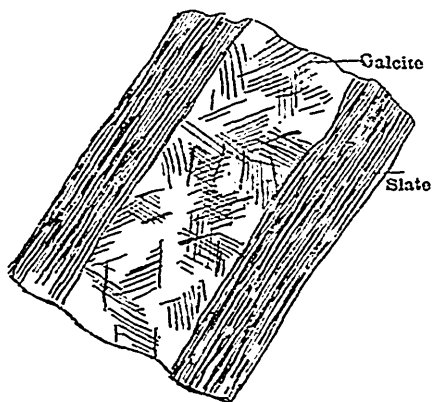
I.



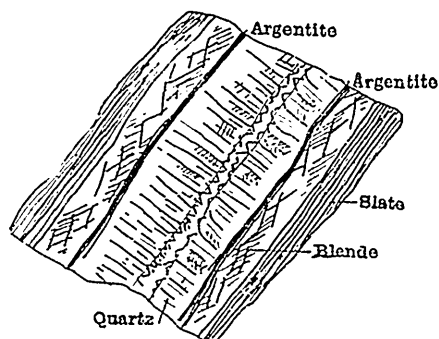
II



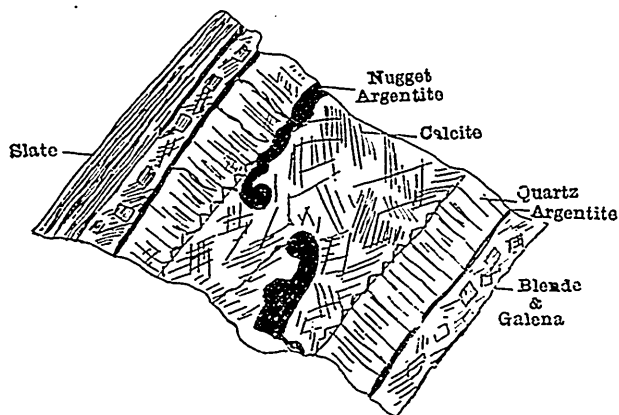
III.



IV.



V.



These veins have, with one or two exceptions, the same general strike, *i.e.*, north-west and south-east. They are true fissures, and have, no doubt, all been produced by the same convulsion of nature. They are, roughly speaking, members of that series known as *ribanded veins*, though they assume at times a sort of brecciated character owing to the presence of bits of slate in the matrix. They dip south with a slight inclination from the vertical. The ore in its richest zones, occur in pockets or limited portions of the vein—but generally speaking the vein matter is all available as average mill-rock. I believe these veins to have been filled from below by *hot siliceous* waters depositing their mineral constituents in the orders above mentioned. The richest ore it is said commonly occurs at the contact of

trap and slates, while little or no silver-bearing mineral is found in the vein intersecting the trap.

The second group is undoubtedly the most interesting, but in general characters the veins of the first group, *i.e.*, *Silver Mountain Group*, lying in the neighborhood of Whitefish Lake resemble it.

The following is a brief sketch of these veins of second group :

See map—

1. *Badger Vein.*

This vein in operation for one year and has turned out very rich ore. It is from six inches to three feet in width. It splits a great deal, and at a depth of one hundred and fifty feet the pay-streak has diminished to two or three inches while the vein is three feet wide. It would seem as if the bonanza were about exhausted. One shaft has been sunk and three levels driven, two being air levels. This cannot be denominated as a very regular vein.

2. *Porcupine.*

Runs parallel with and but a quarter of a mile distant from the Badger. Is two feet in width at surface and has been mined with excellent results, but owing to financial difficulties is abandoned.

3. *Silver Creek.*

But slightly opened by a tunnel driven in the side of the bluff. Good ore has been taken out but at present not worked.

4. *Little Pig.*

A very wide strong vein split in two parts at surface, one portion alone yielding rich ore which must evidently be the pay-streak. This vein is six feet wide at outcrop.

5. *Peerless.*

Typically the same, lies two miles west of Little Pig, but *strike and dip* the same.

6. *Beaver.*

This vein is apparently an exception to the general rule in this region as regards direction. It turns north-east instead of north-west, but I am inclined to think that this is a twist produced by contour of trap-nets, and as they open it with more extended levels, it will I believe assume the direction taken by the others.

Three shafts have been sunk here, but one has been closed up. They are 350 feet from bank here, the vein being from two to four feet wide though considerably split. This is a regular vein and very promising. As this vein intersects a mountain it has been comparatively easy to mine; three air levels being present, No. 3 being used as an adit. They have encountered gas here at lowest depths. It burns with a pale-blue flame and is very light, evidently light carburetted hydrogen gas. That it may be produced by the alteration of the slates into talcose rock at considerable depths is not improbable.

7. *Ontario Vein.*

Formed by the union of two stringers which unite some ten or twelve feet below surface to form a vein a few inches in width. Has not been at all developed.

8. *Rabbit Mountain Vein.*

Of unusual width and at one time extensively mined, but at present abandoned. Its strike, dip, and the general character of the mineral the same.

9. *Big Bear.*

A promising vein though it has been but slightly opened up.

10. *Caribou.*

This has also been considerably mined, but at present not worked.

I believe this region must ultimately take a foremost place among the silver mining districts of America. My reasons are these: *First*, the universal excellence of the ore; while much is extremely rich run-

ning as high as ten or twelve thousand dollars a ton, it is all good average stamp rock. *Second*, the close proximity of the ten locations in the second group, all within a radius of three or four miles, leads one to believe the belt has plenty of out-crops awaiting the prospector's pick. *Third*, as the depth of mining increases the value of the ore does not necessarily decrease, as the richest ore is in zones or pockets liable at any moment to come into view. *Fourth*, it is as yet a new mining region and but awaits the thorough and satisfactory trial of one or two mines to ensure the development of all. *Fifth*, from a geological point of view the veins should all be rich satisfactory mines. They trend with hardly an exception north-west and south-east, and are true fissures in all probability formed by the one convulsion of nature and similarly filled. The difficulties that have hitherto attended the development of this mineral region seem to have been in several cases the temerity of the capitalists unacquainted with mining and the expenditure involved in sinking into rich zones of ore. In other cases properties have become mortgaged, mismanaged, till finally abandoned. What is needed is thorough mining to take hold with lots of capital and push the mines and sink till the mine becomes a settled organization, working, yielding, and paying.

THE MAROONS OF JAMAICA AND NOVA SCOTIA.

BY J. C. HAMILTON, LL B.

Negro slavery disappeared from the Province of Nova Scotia during the latter part of last century, without legislative enactment, by what Judge Haliburton, in his history of Nova Scotia, calls "latent abandonment beneficial to the country." There remained a number of emancipated provincial slaves and still more Africans who escaped to Nova Scotia from the United States. These latter people were called "Loyal Negroes." In 1821 a party of nearly one hundred of them emigrated to Trinidad. But before this, on the founding of Sierra Leone on the west coast of Africa, about twelve hundred went there, arriving in 1792. Four years after this, three ships entered the harbour of Halifax, laden with the most extraordinary cargoes that ever entered that port. Prince Edward, Duke of Kent, then in command at Halifax, boarded the *Dover*, was met by Colonel W. D. Quarrell, Commissary-General of Jamaica, with whom Mr. Alexander Ouchterlony was associated, and a detachment of the 96th Regiment drawn up on board to receive him. Black men of good proportions with many women and children, all in neat uniform attire, were mustered in lines. Other transports, the *Mary* and *Anne*, were, his Highness was informed, about to follow, and the main cargo was six hundred Maroons exiled from Jamaica with soldiers to guard them and meet any attacks from French vessels on the voyage.

The Prince was struck with the fine appearance of the black men, but the citizens had heard of how Jamaica had been harried by its black banditti, and were unwilling at first to have them added to their population. When the Spaniards first settled in the Antilles in 1509, it is estimated by Las Casas, Robertson, and other historians that the Indian inhabitants amounted to ten million souls, but by the

exercise of the utmost atrocities, these were melted away until none remained to work as slaves in the mines or in the fields.

“Here,” says Las Casas, “the Spaniards exercised their accustomed cruelties, killing, burning, and roasting men, and throwing them to the dogs, as also by oppressing them with sundry and various torments in the gold mines, as if they had come to rid the earth of these innocent and harmless creatures. So lavish were the Spanish swords of the blood of these poor souls, scarce 200 remaining, the rest perished without the least knowledge of God.”

When conquering Cuba, Hatuey, a cacique, was captured and fastened to the stake by these emissaries of a Christian King. A Franciscan friar laboured to convert him and promised him immediate admittance into heaven if he would embrace the Christian faith. “Are there any Spaniards” said he, “in that heaven which you describe?” “Yes,” replied the monk, “but only such as are worthy and good.” “The best of them,” returned the indignant cacique, “have neither worth nor goodness. I will not go to a place where I may meet one of that accursed race.”

As a military measure this cruel murder was successful. All Cuba submitted awed by the example made of poor Hatuey. When Hispaniola was discovered, the number of its inhabitants was computed, says Robertson on the authority of Herrera, to be at least a million, certainly a large and probably excessive estimate. They were reduced to sixty thousand in fifteen years. Jamaica was not so populous, but not a single descendant of the original inhabitants existed on that island, says Dallas, author of the “History of the Maroons,” in 1655, when Venables and Penn, under commission from Oliver Cromwell, landed there. Caves were found where human bones, evidently belonging to the oppressed and harried natives, covered the ground. Famine and cruelty desolated these lovely islands. Then the Spaniards decoyed natives of the Lucayo islands to Hispaniola (now Hayti) to the number of forty thousand, and these shared the fate of the former inhabitants.

The scheme for importing Africans to take the place of the natives, was then pushed on under the guise at first of mistaken philanthropy,

but supported by the high prices paid for the victims stolen from Africa.

Genoese merchants were the first who began a regular commerce in slaves between Africa and America, receiving a patent for this purpose from Charles V., of Spain, in 1518. The traffic had begun however in 1501, and King Ferdinand had publicly sanctioned it in 1511. Captain, afterwards Sir John Hawkins, led the English in the slave trade in 1562. In 1567 he had for partner in such enterprise Sir Francis Drake and secured a cargo of slaves off the Guinea coast. Many charters, incorporating adventurers, with monopoly of the importation of slaves from Africa, were granted by James I., Charles I., Charles II., and their successors down to George III. In the single year 1792, twenty Acts of the Imperial Parliament could be enumerated whereby the trade was sanctioned and encouraged.

The number of Africans so introduced into Jamaica was soon in excess of the white population, and thus continues to the present day. Bryan Edwards in his "History of Jamaica," summing up the assets of this island, put down 250,000 negroes at £50 stg. each, making £12,500,000 in 1791. Let us remark the extraordinary ethnic revolution that has taken place in the Antilles since European interference therein began. As examples, take the two islands Hispaniola and Jamaica. At the time of Columbus, Hispaniola, according to Robertson, had one million souls. Before the year 1500, the aborigines had been swept away, and black and white races were taking their places. Now the population of the two States into which this island is divided, namely, Hayti and the Dominican Republic, jointly amounts to about 900,000 souls.

The Indian race, to the number of half a million, as stated by old historians, likewise disappeared from Jamaica. In 1881, its population numbered about 581,000 of whom those of pure white blood seem to have been less than 20,000, the remainder being Africans or of mixed African and European Stocks. Thus it has taken nearly four centuries, with the aid of forced African migration, to fill the places of the aboriginal people.

But to revert to the time when Spanish rule was brought to an end

in Jamaica, masters and slaves were uneducated, slothful and poor. The exports consisted only of some cocoa, hogs, lard and hides.

When the officers of the great Protector conquered the island, in May 1655, most of the old white settlers fled, or voluntarily removed to other Spanish possessions. In many cases slaves were left on the abandoned plantations. They still sympathized with their old masters and communicated with them. They took to the woods and defiles called "cockpits," with which parts of the island abound. They harassed the English, decoyed away their slaves, destroyed outlying plantations, and murdered those who ventured abroad without escort. This mass of savages increased in numbers, both by natural causes, and by the addition of run-away slaves, and were known as Maroons. They lived on the game, fruits, and edible roots with which the country abounded, and on the flesh of the wild hog which roamed in the forest and fed on the mast of trees and roots. No country could probably be found more fitted to foster the wild and lawless life which this race passed for nearly two hundred years in Jamaica, with its varied natural resources.

The name Maroon is generally derived from the word meaning "hog hunters," but some take it from the Spanish "Simaron," meaning ape. Either derivation is significant of this people and their habits. In the year 1730, trouble with the Maroons culminated in a revolt, led by Cudjoe, a bold Coromantee negro. His brothers Accompong and Johnny were subordinate leaders, Cuffee and Quaco were his captains. Insurgent slaves, and other ill-disposed negroes joined them. The island was harassed for many months by the bold and skilful attacks of these daring men. It was impossible to take them, as they hid in the glens and "cockpits" enclosed by rocks and mountains. Loyal "Blackshot" negroes and Mosquito Indians from the American coast were hired to aid the soldiery and militia. Peace was at last secured by Colonel Guthrie and Captain Sadlier in March, 1738. It was arranged that Cudjoe and his people should settle in the parish called Trelawney, which is in the north-west part of Jamaica, the place where the Maroons lived mainly for the next forty years.

They still retained much of their African savagery, were illiterate, and no attempt was made to Christianize them. Their language was a conglomerate of African dialects and Spanish, with a sprinkling of English and French. They had fetish and obeah rites and ceremonies. Polygamy obtained, the husbands living in turn two days with each wife. As to the poor wives, the labour imposed on them and the miseries of their situation left them little leisure to quarrel with each other. A white superintendent lived in each of the Maroon towns as a magistrate and the means of communication with the whites and the Government, and he with the chief men had judicial power in ordinary cases. Cases of felony were reserved for the regular magistrates and courts with white judges.

By 1795 the Trelawney Maroons numbered about 1,400; then the second war began, Lord Balcarres being Governor. Montague was the leading Maroon chief; the English Colonels Sandford and Gallimore and many men were slain. Blackshot Indians were hired again to aid the redcoats, of whom there were more than 1,000, and the militia. Still the war lasted with much loss and expense to the island.

Col. Quarrell had heard of the Chasseurs and their famous dogs used in Cuba to track and secure marauders and runaways both white and black. After much discussion the colonel was dispatched in a vessel to Cuba, and secured 40 Chasseurs and 100 dogs, with which he returned. The effect their arrival had on the Maroons was wonderful. The dogs were not even let loose, but were paraded with the soldiers. The terror they excited, added to weariness of the struggle, led the insurgents to gradually come in and submit. All who had not surrendered by a certain day, six hundred in number were, as they came in, sent off to Montego Bay and Spanish Town under guard. The war had cost the island \$1,000,000. The Legislature voted \$100,000 more, and ordered the 600 to be banished from Jamaica. Colonel Quarrell and Mr. Ouchterlony were put in command of the three ships which carried them and their guard of redcoats, and so they came to Halifax. Colonel Quarrell had recently travelled in Upper Canada, in which Governor Simcoe was then extending a system of self-government. The Colonel praised the Governor's administration, and told the Jamaica people of the large cultivated

districts and beautiful towns then rising in the forests north of Lake Ontario. He desired to settle the Maroons in Upper Canada, as he also thought the climate suitable to them. The Assembly, however, with the approval of the Home Government, decided on Halifax. It seems strange that the Home Government had not learned from the experience of the "Loyal negroes" to avoid the choice of a place with climate so unsuited to the race. The vessels arrived and were inspected as stated. The Maroon men were asked what they would do, and expressed willingness to work for "Massa King" and "Massa King's son." The General and Admiral and Governor, Sir John Wentworth, arranged terms with the people. The Maroons were landed from the vessels—the *Dover*, *Mary*, and *Ann*—on which they had come. Admiral Richery, with a threatening French squadron, was off the coast, and it was desirable to get the fortifications completed. The Maroons worked on them. They laboured mainly on earthworks since obliterated by more extensive and permanent improvements to the great citadel and harbour made when the Duke of Wellington was Prime Minister. Maroon hill near Halifax still retains their name. Their chief men were Colonels Montague and Johnston, Major Jarratt, and Captains Smith, Charles Shaw, David Shaw, Dunbar, and Harding.

For two years these people lived in Nova Scotia, but made little progress in civilization or religion. Most of them were settled on lands at Preston; some families were removed to Boydville. A schoolmaster was appointed and the religious training was entrusted to an orthodox gentleman, the Rev. B. G. Gray, and a curate with glebe house and salary supplied. Sir John Wentworth asked for a grant of £240 per annum, to be applied in religious instruction and education. He hoped this course would "reclaim them to the Church of England, and disseminate Christian piety, morality, and loyalty, among them." He also sent an order to England for many things required by them, among which were "40 gross coat and 60 gross white vest metal buttons, strong; Device an Alligator holding wheat ears and an olive branch. Inscription: Jamaica, to the Maroons, 1796" He described the people as "healthy, peaceful, orderly, inoffensive, and highly delighted with the country."

The Commissioners, Messrs. Quarrell and Ouchterlony, with not less

than three chief men of the Maroons, held court for the trial of smaller offences, a custom introduced from Jamaica. In time both the Commissioners resigned through disagreement with the Governor and were succeeded by Captain Howe, and he by Mr. Theophilus Chamberlain. The two winters which ensued were unusually severe, and the Maroons, unaccustomed to such weather, suffered and became discouraged. They became generally dissatisfied, refused to work regularly, and were addicted to cockfighting, card playing, and the like amusements.

The zeal of the worthy Governor who was a very sanguine philanthropist, had been well intended, but "little effect was produced from weekly sermons on doctrines of faith, delivered to old and young promiscuously in a language not understood," says Edwards. "Some smoked their pipes, and some slept during the services." The old chief Montague, whom all the Maroons honored, was asked if he had understood the sermon, and wishing not to appear ignorant, replied: "Massa parson say, no mus tief, no mus meddle with somebody wife, no mus quarrel, mus set down softly."

The Governor assembled the men and urged them to adopt Christian marriage customs, but after much discussion they would say: "Dat white people fashion, dat no do for we poor Maroon." They referred Sir John and his good friends to their wives. "If you please, you may make the women take swear, we men can't do so," meaning the marriage vow, to hold to one wife. The women were called in but none would resign her right to her husband, or to such divided interest as she held in him. They all objected to "take swear," and went off, says Dallas, in an uproar clamouring at the men for making such a proposal. Some of these colored ladies even broke out in "insolent observations on the latitude in which some of the greatest characters known to them had indulged."

On 21st April, 1797, Sir John Wentworth, in a letter to the Duke of Clarence, said of the Maroons: "From my observation of them, neither Jamaica or any other island would be long at peace, nor secure from insurrection, were these people among them." . . . I am convinced they will be a useful and faithful corps to oppose an invading enemy. "They do not wish to live by industry, but prefer war

and hunting." It had proved impossible to change the "leopard's spots." Two years under the regime of the amiable Governor with the most approved appliances and surroundings of civilization had not worked the expected miracle. The Halifax experiment had failed. It appeared too that the Maroons were divided into three tribes jealous of each other. One captain complained that he had not a well furnished house and cellar to exercise hospitality. Another longed for the yams, bananas, and cocoa of Jamaica. A third wanted hogs to hunt. The weekly sermons were unattended. Parents did not object to bring their children to be baptized, but as to marriage adhered to their old free customs with polygamy, and funerals were conducted with inherited Coromantee ceremonies. The Government still treated them with kindness, but found watchfulness necessary.

In April, 1799, two officers and fifty militia men were for a time posted near the Preston settlement to guard against threatened disorder. Before this when Halifax was threatened by the French, who had attacked Newfoundland, the Maroon men had been formed into companies, and their chiefs had received military commissions which flattered their vanity.

But they were not self-supporting and the cautious Haligonians fought shy of all responsibility for their maintenance. Jamaica had to foot their bills, adding to the original appropriation of \$100,000, further sums of \$40,000 and \$24,000, but now the Government of that island intimated that it would no longer consider the Maroons as their wards. The mother country did not forsake them, but took their views on the situation, if so we may refer to the very limited knowledge of these people. They had heard of Sierra Leone and asked to be allowed to follow the twelve hundred "Loyal Negroes," who had gone there seven years previously.

It is not probable that the Maroons knew then that these, their predecessors, to that sultry and unhealthy peninsula on the West Coast of Africa had not shown signs of improvement in civilization or appreciation of the choice, now clearly mistaken, of this site as a partly missionary, partly commercial establishment.

They probably had but limited knowledge of the tornadoes that

prevail in some seasons, and of the fog and rain that wrap that land in frequent gloom.

Some of these facts were no doubt known to the Duke of Portland, the Crown Minister, whose wisdom had directed them, against Colonel Quarrell's advice, to Halifax with its winter snow and fog. His Grace decided to remove them to equatorial heat and fog, and hoped that their military spirit and training in Nova Scotia would be instrumental in keeping the surrounding savages in order, and useful even as an example to the "Loyal Negroes," so called, who lacked discipline and character. Governor Wentworth, now that his missionary zeal had cooled, and Admiral Richery with the French fleet was no longer off the coast, seemed to be possessed of but one desire; to see them depart from Nova Scotia without exception. On the sixth day of August, 1800, Sir John Wentworth informed the Duke that five hundred and fifty-one Maroons had embarked on the *Asia* and set sail from Halifax. Four had deserted to avoid going. Many, Sir John stated, regretted to leave, and all expressed gratitude to Nova Scotia. They arrived in Sierra Leone, in October, 1800. As caged animals let loose, seek again their native wilds, so did these brave people return to the land of their ancestors, holding fast to their old inbred customs and superstitions.

The spirit of Saxon civilization passed lightly over them, but did not penetrate their breasts. But a kindly feeling prevailed, and the Maroon has not since raised his hand against the white man. The children and grand children of the Maroons of Trelawney, may now be found on the West Coast of Africa.

They are reported to have aided the Government in repressing revolts of savage tribes, and in opening to the advance of freedom and civilization the Dark Continent, from which their ancestors were torn by the cruel Saxon. Doubtless the brave deeds of their forefathers, who defied the redcoats and held their own so long in the defiles and cockpits of Jamaica, and the terrors of ice cold Nova Scotia are still the theme of song and story in the cottages of Freetown by the Sierra Leone rivers and Isles de Loss. Doubtless there tired mothers still crying babes to rest with tales inherited from their parents of the terrible Chasseurs and their savage dogs of war.

NOTE.—Since the above abstract was put in print I have received an interesting communication from Hon. E. J. Barclay, Secretary of State of Liberia. He gives gratifying information as to the progress made and position taken by some of these people on the West Coast, stating: "The only family that I have known to come direct from the Dominion was Henry Rankin and wife, who came from a place called Muskoka. They arrived in 1873 or '4. Mr. Rankin has since died." . . . As regards the "Loyal Negroes," yclept Nova Scotians, on the coast, who were sent to Sierra Leone, and the Maroons who followed, I have, through the kindness of Mr. Boyle, Liberian Consul at Sierra Leone, been furnished with a list of the most prominent of these persons in the British West African colonies:—

Nova Scotians.—John B. Elliott, J.P., J. W. Elliott, and John Priddy, of Sierra Leone; Rev. S. Trotter Williams and Mr. Porter, government contractor, of Waterloo; J. F. Eastman, M.D., Assistant Colonial Surgeon, Gold Coast Colony.

Maroons.—Dr. T. Spilbury, Colonial Surgeon, Gambia; J. Gabbidon, Commissariat clerk; and Hon. Francis Smith, Assistant Judge, Gold Coast Colony; Nash H. Williams, B.L., of Freetown; and Mr. Samuels, Trelawney Street, Freetown, Sierra Leone.

There is a Maroon church at Freetown called St. John's, of which the Rev. J. A. Cole—an able native African—is the pastor. It will be noticed that the old home in Jamaica is remembered in the name of a Freetown street.

A PRELIMINARY LIST OF ALGÆ COLLECTED IN THE
NEIGHBOURHOOD OF TORONTO.

BY

J. J. MACKENZIE, B.A.

The following is a list of Algae which I collected and identified during the summer of 1889, with the localities in which they were found. I purpose continuing my observations, and will endeavour to add to this list from time to time.

The classification and nomenclature is that used in Wolle's "Fresh Water Algae of the United States" and "Desmids of the United States."

CHLOROPHYCEÆ.

CONFEROIDEÆ.

COLEOCHAETACEÆ—

Coleochaete, Breb.

C. scutata, Breb.; Humber.

OEDOGONIACEÆ—

Oedogonium, Lk.

Oe. crassiusculum, Wittr.; Ashbridge's Bay.

Bulbochaete, Ag.

B. intermedia, D. By.; Humber.

B. gigantea, Pringsh.; Humber.

CONFERVACEÆ—

Draparnaldia, Ag.

D. glomerata, Ag.; Humber.

Stigeoclonium, Kg.

S. nanum (Dillw.), Kg.; Humber.

Chaetophora, Schrank.

C. endiviaefolia, Ag.

var. *ramosissima*, Rab.; Humber.

Aphanochaete, H. Br.

A. globosa (Nord.), Wolle; Humber.

Cladophora.

C. fracta, Kg.; Don Valley.

C. glomerata, Kg.; Humber.

Ulothrix, Kg.

U. zonata (W. and M.), Aresch.; common everywhere.

Conferva, Lk.

C. vulgaris, Rab.; Humber.

SIPHONÆ.

VAUCHERIACEÆ—

Vaucheria, D.C.

V. sericea, Lyngb.; Don Valley.

V. Dillwynii, Aq.; High Park.

V. sessilis (Vauch.), D.C.; High Park and Don Valley.

V. geminata (Vauch.), D.C.; Don Valley.

PROTOCOCCOIDEÆ.

VOLVOACEÆ—

Volvox, Ehrb.

V. globator, Linn.; Don Valley.

Eudorina, Ehrb.

E. stagnale, Wolle; Ashbridge's Bay.

Pandorina, Ehrb.

P. morum, Bory.; Ashbridge's Bay.

Gonium, Mueller.

G. pectorale, Mueller; High Park. This plant I have only found once; it seems to correspond to the European species.

Chlamydococcus, A. Br.

C. pluvialis, A. Br.; rain-water pools; common.

PROTOCOCCACEÆ—

Pediastrum, Meyen.

P. Boryanum, Menegh; Ashbridge's Bay.

P. Ehrenbergii, A. Br.; High Park.

P. tetras, Ehrb.; High Park.

Scenedesmus, Meyen.

S. candatus, Corda.; High Park, Humber, Ashbridge's Bay.

S. acutus, Meyen; same localities as preceding.

Characium, A. Br.

C. Naegelii, A. Br.; Don Valley.

Protococcus, Ag.

P. viridis, A.; common everywhere.

Polyedrium, Naeg.

P. gigas, Wittr.; Ashbridge's Bay. Possibly this is not an independent species, but simply a stage in the development of Hydrodictyon.

PALMELLACEÆ —

Raphidium, Kg.

- R. polymorphum, Fres.; Ashbridge's Bay and High Park. It is claimed by some authors that Raphidium is a stage in the development of Pediastrum.

CONJUGATÆ.

ZYGNEMEÆ—

Spirogyra, Link.

- S. flavescens (Hass.), Cleve.; Don Valley.
 S. longata (Vauch.), Kg.; Ashbridge's Bay.
 S. nitida (Dill.), Link.; Don Valley.
 S. jugalis (Dill.), Kg.; Ashbridge's Bay.
 S. majuscula, Kg.; Ashbridge's Bay and Humber.
 S. orthospira (Naeg.), Kg.; Don Valley.
 S. quadrata (Hass.), Petit.; Don Valley.

Zygnema, Kg.

- Z. anomalum (Hass.), Kg.; Humber.

Pleurocarpus, A. Br.

- P. mirabilis, A. Br.; Humber and High Park.

DESMIDIEÆ—

Hyalotheca, Ehrb.

- H. dissiliens (Smith), Breb.; Humber.

Desmidium, Ag.

- D. Swartzii, Ag.; Humber.

Penium, Breb.

- P. digitus (Ehrb.), Breb.; Humber.
 P. closterioides, Ralfs.; Ashbridge's Bay.

Closterium, Nitsch.

- C. gracile, Breb.; Humber.
 C. Cucumis, Ehrb.; Humber and Don Valley.
 C. turgidum, Ehrb.; High Park.
 C. striolatum, Ehrb.; High Park, Humber, and Don Valley.
 C. Dianæ, Ehrb.
 var. arcuatum, Breb.; Ashbridge's Bay.
 C. acuminatum, Kg.; High Park.
 C. Jenneri, Ralfs.; Humber.
 C. Venus, Kg.; Humber and High Park.
 C. Ehrenbergii, Menegh.; Humber.
 C. rostratum, Ehrb.; Ashbridge's Bay.
 C. Brebissonii, Delp.; Humber.

Docidium, Breb.

- D. crenulatum (Ehrb.), Rab.; Humber.
 D. Trabecula (Ehrb.), Naeg.; Ashbridge's Bay.

Calocylindrus, D. By.

- C. Cucurbita (Breb.), Kirch.; Humber.

- C. Thwaitesii*, Ralfs.; High Park.
Cosmarium, Corda.
C. ovale, Ralfs.; Humber.
C. Cucumis, Corda.; Humber.
C. granatum, Breb.; Humber.
C. tumidum, Lund; Humber, High Park.
C. nitidulum, De Not.; Humber, High Park, and Don Valley.
C. Naegelianum, Breb.; High Park.
C. pseudopyramidatum, Lund; Humber.
C. anisochondrum, Nord.; Humber.
C. Botrytis, Menegh; Humber, Don Valley, and Ashbridge's Bay.
C. Brebissonii, Menegh; Humber.
C. conspersum, Ralfs; Ashbridge's Bay.
C. intermedium, Delp; Humber and High Park.
C. reniforme (Ralfs), Arch.; Humber.
C. brierme, Nord.; High Park.
C. protractum (Naeg.), Archer; Humber,
C. suberenatum, Hantzsch; High Park.
C. Broomei, Thwaites; Humber, Ashbridge's Bay.
C. biretum, Breb.; Humber, High Park.
C. Beckei, Wolle; Humber
- Xanthidium*, Ehrb.
X. antelopaeum (Breb.), Kg.
 var. *polymazum*, Nord; Ashbridge's Bay.
- Arthrodesmus*, Ehrb.
A. Incus (Ehrb.), Hass.; Ashbridge's Bay.
- Euastrum* Ehrb.
E. inerme, Lund; High Park.
E. rostratum, Ralfs; Humber.
- Micrasterias*, Ag.
M. furcata (Ag.), Ralfs; Ashbridge's Bay.
- Staurastrum*, Meyen.
St. dejectum, Breb.; Humber.
St. Margaritaceum Ehrb.; Humber.
St. crenulatum, Naeg. (Delp.); Humber, Ashbridge's Bay.
St. rugulosum, Breb.; Humber.
St. alternans, Breb.; Humber, Ashbridge's Bay.
St. cyrtocerum, Breb.; Humber.
St. gracile, Ralfs; Humber.
St. nanum, Wolle; High Park.
St. pseudosebaldi, Wolle; Humber.
St. hirsutum (Ehrb.), Breb.
St. furcigerum, Breb.; Ashbridge's Bay.

CYANOPHYCEÆ.

NOSTOCACEÆ—

Mastigonema (Fisher), Kirch.

M. aeruginosum (Kg.), Kirch.; Humber.

Rivularia.

R. dura, Kg.; High Park.

Tolypothrix, Kg.

T. flaccida, Kg.; Humber,

Nostoc, Vauch.

N. commune, Vauch.; High Park and Don Valley.

N. coeruleum, Lyngb.; High Park.

Anabaena, Bory.

A. flos-aquae, Kg.; Humber and High Park.

A. stagnalis, Kg.; High Park.

Cylindrospermum, Kg.

C. macrospermum, Kg.; High Park.

Lyngbya, Ag. et Thur.

L. vulgaris (Kg.), Kirch.; Humber.

Oscillaria, Bosc.

O. percursa, Kg.; High Park.

O. Froelichi, Kg.

var. *fusca*, Kg.; Humber.

O. princeps, Vauch.; High Park.

CHROOCOCCACEÆ—

Merismopedia, Meyen.

M. glauca, Naeg.; High Park.

Chroococcus, Naeg.

C. turgidus, Naeg.; High Park.

ON THE USE OF FAUNAL LISTS.

By ERNEST E. THOMPSON.

The following is a brief abstract of Mr. Thompson's paper:

"A Faunal List is a full catalogue of the animals known to inhabit any given area, and is usually understood to include remarks on the relative abundance in that area, on any irregularities of distribution, and on seasonal or other changes. It is, therefore, a work founded on (first) correct identification of the animals, and (second) correct particular identification of the time and place of their occurrence.

The evident object of a faunal list is the exact mapping out of a country in such a way that the distribution, etc., may be compared with other physical maps, *i.e.* arranged facts, and the reasons of that distribution understood. The end of enabling students to know what to look for is quite subsidiary and incidental.

The only possible means of preparing a proper list is by a certain very small area being watched daily for a number of years by a thoroughly competent observer, who must appreciate the necessity for scrupulous exactness and for keeping separate his ascertained facts and his theories. Let him theorize all he likes, but he must never mix his theories with, or put them forward as, facts.

It will be seen at once that the worst faults a list can have are—actual misstatement, hasty generalisation, which is partial misstatement, and vagueness, which is equivocal misstatement. No one will, I presume, deny the total depravity of actual misstatement, whether intended or not. A wrong fact is a long time in being corrected, and has marvellous power for evil. Hasty generalisation is less noxious only because it bears on its face more or less clearly the imprint of

unreliability. Vagueness is a very common vice, and many otherwise good observers have, by this unfortunate failing, nullified a great deal of their work.

Thus far I have referred to original observations only, used in the formation of a list; but, in addition, it is not only allowable, but binding on a worker, that he use all previously published or otherwise accessible reliable information to make his own list complete. In doing this he is to adhere to two rules:—First, give full credit *in print* to his authority; second, do not put into his mouth words or meanings that are not his, or, in other words, don't plagiarise and don't misrepresent.

Now, with these tenets before us, let us examine the process of making a list, and later we will enquire as to the ultimate use of so much labor.

It should be borne in mind that the settled habitation of the animal is the most important item in its distribution; notes on its migration are valuable, but must be carefully kept separate from matters relating to its true home, or, as we say more especially of birds, their summer habitat. The reason of this importance is evident, for while animals pass over all kinds of countries in migrating, they are sure, when settled down to breed, to be surrounded by just that nice adaptation of external circumstances which is their proper environment, and to understand which we are chiefly aiming.

Our naturalist, then, is supposed to have set about his list duly impressed with the necessity of giving the truth, without generalities or vagueness. The pernicious effect of untruthfulness need not be enlarged on; those of vagueness will be more or less evident to all, but hasty generalisation is not so evidently dangerous, and its *modus operandi* may be shewn.

In all ages this very error has been the parent of much degrading superstition and misery. Take an example: A shrew was seen to run over a cow's leg as she lay in pasture. The next week this cow, alone, dies of a strange disease! Obviously, the logical generalisation is that shrews infect cows with a deadly disease through mere contact!

Again: In building a heathen temple in the South Seas a man is accidentally killed. It so happens that the building proves "lucky," as we would say. Evidently it is to the death of this man that the good fortune is due. Hence the origin of a fearful custom!

Again: Two children were suffering from a wasting disease. One of them happened one day to hold the bridle of a piebald mare. This recovered; the other died. Clearly, then, the child was cured by the breath of a piebald mare!

Seeing that in these cases it was not possible to trace the course of cause and effect, as the persons concerned were without the knowledge requisite, the only logical process available for them is to look for sequent phenomena and assume them to be cause and effect, and the only fault in this logic is that too few cases were taken as a basis of the theory, *i.e.* they were too hastily generalised."

Mr. Thompson, then returning to the immediate subject, gave examples of birds and mammals, shewing how totally wrong would be sweeping generalisations founded on a few instances. He further illustrated this principle by a detailed map of the peculiar distribution in a small section of Manitoba of the *Pipilo erythrophthalmus*, and having thus shewn how erroneous would be the statement that the bird is found throughout this region, he proceeded:—

"Of course, a common expedient for avoiding the necessity of so much care in giving details is the use of the expression "in suitable places" throughout the area treated. I consider the phrase a miserable evasion. We might as well and truly say of each and every species, dead and alive, "in suitable places throughout the earth;" for it is very certain that if it is not so found it is because the area was not suitable, either actually, or unsuited through the presence of stronger competitors, or else not suitably contiguous to the birthplace of the species.

The simple facts, then, as ascertained and here shewn, are what I should offer to the public, accompanying the same with a map of the area in question, without giving any reason for this apparently erratic distribution, except as a matter of opinion—for it will be long before

any one can speak positively on the subject—and also without heeding the fact that in other regions the distribution of this same bird may be quite different, in accordance with different surroundings.”

Mr. Thompson then proceeded to enumerate the better-known elements of environment that tend to modify geographical distribution, and gave a large number of illustrations of these modifications.

Temperature, as varied by latitude, elevation, slope, exposure, etc., he considered of prime importance, and particularly dwelt on the accuracy with which birds adhere in their summer habitat to the exact isotherm that affords the nice balance of surroundings which is most favorable to the species.

Barometric pressure, rainfall, formation of surface, character of soil, proximity of bodies of water and of currents, exposure to certain winds, presence of competitors or of parasites, hygienic conditions, and vegetation were all instanced and illustrated in their bearing on distribution. The last, he stated, was of evident importance, and probably ranked next to temperature, on which, however, it is largely dependent.

“These,” he continued, “are among the known factors of environment, but there is evidence that many other more obscure influences are in operation, and there can be little doubt that every force that is or ever will be found in the whole range of the solar spectrum will be ultimately proven an important element in the various problems of distribution, so that the question finally resolves itself into a search after the total environment of each species.

I have been thus minute in tracing the known causes and aspects of distribution in order to give a fair idea of the intricacy of the problem presented, and I think it the more necessary because of late I have been compelled to make a stand for the principles of work herein maintained. I do not think any one will gainsay them; I have, at least, the best authorities of the day in harmony with my views in general, if not in detail, and it is on these lines that I have had so often to condemn Canadian work.

It will be seen that, since so much care and detail is required, no

one man can possibly gather, even in a lifetime, from his own observation, facts enough to fully and accurately map out the faunal areas of more than a few square miles. Obviously, then, if the work is ever to be done, it must be by hundreds, or thousands even, of observers uniting their efforts, *i.e.* each contributing his little mite of ascertained fact, unmarred by generalisation, and put down in such a way that it will always mark a step in advance and may ultimately be used, without revision, as material for preparing the fullest and most accurate account; and then, after a sufficiency is gathered, the whole plan, with its many complex reasons, will unfold itself to our eyes like a magnificent pattern, so intricate that no one could have imagined it, and so beautiful that its mere contemplation will be found more elevating than many a noble work that is credited with shaping the human mind in a right direction.

And what is the object of expending so much effort on so small a matter? Setting aside the incidental benefit accruing to agriculture from a right understanding of the balance of nature, also the fact that science in general, of which this is an important part, is a material benefit to mankind, as well as the not very tangible, but not the less incontrovertible fact, that a common purpose, answered by all such studies, is the cerebral development of the whole race through action on a large number of its individuals; and it is not unworthy of consideration, also, that the many who are actually taking part in the study are thereby provided with a delightful, healthy, and elevating occupation.

Apart from all this, I say: We now come to the final and great end of the study itself. When by this means we have completely worked out the geographical range of our fauna the reason for such distribution will be clear. The effect of each slight change of surroundings will be manifest, and then not only will we be able to turn to the best account the various domesticated animals and their products, but we will thereby arrive at a vastly more complete knowledge of ourselves. Discomforts and diseases hitherto inexplicable will be dispelled in a short time, perhaps, finally, by some master hand playing deftly on the constitution with a skilful combination of certain of these ascertained factors of environment. The proper authorities then will meet a plague like that of the mosquitoes

in Manitoba not by advocating the building of smudges, thereby replacing the evil by one only a grade less—a method just a step higher than the old-fashioned plan of fighting a disease by incantation—but by simple effectual scientific means. An epidemic like *la Grippe* will be unable to begin its career of death. At the very outset the cause of its appearance will be understood, and by a touch, perhaps, or a word to the people at large, the delicate machinery of its environment will be readjusted in such a way as to summarily end it at the very beginning. In this way almost all the pests that are of the nature of an epidemic on man, beast, or vegetable may be met at once and annihilated, along with the circumstances that gave rise to them.

Thus, as I have briefly endeavoured to indicate, to a greater extent probably than we have any idea of, the race will be elevated and benefitted by the pursuit of what is, after all, simply a delightful recreation."

REPLY TO MR. THOMPSON'S CRITICAL NOTE

BY J. B. TYRRELL.

In the last number of the *Proceedings*, which was received about the middle of December, 1889, there is what purports to be a "Critical Note," by Mr. E. E. Thompson, on my "Catalogue of the Mammalia of Canada," and, as the statements there made may be misleading to some of the readers of *The Proceedings*, I must ask to be allowed the privilege of a short reply, though I am surprised that the courtesy was not extended me of allowing me to make this reply in the same number in which the "Critical Note" appeared.

The first of the three pages of the "Note" is almost entirely occupied with a general vilification of the "Catalogue," and this diatribe may very well go unanswered. In the following two pages my statements regarding seven species of mammals are impugned, these statements, doubtless, being considered my most glaring errors:—

I. On the occurrence of *Felis concolor* in Southern Quebec. That the Cougar does, or did until very recently, occur in Southern Quebec is very well known, and at the present time there are two mounted specimens in the Museum of the Natural History Society in Montreal, both of which are stated to have been shot in the adjoining country.

II. On the occurrence of *Cervus Canadensis* in Eastern Canada. It is a well-known tradition that in recent times the elk was an inhabitant of the Ottawa valley, and my friend Mr. W. P. Lett, in a paper read before the Ottawa Field Naturalists' Club on March 13th, 1884, and published on pp. 101-116 of No. 5 of its *Transactions*, gives authority for the statement that within the last seventy years it

has been seen within four miles of the present site of the city of Ottawa. There are also numerous records of horns of this deer having been found in different parts of Ontario, both on the surface and just below it, many of them in quite a perfect state of preservation, precluding the idea of any great antiquity.

III. and IV. Referring to my notes on *Hesperomys leucogaster* and *Synaptomys Cooperi*, Mr. Thompson flatly accuses me of plagiarising whole paragraphs, quoting them "verbatim or nearly so" from his "List of the Mammals of Manitoba," leaving it to be inferred that he had made some original observations on these rodents that I had copied without giving him credit for them.

The facts, however, are as follows:—Mr. Thompson, in his "List," has copied from Coues and Allen's "Monographs of North American Rodentia" statements concerning the finding of the first of these species in Minnesota close to the international boundary, and the second both in Minnesota and Alaska, and he has drawn the inference that they would be found in Manitoba. I had drawn the same simple inference before Mr. Thompson's paper was published. My paragraph referring to the former species is a line and a half long and contains eighteen words, only nine of which (five of them being proper names) are to be found in Mr. Thompson's note on the same animal. My paragraph on *S. Cooperi* contains the same number of words, ten of which (two being proper names and five prepositions or conjunctions) are also found in Mr. Thompson's note. His ideas of what is meant by the expression "verbatim or nearly so" are, therefore, evidently broader than those held by people generally.

V. Regarding the distribution of *Lepus sylvaticus* in Ontario, Mr. Thompson is probably correct in saying that in the northern nine-tenths of the province the species is unknown. It is advancing northward through the southern more thickly settled portions of the province.

VI. Commenting on my "ignorant" remarks on *Geomys bursarius* Mr. Thompson says that this species "is an animal of the Mississippi valley," and then even he himself goes on to say that it has been found in Southern Manitoba—a fact of which I was not before aware. As he knows perfectly well that neither the Mississippi nor

any of its tributaries flows through Manitoba, he doubtless means by the term "Mississippi valley" the great central basin of the continent, a large portion of which is drained into the Mississippi river. He ought also to be aware that the south-western peninsula of Ontario, as regards both its fauna and flora, approaches more nearly to the central basin than to any other part of America—in fact, from a biological point of view, may be said to form part of it. *Geomys bursarius* was originally described by Shaw in the Linnaean Transactions in 1800, and his statement regarding its habitat is not that quoted by Mr. Thompson, but: "This quadruped was taken by some Indian hunters in the upper parts of interior Canada, and sent down to Quebec." (Linn. Trans., vol. v., 1800, p. 223 and tab. 8.) The fur trade of the West was then in the hands of the North-West Company, &c., who brought their furs *in bales* to Montreal and shipped them to foreign markets, so that it appears improbable that the skin was brought loose from west of Lake Superior. I have, therefore, interpreted Shaw's statement as meaning Eastern rather than Western Canada.

VII. For my "surprising statement" as to the northerly range of the black squirrel (*Sciurus Carolinensis*) I have no less an authority than Sir John Richardson, who states that specimens of his *S. niger*, which is a synonym for this species, had been sent in to him both from Penetang and Fort William.

On the question of the Indian names of the different species Mr. Thompson complains that no special alphabet is used, whereas I state in the Catalogue that the vowels are given the Continental sounds, and, being a member of the staff of the Canadian Geological Survey, I have used the simple alphabet that has been used by that corps in their reports for years past. That no marks are used representing the lengths of the vowels is a matter of considerable regret to me. The manuscript sent to the printer, which by the way is still in my possession, has the lengths of any doubtful vowels marked throughout, as in Appendix IV. to my Report on Northern Alberta; and, although in the Algonquin languages each syllable is accented or not according to the length of its vowel sound, accents were occasionally inserted for the greater convenience of pronunciation. These marks have in some way been omitted in printing.

From the above it will be seen that although a desire for brevity has forced me to omit long lists of synonyms, specific references under each species, and interesting details throughout, the errors in the Catalogue, in view of our present imperfect knowledge, are not so glaring as Mr. Thompson would like to have believed.

OTTAWA, March 13th, 1890.

REPLY TO MR. TYRRELL'S NOTE.

BY ERNEST E. THOMPSON.

Mr. Tyrrell has made a reply to my criticism of his paper that is in most respects, apart from certain preliminary adjectives, just what it ought to be. The reader, however, will be amused if he turns to my letter and reads the paragraph which Mr. Tyrrell characterizes as a "diatribe," "vilifying," etc., but which he admits to be logically unanswerable.

Mr. Tyrrell responds to my demand for the grounds on which he bases several interesting records by giving the data which should have appeared at the time, but he errs in saying that I impugned their truthfulness, as he will see on re-reading my note.

I withdraw the charges of plagiarism.

On the next question, that of *Lepus sylvaticus*, he admits he is wrong.

On the next, *Geomys bursarius*, he endeavours, by a curious juggle of words, to prove that he is right, when he himself knows he has made an egregious mistake, and would shew to much better advantage by admitting and correcting it. If he takes the trouble to look the matter up he will find that I did *not* quote "Shaw."

Mr. Tyrrell does not appear to be aware that the authenticity of the Fort William specimens has been challenged; but, even supposing it were not so, the idea of ascribing this species to the vast region that he names, much of which lies further north than Fort William, shews such a melancholy ignorance of the whole subject of faunal areas and distribution as can only be accounted for on the ground that we have here the ambitious effort of a geologist who has

suddenly turned mammalogist, and thinks to finish at a stroke a work which he would not have ventured to attempt if he had had the experience of a lifetime to guide him.

In his last item Mr. Tyrrell admits the grave omission which I pointed out, and explains that for this the printer is responsible.

It is greatly to be regretted that his desire for brevity induced Mr. Tyrrell to put observations in such a shape as to deprive them of nearly all value.

But I would again assert that the specific errors pointed out are not so much the grounds for my objection to the publication of the paper as are the wrong principles on which it is based.

Such methods of work might have passed unchallenged a hundred years ago, but are decidedly behind the age now. The author's ideas on distribution are nebulous in the extreme, he does not realize the magnitude and importance of such a work as he has undertaken, and while, as already intimated, I admit him to be a person of, at least, great enterprise, it is to be greatly regretted that he has attempted so much and done it so superficially and ill. Had he limited his field and exercised proper care and research he might have rendered to science a really valuable service.

TORONTO, 19th March, 1890.

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Shutt, Prof. F. T., M.A., F.C.S., Ottawa, Ont.	VanderSmissen, W. H., M.A., Toronto.
Smith, Prof. A. Toronto.	Walker, B. E. Toronto.
Smith, Goldwin, M.A., D.C.L. "	Watson, Rev. D., D.D., Beaverton, Ont.
Smoke, S. C., M.A., Barris- ter-at-Law "	Weaver, H. D. Toronto.
Speight, T. B., P.L.S. "	White, G. Montague, D.T.S. "
Spence, David. "	Wilgress, G. S., B.A., Bar- rister-at-Law Huntsville, Ont.
Spence, F. S. "	Williams, J. B. Toronto.
Spotton, H. B., B.A. Barrie, Ont.	Williamson, Thomas G. "
Squair, John, B.A. Toronto.	Williamson, William. "
Stewart, Louis B., C.E. "	Wilson, Rev. Edward F., Sault Ste. Marie, Ont.
Strickland, Walter R. "	Wilson, G. H. Toronto.
Stupart, Capt. R. D., R.N. "	Wishart, D. J. Gibb, M.D. "
Stupart, R. F. "	Wood, H. R., B.A. Montana, U.S.A.
Talbot, D. H., Sioux City, Ia., U.S.A.	Wright, Prof. R. Ramsay, M.A., B.Sc., Univ. College. Toronto.
Thompson, E. E. Toronto.	Wrong, Rev. G. M., M.A. "
Toeppen, Hugo, Ph.D. "	
Townsend, Joseph "	
Tyrrell, J. B., B.A., F.G.S., Ottawa, Ont.	Young, Arch. H., B.A. Toronto.

ASSOCIATES.

Armstrong, C. W	Toronto.	McCracken, Ernest	Toronto.
Atkinson, G	"	Macklin, H. G	"
Barrett, A. C	"	Maughan, John	"
Blackburn, W.	"	Maybee, J. E.	"
Bond, C. H. A.	"	Metcalf, W.	"
Brown, Hubert	"	Murdoch, A. W., Jun.	"
Brown, J. F	"	Musson, George, Jun	"
Champ, H. C	"	Pearson, Charles	"
Cockerell, L. M.	"	Phillips, W. Q.	"
Dent, C. Reade	"	Ramsey, Jack	"
Eddis, H. C	"	Staunton, Edmund	"
Edmonds, John	"	Thurston, James	"
Fleming, James H.	"	Turner, Harry	"
Goldstone, G. T.	"	Tweed, Frank.	"
Grupe, Albert	"	Tyrrell, Ernest	"
Harvey, C. H.	"	Varley, J. A.	"
Jackson, John.	"	White, Murray A.	"
Knowles, Arthur.	"	Wilby, Ernest	"

THE CANADIAN INSTITUTE.

Exchanges with the following Societies and Periodicals:

I. — A M E R I C A .

(1.)—CANADA.

Canadian Practitioner	Toronto.
Canadian Architect and Builder	“
Meteorological Reports	“
Public Library	“
Education Department	“
Provincial Board of Health	“
Publications of Provincial Government	“
Library of the University of Toronto	“
Geological and Natural History Survey of Canada	Ottawa.
Parliamentary Library	“
His Excellency the Governor-General	“
Royal Society of Canada	“
Ottawa Field Naturalists' Club	“
Canadian Mining Review	“
Entomological Society of Ontario	London.
Hamilton Association	Hamilton.
Natural History Society of Montreal	Montreal.
Montreal Medical Journal	“
Canadian Society of Civil Engineers	“
Celtic Society of Montreal	“
Library of McGill University	“
Literary and Historical Society of Quebec	Quebec.
L' Institut Canadien de Québec	“
Le Naturaliste Canadien	Cap Rouge, Que.
Natural History Society of New Brunswick	St. John, N. B.
Nova Scotia Historical Society	Halifax, N. S.
Nova Scotia Institute of Natural Sciences	“
Manitoba Historical and Scientific Society	Winnipeg, Man.

—28.

(2.)—UNITED STATES.

Bureau of Steam Engineering, Navy Department	Washington, D. C.
Smithsonian Institution	“
Bureau of Ethnology	“
Bureau of Education	“
Bureau of Statistics	“

Surgeon-General, War Department	Washington, D.C.
United States Commission of Fish and Fisheries	"
Office of Indian Affairs	"
General Weather Service of United States	"
United States Geological Survey	"
Philosophical Society of Washington	"
United States Coast and Geodetic Survey	"
Bureau of Navigation	"
United States Naval Observatory	"
Chief Signal Officer	"
United States National Museum	"
Department of Agriculture	"
Census Office	"
Anthropological Society of Washington	"
Biological Society of Washington	"
Women's Anthropological Society of America	"
American Monthly Microscopical Journal	"
California Academy of Science	San Francisco, Cal.
Technical Society of the Pacific Coast	"
West American Scientist	San Diego, Cal.
Colorado Scientific Society	Denver.
Bridgeport Scientific Society	Bridgeport, Conn.
Meriden Scientific Association	Meriden, Conn.
American Journal of Science	New Haven, Conn.
Connecticut Academy of Arts and Sciences	"
Yale College Observatory	"
Georgia Historical Society	Savannah, Ga.
Chicago Historical Society	Chicago, Ill.
American Antiquarian and Oriental Journal	"
Illinois State Laboratory of Natural History	Champaign, Ill.
Brookville Society of Natural History	Brookville, Ind.
Indiana Historical Society	Indiana.
Academy of Natural Sciences	Davenport, Iowa.
State Historical Society of Iowa	Iowa City.
Kansas Historical Society	Topeka.
Kansas Academy of Science	"
Washburn College Laboratory of Natural History	"
Academy of Natural Sciences	New Orleans, La.
L' Athénée Louisianais	"
Peabody Institute	Baltimore, Md.
Johns Hopkins University	"
United States Naval Institute	Annapolis, Md.
Boston Society of Natural History	Boston, Mass.
American Academy of Arts and Sciences	"
American Statistical Association	"
Observatory of Harvard College	Cambridge, Mass.
Harvard University Library	"

Quarterly Journal of Economics, Harvard University.....	Cambridge, Mass.
Museum of Comparative Zoölogy at Harvard College. . . .	"
Peabody Museum of Archæology and Ethnology	"
American Association for the Advancement of Science	"
Cambridge Entomological Club	"
American Folk-Lore Society	"
American Dialect Society	"
Essex Institute	Salem, Mass.
Peabody Academy of Science	"
Hemenway South-western Archæological Expedition.....	"
American Antiquarian Society.....	Worcester, Mass.
Worcester Society of Antiquity	"
Agricultural College	near Lansing, Mich.
Academy of Natural Sciences	Minneapolis.
Geological and Natural History Survey of Minnesota	"
American Geologist	"
Academy of Sciences	St. Louis, Mo.
Missouri Historical Society	"
Nebraska State Historical Society	Lincoln, Neb.
University Studies, University of Nebraska.....	"
New Jersey Historical Society	Newark, N. J.
E. M. Museum of Geology and Archæology, Princeton College	Princeton, N. J.
Trenton Natural History Society	Trenton, N. J.
New York Academy of Sciences.....	New York.
American Museum of Natural History, Central Park	"
American Society of Civil Engineers	"
Journal of Speculative Philosophy	"
Journal of Comparative Medicine and Veterinary Archives. .	"
Linnean Society of New York.....	"
New York Microscopical Society.....	"
School of Mines Quarterly, Columbia College	"
Magazine of American History	"
American Geographical Society	"
New York Academy of Anthropology	"
American Chemical Society.....	"
Electrical Review	"
Electrical Engineer.....	"
American Institute of Mining Engineers	"
Political Science Quarterly	"
"Christian Thought".....	"
The "Globe"	"
New York State Library.....	Albany, N. Y.
New York State Museum of Natural History	"
Buffalo Society of Natural Sciences	Buffalo, N. Y.
Buffalo Historical Society.....	"
Cornell University	Ithaca, N. Y.

Vassar Brothers Institute	Poughkeepsie, N. Y.	
Oneida Historical Society	Utica, N. Y.	
Rensselaer Society of Engineers	Troy, N. Y.	
Elisha Mitchell Scientific Society	University of North Carolina.	
Ohio Mechanics' Institute	Cincinnati, O.	
Historical and Philosophical Society of Ohio	"	
Cincinnati Society of Natural History	Cincinnati, O.	
Denison University, Laboratories of Biology and Natural History	Granville, O.	
State Geological Survey of Ohio	Columbus, O.	
Ohio State Archeological and Historical Society	"	
Library Department, Commonwealth of Pennsylvania	Harrisburg.	
University of Pennsylvania	Philadelphia.	
American Catholic Quarterly Review	"	
American Naturalist	"	
American Philosophical Society	"	
Academy of Natural Sciences of Philadelphia	"	
Wagner Free Institute of Science of Philadelphia	"	
Franklin Institute of the State of Pennsylvania	"	
Historical Society of the State of Pennsylvania	"	
American Catholic Historical Society of Philadelphia	"	
American Notes and Queries	"	
American Journal of Photography	"	
Prof. Daniel G. Brinton, M.D.	"	
The "Book-Mart"	Pittsburg, Pa.	
Wyoming Historical and Geological Society	Wilkesbarre, Pa.	
Rhode Island Historical Society	Providence, R. I.	
Newport Natural History Society	Newport, R. I.	
University of Virginia	Charlottesville.	
Wisconsin Academy of Science, Arts and Letters	Madison.	
State Historical Society of Wisconsin	"	—128.

(3.)—MEXICO.

Museo Nacional de México	México.	
Sociedad Científica, "Antonio Alzate"	"	
Sociedad Mexicana de Geografía y Estadística	"	
Observatório Meteorológico-Magnético Central	"	
Deutscher Wissenschaftlicher Verein	"	—5.

(4.)—CUBA.

Sociedad Antropológica de la Isla de Cuba	Habana.	—1.
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(5)—SOUTH AMERICA.

Instituto Histórico, Geográfico, e Ethnográfico do Brazil	Rio de Janeiro.	
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Annaes da Escola de Minas de Ouro Preto.....	Rio de Janeiro..
Sociedade de Geographia de Lisboa no Brazil	“
Museu Nacional do Rio de Janeiro.....	“
Observatorio.....	“
Academia Nacional de Ciencias en Córdoba.....	Republica Argentina..
Museo Nacional de Buenos Aires.....	“
Instituto Geografico Argentino, Buenos Aires	“
Sociedad Cientifica Alemana, Santiago ...	Chili.
Museo Nacional, San José	Costa Rica.
Instituto Americano, Cartago	“
La Sociedad “Amantes de la Ciencia,” Lima	Peru.
Royal Agricultural and Commercial Society of British Guiana	Demerara. —13.

II. — EUROPE.

(1.)—GREAT BRITAIN AND IRELAND.

ENGLAND.

Birmingham Natural History and Microscopical Society...	Birmingham..
Journal of Microscopy and Natural Science	Bath.
Scientific Enquirer	“
Bristol Naturalists' Society	Bristol.
Cumberland and Westmorland Association for the Ad- vancement of Literature and Science.. ..	Carlisle.
Cambridge Philological Society	Cambridge.
Cambridge Philosophical Society	“
Royal Geological Society of Cornwall	Penzance.
Royal Institution of Cornwall	Truro.
Literary and Philosophical Society of Leeds	Leeds.
Literary and Philosophical Society of Liverpool	Liverpool.
Liverpool Astronomical Society	“
Liverpool Polytechnic Society	“
Liverpool Biological Society.....	“
Royal Geographical Society	London.
Royal Astronomical Society	“
Royal Microscopical Society.....	“
Royal Society	“
Victoria Institute	“
Quekett Microscopical Club	“
Society for Psychical Research	“
Anthropological Institute of Great Britain and Ireland....	“
Royal Colonial Institute	“
Linnean Society of London.....	“
Geological Society of London	“
London Mathematical Society	“
Institution of Civil Engineers ..	“

Financial Reform Association	London.
British Museum	“
British Museum, Natural History Section	“
Palestine Exploration Fund	“
Patent Office	“
Trübner's Record	“
Physical Society of London	“
National Association for the Advancement of Social Science.	“
Sanitary Institute of Great Britain	“
“Chemical News”	“
Imperial Federation League	“
Iron and Steel Institute	“
“Iron”	“
The “Electrician”	“
Royal Institution of Great Britain	“
Aristotelian Society for the systematic Study of Philosophy.	“
Society of Arts	“
Society of Antiquaries of London	“
Literary and Philosophical Society of Manchester	Manchester.
Manchester Geological Society	“
Manchester Association of Engineers	“
Manchester Geographical Society	“
Society of Antiquaries of Newcastle-upon-Tyne	Newcastle-upon-Tyne.
North of England Institute of Mining and Mechanical En- gineers	“
Midland Institute of Mining, Civil and Mechanical En- gineers	Barnsley.
Somersetshire Archaeological and Natural History Society ..	Taunton.

—53.

SCOTLAND.

Aberdeen Philosophical Society	Aberdeen.
Dumfriesshire and Galloway Natural History and Antiqua- rian Society	Dumfries.
Royal Society of Edinburgh	Edinburgh.
Society of Antiquaries of Scotland	“
Royal Scottish Society of Arts	“
Royal Physical Society	“
Edinburgh Botanical Society	“
Edinburgh Geological Society	“
Royal Scottish Geographical Society	“
Library of the University of Edinburgh	“
Royal Philosophical Society	Glasgow.
Glasgow Geological Society	“
Natural History Society of Glasgow	“
Institution of Engineers and Shipbuilders of Scotland ..	“
Greenock Philosophical Society	Greenock.

—15.

IRELAND.

Royal Irish Academy.....	Dublin.	
Royal Dublin Society.....	“	
Royal Geological Society of Ireland.....	“	
Institution of Civil Engineers of Ireland	“	
Naturalists' Field Club	Belfast.	
Belfast Natural History and Philosophical Society.....	“	—6.

(2.)—AUSTRIA-HUNGARY.

Société Archéologique.....	Agram.	
Société Hongroise de Géographie.....	Budapest.	
L'Académie des Sciences	Cracovie.	
Historischer Verein für Steiermark.....	Graz.	
Siebenbürgischer Verein für Naturwissenschaften	Hermannstadt.	
Institut für österreichische Geschichtsforschung.....	Innsbruck.	
K. Böhmisches Gesellschaft der Wissenschaften	Prag.	
K. K. Universitäts-Sternwarte	“	
Naturhistorischer Verein “Lotos”	“	
Verein für die Geschichte der Deutschen in Böhmen.....	“	
Museo Civico di Storia Naturale di Trieste	Trieste.	
Società Adriatica di Scienze Naturali.	“	
K. K. Akademie der Wissenschaften	Wien.	
K. K. Geologische Reichsanstalt.	“	
K. K. Geographische Gesellschaft	“	
K. K. Zoologisch-Botanische Gesellschaft	“	
K. K. Naturhistorisches Hofmuseum.....	“	
K. K. Central Anstalt für Meteorologie und Erd-Magnetismus.	“	
K. K. Gradmessungs-Bureau	“	
Anthropologische Gesellschaft in Wien.....	“	
Wissenschaftlicher Club in Wien	“	
Oesterreichischer Ingenieur-und Architekten-Verein.....	“	
Internationales Permanentes Ornithologisches Comité	“	—23.

(3.)—BELGIUM.

Académie Royale des Sciences, des Lettres et des Beaux Arts de Belgique	Bruxelles.	
Société Royale de Botanique de Belgique	“	
Société Royale Belge de Géographie	“	
Musée Royal d'Histoire Naturelle de Belgique	“	
Société Royale Malacologique de Belgique	“	
Société Liégeoise de Littérature Wallonne	Liège.	
Société Royale des Sciences.....	“	
L' Université Catholique	Louvain.	
Prof. E. Pasquier	“	—9.

(4.)—DENMARK.

Kongelige Bibliotheket	Copenhagen.	
Kongelige Danske Videnskabernes Selskab	“	
Kongelige Nordiske Oldskrift Selskab	“	
Nordisk Tidsskrift for Filologi	“	-- 4.

(5.)—FRANCE.

Société Linnéenne du Nord de la France	Amiens.
Société de Géographie Commerciale de Bordeaux	Bordeaux.
Académie Nationale des Sciences, Arts et Belles-Lettres	Caen.
Société Nationale des Sciences naturelles de Cherbourg	Cherbourg.
Académie des Sciences, Arts et Belles-Lettres de Dijon	Dijon.
Union Géographique du Nord de la France	Donai.
Académie de La Rochelle	La Rochelle.
Société Géologique de Normandie	Le Havre.
Société Géologique du Nord	Lille.
Société de Géographie de Lille	“
Revue Biologique du Nord de la France	“
Société Bretonne de Géographie	Lorient.
Société pour l'Étude des Langues Romanes	Montpellier.
Société de Géographie commerciale	Nantes.
Académie des Sciences, Inscriptions et Belles-Lettres	Toulouse.
Annales des Mines	Paris.
Annales des Ponts et Chaussées	“
Société des Ingénieurs Civils	“
Société Nationale des Antiquaires de France	“
Société Géologique de France	“
Société Académique Indo-Chinoise de France	“
Société d'Ethnographie	“
Société Américaine de France	“
Société d'Anthropologie de Paris	“
Bibliothèque Nationale	“
Société de Géographie	“
Alliance Française pour la Propagation de la Langue Française	“
Musée Guimet	“
“Cosmos”	“
“Électricité”	“
Association Française pour l'Avancement des Sciences	“
Journal des Sociétés scientifiques	“
Revue scientifique	“
Revue de Linguistique et de Philologie Comparée	“
Société Zoologique de France	“
Société Mathématique de France	“
Feuille des Jeunes Naturalistes	“
Tablettes Coloniales	“

Bulletin d'Histoire Ecclésiastique et d'Archéologie Religieuse
des Diocèses de Valence, Gap, Grenoble, et Viviers. Romans.

—39.

(6.)—GERMANY.

Naturforschende Gesellschaft zu Freiburg	Baden.
Königliche Preussische Akademie der Wissenschaften....	Berlin.
Gesellschaft Naturforschender Freunde.....	“
Gesellschaft für Erdkunde.....	“
Berliner Gesellschaft für Anthropologie, Ethnologie und Urgeschichte	“
Bibliographie der Staats- und Rechtswissenschaften	“
Archiv der Mathematik und Physik	“
R. Friedländer und Sohn	“
Deutsche Geologische Gesellschaft	“
Naturhistorischer Verein für die Preussischen Rheinlande und Westphalen	Bonn.
Verein für Naturwissenschaften zu Braunschweig	Braunschweig.
Naturwissenschaftlicher Verein	Bremen.
Geographische Gesellschaft	“
Naturforschende Gesellschaft	Danzig.
Naturwissenschaftlicher Verein “Isis”.....	Dresden.
Verein für Erdkunde	“
Senckenbergische Naturforschende Gesellschaft	Frankfurt-am-Main.
Naturwissenschaftlicher Verein des Regierungs-Bezirktes. Frankfurt-an-der-Oder.	
Dr. Ernst Huth	“
Oberhessische Gesellschaft für Natur-und Heilkunde.....	Giessen.
Oberlausitzer Gesellschaft der Wissenschaften.....	Görlitz.
Königliche Gesellschaft der Wissenschaften.....	Göttingen.
Verein für Erdkunde	Halle.
Naturwissenschaftlicher Verein	Hamburg.
Verein für Naturwissenschaftliche Unterhaltung.....	“
Naturhistorisches Museum zu Hamburg	“
Geographische Gesellschaft	Hannover.
Naturhistorischer Verein für Niedersachsen	“
Historischer Verein für Niedersachsen	“
Naturhistorisch-Medicinischer Verein.....	Heidelberg.
Universitäts Bibliothek.....	Jena.
Verein für Naturkunde	Kassel.
Anthropologischer Verein in Schleswig-Holstein.....	Kiel.
Naturwissenschaftlicher Verein für Schleswig-Holstein....	“
Ostpreussische Physikalisch-Oekonomische Gesellschaft....	Königsberg.
Naturforschende Gesellschaft zu Leipzig	Leipzig.
Königlich-Sächsische Gesellschaft der Wissenschaften . . .	“
Verein für Erdkunde zu Leipzig	“
Museum für Völkerkunde	“

Königlich-Baierische Akademie der Wissenschaften	München.	
Deutsche Gesellschaft für Anthropologie, Ethnologie und Urgeschichte	“	
Görres-Gesellschaft (Historisches Jahrbuch)	“	
Geographische Gesellschaft	“	
Westfälischer Provinzial-Verein für Wissenschaft und Kunst	Münster.	
Naturhistorische Gesellschaft zu Nürnberg	Nürnberg.	
Germanisches Nationalmuseum	“	
Verein für Naturkunde	Offenbach-am-Main.	
Historische Gesellschaft für die Provinz Posen	Posen.	
Zeitschrift für Physiologische Chemie	Strassburg.	
Kaiserliche Universitäts- und Landes Bibliothek	“	
Verein für Vaterländische Naturkunde in Württemberg	Stuttgart.	
Nassauischer Verein für Naturkunde	Wiesbaden.	—52.

(7.)—ICELAND.

Islenzka Fornleifafélags	Reykjavik.	—1.
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(8.)—ITALY.

Società Italiana dei Microscopisti	Acireale.	
R. Accademia Petrarca di Scienze, Lettere ed Arti	Arezzo.	
R. Accademia delle Scienze dell' Istituto di	Bologna.	
Ateneo di Brescia	Brescia.	
Società Storica per la Provincia e Antica Diocesi di Como	Como.	
R. Istituto di Studi Superiori in Firenze	Firenze.	
Società Italiana di Antropologia, Etnologia, e Psicologia Comparata	“	
Sezione Fiorentina della Società Africana d'Italia	“	
Società Entomologica Italiana	“	
Società di Lettura e Conversazione Scientifiche	Genova.	
Società Ligustica di Scienze Naturali e Geografiche.	“	
R. Accademia Lucchese di Scienze, Lettere ed Arti	Luca.	
R. Accademia di Belle Arti	Milano.	
R. Istituto Lombardo di Scienze e Lettere	“	
Società Veneto-Trentina di Scienze Naturali	Padova.	
Nuova Notarisia	“	
Società Toscana di Scienze Naturali	Pisa.	
Gazetta Chimica Italiana	Palermo.	
Circolo Matematico di Palermo	“	
Società Siciliana per la Storia Patria	“	
R. Accademia di Scienze, Lettere, e Belle Arti di Palermo	“	
Società Istriana di Archeologia e Storia Patria	Parenzo.	
Direzione del Giornale del Genio Civile	Roma.	
Società Geografica Italiana	“	

R. Comitato Geologico d'Italia	Roma.	
R. Accademia dei Lincei	"	
Accademia Pontificia de' Nuovi Lincei	"	
Bullettino di Bibliografia e di Storia delle Scienze Matematiche e Fisiche.....	"	
Specula Vaticana.....	"	
"Cosmos" di Guido Cora.....	Torino.	
Archivio di Letteratura Biblica ed Orientale	"	
R. Accademia delle Scienze	"	
Notarisia, Commentarium Phycologicum.....	Venezia.	
R. Istituto Veneto di Scienze, Lettere ed Arti	"	--34.

(9.)—NETHERLANDS.

Koninklijke Akademie van Wetenschappen	Amsterdam.	
Kon. Zoologisch Genootschap "Natura Artis Magistra".....	"	
Kon. Nederlandsch Aardrijkskundig Genootschap.....	"	
École Polytechnique de Delft	Delft.	
Koninklijk Instituut voor de Taal, Land en Volkenkunde van Nederlandsch-Indië	'S Gravenhage.	
Société Hollandaise des Sciences	Harlem.	
Fondation de P. Teyler van der Hulst	"	
Nederlandsche Botanische Vereeniging	Leiden.	
Nederlandsche Dierkundige Vereeniging	"	
Recueil des Travaux Chimiques des Pays-Bas	"	
Koninklijk Nederlandsch Meteorologisch Instituut	Utrecht.	—11.

(10.)—NORWAY.

Musée de Bergen.....	Bergen.	
Polytekniske Forening	Kristiania.	
Forening til Norske Fortidsminde-merkens Bevaring.....	"	
Videnskabs Selskabet.....	"	
Kongelige Norske Frederiks Universitet	"	
Nyt Magazin for Naturvidenskaberne	"	
Norwegische Commission der europäischen Gradmessung	"	
Tromsø Museum	Tromsø	—8.

(11.)—PORTUGAL.

Sociedade de Geographia de Lisboa.....	Lisboa.	
Académie Royale des Sciences de Lisbonne	"	—2

(12.)—ROUMANIA.

Institut Météorologique de Roumanie	Bucarest.	—1.
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(13.)—RUSSIA.

Société des Naturalistes à l'Université Impériale de	Kharkow.	
Société des Naturalistes à l'Université de St. Wladimir	Kiew.	
Societas Scientiarum Fennica	Helsingfors.	
Tifliser Observatorium	Tiflis.	
La Section Caucasienne de la Société Impériale Russe de Géographie	“	
Société Impériale des Naturalistes de Moscou	Moscou.	
Société Physico-chimique Russe à l'Université de	S. Pétersbourg.	
Comité Géologique	“	
La Société Impériale Russe de Géographie	“	—9.

(14.)—SPAIN.

“Crónica Científica”	Barcelona.	
Real Academia de Ciencias Naturales y Artes	“	
Real Academia de Ciencias Morales y Políticas	Madrid.	
Real Academia de la Historia	“	
Sociedad Geográfica de Madrid	“	—5.

(15.)—SWEDEN.

Kongliga Universitetet	Lund.	
Kongliga Fysiografiska Sällskapet	“	
Kongliga Svenska Vetenskaps-Akademien	Stockholm.	
Kongliga Biblioteket	“	
Stockholms Högskola	“	
Svenska Sällskapet för Antropologi och Geografi	“	
Geologiska Förening i Stockholm	“	
Acta Mathematica	“	
Kongliga Universitetet	Upsala.	—9.

(16.)—SWITZERLAND.

Geographische Gesellschaft von Bern	Bern.	
Naturforschende Gesellschaft in Bern	“	
Schweizerische Naturforschende Gesellschaft	Frauenfeld.	
Société de Physique et d'Histoire Naturelle	Genève.	
Société de Géographie de Genève	“	
Institut National Génois	“	
Société Vaudoise des Sciences Naturelles	Lausanne.	
Société Neuchâteloise de Géographie	Neuchâtel.	
Naturforschende Gesellschaft in Zürich	Zürich.	—9.

III. — ASIA.

(1.)—INDIA.

Asiatic Society of Bengal	Calcutta.
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Geological Survey of India	Calcutta.	
Editor of the "Record"	"	
Survey of India Department	"	
"Indian Antiquary"	Bombay.	
"Orientalist"	Kandy, Ceylon.—6.	

(2.)—STRAITS SETTLEMENTS.

Journal of the Straits Branch of the Royal Asiatic Society..	Singapore.	—1.
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(3.)—JAPAN.

University of Tōkyō	Tōkyō.	
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College of Science, Imperial University of Japan	"	
Tōkyō Anthropological Society	"	—6.

(4.)—JAVA.

Bataviaasch Genootschap van Kunsten en Wetenschappen.	Batavia.	
Nederlandsch-Indische Maatschappij van Nijverheid en Landbouw.....	"	—2.

(5.)—CHINA.

China Branch of the Royal Asiatic Society	Shanghai.	
Observatory of Hong Kong, and Government Publications.	Hong Kong.	--2.

(6.)—COCHIN-CHINA.

Société des Études Indo-Chinoises	Saigon.	—1.
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IV. — A F R I C A .

(1.)—ALGERIA.

Société Archéologique du Département de Constantine	Constantine.	
Société de Géographie et d'Archéologie de la Province d'Oran.	Oran.	
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(2.)—CAPE COLONY.

South African Philosophical Society	Cape Town.	—1.
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(3.)—EGYPT.

Institut Égyptien	Le Caire.	—1.
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V. — AUSTRALASIA.

(1.)—AUSTRALIA.

Royal Society of New South Wales	Sydney.	
Royal Geographical Society of Australasia	“	
Department of Mines, New South Wales	“	
Linnean Society of New South Wales	“	
Board of Technical Education	“	
Australasian Association for the Advancement of Science..	“	
Royal Society of Queensland	Brisbane.	
Royal Society of Victoria	Melbourne.	
Public Library of Victoria	“	
Government Statist	“	—10.

(2.)—NEW ZEALAND.

New Zealand Institute	Wellington.	—1.
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(3.)—TASMANIA.

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