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THE

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Descriptions of Four New Species of Fossils From the Silurian Rocks of The South Eastern Portion of the District of Saskatchewan.[1]

By J. F. Whiteaves.

(*With Plate III.*)

While engaged in explorations on behalf of the Geological Survey of Canada in 1889 and 1890, Mr. J. B. Tyrrell discovered an area of Silurian (Upper Silurian) rocks on the north east side of Lake Winnipegosis, on Cedar Lake, and on the Saskatchewan River below Cedar Lake. From these rocks an interesting series of fossils was obtained, some of which are apparently new to science, and of these latter, four of the most characteristic or important species will be described and illustrated in the present paper. On stratigraphical and other grounds, Mr. Tyrrell has found it desirable to divide the Silurian of this district into two local subdivisions. The fossils here described will be considered in the order of their geological relations, but it may be well to state that the *Pentamerus* and *Gomphoceras* are from the

[1] Communicated by permission of the Director of the Geological Survey of Canada.

lower of these two subdivisions, and the *Strophomena* and *Acidaspis* from the upper

BRACHIOPODA.

Strophomena acanthoptera. (Sp. nov.)

Plate iii, figs. 1 and 2.

Shell varying in outline from broadly semicircular or semioval and regularly rounded in front, to subtrigonal with the front margin produced and somewhat pointed in the centre,—but always broadest at the cardinal margin, which is produced on each side into a long, very slender, and slightly curved spine; length of each cardinal spine a little more than one half of the greatest breadth of either valve without the spines. Ventral valve regularly convex from beak to front, though the nasute forms are most prominent anteriorly along the median line; umbonal region compressed; beak small and raised very little above the general level of the hinge line; area transversely elongated and very narrow in the direction of its height, with a small equilateral foramen in the centre. Dorsal valve concave, with a perfectly straight cardinal margin, an extremely minute beak and a hinge area much narrower than that of the ventral.

Surface marked by numerous, but comparatively distant and, for the most part simple, radiating raised lines, which increase by intercalation and alternate at unequal distances with from one to five (or perhaps more) shorter and much smaller ones, the whole being crossed by extremely minute and close set concentric striations, and by a few more or less distant lines of growth. Characters of the interior unknown.

Collected at several localities on the northern portion of the east shore of Lake Winnipegosis, in the district of Saskatchewan and in the adjacent part of the Province of Manitoba by Mr. J. B. Tyrrell in 1889, (but previously found

loose in this vicinity by Mr. D. B. Dowling in 1888,) also on the shores and islands of Cedar Lake and on the Saskatchewan below Cedar Lake by Mr. J. B. Tyrrell in 1890. At each of these localities it is apparently abundant and often associated with *Isochilina grandis*, Jones.

The specimens consist either of natural moulds of the exterior of the shell or of casts of the interior, in a compact fine grained dolomite, and in no case is there any vestige of the actual test remaining. In several of these natural moulds, however, the minutest details of the surface ornamentation are well preserved, and it is from wax impressions made from two of these moulds that the figures on Plate III. were drawn.

The species is apparently most nearly related to the *Strophomena Leda* of Billings,[1] from division 3 of the Anticosti group of the Island of Anticosti, (which Mr. Billings correlates with the Llandovery of England and with the Clinton of the State of New York), but seems to differ therefrom in its much larger size, and in the greater proportionate length of its cardinal spines. Both it and *S. Leda* are evidently what Professor H. L. Williams[2] would call "geological mutations" of the "race which began in *Strophomena alternata* in the Trenton stage," but they form a marked exception to his statement that in the American race of the *S. alternata* type the slender mucronate points at the terminations of the hinge line "first appear in the Tully limestone."

Pentamerus decussatus. (Sp. nov.)

Plate iii, figs. 3 and 4.

Shell large, usually longitudinally and rather narrowly subovate, about one third longer than broad, and broadest a little in advance of the midlength, but sometimes nearly

[1] Geol. Surv. Can., Palæoz. Foss., vol. 1, 1865, p. 120, figs. 98 and 99.

[2] See his paper on "The Cuboides Zone and its Fauna," in Bull. Geol. Soc. America, published May, 1890.

as broad as long ; front margin regularly rounded in most specimens, but somewhat pointed in the centre in others. Ventral valve strongly convex, very tumid, prominent, and rounded or obtusely angulated along the median line, and narrowing rapidly to the margin on both sides, but devoid of a distinctly defined mesial fold, its umbo prominent and rather broad, and its beak so strongly recurved as almost to touch that of the opposite valve. Fissure rather large, triangular, a little higher than broad, completely covered by the recurved beak and visible only when the beak is broken off. Dorsal valve much flatter than the ventral, gently and uniformly convex, or flattened with a faint longitudinal depression in the centre, its beak small, rather narrow and slightly incurved.

Surface marked by very numerous, closely disposed, rounded and but slightly elevated radiating raised lines, which are crossed by smaller, more close set and irregularly disposed concentric raised lines, as well as by a few distant and more or less imbricating lines of growth. The radiating raised lines, which are rather irregular in their arrangement and unequal in size, increase so rapidly by division that as many as from sixty to one hundred or more of them can be counted around the front margin of an adult specimen, though, on account of its greater convexity, there is always a larger number on the ventral valve than on the dorsal.

Septum of the ventral valve well developed, comparatively thick but very short, occupying less than one fourth of the entire length in some specimens, but a little longer in others, though rarely or never exceeding one third of the total length. Septa of the dorsal valve thin, feebly developed and almost rudimentary, very slightly divergent and much shorter than the ventral septum. Muscular and vascular impressions unknown. Interior of the valves rather minutely papillose.

Dimensions of the specimen figured ; maximum length, eighty seven millimetres, greatest breadth, fifty nine mm. ; maximum height or depth through the closed valves, fifty

two mm.; amount of recurvature of beak of ventral valve, sixteen mm.

The only locality at which this species is known to the writer to have been certainly found *in place*, is in a light brownish yellow dolomitic limestone at the foot of the Grand Rapids of the Saskatchewan, where a number of fine specimens were collected by Mr. Tyrrell in 1890. Boulders containing it have been found at several localities in Manitoba and elsewhere in the central portion of the Dominion. It is almost certainly the shell referred to by Sir John Richardson as a "*Pentamerus*, very like *P. Knightii*," which was gathered by Dr. Bigsby "in 1823" on the Lake of the Woods and presented by him to the British Museum,[1] as specimens of the shell which I here call *P. decussatus* have since been collected from boulders on the south west shores of that lake by Dr. G. M. Dawson in 1873 and by Dr. A. C. Lawson in 1884. Other localities at which the species has been obtained from boulders are as follows:—Nelson River, about sixty miles above its mouth, Dr. R. Bell, 1879; Lower Fort Garry, Dr. R. Bell, 1880; Kenogami River, six miles above the mouth of the Bagutchewan, Dr. R. Bell, 1886. Mouth of the Fairford River and Steep Rock Island, Lake Manitoba, J. F. Whiteaves, 1888. North east side of Lake Winnipegosis and Red Deer River near its mouth, J. B. Tyrrell, 1889; Virden, Manitoba, C. N. Bell, 1889.

In Appendix No. 1 to Franklin's "Narrative of a Second Expedition to the Shores of the Polar Sea, in the years 1825, 1826 and 1827," Sir John Richardson says that "Mr. Sowerby determined a shell, occurring in great abundance in the strata at Cumberland House" . . . "to be the *Pentamerus Aylesfordii*," which is regarded by Dr. Davidson as a synonym of *P. Knightii*. Although Cumberland House is 135 miles farther up the Saskatchewan than the locality at which Mr. Tyrrell obtained *P. decussatus* in place, it is by no means improbable that the specimens which Mr.

[1] Journal of a Boat Voyage through Rupert's Land and the Arctic Sea, vol. 1, foot note to page 62. See also Ib., vol. ii, p. 197.

Sowerby determined as *P. Knightii* are really referable to the present species. However this may be, it seems to the writer that *P. decussatus* differs materially from the true *P. Knightii*, especially in the following particulars. The umbo of the ventral valve of the former is narrower and less prominent, while its beak is much less strongly curved; the coarser surface markings of both valves do not consist of comparatively distant and regular radiating ribs, as in *P. Knightii*, but of close set, irregularly disposed, unequal and not much elevated radiating raised lines; and the mesial septa of both valves of *P. decussatus* are not more than half the comparative length of those of *P. Knightii*.

CEPHALOPODA.

Gomphoceras parvulum. (Sp. nov.)

Plate iii, figs. 5, 5 a, b.

Shell small, straight, slender, rather more than three times as long as broad, and broadest a little in advance of the midlength: sides slightly compressed, the outline of a transverse section near and at the commencement of the body chamber being ovate: venter narrower than the dorsum and especially so at both ends: lateral outline conical, with the ventral border not much more convex than the dorsal. Septate portion occupying a little more than one-half the entire length, narrowly conical in lateral aspect, pointed posteriorly and about twice as long as it is broad anteriorly. Body chamber crenulated around the base, its outer margins at first nearly straight and almost parallel on both sides as viewed laterally, its anterior termination rounded but much more broadly so on the ventral side than on the dorsal: ventral region at the summit laterally compressed on each side of the aperture. Aperture, as viewed from above, extremely contracted, Y shaped, with the stem about twice as long as either of the two branches, which diverge from it at an angle of about 115°. The stem is a

narrow slit which expands at its outer termination into a narrow and longitudinally elliptical orifice, exactly in a line with the siphuncle, and the branches are similarly narrow divergent slits, each of which widens into a smaller and circular orifice externally.

Surface markings consisting only, so far as known, of extremely fine transverse striations, which are too minute to be shown in the figure.

Sutures slightly concave at the sides, closely approximated but rather nearer together posteriorly than anteriorly: siphuncle exogastric, marginal and placed in the median line of the venter.

Approximate dimensions of an average specimen (the one figured): entire length, thirty eight millimetres; length of the septate portion, twenty one mm.; greatest breadth, twelve mm.

Grand Rapids of the Saskatchewan below Old Portage, J. B. Tyrrell, 1890: a number of casts of the interior of the shell, in a pale brownish yellow or nearly white dolomitic limestone.

A singular little species, apparently well characterized by its diminutive size, ovately conical, slender and nearly equilateral contour, as viewed laterally, and by its narrowly contracted and widely divergent Y shaped aperture. It is not at all likely to be mistaken for any American species, and is perhaps most nearly related to the *G. clava* of Barrande,[1] young specimens of which have a very similar marginal outline. The aperture of *G. clava*, however, is regularly T shaped at all stages of growth, and in the adult stage it seems to differ very widely from the present species, both in its dimensions and in its general contour.

[1] Système Silurièn du Centre de la Bohême, Prague and Paris, vol. ii, 1865 pl. 77, figs. 6-22, and pl. 92, figs. 10-13.

G. clava is from Etage E of Bohemia, which is said to be the equivalent of the Lower Ludlow of England.

TRILOBITA.

Acidaspis perarmata. (Sp. nov.)

Plate iii, fig. 6.

Body depressed, very slightly convex, its general outline, apart from the marginal spines, longitudinally subelliptical and a little longer than broad.

Head about twice as broad as long, occupying one third of the total length, exclusive of the spines on the pygidium: its front margin broadly subtruncate, nearly straight but faintly sinuous and very obscurely three lobed, with a slight indentation on each side of the glabella immediately in front of the anterior termination of each of the ocular ridges: its posterior margin much more distinctly flexuous and curved backward in the centre with a moderately convex curve, and forward with a shallowly concave curve, on each side. Eyes small, placed very near the posterior margin of the head and opposite the most contracted portion of each of the free cheeks: ocular ridges moderately prominent, slightly curved and converging obliquely forward from the eyes to their terminations near the frontal margin, where they are about twice as close together as at their commencement anteriorly. Characters of the glabella unknown. Outer margin of each of the free cheeks somewhat expanded anteriorly and forming a not very prominent rounded lobe, which is armed with eight very short pointed spines—slightly contracted behind the midlength and terminating posteriorly in a straight and pointed genal spine, which is a little shorter than that of the pleura of the first abdominal segment, and diverges outward and backward at an angle of 40° ω a line drawn at a right angle to the longitudinal axis.

Thorax arched upon the axis, depressed and flattened on the pleuræ: composed of nine segments: axis occupying more than one third of the entire breadth without the spines, and narrowing very gradually to the posterior end:

its annulations horizontal, subparallel and nearly straight, but faintly sinuous at their margins, both in front and behind. Pleuræ also decreasing very gradually in breadth to the posterior end of the thorax, nearly straight and terminating externally on each side in a long and very slender spine, which is bent backward and outward at an angle of about 57°. The spines increase gradually in length posteriorly, the two spines on the anterior thoracic segment being shorter than the pleuræ from which they proceed, and nearly equal in length to the genal spines immediately in front of them, whereas in the posterior thoracic segment the pleural spines are nearly three times as long as the pleuræ and as the spines on the pleuræ of the anterior thoracic segment.

Pygidium broad and short, its outer margin broadly rounded and fringed with spines, its inner or anterior margin almost straight and nearly three times as broad as the length of the non spinose portion along the median line; its axis moderately convex and its pleuræ flat. Axis narrowly rounded posteriorly and terminating just within the margin of the pygidium, apparently bearing two transverse annulations, the posterior unarmed and the anterior bearing a long and very slender primary spine on each of its rounded postero-lateral angles. These primary spines, whose length considerably exceeds that of the united pygidium and thorax, diverge for the greater part of their length at an angle of about 48°, but curve slightly inward at their outer ends. Outer margin of the pygidium armed with four secondary internal spines between the two primaries and with five secondary external spines on each side of the latter. The four secondary internal spines are moderately close together, nearly equal in length and about one fourth as long as the primaries. The five outer secondary spines on each side are much closer together than the four inner ones and not more than one half as long.

Surface markings unknown.

Long Point, at the northeast angle of Lake Winnipegosis,

just outside of the northern boundary of Manitoba, J. B. Tyrrell, 1890; a single and not very well preserved cast of the interior of the dorsal or upper side, in a compact and slightly vesicular dolomite. Although the surface markings are not even faintly indicated, and the characters of the glabella and some of those of the central portion of the thorax are unknown, the whole of the marginal outline of the specimen can be ascertained with considerable accuracy.

In the elucidation of its characters the writer has been materially assisted by Mr. L. M. Lambe.

The species appears to be of the type of the *A. Prévostii* of Barrande,[1] from the Upper Silurian Rocks (Etage E.) of Bohemia, but it has a smaller number of short spines on the lateral margins of the two free cheeks, a proportionately broader axis to the thorax, much longer primary spines on the pygidium, and differs from that species in several other particulars.

EXPLANATION OF PLATE III.

STROPHOMENA ACANTHOPTERA.

Fig. 1.—Dorsal view of a specimen, showing the whole of the dorsal valve and the cardinal areas of both valves.

Fig. 2.—Ventral view of another specimen.

PENTAMERUS DECUSSATUS.

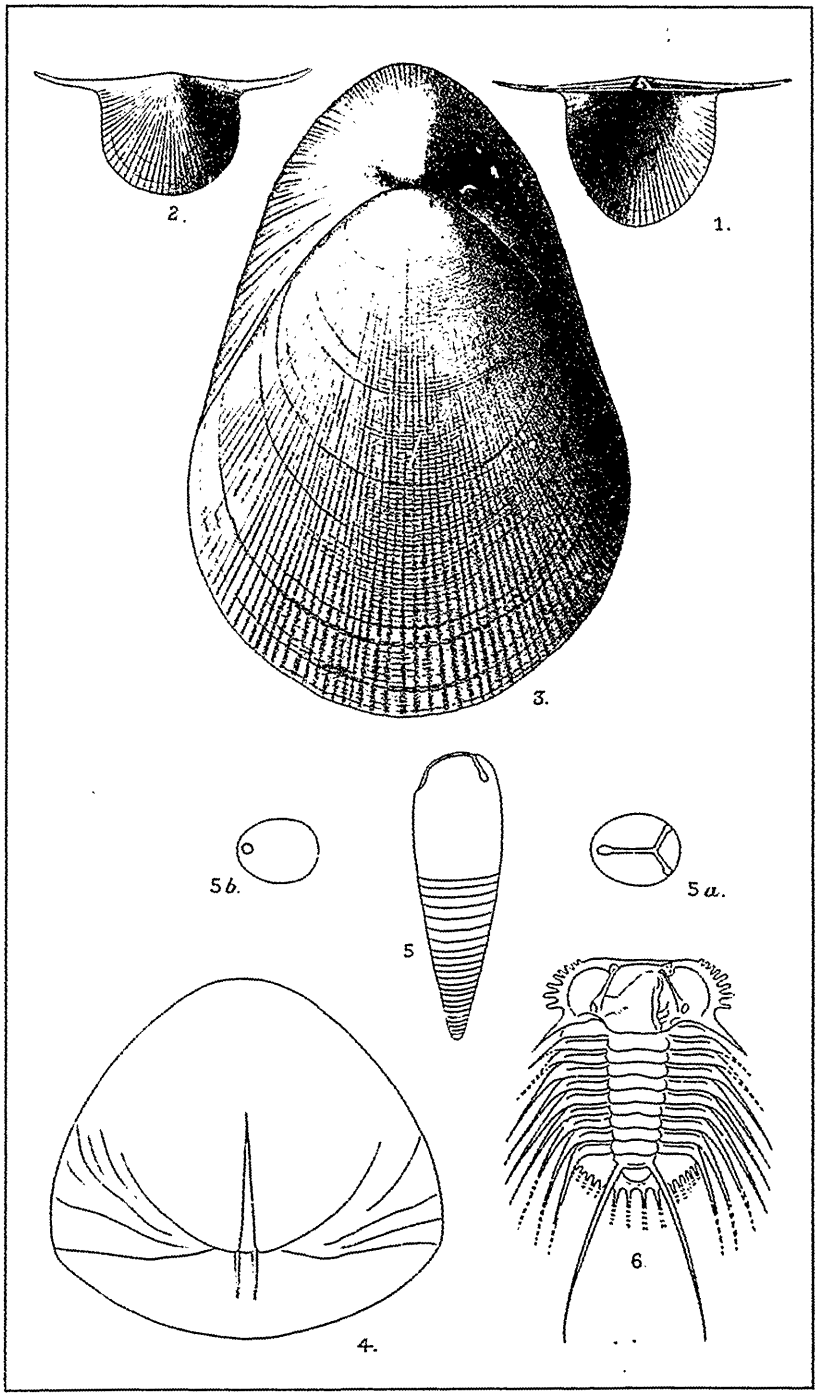
Fig. 3.—Dorsal view of a specimen, showing the whole of the dorsal valve and the prominent umbo and recurved beak of the ventral.

Fig. 4.—Outline of the posterior end of a cast of the interior of the shell of this species, to show the relative convexity of the two valves, the length and other characters of the mesial septum of the ventral valve and the nature of the two short septa in the dorsal.

GOMPHOCERAS PARVULUM.

Fig. 5.—Lateral outline of a cast of the interior of the shell.

[1] Système Silurien du Centre de la Bohème, Prague and Paris, vol. i, 1852, p. 739, pl. 39, figs. 33-41.



SILURIAN FOSSILS FROM SASKATCHEWAN.

Fig. 5a.—Outline of anterior end of another specimen, to show the shape of the aperture.

Fig. 5b.—Outline of one of the septa near the body chamber, to show the relative position of the siphuncle.

ACIDASPIS PERARMATA.

Fig. 6.—Outline of the only specimen collected, slightly restored. (All the figures are of the natural size.)

NOTE ON A SHARK AND RAY OBTAINED AT LITTLE METIS, ON THE LOWER ST. LAWRENCE.

By SIR WILLIAM DAWSON, F.R.S.

(With Plate IV.)

Some of the summer resorts on the Lower St. Lawrence are not destitute of supplies of fish. In addition to the delicious trout of the lakes and streams, the sea affords, at certain seasons, an abundant harvest of various kinds. At Little Metis, for example, salmon are taken in the St. Lawrence in early summer. A little later, mackerel, herring, and the delicate sardine make their appearance, and flounders, loche or tom-cod, and smelts are taken by juvenile anglers. Now and then the brush wears erected on the shore capture a specimen of the great Albecore or horse mackerel, an excellent fish, and the striped bass is sometimes taken in the same way. Formerly the cod was taken in considerable quantity, but it seems to have deserted the locality, except that a few "rock cod" and young cod, scarcely larger than the loche, are sometimes caught. Of late years, however, the halibut has appeared in sufficient numbers to make a profitable fishery for local use, and it is in connection with the halibut fishery that the animal to which this note refers has made its appearance.

The halibut fishers, using herring or sardine for bait, occasionally hook a large shark, and find little difficulty in capturing it. Five or six specimens, some of them ten feet in length, were thus taken and towed ashore last summer. They are not valued for food, but the liver yields a consid-

erable quantity of oil, and the skin is used as a rasp for dressing wood. I examined and measured one specimen about ten feet in length, and secured, with the aid of Mr. Sim, of Lighthouse Point, the skin of another, which is now admirably mounted by Bailly in the Peter Redpath Museum. I also obtained the jaws and teeth of a third specimen, now in the same museum.

The creature is known to the fishermen at Little Metis as the "Dog Fish," a name not altogether inappropriate, since it belongs to the same family of sharks with the ordinary dog-fish, though much larger than they, and destitute of the bony spines with which they are armed. It seems to haunt the bottom rather than the surface of the sea, and to feed on all sorts of smaller fish and crustaceans. It is apparently sluggish, though muscular and powerful, and is said, when hooked, to make little resistance.

It belongs to a species or group of closely-allied species haunting all the northern seas, and known by a great variety of names. Gunther appears to think that the fishes designated by all the following names belong to one widely distributed species, to which he assigns the name

LAEMARGUS BOREALIS,

With the following synonyms:—

Squalus carcharias, Linnæus, Muller and Otho Fabricius.
Squalus microcephalus, Bl. Schn.
Somniosus brevipinna, Leseur and Storer, Fishes of Massachusetts.
Scymnus brevipinna, Dekay, Fishes of New York.
Squalus borealis, Scoresby.
Scymnus borealis, Fleming.
Laemargus borealis, Muller and Henle.
Somniosus microcephalus, Goode, Fish Commission, United States.

In England it is usually known as the Greenland Shark, and on the American coast bears the names "Nurse," "Sleeper," "Ground Shark," and "Dog Fish."

Its distinctive characters are thus given by Gunther and Day:—

All the fins small and spineless; two dorsal and a pair of ventral fins; skin uniformly covered with minute tubercles; nostrils near the extremity of the snout; no nictitating membrane to the eye; mouth with a deep oblique groove at the angle; the upper teeth small, narrow, conical, and in several rows (44 to 52 in a row); the lower teeth more numerous, also in several rows, flat, and each tooth having its front so much turned aside, that the inner margin forms the cutting edge, which is not serrated; spiracles of moderate width. The skeleton is wholly cartilaginous.

The colour is either very variable or changes easily under different circumstances. It is usually represented as gray or dusky above and lighter below; and Calderwood states that of two recent specimens which he examined, one, a young individual, was of a dull, slate colour, with a number of small white spots distributed irregularly over the surface of the skin. The other, of larger size, was of a more bluish tint and without white spots. One specimen which I saw at Metis seemed of a general gray or dull brown colour above, with slightly lighter bands on the sides. Another, which had been some time dead, was of a rich deep brownish colour above, with distinct zebra-like stripes of brown on the sides, and creamy white below. The colours probably differ under different circumstances, even during life; and preserved and dried skins usually fade into a uniform gray hue.

The measurements of my Little Metis specimen are as follows:—

	Feet.	Inches.
Total length	9	6
Girth behind pectorals	4	5
Nostrils behind point of snout	0	2
Snout to centre of eye	4	5
Do. to first gill opening	1	5
Width of mouth	0	8
Length of series of five gill openings	0	7

Last gill opening to base of pectoral	0	2
Length of pectoral	0	11
Breadth of do.	0	6¼
Snout to base of pectoral	2	4
Do. to first dorsal	4	0
Breadth of first dorsal	0	9
First to second dorsal	2	1
Length of second dorsal	0	5½
Second dorsal to origin of caudal	0	11
Length of caudal	1	7
Depth of do. about	2	0
Pectorals to origin of ventrals	3	6
Breadth base of ventral	0	6
Base to points of ventrals	0	10½
Ventral to caudal	1	6

The Greenland shark seems to have its headquarters in the seas of that country and Spitzbergen, in which considerable numbers are taken annually for their oil. It ranges southward to Newfoundland and the New England coast, is found also on the west coast of America, and occasionally strays to the coast of Europe. Though a powerful creature, and said sometimes to attain to the length of 25 feet, it seems slow and sluggish in its habits, and haunts the bottom rather than the surface of the water. In addition to feeding on small fish and crabs, it is said to have the habit of devouring cod and other fish when caught in set lines, and is therefore not loved by the fishermen. In the arctic seas it is often seen to feed on the floating carcases of dead whales, around which these sharks are said to collect in great numbers. Scoresby states [1] that they are able to bite out large pieces of the flesh with their sharp cutting teeth. On the coast of the United States, it is said by the American naturalists cited above, to devour fish offal at the fisheries, and on this account has acquired locally the name of "gurry shark." Its flesh is not eaten on our coasts, but is said to be used as food by the Esquimaux. The liver of a

[1] Arctic Voyages.

large individual will yield as much as five or six gallons of oil.

It does not appear to be dreaded by man on our coasts, but in Greenland and on the Labrador coast the larger individuals seem sometimes to attack boats and canoes. Fabricius [1] states it is much dreaded by the Greenlanders, as it can bite through the skin bottoms of their kayaks and seize the legs of the occupants. Hence, when a solitary Greenlander in his kayak sees one of these animals, he generally takes to flight. They are believed to be attracted by the smell of putrid carcases, and also by any sound or noise; and as their presence scares away the fish, the fishermen keep silence in order not to bring them near. He remarks that it shows little fear of man, and states that when the Greenlanders are flensing the floating carcase of a whale, the sharks are often as diligently employed in feeding on it below the water. The Greenlanders occasionally take it with hook and line or with the harpoon.

Ballantyne, in his work on Hudson's Bay, tells a frightful story of an Indian who, when voyaging with his family in a canoe, was pursued by a large shark which attempted to upset the canoe, and failing in this, to break it up. The canoe beginning to give way, the terrified Indian seized his youngest child and threw it to the ferocious monster to secure his own safety. It is not, however, quite certain that this story refers to the present species; but if so, it would confirm the impression of the Greenlanders that large individuals impelled by hunger and, perhaps, accustomed to feed on the carcases of whales, may become dangerous to man. It is not likely, however, that they ever venture so near the shore as to attack bathers.

Calderwood thus describes two specimens taken on the Coast of Scotland and studied by him [2]:—

"The Greenland shark is described by the various ichthy-

[1] Fauna Greenlandica.

[2] Appendix to Fourth Annual Report of the Fishery Board for Scotland.

ologists as a fish rarely straying to the British shores. Its natural home is doubtless in the colder waters of the Arctic Circle, where it is said to occur in considerable abundance; but when its occurrence is compared with that of the more truly British sharks, it would appear to be at least as common in our waters as any other. Since 1803 there are records of it's capture which go to prove that scarcely a year passes without one or more specimens being obtained, and it is worthy of note that nearly all these specimens were captured on the East Coast. The most southerly point from which this shark is recorded is the Seine, where one was taken in 1832. Three were caught off the Bell Rock in 1873, and two at Scarborough in 1878. Three specimens are recorded from Aberdeen, and two from the Dogger Bank, besides a number of single ones from different parts of the coast.

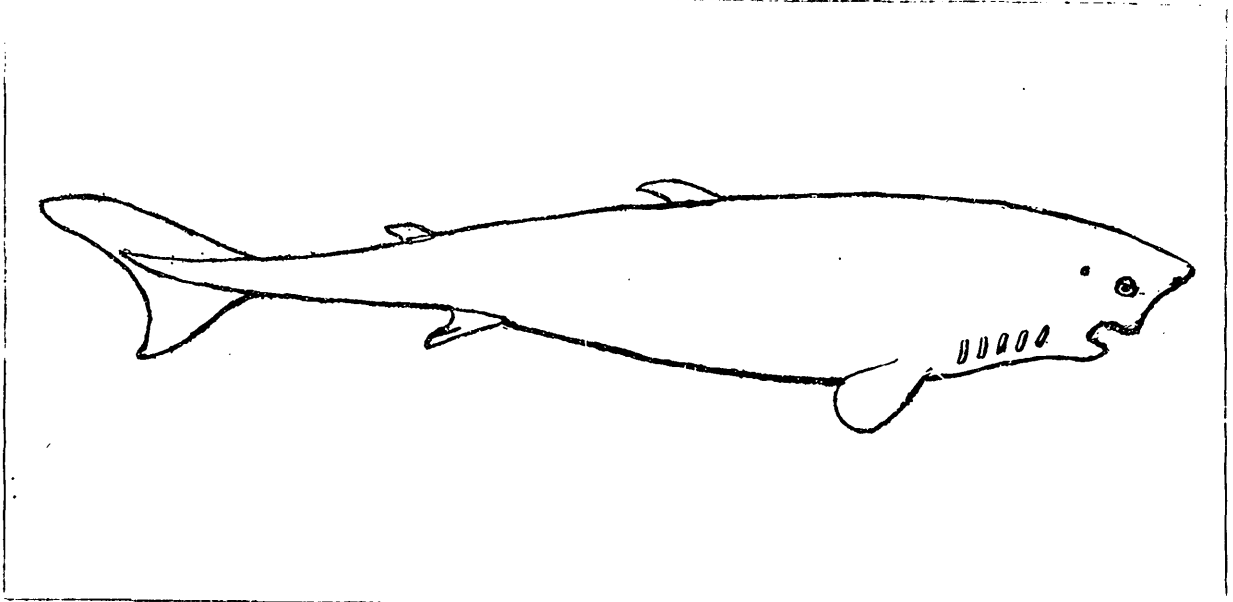
"The two which I dissected were caught, within a few days of each other, in January of this year. The first was a fine specimen 11 feet long, which was brought up by one of the trawlers of the General Steam Fishing Company 8 miles S.E. of the May Island. When it was slung up clear of the water, a cod and three baited hooks with snoods attached fell out of its mouth, and I afterwards found a large cod hook fixed in the gullet. Its stomach contained one herring, five cod, one conger eel, and a considerable quantity of partly digested fish.

"The second shark was only 5 feet long, and was caught by line fishermen. The stomach of this one contained three herrings and about a score of cuttle fish beaks."

The figure (Plate IV.) is an accurate outline of the specimen now in the Peter Redpath Museum.

Raiaerinacea, Mitchell.

Along with the shark above described, I obtained a specimen of a ray, or skate, which appears to be the species above named. Mitchell's species is referred by Gunther to *R. eglanteria* of Lacepede. My specimen is, however, so



LAEMARGUS BOREALIS. GUNTH.

different from the typical *R. eglanteria* that I am inclined to think it may be distinct. It is found at Little Metis, and is sometimes taken in the wears, or in fishing for halibut.

Specimens of British Wild Flowers in July and August.

By Rev. Robert Campbell, M.A., D.D.

My holiday in 1890 was spent in Great Britain. I was accompanied by two lady members of my family, to whom I was to act as guide to the most noteworthy scenes of the mother country, with which I was already familiar from having gone over the ground thoroughly on two previous occasions. It occurred to me that it would impart new interest to even old scenes if I should note the flora of the several districts visited; and I provided the simple apparatus which is sufficient to equip the botanist for field work, having first learned that the best book for general use, as applicable to the entire island, was Bentham & Hooker's British Flora. On subsequently visiting the herbarium of the Botanic Gardens of Edinburgh, under the guidance of Prof. Balfour, I found that the specimens in that fine collection are determined by this authority, and in arranging the collection which I present to the Society, I have numbered the specimens as they are named in Bentham & Hooker, so as to facilitate a reference to that text-book. This hint I obtained from Prof. Balfour.

During my eleven weeks' tour in England, Wales and Scotland I succeeded in collecting 481 of the 1,310 British species recognized by the best authorities, more than one-third of the whole. Of course, my botanical pursuits were subordinated to sight-seeing and visiting friends. Except an afternoon spent in Epping Forest, I may say that I never went out of my way to look for specimens. Making a collection was only an indirect object of my movements, so that I have no idea of claiming completeness for this one,

for which my friend, Mr. Brown, has promised to find a place in the Society's Museum. But the considerable number of plants on which I stumbled shows how rich the grand old island is in flowers, as well as in men, money and merchandise, and how one may make his ordinary holiday serviceable in enhancing his knowledge, especially of this department of natural history, by keeping his eyes open. It may entail some inconvenience on the collector's companions if they are not animated with his enthusiasm, and large demands have to be made upon the forbearance of the friends whom he may chance to be visiting, as he spreads about his room each evening the spoils of the day's pursuit of specimens. But with all the drawbacks involved, and the labour and perseverance required in prosecuting the work successfully, it adds immensely to the enjoyment of a tour in Great Britain to pick up every new flower which one comes across and to which one can get legitimate access. You may excite the suspicion of foresters and gamekeepers, and you will certainly draw down upon you the wonder and pity of people everywhere that you should consider it worth while to be carrying away armsfull of what they call weeds; but all these little incidents will be gladly met, and whatever risks are run are more than repaid by the delight that is experienced in finding new specimens. There is no earthly joy comparable to that which flows from discovering at last some new plant for which you may have been on the look-out. Even an amateur botanist can in some measure enter into the feelings which are said to have moved the great Linnæus when he at last found a specimen of furze, *Ulex Europœus*, and kneeled down and thanked God for giving him this favour. On my former visits to Great Britain I paid no particular attention to its flora. Of course, no one could spend nearly two years tramping through that country without taking notice of the more showy of its plants. The foxglove, the broom, the whin, the heather, the harebell, the daisy, could not fail to attract the attention of the most unpractised eye, especially of a Canadian, to whom

they were not familiar objects. But those plants which have to be looked for in the quiet recesses of the woods, or which modestly hide themselves by the brooksides, I knew nothing about practically. Great Britain was, therefore, to me an unexplored territory so far as its botany was concerned. Nine out of every ten species were new to me. You can, therefore, see what splendid field practice I had in gathering and determining this collection; as you can conceive, the elevation of spirits I felt when first I set my eyes on flower after flower of which I had often read, and which have entered so largely into the poetry and song of the mother country.

Landing at Liverpool on July 4th, that afternoon our company proceeded to Chester, and in walking round the walls of that venerable episcopal city I first broke ground, and succeeded in capturing a number of specimens: *Epilobium parviflorum* and *Sagina procumbens*, growing in large numbers out of the old wall; *Rubus fruticosus*, *Heracleum sphondylium*, *Ranunculus acris*, *Urtica urens* and *Bellis perennis*, that modest crimson-tipped flower which is the glory of every grass plot in Britain from March to November, and well earns its title *perenne* by lasting right through the year in well-sheltered nooks—these being among the rest. During the fortnight of our stay in London I succeeded in finding a number of plants in the neighbourhood of Crouch Hill; *Salvia pratensis*, *Tragopogon pratensis*, *Stellaria media*, *Erysimum cheiranthoides* and *Myosorus minimus* among them. I gathered a few plants in the park at Richmond, on the banks of the river at Hampton and Kew—the alluvial basin of the Thames, formed in the course of ages, being rich in vegetable productions. But the first really important addition made to my growing stock of British wild flowers was obtained in that part of Epping Forest which is nearest the metropolis, where I spent an afternoon. The heavy London clay soil yielded a large crop of *Cruciferæ*, *Ranunculaceæ* and *Caryophyllaceæ* in particular. Epping Forest is credited with twenty of these specimens.

My next stopping place was at Bridport, Dorsetshire, on the English Channel, where I spent a delightful week. This is a very paradise for the botanist. Had I been in search of one of the best hunting grounds in England for wild flowers, I could not have found a more fruitful county than Dorsetshire. From the lias of the coast, up through the green-sand and tertiaries, the geological formation gave promise of abundance of vegetable life. The sands, the chalks and the clays amply fulfilled this promise. Within a few miles a very great variety of specimens was found in profusion. So remarkably mild is the air on the coast, that in some of the sunnier spots even tropical plants are found to flourish in the open air. I made incursions into the neighbouring parishes of Allington, Charmouth and Whitchurch Canonicorum, and to the top of Golden Cap and Hardown Hill, crowned with terraces of flint. A lad belonging to the parish of Whitchurch has just succeeded in carrying off the Bishop of Salisbury's prize for the best collection of wild flowers made by the youth of his diocese. His Lordship suggested, a couple of years ago, that a varied and useful recreation might be found for the youth connected with the Church Sunday-schools in collecting and arranging under their several orders, and giving the local nomenclature of the immense variety of wild flowers with which the diocese abounds. The successful collection embraced 611 species, and I suppose I may congratulate myself upon gathering 75 new species in the same district in the course of four or five days.

A day's journey brought us next to the old Manor House of Tregwynt, Parish of St Nicholas, Pembrokeshire, South Wales, situated near the west coast, about half way between St. David's and Fishguard. This coast is swept by the Atlantic storms and is thus denuded of forests, but it is rich in botanical specimens. The soil prevailing is a dark grey loam, resting on carboniferous limestone and old red sandstone, with a buttress of Igneous rocks around St. David's Head. Here were *Senecios*, *Scabiosas*, *Hypericums*, *Scillas*,

Saponarias, *Lychnises* and *Epilobiums* in great profusion. It was a difficult matter harvesting the fruits of the field here and at Bridport. It was *embarras de richesse.* Old newspapers were at a premium in both places, and it generally took the late evening hours and the early hours of morning to arrange the specimens and change the drying papers. Altogether, sixty-five new species of plants were gathered in this district.

The Braes o' Gleniffer, rendered classic ground by the sweet music of Tannahill, the glen lying at its base, made famous by the wit of its late laird, and the clay loam of the adjoining country of Ayr have also contributed their quota to this collection. Seamill is a small watering place on the Ayrshire coast, and the banks of the little stream that drives its "mill" I found one of my richest hunting grounds. Here and at Prestwick, Mauchline, and Mossgiel, where Burns ploughed down the daisies, sixty-two specimens were obtained. But the field that yielded the largest amount of results with the least toil and trouble was the island of Arran, or rather the district of Corrie on that island. The geology of Arran is an epitome of that of the whole of Scotland. From the granite on the top of Goatfell, flanked by micaceous and argillaceous slates, and on their edges red sandstones, with conglomerate and limestone intercalated, every variety of soil may be looked for within a radius of three or four miles, and as the coast is never visited by frost, *Laurinæ* and other tropical species grow luxuriantly at the highland village of Corrie. In this quarter I was able to add fifty-six new species to my collection.

Of course, the finding of new plants was now becoming more difficult. All those most frequently met with I had already secured. The flowers "born to blush unseen," had to be wooed and won from their retirement, or further progress was to be slow. Besides, July in England corresponds with August in Scotland, and so I was only coming in contact with the same general plants which I had previously seen in the south. When I visited the north a

month later, I had no thought at first of touching either grasses or ferns, as I concluded I should have more than enough to do in harvesting the phanerogamous plants; but before I left Seamill and Corrie, I concluded that I had better divide my attention for the remainder of my holiday between the flowering plants and the *Gramineæ* and *Filices*.

This was a fortunate conclusion, because the banks of Loch Etive, a frith of the sea running far into the heart of Argyllshire, founded on igneous rocks, are very rich in grasses, while flowering plants are comparatively rare; and Glen Etive, with Inverliver and Glennoe, rich glens leading down to Loch Etive from the south, are credited with twenty-nine specimens.

The band of limestone bounding the north side of Loch Tay, in Perthshire, plunging under Ben Lawers, and rising in Glenlyon, with the granite and porphyry of the Ben, the King of Perthshire Hills, with its top 4,000 feet high, usually in the clouds, gave a few new specimens, as did also Balyukan near Pitlochrie. But my work was virtually done now. My search afterwards in the neighborhood of Eskbank, Dryburgh, Abbotsford and Melrose, added indeed a few more to my now somewhat unwieldy bundle of plants; but the summer flowers were over, and the autumn ones had not yet to any considerable extent begun to bloom. The season was in the main a favourable one for my undertaking. The spring and early summer were cold and wet, and this retarded the progress of vegetation, so that I got a good chance to make myself acquainted with some of the later spring flowers as well as the whole of the summer ones, and they were very fine. I was disappointed, however, with the September bloom; for it was the 19th of that month before I sailed from Liverpool. So far, nothing had appeared that would vie with our golden-rods and asters, the glory of our early Canadian autumn.

I could have wished to be able to compare my British collection with Canadian catalogues and note what species are common to both countries; but time did not allow of

my doing this; but a few came under my notice. One general observation, however, I make, that the species is modified by the climatic and other conditions of the two countries, in Canada the same plant being usually sturdier than in Britain. This is true, for instance, of *Solidago virgo aurea* of the *Silene inflata*, called the *Silene cucubalus* in England, of the *Verbascum thapsus*, of the *Arctium lappa*, and of the *Epilobium Angustifolium*, among others that occur to me.

I have made a catalogue of the collection, but I wish to copy it for the duplicate specimens which I have retained for my private Herbarium. As soon as I have a little leisure to do this piece of clerical work, I shall have great pleasure in putting the catalogue in the hands of the curator of the museum.

On the Geology of Quebec City, Canada.

By Henry M. Ami, M.A., F.G.S.

(Of the Geological Survey of Canada.)

The researches of Sir William Logan, Mr. Billings, Dr. Sterry Hunt, Dr. Selwyn, Sir William Dawson, Prof. James Hall, Prof. Emmons, Prof. Walcott, Prof. Marcou, Dr. Ells, Prof. Lapworth, and many others on the geology of Quebec and its environs have made that region classic ground to the student of North American Geology. The famous Quebec group controversy, as well as its closely related friend, the Taconic question in geology, and the Lorraine-Hudson River problem, are all involved in the geologic history of Quebec. Much diversity of opinion has existed as to the exact geological position of some of the terranes at and about Quebec City, as also along the whole line of the great Appalachian or St. Lawrence-Champlain. Nor is this at all astonishing, seeing that profound dislocations exist, intricate foldings of strata occur, and several terranes are met within very narrow belts, faulted and folded together in anything but a simple manner, which requires

exceedingly detailed and careful examination before satisfactory conclusions are arrived at.

The rocks forming the Citadel Hill or promontory of Quebec (Cape Diamond) have been assigned to different positions in the geological scale by different writers at different times. An elaborate review of these views is given in Dr. Ells' last report to Dr. Selwyn (1888) published by the Geological Survey of Canada, which includes from Dr. Bigsby's paper published in 1827, down to Prof. Lapworth's Report, etc., published in the Transactions of the Royal Society of Canada for 1887.

The rocks of Quebec have been referred by some of the geologists above named to the age of the Quebec Group (Levis Division) whilst others, and the majority at present regard them as newer than the Trenton limestone, viz.: being of "Trenton-Utica," "Utica-Hudson," or "Lorraine" age. But before assigning a definite position to the rocks of Quebec City in the scale of terranes in America, it is necessary for the writer to state that, so far, he has been unable to find any evidence in the field, either stratigraphical or palæontological, whereby the "Hudson River" rocks and "Lorraine" shales, as originally understood by Emmons, could be correlated, or referred to the same or immediately following geologic terrane.

The fauna of the Norman's Kiln shales, that of the Marsouin, of the Tartigo River, Griffin Cove and Gagnon's Beach Rocks, as well as that from Crane Island, N. W. or False Point of the Island of Orleans, Quebec City, Etchemin River, between St. Henry and St. Anselme, Drummondville, and other localities in Maine, Vermont, and New York States constitutes one large assemblage of forms peculiar to one terrane.

The fauna of the Lorraine shales, (Cincinnati era in part) on the other hand, as it is characterized at Montmorency Falls, Côte Sauvageau, in the St. Charles Valley near Quebec, at Charlesbourg (near the Church), two miles above St. Nicholas, Yamaska River, Rivière des Hurons, and in the

undisturbed regions in Ontario at Ottawa, Toronto, Weston, Oakville, Collingwood, etc., intermediate between the Utica terrane and the base of the Silurian Epoch marks another terrane.

These two faunas, I hold, are very distinct both in their palæontological and stratigraphical relations. The Lorraine terrane, according to Dr. Selwyn's classification of formations ("Index to the Colours and Signs used by the Geological Survey of Canada,") has a definite position, viz., at the summit of the Cambro-Silurian or Ordovician system, The strata at Quebec, either on physical or palæontological grounds, cannot be referred to the Lorraine nor to the Utica, nor yet to the Trenton nor to the Black River formation.

Sir William Logan referred the Quebec city rocks to the Levis division of Quebec group. From examinations recently made, the fauna which Mr. Weston, Mr. Giroux, l'Abbé Laflamme and the writer have been able to obtain from the rocks of that locality, presents some fifty species of fossils, including graptolites, brachiopods, ostracods and trilobites, different from Levis forms and yet capable of being correlated with forms from a portion of the Quebec group of Logan, as described in his Newfoundland section, as also with Cambro-Silurian strata in the Beccaguimic valley of New Brunswick.

To state the precise geological horizon to which the strata at Quebec city belong, I hold, is perhaps premature. These rocks appear, however, to occupy a position in the Ordovician system higher than the Levis formation being akin to it, but lower than the Trenton, and probably an upward extension of that peculiar series of sedimentary strata occurring along the present valley of the St. Lawrence, which, owing to the peculiar conditions of deposition of the specialized fauna entombed, Sir William Logan advisedly classed under the term "Quebec Group." This would make the rocks at Quebec about equivalent to the Chazy formation of the New York and Ontario divisions.

As to the propriety of retaining the term "Hudson River" group, or terrane in geologic nomenclature, at present, there may be some doubt. Much confusion exists as to its use. It would very naturally follow, however, that some such designation as the "Quebec terrane" or "Quebec formation" would be most acceptable at this particular juncture in order to designate the horizon of the Quebec city rocks, and include those which constitute the citadel and main portion of Quebec city and other synchronous strata.

The term "Hudson River" is very extensively used throughout North American geological nomenclature to designate the highest series of strata in the Ordovician or Cambro-Silurian epoch. Its use is far more general than the equivalent term, "Lorraine," as defined and very carefully used by Emmons. One of the two terms requires to be dropped, and whilst neither term is objectionable and both have been used by various authors at different times to designate precisely the same horizon, it appears most practical now to retain the term which has been most extensively used and adopted in North American geology, viz., the term Hudson River or Hudson Terrane, whilst it is decidedly regrettable to drop Emmons' well-defined and clearly marked Lorraine. The adoption of the term Hudson River, in preference to the term Lorraine, would entail much less confusion, and would thus serve the ends of geological science more effectively.

Amongt the most characteristic and better known species of graptolites peculiar to the Quebec terrane may be mentioned the following:—*Cœnograptus gracilis*, Hall; *Dicellograptus sextans*, Hall; *D. divaricatus*, Hall; *Dicranograptus ramosus*, Hall; *Diplograptus foliaceus*, Murchison; *D. Whitfieldi*, Hall; *D. marcidus*, Hall; *Climacograptus bicornis*, Hall; *C. bicornis*, var. *tricornis*, Lapworth; *Corynoides calycularis*, Nicholson.

In a paper which the writer is now preparing for the Royal Society of Canada, the various forms characterizing the Sillery, Levis and Quebec divisions of the Quebec Group

in Canada as now understood, and constituting the natural series of sedimentary strata to which Sir William Logan had given that very appropriate term, will be tabulated and the palæontological grounds for the separation of these will then be very apparent and evident.

Aids to the Study of the Coleoptera of Canada.—No. 2.

On Some Little Known Canadian Coleoptera, with Descriptions of Two New Species.

By J. F. Hausen.

(With Plate V.)

Zilora, Muls.

The genus *Zilora* may be distinguished from the other genera of the melandryini of our fauna by the following characters:—

The antennæ are slender, not suddenly enlarged; frontal suture indistinct; maxillary palpi have the last joint wider than the preceding joints and securiform. The front coxæ, which are contiguous, are without trochantin, and the acetabula have on the outer side a distinct fissure; the middle coxæ are separated, and the body clothed with erect hairs.

Only two species are known to me as occurring in the northern parts of America, one of which has been described from Canada. They appear to be rare.

Z. canadensis, n. sp. (Plate v, figs. 1 and 2).—*Fusco-castanea, elongata, sub-convexa, undique breviter haud dense pube suberecta vestita et punctulata; subtus, antennis trophis pedibusque dilutioribus; elytris haud striatis sulculo suturam versus a medio ad apicem extendente excepto; prothorace latitudine breviore, antice angustato, lateribus rotundatis et subtiliter marginatis, anguils posticis subrectis, basi utrinque foveolato, medio sublobato et late rotundato. Long. ·23 unc.; 6 mm.*

The head and thorax are somewhat darker and more densely and finely punctured than the wing-covers. The elytra are not very finely punctured, and with no trace of striæ except an impressed line along the suture extending from before the middle backwards, but interrupted before reaching the apex.

The pygidium extends slightly beyond the elytra, and in my specimen, which seems to be a male, the penis is protruded and bilobed at the extremity. The eyes are disengaged from the thorax, prominent and scarcely transverse. The front is indistinctly impressed between the eyes. Posterior tibiæ are slightly longer than their tarsi, of which the first joint is about equal to the three following. Taken at Montreal.

I have not had an opportunity of comparing this with the species described from New Hampshire by Leconte[1] as *hispida*, which is said to have the foreæ of the thorax "*profunde et late impresso*," and the elytra "*obsolete sulcatis.*"

It also seems to come near the European *ferruginea* figured by Duval,[2] but specimens will have to be carefully compared before they can be pronounced identical.

It is evidently distinct from *nuda* described from our territory by Abbé Provancher,[3] which is stated to be black, the thorax with a transverse impression at the base, which does not reach the angles, and the elytra without pubescence, while no mention is made of their being grooved at all.

I owe the privilege of describing this interesting little species to my friend, Mr. A. F. Winn, who has kindly placed the only specimen in his collection in my hands for this purpose.

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[1] New Species of Coleoptera, pt. i, p. 148.

[2] Gén. Coleopt., Europe, iii, pl. 87, f. 432.

[3] Additions et Corrections à la Faune Coléoptérologique Province Québec, 1877.

PHILONTHUS STICTUS, n. sp. (Plate V, fig. 3.)

Crassiusculus subdepressus, subnitens piceo-niger, antennis pedibusque concoloribus; capite subovato, basi subtruncato angulis posticis rotundatis, pubescenti et punctato, spatio medio lævi; thorace vix latiore convexo, latitudine longiore, basi late rotundato, lateribus paullum rotundatis atque antice convergentibus, disco creberrime punctato linea dorsali lævi; elytris thorace longioribus, postice paullo latioribus, convexiusculis, confertim non subtellissime punctulatis pubescentibus, stria suturali conspicua, sutura subimbricata; abdomine thoracem elytra que conjuncta æquanti, valde marginato, confertim punctulato pubescenti. Long. ·31 unc.; 7·9 mm.

Head a little longer than broad, parallel behind the eyes, with the hind angles rounded, punctured and pubescent, and furnished in addition with a few longer hairs. Antennæ rather stout, reaching the base of the thorax, first joint equalling joints two and three taken together, fourth to seventh subequal, remainder obconical, a little longer than broad, the last obliquely emarginate at the end, subacuminate. Thorax with the surface closely and rather coarsely uniformly punctured, except a smooth median line, which has, however, a longitudinal impression before the base; somewhat pubescent, shining, with a few longer hairs, two of which (one on each side), a little before the middle, are conspicuous by their length. There are also one or two shorter ones at the front angles, which are rectangular. The elytra are somewhat wider behind, densely, confluently, but not finely punctured; the striæ of the left wing is more remote from the junction than the other, so that the suture appears imbricated, abdomen strongly margined, slightly iridescent, margins of fourth and fifth (apparent) dorsal segments piceous, pubescent, villose at the sides and behind; abdominal segments gradually increasing in length behind, convex, not finely punctured, fourth and fifth segments truncate at apex. Hind tarsi scarcely shorter than

their tibiæ, first joint about equalling the three following joints.

This species, which is remarkable for the close punctuation of the thorax, bears considerable superficial resemblance to *Philonthus viridanus*, but differs from it in several important particulars.

It is broader and stouter, the sides of the thorax slightly rounded and converging in front, not almost parallel as in the latter species, and the punctuation of the thorax is also different. In *viridanus* the legs are also more or less testaceous. It is, perhaps, more of the form of *P. confertus*, but quite different in color.

Described from a single specimen (♀ ?) in my collection, captured at Lachine, Montreal Island.

HYDNOBIUS LONGULUS, Lec. (Plate V, figs. 4 and 5.)

Piceo-castaneous, elongate, convex, elytra finely and rather inconspicuously striate, the sutural stria deeper, interspaces flat, somewhat densely punctulate. Thorax transverse, much less deeply and densely punctured than the wingcases and more shining, finely margined at the sides, apex truncate and with rounded hind angles. Labrum deeply emarginate and villose. Male femora provided near the end with a large tooth, which is obliquely truncate at the apex Length ·12 in.; 3·5 mm.

Collected by Dr. A. R. C. Selwyn, Director of the Geological Survey, in British Columbia, and by him presented, with other coleoptera from the same locality, to the Society.

LIMONIUS STIGMA, Herbst. (Plate V, fig. 6.)

Elater stigma, Herbst, 10, 86, tab. 166, f. 1.

Elater armus, Say, Trans. Am. Phil. Soc., 6, p. 171.

Gambrinus armus, Lec., Revision Elateridæ U. S., Trans. Am. Phil. Soc., 1853, p. 435.

Black, shining, tinted with æneous, more especially the thorax, with short grey pubescence, rather convex, punc-

tured. Prothorax convex; the surface rather distantly punctured, slightly channelled at the middle behind; the sides behind the middle are parallel, then at the middle somewhat suddenly obliquely narrowed to the front. The sides are obtusely angulated before the anterior angles, which are dentiform. Elytra with rather strongly punctured furrows, the intervals also densely punctured, the sides parallel and obtusely rounded at the tip, third and fourth striæ confluent before reaching the extremity. The humeri are covered with a conspicuous red spot; larsi piceous. Variable in size, ·25-·37 in.

CORYMBITES HAMATUS, Say. (Plate V, fig. 7.)

Elater hamatus, Say, Tr. Am. Phil. Soc., 6, 170.
Corymbites hamatus, Lec., *loc. cit.*

Robust, head and thorax black, rather finely densely punctured, the punctures almost concealed by the short yellow pubescence. Thorax convex, with the sides rounded, the hind angles moderately divergent, disk channelled at the middle near the base; sides, hind angles and inflexed portion of the thorax, as well as the anterior lobe of the prosternum rufo-testaceous. Elytra pale yellow, with a brownish curved spot near the extremity, and the suture also infuscate behind. The elytral striæ are well marked, with the intervals convex and densely punctured; antennæ brown, second and third joints nearly equal; legs brown testaceous.

Length ·43; 11 mm.

New Jersey (Geux), Ontario, Montreal.

GNORIMUS MACULOSUS, Kn. (Plate V, fig. 8.)

Cetonia maculosa, Knoch.
Trichius maculosus, Schönherr.
Trichius bigsbii, Kirby, Zool. Journ., iii, 155, t. v., f. 7; Fauna Bor. Am., Pt. IV, p. 136.
Gnorimus dissimilis, Gory.

Black, ovate, variously spotted and villose with yellowish hairs; head quadrangular, front margin reflexed and emarginate, antennæ and legs black, sometimes more or less luteous, vertex occasionally with a yellow-white longitudinal spot. Thorax narrowed in front, sub-angulated at the sides, broadly lobed at the base, which is sinuate on each side of the middle, densely but not finely punctured, and villose with yellow hairs, the surface not or variably maculate with numerous yellow spots. Elytra luteous, with a slight bloom, and usually with nine black spots arranged transversely, two in front, three at the middle and two behind the middle, the humerus and apical gibbosity also black and shining. Tarsi piceous. The pygidium is often covered with dense yellow-white scales. Very variable in color, another individual in my collection being almost entirely black, the elytra alone having four rufous spots in the middle and two indistinct ones near the scutel.

Length ·53 in.; 13·5 mm.

Lake St. Clair (Bigsby), Ontario (Kilman), Montreal (Cushing).

Mr. Cushing tells me he took it on thorn blossoms in spring. Uncommon.

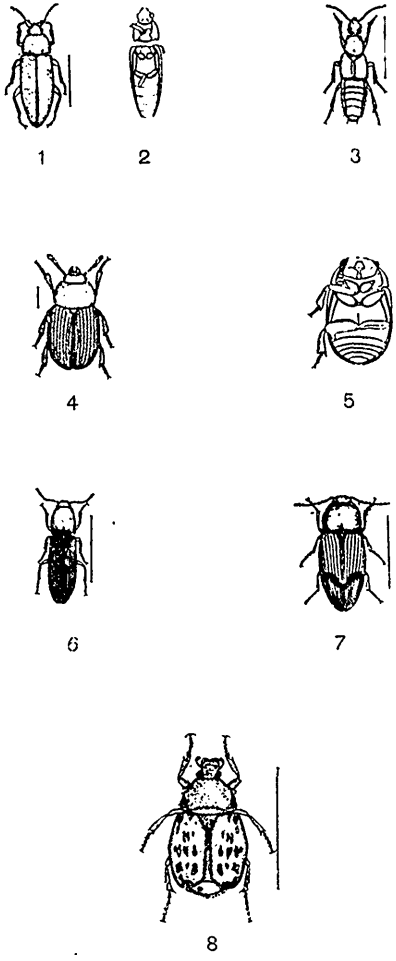
EXPLANATION OF PLATE V.

Fig. 1. ZILORA CANADENSIS, n. sp.
" 2. " " seen from beneath to show details.
" 3. PHILONTHUS STICTUS, n. sp.
" 4. HYDNOBIUS LONGULUS, Lec., ♂.
" 5. The underside of the same to show structure.
" 6. LIMONIUS STIGMA, Herbst.
" 7. CORYMBITES HAMATUS, Say.
" 8. GNORIMUS MACULOSUS, Knoch.

ERRATA.

The following errors, partly clerical, partly typographical, occur in my paper in the last number of this magazine:—

Page 252, l. 17 from top, instead of *stenopus* read STENOPS.
" 252, l. 28 " " " *sullcatis* read SULCATIS.
" 252, l. 31 " " " *simplictus* read SIMPLICIBUS.
" 253, l. 20 " " " *points* read JOINTS.
" 253, l. 31 " " " *freely* read FEEBLY.
" 253, l. 34 " " " *stenopus* read STENOPS.
" 254, l. 15 " " " *stenopus* read STENOPS.



J. F. HAUSEN, DEL.

HAUSEN ON CANADIAN COLEOPTERA.

The Royal Society of Canada.

By John Reade, A.M.

The Royal Society of Canada owes its existence to the thoughtful interest of Lord Lorne in the intellectual progress of Canada. The movement out of which its organization arose was inaugurated in 1881. Already its enlightened founder had established a Canadian Academy of Arts, for the encouragement of design as applied to painting, sculpture, architecture, engraving and the industrial arts, and the promotion and support of art education. The success which had attended the formation and early proceedings of the institution led his Lordship to believe that a national organization which would be to science and literature what the Academy was to art would be of real service to the cause of the higher intellectual culture in the Dominion. After consulting with the leading men of science and letters, both French and English, his Lordship invited the gentlemen whom he had designated as provisional officers of the proposed organization to meet in Montreal. The meeting accordingly took place on the 29th and 30th of December, 1881, and thereat a memorandum from Lord Lorne on the subject was read and considered.

A provisional basis was then agreed upon for the constitution of the new society, the first meeting of which took place at Ottawa on the 25th of May, 1882. The Governor General (Lord Lorne) had invited the members of the provisional council to Government House for the settlement of the procedure, and the arrangements proved entirely satisfactory. The Council consisted of Principal (now Sir) J. W. Dawson, C.M.G., LL.D., F.R.S., President; the Hon. P. J. O. Chauveau, LL.D., Docteur des Lettres, Vice-President; and the Presidents and Vice-Presidents of sections: J. M. LeMoine, Esq., and Faucher de St. Maurice, Esq., first section; Dr. (now Sir) Daniel Wilson, F.R.S.E., and Goldwin Smith, Esq., D.C.L., second section; Dr. T. Sterry

Hunt, F.R.S., and Charles Carpmael, Esq., third section, and Dr. A. R. C. Selwyn, F.R.S., and Dr. George Lawson, Ph.D., fourth section; J. G. Bourinot, Esq., F.S.S., Honorary Secretary. All these members of Council were present except Dr. Goldwin Smith, then absent in England.

At the general business meeting, held in the railway committee room, Parliament Building, Ottawa, on the morning of the 25th of May, the Honorary Secretary read the Council report, the recommendations of which were afterwards embodied in the charter and constitution of the Society. The formal public inauguration of the Society took place in the Senate Chamber, at 4 o'clock in the afternoon. Members of the Society having been presented to the noble Founder, His Excellency set forth the aims of the Society, and expressed the hope that its formation would promote the intellectual development of the Dominion in the higher ranges of thought, letters and research. "Imperfections," said his Lordship, "there must necessarily be at first in its constitution—omissions in its membership and organization there may be. Such faults may be hereafter avoided. Our countrymen will recognize that in a body of gentlemen drawn from all our provinces and conspicuous for their ability there will be a centre around which to rally. They will see that the welfare and strength of growth of this association shall be impeded by no small jealousies, no carping spirit of detraction, but shall be nourished by a noble motive common to the citizens of the republic of letters and to the students of the free world of nature, namely, the desire to prove that their land is not insensible to the glory which springs from numbering among its sons those whose success will become the heritage of mankind.

The President, in his address, mentioned some of the reasons which, in his opinion, justified the institution of such a body in Canada. If the idea had been broached in the past, it had been abandoned owing to obvious difficul-

ties. But it had at last presented itself under happier conditions which gave fair hopes of success. It was fitting that the representative of a Sovereign, whose rule had been so favorable to culture and research in the United Kingdom, would show himself the patron of letters and science in the new world. The time, moreover, was auspicious. Political consolidation had been drawing nearer to each other the once scattered and isolated scientific workers of the North American provinces. Such a society would be to them a bond of union and sympathy, and by the interchange of ideas would supply a needed stimulus to men of kindred pursuits. It would, by the publication of its Transactions, be of incalculable benefit to Canadian naturalists, hitherto so largely dependent on foreign aid for placing the results of their labors, in a worthy form, before the world. As a centre of literary and scientific effort, it would, without interfering with the claims of older local societies, be of very real help to them. Comparing Canada with other countries, the President thought it was rather matter for surprise that so many persons amongst us had won distinction in the paths of research and of letters than that there were not more. Finally he spoke of the great responsibility of the members, and he hoped that by earnest and united effort they would prove themselves deserving of the name to which they aspired. The Vice-President set forth in French, with his customary grace of style, the intellectual progress that Canada had already achieved, dwelling especially on its literary, as Dr. Dawson had dwelt on its scientific aspects. He trusted that the Royal Society would prove a common meeting ground not only for scientific and literary workers, but also for the culture of the two great races whose lot was cast together in this broad Dominion.

The Society then separated into sections. Fifty-six papers, embracing nearly all the departments of research, were either read or presented at the first meeting, and of these thirty-three were published in the Transactions. Re-

ferring a year later to the general results of the meeting Sir William Dawson was able to express a high degree of satisfaction at what had so far been accomplished. "We have occasion," he said, "to congratulate ourselves on the reception which our inaugural meeting met with at the hands of the public and the newspaper press. Everywhere the institution of the Society was recognized as wise and beneficial, and if any doubts were expressed with reference to it, they were based not on hostility to the Society, but on a very natural diffidence as to the capacity of Canada, in its present state of development, to sustain a body comparable with the great national societies of other countries. The amount of original work produced at our first meeting was evidently an agreeable surprise to many; and while there was some friendly criticism by which we may hope to profit, on the whole our debut was regarded with that feeling at once kindly, considerate and patriotic which becomes all true Canadians in witnessing any effort, however feeble, to sustain and exalt the greatness of our country."

Meanwhile the Society had obtained the recognition of the Queen and of the Canadian Parliament. A letter from Lord Kimberley, Secretary of State for the Colonies, dated the 22nd of August, 1882, to the Marquis of Lorne, gave the pleasing information that Her Majesty had graciously permitted the Society to be styled "The Royal Society of Canada." On the 1st of March, 1883, a Bill to incorporate the Society was introduced in the House of Commons by Mr. Tassé. It was read a second time on the 19th of the same month, and on the 6th of April it was considered in committee, read a third time and passed. It received the royal assent on the 25th of May.

Rule 11, regarding the affiliation of local literary and scientific societies throughout the Dominion, has proved most fruitful in concentrating and developing the intellectual efforts of all the provinces of the Dominion. In

1883 twelve societies responded to the Hon. Secretary's invitation by sending delegates. This number has increased from year to year, until now there are altogether twenty-four literary, scientific, philosophical and historical societies represented in the Transactions. The full reports of their proceedings submitted by these organizations of kindred aim are extremely valuable, as indicating the work that Canada is doing in the various fields of scientific research, historical investigation and literary creation or criticism. Some of the delegates have contributed records covering the whole period of their society's existence—records of undoubted interest and value to the future historian of our intellectual progress. The following is a list, in the order of their seniority, of these

AFFILIATED SOCIETIES.

Literary and Historical Society of Quebec	1824
Natural History Society of Montreal	1827
(Incorporated, 1832.)	
Institut Canadien, Quebec	1846
Canadian Institute, Toronto	1851
Institut Canadien, Ottawa	1852
Hamilton Association, Hamilton	1856
Société Historique, Montreal	1858
Nova Scotia Inst. Natural Science	1862
Natural History Society, New Brunswick	1862
Numismatic and Antiquarian Society, Montreal	1862
Entomological Society of Ontario	1863
Ottawa Literary and Scientific Society	1869
Murchison Scientific Society, Belleville	1873
Nova Scotia Historical Society	1878
Ottawa Field and Naturalists' Club	1879
Geographical Society of Quebec	1879
Historical and Scientific Society of Manitoba	1879
Society for Historical Studies, Montreal	1885
Cercle Littéraire Français, Montreal	1885
Cercle A. B. C. (Philosophical), Ottawa	1886
Canadian Society of Civil Engineers	1888
Wentworth Historical Society, Hamilton	1888
Society of Canadian Literature	1889
Natural History Society of British Columbia, Victoria	1889

Though the work the sections can hardly be said to have been fairly divided, some members contributing much more than others, while of a certain number the names have been conspicuous by their absence from the yearly programmes; it may, on the whole, be said that the promise of the opening session has been fulfilled in the successive meetings of the last eight years. In their chosen branches of study and research, all the four sections have added not a little to the sum of the world's knowledge, and if this total be enlarged by the aggregate of work done by the affiliated societies, the whole makes an intellectual product of which the Dominion has no reason to be ashamed.

The points most criticized in the constitution of the Society were the combination of science and literature and its bi-lingual character. As to the former, the first President took occasion, in the address already quoted from, to show that, instead of being a drawback, it was an advantage. After indicating the close relations between the two departments of intellectual effort, he thus expressed his satisfaction at the Society's comprehensiveness:—"For these reasons I rejoice that our Society embraces both science and letters, and I am profoundly convinced that it is for the highest interest of Canada that her scientific men shall be men of culture, and that her literary men shall be thoroughly imbued with scientific knowledge and scientific habits of thought." In a paper read before the Society on the relation of such bodies to the State, the late Dr. Todd showed that New South Wales had anticipated Canada by forming a Royal Society on the like broad basis, its avowed object being "the encouragement of studies and investigations in science, art, literature and philosophy." Lord Lansdowne also expressed his satisfaction at its twofold division, which, he said, greatly enhanced the interest and value of the Transactions.

As to the other point which was the subject of discussion—the union of French and English-speaking members—

so far from proving an obstacle to the Society's usefulness, it has been one of its most fruitful features. The French and English sections have, by their harmony and good-will, set an example which the whole Dominion might follow with advantage. Differences of race and creed have been revealed only by mutual courtesy and willing co-operation in the grand aims of the Society. From the rule of kindliness and deference there has been, from the opening of the first to the closing of the last meeting, no instance of departure. It is also noteworthy that the Society has been the means of renewing relations between the two branches of the French race in the new world—that of Canada and Acadia, and that of Louisiana—the *Athénée Louisianais* of New Orleans, being one of the first of foreign organizations to respond to the invitation of the Honorary Secretary. In the list of the corresponding members, moreover, eminent sons of the French race have their places along with illustrious Anglo-Saxons of both hemispheres. Had the Society effected nothing else than these exchanges of cordial sympathy, it would not have lived altogether in vain.

The letters from eminent foreign societies which greeted the entrance of Canada into their illustrious sisterhood were most gratifying. M. Camille Doucet, perpetual secretary of the French Academy, in acknowledging the Hon. Secretary's invitation to the Institute of France to send a delegate to the meeting at Ottawa, said that Dr. Bourinot's letter had been received with the most cordial sympathy by each of the five Academies that constitute that great centre of universal learning.

The circulation of the Transactions has done much to make Canada better known at the chief seats of enlightenment in the Old World. "Not a week passes, says the report of the Council for 1887, "without some evidence being furnished of the attention that the papers are receiving in cultivated circles abroad, and requests for the volumes are constantly at hand from various centres of intelligence to

which they have not hitherto been sent. Only a fortnight ago, for instance, the Hon. Secretary received some very interesting volumes from the Imperial University of Japan, at Tokio, with an expression of the wish that the Transactions should be regularly sent to that institution." More than six hundred copies are thus distributed every year, and that they do not lie unread on dusty shelves is shown by the best of evidence—the extent to which they are quoted in works dealing with the themes of which they treat.

Apart from its relations to the centres of learning and research in other lands, and its attractive potency on the scattered circles of local intellectual effort in the Dominion, the Royal Society plays a not unimportant *rôle* in connection with the State. This phase of its usefulness (which has hardly yet, perhaps, been allotted due significance) was very clearly illustrated in a paper read by the late Dr. Alpheus Todd, C.M.G., before the Society not long before his death. Citing the example of New South Wales, which was the first of the British Colonies to establish a Royal Society, he commended the statesmen of that great country for availing themselves of the co-operation of learned and capable advisers to advance the public welfare in matters that lay distinctly apart from the domain of party politics. In so doing, however, they were simply following the precedent of the motherland, which had long assigned to the Royal Society of London certain duties of a scientific nature which it was peculiarly qualified to discharge. The application of the same principle in Canada was a logical sequel of the formation of such a body. The same subject was very appositely though indirectly treated by the first President in his second address (1883), wherein he outlined the progress already achieved mainly through the Geological and Natural History Survey and the provisions for science teaching in the Universities. A perceptible stimulus was given to the scientific movement in Canada, both in its practical and scientific aspect, by the departure of the Bri-

tish Association from its narrower early traditions in consenting to hold a meeting in Montreal. In that meeting (1884) members of Canada's Royal Society took an active part, and among the subjects which they chose for their papers there were several which had a distinct relation to the State—such as those on Standard Time, on Tidal Observations on Canadian Waters, on our Mineral Resources, on various branches and details of economic science, and on questions pertaining to our native races.

But, in reality, it is not occasionally but always that the Royal Society is, in sympathy, aspiration and the sphere of its labors, in close relation to the State and the needs of the country at large. Such relation arises necessarily from the fact that the membership of the scientific sections is so largely composed of officers of the scientific departments of the Government. The head of the Geological Survey and the principal members of his staff, the Surveyor-General, the director of the Experimental Farms, the chief Analyst, the head of the Meteorological Service, the director of State Telegraphs, the Government Entomologist, more than one *emeritus* official of high standing, and the several members of corresponding services in the provinces—these, with representatives of the Universities occasionally employed in public functions, form a sort of State Council on the whole range of important questions in which scientific knowledge and experience are essential to the general welfare. An examination of the contents of the Transactions for any and every year will, in fine, furnish convincing proof of the alliance between the Royal Society and the State, and of the benefits which the former renders to the latter.

BOOK NOTICES.

THE BIRDS OF GREENLAND.[1]—This work, edited by Montague Chamberlain, consists of two parts—the first, an annotated list of the birds of Ivigtut, by A. T. Hagerup, is based upon observations made at that place during a residence of fifteen months, published in the Auk, Vol. VI, Nos. 3 and 4. An additional fifteen months' residence at the same locality has enabled the author to "add considerably" to his former notes and to correct a few errors that had crept in.

Much interesting information is given respecting the habits of many species, particularly with regard to nesting and migration. Considerable attention appears to have been given to the vexed question of the Gyrfalcons, with the result that "as Holboll and Fencker repeatedly observed mated pairs, one of which was white (*F. islandicus*) and the other dark (*F. rusticolus*), and as Holboll also found light and dark young in the same nest, I conclude that there is only one species of Gyrfalcon found in Greenland." This certainly is strong evidence, but it is weakened by the statement that the light-colored birds breed chiefly in North Greenland, while the dark birds are chiefly restricted to South Greenland; perhaps further observations may show that they are now equally distributed. The second part, a Catalogue of the Birds of Greenland, "is based on the works of Holboll, Reinhardt, Alfred Newton Ludwig Kumlien and others. Use has also been made of the late Alfred Bewgon's collection of birdskins and eggs," and the author's own observations add much to its value. "The Catalogue comprises all the birds discovered up to date in that part of Western Greenland which is settled by the Danes, namely, the country lying south of 73° N. lat. This is divided at 68° N. lat. into North Greenland and South Greenland. Of the one hundred and thirty-nine species here enumerated, one is extinct, and fifty-three are merely accidental stragglers, while twenty-four others are so rare that they might be classed with the accidentals, leaving but sixty-one species that should be recognized as regular inhabitants of Greenland, and of these several are of quite uncommon occurrence. M.C."

The whole work forms a convenient handbook, its value being much enhanced by Mr. Chamberlain's critical notes, his knowledge of our northern forms pre-eminently fitting him for the task. It will be welcomed by all interested in the avifauna of Greenland.

F. B. C.

[1] The Birds of Greenland. By Andreas T. Hagerup. Translated from the Danish by Frimann B. Arngrimson. Edited by Montague Chamberlain. Boston: Little, Brown & Co., 1891.

Proceedings of the Society.

The fourth monthly meeting was held on Monday evening, Feb. 23rd, 1891, the President, Dr. Harrington, presiding.

On behalf of the Lecture Committee, Dr. Harrington reported that arrangements for the Somerville course had been completed, and that the first lecture would be delivered on the 17th of March, by Mr. J. M. Lemoine of Quebec.

The Curator reported the donation of a female Goshawk by Mr. E. D. Wurtele, to whom a vote of thanks was tendered.

The librarian reported the usual exchanges.

The following were elected ordinary members of the Society:—Mr. James Oxley, Prof. Charles Carus-Wilson and Prof. John Cox.

Dr. Archibald Campbell, who was about leaving for Colorado on account of ill health, was elected corresponding member.

Sir William Dawson then presented a paper on "Some Interesting Fishes from the Lower St. Lawrence." This paper was of a most interesting and instructive nature, and will be found in full in the present number of the *Record* It was illustrated by finely prepared specimens, and called forth many remarks from those present.

Dr. Ruttan also read a paper on "A form of Apparatus for Collecting Traces of Suspended Matter in Drinking Water." The author exhibited a simple but most efficient form of apparatus for collecting sediment from drinking water in process of analysis. The usual vote of thanks was tendered the authors of these papers.

The fifth monthly meeting of the Society was held on Monday, March 30th, 1891, Dr. Harrington presiding.

The routine business having been disposed of, Rev. Dr. Campbell presented a most interesting paper on "Wild Flowers of Great Britain in July and August." The paper was illustrated by a large collection of British wild flowers, which Dr. Campbell presented to the Society as the nucleus of a New Herbarium. A hearty vote of thanks was tendered the author for his paper and his valuable donation.

The sixth monthly meeting of the Society was held on Monday evening, April 27th, 1891. In the absence of the President, Mr. J. S. Shearer took the Chair.

The Field Day Committee reported that they recommended Calumet as the place of holding the next annual excursion in connection with the visit of the Royal Society of Canada. The report was adopted.

The Curator reported the following donation :—

Golden Wyandotte from Mr. Ulley.

The Librarian reported the usual donations of books, also fine photographs of Carboniferous Batrachians from the coal formation of Nova Scotia, and several authors' reprints from Sir William Dawson.

Dr. J. M. Stirling then presented a paper on "Our present knowledge of the projection of sound in space by the human ear," illustrating the same with beautiful diagrams. The paper called forth a very valuable and interesting discussion by the various members.

On suspension of the rules, Mr. R. W. McDougall was elected an ordinary member, and Mr. J. F. Hausen a junior member.

NOTES.

At a meeting of the Biological Society of Washington, on February 7, Mr. Charles D. Walcott, of the U. S. Geological Survey, announced the discovery of vertebrate life in the Lower Silurian (Ordovician) strata. He stated that "the remains were found in a sandstone resting on the pre-Palæozoic rocks of the eastern front of the Rocky Mountains, near Canon City, Colorado. They consist of an immense number of separate plates of placoganoid fishes, and many fragments of the calcified covering of the notochord of a form provisionally referred to the Elasmobranchii. The accompanying invertebrate fauna has the facies of the Trenton fauna of New York and the Mississippi valley. It extends into the superjacent limestone, and at a horizon 180 feet above the fish beds, seventeen out of thirty-three species that have been distinguished are identical with species occurring in the Trenton limestone of Wisconsin and New York. Great interest centres about this discovery from the fact that we now have some of the ancestors of the great group of placoderm fishes which appear so suddenly at the close of the Upper Silurian and the lower portion of the Devonian groups. It also carries the vertebrate fauna far back into the Silurian, and indicates that the differentiation between the invertebrate and vertebrate types probably occurred in Cambrian time." Mr. Walcott is preparing a full description of the stratigraphic section, mode of occurrence and character of the invertebrate and vertebrate faunas, for presentation at the meeting of the Geological Society of America, in August next.

At the annual general meeting of the Geological Society of London, held on Feb. 20th last, the Bigsby medal was awarded to Dr. G. M. Dawson of the Geological Survey of Canada. This is a well deserved honour which Canadians will fully appreciate.

Following closely upon the award of the Bigsby medal, McGill University, through the initiative of its Graduates Society, has added one more to the list of honorary degrees worthily bestowed, by conferring upon Dr. G. M. Dawson, at its last convocation, the degree of Doctor of Laws.

We have just received from Mr. F. J. Hanbury a portrait sketch, reprinted from the Journal of Botany for December, 1890, of the late James Backhouse. Mr. Backhouse was chiefly known for his monograph on the British Hieracia, though his explorations in various parts of Great Britain and his close and accurate knowledge of the British flora, gave him great pre-eminence, especially in connection with the work instituted by his father, James Backhouse, sr. Mr. Backhouse died at West Bank, York, England, on the 31st August, 1890.

An interesting little pamphlet has recently been placed in our hands by Mr. Henry Mott. It is the "Objects and Constitution of the Botanical Society of Montreal." This Society was organized March 28th, 1855, under the direct inspiration of Dr. James Barnston. Its officers for the year 1856, embraced such names as those of Sir Wm. Dawson, Dr. T. Sterry Hunt, J. G. Barnston, Dr. James Barnston and Rev. Alex. F. Kemp. The Society was short lived, and it is a matter of regret that it could not have been perpetuated.

The local committee have just issued a little pamphlet in connection with the forthcoming meeting of the Royal Society of Canada, which contains much useful and interesting information. The larger part of the publication is devoted to the Royal Society itself, its organization and work up to the present time. There are also articles dealing with the Zoology and Botany of the immediate vicinity, as well as information more directly applicable to the immediate requirements of visitors during their sojourn in the city.

ABSTRACT FOR THE MONTH OF JANUARY, 1891.

Meteorological Observations, McGill College Observatory, Montreal, Canada. Height above sea level, 187 feet. C. H. McLEOD, *Superintendent.*

DAY.	THERMOMETER. Mean.	Max.	Min.	Range.	*BAROMETER. Mean.	§ Max.	§ Min.	Range.	† Mean pressure of vapour.	‡ Mean relative humidity.	Dew point.	WIND. General direction.	Mean velocity in miles perhour	SKY CLOUDED IN TENTHS. Mean.	Max.	Min.	Per cent. of Possible Sunshine.	Rainfall in inches.	Snowfall in inches.	Rain and snow melted.	DAY.
1	10.43	34.0	—6.9	40.9	29.9117	30.197	29.547	.650	.0642	78.6	5.2	S.W.	13.1	10.0	10	10	00	0.04	Inapp.	0.04	1
2	31.37	38.5	18.5	20.0	29.4538	29.725	29.315	.410	.1638	87.0	27.8	N.	**16.9**	10.0	10	10	00	0.29	Inapp.	0 29	2
3	6.48	19.1	2.0	17.1	30.1722	30.329	29.940	.389	.0410	71.2	—1.0	.....	. ....	0.0	0	0	96	....	....	....	3
SUNDAY..... 4	.....	8.0	—4.0	12.0	.....	.....	.....	....	.....	....	....	.....	.....	...	..	..	60	....	....	....	4 .....SUNDAY
5	11.58	15.9	6.0	9.9	30.1500	30.217	30.116	.101	.0607	81.8	7.2	.....	.....	9.0	10	7	56	....	....	....	5
6	16.37	20.2	12.8	7.4	30.0942	30.154	30.054	.100	.0785	85.7	12.8	**N.E.**	**14.7**	10.0	10	10	00	....	2.7	0.12	6
7	20.27	25.4	15.6	9.8	30.1980	30.329	30.110	.219	.0752	69.0	12.0	**N.W.**	**13.6**	3.7	10	0	78	...	....	....	7
8	14 18	21.2	9.2	12.0	30.5073	30.578	30.418	.160	.0602	72.7	7.2	**N W.**	**12.7**	0.0	0	0	93	....	....	....	8
9	14.27	20.0	3.7	16.3	30.4752	30.572	30.253	.319	.0713	84.3	10.5	S.W.	16.7	6.7	10	0	00	...	.. .	...	9
10	21.20	24.9	16.8	8.1	30.1880	30.272	30.128	.144	.1013	89.7	18.5	S.W.	14.9	10.0	10	10	04	....	Inapp.	0.00	10
SUNDAY 11	.....	24.1	14.0	10.1	.....	.....	.....	....	.....	....	....	N.E.	13.8		..	..	00	....	8.0	0.80	11 ..... SUNDAY
12	22.72	30.1	10.6	19.5	29.1155	29.462	28.874	.588	.1102	84.7	18.8	S.W.	14.7	8.3	10	0	00	0.09	0.2	0.11	12
13	—1.85	11.3	—8.3	19 6	29.7567	29.885	29.566	.319	.0313	75.3	—8.0	S.W.	15.5	2.0	10	0	97	....	..	....	13
14	—2.78	3.7	—10.5	14.2	29.7828	30.009	29.65.	.358	.0345	90.7	—5.2	N.E.	17.9	8.5	10	0	05	....	2.7	0.20	14
15	4.50	17.0	—4.7	21.7	30.2520	30.354	30.124	.230	.0465	84.0	0.5	S.W.	19.6	6.7	10	0	00	....	2.4	0.21	15
16	—6.68	10.5	—11.9	22.4	30.6578	30.719	30.525	.194	.0242	75 8	—12.8	N.E.	12 4	0.2	1	0	82	....	0.2	0.02	16
17	—1.18	13.8	—15 0	28.8	30.3942	30.591	30.208	.383	.0372	83.3	—5.3	N.E.	14.3	6.0	10	0	31	....	Inapp.	0.00	17
SUNDAY.....18	.....	20 7	13.4	7.3	.. ....	.....	.....	....	.....	....	....	N.	27.3	.	..	..	00	.....	Inapp.	0.00	18 .....SUNDAY
19	13.82	16.3	11.9	4.4	30.2300	30.286	30.162	.124	.0682	84.2	10.0	N.	14.3	7.7	10	3	50	.....	Inapp.	0.00	19
20	14.12	16.7	10.9	5.8	30.0992	30.195	30.032	.163	.0673	81.8	9.8	N.E.	8.5	8.5	10	1	54	....	Inapp.	0.00	20
21	19.15	22.2	15.8	6.4	29.9555	30.029	29.911	.118	.0973	93.5	17.7	E.	9.8	10.0	10	10	00	....	1.4	0.11	21
22	30.22	35.4	21.7	13.7	29.5047	29.916	29.177	.739	.1615	95.5	28.8	N.E.	15.5	10.0	10	10	00	0.81	0.2	0 92	22
23	30 87	34.9	27.0	7.9	29.7532	29.999	29.456	.543	.1288	77.3	23.7	S.W.	32.6	7.8	10	4	16	Inapp.	Inapp.	0.00	23
24	32.13	35.1	29.7	5.4	30.0220	30.052	29.993	.059	.1520	83.5	27.8	S.W.	16.3	10.0	10	10	00	....	0.5	0.03	24
SUNDAY.....25	.....	32.0	22.8	9.2	.....	.....	.....	....	.....	....	....	W.	11.0	....	..		16	....	Inapp.	0.00	25 ..... SUNDAY
26	6.93	26.5	3.0	23.5	30.0947	30.133	30.017	.116	.0398	63.0	—3.3	N.E.	18.5	8.8	10	1	49	....	0.2	0 02	26
27	6.73	11.5	1.0	10.5	30.1460	30.165	30.119	.046	.0485	81.5	2.0	N.E.	14 4	10.0	10	10	00	.... .	0.2	0.02	27
28	16.88	23.0	10.7	12.3	30.2748	30 310	30.222	.088	.0777	83.0	12.5	S.W.	7 6	9.8	10	9	33	..	Inapp.	0.00	28
29	22.62	30.1	15.5	14.6	29.9778	30.293	29.537	.756	.1137	92.3	20.5	N.E.	9.0	10.0	10	10	15	....	1.0	0 29	29
30	32.90	37.0	28.7	8.3	29 6987	30.037	29.446	.591	.1537	81.2	27.7	W.	27.6	9.3	10	6	28	0.06		0.06	30
31	27.87	32.1	20.8	11.3	30.0253	30.149	29.772	.377	.1218	79.3	22.5	S.W.	14.5	9.0	10	4	36	....	1.3	0.06	31
....Means	15.38	22.94	9.06	13.88	30.0308	.....	.....	.307	.0826	81.8	10.7	.....	....	7 48	..	..	29.0	1.29	21.0	3.30	Sums .....
17 yrs. means for & including this mo.	12.00	20.57	3.85	16.70	30.0639	.....	.....	.341	.0730	80.7	....	.....	....	6.42	..	..	33.0	0.87	29.8	3.66	17 years means for and including this month.

ANALYSIS OF WIND RECORD.

Direction.....	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm
Miles.....	1912	2440	338	462	288	3091	950	1018	
Duration in hrs..	114	177	35	34	22	162	51	72	5
Mean velocity....	16.8	13.8	9.7	13.6	13.1	19.1	18.6	14.1	

Greatest mileage in one hour was 53 on the 23rd.
Greatest velocity in gusts, 66 miles per hour on the 23rd.
Resultant mileage for 28 days, 2140.
Resultant direction for 28 days, N. 43° W.
Total mileage for 28 days, 10,499—equal 11,624 for whole month.
Average mileage, 15.62.

* Barometer readings reduced to sea-level and temperature of 32° Far.
§ Observed.
† Pressure of vapour in inches of mercury.
‡ Humidity relative, saturation being 100.
¶ Ten years only.

The greatest heat was 38.5 on the 2nd; the greatest cold was 15.0 below zero on the 17th, giving a range of temperature of 53.5 degrees. Warmest day was the 24th. Coldest day was the 16th. Highest barometer reading was 30.719 on the 16th: lowest barometer was 28.874 on the 12th, giving a range of 1.845 inches. Maximum relative humidity was 100 on 7 days. Minimum relative humidity was 52 on the 26th.

Rain fell on 6 days.
Snow fell on 23 days.
Rain or snow fell on 24 days.
Rain and snow fell on 5 days.
Hoar frost on 1 day.
Lunar halo 1 night.
Fog on 3 days.

NOTE.—Figures and letters, under wind, in bold face type, are from the City Hall record, the mileage of which has been multiplied by 1.25 in order to reduce it to the mountain anemometer.

ABSTRACT FOR THE MONTH OF FEBRUARY, 1891.

Meteorological Observations, McGill College Observatory, Montreal, Canada. Height above sea level, 187 feet. C. H. McLEOD, *Superintendent.*

DAY.	THERMOMETER.				* BAROMETER.				† Mean pressure of vapour.	‡ Mean relative humidity.	Dew point.	WIND.		SKY CLOUDED IN TENTHS.			Per cent. of Possible Sunshine.	Rainfall in inches.	Snowfall in inches.	Rain and snow melted.	DAY.
	Mean.	Max.	Min.	Range.	Mean.	§ Max.	§ Min.	Range.				General direction.	Mean velocity in miles per hour	Mean.	Max.	Min.					
SUNDAY.. 1	.....	32.0	17.2	14.8	.....	.....	.....	....	.....	....	....	N.	5.1	....	..		∞	....	5.3	0.44	1 .....SUNDAY
2	3.07	18.0	—2.0	20.0	30.2757	30.387	30.107	.280	.0393	76.5	—3.0	S.W.	14.2	4.0	10	0	74	....	1.0	0.04	2
3	20.68	34.1	1.1	33 0	29.5108	29.830	29.332	.498	.1007	80.2	15.8	S.W.	21 8	6.7	10	0	∞	0.02	1.4	0.25	3
4	—4.50	13.2	—10.5	23.7	30.0775	30.446	29.681	.765	.0285	79.7	—9.3	W.	24.6	1.0	6	0	96	...	....	....	4
5	—2.62	11.0	—13.0	24.0	30.3072	30.495	30.103	.392	.0353	88.3	—5.5	S.E.	12.5	8.3	10	0	∞	....	3.8	0.11	5
6	17.02	29.7	—1.0	30.7	29.9940	30.075	29 924	.151	.0957	91.7	15.0	S.	11.2	10.0	10	10	∞	...	1.8	0.09	6
7	18.68	26.0	14.0	12.0	30.0835	30.151	30.018	.133	.0867	84.8	15.0	N.E.	22.4	7.7	10	1	∞	....	0.1	0.01	7
SUNDAY 8	.....	16.5	11.4	5.1	.....	.....	.....	....	.....	....	....	N.	27.1	....	..	..	∞	....	1.7	0.17	8 .....SUNDAY
9	17.78	33.5	8.6	24.9	30.0545	30.421	29.545	876	.0935	88.2	14.8	N.E.	15.0	10.0	10	10	∞	0.18	1.3	0.31	9
10	26.32	36.0	12.4	23.6	29.6790	29.972	29.485	.487	.1142	73.8	19.5	S.W.	28.9	8.7	10	1	51	0.07	0.1	0.08	10
11	9.32	14.4	3.5	10.9	30.2455	30.297	30.153	.144	.0463	70.5	1.7	S.W.	17.7	2 0	10	0	95	....	....	.....	11
12	21.78	30.6	8.4	22.2	30 1115	30.257	30.011	.246	.0878	74.0	15.0	S.	12.5	8.0	10	0	60	....	....	....	12
13	12.97	26.5	1.7	24.8	30 1945	30.362	30.061	.301	.0577	70.0	5.0	N.	15 3	4.0	10	0	36	....	....	....	13
14	—0.48	4.0	—6.9	10.9	30.6132	30.725	30.445	.280	.0248	60.0	—11.7	W.	8.2	1.3	8	0	92	....	....	....	14
SUNDAY.. 15	.....	24.5	—7.9	32.4	.. ....	.....	.....	....	.....	....	....	S.E.	13.3	....	..	.	64	.....	....	....	15 .....SUNDAY
16	35.52	40.0	23.9	16.1	29.6102	29.673	29.565	.118	.1927	92.3	33.3	S.W.	15.5	10.0	10	10	∞	0.08	1.2	0.22	16
17	17.55	31.7	14.9	16.8	29.7448	29.815	29.647	.268	.0748	77.2	11.5	N.E.	15 0	9.5	10	7	18	....	0.3	0.05	17
18	22.50	34.5	14.5	20.0	29.7327	30.174	29.358	.816	.0863	69.5	13.8	S.W.	28.2	3.3	10	0	79	0.31	0.1	0.32	18
19	10.92	15.1	7.0	8.1	30.4972	30.569	30.308	.261	.0432	60.7	—0.2	S.W.	12.5	0.0	0	0	100	....	....	....	19
20	11.47	22.6	0.0	22.6	30.2883	30.553	29.977	.576	.0672	85 3	7.7	E.	10.9	10.0	10	10	∞	..	0.5	0.08	20
21	34.00	37 8	21.8	16.0	29.6088	29.768	29.531	.237	.1768	89.8	31.2	S.	15.0	10.0	10	10	∞	0.38	....	0.38	21
SUNDAY.... ...22	.....	34.8	8.9	25.9	.....	.....	.....	....	.....	....	....	S.W.	25.2	....	..	..	53	....	Inapp.	0.00	22 ..... SUNDAY
23	12.05	20.3	2.1	18.2	30.4112	30.557	30.194	.363	.0542	70.3	3.7	S.E.	6.4	8.0	10	0	47	....	....	....	23
24	30 43	39 0	11.8	27.2	29.9843	30.197	29.686	.511	.1477	84.2	25.7	S.	21'9	10.0	10	10	20	0.06	....	0.06	24
25	41.43	45.2	37.5	7.7	29.3513	29.571	29.225	.347	.2382	90.5	38.8	S.	27 7	10.0	10	0	∞	0.52	....	0.52	25
26	25.80	37.5	22.5	15.0	29 5992	29.668	29.496	.172	.0948	67.3	16.5	S.W.	20.5	5.0	10	0	85	....	..	.. .	26
27	16.85	23.0	12.5	10.5	29.8388	30.139	29.633	.506	.0588	62.8	6.5	W.	18.5	4.8	10	0	53	.....	....	...	27
28	18.20	26.2	8.2	18.0	30.1485	30.260	30.033	.227	.0808	78.0	12.7	S.	17.5	8.0	10	0	∞	....	0.1	0.01	28
.....Means	17.36	27.06	7.95	19.11	29.9984	.....	.....	.373	.0886	77.7	11.4	.....	17.3	6 68	..	..	68.7	1.62	18.7	3.14	Sums .....
17 yrs. means for & including this mo.	15.59	24.13	6.85	17.27	30.0389	.....	.....	.326	.0825	78.5	....	.....	....	5.89	..	..	¶41.4	0.94	22.4	3.07	17 years means for and including this month.

ANALYSIS OF WIND RECORD.

Direction.....	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm
Miles.....	1022	812	713	1091	2189	3930	1680	189	
Duration in hrs ..	50	66	41	77	122	186	97	20	13
Mean velocity....	20.4	12.3	17.4	14.2	17.9	21.1	17.4	9.4	

Greatest mileage in one hour was 45 on the 18th.
Greatest velocity in gusts, 58 miles per hour on the 18th.

Resultant mileage, 4750.
Resultant direction, S. 32° W.
Total mileage, 11,626.
Average mileage, in miles per hour, 17.3.

* Barometer readings reduced to sea-level and temperature of 32° Far.

§ Observed.

† Pressure of vapour in inches of mercury.

‡ Humidity relative, saturation being 100.

¶ Ten years only.

The greatest heat was 45.2 on the 25th; the greatest cold was 13.0 below zero on the 5th, giving a range of temperature of 58.2 degrees. Warmest day was the 25th. Coldest day was the 4th. Highest barometer reading was 30.725 on the 14th; lowest barometer was 29.225 on the 25th, giving a range of 1.500 inches. Maximum relative humidity was 100 on the 4th. Minimum relative humidity was 48 on the 14th.

Rain fell on 8 days.
Snow fell on 15 days.
Rain or snow fell on 18 days.
Auroras were observed on 3 nights.
Lunar halo on one night.
Lunar corona on one night,
Fog on 4 days.

ABSTRACT FOR THE MONTH OF MARCH, 1891.

Meteorological Observations, McGill College Observatory, Montreal, Canada. Height above sea level, 187 feet. C. H. McLEOD, *Superintendent.*

DAY.	THERMOMETER.				* BAROMETER.				† Mean pressure of vapour.	‡ Mean relative humidity.	Dew point.	WIND.		SKY CLOUDED IN TENTHS.			Per cent. of Possible Sunshine.	Rainfall in inches.	Snowfall in inches.	Rain and snow melted.	DAY.
	Mean.	Max.	Min.	Range.	Mean.	§ Max.	§ Min.	Range.				General direction.	Mean velocity in miles per hour	Mean.	Max.	Min.					
SUNDAY..... 1	.....	14.4	2.0	12.4	.....	.....	.....	....	.....	...	....	W.	18.2	....	..	..	99	....	....	....	1 .....SUNDAY
2	5.53	10.8	—2.1	12.9	30.5788	30.659	30.478	.181	.0357	64.7	—4.2	W.	2.7	2.2	10	0	78	....	....	....	2
3	16.33	25.0	4.0	21 0	30.3410	30.481	30.137	.344	.0672	69.8	8.3	N.E.	11.0	6.8	10	0	45	....	....	....	3
4	19.42	24.3	14.8	9.5	29.9103	30.080	29.820	.260	.0973	92.2	17.3	N.E.	17 6	10.0	10	10	00	...	9.1	0.67	4
5	19.32	26.5	13.0	13.5	30.0188	30.155	29 905	.250	.0817	78.3	13.7	W.	15.8	10.0	10	10	00	....	0.2	0.03	5
6	18.30	22.5	10.9	11.6	30.1712	30.256	30.102	.154	.0690	69.5	10.2	W.	17.3	2.8	10	0	89	...	....	...	6
7	20.75	26.9	15.1	11.8	30.2003	30.229	30.182	.047	.0737	66.3	11.5	S.W.	8.7	2.3	10	0	89	....	....	....	7
SUNDAY 8	.....	28.9	13.0	15.9	.....	.....	.....	....	.....	....	....	N.E.	10.7	....	..	..	72	....	....	....	8 .....SUNDAY
9	33 67	39.9	20.8	19.1	29.9150	30.092	29.743	349	.1592	81.0	28.3	S.E.	13 1	10.0	10	10	00	1.41	....	1.41	9
10	30 60	36.0	26.9	9.1	30.0573	30.245	29.794	.451	.1320	77.0	24.2	S.W.	24.7	4.5	10	0	52	0.20	1.9	0.39	10
11	35.32	42.2	25 7	16.5	30 1988	30.282	30.145	.137	.1290	63.3	23.8	S.	21.0	3 0	10	0	81	....	....	....	11
12	37.02	39.0	35.7	3.3	30.0898	30.158	30.027	.131	.1730	78.5	30.5	S.	20.2	8.3	10	0	00	0.30	....	0.30	12
13	37 40	40.9	32.5	8.4	29.5005	29.988	29.118	.870	.1982	87.7	34.0	E.	19 4	10.0	10	10	00	0.29	....	0.29	13
14	24.05	33.1	17.5	15.6	29.5273	29.916	29.251	.665	.0892	67.6	15.2	S.W.	39.7	10.0	10	10	03	....	0.8	0.04	14
SUNDAY.....15	.....	29.0	10.6	18.4	.. ....	.....	.....	....	.....	....	....	S.W.	20.3	....	..		93	.....	....	....	15 .....SUNDAY
16	23.13	33.0	8.5	24.5	29.9210	30.187	29.755	.432	.0897	66.0	13.2	W.	26 0	4.7	10	0	52	....	0.8	0.08	16
17	14.10	22.0	3.8	18.2	30.2278	30.324	30.126	.198	.0553	66.5	5.0	S.W.	18.7	3.0	10	0	98	....	....	...	17
18	22.90	27.6	17.8	9.8	29.9730	30.064	29.894	.170	.1085	88.3	20.0	S.E.	8.5	10.0	10	10	00	....	3.5	0.26	18
19	10.28	25.1	5.0	20.1	30.3767	30.446	30.246	.200	.0432	61.7	—0.7	N.	16.5	0.0	0	0	96	....	....	....	19
20	19.42	32 0	3.0	29.0	30.2923	30.363	30.243	.120	.0853	72.5	12.3	N.E.	8.5	6.7	10	0	18	Inapp.	....	0.00	20
21	31.65	35.0	22.8	12.2	30.0778	30.247	29.883	.364	.1403	78.2	25.7	N.E.	16 3	10.0	10	8	05	0.19	Inapp.	0.19	21
SUNDAY.....22	.....	42.0	33.7	8.3	.....	.....	.....	....	.....	....	....	N.E.	14.0	....	..		31	0.12	....	0.12	22 ..... SUNDAY
23	41.02	47.8	34.6	13.2	30.0455	30.069	30.024	.045	.2258	87.8	37.5	N.E.	12.2	9.7	10	9	31	Inapp.	....	0.00	23
24	37 43	42.9	31.9	11.0	30.1768	30.218	30.128	.090	.1808	80.0	31.7	S.W.	17.8	7.8	10	0	31	0.14	....	0.14	24
25	26.90	33.0	21.8	11.2	30.3057	30.368	30.262	.106	.0815	55.2	13.7	W.	16.1	1.3	3	0	93	....	....	....	25
26	21.30	27 0	13.9	13.1	30.4588	30.516	30.429	.087	.0767	66.5	12.3	S.W.	8.4	1.8	10	0	93	.....	..	.. .	26
27	27.63	36 0	17.8	18.2	30.3030	30.451	30.147	.304	.0985	65 8	17.8	N.E.	5.7	0.0	0	0	97	. .	....	..	27
28	35.45	38.5	29.6	8.9	30.0285	30.125	29.982	.143	.1313	63.2	24.2	N.	12.4	5.3	10	0	57	....	Inapp.	0.00	28
SUNDAY.....29	.....	49.0	34.8	14.2	.....	.....	. ....	....	.....	....	....	N.	18.5	....	..	.	95	....	....	....	29 ..... SUNDAY
30	33.20	40.0	27.6	12.4	30.1968	30.231	30.171	.060	.1128	59.5	20 8	N.	10.5	0.0	0	0	97	....	....	...	30
31	32.25	40.0	23.7	16.3	30.1155	30.218	30.050	.168	.1205	67.3	22.5	N.E.	13.1	1.8	10	0	86	....	....	....	31
.....Means	25.94	32.59	18.41	14.18	30.1157	.....	.....	.243	.1098	72.1	18 0	.....	15.60	54.6	..	..	54.7	2.65	16.3	3.92	Sums .....
17 yrs. means for & including this mo.	23.99	31.22	16.30	14.92	29.9671	.....	.....	.263	.1069	75 4	....	....	....	61.4	..	..	46.5	0.96	25.0	3.44	17 years means for and including this month.

ANALYSIS OF WIND RECORD.

Direction..... ..	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm
Miles.....	1412	2142	694	671	1087	2546	2555	495	
Duration in hrs .	97	179	53	52	57	119	120	36	31
Mean velocity....	14.6	12.0	13.1	12.9	19.1	21.4	21.3	13.7	

Greatest mileage in one hour was 52 on the 14th.
Greatest velocity in gusts, 66 miles per hour on the 14th.

Resultant mileage, 2020.*
Resultant direction, S. 87°.5 W.
Total mileage, 11,602.

* Barometer readings reduced to sea-level and temperature of 32° Far.

§ Observed.

† Pressure of vapour in inches of mercury.

‡ Humidity relative, saturation being 100.

¶ Ten years only.

The greatest heat was 49.0 on the 29th: the greatest cold was 2.1 below zero on the 2nd, giving a range of temperature of 51.1 degrees. Warmest day was the 29th. Coldest day was the 2nd. Highest barometer reading was 30.659 on the 2nd; lowest barometer was 29.118 on the 13th, giving a range of 1.541 inches. Maximum relative humidity was 99 on the 4th. Minimum relative humidity was 36 on the 29th.

Rain fell on 9 days.
Snow fell on 8 days.
Rain or snow fell on 15 days.
Auroras were observed on 2 nights.
Hoar frost on 2 days.
Solar halo on 1 day,
Lunar halo on 3 night.
Fog on 2 days.