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THE

CANADIAN

NATURALIST AND GEOLOGIST.

VOL. VI. JUNE, 1860. No. 3.

ARTICLE. XIII.—*New Species of Fossils from the Lower Silurian Rocks of Canada.* By E. BILLINGS.

(*From the Report of the Geological Survey for* 1860.)

STRAPAROLLUS CIRCE. N. S.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 1.—*Straparollus Circe.* Front view.
2.—Vertical view of the spire.
3.—View of the umbilicus.

Description.—Depressed conical, height a little more than half the width, apical angle about 125°; apex rounded, not acute; whorls four or five, with a nearly circular section; umbilicus deep, conical, extending quite to the apex, about one third the width of the shell. Aperture nearly circular, the height slightly exceeding the width, scarcely indented by the preceding whorl Surface nearly smooth. Suture distinct.

Width of the only specimen examined eight lines; height five lines; width of aperture three lines.

This species closely resembles the original *Straparollus Dionysii* upon which Montfort established the genus. It also approaches *Euomphalus cyclostomus*, (Hall). Geology of Iowa Pl. VI. fig., 6 (Hamilton Group Iowa).

Locality and Formation.—Pauquettes Rapids, Ottawa River, Black River, and Birdseye. (very rare).

Collector.—Sir W. E. Logan.

STRAPAROLLUS EURYDICE. N. S.

Fig. 4.

Fig. 5.

Fig. 4.—*Straparollus Eurydice.* Front view.
5.—Side view.

Description.—Conical, apical angle about 60°, rounded not acute; height and width about equal; whorls five, with a nearly circular section, uniformly ventricose; suture distinct; umbilicus small, deep, one sixth the width of the base of the sheli; the body whorl obtusely carinated close to the edge of the umbilicus; the aperture nearly circular, its height slightly exceeding the width. Surface with obscure lines of growth, which cross the whorl a little obliquely from the suture downwards and backwards; a few wide shallow undulations parallel with the lines of growth.

Height seven lines; width the same; width of aperture three lines, height three and a half.

Locality and Formation.—Pauquettes Rapids, River Ottawa, Black River, and Birdseye.

Collector.—Sir W. E. Logan.

STRAPAROLLUS ASPEROSTRIATUS. N. S.

Description.—Shell small, depressed-conical; apical angle between 80° and 90°; whorls about three with a nearly circular section, regularly ventricose above; obscurely carinated along the middle on the underside, suture distinct, umbilicus about one fourth the width of the shell, penetrating to the apex; aperture circular. Surface with strong sharply elevated lines of growth,

which on crossing the whorl are deflected gently backwards until on approaching the base of the body whorl, they turn a little forward and pass vertically into the umbilicus. There are six striæ in the width of one line. Width of only specimen seen five lines, height four lines; width of aperture two and a half lines.

This species differs from *S. Circe* in being much smaller, and in having the surface so strongly striated as to present a peculiarly rough file-like appearance; only one specimen has been collected, but as it exhibits the aspect of a mature shell, I am inclined to think the species is small.

Locality and Formation.—Pauquettes Rapids, Ottawa River, Black River, and Birdseye, (apparently rare).

Collector.—Sir W. E. Logan.

The following species of *Pleurotomaria* have been usually referred to *P. lenticularis*, (Sowerby) but they all appear to be distinct from that species.

PLEUROTOMARIA PROGNE. N. S.

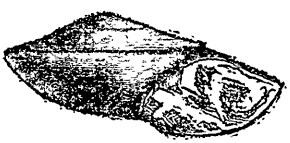

Fig. 6.

Fig. 6.—*Pleurotomaria Progne.*

Decription.—Lenticular; about one inch and a half in width; spire depressed conical, apical angle about 140°, seldom more but often a little less; surface of spire presenting an uniform nearly flat, smooth slope from the apex to the margin, the sutures in perfect specimens being scarcely distinguishable although in casts of the interior they are somewhat strong and deep. The margin is narrowly rounded and does not exhibit the acute edge possessed by such species as *P. qualteriatus*. On the under side the whorls are uniformly depressed convex and the base, or all that portion of the shell which lies below the margin, is usually nearly double the bulk of the spire. When perfect the umbilicus is completely closed, but in the casts of the interior, there is a small perforation. The aperture is transversely sub-oval, scarcely sub-rhomboidal

and in perfect specimens the width must be nearly twice the height. There are about four whorls. The surface appears to be nearly smooth, but as the only specimens with the shell preserved, that I have seen are silicified, they do not exhibit it perfectly.

This species differs from all those described by Hall in the Palæontology of New York in having the umbilicus closed and from the *P. lenticularis* and *P. qualteriatus* of the European authors, not only in the same respect, but also in having the margin rounded instead of acute.

Locality and Formation.—City of Ottawa; near Montreal; Belleville; Trenton, and numerous other localities in Trenton Limestone; good specimens extremely rare.

Collectors.—Sir W. E. L.; A.M.; J. R.; E. B.

Pleurotomaria Americana.

P. lenticularis ?—Hall, *Pal. N. Y.*, p. 172.

Not *P. lenticularis.*—Of European Authors.

Fig. 7.

Fig. 7.—*Pleurotomaria Americana.* A section through the umbilicus. General form same as *P. Progne*, (see fig. 6) from which species it only differs in having an open umbilicus.

Description.—Lenticular, one or two inches wide; whorls four or five, nearly flat above, elevated into a depressed conical spire with a nearly smooth continuous slope from the apex to the margin; the latter obtusely rounded. On the under side the whorls are moderately convex, forming a depressed conical base, the bulk of which is always somewhat greater than that of the spire. The umbilicus penetrates to the apex, and is in general somewhat less than one third of the whole width of the shell. The aperture is transversely sub-rhomboidal, the width about one third greater than the height.

The surface is rarely preserved, but from such fragments of the shell as I have seen it must be nearly smooth or at least very finely striated.

This is the most common species of *Pleurotomaria* in the Trenton Limestone, and is I have no doubt the same as that figured by Prof. Hall in the work above cited, but surely it cannot be the European species *P. lenticularis* to which it has been referred. That species has a sharp edged margin. There are several European species under the name *P. lenticularis*, but it is the Silurian form to which I refer.

P. rotuloides.—(Hall) has not the smooth spire, and concealed suture of *P. Americana*, and there is no other in the Palæontology of New York, to which this species can be compared. It may be that *P. Progne* and *P. Americana* should be classified as one species, but at present I think the great difference in the umbilicus is sufficient to separate them.

Locality and Formation.—Trenton Limestone at Ottawa, Montreal, Beauport, Trenton, Belleville, and St. Joseph's Island, Lake Huron. Good specimens exceedingly rare.

Collectors.—Sir W. E. L.; A.M.; J. R.; E. B.; R. B.

PLEUROTOMARIA HELENA. N. S.

Fig. 8.

Fig. 8.—*Pleurotomaria Helena.*

Description.—Sub-lenticular, with an elevated narrowly rounded margin; spire depressed conical; apical angle varying from 110° to 125°, apex rounded not acute; whorls about four, the last one rather strongly concave on the upper side, the others only slightly so. On the under side of the shell the whorls are moderately convex, and the umbilicus closed. The aperture is a little wider than high, the upper part of the inner lip slightly indented by the body whorl, the lower half somewhat vertical, but rounded, the lower part of the outer lip from the umbilicus to the margin of the whorl gently convex, the portion above the margin concave. In most specimens the suture is enamelled, the shell appearing to be continuous from the apex to the margin, but in some, especially

those which are a little worn, it can be more or less distinctly seen; the last whorl usually drops a little below the margin of the next preceding, but even in such instances the suture is not very distinct. In the specimens from shaly rocks no surface markings are visible, but in those from the sandstone of Anticosti, the striæ are distinctly visible curving backwards from the suture to the margin. They are very fine in general, but there are occasionally a few coarse ones at distances of half a line or thereabouts from each other. Width from ten to fifteen lines; height a little variable; usually about three fourths of the width.

This species is evidently allied to *P. calcifera*, but differs therefrom in having no umbilicus.

Variety.—Associated with the specimens upon which the above description is founded are several others which have the last whorl on the underside obtusely angulated at about two thirds the width from the outside, this angulation forming the edge of a shallow concave umbilicus, about one third of the whole width of the shell but which does not appear to penetrate the spire more than half the depth of the last whorl.

One of these specimens is nearly two inches wide, with the strongly elevated margin forming a spiral ridge quite to the apex, this character giving to the spire a more distinctly turretted aspect than is exhibited by the specimen above figured. It may be that these should constitute distinct species, but the fact of their having been found associated together both at Lake Huron and Anticosti induces me to regard them as only varieties.

Locality and Formation.—Cape Smith, Lake Huron; Hudson River Group; and also in the same formation at Anticosti.

Collectors.—J. Richardson and R. Bell.

OPHILETA OTTAWAENSIS. N. S.

Description.—About one inch wide; whorls four or five; an elevated sharp margin all round; spire concave more or less depressed below the plane of the margin; underside of whorls regularly ventricose; umbilicus wide, shallow, concave, exposing all the whorls, occupying all the space within the outer whorl. Surface not observed.

Width of largest specimen seen fourteen lines; width of last whorl at the aperture five lines; depth of same four lines; depth of concavity of spire in the centre nearly one line; of umbilicus rather more than one line. The depth of the concavity of the

spire varies greatly. A small specimen eight lines wide consisting of three whorls has the spire full two lines depressed below the margin the lower side being nearly flat.

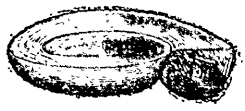

Fig. 9.

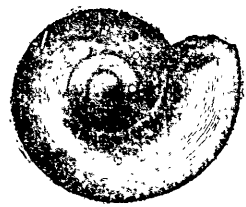

Fig. 10.

Fig 9.—*Ophileta Ottawaensis.* Front view partly shewing the depressed spire.

10.—View of the base. The specimen figured has the whorl more slender than they are in the majority of the individuals.

In the geology of Russia plate 23 Figs. 2*a* 2*b* De Verneuil and De Keyserling have figured a species almost identical with this, but they regard it as only a variety of *Pleurotomaria qualteriatus.* It appears to me however to be a distinct species. We have in the Trenton Limestone a number of species of *Pleurotomaria* and in some localities the individuals (although rarely perfect) are not uncommon. Yet I have never seen any specimens that could be considered as intermediate forms between the one here described and those which belong to the group of *P. qualteriatus.*

This species differs from *O. compacta* Salter principally in having the umbilicus concave instead of flat.

Locality and Formation.—City of Ottawa, Trenton; not common.

Collector.—E. B.

BELLEROPHON ARGO. (N. s.)

Description.—Lenticular; from half an inch to an inch and a-half in diameter, (usually about one inch); the dorsum with a rounded edge and the sides rather strongly and uniformly convex. Whorls three or four, each concealing about two-thirds of the one next preceding it. Umbilicus small, exposing all the whorls in a series of rectangular steps. Aperture not expanded, triangular, indented on the ventral side to about one-third its height by the dorsum of the penultimate whorl, the two sides gently convex uniting at the dorsal angle at about 80° or 90°. Surface apparently not striated but often exhibiting some rough transverse undulations.

Diameter of a specimen of the ordinary size fifteen lines; thickness in the centre seven lines; width of that portion of the umbilicus which is formed of the last whorl three lines; of the portion included in the penultimate whorl one line and one fourth; width of aperture at the base eight lines; height about the same. A small specimen nine lines in diameter is four lines and a-half in thickness at the centre; umbilicus two lines wide; aperture five lines wide at base and the same in height.

Locality and Formation.—This species occurs at Pauquettes Rapids in the Black River and Birdseye Limestone and also at Lake St. John at the same level.

Collectors.—Sir W. E. Logan. T. Richardson.

BELLEROPHON DISCULUS. N. S.

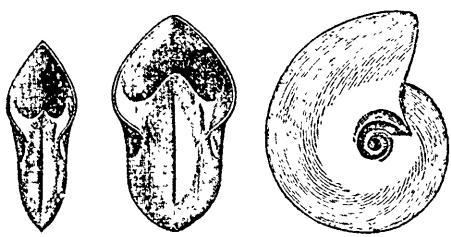

Fig. 11. Fig. 12. Fig. 13.

Fig. 11.—*Bellerophon disculus.* Front view.
12.—*Bellerophon Argo.* Front view.
13.—Side view of the latter.

Description.—Lenticular; compressed; greatest thickness at the umbilicus about one fourth the diameter; the dorsum acutely? angular; the sides gently convex next to the umbilicus, becoming somewhat flat or very slightly concave towards the circumference. Whorls two or three each concealing rather more than half of the one next preceding it. Umbilicus small exposing all the whorls in a series of rectangular steps. Aperture triangular, not expanded, indented on the ventral side to about one third its height by the preceding whorl; the two sides gently convex uniting at the dorsal angle at an angle of about 50°. Surface apparently nearly smooth.

Diameter of the only specimen examined one inch; thickness at the umbilicus three lines; width of umbilicus four lines.

This species agrees exactly with *B. Argo* in all respects except in being only one half the thickness and in having the umbilicus a little larger. It is also closely allied to *B. acutus* Sowerby but that species is, according to Sowerby and McCoy only six or seven lines in diameter and nearly half as much in thickness.

Locality and Formation.—Blue Point Lake St. John's. Black River and Birdseye Limestone.

Collector.—J. Richardson.

BELLEROPHON CHARON. N. S.

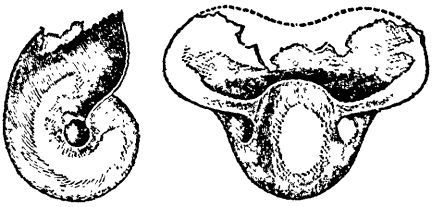

Fig. 14. Fig. 15.

Fig. 14.—*Bellerophon Charon.* Side view.
15.—Front view.

Description.—Sub-globular with a widely expanded aperture; diameter about an inch. Whorls about three each concealing half of the one next preceding it. Dorsum broadly rounded; a scarcely perceptible angulation along the median line, on each side of which, especially towards the aperture the shell is in some specimens very slightly flattened. The umbilicus is deep, penetrating to the centre, exposing all the whorls, the inner ones only obscurely seen, owing to their being imbedded in those preceding them. The sides encircling the umbilicus narrowly rounded, not angular. The aperture is very much expanded transversely, widely auriculated on each side, the width being about three times the height; the ventral side indented by half the thickness of the preceding whorl and the dorsal border apparently with a wide though not very deep emargination. The surface apparently nearly smooth or only very finely striated.

Diameter of a nearly perfect specimen, measured from the middle of the dorsal lip through the aperture to the opposite side, one inch; width of aperture at base sixteen lines; height of aperture, five lines; width of last whorl at the entrance of the aperture, five lines; diameter of umbilicus, three lines. A cross section of the

whorl would be elongate sub-oval (or owing to the indentation caused by the preceding whorl, reniform) in the proportion of about two and a half to five.

Allied to *B. rotundatus*, (Hall) but that species according to the figures has the umbilicus full half the whole diameter, and the whorl angulated at the sides. In this species the umbilicus is about one fourth the whole diameter, and the whorls rounded at the sides. The aperture also in *B. Charon* must be proportionally much wider.

There appears to be some variation in the proportions of different individuals of this species, but as most of the specimens are mere fragments, the amount cannot be determined at present.

Locality and Formation.—Pauquettes Rapids, Black River, and Birdseye Limestone.

Collector.—Sir W. E. Logan.

Genus PILOCERAS (Salter.)

PILOCERAS (Salter) *Quart. Jour. Geo. Soc.* vol. 15, p. 376. 1859.

This genus consists of short, thick, curved Orthoceratites, with a very large siphuncle, the smaller extremity of which is, for a short distance, filled with a solid secretion so organised as to exhibit the appearance of several hollow cones inserted one within another.

The specimens upon which Mr. Salter founded the genus were imperfect and did not exhibit the true septa, but there are now in the collection of the Geological Survey of Canada two fragments of different individuals of a species of this genus, with several of the septa well preserved, so that there can be no doubt of their existence. The discovery of these fossils, and also of *Maclurea Atlantica* in Canada, furnish an interesting additional proof of the value of organic remains in establishing the equivalency of widely separated deposits of rock. When Sir R. I. Murchison, in 1857, announced that certain beds of limestone in Scotland were of the age of the Calciferous Sandrock and Chazy formations of Canada and New York, the only evidence consisted of a few imperfect fossils, among which were an *Ophileta*, considered by Mr. Salter to be either identical with or closely allied to the Canadian *O. compacta*, together with a *Maclurea* of a new species and several Orthocerites, resembling in aspect those asso-

ciated with the genera *Ophileta* and *Maclurea* in this country. Their *Maclurea Peachii* has a long spiral operculum, very unlike anything then known on this side of the Atlantic, and it was not suspected that the genus *Piloceras* would ever be found here at all. But we have now not only a species of *Piloceras* (from the Calciferous Sandrock) but also *Maclurea Atlantica* (from the Chazy) which latter species has an operculum almost identical with that of *O. Peachii.* When it is considered that evidence of this kind as it accumulates increases in its demonstrative power in a much higher ratio than do the mere number of the species (or the facts which constitute the data) the correctness of the view that the Scottish and Canadian rocks above referred to are of the same age, cannot fail to be perceived.

PILOCERAS CANADENSE. N. S.

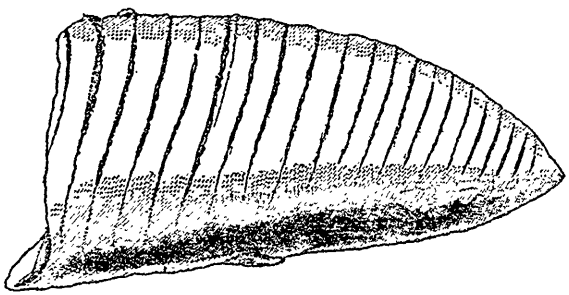

Fig. 16.

Fig. 16.—Side view of the solid portion of the siphuncle shewing distance of the septa.

Description.—Of this species we have, besides several detached siphuncles, two fragments, each exhibiting some of the septa. The form, as nearly as it can be determined is that of a short thick curved Orthoceratite. The length of the largest specimen appears to have been about ten inches, and the diameter at the aperture four or five inches. The transverse section is oval, the narrowest side being that of the concave curvature. The siphuncle of one specimen is, at two inches and three-fourths from the apex, seventeen lines in diameter in the dorso-ventral direction, and fourteen lines in the transverse direction. On the surface of this specimen there are, on an average, six septal rings in the length of one inch. Judging from the appearance of another spe-

cimen, the position of this siphuncle would be close to the ventral side of the shell. Another siphuncle about the same size shows seven septal rings to the inch. In a third, consisting of a portion of the larger extremity of an individual which, when perfect, must have been at least nine inches in length, there are six septa partly preserved apparently those next the aperture. They are distant from each other about five lines, the whole being comprised within a length of thirty lines. The shell where these septa are situated is at least four inches in diameter in the transverse direction, and the siphuncle about two inches. The edges of the septa, in crossing the ventral or concave side, make at the surface a short curve towards the apex, but on the siphuncle the septal ridges cross from the dorsal to the ventral side obliquely, so that on the ventral side they are somewhat nearer the aperture than they are on the dorsal side.

The above are all the details of this species of any importance furnished by our specimens. On comparison with Salter's *P. invaginatum*, it will be seen that the septal rings do not cross the siphuncle in the same direction as they do in ours, and further, that that species is more broadly curved.

Locality and Formation.—Mingan Islands, Calciferous Sandrock.

Collectors.—Sir W. E. Logan. J. Richardson.

CYRTOCERAS EXIGUUM. N. S.

Fig 17.

Fig. 18.

Fig. 17.—*Cyrtoceras exiguum.* Outline of a specimen. The dotted lines represents the supposed outline of the smaller extremity.

18.—A specimen shewing the depth of the chamber of habitation and five of the air chambers.

Description.—Small, slender, slightly curved; section circular. One of the specimens examined is three lines in diameter at the aperture and apparently a little less at one line and a half above. The shell then expands to a diameter of four lines at the distance of five lines from the aperture. It then tapers to two lines at a

length of thirteen lines; thence to the apex unknown, but probably terminated at a length of eighteen or twenty lines. One side of the fragment is nearly straight. No septa or siphuncle observed in this specimen, but the form alone is sufficient to distinguish the species from any other known in the Lower Silurian of this country. Associated with the one above described was found another fragment ten lines and a half in length. Width at aperture three lines; diameter at five lines from aperture four lines; length of chamber of habitation five lines and a half. Next to the chamber of habitation five of the septa are preserved and they occupy a length of exactly five lines; the siphuncle not visible.

Locality and Formation.—Near L'Orignal, Trenton limestone.

Collector.—R. Bell.

PRAGMOCERAS PRÆMATURUM. N. S.

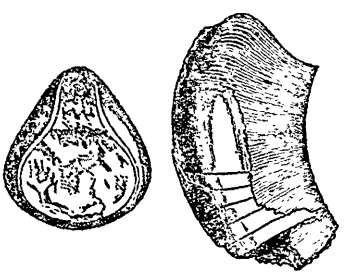

Fig. 19. Fig. 20.

Fig. 19.—*Phragmoceras præmaturum.* Aperture of a specimen.
20.—Side view of a different individual.

Description.—Ventral aspect with the convex curvature; dorsal aspect concave; section oval narrowly rounded on the ventral aspect; depressed convex on the sides and broadly rounded on the dorsum. In the first inch and a half of the length the ventral side forms a curve of which the radius is about one inch; the remainder of the curve to the apex unknown. The aperture is broadly rounded on the dorsal side; at about one third the dorso-ventral diameter it begins to contract; at two thirds its diameter its transverse width is about half its greatest width; thence to the ventral margin the sides are sub-parallel, gradually approaching each other; the ventral margin narrowly rounded. On a side view the dorsal two thirds of the aperture is obliquely truncated

towards the apex while the ventral third slopes so as to form an obtusely rounded right angle with the dorsal two thirds. The aperture is thus obscurely trilobed, the ventral lobe being the smallest and forming a deep narrow sinus in the ventral margin. At the aperture the greatest transverse width is six lines in the specimen on which the species is founded; the dorso-ventral diameter eight lines. At seven lines (from the most prominent point of the aperture on the side) we find the greatest transverse diameter which is here seven lines and a half and the dorso-ventral diameter nine lines. At the length of one inch and a fourth the dorso-ventral diameter is reduced to between five and six lines. The remainder of the specimen is not preserved. The depth of the chamber of habitation is ten lines. The first five septa occupy six lines of the ventral margin, but at the middle of the lateral aspect four lines and a half. Siphuncle about one line in diameter and apparently in contact with the shell along the median line of the ventral side. The surface of the shell is covered with fine striæ or rather small smooth continuous wrinkles which encircle the tube following the curves of the aperture. These wrinkles vary in size, but in general there are five or six in the width of one line.

The majority of the species of this genus have the siphuncle on the inside or close to the shell on the side of the concave curvature. M. Barrande, however, has one species *P. perversum* in which it lies close to the outer curve.* The aperture is not so strongly trilobed as it is in Upper Silurian and Devonian species.

I believe this is the only *Phragmoceras* known in the Lower Silurian Rocks.

Locality and Formation.—The specimen figured was found on Le Cloché Island, Lake Huron, in the Black River Limestone. Two other fragments have been collected, one at La Petite Chaudière Rapids and the other at Pauquettes Rapids, Ottawa River, in the same formation

Collectors.—Sir W. E. Logan, R. Bell, E. Billings.

Orthoceras tener. N. s.

Description.—Small, section sub-oval; broadly rounded on the dorsal and very gently convex on the ventral aspect; sides nar-

* See translation of Barrande's note on the Silurian Cephalopoda of Bohemia, Jour. Geo. Soc. Vol. X. Translations p. 21.

rowly rounded. Siphuncle very small, close to the ventral margin slightly dilated between the septa; of these latter there are six in three lines where the transverse diameter of the shell is five lines.

The dimensions of the best preserved specimen that I have seen are as follows. Length of specimen twenty-two lines; transverse diameter of aperture seven lines; dorso-ventral diameter of aperture five lines; depth of chamber of habitation, twelve lines; transverse diameter at smaller extremity of specimen four lines nearly; dorso-ventral diameter three lines nearly. In the length of twenty-two lines measuring from the aperture this specimen tapers three lines in the tranverse diameter and one line in the dorso-ventral diameters. The width of the siphuncle between the septa is about three-fourths of a line; its passage through the septa is a small circular aperture scarcely one third of a line in diameter. At the smaller end of this specimen the greatest transverse width is about one fourth the dorso-ventral diameter from the ventral margin. The aperture is more nearly a regular oval. The siphuncle is in the middle of the ventral aspect. The shell is gently curved towards the dorsal side.

This species is related to both *O. xiphias* and *O. hastatum*, (Report for 1856, p. 318 and 333) but the proportions are very different. In *O. xiphias* the two diameters of the aperture are to each other as 7 to 3, but in *O. tener* they are as 7 to 5. *O. hastatum* tapers at the rate of about 4 lines to the inch, while in *O. tener* the rate is scarcely two lines.

Locality and Formation.—Black River limestone. Pauquettes Rapids.

Collectors.—Sir W. E. Logan, E. Billings.

Orthoceras pertinax. N. s.

Description.—The specimen on which this species is founded is two inches and five lines in length; nine lines in diameter at the larger and seven lines at the smaller extremity; section circular; septa distant three lines at the large end and two lines and a-half at the small end. The siphuncle is moniliform its centre distant two lines from the margir where the diameter is seven lines; the expansions are sub-globular and about two lines or a little more in their greatest diameter. The septa have a convexity equal to about half their distance from each other and they cross the tube obliquely so that their edges at the surface on the

dorsal side are full half the distance between them nearer the aperture than they are on the ventral side.

The probable length of this *Orthoceras* judging from several imperfect specimens which I believe to belong to the species is from one foot and a half to two feet.

The surface exhibits some indistinct flat longitudinal ridges, each about one third of a line wide and half a line distant from each other.

Locality and Formation.—Pauquettes Rapids, Ottawa River, Black River limestone.

Collector.—Sir W. E. Logan.

ORTHOCERAS RAPAX. N. S.

Description.—Large, section circular, septa distant a little less than one fourth of an inch where the diameter is between five and six inches. Siphuncle large, marginal very nearly in contact with the shell on the ventral side. The rate of tapering appears to be about one inch and a half to the foot. The depth of the chamber of habitation is about one half greater than the width of the aperture.

Of this species we have portions of two individuals. One is a fragment of the oral extremity entirely deprived of the shell, and exhibiting a good cast of the interior of the chamber of habitation. The following are the dimensions. Length fourteen inches; diameter at aperture six and a half inches; at fourteen inches from aperture, four and three fourths inches; diameter of siphuncle one inch and three fourths at the broken or smaller end of the specimen; the first twenty one septa occupy a length of four inches and seven eighths.

The second specimen is fifteen inches and a half in length, and tapers from six inches to four as nearly as can be determined. In the first five inches of the smaller extremity there are twenty septa; in the next inch five; in the next inch and a half twelve, and in the remainder from four to seven in the inch.

The distance of the septa is thus variable in the same specimen, but judging from the general appearance of the two examined, my present impression is that the average distance must be from two and a half lines to three lines, or a little less than one fourth of an inch at a diameter of from four to six inches. The proportional distance of the septa to the diameter of the shell therefore would be about as twenty to one.

This species clearly belongs to the same group with those which Professor Hall has figured under the name of *Endoceras proteiforme*, in the 1st Vol. of the Palæontology of New York. But on measuring the figures in that work it will be seen that the proportional distance of the septa to the diameter of the shell in that species is between four and eight to one or six to one on an average while in this species it is twenty to one.

Locality and Formation.—The specimens were procured at Kingston in the Black River Limestone.

Collector.—The specimens were collected by Col. Gordon, R.A. and by him presented to the Geological Survey.

ARTICLE XIV.—*Notices of the Life of the late Professor George Wilson of Edinburgh.*

The University of Edinburgh has lately suffered severely by the death of several of its most distinguished teachers. The department of science has been specially unfortunate. Since the death of the venerable Jamieson, Professor Forbes, whose fine genius and extensive erudition gave promise of an illustrious life, has been laid in the sepulchre of his fathers; and ere yet his country, and we may say the world of science, had ceased to mourn for this most gifted of her children, another equally honorable and beloved has been laid in the dust. The name of Professor George Wilson, whose recent appointment as Regius Director of the Industrial Museum of Scotland and to the professorship of Technology in the University of Edinburgh was hailed with so much satisfaction by all who had any acquaintance either with his personal character or numerous contributions to literature and science, will we are sure be held in lasting and affectionate remembrance.

The most complete notice of his life and works which we have yet seen is that contained in the February number of the North British Review. The article is preceded by a list of no less than sixty eight of his writings. They comprise original papers on chemistry, biographical sketches of men eminent in science, several contributions to popular and scientific literature with four poems published in Blackwood's Magazine. The ability, research,

and true genius which all those writings display, will ever give the name of George Wilson a high place among the illustrious dead We are sure it will be grateful to those of our readers who may not have access to other sources of information to be ut in possession of the following particulars of his history.

Dr. Wilson was born in Edinburgh, on 21st February 1818; and was thus, at his death, in the forty-first year of his age. "His parents were highly respectable, though not in such an elevated station as to diminish the credit due to his own exertions in attaining the position which he ultimately reached; but it deserves to be noticed, that he may be included in the number of distinguished men who have been in a great degree indebted for the development of their talents to the maternal character and influence."

His father, Mr. Archibald Wilson, was a wine merchant in Edinburgh, and died about sixteen years ago. His mother, Janet Aitken, who is still living, was the youngest daughter of a land-surveyor in Greenock. She was a lady of great intelligence and piety, and she devoted much attention to the education of her children. There were eleven of the family; but of these only three now remain,—a son, Dr. Daniel Wilson, the well-known author of "The Prehistoric Annals of Scotland," at present Professor of English Literature and History in the University of Toronto,—and two daughters. From his childhood, George was distinguished by many noble qualities—great truthfulness, self-sacrifice, delicate sense of honour, and generous feelings. Studious, and with a marked love for books, he gave early promise of great mental ability.

In 1822 he commenced his studies in a private school, and in 1828 he entered as a pupil of the High School, under Mr. Benjamin Mackay, an able classical teacher. He was always among the first five in the class, and was remarkable for his *general knowledge*—a quality which was exhibited during life, and which seemed afterwards to fit him specially for the situation he occupied in the University. So warm were his affections, and such his power of attracting others, that from his boyhood onwards no one was more generally beloved. While at school, in 1828-29, he and his brothers formed among their companions a "Juvenile Society for the Advancement of Knowledge." They met once a week in his father's house, when papers were read on natural

history, mechanics, astronomy, etc. Minutes of their proceedings were kept by his brother Daniel. His mother presided over the youthful assembly, and usually wound up the evening by giving a verse from Proverbs.

Wilson remained at the High School until he was fifteen. On leaving it he selected Medicine as his object of study, and commenced by becoming an apprentice in the laboratory of the Royal Infirmary, where he remained for four years. The suffering and distress which he witnessed during this period, made an indelible impression on his very sensitive nature, and had a saddening effect on his mind. Many are the stories which might be told illustrative of his sympathy with the patients, and his eager desire to relieve them.

He entered the University of Edinburgh in 1834, passed as surgeon in 1838, took his degree of Doctor of Medicine in 1839, and wrote a thesis "On the Certain Existence of Haloid Salts of the Electro Negative Metals in Solution." After taking his degree, chemistry became his favourite pursuit. He had studied the subject assiduously under Dr. Hope and Mr. Kenneth Kemp; and in 1836-37 he had been engaged for eighteen months as chemical assistant in Dr. Christison's laboratory, which was at that time the best school of analytical chemistry in the University. His first lectures on chemistry were given to private audiences, in the drawing-room of his father's house, in 1837. In a MS. journal kept by him, we find the following entries: — "September 20th, 1838"—"I meet with scarcely one lady in ten or fifty, who has sufficiently cultivated her natural intellectual powers." . . . "This winter shall see me do my utmost to suggest an improvement among my own small circle."

"May 1839. Following out the proposal to amend the subjects of ladies' conversation and study, I assembled some of them in my father's house, and delivered a course of prelections on chemistry, especially the chemistry of nature. This was in the winter of 1837-38, so that I was then not nineteen. The majority of my audience were older than myself by a year or two. I was greatly praised and encouraged, most kindly listened to, and assisted in many ways, especially by J. M'G., a generous, unselfish, happy fellow, without whose aid I should have come on very poorly. This course, which began in October, was first interrupted by the illness of my sister, and afterwards by the mournful indis-

position of my cousin C.; so that only ten or twelve lectures were given.

Subsequently to this Dr. Wilson went to London, and entered the laboratory of University College, under the superintendence of Professor Graham, now Master of the Mint. There, with Dr. Lyon Playfair, Mr. James Young of Glasgow, Dr. Livingstone, the African traveller, and other zealous students, he carried on his chemical pursuits for a period of six months.

He began to lecture publicly on chemistry in Edinburgh in 1840. About this time, however, his health began to suffer, apparently in consequence of excessive exertion during a pedestrian excursion in the Highlands with a cousin. His first course of lectures was arranged when he was confined to bed, and he was scarcely convalescent when he commenced the session of November, 1840. His health continued broken after this. An attack of rheumatism was followed by disease of the ankle-joint, which ultimately called for amputation. This was performed in January 1843, by his friend, and afterwards his colleague, Professor Syme. Amputation seemed to offer the only hope of relief, and Mr. Syme proposed disarticulation. Accordingly, he performed this operation; and as the articulating surfaces of the joint were everywhere divested of cartilage, rough and carious, instead of removing the malleolar projections separately, he exposed the bone sufficiently to saw off both together, with a thin lamina of the tibia connecting them. This was the first instance in which Professor Syme amputated through the ankle-joint for disease of the joint. It is therefore interesting in the annals of surgery. The case proceeded favourably. The feelings which Dr. Wilson experienced previous to the operation, and during its performance, are graphically portrayed by him in a letter on "the Anæsthetics of Surgery," which he addressed to Professor Simpson, and which is published in Simpson's Obstetric Works, edited by Drs. Priestley and Storrer, Vol. II., p. 796. He contrasts the condition of patients in his day, before the use of chloroform, with their state at the present time:—

"Several years ago," he says, "I was required to prepare, on very short warning, for the loss of a limb by amputation. A painful disease, which for a time had seemed likely to yield to the remedies employed, suddenly became greatly aggravated, and I

was informed by two surgeons of the highest skill, who were consulted on my case, that I must choose between death and the sacrifice of a limb,—and that my choice must be promptly made, for my strength was fast sinking under pain, sleeplessness, and exhaustion. I at once agreed to submit to the operation, but asked a week to prepare for it, not with the slightest expectation that my disease would take a favourable turn in the interval, or that the anticipated horrors of the operation would become less appalling by reflection upon them; but simply because it was so probable that the operation would be followed by a fatal issue, that I wished to prepare for death, and what lies beyond it, whilst my faculties were clear and my emotions were comparatively undisturbed. For I knew well that if the operation was speedily followed by death, I should be in a condition, during the interval, in the last degree unfavourable to making preparation for the great change."

During the interval, he diligently and prayerfully studied the Bible, and at the end of a week the operation was performed. There were no anæsthetics in those days, and the operation was a very painful and somewhat tedious one. Not being gifted with great physical courage, he was one of those to whom cutting, bruising, burning, or any similar physical injury, even to a small extent, was a source of suffering never willingly endured, and always anticipated with more or less apprehension. He states that he could never forget the black whirlwind of emotion, the horror of great darkness, and the sense of desertion by God and man, bordering almost upon despair, which swept through his mind and overwhelmed his heart. Chloroform would have been the greatest boon to him. From his relations he concealed the impending operation, fearing that the expression of their grief would shake his resolution. They were not aware of what had happened until the surgeons made it known to them. "During the operation," he continues, "in spite of the pain it occasioned, my senses were preternaturally acute; I watched all that the surgeons did with fascinated intensity. I still recall with unwelcome vividness the spreading out of the instruments, the twisting of the tourniquet, the first incision, the fingering of the sawed bone, the sponge pressed on the flap, the tying of the blood-vessels, the stitching of the skin, and the bloody dismembered limb lying on the floor." He then dwells on the value of anæsthetics, and con-

cludes thus:—"The sum, you will perceive, of what I have been urging is, that the *unconsciousness* of the patient secured by anæsthetics, is scarcely less important than the painlessness with which they permit injuries to be inflicted on him."

Forbes was an older student than Wilson, and had attained eminence as a rising naturalist before their acquaintance began. He was a genius in science who had the wonderful power of attracting followers, and of stimulating to exertion. Forbes' influence told in no small degree on the mind of Wilson, who afterwards undertook to write his Biography. This work occupied his leisure hours ever since the lamented death of his friend; but we fear that little more than half the task has been completed. In a MS. note-book, the chapters of the Life of Forbes are sketched out thus:—

1. Isle of Man. 2. Boyhood and School Life. 3. London Artist Life. 4. The University of Edinburgh. 5. The Student Life of E. F. 6. The Sea Naturalist. 7. The Mediterranean Cruise. 8. The London Chair of Botany. 9. The Geological Survey. 10. The Edinburgh Class of Natural History. 11. The Artist and Litterateur. 12. The End. 13. Epilogue.—Of these the first five chapters are ready for the printer, and the sixth seems also to be finished, though not copied out. As the materials have all been accumulated, it is earnestly hoped that the work may be completed by other hands.

Up to manhood the vigour and elasticity of his health was unusual; but from the year 1842 to the end of his career, a thorn in the flesh never ceased to buffet him. It was during this illness that his attention was specially directed to matters of eternal moment. The bed of affliction was made to him a blessing. The chastening of the Lord was for his profit. There happened at that time to be a student at the Divinity Hall who became acquainted with Dr. Wilson, and was a constant visitor at his house. This was the present Rev. Dr. Cairns of Berwick. The friendship which sprung up between Dr. Cairns and himself was of the warmest kind, and continued throughout the remainder of life. Their fellowship was cemented by holier ties than any of a mere earthly nature. Dr. Wilson always regarded Dr. Cairns as his spiritual father, whose counsels encouraged him, and whose ministrations at the hour of death helped to cheer his spirit. What he owed to God's discipline during his life was ever gratefully present to his mind.

His recovery from his severe illness was tedious, and he was rendered unfit for public duty for some time. His father died very suddenly in April 1843, and this added not a little to his sufferings.

The commencement of Dr. Wilson's career as a lecturer was thus also that of his ill health. His weak body seemed often to be sinking into the dust, while his noble spirit ignored its fetters, and seemed to rise above the feebleness of the flesh. For fifteen years he continued to teach as a private lecturer, and he acquired eminence and celebrity. In 1844 he was appointed by the Directors of the School of Arts their lecturer on chemistry; and in the same year, with the sanction of the Highland and Agricultural Society, he became lecturer in the Veterinary College of Edinburgh. Between 1844 and 1852 he continued to deliver regularly nine lectures on chemistry every week during the six winter months, and at a later period of his history he even delivered thirteen.

Dr. Wilson had a peculiar power of making science popular, and describing intricate subjects in such a way as to make them plain to a common audience. His inventive powers in illustrating his lectures were remarkable. His graceful diction and æsthetic taste, combined with his play of fancy and of genial wit, gave peculiar attractions to his prelections, and crowded audiences hung on his lips whenever he appeared in public. In the Academic Hall, the Philosophical Institution, the learned society, and in the miserable lecture-room in the Cowgate or the Canongate, he was equally at home and equally successful.

The attention which he devoted to economical science, and to the applications of chemistry, pointed him out as the man best qualified to occupy the situation of Director of the Industrial Museum of Scotland. In the autumn of the same year he was chosen by the Crown to fill the newly-instituted chair of Technology in the University of Edinburgh.

The duties of this unendowed chair he fulfilled with the greatest ability and success. Although the class was not demanded for any academic honours, and was not included in any curriculum of study (except that of the Highland Society), still the talents of the Professor secured a large attendance. At the time of his death (although the entrance was not completed) the number of pupils was eighty-four, embracing students from all the Faculties and many amateurs. Nothing could more plainly indicate the

value put on his lectures In his inaugural lecture he considers the subject, What is Technology? and he thus writes: "Technology is the sum or complement of all the sciences which either are or may be made applicable to the industrial labours or utilitarian necessities of man. While the subject has a connection with various subjects already taught in the University, it steers a course distinct from all, has a province of its own, and will not, when properly handled, interfere with the duties of any other professor."

The full course of technology embraced three sessions, in each of which certain of the industrial arts were made the subject of lecture, which were not discussed in the other two. The course was divided into Mineral, Vegetable, and Animal Technology. Under the first were included the relation of the atmosphere, the ocean and tributary waters, and the earth, to technology; and among special subjects, fuel, building material, glass and glass-making, pottery, earthenware, stoneware, and porcelain, metallotechny, electrotechny, and magnetotechny. Under the second or Vegetable Technology, were considered: saccharoamylaceous substances, sugar-making, albuminous substances and fermentations, distillation, wood and wood-fibres, textile tissues, bleaching, dyeing calico-printing, paper-making, scriptorial or graphic industrial arts, caoutchouc, gutta-percha, and the resins, fats and oils. Under the third section, or Animal Technology, were included the mechanical application and chemical products of bones, ivory, horns, hoofs, tortoise-shell, shells, and corals; skins, tanning, fish-scales; hair, fur, wool, bristles, quills and feathers, animal refuse.

The lectures were fully illustrated by experiments and drawings, and by specimens from the natural history collections and the Industrial Museum. Occasion was taken throughout the course to visit various manufactures.

Besides occupying these important positions in the University and in the Museum, Wilson was also an active member of many societies, and contributed papers to their Transactions, as will be seen by referring to the list of his publications. He was twice elected a member of Council of the Royal Society of Edinburgh; he was a member of the Council of the Chemical Society of London; a member of the Chemical Committee of the Highland and Agricultural Society, and one of the examiners for the Agricultural Diploma; an honorary member of the Pharmaceutical Society of Great Britain; and he had been twice president of the

Royal Scottish Society of Arts, and for some time editor of its "Transactions."

A growing holiness, sweetness, and patience, had been markedly visible in Dr. Wilson of late years. In times of sickness and dangerous illness, there was ever a serene calmness and cheerfulness, that seemed greatly to aid recovery. His patient endurance of suffering was remarkable. Patience wrought experience, and experience hope—even that hope which maketh not ashamed. He was always ready for his great change. About six months ago, when saying good bye on a morning visit to a friend, he said, "I am trying to live every day, so that I may be ready to go on an hour's notice." To another he used the remarkable expression, "I am resigned to live."

His feeble health at the commencement of the Session 1859 was ill calculated to fit him for the arduous duties he had undertaken, and there seemed to be in his own mind a feeling that he was not likely to survive long.

In the last few days of his life his serenity was more obvious than at any previous time. So well was it known that, living or dying, he was the Lord's, that the anxieties of a death-bed season were as much lightened as is possible in this life. His death was more like a child going to sleep than anything else.

He commenced his lectures in November 1859 with high prospects of success. His introductory lecture was characterised by his usual felicitous illustrations, and the class-room was crowded to the door.

His last illness began from exposure to cold and wet in a manufactory in the west, on the morning of Friday, 4th November. He had gone there to acquaint himself with the particulars of a Court of Session case relating to the dyeing mauve-coloured silk. On the morning of Friday, 18th November, he complained of a pain in his side, but he treated it as a pleurodynic attack, and went to lecture as usual. He was, however, much exhausted; and in spite of this he continued to write letters, receive visitors and make business calls, and he even ventured to give a second lecture in the afternoon. This seemed to prostrate him completely, and he had to apologise to the class for t..king a seat in place of standing during the lecture as usual. When he reached home he was scarcely able to get up stairs to bed, from whence he never rose.

On the morning of Tuesday, 22d November, there appeared to be a slight alleviation of symptoms, but it was a temporary rally. Ere long it was evident that he was sinking. He was peaceful and happy, when he breathed his last.

The respect and affection with which he was regarded were well shown in the public funeral, which was attended by Professors of the University, the Lord Provost, Magistrates, and Council, the Colleges of Physicians and Surgeons, members of the Royal Society, Royal Scottish Society of Arts, Royal Physical Society, Botanical Society, Philosophical Institution, School of Arts, Merchant Company, Chamber of Commerce. His friends, the Rev. Dr. Alexander and the Rev. Dr. Cairns, officiated on the occasion. His remains were interred in the Old Calton Burying-ground on 28th November, and his funeral sermon was preached by Dr. Alexander, in the Music Hall, to an overwhelming audience, on 4th December—the text being, "Blessed are the dead that die in the Lord," Rev. xiv. 13.

While Wilson's lectures threw a genial light on the facts of science, his writings contributed not less to extend and popularise them. Everything he touched became instinct with life, and was impressed upon the mind of the hearer or reader by associations of the most pleasing and lasting nature. His collected writings will undoubtedly be an important contribution to literature.

"The effort of his life." Dr. Cairns remarks, "was to render science at once more human and more divine. His heart was strung throughout in sympathy with the touching prayer of the *Novum Organon*, that all science may become a healing art; and his last public office was regarded by him with special affection, as ministering to industrial progress and happiness. No scientific writer of our day has so habitually and lovingly quoted the Bible, from his essay on Dalton, whom he represents as proving that God literally 'weighs the mountains in scales, and the hills in a balance,' down to his last paper, which closes with marking the identity of Professor Thomson's astronomical proof of the evanescence of the heavens with the words of the 102d Psalm. He hoped to live to write a 'Religio Chemici,' corresponding to Sir Thomas Browne's 'Religio Medici,' and embracing amongst other topics of discussion the doctrine of the resurrection."

"To have moved, amidst the altitudes and solitudes of science with a humble and loving heart; to have spoken out words on

the sacredness of medicine as a profession and scientific life in general, more lofty than have almost been heard even from the pulpit, and to have illustrated them in practice; to have enforced the subjection of all knowledge to one Name, the highest in earth and heaven; to have conquered by faith in a life-long struggle with pain and suffering; and to have wrought out the work of the day placidly and devoutly till the night came;—these, in any, and especially in the leaders of science, are processes and results greater than can be described in the transactions of any society, or preserved in any museum."

We conclude these notices from the North British Review with a beautiful tribute of affection from the pen of his brother Dr. D. Wilson of Toronto, published in the "Canadian Journal," for March.

"Death has been busy of late among Edinburgh men whom I counted my personal friends. Dr. Samuel Brown, Professor Edward Forbes, and Hugh Miller, have followed one another to the grave within a brief period, and ere the past year drew to a close, Dr. George Wilson was added to the number of those who live only in honored memory. Dying at the early age of forty-one, when a career full of rich promise appeared only opening before him, and his mind seemed to be ripening in many ways for a great life-work: those who knew his capacity and his genius regard all that he had accomplished as insignificant indeed when compared with what he would have done if spared to those years in which men chiefly fulfil the promises of youth. Yet what he did accomplish, amid many and sore impediments to progress, is neither poor nor of small amount. Nor is it a light thing now to remember that one whose years of public life have been so few, and even these encroached on by the ever increasing impediments of failing health, has been laid in his grave amid demonstrations of public sorrow such as have rarely indeed been accorded, in that native city of his, to Edinburgh's greatest men. This was due even more to the genial kindliness and worth of a noble Christian man, than to the unwearied zeal of a popular public teacher, and an enthusiastic student of science. His loss to his university is great, but to his friends it is irreparable. In him the faith of science, and the nobler faith of the Christian, were blended into perfect harmony: for no doubt springing from half-revealed truths of science ever marred the serene joy of his faith while looking at

the things which are not seen. Prejudice and falsehood, ignorance and vice, were felt by him to be the common foes of both; and pardon me, if I add, that no man I have ever known carried more genially and unobtrusively, yet more thoroughly, his earnest Christian faith into all the daily business and the duties of life.

When a man of such genuine kindliness and worth is suddenly called away in his prime, with still so much of his life-work seemingly waiting its accomplishment, it is as when a brave vessel founders in mid-ocean. The wild eddy of the troubled waters gathers around the fatal gulf, and a cry of sympathetic sorrow rises up as the news is borne along to distant shores. But the ocean settles back to its wonted flow where that gallant bark went down, and the busy world soon returns to its old absorbing occupations. But there are those to whom that foundered bark has been the shipwreck of a life's hopes; and to me the loss of my life-long friend and brother will make life's future years wear a shadow they could never wear before."

ARTICLE XV.—*Notice of Tertiary Fossils from Labrador, Maine, &c., and Remarks on the Climate of Canada in the Newer Pliocene or Pleistocene Period.* By J. W. Dawson, LL.D., F.G.S.

(Read before the Natural History Society.)

I am indebted to Capt. Orlebar, R.N., for a small collection of fossils from the vicinity of Tertiary Bay on the coast of Labrador, a locality in which similar collections were made several years since by Adm^{l}. Bayfield. They occur in clay a little above high water mark; but the species present indicate a considerable depth at the time of the deposition of the bed in which they are contained, so that it cannot properly be regarded as merely a raised beach. The species contained in the collection are as follows; those found in the newer Pliocene of Canada being marked with asterisks.

*Balanus porcatus.**
Spirorbis vitrea, attached to shells.*
Sp. carinata.
*Buccinum undatum.**

Aporrhais occidentalis.
Natica, (fragment probably of *N. Clausa.*)*
Saxicava rugosa, var. *Arctica.**
Tellina proxima, (*calcarea*) *
Astarte elliptica.
*Rhynconella psittacea.**
Echinus granulatus.
Hippothoa catenularia, (attached to shells) *
*Lepralia pertusa.**
L. (not determined.)
Cythere.

The greater number of the above species have already been recognised in the tertiary clays of Canada; * but the following exceptions are deserving of notice.

Spirorbis vitrea, has not been named in my previous papers; but I now find, on comparison with the specimens from Labrador and recent examples from Gaspé, that it is this and not *Spirorbis sinistrorsa* as previously stated, that occurs in the tertiary beds at Montreal and Quebec. It is at present a deep water species in the Gulf of St. Lawrence and on the banks of Newfoundland. *Spirorbis carinata* has not previously been observed in the tertiary beds; but is common on the coast of Labrador and Gaspé.†

Aporrhais occidentalis, the American representative of the "Pelican's-foot Spout-shell" of Britain, and remarkable in the adult state for its singularly expanded outer lip, is a deep water shell somewhat widely though not very abundantly distributed on the American coast. I have specimens from Labrador, Sable Island, and Portland, where a very fine living specimen was dredged for me last summer by Mr. Ferrier.

Saxicava rugosa, occurs in the Labrador collection under the form described as *S. Arctica* by Forbes and Hanley. This form is not prevalent though sometimes seen among the *Saxicavæ* of the St. Lawrence valley deposits, and at present is I think found only in deep water. The intermediate specimens prove it to be merely a variety of the common species.

Astarte elliptica is the common *Astarte* of the Gulf of St.

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* See papers by the author in Canadian Naturalist, Vols. 2 and 4.

† See paper on *Spirorbes* of the Gulf of St. Lawrence in last number of this Journal.

Lawrence at present. Great numbers have been dredged by Mr Bell on the coast of Gaspé in about 60 fathoms. Along with them are found a few specimens having the characters of the typical *Astarte sulcata* of Great Britain, and others having the characters of *A. compressa*, a species much more nearly related than the others to the fossil *A. Laurentiana*, though quite distinct. I can recognise in the collections made by Mr. Bell and myself all the above species or varieties, and in addition the *A. Arctica*, which I have found only in the pleistocene beds near Portland. *A. Laurentiana* and *A. Arctica* are without doubt distinct species from *Sulcata*, but different views have been entertained as to the others. The distinction based by some authors on the crenulated or smooth margin, and on which the species *A. Scotica* and *A. Danmoniensis* have been founded, is evidently worthless, depending as it does on age; but the distinctions of external form and marking are apparently constant at all ages, and do not shade into each other. Although therefore Dr. Gould and Mr. Stimpson retain the name *sulcata* for all our American forms, I think it admits of a doubt whether the same distinctions made by Forbes and Hanley in Britain do not hold here. Mr. P. P. Carpenter when in Montreal very kindly went over my collections with me, and expressed himself satisfied that we have the forms recognised in Britain as *elliptica*, *sulcata*, and *compressa*, whatever their specific value. My impression at present is that *compressa* is a good species, but that *sulcata* and *elliptica* as we have them may be varieties of one. It is curious that while *A. Laurentiana* prevails exclusively in the St. Lawrence deposits, the modern species is found at Labrador; and very possibly, especially when we regard the more inland position and greater elevation of the former, this indicates a difference of age in the deposits.

The clay attached to and in the interior of Capt. Orlebar's specimens is very rich in the minute *Foraminifera*. It contains specimens of all the forms found in the clays of Montreal and described in my former papers, and in addition the following:

Rotalina oblonga, Fig. 1.
Bulimina pupoides, Fig. 2.
B. auriculata?
Orbulina universa,
Textularia variabilis, Fig. 3.
Nonionina Labradorica, N. sp. Fig. 4.
Truncatulina lobata Fig. 5.

All of these except one are well known living species, and all except *Textularia variabilis* have been found in the Gulf of St. Lawrence. This last statement however could not have been made but for specimens obtained from clay taken up by the sounding lead off the coast of Anticosti, from depths varying from 144 to 313 fathoms, and for which also I am indebted to Capt. Orlebar. In these soundings there also occur *Globigerina bulloides* a species world-wide in its distribution, and *Nodosaria pyrula*, neither of which have as yet been found in the tertiary beds of Canada. With these recent shells there is a *Cythere* like *C. angulata* of the British seas, and numerous spicules of sponges; there are also immense numbers of the round perforated silicious shields of *Coscinodisci* apparently the *C. lineatus* and *C. radiatus* of Ehrenberg. It is a remarkable and at present unaccountable fact that while in the pleistocene beds there is a great abundance of foraminifera, sponge spicules, and valves of cythere, imbedded in calcareous clays like those of the deep soundings of the Gulf, the *Coscinodisci* and other diatoms are absent or at least have not been recognised.

Fig. 1.

Fig. 2.

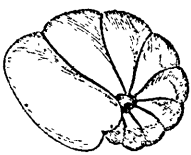
Fig. 3

Fig. 1.—*Rotalina oblonga.*
2.—*Bulimina pupoides.*
3.—*Textularia variabiltis.*

Truncatulina lobata. The last species in the list is a little parasitic foraminiferous shell adhering to shells, stones, and zoophytes. It abounds in Mr. Bell's and Mr. Richardson's recent collections from Gaspé, and since I observed it in Capt. Orlebar's collection, I have found it also at Montreal. It is the *Nautilus stellaris* of Fabricius.

The *Nonionina* which I name *N. Labradorica*, and which is found both recent and fossil, is a very beautiful species. It is perfectly equilateral, smooth and remarkably white and lustrous. It is most readily characterised by the great expansion of the last chamber, which spreads laterally and extends in two lobes on

either side of the earlier whorls. When seen from one side it resembles *Rotalina turgida*, for which indeed I mistook it at first; but when viewed in front it is seen to be equilateral and to have the characteristic septal aperture of Nonionina. It is about equal in size to *N. umbilicatula*, and has the last chamber inflated even in young shells.



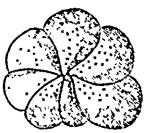


Fig. 4. Fig. 5.

Fig. 4.—*Nonionina Labradorica*, N. sp.
5.—*Truncatulina lobata.*

The Foraminifera from the deeper parts of the Gulf are usually of small size, and this applies also to those from the pleistocene of Labrador.

In the past summer another deposit of pleistocene shells was discovered by Sir W. E. Logan at the Mingan Islands, Labrador. The specimens obtained from it consist of *Mya arenaria* and *Tellina proxima* in hard sand, and have the aspect of a littoral deposit corresponding to the "saxicava sand" of the vicinity of Montreal.

2. Portland, Maine.

In last August I enjoyed some opportunities of examining the tertiary deposits at and near Portland, and also at Pond Cove, Cape Elizabeth, where a small patch of this deposit occurs nearly at the level of the sea. At the south end of the city of Portland, in a deep railway cutting, the tertiary beds are well seen, and consist, in ascending order, of boulder clay, fossiliferous stratified clay and sand, and stratified sand and gravel. These beds appear to be very irregular, being entangled in ledges of metamorphic rock, which sometimes rise through them. The distinction between the deeper water and shallow water parts of the deposits is in

consequence less strongly marked than at Montreal, but is indicated by beds containing *Mytilus edulis* alone, overlying those which contain shells characteristic of the open sea. At Cape Elizabeth the pleistocene clays occupy depressions between ridges of slate. At the only place where I observed fossils, the deposit is a hard gray stony clay containing a mixture of deep sea and littoral shells. The bivalves are mostly in detached valves and often on edge, as if the bed had been subjected to the pressure of ice after its deposition.

The fossils observed in the above mentioned beds are as follows,—those common to Portland and the St. Lawrence valley being marked with asterisks :

*Balanus crenatus,**
Fusus decemcostatus, (var. *borealis,*)
*Buccinum undatum,**
Fusus scalariformis,
*Natica clausa,**
*Mytilus edulis,**
Mactra ovalis,
*Saxicava rugosa,**
Astarte elliptica,
A. compressa,
A. arctica,
*Tellina proxima,**
*Pecten Islandicus,**
*Mya truncata,**
Nucula Jacksoni,
Aphrodite Grœnlandica,
Lepralia variolosa,
*L. Bellii,**
Membranipora, (undetermined.)

The assemblage of shells in the above list cannot be said to indicate any very great change of climate, though more like that of the Gulf of St. Lawrence than of Portland at present. With the exception of *Astarte arctica* not now found on the American coast, and *Nucula Jacksoni* which is possibly extinct, they are

* A new species, now living in the Gulf of St. Lawrence, and described in the Report of the Geological Survey of Canada for 1858.

all common American species. It is curious that in the collections of the Canadian Geological Survey, the group of shells obtained by Mr. Bell and Mr. Richardson in dredging on the north coast of Gaspé in about 60 fathoms, is almost precisely that of these Portland beds.

On comparison with the St. Lawrence tertiaries, it will be seen that 8 out of 19 species are distinct. It is further to be observed that *Fusus decemcostatus* replaces the closely allied *F. tornatus*. that *Saxicava rugosa* is much less abundant, that modern Astartes appear instead of *A. Laurentiana*, and that *Mytilus edulis* is of large size and of the ordinary form. These differences are however probably nothing more than the effects of the more oceanic position of the Portland beds, as compared with the old inland sea of the St. Lawrence valley, and it will be observed that in respect to the Astartes the Portland beds correspond with those of Labrador. The less elevation of the Portland beds however renders it probable that they are somewhat newer than those of the St. Lawrence valley and of Lake Champlain.

In the cabinet of Dr. Jackson of Boston, I had an opportunity of examining a collection of about 14 species obtained by him from the beds on the Pressumpset River, described many years ago by Professor Hitchcock and Dr. Jackson. In this collection while several of the shells found at Portland are absent, I found *Leda Portlandica*,* *Nucula proxima*, *Terebratula septentrionalis*, *Mya arenaria*, and the carapace of a crab.

3. OCCURRENCE OF FRESH WATER SHELLS IN THE PLEISTOCENE BEDS.

I owe to the kindness of A. Dickson, Esq., additional collections of the fresh water shells and the sands containing them from Pakenham,† together with a communication from a gentlemen of that place giving a section of the deposits as seen in a deep road cutting. The arrangement is as follows in descending order:

Sand and surface soil, about,.....10 feet
Clay, ...10 "

* Dr. Gould informs me that he is now satisfied of the correctness of the identification of this shell by Mr. Wood with the species *L. truncata* of the British Pleistocene and of the artic seas, where it has been found living.

† See my paper, Canadian Naturalist, Vol. IV.

Fine gray sand (shells of *Valvata*, &c.).....		2 inches
Clay, ...	1 foot	
Gray sand, laminated (*Tellina Greenlandica*),..	3	"
Clay, ...	8	"
Light gray sand (*Valvata, Cyclas, Paludina, Planorbis* and *Tellina*),.....	10	"
Clay, ...	1 foot 2	"
Brown sand and layers of clay, (*Planorbis* and *Cyclas*), ...	4	"

The species were the same with those described in my previous papers, and the only marine shell is *Tellina Grœnlandica*, a species now found farther up in our estuaries than most others.

Mr. Dickson informs me that a similar case occurs near Clarenceville, about four miles from the United States frontier, and at an elevation of about ten feet above Lake Champlain. Specimens from this place contain large shells of *Unio rectus* and *U. ventricosus*, the latter with the valves cohering, and a *Lymnea*. Intimately mixed with these in sandy clay are valves of *Tellina Grœnlandica* and *Mya arenaria*.

I record these facts, without pledging myself to the conclusion that these deposits really mark the margins or river estuaries of the old Pleistocene sea of Canada; though they will certainly bear that interpretation. In farther connection with these facts, and in relation also to the question why marine fossils have not been found west of Kingston, Mr. Dickson informs me that fossil capelin are found on the Chaudière Lake, 183 feet above Lake St. Peters, on the Madawaska 206 feet, and at Fort Colonge Lake 365 feet above the same level, a very interesting indication of the gradual recession of the capelin spawning grounds, from this last high elevation to the level of the more celebrated locality of these fossils at Green's Creek. Farther, throughout the Counties of Renfrew, Lanark, Carlton and Leeds, the marine deposits rise to an elevation of 425 feet, or nearly the same with that which they reach on Montreal Mountain; but while this elevation would with the present levels of the country carry a deep sea to the head of Lake Ontario, no marine fossils appear to have been found on the banks of that lake. Was the depression of the later pleistocene period limited to the country east of Lake Ontario, or have the marine deposits of the upper St. Lawrence hitherto escaped observation

or been removed by denuding agencies. The question awaits further explorations for a satisfactory answer.

In the mean time it is certain that the boulder clay and deposits corresponding in arrangement and mechanical character to the Leda clay and Saxicava sand of the Lower St. Lawrence exist in these more western regions, though they have not been found to contain marine fossils.

4. CLIMATE OF CANADA IN THE PLEISTOCENE PERIOD.

The climate of this period and the causes of its difference from that which now obtains in the northern hemisphere, have been fertile subjects of discussions and controversies, which I have no wish here to re-open. I merely propose to state in a manner level to the comprehension of the ordinary reader, the facts of the case in so far as relates to Canada, and an important inference to which they appear to me to lead, and which if sustained will very much simplify our views of this question.

Every one knows that the means and extremes of annual temperature differ much on the opposite sides of the Atlantic. The isothermal line of 40° for example passes from the south side of the gulf of St. Lawrence, skirts Iceland and reaches Europe near Drontheim in Norway. This fact, apparent as the result of observations on the temperature of the land, is equally evidenced by the inhabitants and physical phenomena of the sea. A large proportion of the shell fish inhabiting the gulf of St. Lawrence and the coast thence to Cape Cod, occur on both sides of the Atlantic, but not in the same latitudes. The marine fauna of Cape Cod is parallel in its prevalence of boreal forms with that of the south of Norway. In like manner the descent of icebergs from the north, the freezing of bays and estuaries, the drifting and pushing of stones and boulders by ice, are witnessed on the American coast in a manner not parallelled in corresponding latitudes in Europe. It follows from this that a collection of shells from any given latitude on the coasts of Europe or America, would bear testimony to the existing difference of climate. The geologist appeals to the same kind of evidence with reference to the climate of the later tertiary period, and let us enquire what is its testimony.

The first and most general answer usually given, is that the pleistocene climate was colder than the modern. The proof of this in Western Europe is very strong. The marine fossils of this

period in Britain are more like the existing fauna of Norway or of Labrador than the present fauna of Britain. Great evidences exist of driftage of boulders by ice, and traces of glaciers on the higher hills. In North America the proofs of a rigorous climate and especially of the transport of boulders and other materials by ice are equally good, and the marine fauna all over Canada and New England is of boreal type. In evidence of these facts I may appeal to the papers and other publications of Sir C. Lyell and Professor Ramsay on the formations of the so called glacial period in Europe and America,* and to my own previous papers on the tertiaries of Canada.

Admitting however that a rigorous climate prevailed in the pleistocene period, it by no means follows that the change has been equally great in different localities. On the contrary while a great and marked revolution has occurred in Europe, the evidences of such change are very much more slight in America. In short, the causes of the coldness of the pleistocene seas to some extent still remain in America, while they must have disappeared or been modified in Europe.

If we enquire as to these causes as at present existing, we find them in the distribution of ocean currents, and especially in the great warm current of the gulf stream, thrown across from America to Europe, and in the Arctic currents bathing the coasts of America. In connection with these we have the prevailing westerly winds of the temperate zone, and the great extent of land and shallow seas in Northern America. Some of these causes are absolutely constant. Of this kind is the distribution of the winds depending on the earth's temperature and rotation. The courses of the currents are also constant, except in so far as modified by coasts and banks; and the direction of the drift-scratches and transport of boulders in the pleistocene both of Europe and America, show that the arctic currents at least have remained unchanged. But the distribution of land and water is a variable element, since we know that in the period in question nearly all northern Europe, Asia and America were at one time or another under the waters of the sea, and it is consequently to this cause that we must mainly look for the changes which have occurred.

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* Lyell's travels in North America, Ramsay on the glaciers of Wales, and on the glacial phenomena of Canada. See also Forbes on the fauna and flora in the British Islands, in Memoirs of geological survey.

Such changes of level must, as has been long since shown by Sir Charles Lyell, modify and change climate. Every diminution of the land in arctic America must tend to render its climate less severe. Every diminution of land in the temperate regions must tend to reduce the mean temperature. Every diminution of land any where must tend to diminish the extremes of annual temperature; and the condition of the southern hemisphere at present shows that the disappearance of the great continental masses under the water would lower the mean temperature but render the climate much less extreme. Glaciers might then exist in latitudes where now the summer heat would suffice to melt them, as Darwin has shown that in South America glaciers extend to the sea level in latitude 46° 50′; and at the same time the ice would melt more slowly and be drifted farther to the southward. Any change that tended to divert the arctic currents from our coasts would raise the temperature of their waters. Any change that would allow the equatorial current to pursue its course through to the Pacific or along the great inland valley of North America, would reduce the British seas to a boreal condition.

The boulder formation and its overlying fossiliferous beds prove, as I have in a previous paper endeavoured to explain with regard to Canada, and as has been shown by other geologists in the case of other regions, that the land of the northern hemisphere underwent in the later tertiary period a great and gradual depression and then an equally gradual elevation. Every step of this process would bring its modifications of climate, and when the depression had attained its maximum there probably was as little land in the temperate regions of the northern hemisphere as in the southern now. This would give a low mean temperature and an extension to the south of glaciers, more especially if at the same time a considerable arctic continent remained above the waters, as seems to be indicated by the effects of extreme marine glacial action on the rocks under the boulder clay. These conditions, actually indicated by the phenomena themselves, appear quite sufficient to account for the coldness of the seas of the period, and the wide diffusion of the gulf stream caused by the subsidence of American land, or its entire diversion in the Pacific basin*, would give that assimilation of the Ame[illegible]

* This is often excluded from consideration, owing to the fact that the marine fauna of the gulf of Mexico differs almost entirely from that of the Pacific coast; but the question still remains whether this difference existed in the later tertiary period, or has been established in the modern epoch, as a consequence of changed physical conditions.

and European climates so characteristic of the time. The climate of western Europe in short, would under such a state of things be greatly reduced in mean temperature, the climate of America would suffer a less reduction of its mean temperature, but would be much less extreme than at present; the general effect being the establishment of a' more equable but lower temperature throughout the northern hemisphere. It is perhaps necessary to add that the existence on the land, during this period of depression, of large elephantine mammals in northern latitudes, as for instance the Mammoth and Mastodon, does not contradict this conclusion. We know that these creatures were clothed in a manner to fit them for a cool climate, and an equable rather than a high temperature was probably most conducive to their welfare, while the more extreme climate consequent on the present elevation and distribution of the land may have led to their extinction.

The establishment of the present distribution of land and water. giving to America its extreme climate, leaving its seas cool and throwing on the coasts of Europe the heated water of the tropics, would thus affect but slightly the marine life of the American coast, but very materially that of Europe, producing the result so often referred to in these papers, that our Canadian Pleistocene fauna differs comparatively little from that now existing in the gulf of St. Lawrence, though in so far as any difference subsists it is in the direction of an arctic character. The changes that have occurred are perhaps all the less that so soon as the Laurentide hills to the north of the St. Lawrence valley emerged from the sea, the coasts to the south of these hills would be effectually protected from the heavy northern ice drifts and from the arctic currents, and would have the benefit of the full action of the summer heat, advantages which must have existed to a less extent in western Europe.

It is farther to be observed that such subsidence and elevation would necessarily afford great facilities for the migration of arctic marine animals, and that the difference between the modern and newer pliocene faunas must be greatest in those localities to which the animals of temperate regions could most readily migrate after the change of temperature had occurred.

It has been fully shown by many previous writers on this subject, that the causes above referred to are sufficient to account for all the local and minor phenomena of the stratified and unstra

tified drifts, and for the driftage of boulders and other materials, and the erosion that accompanied its deposition. Into these subjects I do not propose to enter; my object in these remarks being merely to give the reasons for my belief stated in previous papers on this subject, that the difference of climate between pleistocene and modern Canada, and the less amount of that difference relatively to that which has occurred in western Europe, may be explained by a consideration of the changes of level which the structure and distribution of the boulder clay and the overlying fossiliferous beds prove to have occurred.

ARTICLE XVI.—*Abridged Sketch of the life of Mr. David Douglas, Botanist, with a few details of his travels and discoveries.*

(*Continued from last Number.*)

Turning with the boats as far back as Wallawalla, Douglas proceeded on horseback to the Fourches de l'Eau claire, up the south branch of the Columbia about 150 miles. The party which he accompanied thither came this length for the purpose of trading horses, but getting into difficulties with the Shohoptins, or Nez-perces Indians, and Mr. Douglas finding that little new could be obtained in that quarter, his steps were bent right north to Spokan House, where he was again kindly welcomed by the old hunter Jacquo Finlay. After parting with Jacquo, in crossing the Cedar river lying between Spokan and the Columbia, his horse stuck in the mud, and in the struggle to get extricated the rider was struck a sharp blow that threw him headlong into the water. This misfortune cost him his knapsack, which contained all the seeds he had collected, and his note-book, which were lost in the stream. In this trim he pursued his route, reaching Fort Colvile on the 5th of August, where he found Mr. John Dease in charge. An account of a fray between the natives, viz, the Kettle Falls Indians, and a portion of the Cootanies Tribe, who had come to this quarter for the purpose of fishing, is thus given by Douglas.—

" The parties met to day stark naked, at our camp, painted " some red, some black, others white and yellow, all with their bows

" strung, while those who had guns and ammunition, brought their " weapons charged and cocked. War caps, made of the Calumet " Eagle's feathers, were the only particle of clothing they had on. " Just as one of these savages was discharging an arrow from his " bow, aimed at a chief of the other party, Mr. Dease hit him " such a blow on the nose as stunned him, aad the arrow fortunately " only grazed the skin of his adversary, passing along the rib op- " posite to his heart, without doing him much injury. The " whole day was spent in clamour and haranguing, and unable to " foresee what the issue might be, we were prepared for the worst. " Mr. Dease, however, succeeded in persuading them to make " arrangements for peace, and begged this might be done without " delay on the morrow, representing to them how little they had " ever gained by their former wars, in which they had mutually " butchered one another like dogs. Unluckily for me, my guide, " *the Wolfe*, is equally wanted by his party, whether to make war " or peace, therefore, I am obliged to wait for him.

On the 19th he bade adieu to Mr. Dease, taking horse to Okawyan, where he procured a guide and small canoe. Soon after embarking, in descending a rapid, he took the precaution of walking along shore, carrying with him his papers, plants, seeds, and blanket. While thus occupied, the canoe in descending was struck by a surge in the rapid, and emptied of all its contents except a little dried meat which had been fixed in hard, in the narrow part of the bow. Deprived thus of cooking utensils, or any of the slightest comfort or convenience in the shape of travelling appointment, he pursued his course to Wallawalla, where finding a fresh guide, he continued onward and, after some trouble, as well as assistance from Indians, landed on the first day of August on the Beach above Fort Vancouver. This journey is thus closed very expressively in his own words.—

" In poor plight, weary and travel-soiled, glad at heart, though " possessing nothing but a shirt, leather trousers, and old hat, hav- " ing lost my jacket and neck-kerchief, and worn out my shoes, I " made my way to the fort, having traversed eight hundred miles " of the Columbia valley in twelve days, unattended by a single " person except my Indian guides."

His collections were now shipped for England, consisting of a great mass of dried specimens of plants besides Zoological subjects. The seeds which he had forwarded these two first years on the

Columbia, to the Horticultural Society, were the means of introducing to the knowledge of gardeners above 160 new flowers and plants, all interesting, many of utility, others of uncommon splendor and beauty. Among these were 14 species of *currant*, 5 of *Raspberry* and 2 of *Berberry*, while the flower garden bloomed with 2 new species of *Brodicea*, 2 of *Calochortus*, 3 of *Caprifolium*, 3 of *Clarkia*, 2 of *Clintonia*, 5 of *Collonia*, 3 of *Collinsia*, 3 of *Eutoca*, 5 *Gilias*, 24 *Lupines*, 5 of *Minculus*, 10 of *Œnothera*, 13 of *Penstemon*, 6 of *Potentilla*, and 3 of *Spirea*, besides many single species of other genera—altogether an accession to the shrubbery and flower-garden which must ever be highly appreciated. On the 15th of September Mr. Douglas accompanied a trapping party to the southward or the Umptqua country, with the view principally of procuring cones and seeds of the large pines there growing in the greatest perfection. At this time the Umptqua river was but little known, and only occasionally visited by interpreters or clerks of the Fur trade, for the purpose of bartering with the natives. The mode of travelling suited the botanist well. He had time to look about him, and gather much in the Willamette valley. A month elapsed, but on the 16th of October he arrived on the heights overlooking the Umptqua, the last days having been occupied in passing amongst timber of enormous growth and through thickly wooded forests where the path was frequently obstructed by fallen trees, measuring from 200 to 250 feet in length. Here first commences the district of the Californian laurel, the *Oreodapnue Californica*, which perfumes the air in every direction with its odours. Our Adventurer did not reach the wished for groves of *Pinus Lambertiana* without risk and danger. Having obtained a guide in the person of a youth who had been brought from the southward as a slave, he started from the trapping camp on the 18th, next day, however, having fallen into a gully in pursuit of a wounded deer, he was so much stunned and hurt as to be obliged to return to camp. Whence he again sallies on the 23rd, in pursuit of the great Pine. Proceeding due south, we find him on the 25th of the month not far from the object of his search, but very disagreeably lodged as his journal thus shows.—

" Wednesday the 25th. Last night was one of the most dread-
" ful I ever witnessed; the rain falling in torrents, was accom-
" panied by so much wind as made it impossible to keep in a fire;

" and to add to my miseries the tent was blown down about my " ears, so that I lay till daylight, rolled in my wet blanket on " *Pteris aquilina*, with the drenched tent piled above me, Sleep " was of course not to be procured ; every few minutes the falling " trees came down with a crash which seemed as if the earth " was cleaving asunder, ,while the peals of thunder and vivid " flashes of forky lightening produced such a sensation of terror " as had never filled my mind before, for I had at no time exper- " ienced a storm under similar circumstances of lonliness and un- " protectedness of situation. Even my poor horses were unable to " endure it without craving, as it were, protection from their master " which they did by cowering close to my side, hanging their heads " upon me and neighing. Towards daylight the storm abated, " and before sunrise the weather was clear, though very cold. I " could not stir without making a fire, and drying some of my " clothes, every thing being soaked through ; and I indulged " myself with a pipe of tobacco, which was all I could afford. " At ten o'clock I started, still shivering with cold, though I had " rubbed myself so hard with a handkerchief that I could no " longer endure the pain. Shortly after I was seized with intense " headache, pain in the stomach, giddiness and dimness of sight. " All the medicine I had being reduced to a few grains of calomel, " I felt unwiling, without absolute necessity, to take to this last " resource, and therefore threw myself into a violent perspiration " by strong exercise, and felt somewhat relieved towards evening, " before which time I arrived at three lodges of Indians, who " gave me some fish,. The food was such as I could hardly have " eaten if my destitution were less. Still I was thankful for it, " especially as the poor people had nothing else to offer me ; the " night being dry, I camped early in order to dry the remaining " part of my clothing."

" Thursday the 25th. Weather dull, cold, and cloudy. When " my friends in England are made acquainted with my travels, I " fear they will think that I have told them nothing, but my " miseries, This may be true, but I now know as they may do " also, if they choose to come here on such an expedition, " that the objects of which I am in quest, cannot be obtained " without labour and anxiety of mind, and no small risk of " personal safety, of which latter statement my this day's adven- " tures are an instance. I quitted my camp early in the morning

" to survey the neighbouring country, leaving my guide to take " charge of the horses until my return in the evening, when I " found that he had done as I wished, and in the interval dried " some wet paper which I had desired him to put in order. " About an hour's walk from my camp, I met an Indian, who on " perceiving me instantly strung his bow, placed on his left arm a " sleeve of Racoon skin, and stood on the defensive. Being quite " satisfied that this conduct was prompted by fear, and not by " hostile intentions, the poor fellow having probably never seen " such a being as myself before, I laid my gun at my feet, on the " ground and waved my hand for him to come to me, which he " did slowly and with great caution. I then made him place his " bow and quiver beside my gun, and striking a light gave him a " smoke out of my own pipe, and a present of a few beads. " With my pencil I made a rough sketch of the cone and pine " tree which I wanted to obtain, and drew his attention to it, " when he instantly pointed with his hand to the hills fifteen or " twenty miles distant, towards the south; and when I expressed " my intention of going thither, cheerfully set about accompany- " ing me. At midnight I reached my long-wished-for pines, and " lost no time in examining them, and in endeavoring to collect " specimens and seeds. New and strange things seldom fail to " make strong impressions and are therefore, frequently over-rated; " so that lest I should never again see my friends in England to " inform them verbally of this most beautiful and immensely " grand tree, I shall here state the dimensions of the largest I " could find among several that had been blown down by the " wind. At three feet from the ground its circumference is 57 ft. " 9 inches; at 134 ft., 17 ft. 5 inches; the extreme length 245 ft. " The trunks are uncommonly straight, and the bark, remarkably " smooth for such large timber, of a whitish or light brown colour, " and yielding a great quantity of bright amber gum. The tallest " stems are generally unbranched for two thirds of the height " of the tree; the branches rather pendulous with cones " hanging from their points like sugar loaves in a grocer's " shop. These cones, are however, only seen on the loftiest trees, " and the putting myself in possession of three of these, (all I " could obtain) nearly brought my life to a close. As it was im- " posible either to climb the tree or hew it down, I endeavoured " to knock of the cones by firing at them with ball, when the re-

" port of my gun brought eight Indians, all of them painted with
" red earth, armed with bows, arrows, bone tipped spears and flint
" knives. They appeared anything but friendly. I endeavoured
" to explain to them what I wanted, and they seemed satisfied
" and sat down to smoke, but presently I perceived one of them
" string his bow, and another sharpen his flint knife with a pair of
" wooden pincers, and suspend it on the wrist of the right hand.
" Further testimony of their intentions was unnecessary. To save
" myself by flight was impossible, so without hesitation I stepped
" back about five paces, cocked my gun drew one of the pistols
" out of my belt, and holding it in my left hand, and the gun in
" my right, showed myself determined to fight for my life. As
" much as possible, I endeavoured to preserve my coolness, and
" thus we stood looking at one another, without making any move-
" ment or uttering a word, for, perhaps, ten minutes, when one,
" at last, who seemed the leader, gave a sign that they wished
" for some tobacco : this I signified that they should have, if they
" fetched me a quantity of cones. They went off immediately
" in search of them, and no sooner were they all out of sight, than
" I picked up my three cones and some twigs of the trees, and
" made the quickest posssible retreat, hurrying back to my camp,
" which I reached before dusk, the Indian who last undertook to
" be my guide to the trees I sent off before gaining my encamp-
" ment, lest he should betray me. How irksome is the darkness
" of night to one under my present circumstances ! I cannot
" speak a word to my guide, nor have I a book to divert my
" thoughts, which are continually occupied with the dread lest the
" hostile Indians should trace me hither and make an attack ; I
" now write lying on the grass, with my gun cocked beside me,
" and penning these lines by the light of a Columbian candle,
" namely, an ignited piece of rosiny wood.—To return to the
" tree which nearly cost me so dear, the wood is remarkably fine
" grained and heavy ; the leaves short and bright green, inserted
" five together, in a very short sheath ; of my three cones, one
" measured fourteen inches and a half, and the two others are
" respectively half an inch and an inch shorter, all full of fine
" seed. A little before this time of year, the Indians gather the
" cones and roast them on the embers, then quarter them and
' shake out the seeds, which are afterwards thoroughly dried and
pounded into a sort of flour, or else eaten whole.

" Friday the 27th. My last guide went out at midnight in " search of trout, and brought me home a small one, which served " for breakfast. Two hours before daylight he rushed in with " great marks of terror uttering a shriek which made me spring " to my feet, as I concluded that my enemies of yesterday had " tracked out my retreat. He, however, gave me to understand, " by gesture that he had been attacked by a grizly bear. I " signed to him to wait till daylight, when I would go out and " look for, and perhaps, kill the creature. A little before sunrise, " Bruin had the boldness to pay us a visit, accompanied by two " cubs, one of last year's brood, and one of this; but as I could " not consistently with safety receive these guests before daylight, " I had all my articles deposited in the saddle-bags, and driven " upon one horse to a mile distant from the camp, when I returned " mounted upon the animal, Mr. McLoughlin had given me, and " which stands fire remarkably well, and found the bear and her " two young ones feeding on acorns under the shade of a large oak. " I allowed the horse to walk within twenty yards, when all three " stood up and growled at me. I levelled my gun at the heart of " the old one, but as she was protecting her young by keeping " them right under her, the shot entered the palate of one of " these, coming out at the back of the head, when it instantly fell. " A second shot hit the mother on the chest as she stood up with " the remaining cub under her belly, on which abandoning it, she " fled to an adjoining hummock of wood. The wound must have " been mortal, as these animals never leave their cubs until they " themselves are on the point of sinking. With the carcase of " the young bear I paid my last guide, who seemed highly to prize " the reward, and then abandoned the chase, deeming it only pru- " dent, after what happened yesterday, to retrace my steps towards " the camp of my friends. So I returned crossing the river two " miles lower down than formerly, and halted at night in a low " point of wood near a small stream.

" Saturday and Sunday, the 28th, and 29th. Both these days " being very rainy, as the day before also was, and having very " little clothing, I made all the exertion in my power to reach " Mr. McLeod's encampment near the sea. It was impossible to " keep myself dry, and the poor horses were so fatigued that I " was obliged to walk all the way and lead my own by the bridle, " the road becoming continually worse and worse from the floods

" of rain. On Saturday night I halted at my second crossing " place, but could procure no food from the Indians, the bad " weather having so swollen the rivers, as to prevent their fishing. " I boiled the last of my rice for supper, which gave but a scanty " meal, and resuming my march, the next day, proceeded pretty " well till, reaching the wooded top of the lofty river bank, my " jaded horse stumbled and rolling down, descended the whole " depth over dead wood, and large stones, and would infal- " libly have been dashed to pieces in the river below, had he not " been arrested by getting himself wedged fast between two large " trees that were lying across one another near the bottom. I " hurried down after him, and tying his legs and head close down " to prevent his struggling, cut with my hatchet through one of " the trees, and set the poor beast at liberty. I felt a great deal " on this occasion, as the horse had been Mr McLoughlin's pres- " ent to me, and was his own favourite animal. Reached the camp " at dusk, where I found only Michel La Framboise, our Chenook " interpreter, and an Indian boy, who told me that the savages " had been very troublesome ever since our brigade of hunters " left him some days before. The former kindly assisted me " to pitch my tent, and gave me some weak spirits and water, with " a basin of tea, made from a little that he had brought from Fort " Vancouver, and which greatly refreshed me."

Soon after this, messengers having to be dispatched to Fort Vancouver, Mr. Douglas took advantage of the opportunity and accompanied them homewards. After twelve days travelling under the disadvantage of hunger cold and rain, he reached Fort Vancouver, on the 20th of November, although, not without losing the greater part of his collection in crossing the river Sandiam, a tributary of the Willamette, then swollen with rain. Fortunately, with other rarities, the pine cones were saved.

It was at this period I had the pleasure of making the acquaintance of Mr. Douglas. Having crossed the Columbia, I arrived in this month of November at head quarters, and soon found the man of science to be one of the heartiest, happiest mortals in our little society. He now received letters from England, consolotary to him in every respect, and the sense of inward satisfaction, as well as the bright gleams cast on his spirit, by the cheering words of those he loved and respected in his native country, brought out in full glow the warm effusions of a pure and honest heart.

The Spring of 1827 was severe, and much snow had fallen. The consequence was that many horses died at Fort Vancouver, and we were visited by the various species of beasts and birds of prey that abound in that country. Most conspicuous among these were the California vulture. This magnate of the air was ever hovering around, wheeling in successive circles for a time, then changing the wing as if wishing to describe the figure 8; the ends of the pinions, when near enough to be seen, having a bend waving upwards, all his movements, whether of soaring or floating ascending or descending, were lines of beauty. In flight he is the most majestic bird I have seen. One morning a large specimen was brought into our square, and we had all a hearty laugh at the eagerness with which the Botanist pounced upon it. In a very short time he had it almost in his embraces fathoming its stretch of wings, which not being able to compass, a measure was brought, and he found it full nine feet from tip to tip. This satisfied him, and the bird was carefully transferred to his studio for the purpose of being stuffed. In all that pertained to nature and science he was a perfect enthusiast. It has been frequently matter of surprise how quickly these birds collect when a large animal dies. None may be seen in any direction, but in a few minutes after a horse or other large animal gives up the ghost they may be descried like specks in the æther, nearing by circles to the prey, when as yet one would not suppose the effluvia from the carcase had reached above a hundred yards. This renders it probable that their sight as well as sense of smelling is very acute, bnt that the latter can guide them entirely without aid from the other, I am certain, as I have started them from carrion within the edge of a forest under bushes which must have precluded the possibility of their seeing the carcase before they alighted on it.

March of 1827 arrived, and we were obliged to part with our agreeable companion. On the 20th of that month he left us to proceed to England by traversing the Rocky mountains in Lat. 54° in company with the Hudson's Bay party, which was accustomed to cross annually to York factory with Spring despatches.

(*To be Continued.*)

REVIEWS AND NOTICES OF BOOKS.

The Life, Travels, and Books of Alexander von Humboldt. With an introduction by Bayard, Taylor. New York, Rudd & Carleton; Montreal, B. Dawson & Son, pp. 482.

This is a very able and interesting account of the life and labours of Humboldt. The author's signature is R. H. S., why the full name is concealed, we cannot tell. The task undertaken by him or her, is ably executed. Those who wish to know what Humboldt did, and the foundation upon which his great fame rests, will find the information desired in this volume. It does not profess to be a biography of the great naturalist and philosopher, but it is a sketch taken from the most authentic sources of the course of his life, from the cradle to the grave. It tells us how and where his youth was spent, at what universities he studied, who were his teachers, what his favorite pursuits, his early employments and thirst for foreign travel. A brief notice is given of his travels and researches, in company with the botanist Bonpland, in the regions of South America, during the early part of the nineteenth century. It traces the course of Humboldt's travels through Russia to the Ural Mountains, and through northern Asia to the mines of the Altai. Finally, the author gives a brief account of the character and cost of the great works prepared and edited by Humboldt; and concludes with agreeable notices of his last days. The name of Humboldt has become a household word in Europe and America. He is everywhere known and acknowledged to be the prince of Modern Science. For those who have not much leisure to peruse the works and to make themselves familiar with the scientific researches of the late Baron von Humboldt, we would recommend the perusal of this volume. It is agreeably written, and is worthy of a place in the study or the family library. A. F. K.

A first lesson in Natural History. By Actœa. (Mrs. Agassiz.) Boston, Little, Brown, & Co. Montreal, B. Dawson & Son. *Illustrated.* pp. 82.

This little book has been prepared by its amiable and accomplished Authoress in the hope that it may be interesting to

children. Its aim is to make them acquainted with some of the curious and wonderful forms of animal life which are to be found on the sea shore. Having been revised by Agassiz himself, there is the best guarantee that its facts may be implicitly relied upon. Children may, therefore, be assured that strange as these stories are, they are all perfectly true. The four chapters into which the book is divided treat in succession most pleasantly of sea-Anemones and Corals; Coral Reefs; Hydroids and Jelly-fishes; Starfishes and Sea Urchins. They are addressed in the form of stories to two children, and are so plain and clear, and yet elegant in their language, that they may easily be understood and appreciated by very young persons. We are sure that this will be a favourite childrens book. Although intended for the young, it may yet be read with profit by fathers and mothers. It is beautifully printed and the illustrations are good. We trust that the authoress may be induced to continue these stories, as they seem to us well-fitted to turn the attention of the young from frivolous and hurtful tales to the healthy and delightful pursuit of Natural Science.

A. F. K.

A Manual of Scientific and Practical Agriculture for the School and the Farm. By J. L. Campbell, A.M., Professor of Phys. Science, Washington College, Va., with numerous illustrations. pp. 442. Philadelphia, Lindsay & Blakiston. Montreal, B. Dawson & Son.

This book has been written to supply the rapidly increasing demand for scientific information applicable to the daily business of agriculture. The chief purpose kept in view in its several chapters has been the preparation of a Manual which might serve as a guide to the young in the acquisition of the sciences pertainining to agriculture. None of the systematic books hitherto published on this subject were adapted to the necessities of the Southern and Western States of America. This unoccupied place the present publication is intended to fill. The plan is both simple and complete. It embraces in well digested and clearly expressed paragraphs all the subjects which pertain to the science of farming. The first chapter contains definitions and illustrations of terms, and the twenty-five following embrace the leading facts and principles of chemistry, geology, vegetable physiology, practical treatment of all kinds of soils, and the various cereals, roots

and plants, with which farming on this continent is conversant. The history and property of manures, and the application of fertilizers is carefully treated. The planting and culture of corn, wheat, oats, potatoes, hay, beans and peas, tobacco and cotton, are the topics of successive chapters. And finally root-crops, together with the leading facts of animal physiology, and the selection and care of stock, receive careful attention. The Appendix contains a list of chemicals and apparatus, with tables of money and weights and measures. The wood-cut illustrations are worthy of all praise. The style is highly finished, clear, and forcible. We regard this book as one of a high order of excellence, and which might with advantage be in the hands of the young farmers of Canada. A. F. K.

The British Tortrices. By S. J. Wilkinson. (Van Voorst.)—The great barrier to an exhaustive study of the animals of the British Islands is its insects. Hence we find naturalists who are tolerably conversant with our Vertebrate animals, our Mollusca and Radiata, who scarcely know a single insect. On the other hand, the naturalist who ventures on the insect kingdom is irredeemably committed to its study. A lifetime is quite insufficient to get through its various groups. He begins with the beetles, and there he sticks: he does not even become an entomologist; he is the student of a group, and is dubbed a coleopterist. Thus we have works devoted to his use, and a 'Coleopterist's Manual' to guide him in his studies. If he takes up butterflies and moths, the same affluence obstructs his progress. He becomes a lepidopterist, or a micro-lepidopterist; and only by this exclusive attention to a branch can he expect to aid in the development of the science of Entomology. The same is true of the other great groups of insects, of Diptera, Hymenoptera, Neuroptera, and the rest. Thus it is that the reputation of men who have spent a lifetime in the study of animal habits and forms, and made for themselves an undying fame, is scarcely known to the public at all. The amount of accurate observation, logical generalization, and scientific thought, expended on insects alone, is probably as great as that in all other departments of Zoology. Although its practical value may be thought less, it is, nevertheless, in this group of animals that some of the great laws of animal morpho-

logy have been most successfully worked out, whilst the hosts of those little creatures that dwell in our forests, live in our fields become the pests of our houses, our beds, and our food, give a practical value to the knowledge of their habits, which cannot be claimed by animals of greater size, and which are more easily observed. The work before us is an illustration of the generally unappreciated labours of the entomologist. There is a little group of moths whose caterpillars swarm in our gardens, attack our beans and peas, and twist themselves curious homes in the leaves of our limes, laburnams, and other trees. These are the larvæ of the "British Tortrices." Many of them have been figured and named, but no complete work descriptive of them existed, and Mr. Wilkinson has in this volume supplied the want. He has described, with great accuracy, from original specimens, three hundred species of these insects. As this has been done with the skill of a master, the work must take its place beside the great descriptive works devoted to other families of insects. To the reading public such a work presents no attractions. In passing from page to page it looks like a wearisome repetition of nearly the same forms; but let no one despise who cannot understand, for in these descriptions lies the very soul of zoological science. Without an accurate apprehension of individual forms, there could be no general law of form, and the great science of Morphology would cease to advance. Every now and then, however, amid the dreary waste of description, we get a pleasant peep into the entomologist's way of life. We find his favorite caterpillars feeding on the ferns of Wimbledon Common, the oaks of New Forest, the hawthorns of Epping Forest, the birches of the banks of Dee, or the heather of Scotch mountains. These "habitats" are suggestive of pleasant rambles amongst the forests, rivers and mountains of our island; and we cannot but feel that such pursuits must have an invigorating influence on the mind and body, in addition to their importance in contributing to the advancement of human knowledge.—*Athenæum.*

The Rudiments of Botany, Structural and Physiological. By Christopher Dresser. (Virtue.)—This very modest title introduces in many respects one of the most complete works on structural botany in our language. Mr. Dresser is Lecturer on

Botany, and Master of the Botanical Drawing Classes in the Department of Science and Art of the Privy Council for Education. In this capacity he has felt the want of more copious illustrations than ordinary botanical manuals supply. He has accordingly endeavoured to supply this want, and has produced a work which, for completeness and beauty of illustration, has certainly no rival. The work is more particularly devoted to structure, and the physiological remarks are everywhere only secondary and incidental. It is written in the form of simple propositions easily comprehended by the student, and every detail of the structure of plants is copiously illustrated by original drawings, or by woodcuts from works of acknowledged excellence. As the work is written for Art students, it has been evidently the object of the author to divest his illustrations of the mere diagrammatic form which they assume in most works on botany, and in this, we think, he has to a large extent succeeded. To say that all the drawings are of equal excellence would be doing injustice to those which are executed with great truth and excellence; but the work, as a whole, stands alone in point of illustration, and must henceforth be the text-book of Art-students. We strongly recommend this book to artists, as the want of a knowledge of the real structure of plants is an acknowledged desideratum in the productions of many of our first artists. If they attended more to the laws of plant-life, we should not see their paintings so often disfigured by monstrous and impossible plants. They would learn here that the general effect of particular groups of plants is produced by their special forms, and that nothing but a knowledge of these forms can enable them to give a true expression to the wonderful variety of foliage to be formed in nature.—*Athenæum.*

Professor Hall's Report on the Geology of Iowa. Vol. I. Parts 1 & 2.

We should have noticed some time since these elegant volumes, admirably illustrated, and replete with the results of the application of Prof. Hall's talent and matured skill to the new regions of the west. Iowa is a rectangle of 300 miles by 200, its north line being the parallel of 43° 30′, and its eastern and western boundaries the two great rivers of the west, the Mississippi and Missouri. It is nearly level and consists principally of prairie land with belts of timber in the river valleys.

The greater part of the State rests on the palæozoic formations, the whole of which from the Permian to the Lower Silurian inclusive are represented. The points of difference between these formations in Iowa and in the Eastern States and British America are such as the following. The Permian system, wanting in the East, makes its appearance in Iowa and the neighbouring region of Kansas where it was first recognised. The coal measures thin out, while the carboniferous limestone, largely developed in Nova Scotia, but nearly absent in the region of the Appalachians, re-appears in great force in the west, and with very remarkable differences in its fauna. The various members of the Devonian and Silurian systems are represented, but with the exception of the Niagara limestone and Potsdam sandstone, with diminished thickness. The only formation newer than the Permian as yet recognized in Iowa, is the Cretaceous which has not as yet been fully examined.

All there formations are spread out in an undisturbed and slighly inclined position, and their principal useful minerals are coal, galena, and gypsum. The coal measures have an aggregate thickness of only about 100 feet, and appear to include only two beds of coal, the most important of which sometimes attains a thickness of four feet. The coal seams are by no means regular, but have probably been affected in their original deposition by many local disturbances; a remark which applies to these old fossilized bogs much more generally than persons who have not studied the coal measures in detail are aware of. The coal of Iowa is bituminous, and of various qualities in reference to the quantity of earthy matter contained in it.

The lead region of Iowa is a continuation of that of Upper Missouri. The mineral occurs in vertical fissures widening into large cavities or caverns, filled with clay and ore, or with compact ore, and sometimes communicating with flat tabular expansions or beds. These deposits occur principally in the "Galena Limestone," but are also found in diminished extent in the Trenton limestone which immediately underlies it. They appear to be quite wanting in the overlying formations.

The Gypsum occurs in rocks probably of Permian age, but their detailed examination is not included in this portion of the report.

The second part is devoted entirely to the fossil remains of the

Devonian and Carboniferous rocks, and a great many new species are described. The fossil plants are not noticed.

Professor Hall has been assisted in the survey by Mr. Worthen and Mr. Whitney; the latter of whom acts as chemist and mineralogist to the survey. , J. W. D.

CORRESPONDENCE.

Extract of a letter to the Editors of the CANADIAN NATURALIST from MR. D. W. BEADLE, dated St. Catherines, C. W., February 23, 1860.

Believing that the larva of *Argynnis Aphrodite* has never been described I send you the following description.

I found the larvæ as early as the 8th. of June 1859, of nearly all sizes from a few days old up to the full grown specimen. They feed on plants of the genus *Viola* indiscriminately, not hesitating in confinement to use our gadren varieties when the native species are not supplied.

The full grown larva is an inch and a quarter in length, of a black color and ornamented with parallel rows of black spines, set with minute branches. The head is bi-mucronate, black anteriorly, posteriorly reddish-brown. The second segment has two dorsal spines that are entirely black, the other spines have all a reddish-brown base and are arranged as follows: between the second and third segments are two lateral spines, (one on each side,) on the third segment are two dorsal spines, between the third and fourth two lateral and on the fourth two dorsal spines; the fifth to the twelfth segments both inclusive, have six spines, between the twelfth and thirteenth segments are two dorsal spines, and on the thirteenth two lateral. The spines are so arranged as to form rows both lengthwise and across. The underside of the larva is a little lighter colored than the upper, and the legs are the same color as the underside. The prolegs are black.

The chrysalis is brown, in shape much like that of *Vanessa Antiopa*, suspended, and without any gilded spots.

MEETING OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Meetings of Sections.

A.—MATHEMATICAL AND PHYSICAL SCIENCE.

President.—The Earl of Rosse, F. R. S., &c.

This Section met in a class-room of Marischal College, which was quite crowded. His Royal Highness the Prince Consort, in visiting the Sections, entered this room a few minutes after eleven. His entrance was received with loud cheers, the audience rising to their feet. He took his seat on the left of the President.

Lord Rosse then said:—Ladies and Gentlemen,—It has recently been usual at opening the proceedings, to give, as far as may be practicable, a general outline of the business to be brought before the Section, and some kind of notice of the order in which it is likely to be taken. As, however, many papers usually come in after the meeting of the Section, and as circumstances often arise rendering it necessary to alter the order of proceeding, any notice which can be given must necessarily be very imperfect. The daily notice will, however, in some degree, remove the difficulty. It has also, I believe, been usual to give some slight account of the general character of the business to be transacted, so that new members may be enabled better to decide whether to attend this Section or some other. I have just looked over the papers that have been sent in. I find that there are papers on pure mathematics and on applied mathematics: papers more especially on light and electricity; on magnetism, on meteorology, and on the construction of mathematical instruments. Also, papers in several other minor departments of physics. But, up to the present time, there are some branches of science in this Section in which the papers have not been given in and are yet to come. However, by this account you will be enabled to form some idea of the character of the business to be transacted. Now first, with respect to the mathematical papers, I need perhaps hardly say that essays on so abstruse a subject, can scarcely be of very much general interest; they can scarcely be of interest except to mathematicians. And the subject of mathematics is so extensive, that even they—unless the papers happen to be on branches related to those

they have specially studied—may sometimes be unable to do more than trace the leading principle and general scope of the papers. However, without any special mathematical knowledge, a well informed man may, often in the results announced, and I may add from the observations elicited, obtain very interesting glimpses of the nature of mathematical processes and some general idea as to the progress making in that direction. In applied mathematics there is much more of general interest, and the results are often perfectly intelligible without special education. I recollect that at the meeting of the British Association at Oxford, the general results of a very abstruse investigation in applied mathematics in physical astronomy were made very interesting. The subject was so brought forward as to rivet the attention of the whole section, and there were many ladies present. The paper was given in by M. Leverrier, and the subject was the identification of a comet. Discoveries in electricity, light, heat, and magnetism, cannot fail to be of great general interest. To the human mind nothing is so fascinating as progress. It is not what we have long had that we most prize. We highly prize new accessions, but we enjoy almost unconsciously gifts of far more value, we have long been in possession of. This is our nature; thus we are constituted. It is not surprising, therefore, that we should have a peculiar relish for new discoveries. (Applause.) The interest of discovery, however, is not permanent. For a time we are dazzled by its brilliancy, but gradually the impression fades away, and at last is lost entirely in the splendour of some fresh discovery which carries with it the charm of novelty. When we reflect upon this we cannot help perceiving in how very different a state the world would be from what it is if mankind in the beginning had been in the possession of all the knowledge we now have, and there had been no progress ever since. We naturally ask why were all those objects which have been laid before us so hidden—veiled—only to be brought to light by the vigorous use of our faculties? How wonderful from its origin has been the progress of mathematical science. Beginning perhaps 3000 years ago almost from nothing —one simple relation from magnitude suggesting another, and those relations gradually becoming more complicated, more interesting, I may add more important, till at length in our day it has expanded into a Science which enables us to weigh the planets, and more wonderful still, to calculate the course they will

take when acted continually upon by forces varying in magnitude and direction. When we ask ourselves such questions as these naturally suggest and thoughtfully work out the answers as far as we can do to their full depth, we become in some degree conscious of the immense moral benefits which the human race has derived from the gradual progress of knowledge. The discoveries, however, in Physical Science are ever giving man new powers, enabling him to supply his many wants. I am sure the mention of the subject has suggested to you some of the wonderful discoveries of later times. For instance, the production of force and power, almost without limit, by heat, and its application to locomotion by land and water, the transmission of thought not slowly by letter, not short distances by sound, but to immense distances and instantaneously by electricity. When we look around and see how man has appropriated to his use the properties of light, of heat, the powers of wind and water, the materials which have been placed before him in endless variety on the surface of the globe which he inhabits, that he has effected all this by knowledge accumulated by what we call science, it is surely not surprising that we should look upon discoveries in applied science with surpassing interest. The mere utilitarian, however, has been often reminded that discoveries the most important, and most fruitful in practical results have frequently in the beginning been apparently the most barren, and therefore that the discoveries of abstract science are not without interest even for him. I confess, however, that the gradual development of scientific discoveries; in fact, in other words, the steady flow of knowledge into the world—which like a stream as it proceeds increasing in depth and breadth, points to its own source, its own origin, which is the origin of man.—I confess that these powers appear to me to serve far more noble purposes than merely ministering to the corporeal wants of man, as they increase, or are supposed to increase, with the progress of civilization. (Applause). What those purposes are, I think, to some extent, we can clearly see, though to fathom the full depths of such an inquiry, would be beyond our powers. Looking merely on the surface, we perceive that the continual springing up of new facts, new discoveries, in endless procession, the rewards of industry must tend to make man industrious, to inspire him with hope, quicken his faculties, and entice him to labour—to labour with his mind—the hardest of all labour. It forces him to look behind

and before, to the past and to the future, and it promotes in him a moral training by the influence it exercises over his thoughts and habits. (Cheers). Many, no doubt, will feel anxious to see principles immediately applied to practice; in common language, to see principles made useful. They, I have no doubt, will be highly gratified in the Mechanical Section. Here they may, perhaps, occasionally see the same thing; but more frequently they will find that the results are but stepping stones, which prepare the way for further progress—(Applause).

B—CHEMICAL SCIENCE.

President.—Dr LYON PLAYFAIR, C. B.; F. R. S.

ADDRESS OF DR. LYON PLAYFAIR, F. R. S.

This section was quite crowded. Precisely at half-past 11 o'clock, Dr. Lyon Playfair took the chair, and intimated that the section would not open until the arrival of H. R. H. the Prince Consort. At 12 o'clock Prince Albert arrived, and was received by the company standing. Immediately on the Prince being seated, the President began to read his opening address. Its chief topic was the combining proportions of the elements of bodies, and was as follows:—

My predecessor in this chair, Sir John Herschel, drew our attention to the great importance of studying with increased accuracy, the combining proportions of bodies in the hope of determining the exact numerical relations which prevail between the elements. He justly regarded it as a subject worthy of the most accurate experiment, to ascertain whether the combining proportion of the elements or multiples of the combining of Hydrogen, be as suggested by Prout, cautioning chemists at the sametime not to accept mere approximative accordances as evidence of this relation.

I have now to congratulate the Section on the publication of the laborious investigations of Dumas on this important enquiry. It required a chemist of great manipulative skill as well as of fertile experiment, to obtain combining numbers for the elements upon which a greater reliance could be placed, than upon those determined with such admirable precision by Berzelius that great master of analysis. The atomic weights found by that chemist did not, for many of the simple bodies, confirm the suggestion of Prout

as to the multiple relations of these numbers to the equivalent of hydrogen. At the same time, the more recent determinations for the atomic weights of carbon, silver, and some other elements, so closely coincided with this view, that it was very desirable to extend new experiments to the bodies which had fractional atomic weights assigned to them.

In M. Dumas' Memoirs there are the results, though not the details, of a large series of experiments, on many of the elements. He obtained numbers of precisely the same value as that by the method of the Swedish philosopher—numbers which are not the multiple of the equivalent of hydrogen. But when he pursued his experiments upon these same elements, with the methods of discovery and his own inventiveness, then atomic weights were obtained which corrected themselves from the error inherent in former methods of analysis, and resulted in being multiples of the combining proportions of hydrogen, or in standing in a very simple relation to that number. There is on this point evidence so clear that there is scarcely a chance of deception. The labours of Dumas, Pierre, Peligot, and others, have established the relation by recent determinations of clorine, iodine, bromine, silver, titanium. &c. Elements differing so much in chemical character as well as in atomic weight, that it is difficult to conceive any fortuitous combinations which could have produced such uniformities in the results of analysis. Hence the general view of Prout, that the equivalents of the elements, compared with certain unities, are represented by whole numbers, seems to be established by recent experiment, although it would be premature to declare that there are no exceptions to the law.

In this country we are familiar with many ingenious discussions on the natural grouping of the elements, and the relations of their equivalent numbers to each other. I allude to the paper of Gladstone, Odeling, and Mercer, and to the views of Cork, in America. Altho' these efforts point to important dependencies of the elements on each other, yet we cannot adopt them as parts of our scientific system. Another question of a different character, as regards equivalents, has recently received attention. I refer to the proposal, to double the equivalents of Carbon and Oxygen, that is to raise them from 6, and 8, to 10, and 16 respectively. As these two elements are essentially connected with the whole system of chemistry, the right determination of their equivalents is a matter of extreme importance.

Undoubtedly there are cogent reasons which induce many of our able chemists to double the equivalents of carbon and oxygen, and they are well worthy of the calm and deliberate consideration of a meeting like this. Such an alteration would produce an immense change on the literature of the science, and should only be adopted if the benefit to be derived from it is proved to be so great as to justify the inconvenience. This subject will be brought before the Section on more than one occasion. The change proposed has, in a great measure resulted from the new views of the classification of organic compounds introduced by Gerhardt. The recent brilliant progress in organic chemistry has resulted in the discovery of a vast number of new compounds. A scheme of classification became urgently necessary for them, and the genius of that great French Chemist produced a system which has exerted a most important influence on the advancement of science. The comprehensive system planted by Gerhardt has been carefully watered and tended by our countrymen, Williamson, Hunt, Odeling, and Brodie—watered until the young plant has attained a most vigorous growth. In a report upon the state of organic chemistry, by one of these gentlemen, we shall have the advantage of tracing its effect on the advance of science. Another of our members who admires the beauty of the plant, and the excellence of the fruit it has borne, fears that it is growing too wildly, and that the pruning knife might be adopted with advantage. He, therefore, proposes for our consideration in a paper which will be laid before you some modifications of the system of classifying compounds now so prevalent. With the array of talent in our sections, enlisted in favour of Gerhardt's system, there will be full justice rendered to the merits of that lamented philosopher in any discussion which may follow the reading of the paper to which I allude. In conclusion, I have to congratulate the meeting upon the important muster of English Chemists in our Section; although we have at the same time to regret that our cold northern position has prevented our foreign colleagues from joining us and enjoying that welcome which the warm hearts of our countrymen would assuredly have accorded to them.—*Cited from the London Athenœum.*

MISCELLANEOUS.

Abstract of the proceedings of the Geological Society of London.

SESSION 1859–60.

December, 14, 1859.—Prof. J. Phillips, President, in the Chair.

The following communication among others was read:—

"On a Terrestrial Mollusc, a Chilognathous Myriapod, and some new species of Reptiles, from the Coal-formation of Nova Scotia." By J. W. Dawson, LL.D., F.G.S. &c.

On revisiting the South Joggins in the past summer, Dr. Dawson had the opportunity of examining the interior of another erect tree in the same bed which had afforded the fossil stump from which the remains of *Dendrerpeton Acadianum* and other terrestrial animals were obtained in 1851 by Sir C. Lyell and himself. This second trunk was pointed out to him by Mr. Boggs, the Superintendent of the Mine. It was about 15 inches in diameter, and was much more richly stored with animal remains than that previously met with. There were here numerous specimens of the land-shell found in the tree previously discovered in this bed, —several individuals of an articulated animal, probably a Myriapod,—portions of two skeletons of *Dendrerpeton*,—and seven small skeletons belonging to another Reptilian genus, and probably to three species.

The bottom of the trunk was floored with a thin layer of carbonized bark. On this was a bed of fragments of mineral charcoal (having Sigillaroid cell-structure), an inch thick, with a few Reptilian bones and a *Sternbergia*-cast. Above this, the trunk was occupied, to a height of about 6 inches, with a hard black laminated material, consisting of fine sand and carbonized vegetable matter, cemented by carbonate of lime. In this occurred most of the animal remains, with coprolites, and with leaves of *Noeggerathia* (*Poacites*), *Carpolithes*, and *Calamites*, also many small pieces of mineral charcoal showing the structures of *Lepidodendron*, *Stigmaria*, and the leaf-stalks of Ferns. The upper

part of this carbonaceous mass alternated with fine grey sandstone, which filled the remainder of the trunk as far as seen. The author remarked that this tree, like other erect *Sigillariæ* in this section, became hollow by decay, after having been more or less buried in sediment; but that, unlike most others, it remained hollow for some time in the soil of a forest, receiving small quantities of earthy and vegetable matter, falling into it, or washed in by rains. In this state it was probably a place of residence for the snails and myriapods and a trap and tomb for the reptiles; though the presence of coprolitic matter would seem to show that in some instances at least the latter could exist for a time in their underground prison. The occurrence of so many skeletons, with a hundred or more specimens of land-snails and myriapods, in a cylinder only 15 inches in diameter, proves that these creatures were by no means rare in the coal-forests; and the conditions of the tree with its air-breathing inhabitants imply that the Sigillarian forests were not so low and wet as we are apt to imagine.

The little land shell, specimens of which with the mouth entire have now occurred to the author, is named by him *Pupa vetusta*. Dr. Dawson has found entire shells of *Physa heterostropha* in the stomach of *Menobranchus lateralis*, and hence he supposes that the *Pupæ* may have been the food of the little reptiles the remains of which are associated with them.

Two examples of *Spirorbis carbonarius* also occurred; these may have been drifted into the hollow trunk whilst they were adherent to vegetable fragments. The Myriapod is named *Xylobius Sigillariæ*, and regarded as being allied to *Iulus*.

The reptilian bones, scutes, and teeth referable to *Dendrerpeton Acadianum* bear out the supposition of its Labyrinthodont affinities. Those of the new genus, *Hylonomus*, established by Dr. Dawson on the other reptilian remains, indicate a type remote from *Archegosaurus* and *Labyrinthodon*, but in many respects approaching the Lacertians. The three species determined by the author are named by him *H. Lyellii*, *H. aciedentatus*, and *H. Wymani*.

Distribution of Forests in North America.—(The subject of geographical botany is now exciting much attention, and very deservedly, for independently of its interest in itself, it is capable of throwing much light on the vexed questions of the nature and

origin of species, and on the changes of climate which the earth has experienced in past periods. The Smithsonian Institution has just issued a very interesting pamphlet on this subject relating to the Trees of North America, from which we make the following extracts. The first relates to the mode of collecting specimens for purposes of accurate comparison.)

"Collections of the leaves, fruits, bark, and wood of our native trees are particularly desirable, and from as many localities as possible, in order to determine both their range and abundance, and also to decide those knotty points as to true specific distinctions, which still perplex the most skilful botanists. The specimens from each tree should be kept carefully together, and the name of the locality and collector given in full. Without such collections no information as to the large genera of oaks, hickories, magnolias, and, in fact, most others, can be at all depended on or made use of. Collections from the extreme corners of the United States, and from any part of the western mountains, will be particularly useful in determining all these questions. A good way of preserving a complete set from each species of tree is to obtain two pieces of the thick bark of the trunk about a foot square, *taking care not to rub off the mosses or lichens*, which are often very characteristic of the tree. Other specimens of bark from the branches, sufficient to show all its changes in appearance, and twigs with leaves, flowers and fruits, may be pressed between the trunk bark, with sufficient paper of any kind intervening, to absorb all moisture. One change of this paper will usually be sufficient, (especially if the bark is dry;) and fruits, if large and hard, may be so fixed as to hang outside, wrapped in paper. Particular care is necessary to prevent mixture of specimens. Blocks of wood from the trunk and branches at various seasons are also desirable for experimenting upon.

Observations as to the relative abundance of each tree at the various stations may be expressed numerically, thus: very rare, 1; occasionally met with, 2; not uncommon, 3; common, 4; very common, 5; abundant, 6, &c.; using numbers up to 10, and explaining them. Frequently several trees will be found so nearly alike in abundance as to require the same number. Notice should also be made of the nature of the country and soil—whether mountainous, rocky, gravelly, sandy, or swampy, which will help to determine the limits of the natural regions. The geological structure of the district is, however, of secondary importance.

The columns of range may be used by observers filling the blanks or adding to the recorded range in either direction; but this must be done carefully and with a perfect knowledge of the species noted. The name of the county should be given as well as of the town, and is preferable if only one is stated. Such blanks, filled up, may be cut out and sent to the Smithsonian Institution, addressed to the Commissioner of Patents, with the writer's name. Meteorological observers will take a special interest in the subject, and in most cases can make the best notes from their habit of observing the connexions of peculiarity of climate and forest growth."

A second extract is furnished by the general conclusions as to the causes of the peculiar characteristics of the "Campestrian" region of the western prairies:

"Now coming to the CAMPESTRIAN PROVINCE we find, as already stated, that no new forms of trees appear, while those found rapidly diminish and disappear towards the west. Thirteen species have not been traced west of its eastern border; about ninety extend pretty far into the *Texan* and *Illinois* regions, but only five or six get across the eastern limit of the Camanche and Dacotah regions, which, however, receive nine or ten more from the west and north.

The *Saskatchewan* region, bordering close upon the well-wooded Lacustrian Province, may have a few more eastern species, and possibly more from the west, as there is evidence that it is better watered and approaches in character to the Illinois region.

It will be observed that the southeast and northeast borders of this province form nearly a right angle with each other, and extending east into Michigan cause a wide separation of the Lacustrian and Apalachian provinces. This is one of the most well defined facts in the distribution of trees. A careful examination of the minute land office surveys has shown that the line is exceedingly distinct in Wisconsin and Minnesota, prairies prevailing to the south of it interspersed with oak-openings and groves of deciduous trees along the streams, while to the north pine and spruce forests with tamarack swamps cover the whole country, having the other *Canadian* trees with them. This is doubtless in great part due to the change in the character of soil and of the underlying rocks, which retain the moisture, while it is completely drained off to the south. Thus we have here a distinct division of the two eastern forest

provinces, assisting to determine where it would be eastward were it not disguised by local irregularities of surface.

The cause of the disappearance of trees in the Campestrian Province is, in a word, the deficient and irregular supply of moisture. I need not enter into the proofs of this, but refer to the records of meteorologists. It is true that this does not materially affect agriculture in the more eastern regions; in fact, most crops will succeed better with less rain than is necessary for most trees to thrive, and in some years there is even a greater supply of rain in the Texan and Illinois regions than eastward. But there are years and series of years of drought, when in their natural condition the forests take fire from the slightest cause and burn over large tracts. This was made even more general by the Indians but since the white settlement has in great degree ceased and forests have been re-established. In the Apalachian region droughts have never been sufficient to keep trees from extending themselves as soon as a forest might be partially destroyed by fire, and thus the formation of prairies has been prevented. A consideration of the source of the rains will explain why the limit of prairies has its present direction. Coming north from the Gulf they are continually carried more and more eastward by the westerly winds, and as the greater part of the moisture is precipitated before reaching the Ohio river, the Illinois region is deprived *for many* years of its due share of rains.

The Texan region lying quite west of the line of travel of those Gulf streams has to depend on less abundant sources for its rains. Now, as we go westward the supply rapidly diminishes until in the Camanche and Dacotah regions it is entirely inadequate to the growth of trees as well as of most cultivated products; and in some parts even grass and other herbage entirely disappear over vast tracts. From the great bend of the Missouri north, however, there seems to be an improvement in the country. On the banks of that river, above Fort Union, there is no long interval without trees as there is farther south on nearly all the streams, and on the Saskatchewan there is even less.

The very porous character of the soil and underlying rocks assists much in this aridity of the country, and we therefore find that the line marking the junction of the carboniferous rocks of the Illinois region with the cretaceous and tertiary is a distinct limitation of many trees.

When better known the geological character will help much in defining the physical geography of the surface of this province. In Texas the border of the Llano Estacado coincides with that of the Camanche region for a long distance. It is evidently more the retentiveness of the soil than its mineral composition that affects the growth of trees, for all soils contain more or less of their essential ingredients.

Even the saline substances, which are supposed by some to make deserts of portions of the Great Plains, are rather the secondary effects of the climate; for if rains were abundant these salts would become diffused, and in their proper proportions enter into the structure of trees and other plants."

Catalogue of Coleoptera collected by George Barnston, Esq., of the Hon. Hudson's Bay Company, in the Hudson's Bay Territories.

Dr. Leconte having expressed a wish to examine any Coleoptera from the Hudson's Bay Company's Territories which could be obtained in Montreal, Mr. G. Barnston most obligingly placed his collection in my hands for transmission to Philadelphia; and as Dr. Leconte has kindly furnished me with a list of the species, I have drawn up the following catalogue of them for publication in the "Canadian Naturalist." W. S. D'U.

Montreal, June 2nd, 1859.

COLEOPTERA.

Cincidela longilabris, *Say*. North end of Lake Winnipeg.
" duodecim-guttata, *Dej*. " " "
" hirticollis, *Say*. " " "
Cymnidis reflexa, *Lec*. Locality not recorded.
Calathus confusus, *Lec*. Carlton House.
Platynus erythropus, *Kirby*. (obcordatus, *Lec*.) Lat. 54° N., long. of Lake Winnipeg.
" obsoletus, *Lec*. North end of Lake Winnipeg, and lat. 54° N.
" sinuatus, *Dej*. " " "
" (*not determined*.) " " "
Pterostichus orinomum, *Leach*. Carlton House; north end of Lake Winnipeg; and lat. 54° N., long. of Lake Winnipeg.
" punctatissimus, *Randall*. Carlton House.
Amara confusa, *Lec*. Lat. 54° N., long. of Lake Winnipeg.
" fallax, *Lec*. North end of Lake Winnipeg, and lat. 54° N.

Amara lacustris, *Lec.* North end of Lake Winnipeg, and lat. 54° N.
" interstitialis, *Lec.* Carlton House, and north end of Lake Winnipeg.
" " Var. North end of Lake Winnipeg.
" carinata, *Lec.* Mackenzie River and Great Slave Lake.
" obesa, *Say.* Locality not recorded.
Agonoderus pallipes, *Fabr.* " "
Harpalus amputatus, *Say.* Carlton House.
" pleuriticus, *Kirby.* North end of Lake Winnipeg, and lat. 54° N.
Chlænius niger, *Randall.* North end of Lake Winnipeg.
Carabus serratus, *Say.* " " "
" Agassii, *Lec.* " " "
" Lapilayi, *Lap.* " " " and lat. 54 N.
Nebria Mannerheimii, *Fisch.* Carlton House.
Elaphrus Californicus, *Maun.* var. punctatissimus, *Lec.* Mackenzie River and Great Slave Lake.
Bembidium impressum, *Fabr.* North end of Lake Winnipeg.
" transversale, *Dej.* " " " and lat. 54° N.
Dytiscus confluens, *Say.* Lat. 54° N., long. of Lake Winnipeg.
" Harrisii, *Kirby.* " " "
Helophorus lineatus, *Say.* North end of Lake Winnipeg.
Necrophorus pygmæus, *Kirby.* Lat. 54° N., long. of Lake Winnipeg.
Silpha lapponica, *Herbst.* Carlton House; north end of Lake Winnipeg; and lat. 54° N.
" trituberculata, *Kirby.* North end of Lake Winnipeg.
Staphylinus villosus, *Grav.* North end of Lake Winnipeg, and lat 54° N.
Hister depurator, *Say.* " " " " "
Pediacus planus, *Lec.* Lat. 54° N., long. of Lake Winnipeg.
Dermestes lardarius, *Linn.* North end of Lake Winnipeg.
Attagenus megatoma, *Fabr.* Mackenzie River and Great Slave Lake.
Byrrhus Americanus, *Lec.* North end of Lake Winnipeg.
Cytilus varius, *Fabr.* " " " "
Platycerus depressus, *Lec.* " " " "
Lachnosterna fusca, *Frolich.* Carlton House and north end of Lake Winnipeg.
Dichelonycha subvittata, *Lec.* North end of Lake Winnipeg.
Trichius piger, *Fabr.* North end of Lake Winnipeg, and lat. 54° N.
Chrysobothris scabripennis, *Lap.* North end of Lake Winnipeg.
Melanophila longipes, *Say.* Mackenzie River, Great Slave Lake, and north end of Lake Winnipeg.
Dicerca tenebrosa, *Kirby.* Locality not recorded.
" prolongata, *Lec.* Carlton House, and north end of Lake Winnipeg.
Ancylocheira Nuttalii, *Kirby.* North end of Kake Winnipeg, and lat. 54° N.

Limonius vagus, *Sec.* Locality not recorded.
Corymbites Kendali, *Kirby.* Lat. 54° N., long. of Lake Winnipeg.
" æripennis, *Kirby.* North end of Lake Winnipeg.
Campylus denticomis, *Kirby.* " " "
Collops vittatus, *Say.* " " "
Clerus (*Thanasimus*) undulátus, *Say.* Mackenzie River and Great Slave Lake.
Corynetes violaceus, *Fabr.* Carlton House and north end of Lake Winnipeg.
Anobium foveatum, *Kirby.* Locality not recorded.
Mordella pustulata, *Mels.* North end of Lake Winnipeg.
Meloe rugipennis, *Lec.* " " "
Serropalpus substriatus, *Hald.* " " " and lat. 54 N.
Upis reticulatus, *Say.* Abundant, Carlton House and north end of Lake Winnipeg.
Pitho niger, *Kirby.* North end of Lake Winnipeg.
Pissodes affinis, *Randall.* " " "
Lepyrus colon, *Linn.* (*fide Kirby.*) " "
Alophus (*not determined*). Locality not recorded.
Cleonus (*not determined*). " " "
Bostrichus pini, *Say.* North end of Lake Winnipeg.
Criocephalus agrestis, *Kirby.* " " " and lat. 54° N.
Phymatodes proteus, *Kirby.* North end of Lake Winnipeg; lat. 54° N. and long. of Lake Winnipeg; Great Slave Lake; and Mackenzie River.
Clytus undulatus, *Say.* Mackenzie River, Great Slave Lake, and north end of Lake Winnipeg.
" longipes, *Kirby.* North end of Lake Winnipeg.
Monohammus scutellatus, *Say.* Mackenzie River, Great Slave Lake and lat. 54° N.
Rhagium lineatum, *Oliv.* Mackenzie River and Great Slave Lake.
Acmæops proteus, *Kirby.* North end of Lake Winnipeg, lat. 54 N. and Great Slave Lake.
*Leptura Chrysocoma, *Kirby.* " " " "
Chrysomela multipunctata, *Say.* Abundant, Carlton House.
" scripta, *Fabr.* Mackenzie River and Great Slave Lake.
" interrupta, *Fabr.* North end of Lake Winnipeg.
" Adonidis, *Fabr.* Mackenzie River and Great Slave Lake.
" Polygoni, *Linn.* North end of Lake Winnipeg.
" cyanea, *Mels.* " " "
Bromius vitis, *Fabr.* Mackenzie River and Great Slave Lake.
Hippodamia quinquesignata, *Kirby.* Lat. 54° N., long. of Lake Winnipeg.
Coccinella 12-maculata, *Gebler.* North end of Lake Winnipeg.
" transversoguttata, *Falderm.* " " "
" lacustris, *Lec.* " " "
Mysia 15-punctata, *Oliv.* " " "

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* This species occurs at Quebec in July.

ANNUAL REPORT OF THE COUNCIL OF THE NATURAL HISTORY.

Presented to the Society, May, 1860.

In presenting the customary annual Report, the Council have to congratulate the Society on the marked increase in its usefulness and prosperity in the past year, consequent, in part, on the present commodious and well-placed Building, and in part on the increased numbers and activity of its members.

In the past year the internal arrangements, and furniture of the building, have been completed; large additions have been made to the Museum; many important original investigations have been undertaken by members of the Society, and the results have been published in its proceedings. The annual Somerville course of free lectures has been successfully delivered. These lectures, as well as the ordinary meetings, have been even more largely attended than in former years.

The publication of the *Naturalist* has been carried on with its usual success; and the number of members has steadily increased, while the meetings have been occupied much more fully than formerly, by discussions of a scientific character. These successes have not been attained without much labor and expense; but we have the satisfaction of announcing that the Government and Legislature have, at length, adequately acknowledged the claims and Provincial utility of the Society, by a grant in aid of its funds.

Of the points above briefly noticed, some require a more detailed mention, which may be given under the following heads:—

ORIGINAL PAPERS READ.

Of the different departments in which this Society endeavors to promote the cause of Canadian science this must be regarded as the chief. We do not desire to undervalue the important work of collecting specimens for our Museum; but it is to be regarded as, in some respects, merely amassing the material on which skilled labor must be expended. The popular exposition of scientific principles in our public lectures is also a valuable means of cultivating the love and pursuit of science. The original

investigations, carried on by members of the Society and published by it, must, however, give it its standing among other scientific bodies, and it is by these that the value of its operations will be estimated abroad.

In this important department much has been done in the past year, and the Society has now connected with itself a zealous and constantly increasing band of laborers, who are daily extending the limits of our knowledge of Canadian Natural history and allied subjects.

In the department of Ethnology and social statistics, several valuable communications have been presented to the Society. One, by Principal Dawson, had reference to the art of Pottery, as practised by the aborigines of Canada, and evidenced by an ancient Indian vase in the collection of the Society. Another from an anynomous correspondent, is a very interesting notice of the manners and present condition of the Indian tribes of the McKenzie River, and the Arctic coast of America. Another, prepared by a committee of the Society, relates to certain points of interest connected with the Egyptian antiquities, presented by Mr. Ferrier, and especially to the antiquity and mode of preparation of the mummied remains contained in the collection. A fourth, the most important of the whole, is an elaborate investigation of the vital statistics of Canada, by Mr. P. P. Carpenter, a paper which, it is hoped, will not be merely a contribution to knowledge, but will give a practical stimulus to the sanitary improvement, so much needed for the comfort and health of the laboring classes in our towns.

In Botany the Society has received a number of catalogues, which must be regarded as important contributions to our knowledge of the geographical distribution of American plants. The principal are, that of the Holmes Herbarium of the University of McGill College, prepared by the late Prof. Barnston, that of Prescott plants, by Mr. B. Billings, that of the plants of the river Rouge, by Mr. D'Urban, and of the Algæ of the St. Lawrence, by the Rev. Mr. Kemp. In addition to these, we have had very interesting papers on the Reproductive system of *Vaucheria*, and on the mode of studying the Algæ, by Mr. Kemp; on the genus *Allium*, as found in Canada, by Mr. G. Barnston; and we may properly add here an interesting biographical sketch of the Great Western explorer, Douglas, by the same author.

In Zoology Mr. Bell has given us the most complete list hitherto published of the marine and fresh-water mollusks and radiates of the St. Lawrence, beside a number of other facts, bearing on the Zoology of that region. Mr. D'Urban has done a similar service for the previously unexplored valley of the River Rouge. Both gentlemen, it is proper to state, are protegés of the head of the Canadian Geological Survey, and have done these services to science under his auspices. Dr. Gibb, of London, an old and valued friend of the Society, has contributed some curious notes on the sounds produced by American insects; and Dr. Dawson has presented to us a complete summary of the natural history of the tubicolous marine worms of the Gulf of St. Lawrence, and the description of a new Canadian fish, the *Gasterosteus gymnetes*.

Geology is a department always likely to take an important place in the labours of this Society, more especially as the officers of the Geological Survey of Canada are among our most valued and active contributors. In this subject we have to notice three papers by Prof. Dawson, one on the microscopic structures of our Canadian limestones, and on the origin of these great sheets of calcareous matter in the deposition of the comminuted fragments of shells and corals, another in continuation of the Geology of the tertiary deposits of the lower St. Lawrence, and a third which for the first time brings the Silurian rocks of the peninsula of Nova Scotia into comparison with those of other parts of America. To this last paper, Prof. Hall, of Albany, has added descriptions of the new species of fossils, characteristic of these rocks. Mr. Billings is, as usual, one of our most important contributors. His papers on American Trilobites, on new genera of *Brachiopoda*, on the fossils of the Chazy Limestone, and on new species of fossils from the middle and lower Silurian rocks of Canada, are all steps in advance in Canadian palæontology, of which any Society might be proud to be the medium. We have also to thank Mr. Hunt for contributions to chemical Geology, which if not first published by this society, have at least through its means been more widely made known in Canada. Lastly, the series of original papers for this session has been fitly closed by the very interesting paper read by Sir W. E. Logan, at the April meeting of the Society, on the extraordinary impressions recently found in the Potsdam sandstone at Perth, C.W., constituting with the singular *Protichnites*, previously discovered by the same geologist, some of the oldest and most wonderful traces of life preserved in our Canadian rocks.

In addition to the original contributions above referred to, many abstracts and reviews of papers and other publications important to Canadian science, have been prepared by members of the Society and published in the *Naturalist.*

It was deemed proper by the Council to prsent to His Royal Highness the Prince Consort, on the occasion of his presiding at the meeting of the British Association in Aberdeen, a copy of the *Naturalist* from the commencement. This duty was performed by the President; and the volumes bound in the best style by Mr. Lovell, were presented and graciously received. The correspondence on this subject is appended to the Report.

PUBLICATION OF THE NATURALIST.

The editing committee report that since last annual meeting Vol. IV. has been completed. It consists of 504 pages, 8vo., being 24 pages larger than Vol. III., and contains twenty-two original articles presented to, or read before the Society, and written expressly for the Magazine, occupying .....Pages 217
Fourteen selected articles—many of which, though written for other purposes, were first published in its pages; and others of which were revised and amended by the authors—occupying..... 191
Miscellaneous Matter, nearly all original, as Reviews of Books, Correspondence, and the Societies' Reports..... 96

504

Wood engravings have been as usual, freely furnished by the publishers, who still continue with great liberality to publish the Magazine at some loss to themselves. The Editing Committee regret that the proceedings of the Society have not been so regularly reported in the *Naturalist* as is desirable, and recommend that, in future, this duty be assigned to the Committee.

The circulation of the *Naturalist* has not materially increased: nor do the Committee anticipate any great improvement in this respect, until the Society shall be in such a position as to procure a copy for each of its members, and to distribute the work more extensively in Great Britain, and in foreign countries. The *Naturalist* is doing a most important work in Canada, in stimulating the taste for natural science, and in giving the means of publication to observers; but its value as a medium of publication and

as a means of extending the knowledge of Canada and of enlarging its scientific reputation, is much diminished by the restricted circulation abroad, necessitated by the narrow pecuniary circumstances of the Society. A vigorous effort should be made to remove this evil in the coming year, and to secure for the *Naturalist*, now by far the most important representative of the state of Natural Science in Canada, the circulation which its merits demand.

In thanking the Editing Committee for its services, the Council regard it as nothing more than an act of justice to make especial mention of the services of Mr. D. Allan Poe, on whom the immediate editorial superintendence of the *Naturalist* has devolved, and to whose skill and unwearied attention much of the success of the publication is due.

MUSEUM AND LIBRARY.

The arrangement and improvement of the Society's collection, have been steadily advancing, and the cabinet-keeper, Mr. Hunter, deserves great credit for the zeal which he has displayed in this, as well as in adding to the collection by preparing and setting up numerous specimens of animals presented to the Society. The report of the Curator, Dr. Fenwick, shows that the number of donations has been very large. The most important of the whole is the Ferrier collection of Egyptian antiquities, which is one of the most attractive features of the collection. As at present arranged, the Society's collection of Canadian birds is remarkably complete and available for reference. The collection of Mammals, though containing a number of good specimens, is still very defective. It is much to be desired that members interested in these subjects, would bring up to the same degree of perfection with the birds, the collection of Canadian Invertebrate Animals, Plants, Fossils and Minerals. In all of these departments there is a great amount of material of little comparative value in consequence of the want of modern scientific arrangement. The aquaria, which we owe to the exertions of Mr. Leeming and Mr. Ferrier, now constitute a portion of our Museum of much interest and some scientific value.

The donations to the Library have been comparatively few, and the state of the Society's funds has not permitted the purchase of books. It is hoped, however, that something may ere long be done in this direction, as the library is now much in want of

many of the more modern works on Natural History. There is also a prospect that the Committee appointed to organize a system of exchanges for the *Naturalist*, may be able in this way to procure for us some of the scientific periodicals, not now received by the Society.

It would be of much service to the students of Natural science in Montreal, were there a mutual understanding between the institutions having libraries of reference on science, as, for instance, the McGill College, the Board of Arts and Manufactures, the Geological survey, and th is Society, that in ordering books the one should endeavor, as far as possible, to supplement the deficiencies of the others. The subject is worthy of the attention of the Library Committee in the coming year.

PUBLIC LECTURES.

The Somerville course for the past year consisted of the following Lectures:—

1.—On the uses and advantages of Foreign Travel, by the President, the Lord Bishop of Montreal.

2.—On Crystallization as a force in Nature, by Principal Dawson.

3.—On the History of Astronomy, by Prof. Johnson.

4.—On the Microscope, by T. D. King, Esq.

5.—On the Oyster, by J. Leeming, Esq.

6.—On Mountains and Volcanoes, by Prof. Hunt.

In addition to the ordinary Course, the exhibition of the Ferrier collection furnished the occasion of two interesting lectures on the present and ancient state of Egypt, for which we have to thank the Rev. Prof. Cornish and Mr. R. W. Ferrier.

FINANCIAL POSITION.

The Treasurer's accounts for the past year still exhibit the effects of the increased expenditure attendant on the removal of the Society to its new building, on which there also remains a debt, secured by mortgage and note, of £850. The Society is now, however, owing to its improved accommodation, in a position much more efficiently to carry out its objects, to increase its membership, and to merit that support from the public and the Legislature, which there is now good reason to expect.

In the coming year the Legislative aid and members' fees will suffice to meet all the unpaid accounts and interest of the debt,

and to provide for the current expenses; and it is hoped that in subsequent years, by economical management, some reduction of the debt may be effected, and means reserved for additions to the Library, and for more extensively promoting the circulation of the proceedings of the Society abroad.

GENERAL RECOMMENDATIONS.

Toward the close of the last Session two important branches of the operations of the Society were initiated, in the organization of a Microscopical Section, and in the appointment of a Committee on adulterations of articles of food. They have not as yet reported to the Council, but they are warmly commended to the fostering care of our successors.

It is the practice in most Societies similar to this, that an address on the progress of science in connection with the Society should be prepared and delivered by the President at the Annual Meeting. This has usually been done by us in an imperfect manner in the report of the Council; but the operations of the Society are now so important that this can scarcely any longer suffice, and your Council, therefore, recommend that in future it shall be considered as a part of the duty of the retiring President, and, in his absence, of the 1st Vice-President, to prepare an address for the Annual Meeting, including notices of the papers read and of the other operations of the Society. The report of the Council will then be confined to the business affairs of the Society.

The approaching visit of His R. H. the Prince of Wales will demand on the part of our successors an effort to represent as effectually as possible those departments of Canadian science which specially belong to the Province of this Society. This especially merits attention, inasmuch as the Board of Arts and Manufactures has selected for its exhibition building the ground adjoining that occupied by the Society. Our collections will thus be brought under the notice of a much larger number of visitors than usual, and it is possible that some arrangement might be made for rendering our museum still more useful by opening it as a part of the Great Exhibition to be held on that occasion.

PRESENTATION OF THE "NATURALIST" TO H. R. H. PRINCE ALBERT.

SEE HOUSE, *Montreal*, May 6, 1859.

SIR,—At a recent meeting of the Incorporated Montreal Natural History Society, I was requested to forward to you the accompanying volumes of a bi-monthly periodical issued by that Society, entitled the "Canadian Naturalist," which they desire, through you, to be allowed respectfully to offer to H.R.H. the Prince Consort. The different articles in the magazine are written by the members of the Montreal Natural History Society, and the plates are executed and the work printed and bound in this city. It may, therefore, be considered as a specimen of the progress that is making here in Natural Science and in the Arts. And from the interest which His Royal Highness takes in receiving things connected with these matters, and as he is himself to be President at the ensuing meeting of the British Association for the advancement of Science, we are led to believe that these volumes will meet with a favourable reception.

I have the honor to be, Sir,

Very respectfully,

Your faithful Servant,

(Signed) F. MONTREAL

Vice President of the Montreal Natural History Society.

To the Right Hon.

Sir E. BULWER LYTTON, Bart., M.P.,

Secretary of State for the Colonies.

GOVERNOR'S SECRETARY'S OFFICE,

Toronto, July 23, 1859.

MY LORD,—I am directed by His Excellency the Governor General to transmit herewith a copy of a despatch from the Secretary of State for the Colonies, acknowledging the receipt of your Lordship's letter of the 6th of May.

I have the honor to be, my Lord,

Your Lordship's obedient Servant,

(Signed) R. T. PENNEFATHER.

The Right Rev.

The LORD BISHOP of Montreal.

[Copy, Canada, No. 4.]

DOWNING STREET,
27th June, 1859.

SIR,—My predecessor in this Department received from the Bishop of Montreal, as Vice-President of the Natural History Society of Montreal, a letter dated the 6th of May last, accompanied by volumes of a periodical issued by the Society, entitled the "Canadian Naturalist," which they desired to offer to his Royal Highness the Prince Consort.

His Royal Highness has requested that the expression of His Royal Highness's best thanks may be conveyed to the Bishop of Montreal, and to the Society over which he presides, for the valuable work which they have sent to him, and the assurance of the high value which he shall attach to these volumes as the sign of the cultivation of the Sciences and Arts in the important North American Colonies of Her Majesty.

I have, &c.,
(Signed) NEWCASTLE.

STATEMENT OF LIABILITIES OF THE NATURAL HISTORY SOCIETY.

1*st May*, 1890.

Sundry open accounts,	$ 673 97
Interest due on Mortgages,	257 50
Balance due Treasurer,	126 28
The Society's note due July 11, 1860,	1000 00
Mortgage favor of Wm. Watson, Esq.,	400 00
Do. Do. Wm. Nivin, Esq.,	2000 00
	$4457 75

JAMES FERRIER, JR.
Treasurer.

MONTREAL, 1st May, 1860.

(*To be continued in next number.*)

NATURAL HISTOTY SOCIETY OF MONTREAL IN ACCOUNT WITH JAMES FERRIER, Jr.

RECAPITULATION.

1859.				Dr.
May 1.—To Balance due the Treasurer,				$719 43
1860.				
May 1.—To Cash paid	Salaries,			200 00
" " "	C. McCormick, Commissions, &c			31 00
" " "	Gas and Water Rent,			49 61
" " "	Fuel,			129 96
" " "	Advertising and Printing,			67 30
" " "	Interest,			221 32
" " "	Insurance,			38 00
" " "	Notarial Expenses,			38 00
" " "	Museum Fixtures,			58 50
" " "	Aquaria,			147 08
" " "	On Account Building,			495 52
" " "	Incidental Expenses,			35 48
				$2,231 20

Montreal, May 1, 1860, Examined and found Correct.

Signed, ALEX. GORDON,
" J. H. JOSEPH,
" JAMES MILNE.

RECAPITULATION.

1860.		Cr.
May 1.—By Cash Received from Annual Subscription		
	Diplomas,	$ 504 00
" "	Received from Life Members and Special,	110 00
" "	Received from Admission fees to Museum,	46 75
" "	Proceeds of Lecture on Egypt,	64 50
" "	From American Association Committee, balance,	271 67
" "	From L'Institute Canadien, interest to 1st July on £600,	108 00
" "	Wm. Nivin, Esq., on loan,	1,000 00
"	Balance due the Treasurer,	126 28
		$2,231 20

E. & C. E.

Signed,
JAMES FERRIER, Jr.
Treasurer N. H. S.

Montreal, 1st May, 1860.

NATURAL HISTORY OF THE VALLEY OF THE RIVER ROUGE.

ERRATA.

1*st Part. Vertebrata, Vol. IV.*

Page 254, line 10 from bottom, for "he" and "his," read *it* and *its.*
" 268, " 8 " top, " "40th" read *30th.*
" 269, " 18 " bottom, " "879" " 379.
" 271, " 14 " top, " "congregatiug" read *congregating.*
" 271, " 17 " top, " "2" read 3.
" 273, " 3 " bottom, " "causes" read *cause.*

2*nd Part. Invertebrata. Vol. V.*

" 82, " 16 from top, for "vitresis" read *vitreus.*
" 82, " 20 " top, for "ruṭator" read *scrutator.*
" 83, " 9 " bottom, for "Nichius" read *Trichius.*
" 83, " 16 " " " "microphagus" read *miarophagus.*
" 84, " 31 " top, after Nyctobates, for "not determined" read *not described.*
" 84, (note), line 6 from bottom, for "Ellydina" read *Ellychnia.*
" 85, line 9 from bottom, for "lateripolia" read *laterifolia.*
" 85, " 11 " " " "pontatis" read *frontatis.*
" 86, " 5 " top, for "cappripennis" read *cupripennis.*
" 86, " 11 " " " "Tenebris" read *Tenebrio.*
" 88, " 18 " bottom, for "Ardepias" read *Asclepias.*
" 91, " 26 and 29 from top, for "Shippe' read *Skipper.*
" 93, " 14 from top, for "Medaria" read *Mudaria.*
" 93, " 7 " bottom, for "Sophocanipa" read *Lophocampa.*
" 93, " 7 " " " "Jussock" read *Tussock.*
" 94, " 12 " " insert *Guén* after "Plusia mortuorum."
" 95, " 1 " top, insert *Walker* after "Ellopium aquallaria."
" 95, "Bleptina surrectalis" should precede "Pyralis n. sp.
" 95, line 1 from bottom, for "Samhercalis" read *Samhucalis.*
" 96, " 9 " top, for "Miero-Lepidoptera" read *Micro-Lepidoptera.*
" 97, " 4 " " " "Doran" read *Dolan.*
" 97, " 6 "bottom, for "galhauns" read *galhanus.*
" 98, " 8 " top, for "companulatus" read *campanulatus.*

MONTHLY METEOROLOGICAL REGISTER, ST. MARTINS, ISLE JESUS, CANADA EAST, (NINE MILES WEST OF MONTREAL,) FOR THE MONTH OF APRIL, 1860.

Latitude, 45 degrees 32 minutes North. Longitude, 73 degrees 36 minutes West. Height above the level of the Sea, 118 feet.

BY CHARLES SMALLWOOD, M.D., LL.D.

Day of Month.	Barometer—corrected and reduced to 32° F. (English inches.)			Temperature of the Air.—F.			Tension of Aqueous Vapour.			Humidity of the Atmosphere.			Direction of Wind.			Horizontal Movement in 24 hours. In miles.	OZONE.	RAIN.	SNOW.	WEATHER, CLOUDS, REMARKS, &c. &c. [A cloudy sky is represented by 10, a cloudless one by 0.]		
	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.		Mean amount of, in inches.	Amount of, in inches.	Amount of, in inches.	6 a. m.	2 p. m.	10 p. m.
1	29.871	29 367	29 521	34 0	40.0	27.1	.175	.182	.117	.89	.73	.82	E. S. E.	N. W.	N. N. E.	152.20	8.0	.....	.....	Cu. Str. 10.	Cu. Str. 10.	Cirr. 4. Lunar Halo.
2	788	650	709	10.0	20.0	17.0	.054	.085	.068	.78	.62	.75	N. by W.	W.	S. W.	261.30	0 0	.....	.....	Clear.	Clear.	Clear.
3	574	347	351	20.1	32.1	31.9	.081	.143	.156	.77	.79	.89	S. by E.	S. S. E.	N. e. by E.	59.70	10.0	.....	0.75	C. C. Str. 10	Cu. Str. 10.	Snow.
4	120	367	294	29.0	42.0	36.0	.112	.199	.170	.88	.74	.80	N. E. by E.	N. E. by E.	N. E. by E.	60.70	1 5	.....	.....	Cu. Str. 4.	Clear.	Clear.
5	227	250	451	34.1	38.2	31.2	.180	.201	.149	.90	.85	.86	N. E. by E.	N. E.	N. E.	178.80	7.6	0.500	.....	Rain.	Cu. Str. 4.	C. C. Str. 8.
6	670	662	801	30.1	46.7	34.1	.148	.232	.175	.89	.73	.89	N. W.	N. N. E.	S. S. W.	74.00	3.5	.....	1.60	Snow.	Clear.	Clear.
7	958	684	722	39.1	56.8	40.1	.136	.329	.208	.82	.72	.80	S. S. W.	S. S. W.	S. E.	5.00	0.0	.....	.....	Clear.	"	"
8	551	441	516	38.4	40.2	41.0	.214	.225	.235	.98	.91	.91	S. S. E.	S. S. E.	S. by W.	16.80	10.0	0.583	.....	Rain.	Rain.	Cu. Str. 10.
9	654	747	972	38.0	58 0	38.0	.203	.365	.151	.83	.76	.70	N. N. E.	W. S. W.	N. N. E.	17.00	2.0	.....	.....	Cu. Str. 4.	Cu. Str. 2.	Clear. Aurora Borealis.
10	900	654	261	28.6	42.0	40.1	.129	.184	.225	.82	.70	.90	N. E. by E.	S. S. E.	S. S. E.	56.40	8.0	0.160	.....	" 4.	St. 10.	Cu. Str. 10.
11	570	484	647	33.4	49.6	37.7	.182	.290	.193	.95	.82	.87	W. by N.	N. N. W.	N. by W.	233.40	5.0	.....	.....	Clear.	Cu. Str. 4.	Rain.
12	801	402	347	30.1	55.3	42.2	.148	.321	.237	.89	.74	.89	E.	S. by E.	S. E.	15.00	3.0	0.200	Inapp.	"	Cir. Str. 4.	Cu. St. 10.
13	342	479	515	34.2	41.0	40.2	.170	.169	.203	.86	.65	.82	W. S. W.	W.	S. W.	223.30	3 5	.....	.....	Cu. Str. 10	C. C. Str. 4.	" 4. Aurora Borealis.
14	492	647	742	24.2	26.4	18.9	.083	.082	.061	.66	.57	.60	W. N. W.	W. N. W.	W. N. W.	379.50	2.5	.....	.....	" 6.	Clear.	Clear. " "
15	30.000	911	980	12.1	32.0	27.8	.045	.112	.117	.60	.63	.78	W. N. W.	W. S. W.	S. W.	402.40	1.5	.....	.....	"	"	"
16	602	971	860	32 0	36.4	34.6	.143	.130	.169	.79	.65	.84	S. S. E.	S. S. E.	S. S. E.	31.40	1.0	0.500	.....	"	"	"
17	29.301	204	990	40.1	56.1	36.1	.225	.336	.170	.91	.75	.80	S. S. E.	W. S. W.	W. N. W.	423.40	2.5	.....	.....	Rain with Thunder.	Cu. Str. 4.	"
18	30.381	30.224	30.260	25.0	45.2	29.2	.110	.186	.136	.75	.67	.84	N. N. W.	S. W. by S.	S. S. W.	213.30	1.0	.....	.....	Clear.	Clear.	" Aurora Borealis.
19	272	29.914	29.860	30.0	60.1	46.4	.130	.396	.224	.78	.75	.79	W. by S.	S. W.	S.	73.10	1.0	.....	.....	"	"	"
20	29.842	311	417	36.7	64.9	50.2	.164	.451	.303	.76	.73	.88	S. S. E.	S. S. E.	S. S. W.	129.80	1 0	.....	.....	Cu. Str. 4.	C. C. Str. 8.	Cu. St. 10.
21	437	317	444	43 0	63.7	48.0	.254	.416	.285	.91	.72	.85	E.	E. by E.	N. E. by E.	41.10	1.5	.....	.....	C. C. Str. 8.	Clear.	" 10.
22	594	314	114	36.7	61.7	50.5	.177	.406	.283	.85	.74	.78	N. E. by E.	E. S. E.	S.	195.10	1.5	.....	.....	" 4.	"	Clear.
23	596	414	574	34.2	54.0	39.0	.155	.282	.167	.79	.67	.68	W. N. W.	W. S. W.	W. N. W.	167.80	1.0	.....	.....	Clear.	"	C. C. Str. 4.
24	630	154	600	31.0	39.8	30.0	.136	.131	.130	.77	.55	.70	W. N. W.	W. S. W.	W. N. W.	151.10	1 5	.....	.....	Cu. Str. 10.	Cu. Str. 4.	Snow.
25	671	710	714	25.4	46.2	38.3	.100	.280	.182	.74	.88	.79	S. S. W.	S. E.	S. S. W.	100.90	2.5	.....	0.10	" 2.	C. C. Str. 2.	Cu. Str. 4.
26	557	561	811	37.2	53.0	42 7	.178	.269	.215	.81	.67	.78	W. S W.	W.	W. N. W.	152.60	1.0	.....	.....	Clear.	Clear.	Clear.
27	911	991	954	35.2	55.2	40.3	.162	.218	.203	.80	.50	.82	S. W. by W.	W. by N.	W. S. W.	143.30	1.0	.....	.....	"	"	"
28	30.001	942	847	32.7	67.4	46.3	.137	.274	.192	.74	.41	.62	S. S. W.	S. by E.	S. E.	19.27	1.0	.....	.....	"	"	"
29	952	900	947	35.4	72.1	55.2	.127	.270	.269	.62	.32	.62	N. E. by E.	S. E. by E.	S. E. by E.	130.23	1.0	.....	.....	"	"	"
30	976	942	871	43.0	76.2	57.0	.209	.305	230	.75	.34	.51	E. S. E.	S. E.	E. S. E.	151.40	0 5	.....	.....	"	"	"
	...	.....	.....	... ..	.....	... ..	.....	.....	.....	.....	.....	.....	.....	... ...	.....	.....	... ..	.....	.....	.....	.....	.....	.....

REPORT FOR THE MONTH OF MAY, 1860.

Day of Month.	Barometer—corrected and reduced to 32° F. (English inches.)			Temperature of the Air.—F.			Tension of Aqueous Vapour.			Humidity of the Atmosphere.			Direction of Wind.			Horizontal Movement in 24 hours. In miles.	OZONE.	RAIN.	SNOW.	WEATHER, CLOUDS, REMARKS, &c. &c. [A cloudy sky is represented by 10, a cloudless one by 0.]		
	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.		Mean amount of	Amount of, in inches.	Amount of, in inches.	6 a. m.	2, p. m.	10 p. m.
1	29.979	29.900	29.930	49.9	79.5	23.8	.228	.217	.269	.64	.26	.67	S. E.	S. E.	S. E.	125.30	0 0	.....	.....	Clear.	Clear.	Clear.
2	30.146	890	920	44.9	69.9	53.2	.275	.360	.288	.92	.50	.70	S. E.	E. by S.	N. E.	14.60	0.5	.....	.....	Hazy.	"	"
3	29.990	842	725	47.3	74.5	59.0	.291	.270	.318	.89	.32	.63	E.	S. W. by W.	S. S. E.	8.50	0.5	.....	.....	Clear.	"	"
4	820	714	624	50.0	74.1	52.1	.256	.263	.352	.71	.31	.70	E. S. E.	N. E. by E.	N. E. by E.	131.10	1.5	.....	.....	Cu. Str. 10.	"	"
5	860	954	981	57.0	73.2	58.4	.262	.345	.357	.55	.42	.70	N. N. E.	S. S. E.	S. by E.	0.10	1.0	.....	.....	Clear.	"	"
6	30.017	997	30.001	47.0	84.2	62.2	267	.545	.347	.81	.47	.64	S. E.	S.	S.	12.20	1.0	.....	.....	"	"	"
7	29.920	902	046	54.5	72.1	57.9	.383	.489	.385	90	.62	.84	S. by E.	S. E.	N. N. E.	87.70	1.5	.....	.....	Hazy.	"	Cu. Str. 10.
8	930	941	001	47.0	74.2	60.9	.267	.532	.449	.80	.63	.85	N. N. E.	S. S. W.	S. S. W.	153.40	1.5	.....	.....	Cu. Str. 4.	Cu. Str. 4.	Clear.
9	30.146	30.050	061	56.1	58.5	56.3	.391	.452	.413	.87	.94	.90	S. E.	S. E.	S. E.	100.10	3.0	Inapp.	.....	Clear.	" 10.	Cu. Str. 10. Parhelia.
10	29.947	29.814	29.879	52.2	63.4	57.4	.368	.543	.452	.96	.94	.94	S. E.	E. S. E.	S. S. E.	249.10	5.0	0.160	.....	Cu. Str. 4.	" 4.	Slight Rain.
11	641	846	30.056	60.3	76.1	63.6	480	.541	.510	.91	.69	.83	S. S. E.	S. S. E.	S. S. E.	11.16	5.3	.....	.....	" 4.	" 4.	C. C. Str. 8.
12	998	30.004	110	64.2	81.6	69.2	.529	.617	.635	.89	.58	.90	S. S. E.	S. by W.	S. S. E.	2.70	0.0	.....	.....	Clear.	Clear.	Clear. Aurora Borealis.
13	980	29.894	29.974	59.6	83.1	65.6	.403	.597	.337	79	.53	59	S. S. E.	E. by S.	S. E. by E.	84.50	1.3	.....	.....	"	"	Cu. Str. 4. Solar Halo, dist. lt.
14	871	747	797	63.8	70.1	51.0	.341	.390	.270	83	.30	.72	E. by N.	N. E. by E.	N. E. by E.	311.70	0.0	.....	.....	"	"	Clear. Solar Halo.
15	890	831	814	44.1	72.2	56.7	.218	.327	.359	.76	.42	.78	N. by E.	S. S. E.	W. S. W.	199.70	0.0	.....	.....	"	"	"
16	771	30.040	30.090	46.0	66.2	47.1	.262	.216	.256	.84	.45	.81	N. E. by E.	E. N. E.	E. by S.	222.80	0.0	.....	.....	"	"	"
17	30.140	004	119	45.5	72.4	53.0	.198	.524	.321	95	.66	.80	N. by E.	S. S. E.	S. S. E.	44.64	0 0	.....	.....	"	"	"
18	29.947	29.900	29.793	50.1	64.6	60.3	.326	.285	.426	93	.48	.82	S. S. E.	S. by E.	S. by E.	113.62	6.6	Inapp.	.....	"	Cu. Str. 10.	Cu. Str. 4. Light in S. W.
19	489	279	187	61.1	63.0	55.0	.480	.491	.375	90	.88	.93	S. S. E.	S. S. E.	S. W.	100.10	5.5	2.670	.....	Cu. Str. 10.	Rain.	Rain.
20	360	339	847	32.1	38.7	34.1	.162	.123	.155	89	.54	.79	W.	W. N. W.	N. by W.	255.20	4.9	0.742	0.70	Snow.	Cu. Str. 6.	Clear.
21	997	914	874	35.1	55.5	46.3	.127	.218	.238	62	.50	.78	W.	S. S. E.	S.	24.80	1.5	.....	.....	Clear Frost.	C. C. Str. 8	Cu. Str. 8.
22	738	819	910	47.0	51.9	48.1	.298	.315	.310	92	.83	.92	S. S. W.	N. W.	N. W.	26.80	3.0	.....	.....	Cu. Str. 10.	Cu. Str. 10.	" 8.
23	997	982	30.004	44.2	71.3	56.9	.214	.347	.413	83	.46	.90	N. W.	W. by S.	S. E.	24.20	2.5	.....	.....	Clear, Slight Frost.	Clear.	" 8.
24	30.052	30.011	002	49.5	71.6	59.0	.297	.503	.410	85	.66	.82	E. S. E.	S. W.	S. E. by E.	39.10	1.0	.....	.....	Cu. Str. S.	"	" 4.
25	29.904	29.879	29.891	52.6	85.7	67.4	.354	.610	.420	90	.50	.63	S. by W.	S.	E. S. E.	8.80	2.0	.....	.....	Clear.	Clear.	Cirr. Str. 4.
26	802	800	697	57.2	78.0	63.6	.372	.323	.416	78	.35	.72	E. by S.	E. by N.	S. W.	228.50	1.5	.....	.....	"	Cu. Str. 9.	" 9. Distant Lightning.
27	647	582	711	53.3	63.7	56.1	.378	.471	.390	86	.81	.86	S. E. by E.	S. S. E.	S. S. E.	217.20	2.0	0.732	.....	Rain, thunder.	" 8.	" 8.
28	719	774	871	54.0	63.9	55.7	.355	.409	.370	84	.70	.84	S.	N. E. by E.	S. E.	39.40	2.5	.....	.....	Clear.	" 2.	Cirr. Str. 4.
29	927	991	947	51.2	78.2	65.7	.245	.594	.509	65	.63	.81	S. S. W.	W.	W. by S.	113.80	2.5	.....	.....	Cu. Str. 10.	Cir. Str. 8.	C. C. Str. 4.
30	957	749	697	61.0	73.2	61.7	.419	.545	.383	80	.67	.71	S. S. W.	S. W.	S. S. W.	20.50	1.5	Inapp.	.....	C. C. Str. 8.	" 4.	" 4.
31	642	571	609	63 0	76.3	62.1	.478	.577	.460	83	.64	.83	S. W.	W. by N.	S. W. by W.	206.70	2.5	0.007	.....	" 8.	C. C. Str. 4.	" 8.

REMARKS FOR APRIL, 1860.

Barometer ... { Highest, the 18th day, 30·381 inches. / Lowest, the 5th day, 29.227 " / Monthly Mean, 29.669 " / " Range, 1.154 "

Thermometer ... { Highest, the 30th day, 76°·7. / Lowest, the 2nd day, 10°·0. / Monthly Mean, 40°·29. / Monthly Range, 66°·7.

Greatest intensity of the Sun's rays, 90°·9.
Lowest point of Terrestrial radiation, 7°·6.
Mean of Humidity, .753.
Rain fell on 5 days, amounting to 1.733 inches; it was raining 26 hours and 10 minutes, and was accompanied by thunder on one day.
Snow fell on 4 days, amounting to 2·45 inches; it was snowing 14 hours and 40 minutes.
Most prevalent wind, the W. N. W.
Least prevalent wind, the E.
Most windy day, the 15th day; mean miles per hour, 17.61.
Least windy day, the 7th day; mean miles per hour, 0.20.
Aurora Borealis visible on 4 nights.
Lunar Halo visible on 1 night.
Parhelia visible on 1 day.
Swallows (*Hirundi Bicolor*) first seen on 24th day.
Frogs (*Rana Pipiens*) first heard on 20th day.
The Electrical state of the Atmosphere has indicated high and constant tenison of a negative character.

REMARKS FOR MAY, 1860.

Barometer. ..... { Highest, the 9th day, 30.146 inches. / Lowest, the 19th day, 29.187 " / Monthly Mean, 29.864 " / Monthly Range, 0.959 "

Thermometer. { Highest, the 12th day, 87°·9. / Lowest, the 21st day, 26°·9. / Monthly Mean, 59°·85. / Monthly Range, 61°·0.

Greatest intensity of the Sun's rays, 99°·2.
Lowest point of terrestrial radiation, 15°·1.
Mean of humidity, .695.
Amount of Evaporation, 2·89 inches.
Rain fell on 7 days, amounting to 4.310 inches; it was raining 28 hours 52 minutes, and was accompanied by thunder on two days.
Snow fell on 1 day amounting to 0.007 inches, it was snowing 1 hour 15 minutes.
Most prevalent wind, the S. S. E.
Least prevalent wind, the E.
Most windy day, the 14th day; mean miles per hour, 12.99.
Least windy day, the 5th day; mean miles per hour inappreciable.
Aurora Borealis visible on 1 night.
Slight frost on the mornings of the 17th, 21st and 23rd days.