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NOTES ON LATIN INSCRIPTIONS FOUND IN BRITAIN.

PART IV.

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Read before the Canadian Institute, 26th March, 1859.

12. In the year 1752, some grave-stones* were dug up near Wroxeter, the ancient *Uriconium*,† on one of which were three panels, two bearing inscriptions and the third left vacant. According to the copy in Gough's *Camden*,‡ Vol. iii. pl. 1, fig. 5, these inscriptions stand thus:—

D M PLACIDA AN LV CVR AG CONIA XXX	D M DEVCCV S ANXV CVR ^A G RATRE	
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* They are now preserved in the library of Shrewsbury Grammar School.

† In the MS.S. of the Itinerary of Antoninus (*vide* ed. Parthey and Pinder, Berlin, 1848), the name is given also as *Uriconium*, *Uiriconium*, *Uroconium*, and *Viroconium*. The anonymous *Ravenas* has *Utriconion*; and in the treatise of Richard of Cirencester, *de Situ Britannia*, we find the forms *Viriconium* and *Virioconium*, besides *Uriconium* and *Uriconium*. It is difficult to decide which should be preferred. Mr. Wright adopts *Uriconium*, and Mr. Scarth *Uriconium*; whilst the weight of authority seems to me to preponderate in favour of *Viroconium*, the *Ὀυροκόνιον* of Ptolemy.

‡ I have omitted points, for I am uncertain whether the marks between certain letters, as they appear in the copy of *Gough's Camden*, which I use, are intended for points or for representations of defects in the stone, or are blemishes in the engraving or printing.

The following notice of this slab is given by Mr. Wright, in "the Celt, the Roman, and the Saxon," p. 321 :—

"A monument found at Wroxeter (*Uriconium*) mentions an office, the exact character of which seems to be doubtful, though the *curator agrorum* or *agrarius*, may have been the overseer, or bailiff, of the town lands. The monument consists of a tablet in three columns or compartments; that in the middle contains an inscription to the officer; the one on the left has an inscription to the wife; the other is blank, and it has either been left so for a son, or has become erased. The central inscription is:—

D·M	To the gods of the shades.
DEVCCV	Deuccus
S·V·AN·XV	lived fifteen (?) years,
CVR·AG	he was overseer of the lands
RA TRE	of Trebonius. (?)

"The number of years is perhaps not correctly read from the stone, which seems to be in bad condition. The other inscription is:—

D·M	To the gods of the shades.
PLACIDA	Placida
AN·LV	lived fifty-five years,
CVR·AG	of the overseer of the lands
CON·I·A	she was the wife
XXX	thirty years."

Independently of the objections, that there is no authority for the office of *curator agrorum*, and that no account is taken of A in the 5th line of the central inscription, I am unable to perceive any grounds for passing over the obvious interpretation of CVR·AG scil. cur[am] ag[ente]. The form is found in many sepulchral inscriptions; and on p. 315 of Mr. Wright's work we have an example :—

CVRA[M] AGENTE
AMANDA
CONIVGE.

RATRE is evidently either FRATRE, the F and R being ligulate, or PATRE, the P having been mistaken for R.

In an able and timely* summary of information relative to *Urioconium* by the Rev. H. M. Scarth, of Bath, which has recently been published in the *Journal of the Archaeological Institute*, this with

* Wroxeter, in consequence of the discoveries which have lately been made there, is at present regarded with much interest by antiquaries, and "a well organized movement has at length been made for the exploration of the site of *Urioconium*."

the other inscriptions found at Wroxeter is given, and PATRE is adopted as the true reading of the word in the fifth line, but the letter which follows A in the 4th line is read C instead of G. In the other inscription on this tablet, the I of the fifth line is read by Mr. Scarth as J, and the A in the same line is omitted, whilst the three marks XXX at the bottom are regarded as "more probably merely an ornament, like a leaf introduced at the end of the next inscription." Adopting his readings, with the exceptions of C for G and J for I, I would give the inscriptions *in extenso*, thus:—

D·M	D[iis] M[anibus];
PLACIDA	Placida,
AN·LV	an [norum] LV,
CVR·AG	cur[am] ag[ente]
CONI	conj[uge].
D·M	D[iis] M[anibus];
DEVCCV	Deuccu-
S·AN·XV	s, an[norum] XV,
CVR·AG	cur[am] ag[ente]
PATRE	patre.

If A and XXX be retained in the first inscription, I would expand the contractions in the 5th and 6th lines, thus:—

CONI A	conjugē annorum
XXX	triginta.

i.e., her husband for thirty years.

We have a similar construction in Maffei, *Museum Veronense*, 152, 6 :

C. CASSIVS. C·F
VESPA
MANLIA. T·F
REPENTINA
VXOR·AN·XXX.

It only remains to add, that I concur in Mr. Scarth's opinion, that the vacant panel was left by the father of Deuccus and the husband of Placida "for his own name and age at his decease."*

* Since the above was written, I observe that the author of a very interesting article on *Uriconium*, in *The Gentleman's Magazine* for May, 1859, has adopted Mr. Wright's views, but I am still of opinion that his interpretation cannot be received.

13. On another of these gravestones is the following inscription :

O MANNIVS	C[aius] Mannius,
CF POL SECV	C[aii] f[ilius], Pol[li]a]tribu, Secu-
NDVS POLLEN	ndus, Pollen[tia],
MIL LEG XX	mil[es] leg[ionis] XX,
ANORVLII	an[n]oru[m] LII,
STIP XXXI	stip [endiorum] XXXI,
BEN LEG PR	ben[eficiarius] leg[at]i pr[incipalis],
H S E	[hic] [situs] e[st].

Mr. Scarth remarks, that this inscription " may be thus rendered :—Caius Mannius Secundus,* son of Caius, of Pollentum, a soldier of the twentieth legion, aged 52 years ; having served 31 years in the legion and being the beneficiary of the principal legate. He rests here."

Of this rendering I would suggest the following emendations :—the insertion of the words " of the Pollian tribe " after " son of Caius," " Pollentia " for " Pollentum," and " principal† beneficiary of the legate " for " beneficiary of the principal legate." As to the first of these, it is plain that the words proposed to be inserted were inadvertently omitted. The substitution of *Pollentia* for *Pollentum* is recommended by the consideration, that there were three ancient towns so called,—one in Liguria, another in Picenum, and a third in the Balearic isles ; whilst there is no authority, so far as I am aware, for *Pollentum*. In the following inscription found at Zurzach in Switzerland, (Orelli, n. 455,) we have the name almost complete :—

... GIACVS
 ... POLIASVPER
 PO .. ENTIA MILES
 LEG · XI · C · P · F 7 SALNE
 MAXIMI ANNORV
 XXXV · STIP ...

* The writer in the *The Gentleman's Magazine*, already referred to, gives the name of this soldier as *Caius Marinus Secundus Pollentius*; and adds that he " was also a pensioner of the first legion (i.e., *beneficiarius legionis primæ*), but both these readings are manifestly erroneous.

† The word " principal," as ordinarily used in English, does not convey the meaning of *principalis* as applied to a Roman soldier. The Latin term means that the person so styled was one of the *principales*, a designation given to sub-officers or officials, in contradistinction to *manifcos* or *gregarii*, which denoted the common soldiers or privates. Vide *Veget. de re Militari*, ii. c. 7.

The third emendation is confirmed by reference to Orelli, n. 3461, where we have PRINCIPALIS BENEFICIARIUS TRIBVNI, and Henzen, n. 6791, where we find PBP for *principalis beneficiarius præfecti*; but in consequence of the collocation of the abbreviations in this inscription, it is doubtful whether we should not here read, *Beneficiarius legionis præfecti*.

14. A third stone bore the following inscription :

M PETRONIVS	M[arcus] Petronius,*
L F MEN	L[ucii] f[ilius], Men[enia] tribu,
VIC ANN	vix[it] ann[is].
XXXVIII	XXXVIII,
MIL LEG .	mil[es] leg[ionis]
XIIII GEM	XIV gem[inæ],
MILITAVIT	militavit
ANN XVIII	ann[is] XVIII,
SIGN FVIT	Sign[ifer] fuit,
H S E	h[ic] s[itus] e[st].

Mr. Scarth notices the ingenious conjecture of a friend:—

“That Petronius was a bearer of one of the *Signa* of the fourteenth legion in the famous victory over Boadicea, A.D. 61. This legion arrived in Britain in A.D. 43, when Petronius being only twenty years old was a *Miles gregarius*, and subsequently for his valour, perhaps under Ostorius Scapula, raised to the rank of *Signifer*. It could not have been much later, for in A.D. 68 the fourteenth legion was quartered in Dalmatia, (Tacitus.) He may have died in consequence of his wounds in the year 61.”

It is manifestly impossible to prove the truth of this conjecture, for the fourteenth legion, after their recall from the island under Nero, were sent back in the year 69, and Petronius may have come with them then and died before they were again recalled in the year 70. The conjecture, however, is countenanced by the coincidence, that his period of service, viz. : 18 years, is the same as the interval between the first arrival of the legion in A.D. 43, and the battle in A.D. 61. But how shall we account for his burial at Urioconium? We have no evidence that the fourteenth legion was ever stationed

* It is not unworthy of notice, that in an inscription found in Fritzscheim (Orelli, n. 501), we have the same name of another soldier of this legion, a native of Claudia Celcia, in, Noricum. He, however, was the son of Caius, and had a brother, whose prænomen was Caius.

there, and it is far distant from the scene of the battle, which probably took place not far from London. Can it have been that the fourteenth legion was with Suetonius when he crossed over to Mona (Anglesey), and that on his hurried march back from Wales, Petronius was killed, or died of fatigue, at or near Urioconium, by which route it is probable that Suetonius proceeded to London? But it is scarcely worth while to dwell on conjectures formed on such slight foundations; it is more important to observe that this inscription is the only extant British memorial of the "domitores Britannie."*

15. Of the many inscriptions found at Risingham, (the ancient name of which is supposed to have been *Habitancum*),† one of the most interesting is an ornamented slab, six feet in length having an inscription which it is more than usually difficult to decipher in consequence of the great number of ligulate letters, and the injuries which the stone has sustained. It is figured in Dr. Bruce's *Roman Wall*, p. 287, and in Dr. Surridge's *Notices of Roman In-*

* This stone has escaped the notice of Mr. Wellbeloved, for he states (*Eburacum*, p. 33), with reference to the fourteenth legion, that "it is not mentioned on any tile or in any inscription found in Britain."

† This supposition originated with Camden, who formed it on the authority of an altar which was found there, with HABITANCI on it. His conjecture derives support from Mr. Warc's reading of the words that follow HABITANCI, as PRIMA STA(TIONE), which accord with the position of Risingham, north of the wall on Watling Street. It must be borne in mind, however, that there is no notice in any ancient author of any place in Britain called *Habitancum*. But Horsley (*Britannia Romana*, p. 354) remarks:—"It may sometimes so happen, that the name of a place may be in an inscription which we meet with no where else. And of this there is in fact an instance or two in Britain; namely, *Bracchium* at *Brugh* in *Richmondshire*, and *Habitancum* at *Risingham* in *Northumberland*. To these perhaps may be added *Apiatorium*, in the inscription now in the library at *Durham*, which is probably *Newcastle*, if the altar was found there, and also *Alaterva* for *Cramond* in *Scotland*." The examples, cited by Horsley, prove the danger of depending on such authority for names otherwise unknown. *Bracchio*, which occurs in the inscription given by Horsley, p. 313, is plainly not the name of a place, but the designation of "a line of communication," as Mr. Gale correctly explained it. *Vide* Camden, ed. Gough, iii. p. 331. and add to the references given there, *Livy*, iv. 9; xxii. 52; and xxxviii. 5. *Apiatorio*, in n. lxxvii. *Northumberland*, is also not the name of a place, but of a person, for it should be read A- PLATORIO; and the individual named in it is *Aulus Platorius Nepos*, who was Legate under Hadrian. ALATERVIS, in n. xxix, *Scotland*, is an epithet of the *Deæ Matres*, and seems to me derived from abroad, probably from the neighbourhood of the Meuse or the Rhine, for the altar was erected by a Tungrian cohort. Possibly there was some connection between them and the goddess *Alateivia*, worshipped amongst the *Gugerni*. *Vide* Henzen, n. 5865. It is scarcely necessary to add, that there is no ground for the conjecture of Sir J. Clark (*Stuart's Caledonia Romana*, p. 171), "that Ptolemy probably made a mistake, when translating *Alatervum* or *Alaterva castra* into Greek, and that the latter is the true reading of his *περωτων στρατόπεδον*."

scriptions in *Northumberland*, plate iii.; but the first of these is indistinct from the smallness of the scale: and the second is disfigured by the introduction of absurd conjectures.* The following is the reading given in the *Monumenta Historica Britannica*, p. cxvi. 102 a; and adopted by Henzen, n. 6701:—

* * * ICOMAXI
 COSIII ET M AVREL ANTONINO PIO
 COS II AVG * * *
 PORTAM· CVM· MVRIS VETVSTATE DI
 LAPSIS IVSSV ALFEN SENECINIS VO
 COS CVRANTE COL ANITI ADVENTO PRO
 AVGG NN C*I VANGON OPFS
 CVM AEMI SALVIAN TRIB
 SVO A SOLO RESTI.

At first sight it is plain, that the emperors, named in this inscription, are Severus and Caracalla, and that the defect in the third line, after COS II AVG, was caused by the intentional obliteration of the name of Geta,—an erasure common in similar memorials of the period. Accordingly, Henzen restores the commencement with the formula: *Imp. Caess. L. Sept. Severo pio pertinaci Aug. Arabico Adiabenico ParthICO MAXI* mo p. m. tr. pot. . . . and supplies the defect in the third line with *et P. Sept. Getæ nob. Caes.* As there is no room in the first line for any addition after MAXI, Henzen's suggestion "*mo p. m. tr. pot. . .*" must be rejected; but his reading in the fifth line, VC for VO, should, in my judgment, be adopted. Vide *Canadian Journal* for May, 1859, p. 178, where I have suggested a similar emendation in an inscription also mentioning Alfenus Senecio. For COL in the sixth line, he proposes CL, *i.e.* Claudio; and O P F S he regards as the initials of the *cognomina* of the cohort, scil. O (for 8 or 8) *miliaria*; P, *Pia*; F, *Fidelis*; and S, *Severiana*; but he admits that there is no authority in inscriptions for any *cognomen* of this corps.

In the *Monumenta Historica Britannica*, the commencement is restored by the words: *Imp. Caess. L. Sever. Pio Pert. P. M. Arab.*

* From Mr. Smith's *Collectanea Antiqua*, Vol. iii. P. 4, I learn that "an engraving of this slab illustrates a paper by Mr. Thomas Hodgson, in the *Archæologia Eliana*, Vol. iv." I regret that I have not seen it, as I have been unable to procure the work.

Parth. AdiabenICO,* and the defect in the third line is supplied by *Et. P. Sept. Getae nob. Cæs. Cos.*† In the *Index Rerum et Nominum*, p. cxlvi., *virī consularis* seems to be suggested as the explanation of VOCOS, and *C. Antistio Advento* as another reading of COLANITI ADVENTO.

From what has been stated, it is evident that the parts of the inscription as yet not satisfactorily explained, are the names COLANITI, and the letters O P F S. It appears to me that the difficulties as to the first of these have arisen from mistaking O for C, and *vice-versa*, i.e. reading COL for OCL; and from inverting the order of the first three letters in the ligulate group \overline{N} , i.e. reading NIT for TIN; for I have no doubt that the individual here named is the same *Adventus* who, some years afterwards, in A.D. 218, was Consul with the Emperor Macrinus. His *nomen gentilicium* is variously given as *Coclatinus*, *Oclatinus*, and *Oclatinus*. He is named in the following inscriptions:

VICTORIAE · REDVCIS · DD · NN
 * * * * *
 PII · FELICIS · AVG · ET · * * *
 LIAE * * * * *
 IVGI · D · N · MILITES · LEG · II
 PARTH · * * * * *
 AET · Q · M · COCLATINO AD
 VENTO · COS · &c. &c.

(Fabretti, p. 339, and Relandi *Fast. Consul.* p. 137.)

* The learned editor of the *Monumenta Historica Britannica* doubtless had authority for the collocation which he suggests of the titles of Severus; but I am not aware of any example of them in that order. They are usually placed as Henzen gives them in his restoration.

† The addition of COS seems to be justified by the fact, that in the year A.D. 205, Caracalla was Consul for the second time, and Geta for the first. In Dr. Druce's copy of the inscription, we have, in the third line, COS I instead of COS II; but this, I presume, is a mistake. If not, we should omit COS from Geta's titles, as the inscription would then be of A.D. 202. The addition of I after COS, instead of COS alone which is the recognized form for a first consulship, suggests the conjecture, that this style may have been derived by Caracalla from his father, whose coins of his first consulship present the strange peculiarity of I after COS. Perhaps there was some reference to this in the phrase *ter et semel ccs* by which the year 203 was marked. But I must add, that I have never seen an example, in the case of Caracalla, of I after COS on either coins or stones.

DEDIC · PR · ID · MART
 IMP * * AUG · COS
 ET
 OCLATINIO ADVENTO

(Masson *Hist. Crit.* 6, p. 215, and Orelli, n. 945.)

DIANA
 CARICIANA
 M AVRELIVS CARICVS
 AQVARIUS HVIVS LOC
 CVM LIBERTIS ET ALUM
 NIS
 M · D * * * D · AUG · ET
 DEDIC · IDIB · AVG ·
 OCLATINO · ADVENTO · COS ·

(Muratori, *Nov. Thesaur.* p. 354, n. 1; *Vide* also Henzen, ii. 6058, and Marini, *Atti di Frat. Arvali*, pp. 648-9.)

Muratori, in a note on the last inscription, enquires whether the name should be read COCLATINVS or OCLATINVS, and decides in favour of the latter; but from the second inscription, compared with that on the Bisingham tablet, I am inclined to prefer OCLATINIVS. For other notices of this individual, compare Herodian, *Hist.* iv. 12 and 14; and Dio Cassius, *Hist.* 78, 14,* who was probably personally acquainted with him, as they were at the same time members of the Senate. Oclatinus Adventus was one of the most remarkable men of his time. He entered the army as a common soldier, serving amongst the *Speculatores* and *Exploratores*, who were held in very low estimation, especially as they had occasionally to discharge the

* Ed. Reimar, *Hamburg*, 1752, p. 1322.

duty of executioners. Then he became successively a *tabularius* and *cubicularius*, from which he was raised to the office of *procurator*. Subsequently to his serving in England, he accompanied Caracalla in his Parthian expedition as colleague of Macrinus the *præfectus prætorio*, and was, I suspect, privy to the murder of the Emperor. After that, he was despatched by Macrinus to Rome, *ad funus Caracalli ducendum* as Reimar states in his note, but in reality to get rid of his pretensions as a rival aspirant to the imperial throne, for Adventus did not scruple to tell the soldiers, after the death of Caracalla, that the sovereignty properly devolved on him as the senior of Macrinus, but that in consideration of his advanced age he would give place to his junior. After his return to Rome he was in great favor with Macrinus, who elevated him to the rank of Senator, and to the office of *Præfectus Urbis*, a remarkable elevation, not only with a view to his antecedents, but also because at the time he was not of consular rank. Then he became consul with Macrinus, and after the death of that Emperor, in June 218, finished his year as colleague of Elagabalus.

Dio Cassus speaks of him very contemptuously, and derides his want of qualifications for the high positions to which he had attained, but his career proves that he must have been a man of very uncommon ability.

This inscription confirms the accuracy of the historian as to his having held the office of *procurator* and disproves the conjecture of Reimar, that he had been *procurator rei privatae*. I have already mentioned Henzen's conjecture as to O P F S; it is very ingenious, but must, I think, be rejected on the ground, that there is no authority for the application of any one of the designations, *miliaria*, *pia*, *fidelis*, or *Severiana* to the first cohort of the Vangiones. I interpret the letters O P F S as the abbreviation of *operibus perfectis*, or *factis*,*—*i.e.*, having executed or completed the works. We have a similar form of expression in Gruter, cxc. n. 4: OPERIBUS AMPLIATIS RESTITVIT; and also in Morcelli, vol. ii. pp. 129 and 134. I am inclined to venture on the following restoration :

* It is scarcely necessary to add, that there are examples of O and O P for *opus*, and of P F and F for *perfectit* and *fecit* respectively.

IMPP · CAESS - -	- Imp[eratoribus] Cæs[aribus]
L · SEPT · SEVERO PIO - -	- L[ucio] Sept[imio] Severo Pio
PERTINACI AVG · ARABICO	- Pertinaci Aug[usto] Arabico
ADIABENICO PARTHICO MAXI	- Adiabenoico Parthico Maxi[mo]
COS III ET M · AVREL · ANTONINO PIO	- Consuli tertium et M[arco] Aurel[io] Antonino Pio
COS II AUG · ET P · SEPT · GETAE N · CAES · COS ·	Consuli secundum Aug[usto] et P[ublio] Sept[imio] Getæ Nobilissimo Cæs[ari] consuli*
PORTAM CVM MURIS VETVSTATE DI	- portam cum muris vetustate di
LAPSI IVSSV ALFEN SENECINIS V · C ·	- lapsis jussu Alfen[i] Seneci[o]nis C[larissimi]
COS CURANTE OCLATINI ADVENTO PRO	Consularis curante Oclatini[o] Advento pro[curatore]
AUGG NN COH I VANGON OPFS	- Aug[ustorum] n[ostorum] coh[ors] pri[ma] Vang[i]on[um] o[peribus] p[er]f[ectis]
CVM AEMI SALVIAN TRIB -	- cum Æmi[lio] Salvian[o] trib[uno]†
SVO A SOLO RESTI -	- suo a solo resti[tuit].

EARLY NOTICES OF THE BEAVER, IN EUROPE AND AMERICA.

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By common consent the beaver appears to have been recognised at a comparatively early date, as one of the most characteristic Canadian emblems, and it now shares with the maple-leaf such heraldic significance as pertains to our provincial cognizance. It is scarcely necessary, however, to observe that neither an exclusively Canadian nor American nativity can be assumed for this animal. It is referred to in the laws of the ancient Britons under the name of *Llosllydan y*

* Henzen (*Index*, p. 72.) gives A.D. 202, seqq., as the date of this inscription; but this is impossible, according to his reading, for Caracalla was not COS II until 205. This latter year I regard as the date, although COS III of Severus and COS II of Caracalla extended over 205-207. But if the year had been 206 or 207, we should have had, I think, the tribunitial number (TRIB. POT.) of either Severus (scil. xiiii. or xv.), or Caracalla (scil. viiii. or x.), or of both. I am not satisfied, however, as to the accuracy of the copies, which I have seen, and would suggest a careful re-examination of the stone.

† *Lucius Æmilius Salvianus* was already known as tribune of the 1st Cohort of the Vangiones from an altar, found at Risingham, the inscription on which is given by Horsley. n. lxxxii, Northumberland.

befyr.* It had its name *beofer*, or *befer*, among our Anglo-Saxon ancestors also, centuries before the European discovery of this continent; and a designation more or less closely resembling this, is found in the classic Latin, the Slavonic, the Lithuanic, the Scandinavian, and Germanic, and in the Romance Languages. The solitary exception to this uniformity of name appears to be the Greek *χάστωρ*; but the reference to it, and to the special object of the hunter's chase, in the Fable of the Beaver, ascribed to Æsop, points to the recognition of some of its most highly esteemed virtues at a period of remote antiquity.

Sir Thomas Browne in his "Enquiries into Vulgar Errors," discusses the Greek etymology, along with the popular idea involved in the Apologue of Æsop, and he remarks of it as "a tenet very ancient. For the same we find in the hieroglyphics of the Egyptians. The same is touched by Aristotle in his Ethics; but seriously delivered by Ælian, Pliny, and Solinus; the same we meet with in Juvenal:

————— imitatus castora, qui se
Eupuchum ipse facit, cupiens evadere damno
Testiculorum, adeo medicatum intelligit inguen.

It hath been propagated by emblems; and some have been so bad grammarians as to be deceived by the name, deriving *castor* à *castrando*; whereas the proper Latin word is *fiber*, and *castor* but borrowed from the Greek, so called *quasi γάστωρ*, that is *animal ventricosum*, from his swaggy and prominent belly."

The discovery of America with its prolific beaver-dams only multiplied the means for meeting demands already partially supplied by the resources of the old world; nor is the use of the beaver as a heraldic bearing, a novelty of American or Canadian origin.

Beverley, or Before-leag, *i. e.* beaver place, is the ancient Anglo-Saxon designation of the capital of the East Riding of York; situated in a country abounding with mere and forest in olden time, before the beaver colonists of Befor-leag were transferred from their dams to the borough arms. The oldest armorial bearings of Beverley emblazon Saint John of Beverley, seated on the fridstol, and trampling on the ancient emblem of the town: the beaver. The present seal of the corporation is: *Argent*, three waves, *sable*; On a chief, *sable*, a beaver statant regardant, *argent*.

The ancient history, and present distribution of the beaver

* Ancient Laws of Wales, published by the Record Commissioners. B. XIV. iii. 16; iv. 5.

throughout Europe and in Asia Minor, have recently been illustrated with great research and ability, in a paper communicated by Dr. Charles Wilson to the *Edinburgh Philosophical Journal*; in which also he treats of its ancient and modern relations to pharmacology and medicine, in the use of the *Castoreum*.*

In referring to the origin of the names, both of localities and individuals, naturally traceable to the presence of the beaver he remarks: "Biberach or Biberbach, in Suabia, Merian writes, had its designation from the beavers which had their colonies in a brook or stream in its vicinity. This town was an old *Reichs-stadt*, and, like our Beverley, had long carried the beaver in its armorial insignia. The animal we are told, was first borne *azure*, with a crown *gules*, on a field *argent*; but, in 1487, in consideration of an important service rendered to the Archduke Maximilian, afterwards the Emperor Maximilian I., the citizens acquired the right to have the field *azure*, and the beaver and crown or: a guerdon which we must suppose them to have considered adequate, as they obtained it on petition. There is besides a Bieberach on the *Kinzig*, a tributary of the Rhine; and on the Rhine itself we have Biebrich, probably the analogue of our *Beveridge*, whence our patronymic *Beveridge*."

The ingenious architecture and the social and provident habits of the beaver supply very satisfactory reasons for its selection from among the North American fauna, as the fittest for taking its place among the ordinaries or charges of our provincial escutcheon; but this was probably less thought of than its great importance in the early trade of Canada, and the British American Colonies.

Nevertheless, though the beaver wool of the fashionable hats, to which it gave name, is scarcely less exclusively associated with the early exports of the New World than its tobacco, we have good proof of the use of the beaver's fur for such a purpose, and of a regular European traffic in beaver skins, long prior to the discovery of America, in the fifteenth century. The beaver skin appears indeed to have been from ancient times a royal fur, and her Majesty is still entitled, by royal prerogative, to the skin of the martin, the beaver, and the ermine, though the latter alone has maintained its royal associations. On the continent, the use of the beaver's skin appears to be traceable in the middle of the 14th century; and in "the Tes-

* *Edinburgh New Philosophical Journal*, Vol. VIII.

tatement of *Crescide* " printed in all the earlier editions of Chaucer's works, but assigned by Urry and later editors to the Scottish poet, Robert Henryson, (cir. 1450,) we find the costume of one of his characters thus described :

Whan in a mantell and a *bever hat*,
 With cuppe and clapper wonder priuely
 He opened a secrete gate and out thereat
 Conveyed her, that no man should espie.

It was not however, till the vast resources of the forests of the new world had become known, that beaver wool became the indispensable material for the fashionable European hat. Nearly a century and a half after the discovery of America we at length find Charles I. in 1638, by royal proclamation prohibiting the use of any materials except beaver wool in the manufacture of hats, unless made for exportation. This royal prohibition amounted to a declaration of war by the king of England against the beaver settlements of his North American Colonies and the Hudson Bay Company's territories ; and within less than a century thereafter, they appear to have been almost totally exterminated from the colonies to the south of the St. Lawrence and the great lakes. The French traders in 1743, imported into Rochelle, 127,080 beaver skins, and the British Hudson's Bay Company sold 26,750 skins the same year. Within less than half a century thereafter, when Canada had become a British possession, the trade in beaver peltries seems to have reached its maximum, and to have been maintained with only a slight decline till the commencement of the present century. In 1788, upwards of 170,000 beaver skins were exported from Canada, and the value of those forwarded to England from Quebec alone, in 1808, is estimated at nearly £119,000 stg. The effect of such a wholesale destruction of the poor beaver could not fail to become apparent, notwithstanding the vast regions of the North-West over which the Hudson's Bay trapper and the Indian hunter ranged in pursuit of their defenceless prey. The great fur companies at length became impressed with the danger this profitable branch of their trade was exposed to, and even the improvident Indian learned to systematize his mode of beaver trapping so as to avert its total extermination. The Iroquois and Hurons,—among whom the beaver was known as the *Tsoutayè*,—were especially skilled in its pursuit, and their habit was always to leave at least one pair in the beaver-dam, and to let this remain un-

molested for four or five years, while they pursued the chase in other localities.

In addition to this, however, the imperfect weapons of the Indian hunter, formed no slight protection to the Beaver; and so long as it was pursued alone by the native, unaided by the traps and guns of the European, its numbers suffered no very material diminution. Its settlements formed accordingly a singularly characteristic feature of the New World, which could not fail to impress the observant traveller. I find it, indeed, assigned as the rival of the Indian in the occupation of the soil, in the manuscript journals of the late Mr. David Thompson,* who upwards of sixty years ago explored the Great North West, and was the first discoverer of the passes in the Rocky Mountains, the importance of which is only now being recognised. Writing in 1794, he thus observes in reference to the beaver, and its native hunter:—

“Previous to the discovery of Canada, about 320 years ago, this Continent from the latitude of forty degrees north to the Arctic Circle, and from the Atlantic to the Pacific Ocean, may be said to have been in the possession of two distinct races of beings,—man and the beaver. Man was naked and had to procure clothing from the skin of animals; his only arms were: a stake, pointed and hardened in the fire; a bow with arrows, the points hardened with fire, or headed with stone or bone of the legs of the deer; a spear, headed in the same manner, and a club of heavy wood, or made of a round stone of four or five pounds weight, inclosed in raw hide, and by the same wound round a handle of wood of about two feet in length, bound firm to the stone. Such were the weapons man had for self-defence, and with which to procure his food and clothing. Against the bones of an animal his arrows and spear had little effect, but the flank of every animal is open, and thither into the bowels the Indian directed his fatal and unerring arrows.

“Besides his weapons, the snare was much in use, and the spear to assist it for large animals; and by all accounts the deer and fur-bearing animals were very numerous, and thus man was lord of the dry land and all that was on it. The other race was the beaver, they were safe from every animal but man and wolvereens. Every year each pair having from five to seven young, which they carefully reared, they became innumerable; and, except the great lakes, the waves of which are too turbulent, occupied all the waters of the northern part of the Continent. Every river where the current was moderate and sufficiently deep, the banks at the water edge was occupied by their houses. To every small lake

* By the courteous permission of the son of the author, I have been favoured with access to Mr. Thompson's valuable journals, through the intervention of the Deputy Commissioner of Crown Lands, Andrew Russell, Esq. The journals embrace the results of observations extending over a period of 35 years: and are comprised in 67 volumes, full of information alike curious and valuable.

and all the ponds they builded dams, and enlarged and deepened them to the height of the dams. Even to grounds occasionally overflowed by heavy rains they also made dams, and made them permanent ponds, and as they heightened the dams increased the extent and added to the depth of water; thus all the low lands were in possession of the beaver and all the hollows of the higher grounds; small streams were dammed across, and ponds formed on the dry land, with the dominion of man contracted. Every where he was hemmed in by water without the power of preventing it; he could not diminish their numbers half so fast as they multiplied, their houses were proof against his pointed stake, and his arrows could seldom pierce their skins.* In this state man and the beaver had been for many centuries, but the discovery of Canada by the French, and their settlement up the St. Lawrence, soon placed the natives far superior to the beavers. Without iron man is weak, very weak, but armed with iron he becomes the lord of the earth; no other metal can take its place. For the furs which the natives traded they procured from the French, axes, chisels, knives, spears, and other articles of iron, with which they made good hunts of the fur-bearing animals, and procured woollen clothing. Thus armed the houses of the beavers were pierced through, the dams cut, and the water of the ponds lowered or wholly run off, and the houses of the beaver and their burrows laid dry, by which they became an easy prey to the hunter.

"The average weight of a full grown male beaver is about fifty-five pounds, his meat is agreeable to most, although the fat is oily; the tail is a delicacy. They are always in pairs, and work together. Their first business is to ensure a sufficient depth and extent of water for the winter, and if nature has not done this for them they make dams to obtain it. If there are more families than one in a piece of water they all work together, each appearing to labor on a particular part. The dam is made of earth, and pieces of wood laid oblique to its direction. The wood employed is always of aspen, poplar, or large willows and alders; if pine is used it is through necessity not by choice; the bottom is well laid, and if small stones are at hand they make use of them for the bottom of the dam; the earth is brought between their fore paws and throat, laid down, and by several strokes of the tail made compact; the pieces of wood are with their teeth, which are very sharp and formed like small chisels, cut into the lengths they want, brought to the dam and worked in, and thus the dam is raised to the height required. It is a remark of many that dams erected by the art of man are frequently damaged or wholly carried away by violent freshets, but no power of water has ever carried away a beaver dam. Having secured a sufficient depth of water each family builds a separate house; this is in the form of a low dome; from the doorway, which is a little way in the water, gradually rising to about thirty inches in height and about six feet in diameter; the materials are the same as those of the dam and worked in the same manner, only the pieces of wood are much shorter, and if at hand small flat stones are worked in. The coating of the first year may be about four to five inches thick, and every year an additional coat is added, until it is a foot or more in thickness, grass then grows upon it and

* In my travels thousands of the natives were not half so well armed.—D. T.

it looks like a little knowl. The next work is to make burrows of retreat the first year seldom more than one or two can be made, and sometimes none. These are carried on from a few inches below the surface of the water, direct from it, gradually rising, of about a foot in height by twenty inches in breadth, so that a beaver can turn in them; their length depends on the easiness of digging the ground, the general length is about ten feet, but in good earth they often are of twenty feet or more. The second and third year the number of burrows are augmented to five or six, and where the beaver have been a long time the ponds and small lakes have numerous burrows.

“The Indians think the male and female are faithful to each other. They bring up their young for the first year with care and protection, until the next spring, when the female is about to litter she drives them all away, and some of them before they can be made to stay away receive severe cuts on the back from the teeth of the old ones. The young beavers are very playful and whimper like children. The beaver is supposed to attain to the age of fifteen years, some think twenty years. The beaver hunter is often at a loss what to do, and sometimes passes a whole day without coming to a determination. His shortest and surest way is to stake up the doorway of the house, the stakes he carries with him ready for the purpose; but the beavers are so watchful that his approach is heard, and they retire to their burrows. Some prefer first finding the burrows and closing them up with stakes, and cutting off retreat from the house. Whichever method he takes difficulties and hard labour attend him. To determine the place of the beavers, as the whole family of seven or nine are seldom all found in the house, the Indian is greatly assisted by a peculiar species of small dog, of a light make, about three feet in height, muzzle sharp and brown, full black eyes, with a round brown spot above each eye, the body black, the belly of a fawn color; its scent very keen and almost unerring. This dog points out by smelling and scratching the weakest part of the beaver house, the part where they lie, and the same in the burrows, which are then doubly staked. The Indian with his axe and ice chisel makes a hole over the place shown by the dog. The beaver having changed its place, to find to which end of the burrow it is gone a crooked stick is employed until it touches the beaver, another hole is made and the beaver is killed with the ice chisel, which has a heavy handle of about seven feet in length. When the dog smells and scratches at two or three places on the beaver house it is a mark that there are several in it; the doorway being doubly staked, the Indian proceeds to make a hole near the centre of it to give full range to his ice chisel, and not one escapes; but all with hard labor. Such was the manner of killing the beaver until the introduction of steel traps, which, baited with *Custoreum*, soon brought on the almost total destruction of these numerous and sagacious animals.”

Such were the reflections of an acute and sagacious observer upwards of sixty years since, when the speedy extermination of the beaver seemed inevitable. Before, however, the substitution of silk for the beaver wool had procured for the ingenious rodent, some respite from annihilation, other materials were brought into use for the same pur-

pose. One of these was the fur of the Coypou, (*myopotamus Bonariensis* of Commerson,) an aquatic rodent, somewhat smaller than the beaver, which abounds in Chili, Buenos Ayres, and other parts of South America. Like the beaver and the seal, it has two kinds of fur: a long and coarse ruddy hair, with soft and downy fur underneath. Its commercial value is dependent on the latter, which supplies the place of the beaver down, and the demand became so great, that within recent years the exportations for Great Britain alone, in a single season, principally from the Rio de la Plata, have been stated as high as 800,000 skins, besides those sent to France and other countries. Even those, however, in addition to the immense importations of the true beaver fur, proved inadequate to the demands of commerce; and by their great cost contributed to the introduction of silk as a substitute, which has now to a considerable extent superseded the beaver down. The ultimate consequence has been the greatly diminished zeal in the chase of the beaver, owing to the constant decrease in the value of the skin. Nevertheless, the beaver skins imported into Britain from Canada and the United States, so recently as 1829, were valued at upwards of £70,000 stg. Compared with the value of importations forty years previously, this shows a decrease of considerably more than one half; but the existence of sources for such a supply, after the relentless warfare waged against the beaver settlements, without intermission, for upwards of two centuries, proves how prolific the beaver is, and how numerous and widely diffused the species must originally have been. Traces of ancient beaver villages are said to have been noted as far south as Louisiana, and from that southern latitude their disappearance has gradually preceded that of the red Indian, in his escape from the exterminating pressure of the white man, into the wilds of the north-west.

The geographical range of the beaver commences about latitude 70° extending across the continent wherever the soil is sufficiently fertile to furnish a wooded retreat, and the requisite vegetable food. Dr. Richardson describes them on the banks of the Mackenzie, the largest and best wooded of all the rivers falling into the Polar Sea,—and as still pretty numerous to the northward of Fort Franklin, in the swampy grounds near the Great Bear Lake. There it is probable that some remnant of the beaver tribe, which once built its huts on the banks of the Ohio and the Mississippi, may escape extermination; but throughout the whole of Canada proper, and far beyond its

boundaries the sole memorial of the beaver will probably be preserved, ere long, only in some rare "Beaverton," "Beaver Creek," or other topographical indication of a former settlement of the aquatic builders, like the ancient Beverley of Yorkshire, or the sepulchral mound still marked with the totem of its Indian hunter on his grave post.*

The country lying between Lake Ontario and the Georgian Bay, and extending eastward to the Ottawa, appears to have been the head quarters of the beaver in Canada proper, at the time when the sole value of Upper Canada to its European claimants was as a fur-trading area. The old French writers repeatedly speak of it as the Great Beaver Country. The Iroquois from the southern shores of the lake frequently crossed for the purpose of beaver-hunting in the fall of the year; and one of the reasons assigned for the establishment of a French post at Catarakis was to intercept the trade in beaver skins on its road to the British settlements. The whole country is full of old beaver settlements, almost every stream having a succession of them upon it, which, now that the dams have been broken down, are converted into beaver meadows, from which the lumberers and early settlers drew a large supply of hay. The older settlers speak of the beaver having been almost unknown throughout this district, but since the price of beaver skins has fallen from six or eight dollars, to less than one dollar per pound, while the value of labour has been constantly on the increase, the beaver has only been assailed at irregular intervals by the stray sportsman or Indian hunter, and it has been latterly increasing in some districts much more rapidly than the settlers, by whom it must nevertheless ultimately be displaced.

Were it not, indeed, for the peculiar habits of the beaver, which

* The same topographical evidence serves in Britain to indicate the ancient locations of the beaver. Beverley, in Yorkshire, has been referred to. The "Codex Diplomaticus Ævi Saxonici" supplies such names as *Beferburne*, *Beferige*, *Beferic*, and Dr. Charles Wilson further illustrates the subject as follows: "In the Glossary of Ælfrie the Anglo-Saxon Archbishop of Canterbury near the close of the tenth century, appended to his 'Grammatica Latino-Saxonica,' we have the *Befer* rendered as the *Fiber* or *Castor Ponticus*. The annex in each name: *burne* (brook), *ige* and *ic*, or *icg* (island), and *luc* (inclosed space, fence), is entirely apposite, and suggests to us so perfectly the ordinary habitat of the animal, or the construction of its dam, as to establish at once the certainty of its having existed at the individual place in the Anglo-Saxon period. Again, in an ordinance of Edward I. for the government of Scotland, dated in 1303, we find William of *Bevercotes* named as chancellor of the kingdom; and here we are reminded of the huts (Anglo-Saxon *cole*), of the beaver, a cluster of which had evidently led to the territorial designation of this dignitary. There is a "Bevero Island," which lies about three miles north of the city of Worcester, which is popularly understood to have been so denominated from its having been frequented by beavers: and doubtless it might be easy to glean elsewhere many similar local designations."

render its continuance incompatible with the aggressive encroachments of the colonist and settler; the respite which it has thus found, added to its rapid reproduction when left unmolested, might ere long restore it to many of its forsaken haunts. Even now beaver dams are to be met with, comparatively near large settlements, as on the Otonabee, within a few miles of Peterborough, and in the Nottawasaga district; and the beaver may even be described as of frequent occurrence to the north of the Ottawa, and in the head waters of the streams which flow southward into the St. Lawrence. By the Indian, however, it is greatly prized as an article of food, while its tail is sought after both by the Indian and the white trapper as a peculiar delicacy; nor can its skin ever become altogether valueless to the fur trader. Under all these combined influences it would be vain to hope that the beaver can long survive the encroachments of the clearings on the chosen scenes of its ingenious labours. The extent, however, to which such labours were carried, in localities where the gregarious instincts of the builders had full play, may be inferred from the following note recorded by Mr. David Thompson in 1794, introductory to his report of a curious dialogue with an old Indian, relative to the native ideas and traditions concerning this favourite prize of the north-west trapper. From this it will be seen that even sixty years ago Mr. Thompson speaks of the total destruction of the beaver as inevitable.

“On a fine afternoon in October 1794, the leaves beginning to fall with every breeze, my guide informed me that we should have to pass over a long beaver dam. I naturally expected we should have to lead our horses carefully over it. When we came to it, we found it a stripe of apparently old solid ground, covered with short grass, and wide enough for two horses to walk abreast. The lower side showed a descent of seven feet, and steep, with a rill of water from beneath it; the side of the dam next to the water was a gentle slope. To the southward was a sheet of water of about one mile and a half square, surrounded by low grassy banks. The forests were mostly of aspen and poplar, with numerous stumps of the trees cut down and partly carried away by the beavers. In two places of this pond were a cluster of beaver houses, like miniature villages.

“When we had proceeded more than half-way over the dam, which was a full mile in length, we came to an aged Indian, his arms folded across his breast, with a pensive countenance looking at the beavers swimming in the water, and carrying their winter's provisions to their houses. His form was tall and erect, and his hair almost white, the only effect that age seemed to have on him, though we concluded he must be about eighty years of age, and in this opinion we were afterwards confirmed by the ease and readiness with which he spoke of things long past. I enquired of him how many beavers' houses there were in the pond before

us, he said there are now fifty-two; we have taken several of their houses; they are difficult to take, and those we have taken were by means of the rise of the water on their houses from a strong wind which enabled us to stake them in, otherwise they would have retired to their burrows which are very many. He invited us to pass the night at his tent which was close by; the sun was low and we accepted the offer. In the tent was an old man almost his equal in age, with women and children; we preferred the open air and made a good fire to which the old men came, and after smoking a while conversation began. I had always conversed with the natives as one Indian with another, and been attentive to learn their traditions on the animals, on mankind, and on other matters in ancient times, and the present occasion appeared favorable for this purpose. Setting aside answers and questions which would be tiresome; they said:—by early tradition, of which they did not know the origin, the beaver had been an ancient people and then lived on the dry land; they were always beavers, not men, they were wise and powerful, and neither man nor any animal made war on them.

They were well clothed as at present, and as they did not eat meat, they made no use of fire and did not want it. How long they lived this way we cannot tell but we must suppose they did not live well, for the Great Spirit became angry, and ordered Weesaukejauk to drive them all into the water, and there let them live, still to be wise, but without power, to be food and clothing for man, and the prey of other animals, against all which his defence shall be his dams, his house and his burrows; you see how strong he makes his dams; those that we make for fishing rivers are often destroyed by the water, but his always stand. His house is not made of sand or loose stones, but of strong earth, with wood, and sometimes small stones, and he makes burrows to escape from his enemies, and he has always his winter stock of provisions secured in good time. When he cuts down a tree, you see how he watches it, and takes care that it shall not fall on him. "But if so wise, for what purpose does the beaver cut down large trees of which he makes no use whatever?" "We do not know; perhaps an itching of his teeth and gums." Here the old Indian paused, became silent, and then in a low tone talked with the other, after which he continued his discourse. "I have told you that we believe in years long passed away, the Great Spirit was angry with the beaver, and ordered Weesaukejauk (the Hatter,) to drive them all from the dry land into the water: and they became and continue very numerous; but the Great Spirit has been and now is, very angry with them, and they are now all to be destroyed. About ten winters ago, Weesaukejauk showed to our brethren, the Nepissings and Algonquins, the secret of their destruction; that all of them were infatuated with the love of the Castoreum of their own species, and more fond of it than we are of fire water. We are now killing the beaver without any labor; we are now rich, but shall soon be poor, for when the beaver are destroyed we have nothing to depend on to purchase what we want for our families; strangers now overrun our country with their iron traps, and we and they will soon be poor."

Some three years ago (1797), the Indians of Canada and New Brunswick, on seeing the steel trap so successful in catching foxes and other animals, thought of applying it to the beaver, instead of the awkward wooden traps they made, which often failed; at first they were set in the landing paths of the beaver, with about

four inches of water on them, and a piece of green aspen for a bait, that would allure the beaver to the place of the trap. Various things and mixtures of ingredients were tried without success; but chance made some try if the male could not be caught by adding the castoreum beat up with the green buds of the aspen. A piece of willow of about eight inches in length, beat and bruised fine, was dipped in this mixture; it was placed at the water edge about a foot from the steel trap, so that the beaver should pass direct over it and be caught; this bait proved successful, but to the surprise of the Indians the females were caught as well as the males. The secret of this bait was soon spread; every Indian procured from the trader four to six steel traps, the weight of one was about six to eight pounds; all labour was now at an end, the hunter moved about at pleasure, with his traps and infallible bait of castoreum. Of the infatuation of this animal for castoreum, I saw several instances. A trap was negligently fastened by its small chain to the stake, to prevent the beaver taking away the trap when caught; it slipped, and the beaver swam away with the trap, and it was looked upon as lost. Two nights after, he was taken in a trap, with the other trap fast to his thigh. Another time, a beaver passing over a trap to get the castoreum, had his hind leg broken, with his teeth he cut the broken leg off, and went away. We concluded he would not come again, but two nights afterwards, he was found fast in a trap; in every case tempted by the castoreum. The stick was always licked or sucked clean, and it seemed to act as a soporific, as they remained more than a day without coming out of their houses. The Nepissings, the Algonquins and Iroquois Indians, having exhausted their own districts, now spread themselves over these countries and as they destroyed, the beaver moved forward to the northward and westward. The natives, the Napataways did not in the least molest them; the Chippeways and other tribes made use of traps of steel, and of the castoreum. For several years all those Indians were rich, the women and children, as well as the men were covered with silver brooches, ear-rings, wampum, beads and other trinkets. Their mantles were of fine scarlet cloth, and all was finery and dress. The canoes of the fur trader were loaded with packs of beaver, till the abundance of the article lowered the London prices. Every intelligent man saw the poverty that would follow the destruction of the beaver, but there were no chiefs to control it; always perfect liberty and equality. Four years after almost the whole of these extensive countries became poor, and with difficulty procured the first necessaries of life, and in this state they remain, and probably for ever. A worn out field may be manured and again made fertile; but the beaver once destroyed cannot be replaced. They were the gold coin of the country, with which the necessaries of life were purchased.

This idea of the beaver skins being the current coin, or the dollar bills of the Hudson's Bay territory and the regions surrounding the fur countries, is frequently referred to; and continued to be the case, down to very recent years. It is again noticed by Mr. Francis Assikinack, in introducing some notes of the beaver traditions of his own tribe, the Odahwahs, with which he has favoured me. It can

scarcely fail to remind the classical philologist of the primary derivation of the Latin *pecunia*, the oxen of Homer, and still more of the skin currency of the Carthaginians and Spartans; while the Biblical student will recall the sneering comment of Satan on the patience of Job: "Skin for skin, yea all that a man hath will he give for his life."

In the Odahwah language, a dialect of the Ojibway, the beaver is called, *Ahmik*,—the Ahmeek, king of beavers, of Longfellow's "Song of Hiawatha." So also a beaver dam is *ahmikweesh* or *ahmikobeeg*. No recollection can now be traced of the beaver's tooth having ever been used as a cutting instrument by the Odahwahs; but one of their superstitions seems to point to such a practice. It was believed that the beaver possessed a piece of brass for the purposes of cutting. This tool was said to resemble a wedge, one side of which was very sharp. Sometimes the most celebrated magicians professed to obtain this instrument from the animal, and it was considered a most invaluable treasure, as it answered as a universal charm in strengthening medicine, obtaining the necessaries and luxuries of life, securing success in hunting, &c. Until very lately these Indians reckoned dollars by the beaver skin, and where the whites say one dollar, two dollars, and so on, the Indians would say, one beaver skin, two beaver skins, &c. Formerly, also, every section of a tribe had its own beaver hunting grounds; and this property, as it may fitly enough be called, descended from father to son for the benefit of the family exclusively. To encroach upon a beaver ground belonging to another party was looked upon as a serious offence, and the trespasser was liable to lose his life, if caught by the owners of the ground.

According to Odahwah tradition there was an immense beaver in some part of Lake Superior. The Indians pointed out an Island in the Lake, about two miles long, and one and a third broad, and said that the beaver spoken of was the same size. This story must have been invented very early, because in one of the legends relating to Nanahbozho, it is told that this extraordinary personage went in one morning to Lake Superior for the purpose of catching a beaver for his breakfast. When he got there he succeeded in dislodging a young beaver from its hiding place, and chased it towards the Sault Ste. Marie, the animal of course came under the water, until it reached the entrance of the river leading from Lake Superior into Lake Huron. Nanahbozho thought that the Sault was an excellent place to catch the beaver, as the water was too shallow to conceal it. So he went there and oc-

cupied the place, standing on the British side of the river. Whilst he stood there, watching closely, a bird flew on the American side, he stooped and picked up a stone to throw at it; his attention being thus drawn away from the narrow passage the beaver had an opportunity to dart down the rapids, Nanahbozho threw the stone hastily at the bird, and then renewed the chase. This stone is to be seen at the present day on a sandy beach at the other end of Lake Michigan, being about thirty feet in diameter, where it is the solitary one on the beach. The next place selected by the great hunter is a narrow channel between Manitoulin Island and the mainland, where he took up his position at *Ahssine muddwawa*, called by the French, La Cloche. He had hardly got there when the beaver showed its head in the middle of the channel. Its pursuer hurled his spear at it, but missing his aim, the weapon went beyond his reach, and being in a great hurry, he did not wish to lose time in going for it. This celebrated spear is also to be seen at present in the shape of a mountain having two peaks, about twenty miles from the place whence it was thrown. About two hours after, he caught the beaver in the *Ottawa*, and dashed its head on the rocky banks of the river, where the Indians say the marks of blood are still to be seen.

When a beaver kitten as it is called, is taken young, it is easily tamed, and seems to throw off its natural habits and to abandon most of its wild instincts, almost as readily as the dog; and with a much shorter training. In "The gardens and menagerie of the Zoological Society, delineated," a highly interesting account is given of Binny, a tame beaver, domesticated by Mr. Broderip, and which developed its building instincts in the construction of dwellings and imaginary dams for its self with books, brushes, boots, shoes, and whatever lay within its reach. It proved an exceedingly affectionate and entertaining favourite. It does not however, appear to have manifested its peculiar instincts in the destructive form they frequently assume in captivity. A gentleman resident in Lower Canada, informs me, that he had a tame beaver which used to play with the children like a kitten, but as is commonly the case, it took to gnawing furniture. I am indebted to my friend Mr. John Langton for the following account of another tame beaver, domesticated under different circumstances. The owner of this beaver had no furniture to gnaw, being an old trader married to a squaw, and living more like an Indian than a white man. "His favourite was quite tame, and very playful, and though he lived on the shore of Buckhorn

Lake, the beaver seldom took to the water. It used to lie before the fire as contentedly as a dog; and it was not till winter set in that it became a nuisance. Poor old Bill McHugh's house was well ventilated, an open chink between the logs being thought very little of, by him and his family; but the beaver was very impatient of such negligence, and used to work all night at making things airtight and comfortable, without much discrimination as to the materials it employed. If Bill or his guests went to bed leaving their moccasins and tichigans drying before the fire, they were certain to be found in the morning stowed away in some chink or cranny; and stray blankets and articles of clothing were torn up by the industrious beaver, for the same purpose. The consequence was that the poor pet was at length sacrificed; its body went into the old trader's pot, and its skin to market." When we consider the peculiar shyness of the beaver in its native haunts,—in so much so that, where it is liable to frequent disturbance in the vicinity of the Settlements, it is scarcely possible to get a sight even of its head above water after watching for hours,—the readiness with which it abandons all its wild habits and natural instincts, and adapts itself to sociable companionship with man, constitutes a trait of peculiar interest.

Such being some of the aspects in the natural history of the beaver, *Castor Fiber*, as studied in its comparatively recently disturbed haunts in the New World, some interest may naturally be felt by us here, in the recovery of like traces of its former presence in numerous localities of the Old World, from which it has disappeared for centuries. The relations of the European beaver to pharmacology and medicine have attracted a degree of attention to it in earlier times, to which we owe much of the knowledge now recoverable concerning its early history and wide diffusion. The medicinal virtues attached to the castoreum in early and medieval times were of the most varied and even contradictory kind. Hippocrates recommended its employment in uterine diseases, while Dioscorides and many later writers prescribe it for accelerating child-birth. According to Pliny, when applied externally to the head the castoreum induced sleep, but when used in fumigation it removed lethargy. Its uses and virtues might indeed compare with the most wonderful of modern universal quack medicines. Those have been carefully investigated in Dr. Charles Wilson's "Notes on the use of the Castoreum," and to them we can only add, from the New World, two others to which it is applied in the great

region of the North-west, where still it forms an important object of the chase. To one of these reference has already been made in an extract from the Journal of Mr. David Thompson, where it is seen that the castoreum is successfully employed as a bait in trapping both the male and female beaver. The other use is as an accompaniment of tobacco. Both the Indians and the Hudson's Bay Company's traders frequently place a small portion of the castoreum in their pipe along with tobacco. The flavour is very peculiar, and the smell of the smoke totally different from that of the castoreum itself, but by no means unpleasing. No special effects, however, seem to result from its use in this manner, so diverse from any of the ancient or modern European modes of prescription. That the beaver was at one time indigenous to the British Islands is well known. Its remains have been discovered under circumstances indicative of an antiquity coeval with the extinct mammoth (*Elephas primigenius*)* But their most frequent situation is at the bottom of the peat-bog; as in the Newbury peat-valley, where they were found twenty feet below the present surface, associated with the remains of the wild-boar, roebuck, goat, deer, and wolf. The *Castor Europæus* accordingly occupies an interesting place among the extinct animals referrible to the primeval transition of the British Archæologist, as it is proved to have existed as a living species, both in Scotland and Wales, down to the twelfth century, and as we shall see is referred to so late as the fifteenth century.† In 1788, Dr. William Farquharson presented to the Society of Antiquaries of Scotland, the skeleton of the head, and one of the haunch bones of a beaver, dug up in Martie's Loch of Kinloch, near Coupar Angus, Perthshire. The bones are dyed of a deep brown color, derived from the peaty marle in which they were found embedded; and the cranium is imperfect. But the remains of the remarkable incisors so characteristic of the beaver, still exist in the lower jaw bone. This interesting palæontological relic I recalled to mind with lively interest when exploring a deserted beaver-dam on the Eagle River, Lake Superior, in 1855, and all the more from the recollections of a conversation with Hugh Miller, on the primeval archæological era of Scotland, to which it gave rise, when accompanying that distinguished geologist on one occasion over the Museum of the Scottish Antiquaries. From the nature of his speculations concerning the ancient life of the New Red Sandstone, the fossil beaver spoke to

* Owen's British Fossil Mammals, p. 191.

† Prehistoric Annals of Scotland. pp. 24, 193.

him of very modern times, while to his companion,—then occupied with investigations exclusively confined to the era of man as an occupant of the globe,—it was a memorial of ages belonging to a transitional era during which the ancient earth gave place to that of which man was henceforth to be the chief denizen. The most memorable result of that conversation, was, the explanation then given of ideas he had formed, relative to a chronological key to the age of the existing and ancient Scottish coast lines, based on the height from the present sea level of the caverns abounding along its rocky shores, when taken into consideration with the relative depths of excavation of these sea-worn recesses, some of which may be seen in process of formation, especially where the long roll of the Atlantic wave is abruptly arrested by the rock-bound coast of the western Highlands. This, with so many other ingenious speculations and profoundly suggestive thoughts, of which such mere hints survive, were doubtless intended to be embodied in the great work on Scottish Geology, which now remains an unaccomplished idea.

But such reminiscences tempt me away from the subject in hand; though in returning to it, I am again reminded of old Edinburgh associates and friends, in naming the late Dr. Patrick Neill. In 1819, Dr. Neill read an interesting paper before the Wernerian Natural History Society of Edinburgh,* in which he referred to the specimen of the extinct Scottish beaver, preserved in the museum of the Society of Antiquaries, describing the circumstances under which it was found, and specially noting the discovery in a neighbouring marl-pit of the two metatarsal bones, and a pair of branched horns of a large extinct species of deer. In the same paper, Dr. Neill drew attention to another disclosure of similar fossil remains, the recent discovery of which had then led to the revival of the subject. These, which were found in October, 1818, included the entire skeleton of a beaver, lying partially embedded in marl, under an accumulation of peat moss seven feet in thickness. In this were recognized the shells of filberts, with the wood of the birch, alder, and oak. Only the skull and lower jaw were recovered, the other bones having been found in too soft and fragile a condition to admit of removal, and they are now preserved in the Museum of Edinburgh University. Here also were found, a gigantic pair of deer's horns; and, what is of more interest, the writer

* Edinburgh Philosophical Journal, Vol. I., p. 183. Mem. Wernerian Natural History Society, Vol. III., p. 207.

of the statistical account of the Parish of Edrom,* states that several other heads of the beaver were recovered from the same deposit. Here therefore, it is not presuming too much to assume was the marle deposited from the lake where in ancient centuries a colony of Scottish beavers had constructed their habitations; while the accumulated vegetable moss with its enclosed relics of the ancient forest, might help us to some guess as to the probable era of their extinction: not necessarily one prior to that of man, for the rude monoxylous British canoe, hollwed by fire out of a single tree, like those in use by the Indians on the Columbia River, has been found at as great a depth in more than one of the Scottish mosses.†

But the traces of the former existence of the beaver in Scotland have received additional illustration from the researches of Dr. Charles Wilson, in the paper already referred to, in the Edinburgh Philosophical Journal. In this the author thus describes a third instance of the discovery of the remains of the beaver in Scotland, with the traditional associations of the locality where it was found:—

“On the verge of the parish of Linton, in Roxburghshire, there is a remnant of what has evidently once been a far more extensive loch, which had skirted for some distance the outer range of the Cheviot Hills, but which, from some alteration of the levels, has now, for the most part, gradually drained itself off to the westward. Into this loch had flowed the waters of the Cheviots, entering it, as the little river Kail, by a narrow gorge towards the eastern extremity: and it is doubtless through the agency of this often impetuous current, that those alterations have chiefly been effected which have diverted the stream from what is now the narrow limits of Linton Loch; and left it contracted to a few stagnant pools, imbedded in a deep but not extensive morass, from which, however, still flows a considerable body of water by an artificially constructed channel. The near vicinity of the loch presents many localities of interest, as well in legendary lore as from later associations. The hollow at Wormington, still known as the ‘worm’s hole,’ marks, according to familiar story, the ancient haunt of a monstrous serpent or dragon, the destruction of which, by William de Somerville, obtained for him the gift of the surrounding barony from William the Lion. The little knoll, consisting wholly of fine sand, on which the church of Linton is built, has seemed to the peasant to justify the tradition, that its elevation was the work of two sisters, who sifted the heap as a voluntary penance, to expiate in a brother the crime of murder. The traces of the foundations of the neighbouring *fortalice*, still lurking under their covering of green sward, recal the memory of more than one of the scarcely less stirring, while more authentic scenes of border warfare;

* New Statistical Account; Berwick, p. 267.

† Prehistoric Annals of Scotland, p. 31.

and closer to the loch, perched above its southern margin, we have the little possession of Wideopen, the inheritance of the poet Thomson, who is said to have gathered here, among the storms of the hills, many of the materials for the admirable descriptions in his poem of Winter. Through the adjoining tract of the Cheviots, spreads that range of which it could be said, as in the ballad of the Battle of Otterbourne:

The deer runs wild on hill and dale,
The birds fly wild frae tree to tree.

Few places, therefore, could be more appropriate for the discovery of any remains which were to aid in giving body to our traditions, as in forming a link between remote and existing states of civilization.

The moss, which constitutes the body of the Linton morass, is variable in depth, and covers a very extensive deposit of marl, to obtain which, for agricultural purposes, operations on a considerable scale were undertaken by the tenant, Mr. Purves, by whom the relic of the interesting animal, found in the course of these was placed in my hands, and to whose intelligent observation I am chiefly indebted for the particulars of its discovery. In digging about twenty yards from the margin, and after penetrating a thickness of moss of about eight feet, the marl was reached, and upon its surface was found a skull in excellent preservation,* easily recognised by me, on examining it, as that of a beaver. Either no other parts of the skeleton had remained preserved in its contiguity, or they had failed to attract the attention of the workmen; the probability being, that from the slighter texture of most of the other bones, they had been less able to resist entire disintegration, or had crumbled on exposure. The remains of deer and other animals were also discovered on the surface of the marl, at about the same distance from the margin; but at other places, the horns and bones of deer, and among these a lower maxilla, were found fourteen feet beneath the marl itself, yet still within its layers, or at about an aggregate depth of twenty-two feet. Among the remains preserved and placed before me were horns of the red deer, with metatarsal bones, evidently also of animals of the deer species, all betokening individuals of once stately dimensions; while the left tibia of an ox, doubtless the *Bos primigenius*, which was found imbedded at a depth of seven feet within the marl. I computed must have belonged to an animal measuring at least six feet, or with the hoof and soft parts entire, fully half a foot more to the summit of the shoulder. The moss, at the part covering these remains, might be viewed as divided into three layers. The upper of these, approaching to about three feet in thickness, consisted of the traces of comparatively fresh vegetation: the second layer, measuring about two feet, had a less firm consistence, and changed its colour of a greenish brown, when moist and newly exposed, to almost a white when dry: the third layer extended to about four feet, but in some places to a much greater thickness, and was almost black, holding imbedded, in various grades of preservation, many and not mean remains of the primeval forests, such as trunks of trees, for the most part hazel and birch, with an intermingling of oak, some measuring from two to even four feet in

* The skull is now placed in the Museum of the Tweedside Physical and Antiquarian Society at Kelso.

diameter; and, along with these, large quantities of hazel nuts, heaped into masses, as if gathered and swept from the upper woodlands by the mountain freshets. In some places gravel was found deposited above the moss, bearing testimony to the notion of similar currents.

The stratum of marl varied from two, to almost eighteen feet in thickness, and consisted of the usual fresh-water shells, but mainly of *Planorbis* and *Limnæa*; the greater part being of almost microscopic dimensions, yet often in the most entire preservation. Where the relic of the beaver had been deposited, the marl, however, to judge from portions taken from within the skull, seems to have been largely, if not entirely composed of infusoria. On the application of an acid, after a smart effervescence, with the disappearance of a considerable bulk of the material, there remained amorphous, ferruginous-like masses, and abundantly interspersed with these, the silicious coverings of the animalcules, if they be really animal organisms. Among them I distinguished *Epithemia Argus*, *sorex*, *turgida*, and *longicornis*; *Cyclotella operculata*; *Gomphonema constrictum*; *Nitzschia sigmoidea*; *Surirella craticula*; *Cymbella helvetica*; *Navicula lanceolata*; and, probably most abundant of all, *Himantidium arcus*. The remains of the mammals found in contact with the peat, including the skull of the beaver itself, were of the usual dark tint acquired from that substance: those deposited in the marl preserved more nearly their natural colour. Near the margin of the loch, and about seven feet deep in the moss, were found an arrow-head, and two or three iron horse-shoes; the latter of small dimensions. Could we regard these horse-shoes, and this individual beaver, thus found at nearly the same depth in the moss, as having reached their position there coetaneously, as, perhaps, approximatively we may, the furthest limit to which our archæological experience would entitle us to go back for this would probably be the Anglo-Saxon period; but our surmise as to the era would still be a rude one, and within it, or even possibly long after it though scarcely before, we must be prepared to allow a wide range."

Corresponding evidence derived from a variety of sources, in like manner prove the ancient presence of the beaver in the Cambridge and Norfolk fens, and where the peat mosses of Berkshire and other English localities have accumulated for ages.

"Other discoveries, at Mundesley, Bacton, Southwold, and Happisburg in Norfolk, and at Thorpe in Suffolk, appear under relations which seem to carry the antiquity of the beaver in England farther back into the tertiary period, and ought probably to be referred to a different, yet closely allied species. In Denmark, we learn from a highly interesting communication by Professor Steenstrup,* that a lower jaw, with the greater part of the extremities of a beaver, evidently belonging to an individual animal, were discovered in the moss of Christiansholm; and that a tooth has also been found in Fyen, all the other traces hitherto of its former existence within the Danish territories having been limited to Sjælland. Specimens of stems, evidently gnawed by the beaver's teeth, were taken from Mariendals

* Oversigt over det Kgl. danske Videnskabernes Selskabs Forhandling, 1855, p. 381.

moss, the special locality being regarded by the Professor as probably occupying the former bed of a stream, which had been *once its habitat*. Similar stems, from two to four inches thick, with beaver marks, were seen in Brönsholm moss, in great quantity, and laid with remarkable regularity; while a like deposit, at a depth of about three feet, occurred in a moss near Lyngsbyc. In these interesting facts, we appear to recognise distinctly the remains of the dams of the beaver, and the familiar evidences of its singular constructive faculties. Perhaps we may further refer to a period not remote from that of these relics in the mosses, the location of three beaver's teeth, in a greatly damaged condition, at the side of a human skeleton, which was found in a tomb of an ancient Lap, opened recently* at Mortensnæs, on the Varangerfjord, in the extreme north-east of Norway. A stone hammer, bearing marks of use, lay in the same grave."

The discovery of the teeth of the beaver, alongside of the rude stone hammer of a primitive Scandinavian grave is of peculiar interest to the archæologist and ethnologist, as supplying another of the many interesting examples of analogies in the resources of primeval arts. The incisor teeth of the beaver are broad, flattened, and protected in front by a coat of very hard enamel, so that in the process of wearing, they retain a sharp cutting edge like a chisel. The beaver tooth accordingly furnished to the American Indian one of his best cutting instruments, edged by a sharp and very hard enamel, previous to the introduction of iron tools. Dr. Richardson informs us, that the incisor tooth of the beaver, when fixed in a wooden handle, was used by the Indians of the North-West to cut bone, and fashion their horn-tipped spears and arrows, till it was superseded by the English file.

In Norway, the beaver is still indigenous; and indeed the extent of area which this animal still occupies in Europe, has been very imperfectly appreciated even by the ablest of modern naturalists. From America, the European naturalist has derived his knowledge of the social habits and ingenious arts of the beaver; but careful investigation now satisfies us, that opportunities were not wanting for the study of these before America was discovered, and that such exist in Europe even at the present day. On this subject, Dr. Charles Wilson furnishes the results of extensive and careful research, accompanied with minute reference to his authorities:

"It is interesting to remark that, independent of the more remote evidence produced by Professor Steenstrup from the peat-mosses of Denmark, we have, in the testimony of Giraldus and Albertus Magnus, though not in the classical writers,

* Forhandlinger af danske Videnskab. Selsk.: Illustreret Nyhedsblad, (Christiania, 1856), pp. 104.

proofs of an acquaintance with the gregarious habits and constructive instincts of the beaver, at a time long anterior to the discovery of America, and to the more widely diffused knowledge which followed gradually upon the narratives of the voyagers of the New Continent. It is surprising that Buffon, whose elegance of style so rarely appears as an excuse for carelessness and inaccuracy, should not only have overlooked this fact, but the evidence of all the more recent authorities we have quoted, as well as of others to a like purport, occurring in his own day. The beavers of Europe, says this eminent writer, never assemble in colonies, and never construct, but merely burrow; although he admits what is not nearly enough, that in Norway, and other parts of the extreme north, their huts have been reported to be found within the last centuries. Cuvier appears to have followed Buffon, in assuming that the European beavers, at least in later ages never build; and states the difficulty he has had in attempting to determine, whether those which now have their burrows along the Rhone, the Danube, the Weser, and other rivers, are originally different from the American species, or whether they are identical, and are hindered from building solely by their position in the nearer vicinity of man. While grateful that the eloquence of Buffon, and the comprehensiveness and precision of Cuvier, have given a charm and a solidity to natural history unknown to it before, it is to wonder the more that it should have been easy for us to supplement their inquiries, on this curious point, from sources so readily accessible. To approach even our own times, Boechstein, writing so recently as 1801, tells us that on the Elbe, near Kuhnert, the property of the Prussian minister, Schulenberg, there were then many beavers, which constructed dams on the side channels, or arms of the river, where there was calm water. Near Wittenberg also, they lived in societies, and formed dams. In the vicinity of Hettinghausen, on the Lippe, they built their dams, and were found in considerable numbers; as well as higher up the river in the territory of Paderborn. In these localities, their constructions are stated to have been so skilful as to rival those of Canada, though the colonies were less numerous. The trees they cut down were willows and poplars. Oken mentions a beaver-hut on the Yesil, in the duchy of Cleves, which stood six feet high, with two chambers over each other, the upper having three, and the under four cells; and he refers to a paper by Meyerink, in the Berlin Natural History Transactions for 1820, describing a colony settled for upwards of a century, on the little river Nuthe, half a league above its confluence with the Elbe, in a sequestered canton of the district of Magdeburg. In 1822, it contained from fifteen to twenty individuals: they had burrows; built huts eight or ten feet high, using trunks and branches of trees, along with earth; and constructed a dyke. Martius, writing in 1837, speaks of colonies on the Ammer, which were still tended as objects of forestry, or huntsman's craft. An authority, at the close of the last century assigns to them many localities in Germany: as in Mark, especially in the Altmark and Preignitz, and in the Middle Mark; and in the rivers Spree and Havel, in the vicinities of Berlin, Potsdam, Oranienberg, Liebenwulde, Trebbin, Nauen, and Konigshorst.

“Even close to the present day, the beaver, though scanty in its relative numbers, has a wider distribution in Europe than is usually imagined. Wagner, writing in 1846, mentions it as still not only in the Danube, but in the Amber, Isar, Iller,

and Salznob, tributaries of that river; as well as in the Elbe and Oder; while in other rivers it has only recently disappeared. In Norway, Sweden, and Poland, he reports them as in greater numbers, and as distributed over Russia. Schumard mentions them as occurring in Transylvania; and Okon says they exist in the Traun in Austria, besides specifying for North Russia, the Dwina and Potoshna. Blasius reports that a specimen was taken in Brunswick, in the Schunter, at the close of last century; but that a few years ago they were observed in the Lippe in Westphalia; and that they are still found on the Elbe, between Magdeburg and Wittenburg, though the colonies, since 1848, have been greatly reduced. He adds, that they have been recently observed in the Havel and Oder in the Altmark, in the Vistula, within East Prussia, and in Silesia; and more abundantly, in Lithuania and Poland, and in North Russia. In North-Western Germany it was found, at least formerly, in the Moselle and the Mans. Chem mentions it as tolerably abundant in the southern part of the Rhone. They have been killed near Arles, Beaucaire, Tarascou, and even Avignon; and still subsist in such numbers as to elicit his surprise that some authors should have asserted their extinction in France. Of two which Fr. Ouvier had alive, one was from the Danube, and the other from the Gardon, in Dauphiny. In the Norwegian Pharmacopœia of 1854, the Norwegian castoreum holds its place beside that of Russia and of Canada. Wylie, in the Russian Military Pharmacopœia, mentions the animal as common in Russia and Siberia, and more rare in Livonia and Poland. In South Russia, Demidoff says that they are somewhat scarce on the Danube, but that they are more common in the region towards the Caucasus, and that many have been recently killed in the districts watered by the Natanebi and the Tereck. To the river habitats already noted, Moleschott adds the Inn, the Lech, the Upper Rhine, the Weser and the Bug, as each still presenting rare examples. Upon the whole, the beaver still appears to be encountered, seldom or never plentifully, always in greatly diminished numbers, and generally with an extreme and constantly increasing rarity, in the Austrian and Prussian States, Bavaria, Russia, Sweden, Norway, Lapland, France, and perhaps Switzerland.

• In ancient as in modern times the beaver was applied to the same uses, for dress, for the table, and for medicinal purposes; and from all of these we derive interesting traces of the presence of this animal in ancient historic localities. We learn from Herodotus, that the Budini employed the fur of the beaver as a trimming for their cloaks; and from ancient laws and local charters, fixing the duties on exports, we are supplied with indications of its use at various times for similar purposes. In the Welsh code of Hywel Dda, circa A. D. 900, the *Llostdlydan*, or beaver, is valued at 120 pence. In the *Leges Burgorum* instituted by David I. of Scotland, circa A. D. 1150, fixing the rate of custom duties on "*Peloure*,"—or peltries, as we now call them,—beavers' skins are mentioned along with those of the fox, the weasel, the martin, the wild cat, the ferret, &c., each being charged at

their "outpassing," or export, fourpence "ilk tymmyr," *i. e.* so many as are inclosed or packed between two boards of timber, usually amounting to forty skins.* This Scottish code is copied nearly verbatim from the laws and customs instituted for Newcastle-upon-Tyne, by Henry I. and confirmed by subsequent royal charters; and among the exports from the Tyne, are specified the skins of foxes, martins, sables, beavers, goats and squirrels.† Thus we perceive that the beaver was known in Wales in the tenth century, and its skins were objects of export both in Scotland and England, at least till the middle of the twelfth century. In further illustration of the existence of the Welsh beaver, Dr. Charles Wilson remarks: "Silvester Giraldus, travelling in this country in 1188 with Archbishop Baldwin of Canterbury, who preached there that crusade in which he afterwards followed Richard Cœur de Lion to the Holy Land, and perished at Acre, tells us, in speaking of the river Teivi, that it retained a special notability: 'inter universos namque Cambriæ seu etiam Loegriæ fluvios, solus hic castores habet.' He then proceeds to give an account of the habitat of the animal, at some deep and still recess of the stream; describes its dams and huts and its methods of construction, with considerable minuteness; and records the dangers to which it is liable on the score of its skin, which is coveted in the west, and the medicinal part of the body, coveted in the east; while he adds, with evident scruples as to the orthodoxy of the practice, that in Germany and the northern regions, great and religious persons, 'tempore jejuniorum,' eat the tail of the fish-like creature, as having both the taste and colour of fish:" a practise, which, it will be seen has been transferred, with the races and medieval creed of Europe, to the New World.

To those illustrations of the varied evidence by which the presence of the beaver is traced in Britain from the remotest period, down, at least, to the twelfth century, may be added others of a diverse character, borrowed from different, yet not less interesting and trustworthy sources than those hitherto referred to, *viz.*: the pages of our elder poets. They serve at least to show the familiar occurrence of the name of the beaver, in the traditional illustrations belonging to the reigns of Richard II. and the Fourth and Fifth Henries of England, with the contemporary Scottish sovereigns; and to confirm the evidence derived from other sources, of the probable existence of

* Jamieson's Scottish Dictionary, v. *Timmer*.

† Archæological Institute, Newcastle. *Memoirs of Northumberland*, vol. I. p. 27.

the beaver in the remoter districts of Scotland, England, and Wales, long after it had ceased, from its diminished numbers to be an object of legal or commercial consideration.

The first of these occurs in "Pier's Ploughman's Creed," a poem written by a Wycliffite of the reign of Richard II. and abounding in satirical allusions to the excesses of the clergy. Here he describes the Franciscan, with more cloth in his cape than furnished St. Francis with a frock; and yet underneath this, he wears a coat lined with the fur of the weasel or fitchet, or of the *fine beaver* :

" Loke hough this loresmen
Lordes betrayen,
Seyn that they folwen
Fully Fraunceyses rewle,
That in cotinge of his cope
Is more cloth y-folden
Than was in Fraunceis froc
Whan he hem first made.
And yet under that cope
A cote hath he furred
With foyns, or with sichewes,
Other fyn bevero."

In the Act of the first Parliament of James I. of Scotland, held at Perth, in 1424, regulating the " Custome of Mertrik skinnes, and uther furringes," the martin, pole-cat, fox, otter, and other skins, have their export duties specified; but the beaver, which figured among the Scottish exports in the reign of David I. no longer appears. Yet an interesting piece of evidence of the most authentic kind, proves that the beaver was not unknown to King James; although it had ceased to be a subject of Scottish taxation, and even perhaps no longer continued to form an object of the chase. In his beautiful poem of the King's Quair, written during his detention at the English Court, prior to 1423, after describing his interview with " Dame Minerve," and the good counsel he received, he relates his wandering

" Along a river, pleasant to behold,
Enbroudin all with fresché flourys gay,
Where through the gravel bright as any gold,
The crystal water ran so clear and cold,
That in mine ear it made continually
A maner sound, mellit with harmony.

Of bestis saw I many dyvers kind :

* * * * *

The bugill drawer by his hornis great,
The martrik sable, the soynze, and many mo,
The chalk-white ermine tipped as the jet,

The royal hart, the conyng, and the roe,
 The wolf that of the murder not say ho,
 The lusty beaver, and the ravin bear,
 For camelot the camel full of hair."*

It is to be observed, that in this enumeration of the royal poet, he does not confine himself exclusively to native animals, and this is still more the case in previous stanzas, where not only the tiger, dromedary, and elephant, are named, but even the unicorn :

"That voidis venom with his ivory horn,"

Nevertheless, the mention of the lusty beaver among the other animals enumerated, sufficiently shows that it was not altogether unfamiliar then, although its name disappears in this reign, from the official lists of taxable exports. It probably did not become entirely extinct for a considerable period thereafter.

Reference has already been made to the curious account of the habits of the beaver, as witnessed by Giraldus Cambrensis in the Welsh river Teivi, in 1188 ; and Drayton revived the story in the early part of the 17th century, in his "Poly-Olbion," where in the sixth song, he thus embodies old marvels, and "tells what rare things Tivy breeds :"

"More famous long agoe, than for the salmon's leap,
 For bevers Tivy was, in her strong banks that bred,
 Which else no other brook of Britain nourished ;
 Where Nature, in the shape of this now perished beast,
 His property did seem t' have wondrously express'd ;
 Being body'd like a boat, with such a mighty tail
 As served him for a bridge, a helm, or for a sail,
 When kind did him command the architect to play,
 That his strong castle built of branched twigs and clay :
 Which, set upon the deep, but yet not fixed there,
 He easily could remove as it he pleas'd to steer
 To this side or to that ; the workmanship so rare,
 His stuff wherewith to build, first being to prepare,
 A foraging he goes, to groves or bushes nigh,
 And with his teeth cuts down his timber ; which laid by,
 He turns him on his back, his belly laid abroad,
 When, with what he hath got, the other do him load ;
 Till lastly, by the weight, his burden he have found,
 Then with his mighty tail his carriage having bound
 As carters do with ropes, in his sharp teeth he grip'd
 Some stronger stick ; from which the lesser branches stript,
 He takes it in the midst ; at both the ends the rest
 Hard holding with their fangs, unto the labour prest,
 Going backward tow'rd's their home their loaded carriage led,
 From whom, those first here born, were taught the useful sled.

* The *bugill* ; the bullock or ox. *Martrik sable* ; the sable martin. *Foynze* ; the pole-cat.

Then builded he his fort for strong and several fights ;
 His passages contriv'd with such unusual sleights,
 That from the hunter oft he issu'd undiscern'd,
 As if men from this beast to fortify had learned ;
 Whose kind, in her decay'd, is to this isle unknown,
 Thus Tivy boasts this beast peculiarly her own."

So also Browne, in the fourth song of his "Brittannia's Pastorals," representing the consolation of the bereaved Pan, in the memorial tree that sprung

"Out of the maiden's bed of endless rest,"

introduces Tivy's beavers, as familiar objects of dread to the guardian of the sylvan shades :

"The many-kernel-bearing pynne of late,
 From all trees else, to me was consecrate ;
 But now behold a roote worth more my love,
 Equal to that which, in an obscure grove,
 Infernal Juno proper takes to her.

* * * * *

This must I succour, this must I defend,
 And from the wild boar's rooting ever shend ;
 Here shall the wood-pecker no entrance finde,
 Nor Tivy's bevers gnaw the clothing rinde."

By means of such passages from the elder British poets, we trace the memory of the native beaver, and the popular traditions associated with it, down to a period when the study of the strange habits of this remarkable animal was revived amid its populous haunts in the New World. Then the marvels of the hunter and the traveller effaced the memory of older home traditions, and to this source we may trace the flattering comparison instituted by Gibbon, in the forty-second chapter of his "Decline and Fall of the Roman Empire," between the settled, domestic beaver, and the nomad Tartar hordes of Asia: "They were bold and dexterous archers, who drank the milk, and feasted on the flesh of their fleet and indefatigable horses. Their huts were hastily built of rough timber, and we may not without flattery compare them to the architecture of the beaver, which they resembled in a double issue to the land and water for the escape of the savage inhabitant: an animal less cleanly, less diligent, less social, than that marvellous quadruped."

The hunting of the beaver, appears to have been anciently a favourite sport on the continent, if not in England; though the zeal with which the otter is still pursued in Scotland may suggest the older beaver huntas not improbably one of the ancient sports of that country. The

convenient medieval creed, which converted the amphibious rodent into a suitable lenten dish, when flesh was forbidden, no doubt added to the zeal with which the beaver hunt was pursued, and contributed to hasten its extinction, as it is likely to do in our own Canadian province, where the luxurious *bon bouche* of beaver's tail is recognised and sanctioned by the supreme ecclesiastical authorities of the Roman Catholic Church, as *maigre*, or Lenten fare. On this part of the subject I am informed, on the authority of one of the resident clergy of Lower Canada, that according to the discipline of the Roman Catholic Church the flesh of all amphibious animals is classed in the same category with that of fishes, and as such is allowed to be eaten during Lent and on other days of abstinence from flesh-meat. In this way the flesh of tortoises, frogs, and seals is considered to be meagre, and even certain wild ducks, more than ordinarily aquatic in their habits, enjoy the same distinction.

After the discovery of Canada, the Jesuit Missionaries demanded of the Holy See, whether the beaver might not be ranged in the same category, and from the descriptions sent home by the Reverend Fathers, the beaver was regarded as amphibious, and as such, allowed to be eaten as meagre diet.

It is not the tail only, so far as I can learn, but the whole of the carcase which is *maigre*; though on this point I have received contradictory opinions. The musk-rat is also meagre food, but not the otter; a distinction which, in the absence of any assigned reason seems singularly arbitrary. References to the beaver frequently occur in the journals of the French Missionaries of the seventeenth and eighteenth centuries, but in very many respects these earlier descriptions of this animal are very incorrect, and mingled with fable. A curious and elaborate memoir upon the subject, prepared by Michel Sarrazin, is to be found in the Memoirs of the Academy of Sciences of Paris.

This source of the continued estimation of the beaver, apart from its fur or castoreum, whereby it contributes some variety to the canonical fast-day dietetics by right of its aquatic habits; and in virtue of which, its tail—though so rich as to tax the skill of the cook in its preparation for the table,—is authoritatively prescribed as meagre diet: is no modern novelty of the Canadian church. Dr. Charles Wilson notes various proofs of the value attached to the beaver, especially by ecclesiastics, in ancient times, on account of its having furnished an agreeable variety to the fare prescribed for their fasts and self-denying observances.

"In a German charter dated in 1103, the right of hunting beavers is conferred along with other huntings and fishings; and a Bull of Pope Lucius III, in the year 1182, bestows upon a monastery the property in the beavers within their bounds. In comparatively recent times, Mylius cites a Prussian royal edict, regarding the beaver in the Elbe, dated 20th January 1714; with a subsequent one, insisting upon its protection under a penalty of no less than 200 dollars, issued at Berlin on the 24th March 1725. It was doubtless under a similar policy, that Frederick II. is reported to have gathered together a large colony of beavers, that he might turn them to economic uses: but with so little success, says Zimmermann, that they became afterwards dispersed throughout Brandenburg, and were soon rarely encountered.

Streso, a Dutch writer, states that the animal was used as food in Holland, in the time of the Crusades; and he repeats the common notice, that its tail and paws were eaten as fish, with a safe conscience, during the religious fasts. But the monks of a convent of Chartreux, at Villeneuve-les-Avignon, seem to have carried this indulgent notion farther, and to have accounted their entire carcass among the '*mets maigres*;' preparing from it large quantities of sausages, which were sold, and highly prized in the adjoining country. Albertus Magnus, however, says that their whole flesh was abominable, except the tail. Gesner describes the mode in which it was rendered savoury by the Swiss, he himself relishing the choicer portions as sweet and tender, '*jure croceo conditos*.' Belon also tells us that its tail, which, he says, sometimes weighs four lbs., was in his day used in Lorraine during Lent, and accounted a great delicacy, having a close resemblance in flavour to a nicely-dressed eel. The northern nations, according to Olaus Magnus, agreed with the rest in considering the tail and paws as highly delicate morsels."

We thus recognise in the beaver, which has disappeared within recent generations from so many of its Canadian haunts, and now lingers in greatly diminished numbers only in the least accessible waters, the survivor of a species familiar to man in remote centuries, rendered popular in the fables of Æsop, and noted by Herodotus, Hippocrates, Pliny, and Strabo. The last relics of the extinct Dodo have acquired a value the living animal never could have possessed; and the same reasons that confer an interest on the evidences of the extinction of species, as illustrating the like process still going on which geology reveals in the whole past economy of life, render the beaver of the Old and the New World worthy of special notice, as destined seemingly, like the Aboriginal Indian of this continent, to pass away from the records of living nature.

CAPTURE OF TWO BIRDS OF UNUSUAL OCCURRENCE,
IN UPPER CANADA.

BY T. J. COTTLE, F.R.C.S.E.

*Read before the Canadian Institute, March 5th, 1859.*PICUS (DENDROCOPUS : SWAINSON) MERIDIONALIS. LITTLE
GEORGIAN WOODPECKER.

Swainson, in a note in the *Fauna Boreali Americana*, under the above name, thus describes a bird, which he suggests might be found occasionally in the northern parts of America :

“Woodpecker, varied with black and white; crown, black; a broad red band on the hind head; second quill equal to the eighth; smaller than *Picus pubescens*, which it resembles in general appearance and rounded form of the tail feathers. The under plumage, however, is hair brown (as dark, but not as yellow as that of *P. major*) instead of white, or whitish, as in *P. pubescens*. The red band is much broader, and the relative length of quill is different. Inhabits Georgia. As we have seen as yet but two specimens of this, we consider its claims require further confirmation.”

In September, 1854, I shot a bird, which I think agrees with the above; and as I can find no description corresponding to it in either Wilson or Audubon, it may be worth while laying it before the members of the Canadian Institute, for their opinion.

I send a rough sketch of my bird, which may serve to show the peculiarities in the marking. It differs so much from *P. pubescens* as to preclude any idea of its being a variety. In addition to Swainson's description, I would give the following: Length, six inches. In my specimen, which I suspect to be a young one of the year, the forehead is black, intermixed with rufous; towards the occiput, the red predominates, but is spotted with black. I have no doubt but that in the next moult it would answer the Swainson description. From the bill, passing over the eye and round the head, is a band of dirty white; under this, passing through the eye, is another of black—below which, one of light rufous shading, with dirty white, runs round the lower part of the neck, nearly to the centre, where it is separated from that on the other side by black. The whole of the under parts are of a hair brown. The lateral tail feathers are cinna-

mon brown, crossed by two black bars. The black and white workings on the wings and back closely resemble those of the *P. pubescens*, except that in the latter bird the white is purer.

A comparison of the more prominent differences between *P. meridionalis* and *P. pubescens* :

P. MERIDIONALIS.

Length, six inches; under parts, hair brown; lateral tail feathers, cinnamon brown, with two black bars; red of head, above the white band which reaches to the bill.

P. PUBESCENS.

Length, six inches and three-quarters; under parts white; lateral tail feathers white, with two black bars; red of head below white band, which does not reach to bill

Swainson gives the habitat of *P. meridionalis* as Georgia. I can hardly think so, for Audubon searched that State, and he does not record the bird. It may more probably be Mexico, but if so, it is a long journey for a young bird to Canada.

The other bird I wish to record is the *Ortygometra* (*Rallus*. L.) Jamaicensis, a specimen of which was procured near Ingersoll, I believe, in 1857, and is now in the collection of Wm. Peole, Esq. Audubon figures it in his Synopsis, Plate cccxlix., and thus describes it: "Head and lower parts, dark purplish grey, approaching to black; the sides and lower wing coverts and abdomen barred with greyish white; hind head and fore part of back dark chestnut; the rest of the upper parts greyish black, tinged with brown, and transversely barred with white; wings inclining to reddish brown. From Louisiana to New Jersey: migratory."

COMPARATIVE TABULAR METEOROLOGICAL OBSERVATIONS IN CANADA, ENGLAND AND RUSSIA.

BY W. GRÈME TOMKINS, C.E., P.L.S.

Read before the Canadian Institute, 22nd February, 1859.

The very able and valuable observations, on the meteorological phenomena of Toronto, carried on in the Provincial Observatory under Professor Kingston, have prompted me to join my feeble endeavours in

such investigations, in this more elevated portion of the province; and having now completed one year's observations, I have prepared the same for presentation to the Canadian Institute, hoping the information they may afford will not be considered unworthy of its attention.

The position of St. Mary's in the county of Perth, Canada West, is in latitude $43^{\circ} 17' 57''.6$ north, and longitude $81^{\circ} 13' 30''$ west of Greenwich, and its elevation above Toronto (lake Ontario) is, by the Grand Trunk Railway levels 833.41 feet, to which must be added 24 feet the elevation of my place of observation above the railway, making 855 feet above Toronto; and allowing the lake Ontario, to be 235 feet above the level of the ocean, (the usual quantity allowed) this will give St. Mary's a total elevation of 1090 feet above the ocean. It may be well to remark here that it is about 30 miles west of the highest ridge levels of the province, which ridge runs from Berlin, county of Waterloo, to Woodstock, county of Oxford, and the height of this ridge may be counted about 150 feet above St. Mary's.

The observations have been taken with the greatest care, and read off and registered every morning at 8 a. m., which is given by Professor Airy as the best mean time for barometric and thermometric data. The quantity of rain fall or melted snow is taken in a large rain gauge of nearly one foot in diameter, and the direction of the wind is given as the prevailing one of the preceeding 24 hours, as also the general atmospheric appearance.

To render the observations more interesting from St. Mary's, I have added comparative tables taken from authentic sources, and my own experience. Those from Toronto are from the published papers of the Canadian Institute, and therefore perfectly reliable. I may here call attention to the fact that Toronto is in north latitude $43^{\circ} 39.4'$, and west longitude $79^{\circ} 23.2'$.

The observations in London (England) are from papers read before the Royal Society, by the late professor Daniell, my respected chemical preceptor in King's College, London, and are received as the best extant.

The St. Petersburg observations are taken out and reduced from the Imperial Russian Almanac, published by authority of government, and under the ablest professors of that capital. And, the Moscow tables are from my own observations during several years' residence in that city.

The latitude of St. Petersburg is $59^{\circ} 56'$ north and longitude 30°

19' east of Greenwich. Moscow is situated in latitude $55^{\circ} 46'$ north and longitude $37^{\circ} 36'$ east, the former is about 21 feet above the level of the Neva or Baltic sea, and the latter is by the levels of the St. Petersburg and Moscow Railway about 650 feet above the Baltic sea, and is situated 460 miles in the interior, and away from any large body of water.

The tables will better speak in detail for themselves, but in a general way a few remarks may be made on them as follows. In the barometric table it is very remarkable that the rise and fall of each month is the same in each of six cases although not actually equal, indicating some general law of atmospheric density in this northern hemisphere. Thus the highest month is different as well as the lowest, but the difference is slight.

	Highest.	Lowest.
St. Mary's,	July,	March,
Toronto,	June,	March,
Hamilton,	September,	November,
London, (England),	February,	August,
St. Petersburg,	May,	February,
Moscow,	July,	June.

The differences of the elevations will, of course, account for the varied means, or heights in inches which may be briefly recounted thus :

Place of observation.	Above Ocean level.	Bar. height.
St. Petersburg,	40 feet	29.955 inches.
London, (England,)	80 "	29.885 "
Toronto,	235 "	29.617 "
Hamilton,	240 "	29.681 "
Moscow, (Russia,)	650 "	29.539 "
St. Mary's, (C. W.)	1090 "	28.842 "

NOTE.—These heights take in the buildings as well as the level of the land given before. The barometric heights are modified by local circumstances.

The thermometric tables will be found of considerable interest, from the comparative results of the different months, and the annual means of the various places indicated in Europe and America. By it, it will be seen that St. Mary's is a little the warmest in summer, being in July $74^{\circ}.81$, and Moscow, (Russia,) the coldest in February $7^{\circ}.30$, both measured by Fahrenheit thermometer, and it is the same one employed in both cases, being a standard thermometer prepared by Tagliabera of

London in 1842, of the greatest exactness, and compared by myself with the standard thermometer of the Royal Astronomical Society of London. A short table for the isothermal lines from these data may thus be stated :

	North. Lat.	Warmest Month.	Mean Temp.	Coldest Month.	Mean Temp.	Differ- ence.
Hamilton	43 15.8	July	79.20	January ...	27.57	45.03
St. Marys	43 17.0	"	74.91	February ...	21.58	53.33
Toronto	43 30.4	"	67.03	"	22.08	44.05
London, (England)	51 30.0	August	61.30	January ...	36.10	35.20
Moscow, (Russia)	55 46.0	July	70.25	"	7.30	63.95
St. Petersburg, (Russia)	59 56.0	"	61.50	"	8.04	53.56

From which it appears by these tables that the greatest change of temperature on the continent of Europe takes place in Moscow, and the greatest in Canada, in St. Mary's, the relative difference being noted above.

The table of rain or melted snow, is also of considerable interest, shewing the amount which our streams and rivers have to carry off.

The annual sums point out that the Peninsula of Canada being surrounded on all sides by lakes or large deposits of water, the air becomes greatly saturated with moisture, which falls upon, and fertilises our fields and lands, and that Toronto is the greatest recipient of such fall being 37.16 inches; St. Mary's, the second, 35.42; Woodstock, 34.45, and London, in England, 24.26 inches. The amount at St. Petersburg is very small, and as we know it to be in high northern latitudes, viz: 16.49 inches.

This table for St. Mary's being for only one year will have to be corrected by future observations, which I am making daily, and shall transmit to the Institute as soon as completed, if deemed of sufficient value.

The table of atmospheric phenomena for the year 1858 in St. Mary's, shews in a forcible manner the genial nature of the climate in this part of the province. We have by these tables following, 42 per cent. fine, clear days, and very nearly 24 per cent. changeable and cloudy days, as also 19 per cent. quite dull, cloudy days, and only 15 per cent. absolutely snowy or rainy days, this must be admitted to be a very favourable view meteorologically of our Canadian climate.

The direction of our air currents is also of great importance for this elevated part of the Province, and the observations shew, that the great majority of them are from the westward, being 38 per cent. on

the year, 24 per cent. from the north, 20 per cent. from the south, and 18 per cent. from the east.

In conclusion, I have to regret the absence of other important points, owing to the want of instruments, viz: the position of the dew point, the greatest extremes of heat and cold by a registering thermometer, and the force or velocity of the air currents; all of which I greatly desire to add to render my observations more perfect, but being at present unprovided with the necessary instruments, I must therefore apologize for what I am aware are great defects, and submit the tables to the Institution in the best form I can offer them.

METEOROLOGICAL OBSERVATIONS AT ST. MARY'S FOR 1858.

BY W. G. T.

DIRECTION OF WIND.

TABLE showing the number of days that the winds from the four chief points prevailed in each month.

Month.	West.	East.	North.	South.	Days.	
Winter. {	December	7	7	5	12	31
	January.....	10	8	5	8	31
	February	11	7	6	4	29
Spring. {	March	21	3	3	5	31
	April	9	11	4	6	30
	May.....	8	15	2	6	31
Summer. {	June	20	0	8	4	30
	July	13	4	13	1	31
	August	12	6	9	4	31
Autumn. {	September	10	2	11	7	30
	October	11	3	7	10	31
	November.....	7	9	16	0	30
Sum of direction.	139	75	88	67	365	

Or from Westward, 38 per cent.

“ Eastward, 20 “

“ Northward, 25 “

“ Southward, 18 “

METEOROLOGICAL OBSERVATIONS AT ST. MARY'S FOR 1858.

BY W. G. T.

ATMOSPHERIC APPEARANCE.

Month.		Fine.	Change.	Dull.	Rain.	Days.
Winter.	{ December	10	10	7	4	31
	{ January	10	12	5	4	31
	{ February	7	7	7	7	28
Spring.	{ March	15	0	4	3	31
	{ April	10	0	4	7	30
	{ May	11	0	6	6	31
Summer.	{ June	21	4	3	2	30
	{ July	20	5	4	2	31
	{ August	10	7	3	5	31
Autumn.	{ September	18	5	5	2	30
	{ October	14	5	7	5	31
	{ November	6	0	10	8	30
Annual sum, number of days.		158	87	65	55	365

Or 42 per cent., fine, bright, clear.
 24 " changeable, showers, cloudy.
 10 " dull, overcast.
 15 " rainy or snowy days.
 100

THERMOMETRIC COMPARATIVE TABULAR RESULT OF ANNUAL METEOROLOGICAL OBSERVATIONS IN CANADA, ENGLAND AND RUSSIA.

Month.	St. Mary's, 1858.	Toronto, Mean, 20 years.	Hamilton, Mean, 8 y.	London, (England), 20 years.	St. Peters- burg, (Russia.)	Moscow, (Russia.)	
Winter.	{ December...	30.40	26.33	31.25	30.00	17.73	7.55
	{ January ...	31.00	23.22	27.57	30.10	3.94	7.30
	{ February ...	21.58	22.93	27.77	33.00	10.76	22.10
Spring.	{ March	29.71	29.32	35.02	43.00	22.44	18.67
	{ April	46.40	41.06	44.16	49.00	33.50	46.02
	{ May	50.55	51.37	56.33	54.00	46.74	59.00
Summer.	{ June	74.53	61.16	70.77	58.70	53.13	62.53
	{ July	74.81	67.03	73.23	61.00	61.50	70.25
	{ August	71.74	66.02	70.56	61.30	60.02	60.30
Autumn.	{ September..	63.70	58.07	62.35	57.50	50.33	39.40
	{ October.....	50.30	45.20	49.32	43.00	39.36	29.33
	{ November ..	34.00	36.62	37.95	42.00	33.13	17.60
Annual Mean.		48.23	44.07	48.91	49.36	37.27	36.75

BAROMETRIC COMPARATIVE TABULAR RESULT OF ANNUAL METEOROLOGICAL OBSERVATIONS IN CANADA, ENGLAND AND RUSSIA.

Month.	St. Mary's, 1858.	Toronto, Mean, 20 y.	Hamilton, Mean, 8 y.	London, (England), 20 years.	St. Peters- burgh, (Russia.)	Moscow, (Russia.)	
Winter.	{ December ...	28.803	20.590	20.070	20.770	30.210	20.187
	{ January ...	28.031	20.710	20.710	20.020	29.030	20.097
	{ February ...	28.751	20.580	20.070	30.070	20.005	20.131
Spring.	{ March	28.710	20.553	20.051	20.834	29.805	20.731
	{ April	28.725	20.569	20.001	20.881	30.123	20.580
	{ May	28.812	20.598	20.057	20.898	30.104	20.304
Summer.	{ June	28.008	20.017	20.070	30.020	29.740	20.058
	{ July	28.051	20.005	20.700	29.870	29.981	20.757
	{ August	28.010	20.500	20.724	29.750	20.803	20.098
Autumn.	{ September..	28.025	20.640	20.760	20.031	30.085	20.803
	{ October.....	28.064	20.004	20.060	20.000	20.042	20.871
	{ November...	28.778	20.020	20.037	20.770	30.041	20.498
Mean, year.	28.842	20.017	20.082	20.885	29.055	20.530	

MEM.—Remarkable coincidence in mensural rise and fall in nearly all cases.

RAIN OR SNOW, (MELTED) IN INCHES.

COMPARATIVE TABULAR RESULT OF ANNUAL METEOROLOGICAL OBSERVATIONS IN CANADA, ENGLAND AND RUSSIA.

Month.	St. Mary's, 1858.	Toronto, 18 years.	London, (England), 20 years.	St. Peters- burgh, 10 years.	Wood- stock, C.W. 1854.	
Winter.	{ December	3.20	3.040	2.40	0.64	1.56
	{ January	2.20	2.896	2.48	2.34	2.81
	{ February.....	2.05	2.863	0.75	0.65	1.78
Spring.	{ March	2.38	2.483	1.44	0.90	2.18
	{ April.....	2.42	2.799	1.70	0.55	1.40
	{ May	5.93	3.137	1.85	0.75	1.71
Summer.	{ June.....	7.38	3.103	1.83	1.80	5.07
	{ July.....	1.24	3.562	2.52	1.84	4.08
	{ August.....	2.37	2.807	2.54	1.11	3.80
Autumn.	{ September	1.34	4.333	2.10	2.35	4.21
	{ October	1.01	2.803	2.07	2.15	3.86
	{ November	2.92	3.268	2.40	1.35	2.01
Annual sum, inches,	35.42	37.157	24.26	16.40	34.45	

W. GRÈME TOMKINS, C.E., P.L.S., &c.

St. Mary's, January, 1859.

THE SENSATIONALIST PHILOSOPHY.

BY REV. WILLIAM HINCKS, F.L.S.,
PROFESSOR OF NATURAL HISTORY, UNIVERSITY COLLEGE, TORONTO.

Read before the Canadian Institute, 22nd February, 1859.

I am almost afraid that this paper may bring some discredit on our society, as it will be a subject of wondering inquiry, in what remote corner of the globe, in what peculiarly unenlightened region, the man is to be found who is willing to avow himself a Sensationalist, undeterred both by the general opinion of those at present most engaged in these studies, and by the anything but complimentary epithets with which his system and its advocates have been assailed, not merely by special opponents but even by those who assume the character of calm and impartial historians. I can only account for my obtuseness by observing that I am by no means a young man, that at the distant period when I entered with ardour on the study of the human mind, the Sensationalist philosophy stood well in public estimation, and was powerfully defended by men of acknowledged talents. After much reading, study and reflection I formed my opinions, and having done so I cannot change with changing fashions, see with new eyes, or even patiently sit down under the rebukes and imputations of any one who has himself drank from German fountains, and believes all wisdom to be with his masters. I may not hope in the present state of things to produce conviction in others, but I may perhaps claim to have the opportunity of expressing my views in a form which shall, at least, be free from the perversions of adversaries, and of openly refusing my assent to the prevalent dogmas, however weighty the names by which they are sanctioned. As this short paper relates to a subject upon which one interested in it might easily write a volume, upon which indeed I feel that a volume must be a large one to give space for doing justice to the discussion, I must begin by apologizing for offering so slight an attempt at the treatment of a great question, whilst at the same time I feel myself to be in danger of trying the patience of many who have not given attention to these pursuits, or to whatever degree they have done so, have been carried in the very contrary direction to that in which I persevere in working my way, and may therefore be

little prepared to appreciate what I shall offer. It is a sense of the injustice with which those who hold my views have been treated, that induces me to say something in their defence, although I must candidly confess that my philosophical reading is not quite up to the times, and that my attention has of late years been much diverted to other subjects. If, however, I should feel incompetent to discuss with you the various modifications of German Idealism, and to manage with ease its peculiar phraseology, I believe that I do understand what was really meant by the leading writers of the school, for which I shall accept Mr. Morell's name: *Sensationalist*, and that I know what inferences from their doctrines they who had carefully studied it admitted. When therefore I see these things totally misrepresented by popular authorities I feel entitled to offer a few words of explanation.

The philosophical system, now called Sensationalism, is regarded by its supporters as being no more than the fair carrying out of Mr. Locke's principles. Bishop Law prepared the way for it, whilst the philosophic physician, David Hartley, fully developed it and set it forth as a finished work, complete in all its parts, and even exhibited in its application to the conduct of life. Dr. Priestley perceived that Hartley's account of the physical cause of sensations and their corresponding ideas was misunderstood by many, and disapproved by others to a degree that made it an impediment to the fair consideration of his great doctrine of the association of ideas, and thence was induced to publish what related to the latter in a separate form, with some illustrative dissertations of his own, and in other works he defended in connection with Hartley's theory a peculiar modification of materialism. The speculations of Darwin went to such an extreme, and were so generally thought both false and pernicious as to bring no small odium on the whole system with which his extravagances seemed to be connected. For a time Sensationalism languished, cherished indeed by some learned and thoughtful men, but neglected by the crowd, and doing little to defend itself against adversaries or conciliate public approbation. At length Dr. Brown arose, belonging indeed to the Scotch idealist school,—of which Reid and Stewart were principal ornaments,—but adopting the great law of association, and in his various ingenious analyses of mental states manifestly following the method of the Sensationalists, whilst he rejected the name by which Hartley had expressed his theory, and pursued with ridicule and scorn the

physical part of it, as if hoping thus to conceal his extensive obligations to this great philosopher, or rather perhaps to avoid the imputation of any connection with a system unpopular in his country, and long denounced in the scene of his public teaching. I know of no ground for preferring the term *suggestion*, employed by Brown to *association*, the older name; the distinction between *simple* and *relative* suggestion does not appear to be founded on any essential difference or to be practically useful, and the laws of suggestion were soon shown to be reducible to much greater simplicity. Yet Dr. Brown appreciated and exhibited in a peculiarly pleasing manner some great truths, and displayed a power of thought joined with ingenuity and sagacity which command admiration. He has fallen under the imputation of inclination towards Sensationalism, and he is one whose aid, as far as it goes, any party might be proud of. Not to dwell on writers of secondary importance, we come next to JAMES MILL, one of the clearest of writers and closest of reasoners. He put aside, as not immediately needed, all inquiry respecting the physical cause of sensations and their physical relations with ideas, in which respect his judgment may be called in question; but beginning where he did, his work is a noble contribution to philosophy. He fully adopts the Hartleyan doctrine of association, and by simple and well chosen terminology, clearness of style, vividness of illustration, and a lucid order in his thoughts he has rendered the theory intelligible and interesting, whilst his admirable original views respecting language, and his beautiful analysis of some of the most complex ideas conveyed by it have thrown a new and bright light on the whole subject. I cannot feel satisfied with his account any more than with Hartley's, of the emotional part of our nature, to explain which, something more than he admits seems to be required, and I have a method of my own for endeavouring to complete in this respect the theory of the mind, but Mr. Mill's work seems to me, entitled to a place among the finest that have been produced on the philosophy of mind, and deserving of far more attention than has yet been bestowed upon it.

I need not here dwell on the abuses of sensationalism in France, or on the peculiar forms which it assumed in the hands of Helvetius, Condillac, Cabanis, and De Stutt de Tracey; the last mentioned beyond comparison, the best French writer of this school. I cannot but think the phraseology of Condillac more objectionable than what I take to be his real meaning. The *Ideologie* of De Stutt de Tracey, is both in-

teresting and instructive, and seems to me worth many volumes of the French school which has succeeded him.

The Germans have added nothing to the literature of Sensationalism which is too much opposed to their mystical tendencies ever to have secured any portion of their favour.

Let me now endeavour to explain the connection of the Sensationalist doctrine with Locke's philosophy, which you must be aware does not directly favour it. Locke rejected innate ideas, maintained that the first and the simplest mental states are sensations, and that from them as materials, the mind forms all its other states. The question arises, and may appear not to have been satisfactorily answered by Locke himself, *how* these other states, by him called ideas of reflection, are formed. We all recognise certain remnant copies or revivals of sensations recurring singly or in clusters, as the case may be, differing sufficiently from the actual sensations, yet irresistibly referred to them, as specially connected with them, and implying their previous existence. The inquirer asks, do these, variously combining together according to natural laws, produce all possible mental states; or are they altered by an action upon them of certain faculties inherent in the mind; or again, are they so altered and acted upon after being united with other states necessarily existing, though only made perceptible by such union and which thus constitute an equivalent of the supposed innate ideas? I know not that any other supposition than these three is possible in connection with Mr. Locke's primary principles. The latter must be adopted by the pure idealist if he at all followed out Mr. Locke's course of thought or admitted the first principles. The second was probably Locke's own view, but could not be sustained, if the first and simple supposition explains all the phenomena, or if the alleged faculties are shown by analysis to be mere cases of a general law. The first supposition is that adopted by the Sensationalist, who maintains that assuming only the uniform operation of certain very simple laws derived from a wide induction and shown to have at least a probable connection with the physical cause of sensations, he can show how all possible mental states, intellectual and emotional must arise from sensations and their revivals above referred to. He offers proof that what are described by writers of other schools as distinct faculties of mind are only cases of the results of the great laws, not at all requiring any supposition of distinct powers, and he undertakes to exhibit the composition and gradual formation of those very ideas,

in his view highly complex, which are usually referred to as examples of ideas incapable of being analysed, which must therefore have a necessary origin in the mind. For myself, I will only now say on this subject, that if any one capable of reasoning on such matters, and at all prepared by previous inquiries, can read Dr. Law's notes on the ideas of space, time, immensity, and eternity, in his celebrated edition of Archbishop King's origin of evil, and afterwards study James Mill's clear and masterly analysis of what is implied in these terms and still maintain that they represent simple ideas inherent in the mind and independent of external things; he and I differ so fundamentally and approach these inquiries from such different points that I know not where to seek any common ground, so as to see where our differences begin, or how they are to be settled.

Proceeding on what seemed to me the plainest possible principles, and unwilling to break the continuity of my reasoning I stated the relation of the ideas corresponding to sensations to the sensations themselves, as implying their previous existence, as something certain and generally admitted. I do not wish however to overlook the fact, that manifest and indisputable as this appears to my mind, and generally as it seems to be received as among the most certain truths, it is denied by those who have made a certain progress in the German idealist school of philosophy. As an example I refer to a man of great powers and great attainments, as well as of conspicuous position in the world of science, Dr. Whewell, of Cambridge, in his 'Philosophy of the inductive Sciences,' a work containing so much that is practically valuable, as to be greatly admired even by those who think its philosophical principles fundamentally erroneous. For the sake of conciseness, I quote from the author of the Historical and Critical Review of the speculative philosophy of the nineteenth century, the following, as the first of the points in which Dr. Whewell's work shows the transition which according to this writer philosophy is undergoing, from the Sensationalist to the Idealistic tendency: "In the broad distinction laid down between sensations and ideas; a distinction in which (unlike that of Locke, Mill, and many others,) the latter are shown to have no direct dependence upon the former, but an *a priori* existence of their own, as original forms or categories of the understanding."

It seems then according to these authorities that the idea arising in my mind of any particular object of sense is not a consequence of a previous sensation, is not derived from the sensation, but belongs to

the mind independently of it. Applied to general and abstract ideas, this is *realism* revived in full force, when we might have thought that it had received its final blow, and belonged only to history; but the language used carries us much further, and expresses something so contrary to familiar facts and plain evidence that I hardly know how to treat it.

When a Berkleyan denies altogether the existence of anything external to the mind, I understand his reasoning, and perhaps think it plausible, though I may fancy that I can see the fallacy of it, but if a material universe and a bodily frame of man furnished with senses, be admitted at all; if sensations themselves have any reality: I cannot comprehend the denial that the mind's copy of the sensation is derived from the sensation. The doctrine maintained on my own side I shall explain more fully as I proceed; the assertion incapable of evidence and made to give consistency to a theory, which I have brought under your notice, scarcely admits of argumentative treatment. It seems to me to be in itself a condemnation of the system which requires it.

It appears from what has been stated that Sensationalism professes to be a carrying out of Mr. Locke's leading ideas, by further examination of the nature and origin of that class of mental states of which his explanations are obviously incomplete or unsatisfactory. Some supporters of the doctrine, like James Mill, prefer not to meddle at all with the physical part of the question. To others this appears of no small importance in the way of evidence, and fairly within the reach of investigation. The actual dependence of sensation—though the sensations themselves belong to the mind,—on the nervous system, and this part of the frame forming the link of connection between mind and body, are truths physiologically established, generally admitted, and indeed only to be questioned by those who deny that we know anything but mind, and run into all the extravagances of a spiritual scepticism. Sensations then depend upon or uniformly accompany some kind of action or excitement of the nerves, and through them of the brain. But there are good and well known proofs that a sensation is not instantaneous, but continues as a mental state when the object no longer affects the nerve, and gradually fades away; which fact implies, of course, the continuance in the brain of the action whatever it be which caused the mental change called the sensation. We also know that there arise in our minds states which we recognise as copies or revivals of the sensations when no external

impression exists; it seems then reasonable and even necessary to conclude that these depend on a revived similar, but less vivid or less extended action of the nervous system, probably confined to the brain itself. We may be the more confident of this, from knowing as we do, that in some kinds of madness, and in some other forms of disease, which, though affections of the body, extend their influence to the mind, as well as in sleep, the revived sensation or idea may be so vivid as to create belief in an external impression, although none actually exists. Philosophers of this school have found it convenient to use the word *idea* to express the copy or revival of a sensation such as we have spoken of, and some have deemed it very important to trace the physical action as far as possible. The endeavour to refer the different kinds of mental action to different regions of the brain constitutes the basis of Phrenology, in which effort there has been some apparent success, and as it readily accounts for the different natural mental tendencies and capacities undeniably existing in different individuals, there might possibly have been much more complete success, if anatomical examination and patient observation of facts had been aided by juster views of the general laws of mind and the proper distinction of its so called faculties. We must not now, however, pursue this branch of the subject.

Dr. Hartley attempted the examination of the physical action introducing sensations with the best lights his age afforded, and concluded that there was reason to believe the nervous action to be vibratory. He consequently spoke of sensations as depending on vibration, whilst to express the less vivid or less extended action which he regarded as the corresponding physical cause of the *ideas* or revivals of sensations he invented the term *vibratiuncles* or lesser vibrations.

His object was to bring out strongly the relation between the sensations and their revivals, and thence the possibility that a principle of physical sympathy, strictly analogous with other known facts respecting the human frame, would explain and confirm the observed law according to which ideas are produced. The particular kind of action supposed was of no real importance to the theory—but, in truth, the objections commonly made to Hartley's explanation were drawn from strange perversions of his meaning by those who had never taken the trouble to study his statements. Think, for example, of men pretending to philosophy, ridiculing him for representing the nerves as acted upon like strings under tension, for which notion he never gave

the slightest pretence. What he thought of was communication along a line of minute particles some impulse, given at the external organ of sense, much in the manner of what we see to take place in a series of elastic balls. Our modern knowledge might suggest ideas of communicated action, not mechanical, which might help us on this subject and have indeed more recently been applied, though not always wisely, and within proper limits. But what Hartley proposed gave as good a notion of the real nature of the process as has ever yet been obtained, although modifications in the mode of expression might now be found expedient. We must, however, always recollect that the whole real importance of Hartley's physical theory is contained in these propositions: 1. That sensations belong to a specific action of the nerves and brain. 2. That revivals of sensations, called ideas, depend on a similar but less vivid or less extended action. 3. That ideas arise according to regular laws depending on the nature of nervous matter, and on a physical sympathy between similar contemporaneous or immediately successive excitements—giving them such mutual power over each other that the recurrence of one will bring up the idea of the other. These are propositions in themselves by no means improbable, and which have been independently supported by much curious evidence.

Whether the system be right or wrong we may safely conclude that the ridicule heaped upon Hartley's physical theory was totally misplaced, and originated in the blundering ignorance and prejudice of those who employed it.

I readily acknowledge that Dr. Hartley's attempt to digest his system into propositions and corollaries in mathematical form was injudicious; that his frequent recurrence to his vibration theory after he had once explained its evidence and purport was tiresome and repulsive, and that his style was far from being attractive; but I contend at the same time that in educing all mental states from sensations according to one fixed law, of which all supposed distinct faculties are but special cases, he has attained to the true interpretation of the nature of the mind, and has presented the principles of philosophy in their simplicity and grandeur in a way which ought to command the attention of thoughtful men, and which affords the best foundation for practical usefulness.

The mind which first perceived the real importance and extent of application of the law of association must have belonged to the highest

order, and might well claim to rank with the immortal discoverer of the law of gravitation, among the benefactors of science and of mankind; nor do I despair of a more enlightened age which shall have freed itself from the trammels of false systems now triumphant and fashionable, bestowing the honour which is due.

But the modern Sensationalist attempting to start in the manner I have indicated from Mr. Locke's fundamental principles, is probably told at once by his opponent that Locke was utterly mistaken in his rejection of innate ideas. It may be true, it is said, that the mind has no consciousness until the first sensation, but it has a constitution which determines the manner in which that sensation shall affect it, which gives to it a certain form and accompaniments. Our consciousness we are told is not of the sensation alone, but of that and something more derived from the mind itself and belonging to it—in overlooking which we should neglect the origin of our most essential ideas and most certain judgments.

Now it is quite certain that we have a specific constitution received from our Creator, which it is the object of mental science to understand; and if, beginning with sensations as the first states, and duly considering the law according to which ideas arise from them, and recur or combine together, we arrive at any states not to be thus accounted for, we must of course suppose some other origin for them: but we deny the existence of any such states and we ask for examples that we may consider them. We are probably referred to identity, space, and time. We reply that we have already considered what is conveyed by these terms, and find them to imply complex gradually acquired notions whose history and analysis we can trace with entire satisfaction to ourselves, and we maintain that any instances proposed would be found in the same category, we feel therefore fully authorized in the course we have pursued.

Another great objection popularly urged against us is, that Sensationalism involves materialism, scepticism, and even atheism. In reply, I beg leave to ask, what philosophical opinions have in modern times been found most fruitful in atheistical tendencies, or most manifestly opposed to the influences of religion? Without any doubt the answer must be, the German transcendental philosophy, which however is no more than idealism consistently worked out.

All doctrines may be pushed to extravagance or perverted to the sanction of what the more sober part of society deems serious error.

We must nevertheless seek truth, by the best means in our power, on the subject we are investigating, and when we are satisfied, follow it into its genuine consequences with sobriety and caution. As a matter of fact, Hartley rejected materialism, denied its following from his principles, and considered himself as only studying the nature of the connection established by our Creator between mind or spirit, and the bodily frame. The same is true of other eminent Sensationalists who had carefully examined the consequences of the doctrine they maintained; and if some eminent men of this school have been materialists, having dwelt on the connection of mental states with the physical frame, until they persuaded themselves that the former might be functions of the latter, and that there is no ground for inferring the independent existence of the spirit in man, let it in justice be kept in mind, that a large proportion of these have been as firm believers in God the author and governor of all things, in revelations made by Him of his purposes and will, and in the future life of man, as positively made known by Him, as any defenders of any other philosophical systems whatsoever. It is then a poor controversial artifice to set up materialism as a bug-bear to frighten the weak. Let it be left to its evidence. We may not think it likely to prevail, and may ourselves be abundantly satisfied with the arguments against it, but it is not a necessary or general consequence of Sensationalism; neither supposing it adopted, has it any necessary tendency towards the pernicious and revolting doctrines which some minds will entertain, and which have been founded upon the most opposite philosophical systems. Pantheism, one of the most delusive forms of atheism, is a frequent result, and often regarded as a necessary consequence of pure Idealism.

Having myself early adopted the sensationalist philosophy; having a firm belief in its ultimate prevalence, and seeing how it is misrepresented and perverted by those who profess to give information to inquirers, I hope to be indulged in offering these few remarks in explanation of our views to a Society, whose wide field embraces equally the philosophy of the mind and of nature, the abstract and practical sciences, and the whole extent of literature and art. I am not insensible to the weight of authority against my opinions, or to the value of much that has been written by those to whom in the general theory of the mind I am opposed; but I claim on my own side that we also have our great men, and high authorities, that we are not a set of

wild opponents of everything venerable, but can show genius, learning, piety, and sober, laborious inquiry, employed in investigating the actual phenomena of mind, without setting off from any fanciful assumptions; determining the laws which regulate them, and applying these to the most important practical purposes in connection with the science of reasoning, with education, government, natural morals, and everything that concerns the intellectual progress and social improvement of mankind.

REVIEWS.

Popular Geology. By Hugh Miller. Boston: Gould and Lincoln, 1859.

This, the last work, it may be presumed, that we are to have from the pen of the lamented Hugh Miller, must not be confounded, as its title would lead one to do, with the already sufficiently numerous and superficial class of works on Popular Science. The title, "Popular Geology of Scotland," would have indicated in some respects more definitely the scope of the work. In its treatment it is fully as popular as any of Hugh Miller's previous writings, while in originality of thought and novelty of speculation it is little less scientific than any of them. As is well known to the Geological world, the author was engaged for some time prior to his death upon what he intended to be his "*Maximum Opus*," the Geology of Scotland. The volume under notice contains the skeleton of this intended work, and consists of six lectures delivered before the Philosophical Institution of Edinburgh. It unites the graceful diction and apt simile of the author with an immense amount of original research,—qualities rarely associated in such happy combination. Hugh Miller belonged to that school of geologists, which holds that this earth has been gradually fitted for its present inhabitants, in opposition to those who maintain that "all things have been from the beginning as they are now." Mrs. Miller has contributed an able *resumé* of the progress of Geological Science, and exercises the general editorial oversight of this posthumous work. Several indications however, suffice to show that the notes of the original lectures are printed, very much in the shape in

which they were originally produced before an Edinburgh audience. Various illustrations might be produced in proof of this very pardonably scrupulous fidelity to the author's manuscript, but one will serve our purpose here, better than any others could possibly do. Lecture first begins with the consideration of the junction of geology and human history, with special reference to periods of Scottish history previous to the Roman invasion; and this introductory portion our author thus concludes: "The story of a civilized people I would fain study in the pages of their best and most philosophic historians; whereas I would prefer acquainting myself with that of a savage one archæologically and in its remains. And I would appeal in justification of the preference, to the great superiority in interest and value of the recently published 'Prehistoric Annals of Scotland,' by our accomplished townsman Mr. Daniel Wilson, over all the diffuse narrative and tedious description of all the old chroniclers that ever wore out life in cloister or cell." It is scarcely necessary perhaps to remind any of our Canadian readers, that the author of the work referred to by Hugh Miller in such terms of commendation, when addressing an Edinburgh audience to whom both were then well known; has now the citizens of our Upper Canada capital for his townsmen, and is specially known to ourselves as the editor of this Canadian Journal.

It cannot be overlooked by any intelligent critic of Hugh Miller's writings, amid all his high admiration of them, that there are passages of a theologic-controversial character, traceable to the circumstances under which some of them were first produced, in the columns of a religious and party newspaper. These lectures however, were prepared under altogether different circumstances, and designed for an audience whose presence is a safeguard against polemics. We have accordingly been gratified to find that the author does not touch upon the vexed questions involved in the theological bearings of Geology, which have already been discussed *ad nauseam*, and have become a nuisance to every practical Geologist. Commencing with the Post-tertiary, the author devotes the whole of the introductory lecture to the separation of the *geologic* from the *historic* age, in a manner highly pleasing to the antiquary,—here as everywhere else showing the large amount of general information he possessed. We are tempted to give the following rather lengthy extract, as a specimen of the author's pleasing style for the general reader; as it is only by giving such a continuous passages that the sustained vigour of his style, and the attractiveness

he throws around his theme, can be made fully apparent. It occurs in the fourth lecture, and is entitled "A Walk into the Wilds of the Oolite Hills of Sutherland:"

"Let us, however, ere we part for the evening, adventure a short walk into the wilds of the Oolite, in that portion of space, now occupied on the surface of the globe by the north-eastern hills of Sutherland, where they abut on the precipitous Ord.

"We stand on an elevated wood-covered ridge, that on the one hand overlooks the blue sea, and descends on the other towards a broad river, beyond which there spreads a wide expanse of a mountainous forest-covered country. The higher and more distant hills are dark with pines; and save that the sun, already low in the sky, is flinging athwart them his yellow light and gilding, high over shaded dells and the deeper valley's cliff, and copse, and bare mossy summit, the general colouring of the back-ground would be blue and cold. But the ray falls bright and warm on the rich vegetation around us,—tree ferns, and tall club mosses, and graceful palms, and the strangely proportioned cycadaceæ, whose leaves seem fronds of the bracken fixed upon decapitated stumps, and along the banks of the river we see intensely green hedges of the feathered equisetaceæ. Brown cones and weathered spiky leaves strew the ground; and scarce a hundred yards away there is a noble Araucarian, that raises, sphere-like, its proud head more than a hundred feet over its fellows, and whose trunk, bedewed with odoriferous balsam, glistens to the sun.

"The calm stillness of the air makes itself faintly audible in the drowsy hum of insects; there is a gorgeous light-poised dragon-fly darting hither and thither through the minuter great-like groups; it settles for a moment on one of the lesser ferns, and a small insectivorous creature, scarce larger than a rat, issues noiselessly from its hole, and creeps stealthily towards it. But there is the whirr of wings heard overhead, and, lo! a monster descends, and the little mammal starts back into its hole. 'Tis a winged dragon of the Oolite, a carnivorous reptile, keen of eye and sharp of tooth, and that to the head and jaws of the crocodile adds the neck of a bird, the tail of an ordinary mammal, and that floats through the air on leathern wings resembling those of the great vampire bat. We have seen in the minute, rat-like creature, one of the two known mammals of this vast land of the Oolite.—the insect-eating *Amphithirium*; and in the flying reptile, one of its strangely organized *Plecodactyls*.

"But hark! what sounds are these? Tramp, tramp, tramp,—crash, crash. Tree-fern and club moss, cycas and zamia, yield to the force and momentum of some immense reptile, and the colossal *Iguanodon* breaks through. He is tall as the tallest elephant, but from tail to snout greatly more than twice as long; bears, like the rhinoceros, a short horn on his snout; and has his jaws thickly implanted with saw-like teeth. But, though formidable from his great height and strength, he possesses the comparative inoffensiveness of the herbivorous animals; and, with no desire to attack, and no necessity to defend, he moves slowly onward, deliberately munching, as he passes, the succulent stems of the cycadacea. The sun is

fast sinking, and, as the light thickens, the reaches of the neighbouring river display their frequent dimples, and now and anon long scaly jacks are raised over its surface. Its numerous crocodilons are astir; and now they quit the stream, and we see its thick hedge-like lines of equesotical open and again close, as they rustle through, to scour in quest of prey, the dark meadows that line its banks. There are tortoises that will this evening find their protecting armour of carapaca and plastron all too weak, and close their long lives of centuries. And now we saunter downwards to the shore, and see the ground swell breaking white in the calm against ridges of coral scarce less white. The shores are strowed with shells of pearl. The whorled Ammonite and the Nautilus; and amid the gleam ganoidal scales, reflected from the green depths beyond, we may see the phosphoric trail of the Belemnite, and its path is over shells of strange form and name,—the sedentary Gryphæa, the Pema, and the Plagiostoma.

“But, lo! yet another monster. A snake-like form, surmounted by a crocodilean head, rises high out of the water within yonder coral ledge, and the fiery, sinister eyes peer inquiringly round, as if in quest of prey. The body is but dimly seen, but it is short and bulky compared with the swan-like neck, and mounted on paddles instead of limbs; so that the entire creature, wholly unlike anything which now exists, has been likened to a vast boa constrictor threaded through the body of a turtle. We have looked upon the Pleurosaurus. And now outside the ledge there is a huge crocodilean head raised, and a monstrous eye, huger than that of any other living creature,—for it measures a full foot across,—glares upon the glimmer and less powerful reptile, and in an instant the long neck and small head disappear. That monster of the immense eye,—an eye so constructed that its focus can be altered at will, and made to compromise either near or distant objects, and the organ itself adapted either to examine microscopically or to explore as a telescope,—is another be-paddled reptile of the sea, the *Telyosaurus*, or fish-lizard. But the night comes on, and the shadows of the woods and rocks deepen; there are uncouth sounds along the beach and in the forest; and new monsters of yet stranger shape are dimly discovered moving amid the uncertain gloom.

“Reptiles, reptiles, reptiles,—flying, swimming, waddling, walking,—the age is that of the cold-blooded, ungenial reptiles; and, save in the dwarf and inferior forms of the marsupials and insectivora, not one of the honest mammals has yet appeared. And now the moon rises in clouded majesty; and now her red wake brightens in one long strip of the dark sea; and we may mark where the *Ceteosaurus*, a sort of reptilean whale, comes into view as it crosses the lighted track, and is straightway lost in the gloom. But the night grows dangerous, and these monster-haunted woods were not planted for man. Let us return then to the safer and better furnished world of the present time, and to our secure and quiet homes.”

The above may appear but the vision of a poetic fancy, but “those who have read of the book of nature” can testify to its reality; and to our readers it is a sample of much else in the volume which

presents science under new and singularly suggestive aspects. Lecture five relates to the Lias Hills of Bathie,—a most remarkable deposit near the town of Cromarty, the birth-place of the author; the Trias and Permian systems, and the carboniferous era with its rich and beautiful Flora. The Scottish audience, as well as the Scottish authorship, is present throughout the volume. The Scottish Archæologist, Wilson, is referred to in the first Lecture. The Scottish poet, "Delta," is called in, in Lecture third, preparatory to the idealising of nature's poetical associations, in reference to Geology. Lecture fourth begins with a suggestive passage from the "Guy Mannering," of Scott; and even where our author turns with Sir Charles Lyell's aid to the facts and reasonings derived from the study of our Canadian Lake district, it is only thereby to illustrate the Geology of Scotland, "during the chill and dreary period of the boulder clay." In the sixth lecture the author is at home in his favorite Old Red Sandstone: part of the great Devonian system so extensively developed in Western Canada. The Silurian system closes this lecture, and completes the main scope of the work. An Appendix entitled, "Descriptive sketches from a Geologist's portfolio," is added at the close of the volume, for the insertion of which Mrs. Miller needlessly apologises; for nothing can be more useful than such suggestive ideas as are there wrought out. Often a small and apparently obscure fact thus noted down has helped to the solution of a difficult problem. The wonderful arrangement of the Tertiaries, for example, although far from complete, has been effected in this manner by the filling up of gaps in the succession of strata. We cannot take leave of this most interesting volume without renewing the reiterated expression of regret at the irreparable loss which science and literature alike sustained in the death of one whose peculiar gift in popularising science, as well as in enlarging its bounds, is so happily illustrated in this work. With him the popular treatment of Geology consisted not in evading and ignoring its most difficult researches, but in clothing its profoundest speculations and its abstrusest inquiries in language and thoughts so fascinating that the popular reader was lured on to a mastery of recondite truths by the overruling influence of the master mind which presented them in so attractive a guise.

Meteorites. By Elijah P. Harris, Ph. D. Gottingen: W. F. Kröstner, 1859.

This is an exceedingly useful little pamphlet, containing some original investigations by Dr. Harris, and also a very carefully compiled chronological list of all known meteorites. In Kämtz Meteorologie, and Humboldt's Cosmos, we have catalogues of the same kind; but every year has made large additions to their lists, and Dr. Harris has undertaken the praiseworthy task of bringing our information up to the present date.

In the introduction, our author gives a brief account of the various theories which have been proposed, to account for those extraordinary visitors to our planet, and as might be expected, gives in his adherence to the idea of Chladni, viz: that they are of cosmical origin, or in the words of Lichtenberg, "Weltspähne: World shavings."

The author has omitted to mention the theory of Dr. Smith, which, as a compromise between the cosmical and the lunar hypothesis, is of some interest. According to this theory, the meteorites have been ejected from volcanoes in the moon; not directly on to the earth, but with such force, as to remove them from the influence of the moon's attraction and to cause them to acquire a course of their own, under the influence of the neighbouring planets. The hypothesis has been critically examined by Mr. Gregg.

It is only recently, that Wöhler announced the presence of an organic or carbonaceous matter in the meteorite of Kaba and Dr. Harris has also proved the presence of a similar substance in the stone from the Cape of Good Hope: two very curious discoveries, which throw some light on the previous history of these remarkable bodies.

Dr. Harris has furnished very carefully conducted analyses of these meteorites, first, the stone which was observed to fall near Krahova in Hungary, on the 19th May, 1858, that of Bokkewald, Cape of Good Hope, 13th October, 1838, and the meteorite of Mont Rejean in France, which fell on 9th December, 1858.

The following table represents the results of the analyses:

	I.	II.	III.
Magnetic	8.56	....	8.41
Unmagnetic	91.44	....	91.59

MAGNETIC PART.			
	I.	II.	III.
Iron.....	82.95	....	84.71
Nickel	14.41	....	12.11
Cobalt.....	1.08	....	0.72
Manganese .....	....	....	0.50
Chromium.....	0.76	....	trace.
Phosphorus	0.12	....	"
Sulphur	trace.	....	2.14

THE UNMAGNETIC PART.			
	I.	II.	III.
Silica	41.14	30.80	42.00
Magnesia	27.06	22.20	27.39
Protoxide of iron	24.57	29.94	19.65
Alumina	2.46	2.05	2.46
Lime	0.75	1.70	....
Protoxide of Manganese.....	0.46	0.97	0.33
Soda	1.92	1.23	1.23
Potassa	0.56		0.20
Graphite	0.15	1.67	....
Sulphur	trace.	3.38	2.09
Copper	"	0.03	0.26
Iron .....	....	2.50	....
Nickel .....	....	1.30	....
Bituminous matter.....	....	0.25	....
Oxide of Chromium.....	....	....	0.33
Iron as Sulphide .....	....	....	2.74

Owing to the work having been printed at Göttingen, it contains an unfortunate quantity of typographical errors, and of German expressions which occasionally render the writer's meaning somewhat obscure. This occurs particularly in the portion where the method of analysis is described, and it is to be hoped, that as Dr. Harris is now a resident amongst us, holding the chair of modern languages in Victoria College, he may be induced to reproduce this portion of his pamphlet in a corrected form.

H. C.

Taylor's Treatise on Poisons. 2nd Edition. Blanchard & Lea. 1859.

In the July number of the Canadian Journal, while reviewing that portion of Dr. Taylor's work on poisons, which treats of arsenic, the writer was induced to make some objections to the restricted use of

Reinsch's test as recommended by the author, and at the conclusion of the paper, brought forward the preliminary evidence in the Smethurst case, as a confirmation of his views, inasmuch as a solution was examined for arsenic, a number of times without success; and the poison was only discovered after repeated operations. We formerly gave great credit to Drs. Taylor and Odling, for their perseverance and skill in detecting arsenic under such circumstances, a proceeding which is only rendered difficult, by a bigoted adherence to one method of treatment. We then intimated that the non-detection of arsenic must have been owing to some other mysterious agent than chlorate of potassa. The mystery has since then been cleared up; the fact being, that there was no arsenic present, except such as existed in the copper employed, and was dissolved during the progress of the experiment.

Herapath has well observed, that no ordinary copper could possibly contain such an amount of arsenic as was found by Dr. Taylor; this is undoubtedly true, but on the other hand it is well known, that no reliance is to be placed on the method adopted by Dr. Taylor for ascertaining the quantity present.

In the evidence given at the trial which has since taken place, it appears that arsenic was detected in a portion of an evacuation, but it must be remembered that the same copper was employed and that nothing is said concerning the absence of nitrates, chlorates, &c.

In some of the articles which have appeared in recent English newspapers on the subject, doubt is thrown on chemical evidence as to the presence of poisons. In the case of arsenic and all mineral poisons, we most decidedly object to this opinion; there is no difficulty and no uncertainty affecting our decision on this subject, if proper precautions be adopted, and if we do not refuse to avail ourselves of the results of recent and accurate investigations.

In a late number of the *Philosophical Magazine*, Davy has shown that arsenic is present in the superphosphate of lime, used as a manure, owing to the employment of impure sulphuric acid in its preparation. He has also detected it in turnips grown on soil treated with this manure, and in peas grown in mould moistened with a solution of arsenious acid.

The test employed in all cases, was however, that of Reinsch, and the copper may have contained arsenic. Davy states that the reagents were proved to be pure, but as in the principal experiment, the copper was boiled with the acid for three hours, and as we know from Odling's

experiments, that copper is really dissolved after long boiling, so much doubt is thrown on these results as to call for further and more accurate investigation.

H. C.

SCIENTIFIC AND LITERARY NOTES.

NATURAL HISTORY.

THE EXTINCT AMERICAN HORSE.

At a recent meeting of the Academy of Natural Sciences of Philadelphia, Prof. Holme, exhibited a collection of Fossils from the post-pliocene of South Carolina, accompanied with some highly interesting remarks and references. From the latter we select the following, especially for its bearing on the former existence of the horse on this continent, contemporaneously with the Mastodon and others of the later extinct fauna of prehistoric times:—

“The collections contain remains of the horse, ox, sheep, hog and dog, which I feel strongly persuaded, with the exception of many of those of the first mentioned animal, are of recent date, and have become mingled with the true fossils of the post-pliocene and eocene formations, where these have been exposed on the banks of the Ashley River and its tributaries. In regard to the remains of the horse, from the facts stated in the account given of them in the succeeding pages, I think it will be conceded that this animal inhabited the United States during the post-pliocene period, contemporarily with the *mastodon*, *megalonyx*, and the great broad fronted bison.

“Many of the mammalian remains are of recent animals, or at least are undistinguishable from the corresponding parts of the latter; and if they are not accidental occupants of the post-pliocene deposit, are highly interesting, as indicating their contemporaneous existence with many species and genera now extinct.

“It appears to be quite well authenticated that the horse, which is now so extensively distributed, both in a wild and domestic condition, throughout North and South America, did not inhabit these continents at the time of their discovery by Europeans. With this fact in view, in conjunction with the circumstance that animal remains of late periods may become accidental occupants of earlier geological formations; we should require strong evidence to be advanced before it is admitted that the horse belonged to an ancient fauna of the western world. At the present time the evidence appears to be sufficiently ample to justify the latter conclusion, and it is further sustained by the discovery, in the same part of the world, of the remains of two species of the closely allied genus *Hipparion*.

“Remains of the horse, discovered in Brazil, Buenos-Ayres, Chile, have been indicated by Dr. Lund, Prof. Owen, M. Weddell and M. Gervais. These remains exhibit no well marked characters distinguishing them from corresponding portions of the skeleton of the recent horse, and from a comparison of the figures and

descriptions which have been given of most of them, together with some remarks of the latter author, it is doubtful whether they belong to more than a single species, the *Equus neogæus* of Dr. Lund.

“Prof. Buckland and Sir John Richardson have described remains of the horse, discovered in association with those of the elephant, moose, reindeer, and musk-ox, in the ice cliffs of Eschscholtz Bay, Arctic America.

“In the United States, remains of the horse, chiefly consisting of teeth, have been noticed by Drs. Mitchell, Harlan, and DeKay, but these gentlemen have neither given descriptions nor figures by which to identify the specimens. Some of the latter are stated to have been found in the vicinity of Neversink Hills, New Jersey; others in the excavation for the Chesapeake and Ohio Canal, near Georgetown, District of Columbia; and some in the latter tertiary deposit on the Neuse River, in the vicinity of Newbern, North Carolina. Dr. DeKay, in speaking of such remains, says, ‘they resemble those of the common horse, but from their size apparently belong to a larger animal,’ and he refers them to a species with the name of *Equus major*.

“Dr. R. W. Gibbes has given information of the discovery of teeth of the horse in the pliocene deposit of Darlington, South Carolina; in Richland District of the same State; in Skidaway Island, Georgia, and on the banks of the Potomac River. He further observes that he obtained the tooth of a horse, from eocene marl, in the Ashley river, South Carolina, but the researches of Prof. Holmes indubitably indicates the specimen to have been an accidental occupant of the formation.

“Specimens of isolated teeth, and a few bones of the horse, from the post-pliocene and recent deposits of this country, have frequently been submitted to my inspection. Many of these I have unhesitatingly pronounced to be relics of the domestic horse, though I feel persuaded that many remains of an extinct species are undistinguishable from the recent one.

“Whether more than one extinct species is indicated among the numerous specimens of teeth I have had the opportunity of examining, I have been unable satisfactorily to determine. The specimens present so much difference in condition of preservation, or change in structure; so much variation in size, from that of the more ordinary horse to the largest English dray horse; and such variableness in constitution, from that of the recent horse to the most complex condition belonging to any extinct species described, that it would be about as easy to indicate a half dozen species as it would two.

“Under the circumstances, I would characterize the extinct horse of the United States as having had about the same size as the recent one, ranging from the more ordinary varieties to the English dray horse, with molar teeth, frequently comparatively simple in construction, but with a strong disposition to become complex.

“Among the number of teeth of the horse in Prof. Holmes’ collection labelled as coming from the post-pliocene deposit of Ashley River, there are several which, from their size, construction and condition of preservation, I feel convinced are of recent date: and these no doubt became mingled with the true fossils of that formation where it is exposed on the Ashley River, in which position I personally found undoubted remains of the recent horse and other domestic animals

and objects of human art, mingled with remains of fishes, reptiles, and mammals, washed by the river from the banks, composed of eocene and post-pliocene deposits.

"Teeth of an extinct species of horse, however, undoubtedly belong as true fossils to the post-pliocene formations in the vicinity of Charleston. These are usually, hard in texture, stained brown or black from the infiltration of oxide of iron, sometimes well preserved, but more frequently in a fragmentary condition and water-worn. Generally they are not larger than the teeth of the more ordinary varieties of the domestic horse, and sometimes are quite as simple in the plication of their enamel, but usually are more complex and sometimes exceedingly so.

"One figured represents a first superior molar tooth, neither larger nor more complex in structure than the corresponding tooth of the recent horse. This specimen, which is dense and jet black in color, was obtained by Prof. Holmes from a stratum of ferruginous sand, two inches thick, exposed on the side of a bluff, on Goose Creek, about twelve miles from Charleston.

"Having expressed a desire to see the locality from which the tooth just mentioned was obtained, Prof. Holmes afforded me the opportunity of doing so. The bluff is about thirty feet high; its base is formed of a pliocene limestone, about fifteen feet thick, and composed of the debris of marine shells; above this is the stratum of ferruginous sand, of post-pliocene age, containing numerous pebbles and rolled fragments of bone all blackened like the tooth obtained from the same position. Overlying the latter stratum, there is a layer of stiff blue clay, about two feet in thickness, and above this there are about twelve feet of sand and earth-mould.

"A similar blackened tooth was obtained from the same formation at Doctor's Swamp, John's Island.

"Another figure represents a remarkably well preserved specimen of a lower molar above referred to from Georgia, where it was discovered by J. H. Couper, in association with equally well preserved remains of other extinct animals. The tooth is brown in color, and it neither differs in size nor form from its homologue in the recent horse.

"In the collection of fossils of Prof. Holmes, there is the specimen of an upper first large molar, labelled from Texas, represented in figure 5. The tooth is of the largest comparative size, and exhibits the highest degree of complexity in the folding of its enamel; in both of which characters it differs in such a remarkable degree from the corresponding tooth, represented in figure 5, from the post-pliocene formation of South Carolina, that it appears hardly possible that these two teeth should belong to the same species of horse.

"A remarkably well preserved specimen of an upper molar-tooth, jet black in color, and an incisor, yellow and quite friable in texture, both belonging to the extinct horse, from North Carolina, have been submitted to my inspection by Prof. Emmons.

"Among the most interesting of the fossils discovered by Prof. Holmes, in the post-pliocene beds of the Ashley River, are two molar teeth of a species of the equine genus *Hippotherium*. These are the first remains of the latter discovered in America, and they indicate the smallest known species.

"Both specimens are from the upper jaw, and they are well characterized, not only by the isolation of the internal median column, but also by the complex plication of the interior or central enamel columns.

"The larger specimen is firm in texture; has the enamel stained jet black, and the dentine and cement gray.

"I have personally had the opportunity of inspecting remains of the tapir, found in Texas, Louisiana, Kentucky, Mississippi, Indiana, Ohio and South Carolina, proving an extensive range of this animal at one time over the country of the United States.

"The specimens which were presented by Dr. Carpenter to the Academy of Natural Sciences of Philadelphia, on close comparison are not found to differ from the corresponding parts of the living *Tupia americana*.

"The post-pleiocene deposit of the Ashley River contains a number of small fragments of molar teeth, and one nearly entire and unworn crown of a second lower molar, which have the same characters of form and size, as in the living tapir. Besides these, the same collections contain fragments of lower molars, and two nearly entire crowns of upper molars, having the exact form of the corresponding teeth of the *T. americana*, but larger in size.

"Teeth of the beaver, jet black in color, have likewise been obtained from the post-pleiocene deposit of Ashley River.

"The collections contain numerous specimens of blackened molar teeth, together with a few incisors and fragments of jaws, from the Ashley post-pleiocene deposit which neither differ in form nor size from the corresponding parts of the recent musk-rat.

"Remains of *Lepus sylvaticus*—common gray rabbit—have been found in association with those of other rodents and of the extinct peccary near Galena, Illinois. A few specimens of molar teeth, black in color, apparently belonging to this species, were obtained from the post-pleiocene beds of the Ashley River.

"Several small fragments of teeth of the *Megatherium*, in Prof. Holmes' collection, were obtained from the post-pleiocene bed of the Ashley River. Previously to the discovery of those specimens, remains of the *Megatherium* had been found in no other locality of North America than in the State of Georgia.

"Two small fragments of lower molar teeth of *Myiodon harlani* were obtained from the Ashley post-pleiocene beds. One of the fragments is represented in figure 21, plate xvi. of 'A Memoir on the extinct Sloth Tribe of North America' by the author."

On these remarks from the pen of Professor Leidy, Professor Holmes observes:

As regards the specimens of human art found as above, it must be remarked that it is only at this locality—Ashley Ferry—that we find such relics. Here at the base of a low bluff, is a beach of eoene marl; above the bluff is a farm-yard, and all the sweepings of the premises, consisting in part of old hoes, broken plough-shares, and fragments of crockery-ware, etc., are thrown into the river, and lie mingled with the fossils which are washed out of the bluff, and scattered over the surface of the beach below, which is exposed at low tide. At no other locality on this river, and there are several, viz.: Ramsay's, Clement's, Greer's, Middleton's, &c., where similar fossils are found, do we obtain relics of human art; at least I have never found such.

From the foregoing it would appear that of the ancient fauna of America, which included representatives of many of our present domestic animals, some species have undoubtedly become extinct; but I confess I am not yet prepared to admit from any evidence yet adduced, or from my own examinations, that all of the living species are distinct from those found fossil in the post-pliocene. The teeth and bones of the rabbit, raccoon, opossum, deer, elk, hog, dog, sheep, ox and horse, are often found in these beds, and though associated with those known to be extinct, such as mastodon, megatherium, hipparion, &c., need not necessarily be referred to extinct races also; since their remains cannot be distinguished from the bones and teeth of the living species.

It has been just remarked that about ninety-five per cent., or nearly all of the one hundred and fifty shells of molluscous animals from these beds are specifically identical with the recent or living species of the coast,—two are found only at the south of this, and two are extinct. Of the vertebrates from the same bed, the tapir, peccary, raccoon, opossum, deer, musk-rat, rabbit, beaver, and elk have still their living representatives, generically, if not specifically; and even of the identity of species there seems to be no doubt, as no anatomical differences can be discerned. Two of these species, like the mollusca just alluded to, no longer live in South Carolina; the tapir and peccary are only found in South America and Mexico; the musk-rat, elk, and beaver, though extinct on the Atlantic coast, are still living in the interior of the country. And though it has been acknowledged that the mastodon, megatherium, elephant, glyptodon, and two species of Equine genera, &c., are entirely extinct, yet the discoveries made of the remains even of some of these, would indicate that they still existed at a period so recent, that, in the language of Professor Leidy, "it is probable the red man witnessed their declining existence."

The peccary, or Mexican hog, an animal common in Mexico, is not indigenous to the Atlantic United States; but his bones have been found associated with human remains in caves used as cemeteries by the Aborigines. "A tomb in the city of Mexico," according to Clavigero, (?) "was found to contain the bones of an entire mammoth, the sepulchre appearing to have been formed expressly for their reception." And "Mr. Latrobe relates that during the prosecution of some excavations, near the city of Tezeuco, one of the ancient roads or causeways was discovered, and on one side, only three feet below the surface, in what may have been the ditch of the road, there lay the entire skeleton of a mastodon. It bore every appearance of having been coeval with the period when the road was used."

Again says Professor Holmes, I extract from Professor Leidy's letter:

"The early existence of the genera to which our domestic animals belong, has been adduced as presumptive evidence of the advent of man at a more remote period than is usually assigned. It must be remembered, however, even at the present time, that of some of these genera only a few species are domesticated; thus of the existing six species of *Equus* (horse) only two have ever been freely brought under the dominion of man.

"The horse did not exist in America at the time of its discovery by Europeans; but its remains, consisting chiefly of molar teeth, have now been so frequently

found in association with those of extinct animals, that it is generally admitted once to have been an aboriginal inhabitant. When I first saw examples of these remains I was not disposed to view them as relics of an extinct species; for although some presented characteristic differences from those of previously known species, others were undistinguishable from the corresponding parts of the domestic horse, and among them were intermediate varieties of form and size. The subsequent discovery of the remains of two species of the closely allied extinct genus *Hipparion*, in addition to the discovery of remains of two extinct equine genera of an earlier geological period, leaves no room to doubt the former existence of the horse on the American continent, contemporaneously with the Mastodon and *Megalonyx*; and man probably was his companion."

The result of the whole seems to be, that of the animals found fossil in the post-pliocene beds, all the mollusca of the present day are undoubtedly a perpetuation of the same species; that of the higher order of vertebrata, the tapir, peccary, raccoon, opossum, deer, elk, and musk-rat are equally entitled to be considered the descendants of this ancient race. And if the claims of the mollusca to this distinction rest upon a secure basis, because they are peculiar to this country, and not obnoxious to suspicion of foreign immigration, it must be recollected that this is equally true of the above named animals.

Those which have hitherto been regarded as of recent and European origin, are the horse, sheep, hog and ox; and it must be reserved perhaps for future consideration to determine how far the negative proof of the non existence of these animals in the country at the time of its discovery may be regarded in each individual case sufficiently strong to settle the question of his extinction and re-introduction, when so many of his associates and contemporaries have succeeded in maintaining an unbroken line of descent down to the present day.

The questions involved in the final results of these discoveries are as varied as they are important. Professor Agassiz has taken up the inquiry with lively interest, and in a letter to Professor Holmes observes:—"The circumstances under which these remains are found, admit of no doubt, but the animals from which they are derived, existed in North America long before this continent was settled by the white race of men, together with animals which to this day are common in the same localities, such as the deer, the musk-rat, the opossum, and others only now found in South America, such as the tapir. This shows beyond the possibility of controversy, that animals which cannot be distinguished from one another, may originate independently in different fauna, and I take it that the facts you have brought together are a satisfactory proof that horses, sheep, bulls and hogs, not distinguishable at present from the domesticated species, were called into existence upon the continent of North America prior to the coming of the white race to these parts, and that they had already disappeared here when the new comers set foot upon this continent; but the presence of tapir teeth among the rest show also that a genus peculiar to South America and the Sunda Islands existed also in North America in those days, and that its representative of that period is not distinguishable from the South American species."

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST—JUNE, 1889.
 Latitude—43 deg. 39.4 min. North. Longitude—5 h. 17 min. 33 sec. West, Elevation above Lake Ontario, 108 feet.

Days	Barom. at temp. of 32°.			Temp. of the Air.			Excess of above Average			Tens. of Vapour.			Humidity of Air.			Direction of Wind.			Re-sultant Direc-tion.			Velocity of Wind.			Rain in Inches.	Snow in Inches.
	Temp. of the Air.			Excess of above Average			Tens. of Vapour.			Humidity of Air.			Direction of Wind.			Re-sultant Direc-tion.			Velocity of Wind.							
	6 A.M.	10 P.M.	MEAN.	6 A.M.	10 P.M.	MEAN.	6 A.M.	10 P.M.	MEAN.	6 A.M.	10 P.M.	MEAN.	6 A.M.	10 P.M.	MEAN.	6 A.M.	10 P.M.	MEAN.	6 A.M.	10 P.M.	MEAN.	6 A.M.	2 P.M.	10 P.M.			MEAN.
1	29.760	29.732	29.026	20.0953	52.3	60.6	56.6	36.35	0.60	368.	430.	400.	360.	81.	88.	87.	NNE	EbN	S7E	3.2	8.0	3.5	3.83	5.02	0.320	
2	496	542	564	5317	55.9	71.7	59.6	64.23	+ 6.97	432.	370.	338.	388.	97.	68.	68.	SSW	SWbS	S67W	8.4	15.0	6.0	7.87	8.23	0.035	
3	503	613	830	6882	56.8	61.7	41.8	52.22	- 5.33	386.	213.	174.	233.	83.	64.	62.	SSW	WbN	N52W	13.0	23.5	16.2	15.70	17.81	Inap	
4	326	935	926	9295	36.4	39.1	36.8	38.13	- 19.72	139.	140.	161.	143.	65.	69.	62.	NWbN	NW	N53W	13.0	9.8	2.4	4.76	8.10	Inap	
5	925	881			49.7	56.3				106.	246			64.	54.	51.	NWbN	S	S65W	4.6	13.2	5.0	2.21	5.67		
6	900	876	824	8570	45.8	45.3	48.7	53.27	- 5.18	210.	196.	249.	218.	67.	71.	56.	NWbN	Calm.	S1E	0.6	4.5	0.0	2.75	3.19		
7	792	688	889	6140	50.1	62.0	59.5	57.77	- 0.08	272.	293.	339.	311.	74.	64.	63.	EbS	SbE	S67E	1.0	8.6	4.0	4.46	6.02	0.185	
8	304	409	682	4768	68.3	62.4	46.9	55.50	- 3.57	450.	313.	253.	321.	87.	76.	73.	SSW	NWbN	N63W	0.2	30.0	1.0	11.63	14.34	0.090	
9	711	806	587	6280	46.9	58.1	56.1	54.32	- 5.17	248.	303.	280.	291.	71.	61.	64.	NNW	WSW	N63W	6.0	8.5	5.2	4.96	8.78	0.050	
10	597	685	845	7187	41.7	51.9	42.5	44.85	- 14.93	160.	158.	164.	160.	59.	55.	59.	NW	NW	N48W	11.5	22.2	5.2	11.71	12.27	0.030	
11	949	908	901	9155	36.4	53.2	43.6	45.62	- 14.37	156.	213.	235.	200.	73.	51.	60.	NWbN	SbE	S10E	11.0	12.5	3.4	4.88	7.04		
12	878	697			45.1	53.4				247.	233			82.	62.	60.	EbS	EbS	S58E	2.5	9.0	3.0	4.75	6.38	0.293	
13	412	437	637	5135	58.1	65.0	59.9	61.90	+ 1.32	457.	589.	439.	504.	95.	85.	89.	NNW	SWbS	S52W	9.8	4.8	8.0	3.88	7.06	1.575	
14	708	684	614	6574	54.8	59.2	55.9	56.53	- 4.30	370.	389.	410.	399.	88.	77.	92.	NNW	EbS	N80E	7.0	9.5	2.8	4.04	7.75		
15	444	265	372	3397	52.7	72.2	63.1	62.37	+ 1.23	374.	617.	374.	468.	94.	78.	64.	EbN	SbW	S71W	0.8	14.0	13.4	3.95	7.02	0.965	
16	496	662	582	5502	53.8	58.3	50.3	54.62	- 6.73	316.	312.	221.	253.	76.	63.	58.	NW	NWbN	N38W	5.4	7.5	2.5	4.56	5.58		
17	596	563	505	5478	49.8	57.0	53.6	54.27	- 7.38	261.	312.	289.	273.	72.	67.	70.	NbE	NW	N24E	4.8	5.2	4.6	4.56	6.74		
18	593	550	593	5693	53.0	67.1	57.7	59.27	- 2.68	254.	298.	233.	236.	62.	31.	48.	NbW	NW	N39W	9.5	11.5	6.8	4.82	7.57		
19	633	590			53.9	67.1				233.	163			68.	25.	35.	NbW	SEbS	S72E	0.5	7.2	3.5	2.79	4.08	0.050	
20	431	321	349	3503	53.7	63.9	57.4	57.72	- 4.73	361.	476.	425.	413.	87.	79.	90.	NbE	EbS	N70E	1.2	10.6	2.5	2.79	4.07	0.422	
21	353	350	367	3583	55.9	61.3	53.4	57.40	- 5.27	357.	397.	365.	385.	86.	73.	80.	NbW	EbS	S87W	3.8	7.2	0.2	4.36	5.33		
22	394	490	586	4930	55.9	66.4	57.9	60.67	- 2.29	375.	443.	389.	337.	81.	68.	80.	W	SSW	N55W	5.0	9.5	5.4	3.66	6.25	Inap	
23	674	704	725	7050	55.9	67.1	59.5	62.10	- 1.03	332.	368.	316.	347.	73.	55.	63.	NbW	SbE	N43W	1.6	9.2	4.0	1.69	4.46		
24	757	707	662	7047	60.3	69.3	60.2	63.42	+ 0.47	334.	426.	375.	390.	63.	60.	72.	NbE	EbS	N11E	6.4	6.5	1.0	4.06	4.58		
25	636	703	721	7038	59.9	73.3	63.9	66.03	+ 2.05	301.	408.	362.	375.	75.	50.	60.	N	SbW	N34E	0.5	7.5	7.2	2.10	4.52		
26	782	755			59.9	72.9				380.	427			73.	52.	60.	N	ESE	S84E	1.5	6.8	2.5	3.52	3.65		
27	711	611	554	6129	65.1	80.4	74.0	74.03	+ 9.97	472.	595.	615.	580.	75.	58.	74.	SE	EbS	S9W	3.8	13.2	7.5	5.92	7.32	0.015	
28	638	658	593	6275	73.8	79.8	72.5	75.03	+ 10.75	633.	770.	650.	674.	77.	82.	78.	WSW	SbW	S28W	4.0	13.8	4.0	6.33	6.59	0.060	
29	537	416	563	5115	74.3	85.2	64.0	73.05	+ 8.60	676.	609.	349.	533.	80.	49.	58.	SSW	WbS	N71W	3.0	19.8	30.0	13.86	17.83	0.045	
30	816	767	709	7643	51.0	59.5	54.8	55.20	- 9.38	219.	306.	336.	286.	57.	60.	78.	NNW	SbW	S71W	13.2	9.5	1.8	2.08	5.66		
M	29.6203	29.6088	29.6308	29.6196	54.31	64.25	55.81	58.30	- 2.73	347.	379.	336.	355.	77.	60.	72.				5.19	11.17	5.42	7.19	4.085	Inap	

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR JUNE.

Highest Barometer..... 20.965 at 8 a. m., on 15th } Monthly range =
 Lowest Barometer..... 29.260 at 4 p. m., on 15th } 0.706 inches =
 { Maximum Temperature..... 86°4 on p. m. of 29th } Monthly range =
 { Minimum Temperature..... 32°2 on a. m. of 5th } 54°2
 Mean maximum Temperature..... 65°03 } Mean daily range =
 Mean minimum Temperature..... 49°32 } 17°11
 Greatest daily range..... 27°8 from a. m. to p. m. on 5th.
 Least daily range..... 8°4 from a. m. to p. m. on 3rd.
 Warmest day..... 28th ... Mean temperature..... 75.03 } Difference = 36°90.
 Coldest day..... 4th ... Mean temperature..... 38°13 }
 Maximum { Solar..... 100°8 on p. m. of 29th } Monthly range =
 Radiation. { Terrestrial..... 10°3 on a. m. of 11th } 81°6.
 Auroras observed on 3 nights, viz., on 8th, 15th, and 25th.
 Possible to see Aurora on 20 nights; impossible on 10 nights.
 Snowing on 2 days,—depth, inapp.; duration of fall 2 hours.
 Raining on 16 days,—depth 4.085 inches; duration of fall 23.6 hours.
 Mean of cloudiness = 0.50.
 Most cloudy hour observed, 6 a. m., mean = 0.37; i. e., t. cloudy hour observed,
 10 p. m., mean, = 0.42.

Sums of the components of the Atmospheric Current, expressed in miles.

North. South. East. West.
 1814.75 1510.29 943.63 2311.30.
 Resultant direction N. 77° W.; Resultant Velocity 1.95 miles per hour.
 Mean velocity..... 7.49 miles per hour.
 Maximum velocity..... 37.0 miles, from 10 to 11 p. m. on the 29th.
 Most windy day..... 29th ... Mean velocity 17.83 miles per hour.
 Least windy day..... 6th ... Mean velocity 3.19 ditto.
 Most windy hour..... 1 to 2 p. m. Mean velocity 11.34 ditto. } Difference
 Least windy hour..... 2 to 3 a. m. Mean velocity 4.40 ditto. } 6.96 miles.

1st. Dense Wetting Fog, 6 a. m. to noon. Sheet Lightning, 9 p. m. to midnight.—2d.
 Thunderstorm, 2 to 5 a. m.—3rd. A few particles of snow fell, 8 to 9 p. m. Very
 cold night.—4th. Particles of snow fell at 7 a. m. Very cold day.—5th. Sharp frost
 and thin ice, 6.30 to 7 a. m.—6th. Hoar frost at 6 a. m.—7th. Thunderstorm, 8 p. m.
 to midnight.—8th. Thunderstorms with large Hailstones, 11 to 11.25 a. m.—11th.
 Hoar frost and thin ice at 5.30 a. m. Cold day.—13th, 14th, and 15th. Dense fog,
 a. m.—15th. Thunderstorm, 2 to 4 p. m. Lunar Halo at 10 p. m. (imperfect).
 20th. Thunderstorm 6.50 to 8.45 p. m. Pollen of Plants fell during this storm.
 22nd. Portions of double Rainbow at 6.30 p. m. Colors brilliant.—27th. Thunder
 storm, 10.50 to 11.20 p. m.—28th. Thunderstorm from 7.30 p. m. Sultry day.—29th.
 Thunderstorm from 0.30 to 0.45 p. m. Splendid meteor at 9 p. m.—30th. Cold day.
 Mean Temperature, 17.85 below that of preceding day.

Heavy dew on the mornings of 7th, 9th, 12th and 23rd.
 Registered Maximum Temperature on p. m. of 29th..... 86.4
 Registered Minimum Temperature on a. m. of 30th..... 50.0
 Range in less than 18 hours..... 36.4
 The frost which was so destructive to vegetation on the 5th and 11th of this month
 was the most severe recorded here since 2nd June, 1843.
 June 1859, was cold, wet, and windy, the Mean Temperature being 2.97 below the
 average of 20 years. The Rain, 0.837 inches on the surface above the average of
 the same number of years, and the Wind 2.18 miles per h. above the average of 12 yrs.
 The Resultant Direction and Velocity of the Wind for the month of June from 1843
 to 1859 inclusive, were respectively—West and 0.46 miles.

COMPARATIVE TABLE FOR JUNE.

Year.	TEMPERATURE.			RAIN.			SNOW.			WIND.	
	M'n.	Diff. Aver.	Range.	No. of Days.	Inch's.	No. of Days.	Inch's.	No. of Days.	Inch's.	Resultant Direction.	Mean Force or Velocity.
1840	59.8	1.5	37.1	11	4.860	11	4.860	11	4.860	...	0.36 lbs.
1841	65.6	4.3	45.7	9	1.560	9	1.560	9	1.560	...	0.31
1842	55.6	5.7	28.0	15	5.755	15	5.755	15	5.755	...	0.27
1843	58.4	2.9	81.3	12	4.635	12	4.635	12	4.635	...	0.19
1844	59.9	1.4	33.1	9	3.635	9	3.635	9	3.635	...	0.27
1845	61.0	0.3	40.9	11	3.715	11	3.715	11	3.715	...	0.52
1846	63.3	2.0	41.5	10	1.920	10	1.920	10	1.920	...	0.30
1847	58.4	2.9	36.7	14	2.625	14	2.625	14	2.625	...	4.51 mls.
1848	62.9	1.6	38.3	8	1.810	8	1.810	8	1.810	N 61° W	1.90
1849	63.2	1.9	45.2	7	2.020	7	2.020	7	2.020	S 71° E	0.49
1850	64.3	3.0	49.0	10	3.345	10	3.345	10	3.345	S 69° W	0.36
1851	59.2	2.1	79.2	11	2.695	11	2.695	11	2.695	S 25° W	1.35
1852	60.8	0.5	43.6	10	3.100	10	3.100	10	3.100	S 76° W	1.49
1853	65.5	4.2	86.3	9	1.650	9	1.650	9	1.650	N 1° W	0.10
1854	64.1	2.8	47.4	9	1.460	9	1.460	9	1.460	N 69° W	0.71
1855	59.9	1.4	40.6	17	4.070	17	4.070	17	4.070	N 21° W	0.33
1856	62.1	0.8	62.7	13	3.900	13	3.900	13	3.900	S 21° W	0.30
1857	56.9	1.4	75.1	21	5.060	21	5.060	21	5.060	N 49° W	1.15
1858	66.2	4.9	56.3	12	2.943	12	2.943	12	2.943	S 20° E	0.25
1859	65.3	3.0	33.9	16	4.035	16	4.035	16	4.035	N 77° W	1.95
M	61.27	...	40.50	11.7	3.198	11.7	3.198	11.7	3.198	...	5.01 Mls.

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST,--JULY, 1888.
 Latitude--43 deg. 39.4 min. North. Longitude--5 h. 17 m. 33 s. West. Elevation above Lake Ontario, 108 feet.

Day	Barom. at temp. of 32°.			Temp. of the Air.			Excess of mean above Average			Tens. of Vapour.			Humidity of Air.			Direction of Wind.			Result. Direction.			Velocity of Wind.			Rain in inches.	Snow in inches.
	6 A.M.	10 P.M.	Mean.	6 A.M.	2 P.M.	10 P.M.	M'	N'	Average	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.		
1	29.684	29.516	29.5748	62.7	67.8	65.2	3.83	388	386	457	891	72	57	80	73	s b w	s e b s	f s e	s 20 E	0.8	7.0	1.0	2.32	2.89	0.471	
2	29.8	29.348	29.663	63.1	78.3	66.4	5.25	545	702	500	604	94	72	87	82	s w	s w b w	n w b n	s 50 W	0.5	13.4	0.5	7.04	10.72	1.108	
3	29.539	29.703	29.621	59.5	58.4	59.0	-0.60	360	265	251	304	65	54	57	62	n w b n	n w b n	n w b n	s 26 W	12.6	16.5	10.5	11.77	11.89	inap.	
4	29.025	30.025	30.025	52.3	59.6	56.0	-3.72	244	294	272	329	65	58	63	62	n x w	s b w	s w	s 33 W	3.2	10.2	2.2	2.73	5.07		
5	30.069	30.000	30.0345	53.0	60.6	56.8	-3.82	272	360	342	393	63	55	76	62	n w b w	s b w	s b w	s 4 E	4.5	5.6	3.2	2.56	3.67		
6	29.981	29.330	29.3663	58.1	62.2	58.1	-3.97	374	409	403	398	77	73	84	79	n w b w	s b w	s b w	s 23 W	2.8	8.2	1.2	2.17	3.51		
7	29.874	29.813	29.8435	58.8	67.3	63.0	-4.52	442	503	415	452	80	70	78	81	Cal.	s	e b s	s 55 E	3.5	4.5	1.2	2.22	2.86		
8	29.818	29.797	29.8076	61.9	73.3	63.5	-6.88	420	508	483	473	77	62	79	72	e n e	s s e	s e s	s 55 E	3.5	4.5	1.2	2.22	2.86		
9	29.875	29.806	29.8405	65.7	74.5	64.2	-2.67	477	353	328	366	75	40	55	63	e b e	e b s	e b n	n 88 E	1.0	5.2	6.8	4.69	4.97		
10	29.864	29.315	29.5895	61.0	72.0	61.5	-2.51	342	351	342	351	63	45	55	63	e n e	e s e	n	n 87 E	2.9	4.6	3.2	2.43	3.07		
11	29.764	29.701	29.7325	60.8	82.3	72.9	-7.5	528	670	630	682	81	60	79	73	n	s s w	w	s 36 W	0.8	11.8	0.5	3.26	3.94		
12	29.750	29.675	29.7125	70.7	84.3	78.3	-13.58	614	683	637	637	74	53	61	63	Cal.	s s w	n x w	s 79 W	0.0	5.3	1.5	1.49	3.01		
13	29.685	29.711	29.698	72.0	82.7	76.4	-7.77	683	738	692	678	77	66	79	72	n x w	s s e	e b n	s 71 E	3.2	6.0	5.2	3.10	4.45		
14	29.737	29.685	29.711	70.1	70.1	70.1	0.0	606	530	443	501	79	58	61	61	e b n	e b n	e b n	n 77 E	4.2	10.8	7.5	8.56	9.12	1.91	
15	29.566	29.488	29.527	67.8	71.5	70.0	-7.0	570	648	640	628	83	85	88	85	e b n	e b e	n	n 19 E	4.5	5.4	3.5	2.83	4.87		
16	29.528	29.546	29.537	70.2	79.0	73.3	-7.47	608	738	719	687	82	75	87	81	n w b n	s d w	s b w	n 89 W	1.2	7.0	1.4	1.32	3.69		
17	29.624	29.608	29.616	71.1	79.6	75.3	-4.3	654	708	681	657	87	69	80	81	s	s e	s e b w	s 65 E	1.5	6.0	0.4	1.85	2.45		
18	29.473	29.464	29.4685	73.3	75.0	70.0	-6.40	685	744	654	683	84	85	90	81	n w	e n e	e b e	n 86 E	1.5	9.4	0.4	3.75	4.19		
19	29.422	29.340	29.381	68.9	84.1	76.5	-7.65	693	770	628	675	93	65	75	77	Cal.	s b w	n w b n	s 84 W	0.0	5.0	3.4	2.09	4.82	4.97	
20	29.406	29.353	29.3795	68.9	73.3	69.7	-3.3	475	302	376	370	67	36	73	57	n w b n	n w b n	Cal.	n 87 W	7.2	21.1	0.0	0.86	10.02		
21	29.631	29.588	29.6095	57.7	68.2	64.2	-6.5	386	478	465	453	60	69	77	73	Cal.	s	Cal.	s 28 W	0.0	1.0	0.0	1.16	1.27		
22	29.326	29.270	29.298	62.9	76.1	64.0	-6.88	427	349	288	368	79	39	52	52	s w	n w b n	s w b w	n 72 W	6.5	23.2	10.0	13.35	13.81	0.064	
23	29.518	29.576	29.547	55.9	71.1	64.3	-6.1	337	367	288	317	67	47	68	59	w b n	w b n	Cal.	n 61 W	7.5	14.0	0.0	6.68	6.70		
24	29.684	29.545	29.6145	56.3	73.3	60.0	-7.3	370	439	400	439	82	54	71	85	n b w	s	y s w	s 2 E	1.5	4.4	3.5	1.23	2.57	0.883	
25	29.561	29.539	29.550	62.4	71.8	62.6	-6.4	560	518	521	521	75	62	68	64	n w b n	w b n	w	n 68 W	15.5	24.0	11.2	16.67	17.30		
26	29.472	29.562	29.517	58.4	59.7	57.4	-3.8	365	266	322	312	75	62	68	64	n w b n	w b n	w	n 40 W	11.8	17.4	4.6	12.39	12.38		
27	29.676	29.682	29.679	57.0	66.4	56.3	-6.0	317	342	339	335	68	52	77	65	n w	n w	n w	n 44 W	14.8	11.4	8.4	5.41	7.40	0.051	
28	29.621	29.634	29.6275	57.0	69.6	60.2	-2.8	372	387	340	372	63	63	63	63	n w	n w	n w	n 40 W	4.5	5.6	0.0	2.27	3.14		
29	29.789	29.768	29.7785	57.9	70.1	58.8	-6.3	450	371	392	412	74	69	75	67	n b w	s	Cal.	s 13 W	4.5	6.5	1.8	3.24	3.53		
30	29.781	29.681	29.731	62.4	64.18	62.4	-2.77	361	433	382	412	80	66	67	68	e b s	e b s	e b n	s 81 E	0.5	6.5	4.5	3.87	5.83	0.095	
31	29.613	29.502	29.5575	59.2	74.7	61.9	-7.5	401	470	401	470	80	66	75	70	e d e	e	s	s 84 E	2.2	9.5	4.5	3.87	5.83		
Mean	29.6665	29.6442	29.65535	62.70	72.39	63.03	-6.62	461	498	456	471	78	61	75	70					3.94	9.263	3.18			5.812	6.11

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR JULY, 1859.

Highest Barometer 30.141 at 9 30 a. m. on 5th, } Monthly range =
 Lowest Barometer 29.150 at 2 p. m. on 2nd, } 0.982 range =
 Maximum temperature 88.0 on p. m. of 12th } Monthly range =
 Minimum temperature 44.7 on a. m. of 4th } 43.0
 Mean maximum temperature 74.965 } Mean daily range = 15.245.
 Mean minimum temperature 50.29 }
 Greatest daily range 24.3 from a. m. to p. m. of 1st.
 Least daily range 4.3 from a. m. to p. m. of 26th.
 Warmest day . . . 12th . . . Mean Temperature . . . 79.88 } Difference = 24.80.
 Coldest day . . . 4th . . . Mean "temperature . . . 55.03 }
 Maximum { Solar 10.950 on p. m. of 19th } Monthly range =
 Radiation { Terrestrial 34.8 on a. m. of 1st } 67.2.
 Aurora observed on 4 nights, viz.: 11th, 23rd, 28th, and 29th; possible to see Aurora
 on 21 nights; impossible on 10 nights.
 Raining on 12 days; depth, 2.611 inches; duration of fall, 39.9 hours.
 Mean of cloudiness=0.46; most cloudy hour observed, 6 a. m., mean=0.51; least
 cloudy hour observed, 8 a. m., mean=0.36.

COMPARATIVE TABLE FOR JULY.

YEAR.	TEMPERATURE.				RAIN.		SNOW.		WIND.		
	Mean	Difference from Average.	Maximum Observed.	Minimum Observed.	Range.	No. of days.	Inches.	No. of days.	Inches.	Resultant Direction.	Mean Velocity.
1840	65.8	-1.3	79.4	48.2	31.2	6	5.270	...	...	...	0.27 lbs
1841	65.0	-2.1	80.3	43.2	43.1	10	8.150	...	...	...	0.33 "
1842	64.7	-2.4	90.5	42.0	48.5	4	3.050	...	...	...	0.44 "
1843	64.5	-2.6	84.1	40.2	45.9	8	4.805	...	...	...	0.19 "
1844	67.0	-1.1	80.1	40.5	48.6	12	3.816	...	...	...	0.30 "
1845	66.2	-0.9	94.6	45.6	49.0	7	2.193	...	...	...	0.29 "
1846	68.0	+0.9	91.0	44.9	49.1	9	2.895	...	...	...	0.19 "
1847	68.0	+0.9	87.5	43.8	43.7	8	3.355	...	...	...	0.19 "
1848	68.4	+1.6	83.7	46.7	36.0	10	1.890	...	...	...	0.14 W
1849	65.5	+1.3	89.1	41.0	38.1	4	3.415	...	...	...	0.75 "
1850	68.0	+1.8	84.1	52.8	32.1	12	5.270	...	...	...	3.52 "
1851	65.0	-2.1	82.7	52.1	30.6	12	3.625	...	...	...	0.59 "
1852	66.8	-0.3	90.1	49.5	40.6	8	4.025	...	...	...	4.13 "
1853	65.6	-1.5	89.4	49.4	36.0	10	9.015	...	...	...	0.24 "
1854	72.5	+5.4	93.6	53.0	40.6	9	4.805	...	...	...	3.69 "
1855	67.9	+0.8	89.4	53.1	35.3	13	3.245	...	...	...	0.37 "
1856	69.9	+2.8	92.0	51.4	40.6	8	1.120	...	...	...	0.73 "
1857	67.8	+0.7	85.4	52.4	33.0	15	8.475	...	...	...	1.57 "
1858	67.9	+0.8	85.4	55.9	27.5	12	3.072	...	...	...	0.81 "
1859	66.9	-0.2	87.7	50.5	37.2	13	2.611	...	...	...	1.13 "
Mean	67.06	...	87.49	48.81	39.18	9.5	3.490	...	...	...	4.73

1st. Thunderstorm, vivid lightning and heavy rain, from 11.30 p. m.
 2nd. Thunderstorm and slight rain from noon to 3.25 p. m.
 3rd. Imperfect solar halo and parhelia at 6.40 p. m.
 11th. Distant Thunder at 5.30 p. m.
 12th. Distant Thunder in West at 4.45 p. m.
 13th. Distant Thunder in S. W. at 5 p. m.
 15th. Thunderstorm from 4 to 5.30 a. m., and again from 1.30 to 3.30 p. m.—Perfect
 rainbow at 4.55 p. m.
 17th. Dense fog at 4 a. m.
 18th. Thunderstorm from 0.30 p. m., with but little intermission to 8 p. m.
 18th. Dense fog 6 to 7 a. m.
 21st. Slight ground fog 5 to 6 a. m.

Sens of the components of the Atmospheric Current, expressed in Miles.
 North. South. East. West.
 1649.55 1028.18 934.01 1876.41
 Resultant direction, N 56° W. Resultant Velocity, 1.48 miles per hour.
 Mean velocity of the wind 5.81 miles per hour.
 Maximum velocity 26.8 miles per hour, from 4 to 5 p. m. on 22nd.
 Most windy day 26th—Mean velocity, 17.30 miles per hour.
 Least windy day 21st—Mean velocity, 1.27 do
 Most windy hour, noon to 1 p. m.—Mean velocity, 9.71 do } Difference
 Least windy hour, 8 to 9 p. m.—Mean velocity, 2.68 do } 7.03 miles.

1st. Thunderstorm, vivid lightning and heavy rain, from 11.30 p. m.
 2nd. Thunderstorm and slight rain from noon to 3.25 p. m.
 3rd. Imperfect solar halo and parhelia at 6.40 p. m.
 11th. Distant Thunder at 5.30 p. m.
 12th. Distant Thunder in West at 4.45 p. m.
 13th. Distant Thunder in S. W. at 5 p. m.
 15th. Thunderstorm from 4 to 5.30 a. m., and again from 1.30 to 3.30 p. m.—Perfect
 rainbow at 4.55 p. m.
 17th. Dense fog at 4 a. m.
 18th. Thunderstorm from 0.30 p. m., with but little intermission to 8 p. m.
 18th. Dense fog 6 to 7 a. m.
 21st. Slight ground fog 5 to 6 a. m.

25th. Thunderstorm 2 to 5 p. m.—Perfect double rainbow at 4 p. m., and sheet
 lightning round horizon from 10 p. m. to midnight.
 25th. Imperfect double rainbow 6 to 7 p. m.—31st. Distant Thunder in N. W. at noon.
 Heavy Dew recorded on four mornings during the month.
 The Resultant Direction and Velocity of the Wind for the month of July, from
 1848 to 1859 inclusive, were respectively N. 63° W., and 0.28 miles.
 The mean temperature of July, 1859, differed but little from the average of the
 last 20 years, the depth of Rain recorded was 0.879 inches on the surface, less than
 the mean of the same number of years, and the mean velocity of the wind was 1.908
 miles per hour in excess of the average of 12 years.

MONTHLY METEOROLOGICAL REGISTER, ST. MARTIN, ISLE JESUS, CANADA EAST—JULY, 1859.
(NINE MILES WEST OF MONTREAL.)

BY CHARLES SMALLWOOD, M. D., L.L.D.

Latitude—45 deg. 52 min. North. Longitude—73 deg. 36 min. West. Height above the Level of the Sea—115 feet.

Day	Barom. corrected and reduced to 32°			Temp. of the Air.			Tension of Vapour.			Humidity of Air.			Direction of Wind.			Velocity in miles per hour.			Height in Inches.	Snow in Inches.	WEATHER, &c.			
	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.	6 A.M.	2 P.M.	10 P.M.			6 A.M.	2 P.M.	10 P.M.	A cloudy sky is represented by 10; A cloudless sky by 0.
1	29.821	29.830	29.782	59.0	74.3	61.0	.352	.306	.419	.70	.48	.80	W S W	W S W	W S W	2.23	8.41	5.50	Clear.	Clear.	Clear.	
2	.524	.463	.320	67.2	81.8	72.2	.591	.773	.678	.89	.71	.89	S S W	S S W	S S W	1.47	5.74	15.32	...	...	C. C. Str. 10.	Cirri 2.
3	.586	.700	.895	85.4	62.4	50.1	.259	.984	.228	.68	.51	.64	N B W	N B W	N B W	12.22	7.60	4.42	...	...	Do.	Clear.
4	30.041	30.115	30.134	49.0	68.7	54.8	.212	.319	.165	.60	.47	.63	N E S	S S E	S S E	6.93	3.52	0.54	...	...	Clear.	Clear.
5	.204	.175	.202	45.4	80.2	61.0	.269	.509	.419	.88	.59	.80	S S W	S S W	S S W	0.00	0.00	0.30	...	...	Do.	Str. 2.
6	.134	.125	.038	64.2	85.0	67.2	.464	.509	.463	.77	.54	.71	S S W	S S W	S S W	0.08	2.08	0.21	...	...	Do.	Clear.
7	.047	.039	.090	65.0	76.7	67.5	.471	.577	.522	.81	.64	.79	S S W	S S W	S S W	1.82	2.42	0.42	...	...	C. C. Str. 8.	C. C. Str. 4.
8	.948	.886	.919	64.3	82.2	66.3	.529	.572	.536	.89	.62	.84	W B S	W B S	W B S	0.00	0.92	1.60	...	...	Do.	Cir. Cum. 4.
9	.012	.003	.035	64.5	81.1	67.0	.306	.547	.463	.68	.52	.71	E	N N E	S S E	2.93	2.55	0.72	...	...	Clear.	Cirri 2.
10	.046	.009	.020	70.1	85.5	72.0	.632	.570	.385	.73	.47	.53	S B W	S B W	S S E	0.43	2.03	4.65	...	...	C. C. Str. 6.	C. C. Str. 8.
11	.851	.802	.869	64.6	90.0	78.9	.427	.751	.785	.71	.53	.82	S S W	S S W	S S W	1.78	7.77	0.81	...	...	Light Cirri.	C. C. Str. 6.
12	.838	.767	.783	74.0	95.6	84.0	.031	.915	.789	.81	.56	.68	S S W	S S W	S S W	0.00	1.60	4.70	...	...	Do.	C. C. Str. 8.
13	.850	.962	.979	70.0	85.0	67.0	.551	.746	.496	.73	.64	.77	N N E	S S W	S B E	9.82	6.73	1.70	...	...	Cu. Str. 8. A. B.	Cu. Str. 8. A. B.
14	.957	.906	.908	68.1	82.0	65.2	.509	.432	.483	.75	.40	.78	E S E	N B E	E S E	1.22	3.82	1.00	...	...	Do.	Str. 4. Lightg.
15	.900	.774	.666	68.9	79.0	66.3	.536	.651	.579	.77	.66	.89	N B E	S E	S E	1.10	4.56	10.05	...	...	Cu. Str. 4.	C. C. Str. 6.
16	.719	.710	.728	65.9	87.0	70.1	.529	.670	.628	.78	.53	.88	S E S	S E S	S E S	6.02	14.22	0.93	...	...	C. C. Str. 4.	Cu. Str. 10.
17	.783	.757	.809	70.1	77.1	71.4	.536	.639	.896	.84	.69	.80	S W	S W	S W	1.10	3.13	0.41	...	...	C. C. Str. 6.	Do. 10.
18	.699	.586	.504	67.9	80.9	68.2	.563	.638	.581	.87	.62	.87	E B S	S E E	S E E	1.31	0.71	0.00	...	...	Cu. Str. 8.	Cu. Str. 8.
19	.689	.430	.806	67.0	92.1	77.0	.563	.814	.085	.87	.54	.75	E B S	S S W	S S W	5.46	16.02	1.18	...	...	Do.	Do. 9. Thund.
20	.308	.493	.663	63.0	67.0	52.1	.820	.452	.634	.88	.64	.86	N B W	N B W	N B W	9.56	9.80	7.32	...	...	Cu. Str. 4.	Clear.
21	.477	.595	.663	60.0	75.6	61.1	.360	.454	.461	.68	.56	.77	W S W	W S W	W S W	1.11	0.36	3.48	...	...	Cu. Str. 6.	Cu. Str. 8.
22	.677	.398	.632	63.0	63.0	57.2	.485	.491	.378	.86	.88	.83	S S E	W B S	W B S	7.79	5.55	2.36	...	...	Do.	R'n, with thu.
23	.560	.554	.674	86.4	89.4	80.1	.321	.629	.238	.74	.75	.78	N N W	W	W	10.00	14.57	5.46	...	...	Do.	Clear.
24	.719	.757	.791	48.4	76.1	62.0	.285	.470	.406	.85	.52	.74	W	W	W	0.00	2.07	5.81	...	...	Do.	Do.
25	.794	.669	.747	60.0	68.0	57.0	.456	.465	.407	.88	.47	.87	S S E	S	S	0.11	0.33	7.03	...	...	C. C. Str. 8.	Cu. Str. 1.1.
26	.634	.534	.578	60.0	62.3	53.8	.469	.549	.374	.94	.07	.93	E S E	S E	S E	4.86	8.95	14.57	...	...	C. C. Str. 8.	Clear.
27	.477	.474	.507	53.2	65.1	53.8	.324	.420	.446	.86	.63	.91	W B S	N N W	W B S	3.75	5.00	5.66	...	...	Do.	Do.
28	.654	.620	.794	63.2	73.9	57.8	.478	.510	.436	.83	.63	.94	W B S	N N W	S W	0.15	0.75	0.40	...	...	Cirri. Str. 4.	Clear.
29	.902	.895	.935	60.8	80.6	63.5	.563	.599	.536	.95	.59	.92	S S W	S S W	S S W	0.17	0.26	0.26	...	...	Do.	Clear. in. Bo.
30	.962	.905	.892	64.7	87.0	68.9	.523	.557	.458	.86	.45	.79	S S E	S E	S E	0.00	0.17	0.26	...	...	Clear.	Do.
31	.872	.853	.791	62.1	90.0	69.1	.489	.88	.664	.91	.42	.79	S E E	S E E	S E E	0.00	0.22	1.67	...	...	Cirri. 2.	Do.

REMARKS ON THE ST. MARTIN, ISLE JESUS, METEOROLOGICAL REGISTER
FOR JUNE, 1859.

Barometer	{	Highest, the 10th day	30.097
		Lowest, the 20th day	29.426
		Monthly Mean	29.784
		Monthly Range	0.671
Thermometer ...	{	Highest, the 27th day	91°0
		Lowest, the 12th day	31°1
		Monthly Mean	62°0
		Monthly Range	59°0
Greatest Intensity of the Sun's Rays			101°4
Lowest point of Terrestrial Radiation			24°2
Mean of Humidity .....			.706
Amount of evaporation			2.89
Rain fell on 14 days, amounting to 6.779 inches; it was raining 43 hours and 30 minutes, and was accompanied by thunder on 5 days.			
Most prevalent wind, the W.			
Least prevalent wind, E. by S.			
Most windy day, the 30th day; mean miles per hour, 14.84.			
Least windy day, the 24th day; mean miles per hour, 0.33.			
Aurora Borealis visible on 0 nights.			
The electrical state of the atmosphere has indicated high tension.			
Ozone was present in rather large quantity.			
Solar Halo on the 12th day.			
Frost on the 5th, 6th, 11th and 12th days.			

REMARKS ON THE ST. MARTIN, ISLE JESUS, METEOROLOGICAL REGISTER
FOR JULY, 1859.

Barometer.....	{	Highest, the 5th day	30.292
		Lowest, the 22nd day	29.382
		Monthly Mean	29.815
		Monthly Range	0.864
Thermometer ...	{	Highest, the 12th day	97°7
		Lowest, the 4th day	36°1
		Monthly Mean	67°58
		Monthly Range	61°6
Greatest intensity of the Sun's Rays			110°1
Lowest point of Terrestrial Radiation			27°3
Mean of Humidity .....			.705
Amount of evaporation			3.61 inches.
Rain fell on 9 days amounting to 2.428 inches; it was raining 15 hours 35 minutes, and was accompanied by thunder on 7 days.			
Most prevalent wind, S. W.			
Least prevalent wind, E.			
Most windy day the 24th day; mean miles per hour 11.34.			
Least windy day the 5th day; mean miles per hour 0.61.			
Aurora Borealis visible on 2 nights.			
Parhelia on the 9th day.			
Frost on the 4th and 5th days.			
The electrical state of the atmosphere has indicated high tension.			
Ozone was present in moderate quantity.			

ABSTRACT OF METEOROLOGICAL REGISTER, UNIVERSITY OF QUEEN'S COLLEGE, KINGSTON,
CANADA WEST, FOR 1858.

Latitude North, 44° 13' 30". Longitude West, 76° 30' 1". 294 feet above the level of the Sea.

1858. MONTH.	Barometer corrected and reduced to 32°.		Thermometer.		Tension of vapor.		Humidity.		Clouds.		Pressure of wind in lbs. avoirdupois.		Mean Maxi- mum Tempe- rature in sun's Rays.		Mean Mini- mum Tempe- rature on grass.		Mean Maxi- mum Thermo- meter in shade.	
	9½ A. M.	3½ P. M.	9½ A. M.	3½ P. M.	9½ A. M.	3½ P. M.	9½ A. M.	3½ P. M.	9½ A. M.	3½ P. M.	9½ A. M.	3½ P. M.	9½ A. M.	3½ P. M.	9½ A. M.	3½ P. M.	9½ A. M.	3½ P. M.
	January	29.760	29.712	23.86	28.28	.133	.169	.826	.870	6.0	6.0	.604	.532	36.86	15.17	32.90	30.78	
February	29.695	29.693	13.57	19.00	.910	.116	.844	.839	5.7	5.9	.396	.415	31.47	3.38	34.63	34.63		
March	29.616	29.592	26.60	31.80	.151	.173	.823	.817	5.0	5.4	.435	.530	44.32	15.03	48.40	48.40		
April	29.503	29.556	42.90	46.90	.237	.682	.808	.815	5.4	6.2	.415	.450	59.03	29.50	58.20	58.20		
May	29.682	29.629	51.70	54.30	.299	.308	.711	.699	6.5	7.0	.208	.320	67.60	37.60	71.70	71.70		
June	29.665	29.599	66.80	69.70	.622	.575	.766	.759	5.0	5.0	.050	.080	79.20	52.10	74.40	74.40		
July	29.690	29.649	63.40	72.00	.577	.636	.826	.8.3	5.3	5.3	.064	.145	84.40	55.20	73.40	73.40		
August	29.699	29.659	67.40	71.20	.573	.639	.834	.821	4.5	5.1	.314	.413	84.20	49.30	73.40	73.40		
September	29.755	29.665	60.50	64.30	.445	.375	.803	.765	4.3	5.3	.463	.210	73.64	50.90	66.20	66.20		
October	29.676	29.662	48.50	53.40	.308	.330	.837	.806	6.1	6.9	.530	.360	65.30	39.00	55.90	55.90		
November	29.693	29.628	31.60	34.30	.168	.191	.829	.850	7.9	7.9	.460	.370	44.28	25.70	37.08	37.08		
December	29.813	29.732	22.50	24.80	.129	.144	.803	.845	7.0	7.5	.750	.730	41.90	13.06	32.30	32.30		
Sums	350.317	355.751	523.83	569.98	3.623	3.928	9.720	9.701	68.7	7.9	4.386	4.144	712.25	386.24	615.940	615.940		
Means	29.693	29.646	43.65	47.50	.314	.327	.810	.808	5.7	6.1	.365	.365	59.35	32.18	51.33	51.33		

Highest Barometer, January 8th, 30.841. Lowest do., March, 21st, 28.976. Range of Barometer during the year, 1.865.—Maximum Tempera-
ture, 29th June, 86°.9. Minimum do., 19th February, -11.0. Range of Thermometer during the year, 97.9.—Maximum in sun's rays with blackened
bulb 4 feet above the ground, 29th June, 102°.3. Minimum on grass, 19th February, -14.0. Range during the year, 116.3.—Maximum pressure of wind,
21st March, 10.5 lbs. on square foot, or 31 miles per hour. Most windy month, December. Least do., June.—Most cloudy month, December. Least
do., September.—Thunderstorms, 14.—Bay open, 2nd April.

ABSTRACT OF METEOROLOGICAL REGISTER, UNIVERSITY OF QUEEN'S COLLEGE, KINGSTON,
CANADA WEST, 1858.—(Continued.)

Latitude North, 44° 13' 30". Longitude West, 76° 30' 1". 294 feet above the level of the Sea.

1858.		R E M A R K S.																				
M O N T H.		Mean Annual Thermo- meter in shade	Highest Tem- perature in shade	Lowest Tem- perature in shade	Month- ly Range	Highest Barometer.	Lowest do.	Month- ly Range.	Rain in inches.	Snow in inches.	The observations of the Barometer at half-past nine and half-past three give very nearly the maxima and minima of the day, and thus the mean for the year. The observations of the Thermometer at the same times give the temperature a little higher than the mean of the year. But the maxima and minima observations give the true mean within a few hundredths of a degree. Thus the mean of the observations at Toronto for the year 1858, taken at 6 a. m., 2 p. m., and 10 p. m., is 44° 74, while from the maximum and minimum thermometer is 44.71.											
Year.	Barometer at 9 a. m. and 3 p. m.	Thermo- meter do.	Tension of vapor, do.	Humid- ity, do.	Clouds, do.	Press- ure of wind, do.	Mean of Maxim. and Min. Therm.	Highest Tem. in shade.	Lowest do.	Highest Temper. on sun's rays.	Lowest do. on grass.	Highest Bar r.	Lowest do.	Rain in inches.	Snow in inches.							
January	17.20	47.8	-5	0	52.8	30.481	29.105	1.376	1.02	6.0	The above observations are the first made at Kingston, which can be relied upon as accurate. They have been made with standard instruments—the Barometer compared with that of the Royal Society of London, and the Thermometers constructed by Casella, the best maker, and furnished with certificates of comparison and correction from the Kew Observatory.											
February	6.06	39.6	-11.0	0	50.6	30.218	29.046	1.172	0.06	14.5	J. W.											
March	19.00	49.8	-10.0	0	59.8	30.214	29.076	1.235	1.40	8.0												
April	30.50	62.3	20.0	0	42.3	30.060	29.090	0.961	2.30	0.0												
May	43.60	69.8	34.5	0	32.3	30.216	29.101	0.112	2.64	0.0												
June	53.60	80.9	47.3	0	30.6	29.875	29.106	0.769	3.08	0.0												
July	60.30	83.0	48.3	0	35.6	29.082	29.325	0.657	4.53	0.0												
August	69.30	80.6	42.7	0	37.0	30.081	29.315	0.706	3.39	0.0												
September	53.90	80.2	44.0	0	46.2	32.148	29.049	1.100	2.50	0.0												
October	42.10	70.0	29.0	0	40.1	30.164	29.045	1.119	1.81	0.0												
November	27.18	65.2	14.5	0	40.7	30.044	29.338	0.706	1.10	2.0												
December	15.00	69.0	-6.5	0	63.4	30.398	29.084	1.314	1.34	7.0												
Sums	433.18								25.20	37.5												
Means	36.10																					
Year.	Barometer at 9 a. m. and 3 p. m.	Thermo- meter do.	Tension of vapor, do.	Humid- ity, do.	Clouds, do.	Press- ure of wind, do.	Mean of Maxim. and Min. Therm.	Highest Tem. in shade.	Lowest do.	Highest Temper. on sun's rays.	Lowest do. on grass.	Highest Bar r.	Lowest do.	Rain in inches.	Snow in inches.							
1858	20.650	45.57	.314	.800	5.92	.355	43.71	86.9	-11.0	102.3	-14.0	30.481	28.976	23.02	37.5							
1857	20.643	44.69	.318	.845	6.04	.315	42.67	85.5	-20.0	104.0		30.430	28.684	26.19	51.5							
1856*	20.626	44.16	.310	.813	5.67	.544	42.65	88.5	-17.5			30.526	28.610	17.905	37.5							

* Observations made in 1856 at 9 a. m., and 3 p. m.