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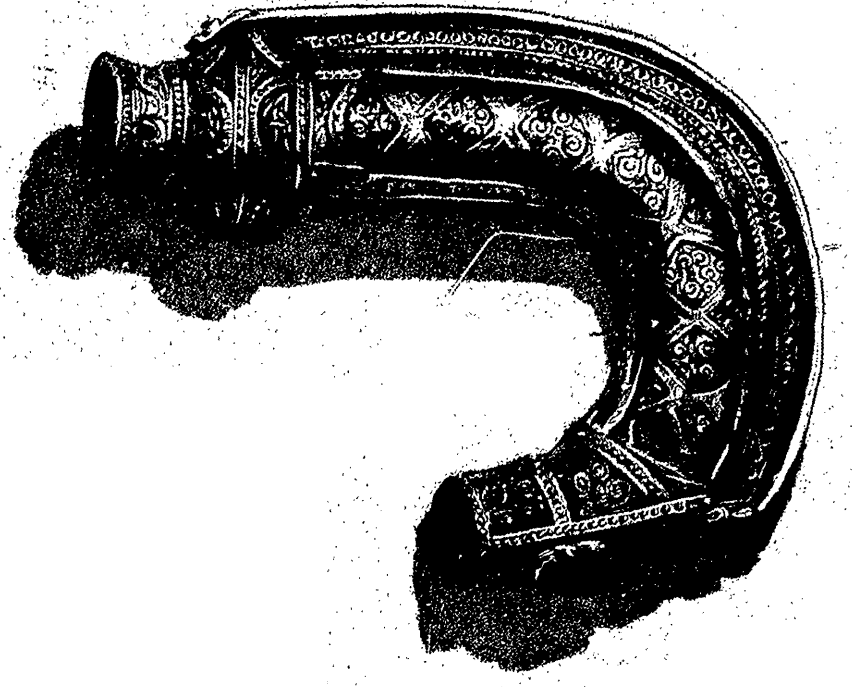

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THE QUIGRICH.

BY DANIEL WILSON, LL.D.,

PROFESSOR OF HISTORY AND ENGLISH LITERATURE, UNIVERSITY COLLEGE, TORONTO.

Read before the Canadian Institute, 12th February, 1859.

In the year 1782, Mr. William Thompson, of Christ's Church College, Oxford, during a long vacation ramble in the highlands of Perthshire, was shown, at the village of Killin, on the banks of Loch Tay, the *Quigrich*, or crosier believed to have anciently belonged to St. Fillan, who has bequeathed his name to the neighbouring Strathfillan, at the head of Glendochart, as well as to other points of local interest in that district of Perthshire. The Earl of Buchan was then organising the Society of Antiquaries of Scotland, which obtained a Royal Charter in the following year, and to him, accordingly Mr. Thompson communicated a notice of the curious relic, accompanied with a drawing, the rudeness of which he entreats the Society to excuse, it being only the hasty sketch of a traveller, meant to lead the Society to the possession of the original.* But in this intention the intelligent tourist indulged in hopes which were not destined to realization; and when the communication was at length

* Transactions of Soc. Antiq. Scot. vol. iii, p. 289.

printed in the Society's Transactions, it was accompanied with a note which told that "The owner of the relic afterwards emigrated to America, carrying the Quigrich with him." When engaged, some years since, in preparing "The Prehistoric Annals of Scotland" for the press,—little dreaming then of becoming a settler in Canadian clearings, but rather disposed to imagine myself in some special respects *adscriptus glebæ*,—I tried to recover the traces of this ancient Scottish relic, and learned that it still existed in the safe custody of its hereditary keeper, who was settled on a farm in Western Canada. Since then, unanticipated changes have afforded me opportunities for a careful inspection of this curious Scottish ecclesiastical memorial, now transferred to Canadian soil, and such notes, descriptive or historical, as I have been able to glean concerning it, may very appropriately find a place in the *Canadian Journal*, relative to a relic, which, though now Canadian, claims an antiquity some centuries older than the first discovery of the New World, with all that pertains to its chronicled history.

Notwithstanding the long proscription of all ante-reformation and episcopal relics in Scotland, it is surprising how many such have been devoutly preserved, and venerated with superstitious fervour, almost to our own day. In the first Scottish Covenant, the subscription of which was, so early as 1585, rendered obligatory on every graduate of the Scottish universities, the subscriber is made do declare, after long and due examination of his own conscience, that he "abhors and detests all kinds of papistrie, but, in special, the vsurpit authoritie of that Romane Antechrist, . . . his canonizatioun of men, worschipping of imagrie, relicques and crosses; . . . his prophane holie water, baptizing of belles, conjuring of spirits, crossing, sayning, anoynting, conjuring, hallowing of Goddis holie creatouris, with the superstitious opinioun joyned thairwith." Nevertheless, at Killin,—according to a former incumbent, *cell-linn*: the cell of the Saint's pool,—and throughout Glendochart and Strathfillan, at the close of the eighteenth, and even in the earlier years of this nineteenth century, faith in the virtues of the relics of Saint Fillan seems to have been scarcely less strong than, of old, in the sanctity which the Gaels of Strathfillan ascribed to their good Abbot in the seventh century.

Alexander Dewar, the present custodier of the Quigrich, writes in answer to queries submitted to him: "I do not remember where

St. Fillan lived, having come to this country [Canada,] in the year 1818, but he had been through Perthshire, and there are several places there named after him, such as Dun-fhaolin: the hill of St. Fillan, at the east end of Loch Earn, where women with sickly children used to attend on the morning of the first of August, and bathe them in a spring that rose at the foot of the hill, believing that there was some virtue in the water; and there they left some of the clothes they had had on the child. On the top of the hill there is the form of a large arm-chair cut out of the rock, where St. Fillan sat and preached to the people. There is likewise, in Strath-fillan, still standing, or at least was when I left Scotland, the walls of an old chapel, where people used to go with those who were out of their minds, and after dipping them two or three times in a deep pool of water that is in Uisge-fhaolin, they would leave them tied for the night in the old chapel, and such as got loose through the night they believed would get better, but those that remained bound were concluded incurable."

In this the Canadian custodier of St. Fillan's Crozier refers to a class of cures associated with the miraculous powers of another relic of the Saint, of which he appears not to have heard, though its associations are little less curious than those of the Saint's pastoral crook. Among the relics of the ancient Scottish and Welsh, as well as the Irish Churches, none appear to have been regarded with more devout or superstitious reverence than the portable hand-bells which are frequently associated with the name of some venerated and canonized ecclesiastic of the district to which they belong. Among the most prized relics of this class in the Museum of the Royal Irish Academy is the *Clog beanuighte*, which was believed to manifest its sympathy by a heavy sweating on the approaching demise of its custodiers; and Mr. John Bell, of Dungannon, thus describes, in a letter to me, a scene which he himself witnessed. "It was an ancient custom to place the bell near any of the Hennings [its hereditary custodiers,] when dangerously ill. I visited Mrs. Henning, the widow of Paul Henning, the last keeper of the *Clog beanuighte*, on her death-bed. She lay in a large, badly-lighted apartment, crowded with people The bell, which had remained several days near her head, seemed to be regarded by those who were present with much interest. The vapour of the heated chamber was so condensed on the cold metal of the bell, that occasionally small streams

trickled down its sides. This 'heavy sweating' as it was termed, was regarded by every one with peculiar horror, and deemed a certain prognostication of the death of the sick woman, who departed this life a few hours after I left the room. The agonised bell, I was told, had on many previous occasions given similar tokens as proofs of its sympathy, on the approaching demise of its guardians." What gives a special value to this Irish hand-bell is the inscription on it, by which its era is believed to be fixed to the eleventh century, though Dr. Petrie assigns it to so early a date as the close of the ninth century. The inscription upon it is: *Oroit ar Chumascach m̄ ailello: i. e.*, A prayer for Chumascach Mac Ailello; who is believed to be Cumascach, Archbishop of Armagh, A. D., 1065.

The Scottish bell of St. Kentigern, the apostle of Strathclyde, after forming an object of devout veneration to the citizens of Glasgow for centuries, has its memorial still preserved in the city arms; and relics or records of at least a dozen such ancient holy bells of Scotland are still extant. The majority of them are rude square iron bells, coated with copper or bronze, and bearing a close resemblance to the cattle-bells which tinkle in the woods around our Canadian clearings, with no very musical or harmonious clank, unless when softened by distance and the intervening forest, or rendered grateful to the ear of the wanderer in "the bush," by the promise they give of some farm-house or settled clearing at hand. Nevertheless, to one of those: the bell of St. Ternan, the apostle of the Picts, was given the name of *Ronecht*, derived seemingly from the Gaelic *ronnaich*, a poet; *rannach*, a songster: however unmusical its *clogarnach* or jangling would sound in modern ears. The Ronnell bell of Birnie, still preserved at the Parish Church of Birnie, in the old Bishopric of Moray, and said to have been brought from Rome by the first bishop, is of the same rude character already described. It is a single sheet of hammered iron formed into a square bell, with the metal overlapped and rivetted at the joinings, after which it has been coated with brass. Yet this unmusical relic of the ancient bishops of the northern diocese, probably derives its name from the like fond ascription of dulcet sounds to its rude clangour.

Of this same class was the ancient relic of St. Fillan, which at a comparatively recent period bore a prominent part in the exorcisms already referred to by the present custodier of the Quigrich, by which the votaries of the Saint were wont to effect cures of madness and

the casting out of devils. The Rev. Patrick Stuart, parish minister of Killin, writing to Sir John Sinclair, in the latter part of the eighteenth century, observes: "There is a bell belonging to the chapel of St. Fillan, that was in high reputation among the votaries of that Saint in old times. It usually lay on a gravestone in the churchyard. When mad people were brought to be dipped in the Saint's pool, it was necessary to perform certain ceremonies, in which there was a mixture of Druidism and Popery. After remaining all night in the chapel bound with ropes, the bell was set upon their head with great solemnity. It was the popular opinion that if stolen it would extricate itself out of the thief's hands, and return home ringing all the way."* The virtues, however, of the ancient relic seem to have vanished along with the faith of simpler ages. In the beginning of our sceptical nineteenth century, an English antiquary carried off the ancient bell, without the Saint's interposition on behalf of his long-favoured strath, and its potent *clogarnach* has never since announced its return to St. Fillan's cell. The *Buidhean* or bell of Strowan, another and no less potent relic of the same old Scottish Abbot, has adhered with more fidelity to the scene of its ancient miraculous powers. Mr. McInroy of Lude, its present custodier, informs me that it is still a favourite popular legend in Strowan and Blair Athol, that the native of a neighbouring parish having stolen the *Buidhean* and fled with it, he sat down to rest on a large boulder, on the top of a neighbouring hill, laying the bell on the stone beside him, while he drew breath. On attempting to resume his journey, however, he found the bell immoveable; but no sooner did the affrighted and penitent thief turn his face towards Strowan, with the resolution of returning the abstracted relic, than it became once more portable, and was forthwith restored to its favourite resting place.

Such are some of the curious evidences of the sanctity with which the relics of St. Fillan were recently regarded in the district where early in the seventh century he bore his part in the introduction of Christianity into Scotland; and won the reputation for ascetic virtue long after celebrated thus under date of his martyrdom, in a calendar of Scottish saints, written in the early part of the sixteenth century, and now preserved in the library of the university of Edinburgh: *v. Idus Januarii.*—In Scocia Sancti Felani abbatis apud Strathfillane

* Sinclair's Statistical Accounts, xvii. p. 378.

qui a puericie primordiis tanta disciplinæ regiditate carnem afflixit ut posterum sensualitatis et viciorum refrenendi motus preberet exemplum. Such also are some of the many traces of the uneradicated veneration for saints, holy bells and other sacred relics, in Presbyterian Scotland, upwards of two centuries after their solemn denunciation in the first National Covenant.

But other associations than such curious psychological phenomena, pertain to the Quigrich of St. Fillan, now transferred with its hereditary custodiers to Canada; though it too had its healing virtues and potent charms, long known and reverenced in the privileged districts of the Saint. It has its historical associations also, and these of a nature so singularly interesting for Scotland, that it seems to lose much of its value by being transferred to Canadian soil; and thus divorced from all those national and local feelings which confer on it so peculiar a charm. When endeavouring to recover traces of this Scottish relic, in 1850, I was favoured with a letter from the Rev. Æneas McDonell Dawson, whose own immediate ancestors were for a time the guardians of St. Fillan's Crozier, in which he remarked: "The celebrated Crook of St. Fillan is still in Canada, and in the keeping of the very family to whose ancestor it was confided on the field of Bannockburn, when the King, displeased with the abbot for having abstracted from it the relics of St. Fillan previously to the battle, from want of confidence, it is alleged, in the Scottish cause, deprived him of the guardianship."*

In this form of family tradition is preserved the recollection of an incident of the field of Bannockburn, thus referred to in Borland's 'Acta Sanctorum."† "During the night when Robert, anxiously bent on his affairs, enjoyed not a moment's rest, and revolving all things in his mind, was at length engaged with some of his friends in earnest devotion and prayer to God and St. Fillan (whose arm inclosed in silver he believed was with him in the army,) that they might be propitious to his victory, suddenly the silver arm, in which the real one was inclosed, appeared open, and in the twinkling of an eye was shut without any person touching or approaching it. This miracle being observed, the priest approached the altar to inspect it, when he saw the real arm within in, and exclaiming that the Divinity was certainly present, he confessed to the King that when he had

* *Vide* Prehistoric Annals, p. 665.

† Borland's Acta Sanctorum. Venice, 1734. De S. Fillano sive Philano.

formerly asked for the arm of St. Fillan he had given him the empty silver case, after taking out the relic, fearing it might be lost in the tumult. The King therefore, full of hope, spent the remainder of the night in thanksgiving and prayer." Hector Boece refers to this potent intervention on behalf of the Bruce. Camerarius also ascribes the victory to the same miraculous aid, speaking of it as "obtained by the intervention of divine assistance, Anno Chr. 1314, to St. Fillan's intercession for his countrymen;" but St. Fillan's legend disappears from the narrative of Major and other later historians.

Other evidence, however, tends to confirm the faith maintained in the Scottish legend of the fourteenth century which ascribed the victory of Bannockburn and the national independence, to the arm of St. Fillan which wrought so marvellously for his people on that glorious day. Were it not, indeed, that the sainted Abbot—no longer heedful of Scotland in this faithless century of ours,—has allowed his favoured reliquary, as well as its humble chronicler, to be transported beyond reach of Scottish legend, tale, or chronicle: much curious illustration might be added to this memento of a memorable national event. But unfortunately the libraries of Canada are far from rich in such materials. Barbour has given due prominence to the picturesque narrative of Maurice, Abbot of Inchaffray, celebrating mass in sight of the Scottish army; and then, passing barefooted along the front of the kneeling host with his uplifted crucifix, exhorting them to win their liberty or die. It connects this historical incident of the field of Bannockburn with the marvelous interposition ascribed to the arm of the sainted Abbot of an older century, when we recall the fact that centuries thereafter, and until the dissolution of religious houses at the Reformation, there was a cell or priory, belonging to the Abbey of Inchaffray, in Strathern, near the miraculous pool of St. Fillan, "founded by King Robert the Bruce, and consecrated to St. Fillan, in consideration of the assistance he had from that saint at the battle of Bannockburn."*

Some curious and highly interesting notices of ancient Scottish Croziers and their hereditary custodiers, with charters of tenure of freeholds held in virtue of such trust, have been recovered by the researches of Mr. Cosmo Innes, Professor of History and Antiquities in Edinburgh University, and Mr. Joseph Robertson, another able

* Spottiswood's App. Hope's Minor Practicks, p. 424.

Scottish antiquary.* Episcopal memorials of the same class, recovered from more than one ancient tomb in the choirs of Scottish cathedrals, are figured or described in the "Prehistoric Annals of Scotland," along with other ecclesiastical relics connected with the early Scottish church.† One of those ancient Scottish Croziers, the relic of a favourite Celtic saint, and a memorial of the older cathedral of the See of Argyll: the Crozier of St. Moluac,—long held, along with a little freehold, in the Island of Lismore, the seat of the old Bishopric,—has been recently transferred to the Duke of Argyll, by the last "Baron of Bachul," as the hereditary keeper of the Crozier was called, from its Gaelic name of *Bachul Mohr*, or the Great Staff. In describing this relic, Mr. Innes adds: "The Baron Bachul's of Lismore, though an uncommon, is not a unique instance of such tenures in Scotland. There is charter evidence of a mere croft of land in Cowal being held in the fifteenth century as an appendage to the office of Keeper of the Crozier of St. Mund, the saint to whom Kilmun is dedicated. In this case the land or the tenure bears the name of Deowray—a name suggesting a similar office with that which gave the name *Deor* or *Jore* (modernised *Dewar*) to the hereditary Keeper of the Crozier of St. Phillan in Glendochart." To this also may be added, in illustration both of such tenure and name, the Holy Bell of St. Rowen, which still secures to the family of Dewar certain hereditary chartered rights in Monivaird.‡

If any such freehold pertained in ancient times to the *Doires* or *Dewars* of Strathfillan, in virtue of their trust, all traces of it have long disappeared. The English tourist to whom we owe the revived knowledge of the Crozier of St. Fillan,—which appears to have been altogether unknown to the authors of the Statistical Accounts of the Parish of Killin,—describes its owner in 1782, as *Malice Doire*, a day labourer. "The neighbours," he says, "conducted me to the envied possessor of this relic, who exhibited it according to the intent of the royal investment. A youth of nineteen, the representative of his father's name, and presumptive heir to the treasure, lay drooping in an outer apartment in the last gasp of a consumption;" and yet here was one who only wanted patrimonial lands to have claimed a prouder descent than any whose ancestry figure in the Ragman roll. The

* Proceedings of Soc. Antiq. Scot., vol. ii., pp. 12, 125.

† Prehistoric Annals of Scotland, p. 464.

‡ *Vide* Archæol. Scot., ii., p. 75.

present representative of those to whom the Bruce entrusted the custody of the sacred relic, has acquired a farm in Western Canada, and—more from want of faith in the fidelity of future heirs, than from himself undervaluing the hereditary trust,—is not unwilling to part with the relic, if he could see it transferred to safe keeping. He has hitherto named £500 as the lowest sum he was willing to receive for it; and at one time submitted to the Earl of Elgin, while Governor General of Canada, a proposition to take in lieu of this, two thousand acres of Canadian land to be apportioned among his sons, on learning that His Excellency, who claims the honors of the Bruce, coveted the precious heirloom. Since then he has expressed his approval of a modified scheme by which I have endeavoured to secure the deposition of this national relic in the Museum of the Scottish Antiquaries at Edinburgh, where it would possess an interest and value altogether wanting to it while it lies, as it has done for some time, safe but totally unheeded, in the strong room of a Canadian Custom House. Under this proposed arrangement the Keepership of the Crozier is to remain nominally with the Dewars,—to avert, it may be, the evil consequences said to have followed on a former occasion, when the custody was transferred to other hands. My correspondent, the Rev. Æ. McDonell Dawson, remarks in the letter already referred to: "This family lost possession of the Crozier for a time, having disposed of it for a sum of money to an ancestor of my mother's family, who adhered to the ancient faith.* Soon after this transaction, however, ceasing to prosper, and attributing their change of circumstances to their indifference to a sacred object that had been solemnly entrusted to them, they persuaded the purchaser, or rather the person who inherited the Crozier from him, to part with it in his favour."

In reply to my inquiries for family traditions or documentary evidence relative to the Crozier of St. Fillan, Mr. Dewar thus writes: "I am sorry to say that I can give you but little information concerning the Quigrich. My father came to this country in the year 1818; and in coming up the Ottawa river, met with an old Scottish gentleman, of the name of McDonald, with whom he left several old papers that he had concerning the Quigrich, which papers were never returned, as Mr. McDonald's house was burned soon after, and

* Mr. Alexander Dewar, the present owner, is a Presbyterian, as his immediate ancestors were.

the papers lost." Mr. Dewar, however, retains in his possession a copy of the royal investment granted to Malice Doire, one of his ancestors, by James III. in 1487, in confirmation of more ancient royal deeds by Robert the Bruce; and registered by the Lords of Council and Session, at Edinburgh, in 1734. In this royal investment,—endorsed on the back of the old copy in Mr. Dewar's possession: "Charter of King James anent possessing the Relic of St. Phillan, in favor of Malice Deore, 1488,"*—it is set forth that "For as mekle as we have understand that oure servitoure Malice Doire and his forbearis has had an Relick of St. Filane, callit the Quegrich, in keeping of us and oure progenitors of maist nobill mynde, quham G^d *assoleze*, sen the tyme of King Robert the Bruys and of before, and made nane obedience nor answere to na persoun spir^ale nor temporale in ony thing concerning the said haly Relick utherwayis y^n is qteind in the auld infeftment thereof made and [grantit be oure said progenitouris. We charge you herefore] and commandis that in tyme to come ye and ilk ane of you reddy answere intend and do obey to the said Malice Doire in the peciable brooking and joising of the said Relick, and z^t ye nain of you tak upon hand to compell nor distreze him to mak obedience nor answere to you nor till ony either bot alanerly to us and our successoures, according to the said infeftment and foundation of the said Relick. . . . And that ye mak him nane impediment, letting, nor distroubance in the passing with the said Relick throw the Countre, as he and his forebearis was a wont to do."†

The virtues ascribed to the Crozier of St. Fillan, in his native district, were of a most varied description. It was regarded as an effectual cure for fever, by administering, or sprinkling with water in which it had been dipped; and was no less infallible in cases of scofula, or the King's evil, by being rubbed on the affected parts. It was serviceable also as a charm for the discovery and restoration of stolen cattle; and generally in all cases of disease of such. On this point Mr. Dewar replies to my queries: "It is quite true that the relic was looked on as a charm, but since it came into my possession

* On the endorsement the date is given in Arabic numerals, 1488; in the deed itself it is "MCCCCLXXXVII, and of oure regne ye XXVII zere—sic subscribitur Jacobus R."

† The whole document is printed in the Archæologia Scotica, vol. iii. p. 290; but the copy in Mr. Dewar's possession, though old enough, differs sufficiently to indicate its being another than that seen in 1782. The portion in brackets, which is a blank in the MS, has been supplied from the printed copy, otherwise I have followed Mr. Dewar's MS.

I have not been much troubled with it in that way, except for diseases of cattle. Two men, who had sick cattle, came to get water of it for them; but I never inquired whether it cured them or not." On another point, also, he adds: "The meaning of the word Quigrich I do not know; neither do I know whether it is a Gælic word or not."

In the name *Quegrich*, by which the Crozier of St. Fillan is designated in the Charter of James III., I am inclined to suspect a descriptive memorial of its historical association with THE KING, as Robert the Bruce was, *par excellence*, long after the days of his Royal descendant James III. Possibly it compounds with *Righ*, an old form of *cuag*, and signifies the King's Crook; as it might well be designated after the miraculous interposition on the Bruce's behalf, recorded in the *Acta Sanctorum*. The proper generic name of such symbols of pastoral oversight and rule, has been made the subject of some difference of opinion. With the usual derivation of Crozier from F. *croix*, it has been assumed that this is properly the superior pastoral staff or cross. But while we have the Medieval Latin: *cambutta* for the crozier, we have the corresponding *crocia* for the pastoral staff; and it is more probable that our crozier, or chief-pastor's crook, is derived directly from the A.S. *cryc* Du. *crook*, equally with the shepherd's crook; as in the description of the Archdeacon, in the FRERES TALE of Chaucer:—

> For smale tithes and smale offering,
> He made the peple pitously sing;
> For er the bishop hent hem with his crook,
> They weren in the archedekens book.

In celtic Scotland, the simple latin *baculus* was converted into *bachul easpuig*, the bishop's staff; *bachul mohr*, the big staff; and the corresponding *bachall* is used throughout the ancient Irish M.SS., not only to denote the crozier of a bishop, abbot, or abbess, but also the penitential staff of a pilgrim; and it is much more likely that the pastoral staff of the Abbot and Apostle of Strathfillan resembled, in material as well as form, a primitive shepherd's crook, than that he bore about with him in his missionary wanderings among the wild Pagans of Loch Tay such a tempting relic as that which has so long helped to associate his name and fame with the scene of his early and self-denying labours. Again we find the crozier presented by St. Columba of Iona, to St. Kentigern, the first Bishop of Glasgow, de-

signated in Joceline's life of the latter, both by the term *baculus* and *cambo*, another form of the *cambutta*; while again at a later period it reappears in the accounts of the Scottish Lord Treasurer, in 1506, as *cabok*. The derivation, there can be little doubt, is from the Gælic or Welsh *cam*, crooked, which enters into so many compounds, and from which, also, is no doubt derived the more homely *cammock*, or Scottish shinty, prohibited by Edward III. under its latinised form of *cambuca*, or *cambuta*.*

To St. Fillan's cabok a special name was given, though it probably represents the most usual form of the ornamental baculus or cambutta of the ninth and tenth centuries, and even of a later period. It is literally a beautiful and elaborately wrought shepherd's crook; and, whatever diversity of opinions may arise on other points, it cannot admit of a doubt that this fine example of early celtic art exhibits abundant evidence of belonging to an era long prior to that of the hero of Scottish independence. The accompanying lithographic plate—skilfully executed from a very careful drawing,—renders any elaborate description of its form or details unnecessary. The interlaced knot-work and other ornamentation is such as is already well known, especially on some of the beautiful silver and goldsmiths' work of early Irish art. The front is jewelled with a large oval crystal, set on a plate which appears to have been moveable, and probably hinged, though it is now somewhat roughly secured, so as no longer to admit of being opened. This may have been the lid by which the bone of the Saint was inserted in the favoured reliquary; and which, according to the legend preserved in the "Acta Sanctorum," suddenly appeared open as it stood on the altar in the Bruce's tent, and reproached its faithless guardian with his unpatriotic deceit. Above this, and forming the front of the crest or ridge, is a figure, or bust, of an ecclesiastic, most probably designed for the Saint himself, while the lower end of the ridge terminates in the form of a snake's head, common on bronze relics of a late period. On the flat shield-shaped point of the crook, is a rude but bold engraving of the crucifixion, with two stars in the field, one on each side below the arms of the cross. The whole is of silver gilt, wrought on a hollow core of copper, and measures nine and a quarter inches in height, and nearly seven and a half inches across, from the point of the crook. It will be seen that it differs considerably, both in form

* Strut's Sports and Pastimes, B. II. c. iii. Goff, Cambuc, &c.

and details, from the sketch furnished to the Scottish Antiquaries in 1785, and copied in the Prehistoric Annals of Scotland, with an authentication of its general accuracy, on the authority of a correspondent at whose request the original had been inspected in its new Canadian reliquary. In its general form it most nearly resembles the head of the short episcopal cambutta borne by St. Luke, in the beautifully illuminated Gospels of MacDurnan, in the Library at Lambeth Palace, which have had the middle of the ninth century assigned as their date.* It is an exceedingly simple form, suggestive of a primitive age of art, and yet adorned with such rich and tasteful skill as to constitute—apart from its singularly interesting historical associations,—a valuable example of the workmanship of the early age to which it must be assigned, and of the primitive civilization which followed in the wake of that Christianity taught by St. Fillan and other Christian missionaries, to the first conver[illegible]om among the pagan Celts of North Britain.

This ancient Scottish relic is still in the possession of Alexander Dewar, the lineal representative, in all probability, of the favoured follower of King Robert, to whom, according to no improbable tradition, it was confided on the field of Bannockburn, five hundred and forty-five years ago. Could the protection which the prejudices and superstition, no less than the national and family pride of earlier generations, secured for it as a sacred and chartered heirloom, be guaranteed to it under the charge of a Canadian yeoman, its fittest place would still be in the keeping of the Dewars, to whose custody it was entrusted, under such remarkable circumstances, and who have been, through poverty and exile, faithful to their trust. But removal from Strathfillan to the clearings of the New World has broken the charm. It only remains in the keeping of its present custodier because no one has hitherto been found able or willing to pay the price he demands for the precious relic; and it is earnestly to be desired that, ere it is too late, it should be secured within the safe keeping of one of our great national collections, before, as apprehended by its former describer in 1785, it "find a ready passage to the melting pot;" or, like the documents which accompanied it to Canada, it perish in some chance conflagration, such as yearly consume hundreds of the frail wooden houses of Canadian settlers.

* Archæol. Journal, vol. vii. p. 20.

DESCRIPTION OF AN INTESTINAL WORM FROM THE DUODENUM OF THE WHITE FISH OF THE CANADIAN LAKES.

BY BEVERLEY R. MORRIS, A.B., M.D.

Read before the Canadian Institute, 29th January, 1859.

ENTOZOA.

PARENCHYMATA.

Fam.: Acanthocephala. *Genus:* Echinorhynchus.
Species: ..... ?

Description.—Body cylindrical, tapering to the tail. Procis subglobular, flattened anteriorly, armed with numerous recurved hooks, very difficult to count, but probably not exceeding twelve in number. Neck distinct nearly as long as the width of the tail. Digestive pouch doubly sacculated for half its length, which equals half the length of the whole body.

Colour—pale brownish yellow.

Length—one-fifth of an inch.

I found three specimens of this parasite adhering to the duodenal portion of the intestinal canal of a White Fish (*Caregonus albus*) of about two pounds weight, on the 5th of December, 1856. They were dead and partially decomposed, which rendered the examination less satisfactory than it would have been had they been alive. The form,

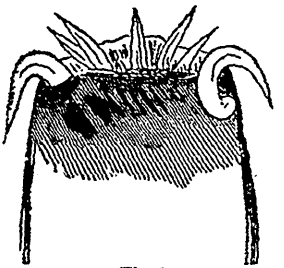

Fig. 2.

Fig. 3.

as well as the arrangement of the hooks (Fig. 2) is curious and is only to be seen by careful focussing when under the miscroscope.

One hook (Fig. 3) is cracked, and is interesting as showing an internal pulp cavity.

This parasite evidently belongs to the genus *Echinorhynchus;* but owing to not having access to books containing descriptions of all the known species of the genus, I am unable to say if it is new, or previously described. Possibly it may prove to be *E. fusiformis* which is parasite in the European trout; but I think it probable that as our White Fish does not occur in Europe, where the other species have been described, it may prove a distinct species. In this case I would propose the name of *E. Coregoni albi* as indicating the fish in which it is parasite.

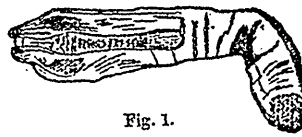

Fig. 1.

The accompanying wood-cuts have been engraved from carefully executed microscopical drawings, and suffice to convey a tolerably accurate idea of the most noticeable peculiarities of this intestinal parasite. Fig. 1 is on too small a scale to convey any very minute details, and especially fails to show the arrangement of the sacculi in two rows, at the head and upper portion of the stomach. It is sufficient, however, to illustrate the general form of the animal.

Fig. 2. Shows the arrangement of the hooks, and their form. Those appearing straight being seen edgeways.

Fig. 3 shows one of the hooks which was cracked, exhibiting an internal pulp cavity.

THE FAMILY OF FALCONIDÆ.

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

Read before the Canadian Institute, 11th December, 1858.

The notices I am about to lay before the Institute have occurred to me, in connection with efforts made to improve the collection of native birds in the museum of the University of Toronto. I have

been fortunate in meeting with specimens of a few rare birds, and in some instances the examination of species not peculiarly rare has led me to opinions differing somewhat from those most in vogue, or at least to doubts on points of some interest which I think it may be useful to record; whilst the interest felt in birds is so general as to justify the hope, that the subject will afford some entertainment to most of my readers.

What I shall now offer, will consist of an essay on the Canadian species of the family Falconidæ.

Throughout the Falcon family, great difficulty in rightly determining the limits of species arises from the changes occasioned in the same species by differences of age and sex, which often led the earlier naturalists and those who have collected specimens without reference to the birds in a living state, to multiply species improperly, whilst a desire to avoid this fault, with a partial knowledge of the facts, has led some moderns as it seems to me, conjecturally to unite really distinct birds, as varying conditions of the same species. I should be presumptuous if I hoped entirely to escape these opposite dangers myself, but I have cautiously endeavoured to find the right mean, and the suggestion of doubts for which there is even an apparent justification, may at least be useful in directing inquiry, or leading experienced observers to communicate the grounds for satisfactory decision.

Mr. Gray, possibly carrying subdivision to an extreme, ranges the FALCONIDÆ under seven sub-families. Of these, *Polyborinæ*, the vulture-hawks, nearly confined to South America, and *Milvinæ*, the kites, are unrepresented amongst us; unless indeed the beautiful swallow-tailed kite of the neighbouring States [Nauclerus furcatus] could be obtained within our borders. The remaining sub-families, Buzzards, Eagles, Falcons, Hawks and Harriers are all well represented.

The Buzzards, *Buteoninæ*, are known by their long wings, powerful feet, beak arched from its base, without tooth, or more than the slightest festoon, and even tail. The majority of these, form the Genus *Buteo*, whilst a few, with the Tarsi feathered to the foot are now named *Archebuteo*. The common buzzard, [Buteo vulgaris] is given by Sir J. Richardson, in Fauna Bor. Am., as a native of the fur countries, but it is now supposed, that his specimens belonged to *B. borealis*, an undoubted North American species. Of this latter, under which Mr. Gray includes several seemingly distinct forms, I can say nothing at present, as I am not so fortunate as to possess a specimen.

B. lineatus, the name given to the red shouldered hawk of Wilson, is now extended to his Winter-hawk also. The late eminent naturalist, Charles Lucien Buonaparte, Prince of Canino, promulgated the opinion that the red shouldered hawk, is the young male of the Winter-hawk, to which view Gray and others have assented. It is with great hesitation I suggest a doubt in opposition to such authorities, but in the collection of the University, we have four examples of the Winter-hawk, two of them apparently well-grown, the others, which were shot together, seeming to be a young pair considerably below the full size, yet all of them present precisely the characters of the Winter-hawk; whilst we have also a fair specimen of the red shouldered hawk, which looks like an older bird than the pair already noticed, and the markings of which differ so essentially in points usually to be relied upon, as the number and nature of the bars on the tail, that a strong presumption arises in favour of its being a distinct species. Accordingly I have thought it best for the present, to label only the red shouldered hawk, *Buteo lineatus*, and to mark the others, *Buteo hyemalis*, and I should be particularly glad of the aid of practical observers and sportsmen in settling the question. Of another rare species, Mr. Passmore has lately supplied us with a specimen, from this neighbourhood, *Buteo Pennsylvanicus*, the broad-winged hawk or buzzard, a bird discovered by Wilson, near Philadelphia, and less common than most of the tribe. Its moderate size, the comparative width of its wing, and the few white bars across its tail, serve to distinguish it.

Passing now to the genus Archebuteo, we find that Mr. G. Gray, in "the Genera of Birds," considers *Archebuteo lagopus* as belonging exclusively to Europe, and refers all the American birds to *Archebuteo Sancti-Johannis*. Not doubting but that this opinion is founded on a careful consideration of evidence, and having before me a good set of specimens, I have endeavoured to make out his reasons, but I cannot satisfy myself. It is true there are authorities, both English and American, for very dark birds, supposed to be of advanced age, being occasionally seen amongst the others, and the wings of our European specimen seem to be longer than those of the American; but most persons looking at the European and American birds in their lighter suit, would pronounce them one species. It seems certain that this is their full ordinary plumage, as they are known to breed in it, and the darker birds are much rarer in America and still more remarkably in Europe. If the striking difference of colour does not mark a species,

but is only a variety, or an effect of age, it may be necessary to suppress *A. Sancti-Johannis* altogether, unless indeed the length of the wing furnishes a better character. In our specimens, the fine light-coloured pair, lately shot on the Island, are, like the European bird, which they so much resemble, marked *A. lagopus*, whilst the fine dark plumaged bird, the true black hawk of American writers, is labelled *A. Sancti-Johannis*. These names were attached under the impression that I could at least maintain with some confidence, that, if the two species are good, we have both in America, but since I have noticed the apparent difference in the length of the wing, and one or two minor distinctions, I find myself as much in doubt as ever. These birds need more study of their habits and anatomical characters, as well as of the changes of colour they pass through.

Proceeding to the sub-family *Aquilinæ*, eagles, I have great pleasure in naming the Golden Eagle, *Aquila Chrysaetos*, as a denizen of our country, several of these noble birds having during the present winter been killed in the neighbourhood, of which we have been able to place a fine specimen in the museum. It has been seen near the Rocky Mountains, in Labrador, and as a rare visitant in various parts of the United States, but always so uncommon as when obtained to be deemed a prize, and as one of the noblest of the feathered race it cannot fail to be admired. Our specimen shows the form known as the ring-tail, and formerly accounted a distinct species. Being the youngest form it is the most common, as large numbers are not permitted to reach maturity, and a doubt has been sometimes raised whether it is not the only one seen in North America. The White-headed Eagle, *Haliætus leucocephalus*, is a more familiar bird, of a less bold and fierce character. It also undergoes a change of colour which has caused another suppositious species, for the young is entirely dark-coloured, or only irregularly sprinkled with white, whilst the fully matured bird has the colour on its head and tail in curious contrast with its dark body and wings.

Pandion Haliætus, the Osprey or Fish-Hawk, belongs to this group, but needs no special remark.

I have not heard of the Washington Eagle being found in Canada, but it may possibly occur to us.

Next in order come the *Falconidæ*, or true Falcons, the most typical form of the family, known by the length and power of the wings, the strength and sharpness of the claws, the presence of one

or even two teeth on each mandible, with a peculiar mode of flight and of seizing its prey. This interesting group is not largely represented amongst us. I have lately seen the Gerfalcon named as shot near Toronto, but I cannot help supposing some mistake. Its most southern limit, according to Richardson, is about the northern boundary of Canada, besides that it is seldom found far from the sea-coast, I can only say that I should be most happy to receive it as a native bird. The peregrine falcon (*Falco peregrinus,*) is thought to be found here, but some American naturalists maintain that ours is an analogous species which they have called *Falco anatinus.* The structure, figure, and colouring of our bird, well-known as the great footed hawk, greatly resembles the European. If there is any difference it is most difficult to discover, and we ought not to multiply species wantonly. I hesitate therefore to admit the claims of this American species. Two others we have, which are peculiar to North America, and which illustrate separate generic forms. *Hypotriorchis Columbarius* the representative of the European merlin and one of our commonest falcons, and *Tinnunculus sparverius,* the American Sparrow-Hawk,—a well-known and handsome bird—the smallest of the whole family in this country.

In the sub-family *Accipitrinæ,* the Hawks,—using that term in its strictly limited acceptation, distinguished from the preceding by having only a festoon on the upper mandible, and by a different mode of seizing their prey, by a swoop off the ground or near to it, instead of a sudden descent in the air,—we have several good native illustrations.

I have lately had the great satisfaction of receiving from Mr. Passmore, *Astur atricapillus,* the American gos-hawk, and of thus satisfying myself by careful comparison with our European specimen of the common gos-hawk, *Astur palumbarius,* of the reality of the alleged specific differences. Our specimen is a very beautiful one, and we possess also what is thought to be the young bird, the markings of which are strikingly different and show the extent of the changes for which we have sometimes to make allowance. My receiving very recently a much larger and seemingly well grown bird, with precisely the same plumage as this young one, has created a doubt in my mind whether its history is well understood.

Accipiter Cooperi, called by Audubon the Stanley Hawk, is one of our commonest raptorial birds, and I have received it likewise from

South America, so that it is widely diffused over the continent. We have also *Accipiter fuscus*, the sharp-shinned hawk, in which the superior size of the female is more conspicuous than in most species.

It remains for me to review the sub-family *Circinæ*, the Harriers. We have a specimen from the old College Museum of *Circus Cyaneus*, the hen harrier, seemingly the same as the British species, and we have a female of the same which I believe is a European specimen; but the bird seems very difficult to procure here. It is declared by some high authorities to be only the mature form of our Marsh-hawk. I wish I could know the exact grounds for this assertion in order to judge of the weight to be given to it, but in the mean time I am impressed by the facts that the Marsh-hawk of this country, *Circus uliginosus* of authors, differs considerably from the female as well as the male of the other species, is perhaps our commonest raptorial bird, whilst the supposed mature state is very rare, and the specimens in our collection were supposed to be a pair, and exhibit differences that would seem to imply difference of sex. I must therefore wait better proof before I unite the species, especially considering that the European *Circus rufus*, which is acknowledged to be distinct, bears a great resemblance in colour to our *uliginosus*: yet observations have been reported to me which favour the idea of the identity of the species. *Circus uliginosus* is a very beautiful bird. It plainly displays the same generic characters as *C. Cyaneus*, but there are signs of specific distinctness suggestive of doubt, so that we want clear evidence of the change it undergoes before admitting it as an established fact.

It appears that we have not less than fifteen native FALCONIDÆ—one or two more being probably to be found, and several of them requiring careful investigation of their history by those whose country residence, out-of-door pursuits, and fondness for the use of the gun afford them the required opportunities. The British members of the family reach twenty in number, but some of them are very rare visitants, and, as we may possibly add one or two, and mine is a strictly local list, the difference is not material.

The family we have been examining is specially employed by Providence to keep within proper bounds the increase of the smaller birds, mammals, reptiles, and even the larger insects. Their armature of foot and beak, the power of their wings, and their mode of seizing

their prey, are nicely adapted in each case to the habits of their intended victims. It is observable that from the small number of their eggs and their slow growth and peculiarly helpless infancy, they increase much less rapidly than the animals on which they feed, and where the dominion of man renders their functions less necessary, their numbers soon diminish. Thus the balance among differing forms of life and the harmony of nature are preserved, and all beings, in seeking the supply of their own wants and the enjoyments which awaken their desires, fulfil the purpose of the great author of being, act under his control, and show themselves his servants. Inferior creatures, guided only by instinct and by the common wants of the animal nature, perform their part, kept within bounds by the natural enemies raised up for them. Man, the chief of the creation, is permitted to rule over others, and called upon to rule himself; he alone has the privilege of a moral nature. He is capable of distinguishing good and evil, submitting himself to restraint under the influence of motives, knowing the existence and learning the will of the Great Invisible, and by faith anticipating his gracious promises. He uses reason in avoiding the injuries with which the operation of natural laws threatens him, and in deriving the highest advantages from powers which seem most formidable and destructive. To the thoughtful mind every object in nature speaks of beauty, order, and wise design for the production of good. The fiercest creatures have a needful and beneficent mission; apparent evil has its limits and its good results. As we rise through nature to the God of nature, we should learn from what we see humility, resignation and trust, and should most gratefully accept the spiritual privileges which are our highest distinction, constituting our true elevation above the beasts of the field and the fowls of the air, whose structure and instincts most interest us as expressions of that supreme wisdom and benevolence in which all our hopes are placed.

NOTE ON THE MORE CHARACTERISTIC FOSSILS OF THE HUDSON RIVER GROUP OF TORONTO AND ITS ENVIRONS.

BY J. F. SMITH, JR.

Read before the Canadian Institute, April 2nd, 1859.

The object of this communication is, principally, to point out to the student of Canadian Palæontology, residing in the neighbourhood of Toronto, the characteristic fossils of the Hudson River Group, as there developed, and the localities from which these fossils may be obtained. The most important localities comprise the valley of the Humber, and more especially the neighbourhood of Weston, on the west; and the Don Mills on the east. Weston is particularly prolific.

The rocks of the Hudson River Group, lying above the Utica slate and below the Medina sandstone, comprise chiefly a series of greenish and brown arenaceous shales, with some interstratified beds of limestone. This formation extends along the shore of Lake Ontario from the Township of Pickering to the Township of Nelson, although it is much covered up and concealed by the overlying drift-clay and sands.

A list of fossils obtained from an excavation on the esplanade, now closed up, has already appeared in the Journal (Vol. I. New Series.) Since the publication of Professor Chapman's note, however, I have thoroughly explored the surrounding country, and I have been rewarded by the discovery of many additional species. Thinking that a list of these, as the result of actual personal observation may not be altogether devoid of practical interest, I have ventured to draw up the following classified distribution:

Commencing with the sub-kingdom, ARTICULATA, we have the great extinct family of the *Trilobites*. The two species found in the Hudson River Group are: *Calymene senaria* (Conrad), and *Asaphus platycephalus* (Stokes). The first named, *Calymene senaria*, or *Blumenbachii*, is very abundant everywhere, and is probably the most common trilobite known. It is found at Weston in the shale which occurs there. Specimens with the head attached, however, are rarely met with at that locality. It is also found at the Don Mills. *Asa-*

phus platycephalus is principally found up the Humber and at Weston. It occurs, commonly, in a fragmentary state.*

We next take the MOLLUSCA. Beginning with the *Cephalopoda*, we have the family of the *Orthoceratidæ*. The *Orthoceras* was a long straight shell, as its name indicates, with a tube running from end to end called the siphuncle. The shell is divided transversely into chambers by simple septa. Of this genus we have *Orthoceras coralliferum* (Hall), and *Orthoceras lamellosum* (Hall). The so-called genera *Endoceras* and *Ormoceras* are also found at Milton up the Humber. The siphuncle of *Endoceras* is said to be made up of funnel-shaped diaphragms, and is very large. The same organ in *Ormoceras* is beaded. These distinctions as generic characters do not now hold good; and Endoceras and Ormoceras, with some other genera are included in the genus *Orthoceras*.

The GASTEROPODA next claim our attention. *Cyrtolites ornatus* (Conrad), a very beautiful shell, is excessively common at Weston, and indeed at all the localities mentioned above. *Murchisonia gracilis* (Hall) the most common of the *Murchisonias*, (a genus named after Sir Roderick Murchison), is found in a good state of preservation at Weston. *Pleurotomaria subconica* (Hall) is rather rare. It is found at Weston, and also at Toronto. A beautiful specimen of *P. bilix* (Conrad), retaining the shell and epidermis or colouring, was found in Toronto.† *Bellerophon cancellatus* (Hall) is very rare, only two or three specimens having been met with in this neighbourhood.

No PTEROPODS have yet been discovered here.

The BRACHIOPODA come next in order, and are extensively represented. The most characteristic are: *Leptæna sericea* (Sowerby), and *L. alternata* (Conrad), both very common at Weston and other places. *Atrypa increbescens* (Hall), is comparatively rare. *Lingula quadrata* (Eichwald), has been discovered at Weston badly preserved. The shell has the dark, polished aspect, so characteristic of the *Palæozoic linguloe*. *Orthis testudinaria* (Dalman), a fossil distributed widely throughout the Lower Silurian system. *Orthis erratica* (Hall) is also

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* To these Trilobites we may add *Trinucleus concentricus*, discovered quite recently in the neighbourhood of Toronto by one of our Students, Mr. William Brown, of Cobourg, C. W.—[E. J. C.

† By the late much lamented Mr. John Head, the only son of his Excellency Sir E. W. Head, Bart., whose early loss, at the commencement of a career so rich in scientific promise, cannot be too deeply deplored. The Editors of the *Canadian Journal* join most sincerely in this expression of regret.

exceedingly common and very well preserved in our neighbourhood. *Orthis occidentalis* (Hall) is abundant here and at the Humber River. *Orthis* (formerly *Spirifer*) *lynx* (*Eichwald*). I have obtained one or two specimens of this fossil from Humber Bay.

Among the CONCHIFERA we have in the *Aviculidæ*: *Avicula demissa* (Conrad), an abundant fossil; and *Ambonychia radiata* (Hall), is also excessively common. In the *Mytilidæ* we have the well known *Modiolopsis modiolaris* (Conrad), a very plain looking shell notwithstanding its long name. *Modiolopsis curta* (Conrad), is rather rare. Besides these two species, *M. anodontoides*, and *M. faba*, with *Orthonota parallela* (Hall), have also been obtained from the shale at Weston.

Nucula postrata (Conrad), is an example from the family of the *Arcadæ*.

In the *Trigonidæ* *Lyrodesma plana* (Conrad), with its peculiar radiating teeth has been discovered. I have also obtained *Cleidophorus planulatus* (Conrad), (family of the *Cyprinidæ*) from the fine green shales of Weston, and Prof. Chapman has the same species from Toronto; but it does not appear to be common.

Chætetes lycoperdon (Say), is the most common and at the same time the only coral yet discovered here. It occurs both in the "puff-ball" and branched forms at all the localities.

We have as yet no *Cystideæ*, and only the stems of *Crinoideæ*, principally *Glyptocrinus decadactylus* (Hall).

Among the mysterious Graptolites we have *G. pristis* (Hisinger). I have lately obtained several very good specimens. *G. Bicornis* also occurs in the Humber Valley, but the forked ends are generally broken off.

The fossils mentioned in the above list comprise merely the characteristic forms of the Hudson River Group, as obtained in my own explorations around Toronto. A few other forms occur, but not in sufficient abundance to be considered characteristic; and I have therefore abstained from alluding to them. I trust, however, that this brief notice may induce some of the younger members of the Canadian Institute to turn their attention to this interesting study, and that our list of fossil species may in this manner be eventually much increased. I think it but right to add, that my own attention was directed in the first instance to this pursuit, by a paper on Trilobites which appeared in a recent volume of our Journal.

ON THE EMPLOYMENT OF THE ELECTRIC TELEGRAPH IN DETERMINING THE LONGITUDE OF SOME OF THE PRINCIPAL PLACES IN CANADA.

BY LIEUT. E. D. ASHE, R.N., F.R.A.S.

The introduction of the telegraph wire into an Observatory, and the facility and rapidity of registering observations by its means, may be considered one of the most useful adaptations of the age; and I never recollect having been more deeply impressed by the idea of man's intellectual development, than I was when I heard the "relay" in the Observatory, Quebec, beating the seconds of the Sidereal clock in the Observatory at Cambridge. I have long ceased to wonder at the snorting locomotive as it dashes past at the rate of forty miles an hour, dragging some hundreds of human beings in its wake. Man can reason step by step, from the tea kettle until he arrives at the steam engine, but when we hear the pulsations of a clock, be it ever so far off, our reasoning faculties stagger under the stupendous fact. It follows then, as a matter of course, that as the beating of a clock in one observatory can be heard in another, no method can be so accurate for determining the difference of meridians as the mode of doing so by the electric telegraph.

Two fixed observatories being connected by the telegraph wire, there are various modes of determining their difference of meridians. Perhaps the most accurate is to send a signal every time a star of a pre-arranged list passes each wire of their respective transit instrument, and as the time of these signals is carefully noted in each, it follows that the time taken by each star to pass from the meridian of one observatory to that of the other can be most accurately obtained. Care, however, must be taken to change the observers in order to eliminate the personal equation. And if the signal be sent from east to west, and again from west to east, the time occupied by the signal in passing along the line causes the meridional difference to be too great in one instance and too little in the other, and consequently the mean gives a correct result. For instance, let the observatory A be twenty minutes to the eastward of an observatory B, and suppose the signal to occupy one second in going along the line, then if A sends a

signal at 4h. 30m. 10s., if no time is lost, B will receive the signal at 4h. 50m. 10s.; but as we suppose the signal to occupy one second in passing from A to B, B will receive the signal at 4h. 50m. 11s., and the difference of meridians will be 20m. 10s., a second too much. But supposing B to send a signal to A at 4h. 50m. 10s., then A will receive it at 4h. 50m. 11s., and the difference of time will be 19m. 59s., evidently one second too little, but the mean of the results give 20m., the correct difference of longitude. Therefore by the observers exchanging places, and by sending the signal backward and forward, the greatest accuracy may be obtained.

Lunar and Stellar photography may be the means of superseding the laborious and imperfect manner of taking observations with the human eye; and it is to be hoped that the noble example set by the Observatory, Cambridge, U. S., in this respect, may be followed by others, and that we shall ultimately succeed in making the heavenly bodies register their own observations. With respect to Stellar photography, so much will depend upon the state and purity of the atmosphere, that but few places are well adapted to this mode of observing, but many say that Quebec has the advantage in this respect over most other places in British America, and I sincerely hope that ere long Stellar photography will be taken up by Canada.

Before giving my report on the determination of longitude, I will make a few observations, that may be useful to those who may be occupied on a future occasion in determining meridional distances.

On arriving at the place, just call at the telegraph office and make friends with the department, as without their hearty co-operation it is useless to proceed. Then look out for some rocky ground near to the office, where you can build your observatory. Let the support of your instrument be of stone, and of a height that will enable you to apply and read the level when standing on the ground. This is of great importance, as the level must be applied quickly and often. Also take care to have the screw that moves the instrument in azimuth to your right hand, in looking to the northward. If you are left-handed, *vice-versa*. See that the Collimation has not been thrown much out by travelling. If it has, correct it as nearly as you can by the middle wire in reversed positions.

As you do not know the longitude of the place within two minutes, and as the rate of your chronometer should not be trusted with its former rate, after travelling, you can not get the instrument into the

meridian by bisecting a star with the middle wire—as the correct time can not be known by the chronometer, and procuring observations for the correct local time would occupy much time—I recommend the following way to get a transit instrument quickly into the meridian.

First direct the instrument to a point about a degree and a half from Polaris, in a line joining that star and the fifth star of the Great Bear. This ought to place the transit instrument within half a degree of the meridian; then take from the nautical almanac two circumpolar stars, that differ about twelve hours in their R. A. For instance, 51 *Cephei* and δ *Ursæ minoris* on March 1st, 1859, had a difference of R. A. of 15m. 58·75s.—51 *Cephei* passing *sub. polo.* first, and it will come into the field of an inverting telescope on the right; before it has passed the second wire of the instrument (if it is not much out of the meridian) by elevating the telescope, δ *Ursæ minoris* ought to be in the field. If it is not, move the north end of the telescope to the east until it is. When you have got these stars within range of the field, and (as near as you can guess) 51 *Cephei* 15m. in advance, there will then be sufficient time to adjust the level, which has of course been put out by moving the instrument. Should you have a mean solar chronometer, the difference of R.A. 15m. 58·75s. must be turned into mean time. Now mark the time that 51 *Cephei* passes the middle wire, and if the transit is in the meridian, δ *Ursæ minoris* will come to the middle wire in an opposite direction 15m. 58·75s. after 51 *Cephei.* Should it not do so, mark its position at the moment that it *should* be at the middle wire, and then by turning the azimuthal screw, bring δ *Urs. min.* not quite half way towards the middle wire. The distance that the star is to be moved is known by looking at deviation factors. This mode of proceeding is independent of the error of the chronometer; it only supposes that it goes with an even rate for a quarter of an hour, and by one operation it should place the instrument within one second of time of the meridian. You then take observations for the errors of deviations, and proceed at once to get local time.

By looking at my report to Sir William Logan many causes of failure may in future be avoided, and perhaps some trouble saved:—

REPORT TO SIR W. E. LOGAN, F. R. S.

QUEBEC, 20th January, 1858.

SIR,—In the month of October, 1856, at your request I left Quebec for Montreal, in order to determine by electric telegraph the longitude

of that city. On my arrival, the first object was to procure a suitable place, not far from the telegraph wire, and permission was given to make use of the top of the Exchange.

The transit instrument was placed upon a stack of chimneys, and a temporary canvas cover erected to protect the instrument from the wind. On the 28th October the transit instrument was in the meridian, the telegraph wire was led up to the top of the house, and a message sent to Quebec to be ready at 7 P.M. The night was fine and clear, and we commenced by giving a signal to look out when a star entered the field of the telescope, and as it passed each wire a single dot was sent along the line to Quebec. The assistant, Mr. Heatley, on the signal being given to look out, listened attentively to these dots and to the tick of the sidereal clock, and registered the fraction of a second: by these means the observations at Montreal were noted down with all the ease and facility that could have been attained in a properly fitted observatory, instead of the temporary arrangement we had on the top of a house.

From the operators not understanding some technical expressions, and from the novelty of the transaction, many stars were lost; but considering that it was a first trial we had every reason to expect that we should finally succeed.

On the following night we were again connected by the telegraph wire, but after sending a few stars a great disagreement was found to exist between this and the preceding night's work. On my taking observations to determine the errors of the instrument, I found that it had moved considerably out of the meridian; and subsequently I discovered that the passing of a cart, even at the distance of two streets, put the whole chimney in motion; for this there was no remedy, and the idea of succeeding with the present arrangement was hopeless.

Having to return to Quebec, I left on the 2nd November, with the knowledge gained by experience that a transit instrument placed on the top of a house could only give doubtful observations, which were worse than useless.

On the 29th December I left Quebec for Toronto, and on my arrival took up my quarters with my friend Professor Kingston of the Magnetic Observatory. Here there was every convenience, a small transit instrument in position, and a sidereal clock. The observations for time were under the superintendence of Professor Kingston. The distance of the Observatory from the Telegraph Office is, I should think, about

two miles, and the work of leading the wire through the town and into the Observatory presented many difficulties—one, the ground being frozen hard could not be opened for sinking the posts, and another, the interference with private property; but by the hearty co-operation of the Superintendent of the Telegraph Office, Mr. Dwight, and by some contrivance, these difficulties were surmounted.

The cloudy state of the atmosphere prevented our working until the 17th January, which was fair for observations. As our object was to determine the time by the face of our respective clocks at the same instant, thirty dots were sent at intervals of a second in each minute, so that if the clocks were not beating together, the fraction of a second that one clock was after the other might be guessed at. The fraction being known, the second, minute, and hour are sent, and consequently the readings of the two clocks are known at the same moment.

The errors of the clocks were obtained by observations of many stars on the same night, and the errors applied to the respective clocks; the true difference of time between Quebec and Toronto was thus known, and hence the longitude. *See Table.*

On the 5th February I left Quebec for Kingston, and on my arrival was offered a home and every assistance by Dr. Yates. The site which I selected for the temporary Observatory is situated in a cross street between Earl street and Barrie street. Two large blocks of limestone were brought and placed in the corner of a yard, and some planks about six feet long were fixed around them, covering in a space about eight feet square. This was also some distance from the Telegraph Office, but by taking advantage of an old fence and of an occasional tree, the wire was brought to the Observatory without much difficulty.

My past experience had taught me to avoid the tops of houses, and to select the solid earth and solid rock for the support of my transit instrument. Still I had another lesson to learn. This neighborhood was infested with boys, who when they saw a light shining through the cracks of the boards, commenced throwing stones with a determination and precision worthy of a better cause; and some of the few clear nights that occurred in this month were lost in consequence of boys' love of mischief. I first tried mild entreaties and then severe threatenings; they laughed at the former, and made faces at the latter. I then procured the service of the police, who partly succeeded in keeping the boys from further interference with my duties.

On the night of the 20th February, all being ready, and the weather

favorable, we made arrangements for sending signals to Quebec. I found that the method adopted at Montreal, of sending a signal to the Observatory at Quebec each time a star passed the wire of the telescope, involved the necessity of employing a telegraph operator for some hours; but by merely exchanging the time, the operator was not required for a longer period than half-an-hour; consequently, in this case, we sent thirteen taps, at intervals of twenty seconds, from Kingston to Quebec, from a mean solar chronometer. As a sidereal clock gains one second on the mean solar chronometer in six minutes, Quebec listened for and marked down the second of the sidereal clock which was co-incident with the signal sent from Kingston, and consequently without any guess-work, had the fraction of a second. Quebec then sent similar signals from the sidereal clock, and Kingston listened for and marked down the second which was co-incident with the signal sent from Quebec; in this way was the difference between the two places ascertained to the hundreth part of a second. I conceive that signals sent from one end of the line by *mean time* and from the other end by *sidereal time* ensure the most satisfactory results. Although the observations for time were not very satisfactory, still from the severity of the weather, and the nuisance above alluded to, I resolved not to stay any longer for further trials, but left for Montreal on the 30th. On my arrival, I accompanied you, and we reconnoitred in the neighbourhood of Viger Square, where we were glad to find that there appeared to be a scarcity of boys, and those that did heave in sight were perfectly tame. The gardener's tool-house, in Viger Square, appeared well suited to our purpose, and by placing a large block of limestone on a solid basis built beneath it, we had in perfection the principal requisite for the support of a transit instrument—that of fixity.

In order that I might avail myself of every opportunity of taking observations, I took up my residence there, and although great cold was experienced, nevertheless the advantage of being close to my work far more than compensated for the severity of the weather.

The night of the 12th March was clear, the instrument firmly fixed and well adjusted, and signals were sent to and from Quebec. Although the electric current was weak, and the signals at the Montreal end of the line difficult to be heard, still the results were most satisfactory, and I left on the following morning for Quebec.

Chicago being placed on some charts, in a longitude differing by

upwards of forty miles from that on another, it was of the greatest consequence before making a map of Canada, that the right position of Chicago should be ascertained. I therefore with that view, left Quebec early in the month of April, for this renowned city, and on my arrival, called on Lieut.-Col. Graham, U. S. A., and stated the object of my visit. He offered and gave me his valuable assistance, and obliged me by taking charge of the operations at one end of the line; after an observatory was erected, my transit instrument in position, and the telegraph authorities spoken to, I hurried back to Quebec, and found that they had succeeded on one night in sending signals; but in consequence of the weather not being very favorable at Chicago, we were again in communication on the night of the 15th May.

The electric current was transmitted *via* Toledo, Cleveland, Buffalo, Toronto and Montreal, a distance of 1210 miles, by one entire connection between the two extreme stations, and without any intermediate repetition, and yet all the signals were heard distinctly at either end of the line; the signal occupied only ·08 of a second in passing along that distance.

On the 24th July, I left Quebec for Windsor, and my past experience enabled me soon to select a spot suitable for the transit instrument, around which a covering of boards was put up; on the night of the 15th August we succeeded in sending signals to Quebec; but unfortunately the sky became cloudy, and I was unable to get satisfactory observations for the local time. However, on the 18th, the signals and observations for time were most complete.

On the 19th, I left Windsor for Collingwood, and on my arrival, I found rock and quietness in the yard of Mr. Armstrong's house, where I was stopping. The instrument was in position and the night favorable, on the 1st September, and satisfactory signals were exchanged. I left on the following day for Quebec.

It was now most important that the longitude of Quebec should be determined with the utmost possible accuracy. I had formerly by electric signals on one night from Fredericton, N. B., obtained, by the kindness and assistance of Doctors Toldervy and Jack, the position of the Quebec Observatory, but on that night observations for our local time could not be taken, and we had to trust to the observations taken on the previous night and to the good character of the sidereal clock.

If we had been able to get the difference of longitude between

Fredericton and Quebec, the position of the Quebec Observatory would have been quite certain, as the longitude of the former had been obtained by frequent signals on many nights with Cambridge, which by interchange of several hundred chronometers with Greenwich, is supposed to have its meridional difference of longitude ascertained with all the accuracy possible short of that to be arrived at by the transatlantic cable.

We were unable to again get telegraphic communication with Fredericton on account of the submerged cable at Cape Rouge being broken; but Professor W. C. Bond, of Cambridge Observatory, offered in the kindest manner possible to send and receive signals to and from Quebec; on the 21st September and 9th October, the communications between the Observatories of Cambridge and Quebec, were completely successful, and the longitude of Quebec, as well as those places already referred to, finally settled.

The longitude of the Observatory as obtained by telegraphic signals, and the longitude published on the Admiralty Charts differ by no less than fourteen seconds of time, and the other places whose positions have been determined in a similar manner have a still greater difference.

On the 29th October, I left Quebec for Ottawa, and on my arrival put up at Mr. Doran's boarding house and went in quest of a site for the transit instrument. On Barrack Hill there were several blocks of limestone, around one of which I built a little Observatory and had the telegraph wire brought there. The night of the 14th November was beautifully clear, and the result of our night's work most satisfactory.

June 18th, 1858. I left Quebec for Three Rivers, and on my arrival I accepted the kind invitation of Oliver Wells, Esq., to make his house my home, and immediately went in search of a place suitable for fixing the transit instrument. After some time I selected the Barrack Square (then unoccupied) as the spot most suitable for my purpose, as it was close to the Telegraph Office, and was also fenced in, I felt myself secure from the intrusion of boys—the pest of itinerant astronomers; indeed I had not seen any since my arrival.

As there was no rock in the neighbourhood, nor any thing suitable for the support of the instrument, on the sandy foundation that exists in the vicinity of Three Rivers, and as a very fine Roman Catholic Cathedral was in the process of erection not far off, I went at once

to the Curé and begged a stone, when with that politeness peculiar to the French Canadians he placed every thing that he had at my disposal; availing myself therefore of his kind liberality, I took two, and had them carted to the Barrack Square. Previously to my going in quest of a stone I had spoken to a carpenter, who on my return had the stuff cut out ready to board in the transit instrument. The stones were firmly placed, and the telegraph wire by the support of only two posts was brought to the Observatory, and all was ready to take advantage of the fine weather to make preliminary observations, requisite for getting the instrument into the meridian. I then made up my mind to return home and rest until sunset, when I would again return for my night work. On leaving the Barrack Square, to my great dismay I saw that two palings of the fence were pulled down, leaving a space sufficiently large for a boy to get through. I looked upon it in the same manner that a person in taking a house would look at a rat hole in a cupboard, but as all was quiet and not a leaf stirring, my fears quickly subsided. A little before sunset I left my friend's house for the Observatory; it was a lovely evening; the twittering of swallows took me back to other climes and other days; and as it was rather early I sauntered along with my thoughts wholly absorbed in this world and not in others, when a sound came floating on the air that quickly dispelled my reveries. It was the noise of boys at play. I then was sensibly made aware of the fact that there were boys in and about Three Rivers—Yes,—and when I came in sight of the Barrack Square I saw it full of boys playing cricket—my feelings might possibly be imagined but they could not be described. I came amongst them just at that part of the game, when they had cried "over." Some boys were taking up their positions by jumping like a frog over the backs of all who came in their way, others by rolling like a carriage wheel into the place assigned to them. Kingston and all its annoyances came now to my mind, but I observed that they were a different sort of boy from that of Kingston. The type of the latter may be considered as short, deep chested, yellow hair, blue eyes, one of which was always winking at a companion, face much freckled, voice loud and shrill, accompanied by a habit of putting the thumb to the nose when spoken to. The type of the former may be considered as tall, dark hair, hazel eye, musical voice, with a habit of paying attention when spoken to. I went up to them and explained the delicate nature of the instruments that

were near them, begged that they would not discontinue their manly sport, as I was sure that they would be careful not to do any harm; they promised to do so, and after they had finished the game they went off and never more gave the least annoyance. That night I got the instrument nicely adjusted, and after only one failure succeeded in sending and receiving signals to and from Quebec on July 1st, that gave a most satisfactory result. I left on the 5th for Quebec.

In conclusion I may say that the ease and accuracy with which the position of a place can now be fixed by means of the electric telegraph renders it imperative that all those places which can avail themselves of the use of the telegraph line, should have their longitudes determined at once, in order that a correct map of Canada may be produced.

Subjoined I send you an abstract of the observations made.

I have the honor to be, Sir,

Your most obedient servant,

E. D. ASHE.

Abstract of the Telegraphic Observations determining the Longitudes of several places in North America, by LIEUT. E. D. ASHE, R.N.

QUEBEC, 21st September, 1857.

The place of observation was the Observatory in Mann's Bastion, Citadel.

	H.	*m.*	*s.*
By the signals sent from Quebec to Cambridge, the difference of longitude is shown to be	0	0	18.27
And by the signals from Cambridge to Quebec	0	0	18.25
Mean difference of longitude by the work of the 21st September	0	0	18.26
Again on the 9th October:—			
By the signals sent from Quebec to Cambridge, &c.	0	0	18.44
By the signals from Cambridge te Quebec	0	0	18.33
Mean difference of longitude by the work of the 9th October	0	0	18.38
Mean of both nights' work:—			
Quebec Observatory west of Cambridge Observatory	0	0	18.32
Longitude of Cambridge west of Greenwich, as communicated by Professor W. C. Bond	4	44	30.70
Longitude of Quebec Observatory	4	44	49.02

Toronto, 21st January, 1857.

The place of observation was the Magnetic Observatory.

	H.	m.	s.
By the signals sent from Quebec, Toronto is west of Quebec.....	0	32	44.51
By the signals from Toronto, " " "	0	32	44.31
Mean difference of longitude.....	0	32	44 41
Longitude of Quebec.....	4	44	49.02
Longitude of Toronto Magnetic Observatory	5	17	33.43

Kingston, 28th February, 1857.

The place of observation was the new Court-house.

	H.	m.	s.
By the signals sent from Quebec, Kingston is west of Quebec	0	21	05.60
By the signals from Kingston, " " "	0	21	05.39
Mean difference of longitude.....	0	21	05.50
Longitude of Quebec	4	44	49.02
Longitude of Kingston	5	5	54.52

Montreal, 12th March, 1857.

The place of observation was in Viger Square, 650 feet west of Capt. Bayfield's station on Gate Island.

	H.	m.	s.
By the signals sent from Quebec, Montreal is west of Quebec.....	0	9	23.01
By the signals sent from Montreal, " " "	0	9	22.38
Mean difference of longitude	0	9	22.70
Longitude of Quebec	4	44	49.02
Longitude of Montreal.....	4	54	11.72

Chicago, 15th May, 1857.

The place of observation was in the play-ground of the School situated to the northward of the Roman Catholic Church, Huron Street.

	H.	m.	s.
By the signals sent from Quebec, Chicago is west of Quebec	1	5	41.44
By the signals sent from Chicago, " " "	1	5	41.60
Mean difference of longitude.....	1	5	41.52
Longitude of Quebec	4	44	49.02
Longitude of Chicago.....	5	50	30.54

WINDSOR, 18th August, 1857.

The place of observation was in the yard of Mr. Sholand in Goyeau Street, about fifty yards to the westward of the new English Church, and twenty yards to the westward of the Court-house.

	H.	m.	s.
By the signals sent from Quebec, Windsor is west of Quebec.....	0	47	19.04
By the signals sent from Windsor, " " "	0	47	18.97
Mean difference of longitude.....	0	47	19.00
Longitude of Quebec	4	44	49.02
Longitude of Windsor	5	32	08.02

COLLINGWOOD, 1st September, 1857.

The place of observation was the Railway terminus.

	H.	m.	s.
By the signals sent from Quebec, Collingwood is west of Quebec...	0	36	01.43
By the signals sent from Collingwood " " " ...	0	36	01.59
Mean difference of longit	0	36	01.51
Longitude of Quebec	4	44	49.02
Longitude of Collingwood.....	5	20	50.53

OTTAWA, 14th November, 1857.

The place of observation was 120 yards east of the Flag-staff on Barrack Hill.

By the signals sent from Quebec, Ottawa is west of Quebec	0	17	59.24
By the signals sent from Ottawa, " " "	0	17	59.30
Mean difference of longitude.....	0	17	59.27
Longitude of Quebec	4	44	49.02
Longitude of Ottawa	5	2	48.29

THREE RIVERS, 1st July, 1858.

Place of observation at Three Rivers was in the Barrack Square, due south of old French Church.

	H.	m.	s.
By signals sent from Quebec, Three Rivers is west of Quebec.....	0	5	20.14
By signals sent from Three Rivers " " "	0	5	20.18
Mean difference of Longitude	0	5	20.16
Longitude of Quebec	4	44	49.02
Longitude of Three Rivers.....	4	50	09.18

NOTE.—It may be interesting to compare the longitudes as determined by Lieut. Ashe, with the values previously assigned to them :

	H.	*m.*	*s.*
Quebec, former value	4	45	04
" Ashe	4	44	49.02
Toronto Observatory, by M. C. Stars in 1840	5	17	19
" by Chronometer with Boston	5	17	33
" Mean of above, formerly adopted	5	17	26
" Ashe	5	17	33.43
Kingston, usual value	5	06	40
" Professor Williamson, 1854	5	06	08.48
" Ashe	5	05	54.52
Chicago, usual value	5	50	20
" Ashe	5	50	30.54

REVIEWS.

Geological Survey of Canada. Figures and Descriptions of Canadian Organic Remains: Decades I and IV. Montreal, 1859.

A notice of the third Part or Decade of this important publication appeared in the *Canadian Journal* of last January.* It was there explained how the work had been allotted by the Director of the Survey, Sir W. E. Logan, to different palæontologists. In consequence of this arrangement, each part becomes more or less independent of the other portions of the series, and thus no consecutive order has been followed in their publication. Decade III, containing Mr. Billings' elaborate essay on our Canadian cystideans, with other valuable papers, having been completed first, was first published. Decades I and IV were issued a few months later, and it is to these that we have now to direct the reader's attention. The first, by Mr. Salter, one of the ablest of European palæontologists, comprises a series of figures and descriptions of various gasteropods and other forms, chiefly from the beds at Pauquette's Rapids on the Ottawa, in which a commingling of Chazy and Black River fossils, with those of the higher portion of the Trenton Group, was first pointed out by

* *Ante*, page 42.

Sir William Logan. The widely known *Maclurea Logani* is one of the most remarkable of these forms. It has been regarded popularly as a left-handed or sinistral Euomphalus, but its affinities are quite distinct from that type. Mr. Salter agrees with Woodward in regarding it as a Heteropod, or Nucleobranchiate Gasteropod, of the Family of the *Atlantidæ*, and thus allied to Bellerophon and Cyrtolites; and also in looking upon the shell as *dextral* the flattened surface with the whorl-markings being consequently the *under* part, in the proper position of the shell, while the so-called umbilicus, on the other hand constitutes a perforated spire. This apparently abnormal position is sustained by an examination of the large and curious operculum, the nucleus of which would otherwise be situated in the *upper* inner-angle of the aperture, a position hitherto unrecognized in operculated shells.

A good deal of confusion prevails in the writings of our New World palæontologists with regard to many of the turbinated and discoidal types of the palæozoic rocks. Mr. Salter has attempted to clear this up with respect to some of the Lower Silurian forms. He places, as sub-genera, under Conrad's genus *Scalites*, Hall's *Raphistoma*, a new sub-genus of his own, called *Helicotoma*, and Vanuxem's *Ophileta*; making also a sub-genus of *Scalites* proper. All these he regards, and truly, as belonging to the Family of *Janthinidæ*; whilst *Murchisonia* and *Pleurotomaria*, if not belonging to the same Family, stand in the adjacent group of the *Trochidæ*; and Hall's *Cyclonema* and *Holopea*, with his own *Trochonema* and *Eunema* fall into the related group or Family of the *Litorinidæ*. It is, however, far from improbable, that at some future time the limits of the *Janthinidæ* will be extended so as to include the whole of these types.

Amongst the fossil forms of our older palæozoic rocks, few have occasioned more perplexity than the *Receptaculites* of Defrance. Although commonly placed amongst the corals, the true affinities of this remarkable type have hitherto baffled observation. Mr. Salter, in the work before us, enters into a somewhat extended discussion and analysis of its structural peculiarities, and refers it to the *Orbitolitidæ Family* of the FORAMINIFERA.* If further investigations sustain this view, we have in the *Receptaculites* the earliest recognised foraminifera,

* Mr. Salter states that this view had suggested itself, some years ago, to Mr. T. R. Jones of the Geological Society of London, but had never been followed up.

giants amongst their tribe as compared with later and existing forms. Mere size, however, should be no obstacle to the reception of Mr. Salter's ingenious suggestion, since there is in that respect less difference between Receptaculites and the larger *Nummulites*, than between the latter and the ordinary foraminiferous forms. A new species, *R. occidentalis*, abundant at Pauquette's Rapids, is described and beautifully illustrated at the close of Mr. Salter's memoir.

The Fourth Decade of "Canadian Organic Remains" comprises a complete and very interesting description of the Crinoids of our Lower Silurian rocks, from the Chazy to the Hudson River formations inclusive, by Mr. Billings, Palæontologist to the Survey. The species described, of which the greater part are new, amount to about fifty. The detailed description of these is very properly preceded by a brief essay on the history and structure of Crinoideæ generally, a plan not only convenient in itself, as explanatory of special terms, and in adding completeness to the work, but also of the greatest assistance to the student; more especially in a country like this, where books of reference are not always procurable, and in which so few public libraries exist. The length of this introductory essay, and the want of its explanatory woodcuts, prevent us from transferring to the pages of the *Canadian Journal;* but the work will necessarily be in the hands of all who take an interest in the subject.* It is now very generally known, that although the greater number of the ancient crinoids, as in the modern *Pentacrinus*, were attached to the sea-bottom by a jointed calcareous stalk, a few species were free or without a stalk; and that the existing *comatulæ* are attached in the embryonic or early condition, and free in the adult state, All our Silurian crinoids (properly so-called) possess however a many-jointed stem; but Mr. Billings conceives, that some of these were also at times free, and that they "moved about through the water dragging their columns after them." He cites more especially the *Glyptocrinus ramulosus*, in which species the column often tapers gradually from about half-an-inch at the base of the cup, to half-a-line at the lower extremity or supposed point of attachment; and in which, furthermore, when perfect, this lower end is always found to be closely curled up "like a miniature coil of rope." Another

* It cannot be too often repeated that these Decades, unlike the earlier publications of the Survey, are obtainable through any bookseller.

species, cited in this connexion, is the *Rhodocrinus pyriformis*. With regard to this species, Mr. Billings states that he has "seen specimens with from six to ten inches of the column attached to the base of the cup, and with the terminal joint, where the fracture occurred, rounded, and the alimentary canal closed, or, as it were, healed up:" a condition which certainly goes far in favor of his suggestion.

A new and interesting genus belonging to the order *Blastoidea*, has been founded by Mr. Billings, upon various fragmentary specimens discovered in the Chazy Limestone of the neighbourhood of Montreal. He has named it *Blastoidocrinus*. A single species, *B. carchariædens*, has been determined. It is evidently related to the genus *Pentremites*, and is chiefly interesting from its low position in the rock series as a Blastoid, and as offering certain connecting characters between *Pentremites* and the ordinary crinoids. Mr. Billings believes that the column actually passes through the cup to the upper part of the visceral cavity, the basal plates being so conformed as to admit of this peculiar, and, indeed, abnormal structure. Two examples have been found with the cup thus penetrated by the column, but some additional evidence seems necessary, viewing the fractured and imperfect state of the specimens, to render this remarkable conformation altogether free from doubt. Various new genera and species of true crinoideæ have also been established by Mr. Billings, and are described in this Decade with great care and amplitude of illustration; but in the absence of the explanatory engravings it would be useless to lay their characters before the reader. On these engravings too much praise cannot be bestowed. The illustrations of Decade III, moreover, have been executed entirely on Canadian soil.

E. J. C.

The Romantic Scottish Ballads; their epoch and authorship. By Robert Chambers, F.R.S.E. Edinburgh: W. & R. Chambers, 1859.

In a recent review of Professor Aytoun's collected edition of the ballads of Scotland, we drew attention to the interesting fact, that many of the best songs and ballads of Scotland now traceable to their authors, prove to be the work of Scotland's daughters; and these including not only pieces of such delicate and tender pathos as "Auld Robin Gray," and "The Land of the Leal," but piquant satires and

humorous political pasquinades, like Lady Nairn's "Laird of Cockpen," and Mrs. Cockburn's clever Jacobite burlesque of Prince Charlie's manifesto, to the tune of "Clout the Cauldron." Since then, however, Mr. Robert Chambers, long since distinguished among the editors and collectors of Scottish songs and ballads, has commenced the publication of a series of "Edinburgh Papers," the first of which, under the title at the head of this article, startles us with the novel theory that the romantic Scottish ballads—instead of belonging to the ancient era hitherto ascribed to them,—are forgeries of a comparatively recent date, and that the authorship of the choicest and most popular of them is another of our fair Scottish songsters of the eighteenth century: Lady Wardlaw, of Pitreavie, who died in 1727. The theory is at once so startling, and so comprehensive in its bearings on the whole question of the transmission of early popular poetry by means of oral tradition, that we must place our critical iconoclast's arguments and illustrations at some length before the reader. If his line of argument is admitted, Mr. Chambers claims for this hitherto unheeded poetess, not only "*Hardyknute*,"—the modernness of which both in form and thought no one will dispute,—but what Coleridge has designated the grand old ballad of *Sir Patrick Spence;* and the authorship of these being conceded, he next proceeds to assign to the same gifted lady's pen, the favourite version of "*Gil Morrice*," in Percy's "Reliques," and then, in all probability, "*Edward, Edward*," "*Gilderoy*," "*Youny Waters*," and in short, all the tender and romantic Scottish ballads of Percy's Collection, and nearly all others marked by a corresponding refinement and tenderness.

I shall lead the reader—says Mr. Chambers,—through the steps by which I arrived at my present views upon the subject.

In 1719, there appeared, in a folio sheet, at Edinburgh, a heroic poem styled *Hardyknute*, written in affectedly old spelling, as if it had been a contemporary description of events connected with the invasion of Scotland by Haco, king of Norway, in 1263. A corrected copy was soon after presented in the *Evergreen* of Allan Ramsay, a collection professedly of poems written before 1600, but into which we know the editor admitted a piece written by himself. *Hardyknute* was afterwards reprinted in Percy's *Reliques*, still as an ancient composition; yet it was soon after declared to be the production of a Lady Wardlaw of Pitreavie, who died so lately as 1727. Although, to modern taste, a stiff and poor composition, there is a nationality of feeling about it, and a touch of chivalric spirit, that has maintained for it a certain degree of popularity. Sir Walter Scott tells us it was the first poem he ever learned by heart, and he believed it would be the last he should forget.

It is necessary to present a few brief extracts from this poem. In the opening, the Scottish king, Alexander III, is represented as receiving notice of the Norwegian invasion:

The king of Norse, in summer pride,
Puffed up with power and micht,
Landed in Air Scotland, the isle,
With mony a hardy knicht.
The tidings to our gude Scots king
Came as he sat at dine,
With noble chiefs in brave array,
Drinking the blude-red wine.

'To horse, to horse, my royal liege;
Your faes stand on the strand;
Full twenty thousand glittering spears
The king of Norse commands.'
'Bring me my steed, page, dapple-gray,'
Our good king rose and cried;
'A trustier beast in a' the land
A Scots king never tried.'

Hardyknute, summoned to the king's assistance, leaves his wife and daughter, 'Fairly fair,' under the care of his youngest son. As to the former lady—

.....first she wet her comely cheeks,
And then her bodice green,
Her silken cords of twirtle twist,
Well plet with silver sheen;
And apron, set with mony a dice
Of needle-wark sae rare,
Wove by nae hand, as ye may guess,
But that of Fairly fair.

In his journey, Hardyknute falls in with a wounded and deserted knight, to whom he makes an offer of assistance:

With smileless look and visage wan,
The wounded knight replied:
'Kind chieftain, your intent pursue,
For here I maun abide.

'To me nae after day nor nicht
Can e'er be sweet or fair;
But soon beneath some drapping tree,
Cauld death shall end my care.'

A field of battle is thus described:

In thraws of death, with wallowit cheek,
All panting on the plain,

The fainting corps of warriors lay,
  Ne'er to arise again;
Ne'er to return to native land,
  Nae mair, with blithesome sounds,
To boast the glories of the day,
  And shaw their shining wounds.

On Norway's coast, the widowed dame
  May wash the rock with tears,
May lang look o'er the shipless seas,
  Before her mate appears.

'Cease, Emma, cease to hope in vain;
  Thy lord lies in the clay?
The valiant Scots nae rievers thole
  To carry life away.'

I must now summon up, for a comparison with these specimens of the modern antique in ballad lore, the famous and admired poem of *Sir Patrick Spence*. It has come to us mainly through two copies—one comparatively short, published in Percy's *Reliques*, as 'from two manuscript copies transmitted from Scotland;' the other, containing more details, in Scott's *Minstrelsy of the Scottish Border*, also 'from two manuscript copies,' but 'collated with several verses recited by the editor's friend, Robert Hamilton, Esq., advocate.' It is nowhere pretended that any *ancient* manuscript of this poem has ever been seen or heard of. It acknowledgedly has come to us from modern manuscripts, as it might be taken down from modern reciters; although Percy prints it in the same *quasi* antique spelling as that in which *Hardyknute* had appeared, where being *quhar;* sea, *se;* come, *cum;* year, *zeir;* &c. It will be necessary here to reprint the whole ballad, as given originally by Percy, introducing, however, within brackets the additional details of Scott's copy:

The king sits in Dunfermline town,
  Drinking the blude-red wine:
'O whar will I get a gude sailor,
  To sail this ship of mine?'

Up and spak an eldern knight,
  Sat at the king's right knee:
'Sir Patrick Spence is the best sailor
  That sails upon the sea.'

The king has written a braid letter,
  And signed it with his hand,
And sent it to Sir Patrick Spence,
  Was walking on the sand.

['To Noroway, to Noroway,
To Noroway o'er the faem;
The king's daughter of Noroway,
'Tis thou maun bring her hame.']

The first line that Sir Patrick read,
A loud laugh laughed he:
The next line that Sir Patrick read,
The tear blinded his ee.

'O wha is this has done this deed,
This ill deed done to me;
To send me out this time o' the year,
To sail upon the sea?

['Be it wind, be it weet, be it hail, be it sleet,
Our ship must sail the faem;
The king's daughter of Noroway,
'Tis we must fetch her hame.'

They hoysed their sails on Monenday morn,
Wi' a' the speed they may;
They hae landed in Noroway,
Upon a Wodensday.

They had na been a week, a week,
In Noroway, but twae,
When that the lords of Noroway
Began aloud to say:

'Ye Scottish men spend a' our king's gowd,
And a' our queenis fee.'
'Ye lie, ye lie, ye liars loud,
Fu' loud I hear ye lie.

'For I hae broucht as much white monie
As gane my men and me,
And I broucht a half-fou o' gude red gowd,
Out ower the sea wi' me.']

'Mak haste, mak haste, my merry men a',
Our gude ship sails the morn.'
'O say na sae, my master dear,
For I fear a deadly storm.

'Late, late yestreen, I saw the new moon
Wi' the auld moon in her arm
And I fear, I fear, my master dear,
That we will come to harm.'

[They had na sailed a league, a league,
A league but barely three,
When the lift grew dark, and the wind blew loud,
And gurly grew the sea.

The ankers brak, and the topmasts lap,
It was sic a deadly storm,
And the waves cam o'er the broken ship,
Till a' her sides were torn.]

O our Scots nobles were richt laith
To weet their cork-heeled shoon;
But lang ere a' the play was played,
Their hats they swam aboon.

[And mony was the feather-bed
That flattered on the faem;
And mony was the gude lord's son
That never mair cam hame.

The ladies wrang their fingers white,
The maidens tore their hair,
A' for the sake of their true loves,
For them they 'll see nae mair.]

O lang, lang may the ladies sit,
Wi' their fans into their hand,
Or ere they see Sir Patrick Spence
Come sailing to the land.

O lang, lang may the ladies stand,
Wi' their gold kames in their hair,
Waiting for their ain dear lords,
For they 'll see them nae mair.

Half ower, half ower to Aberdour,
It's fifty fathom deep;
And there lies gude Sir Patrick Spence
Wi' the Scots lords at his feet.

Percy, at the close of his copy of *Sir Patrick Spence*, tells us that 'an ingenious friend' of his was of opinion that 'the author of *Hardyknute* has borrowed several expressions and sentiments from the foregoing [ballad], and other old Scottish songs in this collection.' It does not seem to have ever occurred to the learned editor, or any friend of his, however 'ingenious,' that perhaps *Sir Patrick Spence* had no superior antiquity over *Hardyknute*, and that the parity he remarked in the expressions was simply owing to the two ballads being the production of one mind. Neither did any such suspicion occur to Scott. He fully accepted *Sir Patrick Spence* as a historical narration, judging it to refer most probably to an otherwise

unrecorded embassy to bring home the Maid of Norway, daughter of King Eric, on the succession to the Scottish crown opening to her in 1286, by the death of her grandfather, King Alexander III, although the names of the ambassadors who did go for that purpose are known to have been different. The want of any ancient manuscript, the absence of the least trait of an ancient style of composition, the palpable modernness of the diction—for example, 'Our ship must sail the faem,' a glaring specimen of the poetical language of the reign of Queen Anne—and, still more palpably, of several of the things alluded to, as cork-heeled shoon, hats, fans, and feather-beds, together with the inapplicableness of the story to any known event of actual history, never struck any editor of Scottish poetry, till, at a recent date, Mr. David Laing intimated his suspicions that *Sir Patrick Spence* and *Hardyknute* were the production of the same author. To me it appears that there could not well be more remarkable traits of an identity of authorship than what are presented in the extracts given from *Hardyknute* and the entire poem of *Sir Patrick*—granting only that the one poem is a considerable improvement upon the other. Each poem opens with absolutely the same set of particulars—a Scottish king sitting—drinking the blude-red wine—and sending off a message to a subject on a business of importance. Norway is brought into connection with Scotland in both cases. Sir Patrick's exclamation, 'To Noroway, to Noroway,' meets with an exact counterpart in the 'To horse, to horse,' of the courtier in *Hardyknute*. The words of the ill-boding sailor in *Sir Patrick*, 'Late, late yestreen, I saw the new moon'—a very peculiar expression, be it remarked—are repeated in *Hardyknute*:

> 'Late, late the yestreen I weened in peace,
> To end my lengthened life.'

The grief of the ladies at the catastrophe in *Sir Patrick Spence*, is equally the counterpart of that of the typical Norse lady with regard to the fate of her male friend at Largs. I am inclined, likewise, to lay some stress on the localities mentioned in *Sir Patrick Spence*—namely, Dunfermline and Aberdour—these being places in the immediate neighbourhood of the mansions where Lady Wardlaw spent her maiden and her matron days. A poet, indeed, often writes about places which he never saw; but it is natural for him to be most disposed to write about those with wh'ch he is familiar; and some are first inspired by the historical associations connected with their native scenes. True, as has been remarked, there is a great improvement upon *Hardyknute* in the 'grand old ballad of *Sir Patrick Spence*,' as Coleridge calls it, yet not more than what is often seen in compositions of a particular author at different periods of life. It seems as if the hand which was stiff and somewhat puerile in *Hardyknute*, had acquired freedom and breadth of style in *Sir Patrick Spence*. For all of these reasons, I feel assured that *Sir Patrick* is a modern ballad, and suspect, or more than suspect, that the author is Lady Wardlaw.

Probably, by this time, the reader will desire to know what is now to be known regarding Lady Wardlaw. Unfortunately, this is little, for, as she shrank from the honours of authorship in her lifetime, no one thought of chronicling anything about her. We learn that she was born Elizabeth Halket, being the second daughter of

Sir Charles Halket of Pitfirran, Baronet, who was raised to that honour by Charles II., and took an active part, as a member of the Convention of 1689, in setting the crown upon William and Mary. Her eldest sister, Janet, marrying Sir Peter Wedderburn of Gosford, was the progenitress of the subsequent Halkets, baronets, of Pitfirran, her son being Sir Peter Halket, colonel of the 44th regiment of foot, who died in General Braddock's unfortunate conflict at Monongahela in 1755. A younger sister married Sir John Hope Bruce of Kinross, baronet, who died, one of the oldest lieutenant-generals in the British service, in 1766. Elizabeth, the authoress of *Hardyknute*, born on the 15th of April 1677, became, in June 1696, the wife of Sir Henry Wardlaw of Pitreavie (third baronet of the title), to whom she bore a son, subsequently fourth baronet, and three daughters.

Having thus afforded to the assailant of the antiquity of the Romantic Scottish Ballads ample space for setting forth the main issues involved in the question, let us see what his arguments are worth.

Elizabeth, Lady Wardlaw of Pitreavie, the authoress of *Hardyknute*, and now the supposed creator of our whole Scottish Romantic Ballad literature, died at the mature age of fifty, in 1727, the year of the second George's accession to his father's throne; and from the acknowledged want of freedom and manifest betrayal of the "prentice hand" of a beginner in the *Hardyknute*,—which, after being repeatedly talked of and quoted, at length made its first appearance in print, in 1719,—we must assign the production of this and all subsequent ballads of Lady Wardlaw to, say, the last fifteen years of her life; or, more conveniently, to the reign of George I.

The style of that period, and the literature then in vogue are well-known; and so accordingly the critic, quoting a line of *Sir Patrick Spence*, says: "No old poet would use *faem* as an equivalent for the sea; but it was just such a phrase as a poet of the era of Pope would love to use in that sense." Consider then what are the circumstances of the production or recovery of those Romantic Ballads? From the era of Montgomery's "*Cherry and the Slae*," published in 1597, to the appearance of Watson's Collection of Scottish Poetry, between 1706 and 1711, whatever favour the genuine old national songs and ballads retained with the people, the printing-press entirely ignored them. They had been superseded by "Ane Compendious Booke of Godly and Spiritual Songs, collected out of sundrie parts of Scripture, with sundrie of other ballotis changed out of prophane sangs for avoiding of sin and harlotrie," &c., and before Lord Hailes, in 1765 once more introduced this curious production to Scottish readers, Ralph Erskine had written his once popular "Gospel Sonnets, or Spiritual

Songs," of which his biographer, writing in 1763, says "this poetical compend was so well relished that it hath undergone a multitude of impressions; and the demand for it is as great as ever." Of this, the twenty-fifth edition, issued from the Edinburgh press in 1797, and others in subsequent years, give unmistakeable evidence. Meanwhile, on the frail chances of the famous but long unheeded Bannatyne Manuscript in the Advocates' Library at Edinburgh, and the more voluminous M.S. volumes of Maitland of Lethington, in the Pepysian Library at Oxford, depended the recovery of many curious and early Scottish poems, of which no other copies are known to have existed. But the appearance of Watson's Collection, in 1706, is an index of that changed feeling which produced, at a later date, Allan Ramsay's volume of Scottish Songs in 1719; his "Evergreen, being a collection of Scots Poems wrote by the Ingenious before 1600;" and his "Tea Table Miscellany," a collection of songs, Scottish and English; issued in 1724 and subsequent years. In the wake of all these, appeared in England, Wharton's "History of English Poetry," in its three original quartos, between 1778 and 1781; and Percy's celebrated "Reliques of Ancient English Poetry," made their first debut, with timidly apologetic introduction to "a polished age," in 1765.

The critical collections of Ritson, Ellis, Herd, Jamieson, and even of Scott, belong to a different class, and to a later period, when the fruits of the earlier movement were being reaped in an entirely new school of original and genuine poetry; as well as in a reverential care for the fragments of antique song and ballad. In one characteristic, especially, the most noticeable of the earlier collections differ from those of this latter class, viz: in their notorious patch-work completeness. The poems are not genuine antique torsos, but "restorations," produced with little or no hint of the modern restorer's hand, excepting such as is unmistakeably present to the instructed ear of a more critical age. It seemed to the collectors of the early part of the eighteenth century, as incumbent a duty to patch and tinker the fragmentary relic of song and ballad that oral tradition had preserved, as to attempt their recovery. Hence we must be slow to reject a whole ballad as a modern compilation, because of modern phrases, ideas, and even whole stanzas, surreptitiously patched into its genuiue warp and woof. It is important also to bear in remembrance that the era of literary forgery,—embracing as it does the Rowley Poems of the gifted Chatterton, the "Ossian" of Macpherson, and the "Shakspeare Ma-

nuscripts" of Ireland,—is of a later date: 1760–1795; though the Hardyknute vellum, "found in a vault at Dunfermline," has a suspicious resemblance to the parchments subsequently recovered from the ancient chest of St. Mary Redcliff, at Bristol.

Mr. Chambers quotes incidentally, but without the slightest comment, the very important statement by Percy, which accompanies the first hint of Lady Wardlaw's authorship of *Hardyknute*, in the second edition of the "Reliques:"

"This account was transmitted from Scotland by Sir David Dalrymple (Lord Hailes), who yet was of opinion that part of the ballad may be ancient, but retouched and much enlarged by the lady above mentioned. Indeed, he had been informed that the late William Thomson, the Scottish musician, who published the *Orpheus Caledonius*, 1733, declared he had heard fragments of it repeated in his infancy before Mrs. Wardlaw's copy was heard of."

It is scarcely necessary to remind the reader that Lord Hailes—the author of "The Annals of Scotland," as well as the first editor of the famous Bannatyne MS.,—is one whose opinion relative to the antiquity of an ancient poem, or any part of it, ought to carry the very greatest weight. Mr. Chambers only assigns to Lady Wardlaw an "improving revisal of *Gil Morrice*," being compelled thereto by the imperfect *Child Maurice* known to have existed in Percy's folio MS., supposed to be of Queen Elizabeth's time. But is he justified in assigning more to the modern authoress of *Hardyknute*, after the clear and definite opinion to the contrary of perhaps the very highest contemporary authority; excepting in regard to the prolix amount of new matter with which the original antique nucleus may have been overlaid. Of the poems collected by Sir Walter Scott in his "Minstrelsy of the Scottish Border," forty-three make their appearance for the first time in print. Two or three are of questionable antiquity or genuineness; but of the great majority no doubt has ever been entertained; though it is not questioned that, even on the lowest estimate of their age, many of them must have been orally transmitted through seven or eight generations.

The greater number of the stanzas of *Hardyknute* are undoubtedly spurious manufactures of the eighteenth century; and betray the

* In a subsequent note, Percy adds information about the pretended discovery of the *Hardyknute M.S.*, but this in no way affects the previously quoted opinion of Lord Hailes relative to parts of the ballad being ancient.

current jingle of the age just as clearly as what is Percy's own, in his *Friar of Orders Grey*, an olio penned, or rather patched up, after hearing Goldsmith read his "Hermit." Compare, for example, stanzas xxxvi, xxxvii, xxxviii, of *Hardyknute*—two of which are quoted above in the extract from our author,—with the ruling idea in Percy's and Goldsmith's ballads, and the reader will find curious evidence of the prevailing uniformity of thought, which the most ingenious efforts at an antique disguise cannot conceal; yet the original of the whole is the genuine old ballad, "*Gentle Herdsman, tell to me.*"

Very different in all respects from any characteristics of *Hardyknute* here referred to, is the beautiful fragment of *Sir Patrick Spence*. In the ampler form in which we now have that fine ballad, it has undoubtedly been patched by more than one modern hand; and, if such anachronisms as the "cork-heeled shoon," be not mere vulgar misreadings like the *blue-gilt* horn, manufactured out of the *bugelet* horn in *The Douglas Tragedy*; they are likely enough corruptions of very recent origin, rather testifying to the honest transcription of some contemporary oral version, than to the ingenious attempt at manufacturing an antique. As to the identity of authorship which Mr. Chambers discovers between the tedious common-places of *Hardyknute* and the terse vigour of *Sir Patrick Spence*, I am at a loss to discover any evidence, excepting that the manufacturer of the former was probably already acquainted with the latter,—which, unless altogether a forgery, was then treasured in some Scottish memories,—and had tact enough to borrow from it, but not skill or judgment enough to imitate it.

As to the additions supplied to Sir Walter Scott, and printed above in brackets, some of them betray a most suspicious correspondence,—two of them at least almost an identity,—with stanzas in "*The Dæmon Lover*;" and that that ballad owes nearly all its present completeness to some modern hand, we presume no genuine lover of ancient ballad literature has ever doubted. It is in the bracketed stanzas of this mint that the objectionable "faem" and "feather bed" of the critic occur.

As to the supposed discrepancies between the ballad and any historical narrative of the era of Alexander III, or of any later period; Mr. Chambers is fully justified in his criticisms by the comments and even the emendations of previous editors of the ballad; but the argument can only affect any attempts at assigning a precise date to the ballad. Should it turn out that *Sir Patrick Spence* has no counterpart in real

history, it will only have to be transferred, in that respect, to the same niche with *Chevy Chase*, of which Percy says "although it has no countenance from history, there is room to think it had originally some foundation in fact."

But another line of argument is next directed against the genuineness or antiquity of the Romantic Scottish Ballads, as follows:—

"Their style is elegant, and free from coarsenesses, while yet exhibiting a large measure of the ballad simplicity. In all literary grace, they are as superior to the generality of the homely traditionary ballads of the rustic population, as the romances of Scott are superior to a set of chap-books. Indeed, it might not be very unreasonable to say that these ballads have done more to create a popularity for Percy's *Reliques* than all the other contents of the book. There is a community of character throughout all these poems, both as to forms of expression and style of thought and feeling; jealousy in husbands of high rank, maternal tenderness, tragic despair, are prominent in them, though not in them all. In several, there is the same kind of obscure and confused reference to known events in Scottish history, which editors have thought they saw in *Sir Patrick Spence*."

So says Mr. Chambers,—as if all these assigned characteristics, embracing some of the most universal materials of epic and dramatic verse were peculiar to one lady in that one age;—and then, after quoting *Young Waters; Edom o' Gordon; Gilderoy; Edward, Edward*, &c., at considerable length; he concludes by producing in contrast to these certain "typical ballads of the common class," with which to compare them. But—with all respect for the writer's judgment and experience,—the argument seems to us singularly illogical. *Sir Patrick Spence* and *Lord Fyvie* may be both genuine ancient ballads, and yet the one may be of the 14th or 15th and the other of the 17th century. If such be their diverse origins, we might as well compare Barbour and Drummond of Hawthornden, for any good result it is likely to lead to. The corruptions of later ages might greatly modify both, and all in one direction, but the difference between them at the last would still remain very wide. We have one beautiful little fragment of a lyric preserved by Wintoun, and belonging undoubtedly to the era immediately succeeding that of Alexander III, and to which the supposed historical elements in *Sir Patrick Spence* have been assumed by some to refer. What process of vulgarising or modernising could give it any resemblance to such popular poems as Mr.

Chambers selects as typical? *Typical of what?*—of the taste and style of a particular and not very remote age, when a certain class of Scottish ballads were composed and recited; but not surely typical of all genuine Scottish ballads of all ages. Here is the authentic Scottish lyrical fragment of the thirteenth, or at latest, of the early part of the fourteenth century:

"When Alexander our king was dead,
That Scotland led in love and lee,
Away was sons of ale and bread,
Of wine and wax, of gaming and glee;

Our gold was changed into lead.
Christ, born into virginity,
Succour Scotland and remede
That stat is in perplexity."

It is not to be doubted that, prior to the eighteenth century,—when as we have seen, Scottish editors and collectors led the way in the recovery of ancient song and ballad literature, both of Scotland and England,—many old songs and ballads were current among the people, which had been handed down orally, from generation to generation, changing and modernising with the familiar characteristics of the age: just as medieval painters and sculptors invariably rendered all ancient and scripture subjects in the costume of their own day. In this way, "facm," "fans," "feather beds," and "cork-heeled shoon," might all find their way into an old ballad, without affording any ground for suspecting it to be a forgery. When however such poems after passing through the alembic of popular tradition for successive generations, were at length committed to writing, the form they assumed depended a good deal on the transcriber. An old dame could be prompted in her recitation where lacunæ occurred; and when she had done her best, the transcriber's work began. Fragmentary songs or ballads were in little esteem from the days of Allan Ramsay to Percy, and their collections only illustrate the process of eking and patch-work everywhere going on. But the original collectors were few, rarely more than one or two to a district. Hence the style which tradition would necessarily give to the oral verse of a locality, was supplemented by the style in which the tinkering of the collected songs and ballads of the district was carried out, alike as the work of one or two enthusiastic gleaners, and of the age in which they wrought. Hence, also,

the somewhat monotonous re-adaptation of certain borrowed formulæ, due perhaps as frequently to the promptings of the transcriber, as to the treacherous memory of the reciter, or the limited invention of the original minstrel; while to the Lady Wardlaws, and other collectors given to versification, may very safely be ascribed such stanzas as unmistakeably betray the style of their own time. Take, for example the following stanzas in Scott's version of *The Young Tamlane*, in which the hero describes to his lady love, how he and others who have been spirited away, deport themselves in Fairyland:

Our shapes and size we can convert
To either large or small;
An old nut-shell 's the same to us
As is the lofty hall.

We sleep in rose-buds soft and sweet,
We revel in the stream;
We wanton lightly on the wind,
Or glide on a sunbeam.

And all our wants are well supplied,
From every rich man's store,
Who thankless sins the gifts he gets,
And vainly grasps for more.

The first two verses belong in their ideas to the class of sylphs and gnomes which Pope's "Rape of the Lock" had introduced into fashionable drawing rooms; while the last stanza has not only the cadence, but the very mode of thought rendered familiar to all, by Goldsmith's beautiful ballad. But to conclude therefore, as Mr. Chambers seems inclined to do, that the whole ballad belongs to the Pitreavie mint, is to confound styles as dissimilar as ever sufficed, by their contrast in form and ideas, to betray the admixture of old and new materials.

Again, Mr. Chambers, having given full play to his newly developed literary scepticism, proceeds in the following fashion to demolish in like manner the claims to antiquity of any more recently recovered ballads:

"It is now to be remarked of the ballads published by the successors of Percy, as of those which he published, that there is not a particle of positive evidence for their having existed before the eighteenth century. Overlooking the one given by Ramsay in his *Tea-table*

Miscellany, we have neither print nor manuscript of them before the reign of George III. They are not in the style of old literature. They contain no references to old literature. As little does old literature contain any references to them. They wholly escaped the collecting diligence of Bannatyne. James Watson, who published a collection of Scottish poetry in 1706–1711, wholly overlooks them. Ramsay, as we see, caught up only one. Even Herd, in 1769, only gathered a few fragments of some of these poems. It was reserved for Sir Walter Scott and Robert Jamieson, at the beginning of the nineteenth century, to obtain copies of the great bulk of these poems—that is, the ballads over and above the few published by Percy—from A LADY —a certain 'Mrs. Brown of Falkland,' who seems to have been the wife of the Rev. Andrew Brown, minister of that parish in Fife,—is known to have been the daughter of Professor Thomas Gordon, of King's College, Aberdeen,—and is stated to have derived her stores of legendary lore from the memory of her aunt, a Mrs. Farquhar, the wife of a small proprietor in Braemar, who had spent the best part of her life among flocks and herds, but lived latterly in Aberdeen. At the suggestion of Mr. William Tytler, a son of Mrs. Brown wrote down a parcel of the ballads which her aunt had heard in her youth from the recitation of nurses and old women. Such were the external circumstances, none of them giving the least support to the assumed antiquity of the pieces, but rather exciting some suspicion to the contrary effect."

On the supposition of those ballads being genuine, and chiefly recovered from the oral conservation of one or two isolated Scottish districts, could any account of such recovery present a more natural aspect. Instead of a successful forger flooding the eagerly credulous collectors with the coveted ballad-prizes: Ramsay gets hold of one; Herd, following towards the close of the century, gathers portions of several; and then the full harvest of them, as of most other classes of Scottish Ballads, is reaped by Jamieson and Scott. Meanwhile Mrs. Brown, of whom we have a very credible and likely account, had been diligently doing her best and without some such collectors of legendary lore it is difficult to see how traditionary songs and ballads were to be recovered at all.

That Mrs. Brown of Falkland had as genuine a love for old ballad literature as either Ramsay or Percy we do not doubt; and that when a line or even a stanza was wanting, she hesitated just as little as they

did at a bit of pious patch-work is extremely probable; but, for the rest, the same course of argument will equally convert "the palpably old historical ballads," or any of those of the Border Minstrelsy, into modern antiques. If Lady Wardlaw or Mrs. Brown could write such wonderful romantic ballads, Sir Walter Scott, and more than one of his correspondents were fully equal to the task of manufacturing sixteenth and seventeenth century historical ballads to any amount. Yet look at Allan Cunningham's work in the same line. Never, surely was poet better fitted by natural gifts and peculiar circumstances for the successful forgery of Nithsdale and Galloway antiques of the sort required. He tried his best, yet who could now be deceived with his *Lord's Marie,* his *Bonnie Lady Annie,* or any other of the ingenious imitations that threw the credulous Cromek into such ecstacies?

The truth is, that Mr. Chambers, having got hold of a really interesting and too much neglected theme, has allowed it fairly to run away with him; as we are all too apt to do with our hobbies. Moreover, the very candour and straight forwardness for which Robert Chambers is admired by all who have the pleasure of knowing him, tempts the editor of "the Scottish Ballads" of 1829, all the more strongly to set forth his recantation of an abandoned faith, in publishing the newly adopted views of 1859. Let us then quote at length, the concluding remarks with which the new views on the epoch and authorship of the Romantic Scottish Ballads are summed up:

"Let it never be objected that, if any one person living in the reigns of Queen Anne and George I. had composed so many fine poems, he or she could not have remained till now all but unknown. In the first half of the present century, there appeared in Scotland a series of fugitive pieces—songs,—which attained a great popularity, without their being traced to any author. Every reader will remember *The Land of the Leal, Caller Herring, The Laird o' Cockpen, The Auld House,* and *He's ower the Hills that I lo'e weel.* It was not till after many years of fame that these pieces were found to be the production of a lady of rank, Carolina Baroness Nairn, who had passed through a life of seventy-nine years without being known as a song-writer to more than one person. It was the fate of this songstress to live in days when there was an interest felt in such authorships, insuring that she should sooner or later become known; but, had she lived a hundred years earlier, she might have died and left no sign, as I conjecture to have been the case with the author of this fine group of ballads; and

future Burnses might have pondered over her productions, with endless regret that the names of their *authors* were 'buried among the wreck of things that were.'

"*If* there be any truth or force in this speculation, I shall be permitted to indulge in the idea that a person lived a hundred years before Scott, who, with his feeling for Scottish history and the features of the past generally, constructed out of these materials a similar romantic literature. In short, Scotland appears to have had a Scott a hundred years before the actual person so named. And we may well believe that if we had not had the first, we either should not have had the second, or he would have been something considerably different, for, beyond question, Sir Walter's genius was fed and nurtured on the ballad literature of his native country. From his *Old Mortality* and *Waverley*, back to his *Lady of the Lake* and *Marmion;* from these to his *Lay of the Last Minstrel;* from that to his *Eve of St. John* and *Glenfinlas;* and from these, again, to the ballads which he collected, mainly the produce (as I surmise) of an individual precursor, is a series of steps easily traced, and which no one will dispute. Much significance there is, indeed, in his own statement, that *Hardyknute* was the first poem he ever learned, and the last he should forget. Its author—if my suspicion be correct,—was his literary foster-mother, and we probably owe the direction of his genius, and all its fascinating results, primarily to her."

Such are the terms with which Mr. Robert Chambers closes his bold and ingenious onslaught on the accepted epochs and authorships of the romantic Scottish Ballads. We doubt not the inquiry he has thus originated, will be well sifted by friend and foe, ere it is allowed to rest. Nor need the controversy kindle Scottish zeal into undue heat; for after all, the question is only whether our national romantic ballads were written by a Scottish Lady, some hundred and forty years ago, or by nameless Scottish minstrels of earlier centuries.

That Elizabeth, Lady Wardlaw is the authoress of *Hardyknute* we fully believe, whatever fragmentary relics derived from an earlier age may have suggested the theme, and controlled its form. That she was one peculiarly fitted to become such a gatherer, and transmuter of imperfect traditional song and ballad literature, as characterised the Scottish collectors of the eighteenth century, may also be affirmed with much probability; and consequently that her hand may be more or less traceable in a whole series of romantic ballads is far from un-

likely; especially since internal evidence proves the manipulation of some modern hand. But that Lady Wardlaw, who died in 1727, with no other poetical repute than the authorship of the stiff and tedious Hardyknute,—a poem bearing in nearly every stanza unmistakeable traces of its modern origin,—is nevertheless the authoress of all the most tender and pathetic of what are designated the romantic Scottish ballads, is a theory which few will be inclined to adopt on such slender evidence as the parallelisms or repetitions now brought forward. Yet on such evidence Mr. Chambers would assign with more or less confidence to Lady Wardlaw the authorship of (1) *Sir Patrick Spence;* (2) *Gil Morrice;* (3) *Edward, Edward;* (4) *The Jew's Daughter;* (5) *Gilderoy;* (6) *Young Waters;* (7) *Edom o' Gordon;* (8) *The Bonnie Earl of Murray;* (9) *Johnie of Bradislee;* (10) *Mary Hamilton;* (11) *The Gay Gos-hawk;* (12) *Fause Foodrage;* (13) *The Lass of Lochryan;* (14) *Clerk Saunders;* (15) *The Douglas Tragedy;* (16) *Willie and May Margaret, or the Mother's Malison;* (17) *Young Huntin;* (18) *Tamlane;* (19) *Sweet Willie and Fair Annie;* (20) *Lady Maisry;* (21) *The Clerk's Twa Sons of Owsenford;* and (22) *The Heir of Linne.*

By the bold course of thus ascribing every thing connected with Scottish ballad poetry that is marked by dignity, refinement, and tender pathos, to the one source, the ingenious critic effectually disarms his opponents, who might otherwise point to such wide correspondence in proof at least of the genuineness of most of the first recovered stanzas of *Sir Patrick Spence.* Ruder versions or fragments of some of the ballads thus assigned to Lady Wardlaw's parentage, are known to be ancient; but what of that? "A ballad," says Mr. Chambers, "named *Burd Ellen,* ressembling *Fair Annie* in the general cast of the story, is a Scottish modification of the ballad of *Child Waters,* published by Percy, from his folio manuscript, 'with some corrections.' It probably came through the same mill as *Gil Morrice,* though with less change,—a conjecture rendered the more probable, for reasons to be seen afterwards, from its having been obtained by Mr. Jamieson from Mrs. Brown of Falkland."

These reasons have been already quoted, and they are singularly unsatisfactory. Beyond the fact that Mrs. Brown of Falkland seems to have been the wife of a Fifeshire minister, and therefore to have had her residence in the district where the supposed productions of Lady Wardlaw's remarkable poetical genius are assumed to have first

seen the light, it is not pretended that there is any evidence of the two ladies having had the slightest connection. No intercourse between mutual friends, or relatives descended from either, is attempted to be traced. The whole ground for so sweeping an inference is that certain ballads, recovered from the same districts of Scotland, at various periods during the eighteenth century, betray a correspondence of thought, feeling and expression; and also some unmistakeable traces of modern interpolations in the style of the artificial verse of that age.

There are one or two additional points to be noted in reference to the authoress of *Hardyknute*. Lady Wardlaw, according to the narrative of Percy, played the part of a coy poetess, as others before and since her time have done. "A suspicion arose that it was her own composition. Some able judges asserted it to be modern. The lady did in a manner acknowledge it to be so. Being desired to show an additional stanza, as a proof of this, she produced the two last, beginning with *There's nae light, &c.*, which were not in the copy that was first printed." This is very much of a counterpart to Lady Anne Lindsay's proceedings about her "*Auld Robin Gray*," a far superior production to *Hardyknute;* but though Lady Anne composed a good many other pieces, none of them approached her first happy hit. There is not the slightest proof that Lady Wardlaw exhibited more than the usual coyness of lady poets. Mr. Hepburn of Keith stated he was in the house with her when she wrote her Norse poem. Several of her descendants knew well about it, as George Chalmers tells, on the authority of Sir Charles Halket, in his *Life of Allan Ramsay;* and Mr. Chambers quotes and italicises the following passage: "Sir Charles Halket and Miss Elizabeth Menzies concur in saying that Lady Wardlaw was a woman of elegant accomplishments, *who wrote other poems*, and practised drawing, and cutting paper with her scissors, and *who had much wit and humour*, with great sweetness of temper." It is manifest therefore that the mystery of the authorship of *Hardyknute* was from the first no mystery to intimate friends, and to the Pitreavie family circle. Moreover, whatever amount of secrecy the poetess encouraged during her lifetime, we see that her immediate descendants exerted themselves to establish her claims to an authorship which they regarded as reflecting honour alike on her and on themselves; and yet we are required to believe that while acknowledging, and even producing metrical proofs in confirmation of her authorship of what Mr. Chambers designates as "to modern taste, a stiff and poor composi-

tion," Lady Wardlaw so effectually concealed the subsequent authorshir of twenty-two of the finest, most tender and vigorous, of all the romantic ballads of Scotland, from her family and her descendants, that it is left for an ingenious literary antiquary, some hundred and thirty years after her death, to make the discovery from internal evidence alone; and to assure us that "The hand which was stiff and somewhat puerile in *Hardyknute*, had acquired freedom and breadth of style" in those deserted foundlings of her muse! The lady, be it remembered, was in her forty-second year when her first *puerile* poem was printed, and still older when she claimed its authorship by the production of additional stanzas, which are fully as puerile as the rest. As her death took place, only eight years after the former date, and with a shorter interval after the latter, the utmost period we can allow for the development of the "puerile style" of *Hardyknute* into the "freedom and breadth of style," of the supposed twenty-two later productions is singularly brief; especially when we consider the mature age of the supposed authoress. The idea is just one of those plausible fancies which prove so temptingly fascinating to the originator, from their very boldness, that we do not wonder at seeing the ample expansion of the first sceptical anatomising of *Sir Patrick Spence*, into the final comprehension of the whole romantic ballad literature of Scotland under the same Pitreavie classification. It required a peculiarly calm temperament to resist the seductions of a theory which, if established, would give to Scottish literature a Chattertonian poetess, little, if at all, inferior in intellectual rank to "the marvellous boy" whom the world accredits with the authorship of the Rowley manuscripts.

D. W.

Description of a deformed fragmentary Skull, found in an ancient Quarry-cave at Jerusalem; with an attempt to determine by its configuration alone, the ethnical type to which it belongs. By J. Aitken Meigs, M. D. Philadelphia: Merrihew and Thompson, 1859.

Dr. Meigs, the able cataloguer of the Morton Collection of Crania, in the Cabinet of the Academy of Sciences of Philadelphia, embodies in this elaborate and careful thesis the results of an ingenious exhaustive process by which he has aimed at determining the

race, by the form and characteristics, in a skull obtained under unusual circumstances. In 1857 Mr. J. Judson Barclay presented to the Academy a human skull, in an imperfect condition, brought from a remarkable cave visited by him at Jerusalem, with the following results:—

Having received some information of the existence of a very extensive cave near the Damascus gate at Jerusalem, (entirely unknown to Franks,) Mr. Barclay, in conjunction with his father and brother, resolved upon its exploration. Accordingly, having obtained permission to this effect, from the Nazir Effendi, they repaired to the cave, the mouth of which is situated directly below the city wall, and the houses on Bezetha. They found the wall at this spot about ten feet in thickness. Through a narrow, serpentine passage which traverses it they gained an entrance into the cave. The length of the cavern they estimated at seven hundred and fifty feet, and the circumference upwards of three thousand feet. The roof is supported by numerous regular pillars hewn out of the solid limestone rock. The floor from the entrance to the termination forms an inclined plane, the descent of which is in some places very rapid. About 100 feet from the entrance a very deep and precipitous pit was discovered containing a human skeleton; supposed to be that of some unfortunate who had fallen headlong down and broken his neck, or rather his skull, judging from the fracture which it exhibits. The bones, of almost giant proportions, gave evidence, from their decayed state, of having remained in that position for many years. The skull, unlike the rest of the skeleton, was in a remarkable state of preservation. Numerous crosses on the wall indicated that the devout Pilgrim or Crusader had been there; and a few Arabic and Hebrew inscriptions —too much effaced to be deciphered,—proved that the place was not unknown to the Jew and the Arab. The explorers found many intricate, meandering passages leading to immense halls as white as the driven snow, and supported by colossal pillars of irregular shape: some of them placed there by the hand of nature, others of them evidently by the stone quarriers to prevent the tumbling in of the city. From their explorations the party concluded that this cavern and the Grotto of Jeremiah, two or three hundreds yards distant, originally constituted one immense cave which was formerly the great quarry of Jerusalem.

The cave appears, therefore, to be a very old one. An allusion

to it under the name of the 'Cotton Grotto' is made by Kadi Mejr-ed-din in an Arabic MS., entitled 'The Sublime Companion to the History of Jerusalem and Hebron,' and bearing date A.D. 1495. A gentleman who entered the cave subsequently to the visit of the Messrs. Barclay, states, in the 'Boston Traveller,' that though its existence was long suspected, 'nothing was positively known regarding it, as it has been kept carefully closed by the successive governors of Jerusalem. The mouth of the cavern was probably walled up as early as the times of the crusades, to prevent its falling into the hands of a besieging army; earth was thrown up against this wall, so as effectually to conceal it from view, and it is only upon the closest scrutiny that the present entrance can be perceived.'

The circumstances under which the skull was discovered afforded no clue to its ethnic classification; nor does its condition furnish any very decisive guide to the era to which it should be referred. It is confidently believed by those who have familiarised themselves with the minute characteristic details of comparative craniography, that by these alone ethnical types can be determined. A skull now in the collection of the Academy of Sciences at Philadelphia, and figured in Dr. Meigs' Catalogue of Human Crania, No. 1252, as ancient Phœnicean, was sent by M. Fresnel, the celebrated archæologist, to the late Dr. Morton, without the slightest information as to where, or the circumstances under which, it was found. After careful study of its characteristics, Dr. Morton pronounced it to be Phœnician. He afterwards learned from Fresnel that it was found in the sepulchral cave of Ben Djemma, in the Island of Malta, and probably belonged to an individual of that race, which, in the most remote times, had occupied the northern coast of Africa and the adjacent isles. It thus appears that Dr. Morton, guided by osteologic characters alone, was enabled to announce the correct geographical locality of this skull, and perhaps also its true ethnic value; though of this latter point Dr. Meigs expresses some doubts, arising from the remarkable resemblance which this skull bears to that of a wandering Chingà of Transylvania, depicted in Blumenbach's Decades (Tab. xi.). In like manner, some time before his death, Dr. Prichard sent to Prof. Retzius two human crania, requesting an opinion as to the race to which they belonged. He pronounced one of them to be Roman and the other Celtic, and was informed by Prichard that he was in all probability correct, for the two skulls had been dug up in an old

battle-field at York, England, where the ancient British Celts, had been vanquished by the Romans.

Encouraged by such examples of success, Dr. Meigs proceeded to apply the tests which his experience in comparative craniology placed at his command. The skull, however, is peculiar, and so far as his experience could guide him, unique. Among all the 1045 crania in the collection of the Academy, none presented a counterpart to it. Its most remarkable feature is that the occipital bone rises vertically from the posterior margin of the great foramen to meet the parietalia, which bend abruptly downward between their lateral protuberances. This striking peculiarity, therefore, gives to a skull brought from an ancient quarry-cave at Jerusalem some of the most typical characteristics of Peruvian Crania. After minutely describing the appearance which the several bones present, Dr. Meigs expresses his conviction that the head has been artificially deformed by pressure applied to the occipital region during youth; thus supplying an interesting illustration of the practice in the old world of the same custom of distorting the human head, which was long regarded as peculiar to the American aborigines.

After marshalling all the probable ethnic claimants for this remarkable cranium, and assigning reasons for rejecting each; Dr. Meigs shows that it unites some of the most characteristic elements of the Mongolian and the Sclavonian head, while differing in some respects from both; and he finally concludes that it may be refered—not as a positive and indisputable conclusion, but as an approximation to the truth,—to the people and the region about Lake Baikal. Through the Sclaves and Burats of that region the short-headed races of Eastern Europe graduate apparently into the Kalmucks and Mongols proper of Asia; and here probably is a remarkable example of an artificially modified cranium of that transitional people of Lake Baikal.

The whole paper is an interesting one to those engaged in similar studies, and is marked throughout by the candour and temperate caution so specially needed in the present state of ethnological investigation.

D. W

SCIENTIFIC AND LITERARY NOTES.

GEOLOGY AND MINERALOGY.

NEW AMERICAN TRILOBITES: BY PROFESSOR JAMES HALL.

The accompanying descriptions of three new Trilobites from the Hudson River group of Vermont, have been kindly forwarded to us by Professor Hall, of Albany:

"The Trilobites most common in the shales of the Hudson River Group are *Triarthrus Beckii** and *Calymene senaria* = *C. Blumenbachii?* I have likewise described two species of *Olenus* in the first volume of the Palæontology of New York; but these are rare in most localities of the rocks of this period.

Some years since, during the progress of the Geological Survey of Vermont, by Rev. Z. Thompson, some specimens of Trilobites were obtained from the shales of this age in the town of Georgia; and these were subsequently placed in my hands. The Survey having since passed under the direction of Professor Hitchcock, I postponed the publication of the descriptions, fearing it might not be agreeable to him; but having now not only his approval, but his express desire that I would publish them, I give below the following species, preliminary to a more complete description and illustration.

Olenus Thompsoni. (*n. s.*)

General form ovate, the length and breadth being nearly as six to five. Head broad lunate, with the postero-lateral angles much extended; the width from the centre to the outer margin of the eye almost equal to the width of the cheek. Eyes (which are much crushed in the specimen) elongate semioval, equal in length to the space between the anterior angles and the frontal margin: glabella distinctly lobed, narrower in front.

Thorax with the lateral lobes about once and a half as wide as the middle lobe, consisting of fourteen articulations, the third one of which is much longer than the others, and curving downwards with an extension reaching as far as the line of articulation of the seventh rib. The posterior articulations are bent abruptly backwards, so that the free extremities are parallel with the axis. Pygidium small, pointed, without visible rings, and having a narrow ridge running down the centre.

The description is chiefly drawn from an impression in slate, and a cast made from the same, together with some fragments of the same species.

Geological position.—In the shales in the upper part of the Hudson River group.

Olenus Vermontana. (*n. s.*)

General form elongate; the posterior extremity obtuse. Head semioval, twice as wide as long, the posterior angles produced in short acute spines. Eyes narrow elongate; the space from the centre of the head, to the outer margin of the eye much greater than the cheek, and the distance from the anterior angle of the

* Apparently confined (or nearly so,) in Canada, to the underlying Utica Slate.—E. J. C.

eye to the frontal margin, less than the length of the eye. Glabella lobed; hypostoma broad oval.

Thorax imperfect, preserving six articulations and part of the seventh; the middle lobe wider than the lateral ones. The third articulation is much broader towards and at its lateral margin, and is prolonged obliquely downwards in a sharp spine, which reaches below the seventh articulation; the lateral extremities of the other articulations produced in short acute spines.

Another fragment, which is apparently of the same species, preserves eleven articulations of the thorax and the pygidium. The upper articulations are imperfect at their extremities; the last one is bent abruptly downwards, and terminates in a long spine on each side, reaching below the pygidium. Pygidium semioval; the axis marked by four annulations, the two upper of which are faintly indicated in the lateral lobes.

This species differs from the preceding, in its proportionally narrow form, the relative proportions of the parts of the head, and the short acute posterior spines. The comparative width of the middle and lateral lobes of the thorax is a very distinguishing feature.

Geological position.—In the shales of the upper part of the Hudson River group.

Peltura (Olenus) Holopyga. (n. s.)

Entire form elongate subelliptical, having a length of about twice and a half the width. Head somewhat semielliptical; the posterior angles produced in long spines. Glabella strongly lobed, its length a little greater than its greatest breadth; the entire breadth of the head, when entire, being about twice as great as the length. Hypostoma wider than long.

Thorax with eleven articulations; the middle lobe prominent, and about twice as wide as the lateral lobes; the articulations strong, rounded above, and each one marked in the centre by a node (or the base of a spine which has been broken off in the specimens examined). Articulations of the lateral lobes short (the extremities of the upper ones broken off in the specimen); the lower ones bending abruptly downwards, and terminating in spiniform processes, the last pair being prolonged much beyond the extremity of the pygidium.

Pygidium longitudinally semielliptical; the middle lobe marked by three annulations, and a fourth obscure one above the terminal lobe; lateral lobes flat and plain, the exterior margin apparently free from ornament or inequality.

This species appears to belong to the genus *Peltura*, taking the figures of *Olenus (Peltura) scarabæoides* as the type of the genus.* Our specimen differs from that one in the absence of the obscure crenulations or inequalities upon the limb of the pygidium, which is regarded by Pictet as important. The number of segments of

* This species, the *Entamostracites scarabæoides* of Wahlenberg, 1821 (*scarabæorum vel aliorum vaginipennium animale vestigia*: Bromel in Act. Litt. Upsal. 1729.) has apparently been refigured from the same specimen, or from the same figure throughout, by subsequent authors; and the original appears to have been deprived of the cheeks, the frontal limb, and the posterior cephalic spines. The eye-tubercle, or the palpebral lobe, having collapsed as in our specimen, gives but a partial representation of the entire animal.

the thorax, if a constant character, seems much more important, and furnishes a more marked feature for the separation from *Olenus*.

Geological position.—In the shales of the Hudson River group.

LOCAL GEOLOGICAL NOTES: BY E. J. CHAPMAN.

Presence of Columnaria alveolata and Stromatocerium rugosum in Trenton Limestone.—Until a comparatively recent period these fossils were considered eminently characteristic of the Black River Limestone. They were not known, indeed, to pass upwards out of that division: a condition which perhaps still obtains in the geology of New York. In parts of Lower Canada, however, Sir William Logan, and the other officers of the Survey, have discovered these forms in direct association with fossils of the Trenton Limestone, properly so called; and in the shale of Tennessee, Prof. Stafford, of the Cumberland University, has found them occupying a high position amongst the Trenton beds. But, so far as regards Western Canada, I am not aware that these types have hitherto been recognised above the Black River subdivision of the great Trenton group. It may not be, therefore, without interest to state, that I have lately found *Columnaria alveolata* in the vicinity of Belleville, C. W., and examples of both *Columnaria alveolata* and *Stromatocerium rugosum* at Shannonville on the Shannon or Salmon River, about eight miles east of Belleville: these fossils, at each locality, accompanying well-known Trenton types. Some additional remarks on this subject will be given in a review of the geology of Belleville and its vicinity, to appear in an early No. of the Journal.

Silicate of Iron in the Limestone Beds of Lake St. John, Rama, C. W.—At the northern extremity of Lake St. John—a small lake lying a short distance east of Lake Couchiching in Rama Township, C. W.,—the junction of the Laurentian and the Lower Silurian strata may be seen; the gneiss rocks of the former dipping at an angle of about 25° to the N. E., whilst the Silurian strata dip at a very slight angle in an opposite direction. A bed of light greenish-brown sandstone, about two feet thick, appears at the base of the Silurian strata, and siliceous limestones, with a few Black River (and perhaps Chazy?) fossils, lie conformably on this. In the bottom beds, more especially, of these siliceous limestones, a number of curious bright-green streaks and markings occur. These at first sight appear to indicate the presence of copper pyrites or other copper ores in the rocks in question. I find them to consist, however, of hydrated silicate of iron, arising from the decomposition of iron pyrites; the green substance at least, in some places, is collected around a minute cube or other nucleus of pyrites, altered into the brown or hydrated sesqui-oxide. In no case have I been able to detect in these markings the slightest trace of copper. The presence, on the other hand, of silica, oxide of iron, and a little water, is easily made out.

MINERALOGICAL NOTICES.

[Condensed, with additional remarks, from various papers in recent Numbers of Poggendorff's Annalen.]

Isomorphism of Silica, Zirconia, and Stannic Acid.—G. Rose, from the isomorphous relations (as discovered by Marignac) of the Fluo-stannates and Fluo-silicates, considers the isomorphism of silica and stannic acid an established fact; and

makes, consequently, the atomic constitution of Silica = SiO^2. Silica and Stannic Acid in their mineral forms, it is well known, crystallize in different systems, but G. Rose seeks to establish a crystallographic connexion between them by the intervention of Zircon, a mineral long known to be identical in form with cassiterite, SnO^2. He makes the formula of Zirconia = ZrO^2 +; and that of Zircon ZrO^2 + SiO^2; viewing the latter as an isomorphous combination of Silica and Zirconia; and, regarding it by inference consequently, as a proof of the dimorphism of silica; or, in other words, as an example of silica crystallising in the dimetric system. This reasoning, however, appears to be somewhat forced. Zircon crystallises in the dimetric system, in all probability, under the crystallographic influence (so to say) of the Zirconia which forms its more essential or predominating constituent. That one of the components in crystal compounds frequently exerts an influence of this kind, is an assumption now generally received. And again, by legitimately following out the argument of Gustav Rose, we ought equally to consider silica a *sesquioxide*, seeing that it occasionally replaces alumina, not only in such compounds as Augite and Hornblende, but also in the Staurolites. With regard to the latter, Professor Rose has himself stated in another place (*Krystallo-chemische Mineralsystem*, p. 77,) that the only way of explaining their variable composition, is to assume the isomorphism of silica and alumina. And if, as he states further in objection to this, no examples of these bodies have yet been found in identical forms, the same argument still holds good with respect to silica and stannic acid on the one hand, and silica and zirconia on the other. The modern progress of mineralogy tends to bring out very prominently two facts:—First, that we should make a careful distinction between simply isomorphous and truly *vicarious* bodies; and secondly that the *assumed* atomic constitutions of mineral compounds must be allowed no preponderating place in questions belonging to the philosophy of that science.

Crystal Form of Oxide of Copper.—Dr. Jenzsch has described some crystals of Black Oxide of Copper from some smelting works near Freiberg. They were obtained from furnaces in which argentiferous copper ores are roasted with common salt, and they are considered due to the alteration of volatilized chloride of copper. They belong to the Trimetric system. Simple crystals are rare, twins and compound groups predominating. The twin-face is one of the planes of the predominating rhombic prism, and the re-entering angle equals 160° 42′ 30″. The prism-angle itself ($V : V = I : I$, Dana = $P\infty : P\infty$, Naumann) =99° 38′ 45″, and 80° 21′ 15″, the latter being, of course, just one-half the amount of the re-entering angle. The crystals are mostly tabular, from the abnormal development of two of the opposite V faces or vertical planes of the rhombic prism. Oxide of copper (Cu O.) is thus shewn to be dimorphous, if not trimorphous. Becquerel obtained it in monometric tetrahedrons by the fusion of the finely comminuted oxide with potash; and the Tenorite from the lava of Vesuvius is looked upon as Hexagonal by some observers. Very probably, however, as pointed out by Dr. Jenzsch, the six-sided scales in which the latter chiefly occurs, are really Trimetric. Dana's Melaconite, another form of Cu O from Lake Superior, sometimes occurs in small cubo-octahedrons, it will be remembered; but these have been regarded (although doubtfully) as pseudomorphs derived from the red oxide Cu^2 O. The crystals

described by Dr. Jenzsch, exhibit a brilliant metallic lustre, with iron-black colour and unchanged streak. H. about 4.0; Sp. gr. = 6.451.

Magnoferrite.—Rammelsberg proposes this name for the so-called octahedral iron-glance from Vesuvius: a combination, according to his analyses, of sesqui-oxide of iron and magnesia. Specimens varying in sp. gr. from 4.56 to 4.65, yielded results closely approaching to sesqui-oxide of iron 85.71, magnesia 14.29; and sesqui-oxide of iron 84.21, magnesia 15.79. The former corresponds to 2 MgO, 3 Fe^2O^3; the latter to 3 MgO, 4 Fe^2O^3. Magnoferrite must not be confounded with the well-known specular iron ore from Vesuvius, which occurs in thin leaves and small crystal aggregations. A specimen analysed by Rammelsberg, yielded: sesqui-oxide of iron 98.05, magnesia 1.40. The formulæ given above throw the magnoferrite out of the great Magnetite and Spinel series, a somewhat unexpected result. The term *Talcoferrite* or *Magnesioferrite* appears to us less likely to create misconception, than that bestowed on this substance by Rammelsberg.

Franklinite.—This mineral has also been newly analysed by Rammelsberg with results somewhat different from those previously obtained by Abich, and by Dickerson. The mean of several analyses shewed: sesqui-oxide of iron 64.51, oxide of maganese 13.51, oxide of zinc 25.30. There results = 3 RO, R^2O^3, a formula considered by Rammelsberg to be isomorphous with the spinel formula RO, R^2O^3.

Cerite.—Rammelsberg has also analysed several specimens of Cerite with the following (mean) results: Silica 19.18, oxide of cerium 64.55, oxides of lanthanium and didymium 7.28, lime 1.35, oxide of iron 1.54, water 5.71. The oxygen-ratios of the water, protoxides, and silica = 5.09, 11.17, 9.96—from which Rammelsberg deduces the formula 2 RO, SiO^2 + HO. As the earlier analyses of Hisinger and Hermann shewed respectively 9.60 and 9.10 per cent. of water, whilst those of Kjerulf and Klaproth shewed 5.29 and 5.10 per cent., agreeing closely in that respect with his own, Rammelsberg starts the question as to whether there may not be two distinct minerals included under Cerite. This mineral, however, so rock-like in its characters, is exactly one of those in which we might expect to find a certain diversity of composition.

Boracite and Stassfurthite.—Dr. Julius Potyka has analysed examples of these substances. His analyses give for Boracite, the formula 2 (3 MgO, 4 BO^3) + Mg Cl: and for Stassfurthite, the same with one atom of water. The latter is identical with that previously deduced by Heintz.

Triphylline.—A new analysis of this mineral (from Bodenmais in Bavaria) has been published by F. Oesten. This analysis, which seems to have been very carefully performed and on pure material, leads to the same formula as that given by Fuchs, viz.: 3 RO, PO^5. This differs very materially from the results obtained by Rammelsberg.

Classification of Meteorites.—An interesting classification of meteorites has been drawn up by the Baron von Reichenbach. It is too long for insertion in the present place, but a condensed analysis of it will be given in our next series of Notes.

PUBLICATIONS.

The following publications, in this department, have been received since the last

issue of the Journal:—1. "Seventh Supplement to Dana's Mineralogy," by the Author [Prof. Dana], from the American Journal of Science and Arts for July, 1859. The publication of these valuable 'Supplements' in a separate form—in sets of five or six for example,—would be exceedingly welcome to all interested in the progress of Mineralogy. 2. "The Old Glaciers of Switzerland and North Wales," by A. C. Ramsay, F.R.S., etc. A review of this interesting and gracefully illustrated essay will appear in an early number of the Journal. 3. "The Microscopic Structure of some Canadian Limestones," by Professor Dawson, LL.D.; and 4. "The Natural History of the Gulf of the St. Lawrence, and Distribution of the Mollusca of Eastern Canada," by *Robert Bell, Jr.*, are from the June number of the Canadian Naturalist. Prof. Dawson's Paper is illustrated by several wood engravings shewing the minute organisms, and the general microscopic appearance, of various specimens of Trenton and Chazy limestone from the neighborhood of Montreal. Mr. Bell's Essay contains a very elaborate exposition of the vertebrated, molluscous and other animals of the St. Lawrence valley and Eastern Canada generally. It is an exceedingly useful and carefully drawn up paper; and as the effort of so young a man, it cannot be too highly commended. Mr. Bell bids fair to occupy a distinguished position amongst Canadian naturalists.

E. J. C.

ETHNOLOGY AND ARCHÆOLOGY.

TRACES OF HUMAN ARTS IN THE DRIFT.

At the late meeting of the British Association, at Aberdeen, several speakers, especially in the Geological Section, took occasion to revert to the highly interesting discoveries recently announced, of the finding of flint implements and other traces of human arts in the diluvial formations. It is now ten years since such discoveries were first announced by M. Boucher de Perthes, as having been made in the neighbourhood of Abbeville; but his elaborate work, entitled "Antiquités Celtiques et Antédeluviennes," contained so much vague and extravagant theorising, and was accompanied by engravings of so many so-called antediluvian works of art, with no more traces of art about them, to ordinary eyes, than any heap of broken flints by the roadside could furnish, that it attracted little attention. More recently, however, M. Aymard, distinguished alike as a palæontologist and an archæologist, has announced the discovery of portions of human skeletons embodied in the volcanic breccia near Le Puy en Velay; and attention being anew drawn to the subject, Mr. Prestwick, Sir Charles Lyell, and other Geologists of unquestionable judgment and probity, have explored the stratified gravel in the neighbourhood of Amiens and Abbeville, and produced artificially formed hatchets, spear heads, and wedges of flint, from gravel pits, at a depth of seventeen feet below the surface. The subject has naturally excited much discussion, and led to many conflicting opinions as to its bearing on the question of the antiquity of the human race, or the condition and occupants of the globe at the period of Man's introduction as the highest among its living inheritors.

The following highly interesting *résumé* of the subject was given by Sir Charles

Lyell, as President of the Geological Section of the British Association, and embodies at once the facts and the opinions which an experienced and cautious scientific geologist considers as at present to be legitimately deducible from such investigations as have yet been made:

"No subject has lately excited more curiosity and general interest among geologists and the public than the question of the antiquity of the human race: whether or no we have sufficient evidence to prove the former co-existence of Man with certain extinct mammalia, in caves or in the superficial deposits commonly called drift, or 'diluvium.' For the last quarter of a century, the occasional occurrence, in various parts of Europe, of the bones of man or the works of his hands, in cave-breccias and stalactites associated with the remains of the extinct hyæna, bear, elephant, or rhinoceros, have given rise to a suspicion that the date of man must be carried further back than we had heretofore imagined. On the other hand, extreme reluctance was naturally felt on the part of scientific reasoners, to admit the validity of such evidence, seeing that so many caves have been inhabited by a succession of tenants, and have been selected by man as a place not only of domicile, but of sepulture; while some have also served as the channels through which the waters of flooded rivers have flowed, so that the remains of living beings which have peopled the district at more than one era, may have subsequently been mingled in such caverns, and confounded together in one and the same deposit. The facts, however, recently brought to light during the systematic investigation, as reported on by Falconer, of the Brixham Cave, must, I think, have prepared you to admit that scepticism in regard to the cave-evidence in favour of the antiquity of man had previously been pushed to an extreme. To escape from what I now consider was a legitimate deduction from the facts already accumulated, we were obliged to resort to hypotheses requiring great changes in the relative levels and drainage of valleys, and, in short, the whole physical geography of the respective regions where the caves are situated,—changes that would alone imply a remote antiquity for the human fossil remains, and make it probable that man was old enough to have co-existed, at least, with the Siberian mammoth. But, in the course of the last fifteen years, another class of proofs have been advanced, in France, in confirmation of man's antiquity, in'o two of which I have personally examined in the course of the present summer, and to which I shall now briefly advert. First, so along ago as the year 1844, M. Aymard, an eminent palæontologist and antiquary, published an account of the discovery, in the volcanic district of central France, of portions of two human skeletons (the skulls, teeth, and bones) embedded in a volcanic breccia found in the mountain of Denise, in the environs of Le Puy en Velay, a breccia anterior in date to one, at least, of the latest eruptions of that volcanic mountain. On the opposite side of the same hill, the remains of a large number of mammalia, most of them of extinct species, have been detected in tufaceous strata, believed, and I think correctly, to be of the same age. The authenticity of the human fossils was from the first disputed by several geologists, but admitted by the majority of those who visited Le Puy, and saw with their own eyes the original specimen now in the museum of that town. Among others, M. Pictet, so well known to you by his excellent work on Palæontology, declared, after his visit to the spot,

his adhesion to the opinions previously expressed by Aymard. My friend, Mr. Scrope, in the second edition of his 'Volcanoes of Central France,' lately published, also adopted the same conclusion, although after accompanying me this year to Le Puy, he has seen reason to modify his views. The result of our joint examination,—a result which I believe essentially coincides with that arrived at by MM. Hébert and Lartet, names well known to science, who have also this year gone into this inquiry on the spot,—may thus be stated: We are by no means prepared to maintain that the specimen in the museum at Le Puy—which unfortunately was never seen in situ by any scientific observer,—is a fabrication. On the contrary, we incline to believe that the human fossils in this and some other specimens from the same hill, were really imbedded by natural causes in their present matrix. But the rock in which they are entombed consists of two parts, one of which is a compact and, for the most part, thinly laminated stone, into which none of the human bones penetrate; the other, containing the bones, is a lighter, and much more porous stone, without lamination, to which we could find nothing similar in the mountain of Denise; although both M. Hébert and I made several excavations on the alleged site of the fossils. M. Hébert, therefore, suggested to me, that this more porous stone, which resembles in colour and mineral composition, though not in structure, parts of the genuine old breccia of Denise, may be made up of the older rock broken up and afterwards re-deposited, or, as the French say, '*remanié*,' and therefore of much newer date; an hypothesis which well deserves consideration; but I feel that we are at present so ignorant of the precise circumstances and position under which these celebrated human fossils were found, that I ought not to waste time in speculating on their probable mode of interment, but simply declare that, in my opinion, they afford no demonstration of Man having witnessed the last volcanic eruptions of central France. The skulls, according to the judgment of the most competent osteologists who have yet seen them, do not seem to depart in a marked manner from the modern European or Caucasian type, and the human bones are in a fresher state than those of the Elephas meridionalis, and other quadrupeds found in any breccia of Denise which can be referred to the period even of the latest volcanic eruptions. But while I have thus failed to obtain satisfactory evidence in favour of the remote origin assigned to the human fossils of Le Puy, I am fully prepared to corroborate the conclusions which have recently been laid before the Royal Society by Mr. Prestwich, in regard to the age of the flint implements associated in undisturbed gravel, in the north of France, with the bones of elephants, at Abbeville and Amiens. These were first noticed at Abbeville, and their true geological position assigned to them by M. Boucher de Perthes, in 1849, in his 'Antiquités Celtiques;' while those of Amiens were afterwards described in 1855, by the late Dr. Rigollot. For a clear statement of these facts, I may refer you to the abstract of Mr. Prestwich's Memoir, in the Proceedings of the Royal Society for 1859, and have only to add that I myself have obtained abundance of flint implements (some of which are laid upon the table) during a short visit to Amiens and Abbeville. Two of the worked flints of Amiens were discovered in the gravel-pits of St. Acheul—one at the depth of ten feet and the other of seventeen feet below the surface, at the time of my visit; and M. Georges Pouchet, of

Rouen, author of a work on the 'Races of Man,' who has since visited the spot, has extracted with his own hands one of these implements, as Messrs. Prestwick and Flower had done before him. The stratified gravel, resting immediately on the chalk in which these rudely-fashioned instruments are buried, belongs to the post-pliocene period, all the fresh water and land shells which accompany them being of existing species. The great number of the fossil instruments which have been likened to hatchets, spear-heads, and wedges, is truly wonderful. More than a thousand have already been met with in the last ten years, in the valley of the Somme, in an area fifteen miles in length. I infer that a tribe of savages, to whom the use of iron was unknown, made a long sojourn in this region; and I am reminded of a large Indian mound, which I saw in St. Simond's Island, in Georgia,—a mound ten acres in area, and having an average height of five feet, chiefly composed of cast-away oyster shells, throughout which arrow heads, stone axes, and Indian pottery are dispersed. If the neighbouring river, the Alatamaha, or the sea which is at hand, should invade, sweep away, and stratify the contents of this mound, it might produce a very analogous accumulation of human implements, unmixed perhaps with human bones. Although the accompanying shells are of living species, I believe the antiquity of the Abbeville and Amiens flint instruments to be great indeed, if compared to the times of history or tradition. I consider the gravel to be of fluviatile origin, but I could detect nothing in the structure of its several parts indicating cataclysmal action; nothing that might not be due to such river-floods as we have witnessed in Scotland during the last half century. It must have required a long period for the wearing down of the chalk which supplied the broken flints for the formation of so much gravel at various heights, sometimes one hundred feet above the present level of the Somme, for the deposition of fine sediment, including entire shells, both terrestrial and aquatic, and also for the denudation which the entire mass of stratified drift has undergone, portions having been swept away, so that what remains of it often terminates abrubtly in old river-cliffs, besides being covered by a newer unstratified drift. To explain these changes, I should infer considerable oscillations in the level of the land in that part of France—slow movements of upheaval and subsidence, deranging, but not wholly displacing, the course of the ancient rivers. Lastly, the disappearance of the elephant, rhinoceros, and other genera of quadrupeds now foreign to Europe, implies, in like manner, a vast lapse of ages, separating the era in which the fossil implements were framed and that of the invasion of Gaul by the Romans.

"Among the problems of high theoretical interest which the recent progress of Geology and Natural History has brought into notice, no one is more prominent, and at the same time more obscure, than that relating to the origin of species. On this difficult and mysterious subject, a work will very shortly appear, by Mr. Charles Darwin, the result of twenty years of observation and experiment in Zoology, Botany, and Geology, by which he has been led to the conclusion, that those powers of nature which give rise to races and permanent varieties in animals and plants, are the same as those which, in much longer periods, produce species, and, in a still longer period of ages, give rise to differences of generic rank. He appears to me to have succeeded, by his investigations and reasonings, to have thrown a flood of light on many classes of phenomena connected with the affini-

ties, geographical distribution, and geological succession of organic beings, for which no other hypothesis has been able, or has even attempted, to account.

"Among the communications sent in to this Section, I have received from Dr. Dawson, of Montreal, one confirming the discovery, which he and I formerly announced, of a land shell, or pupa, in the coal formation of Nova Scotia. When we contemplate the vast series of formations intervening between the Tertiary and Carboniferous strata, all destitute of air-breathing mollusca, at least of the terrestrial class, such a discovery affords an important illustration of the extreme defectiveness of our geological records. It has always appeared to me, that the advocates of progressive development have too much overlooked the imperfection of these records, and that, consequently, a large part of the generalisations in which they have indulged in regard to the first appearance of the different classes of animals, especially of air-breathers, will have to be modified or abandoned. Nevertheless, that the doctrine of progressive development may contain in it the germs of a true theory, I am far from denying."

In the same section, on the following day, the Rev. Dr. Anderson took up the main subject of "Human remains in the Superficial Drift," and after reviewing the nature of the various evidence advanced, he thus proceeded:—As to the instances occurring in beds of lakes, rivers, and seas, and which have become mineralized, he contended that a few years, or even months, often sufficed for the formation of a compact durable mass of calcareous and silicious rock, in which human bones, skeletons, pottery, coins, and implements were imbedded. He referred to a case betwixt Aberdour and Burntisland, in Fife, which he examined a few weeks ago, where an incrustation was now forming of great depth, and in which are imbedded land shells, branches of trees, and where on the face of the incrusted cliff, twigs of the living trees are becoming entangled in the calcareous breccia. He then quoted the case of a cannon-ball—a thirty-two pounder,—lately presented to him by a fellow townsman, deeply incrusted with ferruginous mud, and completely indurated, which was raised on his anchor in the Harbour of Copenhagen: and, he doubted not, an identical bullet of our naval attack of fifty years ago. The skulls of Amiens and Abbeville, the remains in the caverns of Torquay, and those in Sicily, the flint weapons in veined limestone in Cantire, and the arrow-heads with elephant remains in Suffolk, were then successively brought under review in the paper—the solution of all these given by Dr. Anderson being, that from the action of petrifying springs, the subsidence of tracts of country, the falling-in of the roofs of caverns, the undermining of cliffs and headlands, the superficial soil is incrusted or buried beneath the strata on which it was originally superimposed. He saw no evidence deducible from the superficial drifts to warrant a departure from the usually accepted data of man's very recent introduction upon the earth. We have more positive evidence that his first appearance was characterized by many proofs of high intellectual condition which our sacred beliefs attach to his origin, and that he was not primarily the ignoble creature that arrow-heads, and flint-knives, and ossiferous caverns would so lamentably indicate.

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST,—AUGUST, 1859.

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.	2 P.M.	10 P.M.	Mean.	6 A.M	2 P.M	10 P.M	M'N		6 A.M.	2 P.M.	10 P.M.	M'N	6 A.M.	2 P.M.	10 P.M.	M'N	6 A. M.	2 P. M	10 P.M.		6 AM.	2 P.M.	10 P.M.	Result.	M'N		
					°	°	°	°													°							
1	29.454	29.500	29.563	29.5093	64.6	74.3	54.0	67.92	+ 0.95	.545	.457	.436	.461	.90	.53	.73	.69	S W b S	W S W	N b W	N 83 W	4.5	4.2	4.0	2.57	3.70	...	...
2	.604	.625	.600	.6095	58.1	71.5	66.0	66.40	— 0.45	.403	.350	.360	.381	.84	.45	.56	.60	W b N	E b S	E N E	N 84 E	2.4	6.2	2.8	4.05	4.40	...	...
3	.621	.556	.525	.5582	61.3	73.8	65.8	67.88	+ 1.03	.385	.603	.582	.541	.70	.72	.91	.79	N E b E	E b S	E S E	N 67 E	1.8	6.8	1.6	2.85	3.87	1.375	...
4	.306	.449	.509	.4237	63.1	75.1	66.4	67.92	+ 1.12	.537	.536	.534	.539	.93	.61	.82	.79	N b W	N W b W	S b W	N 56 W	3.8	9.0	4.0	4.11	6.26	.035	...
5	.527	.516	.591	.5512	59.2	74.3	55.9	64.10	— 2.70	.437	.388	.299	.366	.87	.45	.66	.62	Calm.	N W b W	Calm.	N 59 W	0.0	18.0	0.0	6.21	6.26	...	...
6	.638	.609	.564	.5982	56.3	72.7	62.4	64.80	— 1.07	.326	.477	.444	.410	.71	.59	.79	.67	N W b W	S S W	S W	S 45 W	9.0	8.0	0.5	4.20	4.82	...	...
7	.515	.475	—	—	65.1	81.4	—	—	—	.408	.473	—	—	.70	.44	—	—	W b S	N W b W	N N W	N 40 W	1.8	11.0	6.0	7.24	8.01	...	...
8	.668	.720	.706	.7013	57.0	72.5	63.1	65.37	— 1.30	.328	.458	.436	.408	.70	.57	.75	.65	W b N	E S E	E b S	N 69 E	0.5	3.5	2.0	2.05	2.69	...	...
9	.789	.769	.753	.7693	59.9	74.7	65.0	68.03	+ 1.48	.427	.581	.441	.497	.83	.67	.71	.72	N E b N	E S E	N E	N 63 E	1.2	2.8	2.4	2.22	3.37	...	...
10	.755	.703	.652	.6975	63.4	74.7	68.9	70.63	+ 4.12	.356	.621	.541	.523	.61	.73	.77	.69	N b E	E	E N E	N 78 E	1.2	4.6	3.4	2.51	2.79	...	...
11	.625	.558	.595	.5943	65.7	75.8	65.3	69.80	+ 3.37	.556	.651	.489	.588	.88	.73	.78	.80	Calm.	E b S	S b E	N 51 E	0.0	6.8	0.5	0.91	2.99	.080	...
12	.558	.558	.548	.5560	67.8	72.9	68.0	69.98	+ 3.65	.641	.587	.588	.61	.94	.73	.86	.84	Calm.	E	N E b E	N 70 E	0.0	9.8	6.0	4.47	4.81	...	...
13	.603	.590	.580	.5866	67.8	74.7	66.7	69.87	+ 3.63	.583	.606	.571	.577	.86	.71	.87	.79	N E	S b E	S b W	S 19 E	2.2	8.2	1.0	2.16	2.91	...	...
14	.571	.556	—	—	64.2	78.7	—	—	—	.543	.679	—	—	.90	.69	—	—	Calm.	S	N W b N	N 80 W	0.0	4.2	5.0	0.94	4.48	...	...
15	.604	.591	.644	.6167	68.6	79.0	68.9	72.90	+ 6.75	.504	.657	.583	.590	.72	.67	.83	.73	N N W	E b N	E N E	N 77 E	4.4	7.5	4.2	4.03	4.97	inap.	...
16	.687	.680	.699	.6902	68.6	75.1	69.1	72.02	+ 6.00	.530	.543	.629	.558	.76	.62	.89	.72	N E b E	E b S	N E b E	N 79 E	5.2	9.0	4.2	5.03	5.39	...	...
17	.740	.727	.696	.7165	66.4	78.5	68.9	72.23	+ 6.27	.602	.511	.625	.558	.92	.53	.89	.76	N E b E	S S E	E b S	S 71 E	1.6	4.8	2.0	3.07	3.88	...	...
18	.635	.524	.508	.5518	64.6	77.6	63.5	68.38	+ 2.55	.558	.583	.455	.519	.92	.61	.77	.74	N E b E	S b W	N N W	N 62 W	1.8	11.4	15.8	5.53	9.69	.180	...
19	.605	.610	.664	.6292	56.6	72.9	62.1	64.83	— 0.93	.372	.255	.293	.305	.81	.31	.52	.52	N W b N	N N W	N N W	N 17 W	11.5	13.5	5.2	10.16	10.33	...	...
20	.730	.741	.718	.7382	58.8	73.1	64.0	66.50	+ 0.95	.360	.378	.431	.360	.72	.47	.71	.57	N b W	S b E	S b E	S 5 E	5.2	11.2	3.0	3.60	4.43	...	...
21	.746	.743	—	—	57.4	75.1	—	—	—	.345	.391	—	—	.73	.45	—	—	E b N	E b S	E	N S S E	2.9	5.8	2.5	3.48	4.00	...	...
22	.670	.637	.597	.6305	61.5	73.1	70.7	69.78	+ 4.43	.464	.470	.546	.497	.85	.57	.73	.69	N E	E	E b S	S 69 E	3.6	10.8	5.5	6.99	8.05	.170	...
23	.608	.567	.572	.5848	66.4	70.5	66.4	66.85	+ 1.72	.520	.507	.610	.545	.80	.68	.94	.81	S S E	S E b S	S S W	S 15 E	5.2	6.2	16.5	7.06	8.18	1.655	...
24	.503	.443	.463	.4627	64.6	70.0	62.4	65.97	+ 1.02	.558	.584	.521	.550	.92	.79	.92	.86	S W b S	S b W	W	S 43 W	6.2	6.0	0.5	2.61	3.95	.315	...
25	.488	.510	.577	.5280	58.4	73.8	62.6	65.65	+ 0.92	.447	.448	.403	.435	.92	.54	.71	.70	N W b W	W N W	W N W	N 68 W	10.5	11.5	5.4	6.85	6.94	...	...
26	.574	.501	.515	.5300	59.2	76.2	66.7	68.42	+ 3.88	.413	.665	.414	.482	.82	.74	.62	.70	N W	S b W	N W b N	N 79 W	4.4	9.0	9.5	4.68	6.95	inap.	...
27	.570	.605	.658	.6117	57.7	66.4	1.8	60.15	— 4.17	.346	.342	.324	.333	.72	.52	.75	.65	N W b W	N W b N	N N W	N 39 W	13.4	14.6	6.0	11.04	11.59	...	...
28	.688	.701	—	—	51.2	59.2	—	—	—	.277	.187	—	—	.73	.37	—	—	N N W	N W	N W b N	N 34 W	8.6	18.5	4.0	11.53	11.60	...	...
29	.778	.706	.680	.7173	48.0	67.1	52.7	56.28	— 7.53	.248	.172	.225	.218	.74	.26	.56	.52	N W b N	N W	N b W	N 39 W	2.8	14.0	1.0	6.57	6.71	...	...
30	.625	.486	.474	.5178	46.2	68.7	58.1	59.15	— 4.47	.262	.300	.393	.317	.83	.42	.81	.65	W N W	W b S	N W	S 85 W	0.5	13.0	9.0	5.93	7.20	.040	...
31	.470	.460	.552	.4948	53.7	60.8	51.9	56.63	— 6.08	.344	.312	.268	.298	.83	.58	.69	.65	N W b W	N W	W N W	N 68 W	2.5	14.6	3.0	9.21	9.60	.140	...
M	29.6091	29.5907	29.5997	29.5990	60.87	72.96	63.71	66.61	+ 0.85	.446	.483	.461	.463	.82	.59	.76	.70	.....	.....	.....	.....	4.05	9.18	4.40	.....	5.96	3.990	...

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR AUGUST, 1859.

Highest Barometer . . . . . 29.811 at 8 a. m. on 9th, } Monthly range=
Lowest Barometer . . . . . 29.306 at 6 a. m. on 4th, } 0.505 inches.

Self-registering Ther.
- Maximum temperature . . . 82°0 on p.m. of 7th } Monthly range=
- Minimum temperature . . . . 45°8 on a. m. of 30th } 36°4
- Mean maximum temperature . . 75°01 } Mean daily range = 15°63.
- Mean minimum temperature . . 59°38 }
- Greatest daily range . . . . . 24°7 from a. m. to p.m. on 30th.
- Least daily range . . . . . 5.2 from a. m. to p. m. on 23rd.

Warmest day . . 15th ... Mean Temperature . . . 72°90 } Difference=16°62.
Coldest day. . . . 29th ... Mean Tem[illegible]ture . . . 56°28 }

Maximum } Solar . . . . . 97°0 on p. m. of 11th } Monthly range=
Radiation } Terrestrial . . . . . 33.6 on a. m. of 30th } 63°4.

Aurora observed on 4 nights, viz.: 19th, 21st, 28th, and 29th; possible to see Aurora on 23 nights; impossible on 8 nights.
Raining on 11 days; depth, 3.990 inches; duration of fall, 39.9 hours.
Mean of cloudiness=0.40; most cloudy hour observed, 8 a. m., mean=0.48: least cloudy hour observed, 10 p. m., mean=0.32.

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

North.	South.	East.	West.
1886.14	915.37	1076.21	1794.02

Resultant direction, N 36° W; Resultant Velocity, 1.62 miles per hour.
Mean velocity of the wind 5.96 miles per hour.
Maximum velocity . . . 23.0 miles per hour, from 9 to 10 a.m. on 27th.
Most windy day . . . . . 28th—Mean velocity, 11.60 miles per hour.
Least windy day . . . . . 8th—Mean velocity, 2.69 do
Most windy hour, 1 to 2 p. m.—Mean velocity, 9.50 do } Difference
Least windy hour, 7 to 8 a.m.—Mean velocity, 3.85 do } 5.65 miles.

1st. Sheet Lightning round horizon in S. W. 11 p. m. to midnight.
2nd. Sheet Lightning from 8 to 9 p. m.
6th. Halo round the Sun at noon.
8th. Corona round the Moon, 10 p. m. to midnight.
11th. Thunderstorm and slight Rain, 4 to 5 p. m.
12th. Fog 6 to 8 a. m. Low scud passing rapidly from E.
15th. Distant Thunder and slight Rain, 4 to 5 p. m.
18th. Dense wetting Fog, 0.10 p.m. to 6 a.m. Corona round the moon at 0.20 a.m.
24th. Thunderstorm and heavy Rain, 0.15 to 0.45 p.m. Beautiful sunset.
26th. Sheet and Forked Lightning, 9 p. m. to midnight.
28th. Magnificent Auroral display from 7 p. m.
31st. Heavy gusts of Wind, Rain, and Hail during the forenoon.

The Resultant Direction and Velocity of the Wind for the month of August, from 1848 to 1859 inclusive, were respectively N. 59° W., and 0.82 miles.

The month of August, 1859, was warm, moist, and windy. The mean temperature having been 0°.5 above the average of 20 years. The depth of rain 1.063 inches on the surface greater than the average of 19 years, and the mean velocity of the wind 0.76 miles per hour in excess of the average of 12 years.

COMPARATIVE TABLE FOR AUGUST.

YEAR.	TEMPERATURE. Mean.	Difference from Average.	Maximum observed.	Minimum observed.	Range.	RAIN. No. of days.	Inches.	SNOW. No. of days.	Inches.	WIND. Resultant Direction.	Resultant Velocity.	Mean Velocity
	°	°	°	°	°					°		
1840	64.7	— 1.4	80.1	47.4	32.7	12	2.905	...	...	...	...	...
1841	64.4	— 1.7	83.5	46.7	36.8	9	6.170	...	...	...	...	0.19 lbs
1842	65.7	— 0.4	80.7	45.3	35.4	6	2.500	...	...	...	...	0.30 "
1843	66.4	+ 0.3	85.5	44.4	41.1	4	4.850	...	...	...	...	0.12 "
1844	64.3	— 1.8	82.5	44.3	38.2	17	imper	...	...	...	...	0.16 "
1845	67.9	+ 1.8	82.5	44.4	38.1	9	1.725	...	...	...	...	0.19 "
1846	68.4	+ 2.3	86.3	50.4	35.9	9	1.770	...	...	...	...	0.17 "
1847	65.1	— 1.0	83.1	44.9	38.2	10	2.140	...	...	...	...	0.19 "
1848	69.2	+ 3.1	87.5	49.3	38.2	8	0.855	...	...	S 21 E	0.98	4.55ms.
1849	66.3	+ 0.2	79.5	51.4	28.1	10	4.970	...	...	N 71 W	0.60	3.76 "
1850	66.8	+ 0.7	84.2	43.0	41.2	13	4.355	...	...	N 15 E	0.35	4.46 "
1851	63.6	— 2.5	79.8	43.6	36.2	10	1.360	...	...	N 63 W	0.40	4.63 "
1852	65.9	— 0.2	81.2	46.7	34.5	9	2.695	...	...	N 70 E	0.56	3.30 "
1853	68.6	+ 2.5	91.6	47.6	44.0	11	2.575	...	...	S 36 E	0.30	4.26 "
1854	68.0	+ 1.9	98.1	47.0	51.1	5	0.455	...	...	N 64 W	1.76	4.60 "
1855	64.1	— 2.0	82.1	44.9	37.2	7	1.455	...	...	N 63 W	1.04	6.97 "
1856	63.6	— 2.5	81.3	44.0	37.3	12	1.680	...	...	N 50 W	2.88	7.03 "
1857	65.3	— 0.8	85.3	50.1	35.2	13	5.265	...	...	N 77 W	1.51	6.36 "
1858	67.6	+ 1.5	83.4	45.4	38.0	11	3.890	...	...	N 69 W	1.57	6.50 "
1859	66.6	+ 0.5	81.4	46.2	35.2	11	3.990	...	...	N 36 W	1.62	5.96 "
Mean	66.12	...	83.98	46.35	37.63	9.8	2.927	...	...	...	...	5.20

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END OF VOL IV.

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