Technical and Bibliographic Notes / Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- [ ] Coloured covers/ Couverture de couleur
- [ ] Covers damaged/ Couverture endommagée
- [ ] Covers restored and/or laminated/ Couverture restaurée et/ou pelliculée
- [ ] Cover title missing/ Le titre de couverture manque
- [ ] Coloured maps/ Cartes géographiques en couleur
- [ ] Coloured ink (i.e. other than blue or black)/ Encre de couleur (i.e. autre que bleue ou noire)
- [ ] Coloured plates and/or illustrations/ Planches et/ou illustrations en couleur
- [x] Bound with other material/ Relié avec d'autres documents
- [x] Tight binding may cause shadows or distortion along interior margin/ La reliure serrée peut causer de l'ombre ou de la distorsion le long de la marge intérieure
- [ ] Blank leaves added during restoration may appear within the text. Whenever possible, these have been omitted from filming/ Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.

- [ ] Coloured pages/ Pages de couleur
- [ ] Pages damaged/ Pages endommagées
- [ ] Pages restored and/or laminated/ Pages restaurées et/ou pelliculées
- [x] Pages discoloured, stained or foxed/ Pages décolorées, tachetées ou piquées
- [ ] Pages detached/ Pages détachées
- [x] Showthrough/ Transparence
- [x] Quality of print varies/ Qualité inégale de l'impression
- [x] Continuous pagination/ Pagination continue
- [x] Includes index(es)/ Comprend un (des) index

Title on header taken from:/ Le titre de l'en-tête provient:

- [ ] Title page of issue/ Page de titre de la livraison
- [ ] Caption of issue/ Titre de départ de la livraison
- [ ] Masthead/ Générique (périodiques) de la livraison

- [ ] Additional comments:/ Commentaires supplémentaires:

This item is filmed at the reduction ratio checked below/
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X
						✓					

THE CANADIAN JOURNAL.

NEW SERIES.

No. VI.—NOVEMBER, 1856.

SUPERSTITIONS AND TRADITIONS OF THE ABORIGINES OF AUSTRALIA.

BY JAMES BROWNE, TORONTO.

In a former paper communicated to the Canadian Institute, the manners and customs of the Aborigines of the western coast of Australia have been sketched from personal observation.* I shall now endeavor to complete the picture of that singular phase of savage life which came under my own notice, while resident on the Australian continent, by depicting the psychological characteristics of the same degraded race, and narrating some of the most remarkable superstitions and traditional ideas, which a long residence among them brought to my knowledge. It has been often affirmed that there is no people so savage and ignorant as not to have some idea of a Supreme Being, or belief in a superior power, whom they worship in some form or character, and of whom they live in awe and dread. But if such is not the case with the natives of the western coast of Australia, and indeed of Australia generally, they so nearly approximate to it, that I believe it can be asserted without a doubt, that so far as religion, or any rudiment of divine worship is concerned, these savages are as ignorant as the beasts of the forest. From them no prayers ascend to propitiate good spirit or evil. They have neither temple nor idol,—neither object of worship, nor any semblance of religious rites.

* Vide: "The Aborigines of Australia," ante, p. 251.

Nevertheless, even the Australian savage manifests such vague traces of the rudiments of religious belief as are implied by a faith in some supernatural power. The aborigines occasionally refer to an imaginary evil-being, whom those I am describing call Jahnac, to whom they give credit for all sickness and misfortunes that may befal them, and whose principal occupation, they say, is to roam about the earth at night, watching to harm such stragglers as may unfortunately happen to fall in his way. Some of the valiant ones, indeed, will even boast of personal encounters and interviews with him; but what Jahnac is like, or what his powers are, none can distinctly tell. Even to those who boast of having encountered him Jahnac remains a mystery. Still they appear to have an indistinct idea of something that has the power of injuring them. Anything and everything accordingly, which frightens them, is Jahnac; but, however much they may dislike leaving their fires at night for fear of coming in contact with him, Jahnac is not worshipped by them, nor do they seek in any way to propitiate him, or manifest respect for him otherwise than what is implied by abject fear.

But although entertaining such vague and grovelling ideas of any spiritual power, and, properly speaking, destitute of all conception of a Supreme Being—these savages, nevertheless, labor under many strange delusions, tantamount, in some cases, to what might be called a religious belief. It generally follows that where the mind is not pre-occupied by any higher form of religious belief, it becomes the dupe of designing cunning and craftiness. This is strikingly exemplified in the Australian savage.

In the description of the different Tribes given in a former paper, it was mentioned that the Cockatoo-men, or a portion of that tribe, had acquired a strange and mysterious influence over their neighbors. I shall now endeavor to relate in what manner this influence is exercised, and the light in which its possessors are regarded, by those who do not belong to the exclusive circle.

The Cockatoo-men are believed to control the elements, and to direct the heavenly bodies; through Jahnac, their ally, they are supposed to have the power of inflicting disease and death upon whomsoever they will. The voice of the Cockatoo-man is heard in the thunder, and lightning is the bursting forth of his wrath, or the manifestation of his displeasure and approaching vengeance. No sooner does the vivid flash dart along the horizon, and the distant murmur of thunder fall upon the ear, than the native crouches within his wigwam, and cries:—"The Cockatoo-man speaks—he is sulky!" Should the husband, the wife, or the child, feel the pains of sickness,

again is the cry raised:—"The Cockatoo-man is sulky!"—and should death not follow, to him alone is the recovery due, for his wrath has passed away. In like manner, the Sun, Moon, and Stars, are all the handiwork of the Cockatoo-man. Night by night does he ascend from this, his terrestrial dwelling place, to hold a glorious banquet on the moon, whose phases are accounted for by these nocturnal expeditions and feasts. They are continued, according to native belief, until the whole is demolished, but one small piece, which is allowed to remain and again expand to its original dimensions, when the feasting is once more resumed.

All the individuals of this tribe are supposed to possess these attributes in a greater or less degree; but some few are endowed with powers of a still more extensive and controlling range than others, and they are therefore flattered and sought after by the surrounding tribes, upon all occasions of danger and great sickness. The gravity with which these medicine men go through their incantations, and the implicit faith in which those operated on appear to submit themselves to the tender mercies of the operator, is ludicrous in the extreme. The patient, in all probability, is suffering from internal pain, or is possibly in the last stage of exhaustion. Jahnac has been put into him by the Cockatoo-man—and the Cockatoo-man alone can get him out. He is therefore sought after, without reference to distance or trouble, and brought (sometimes many days journey) to administer relief to the afflicted.

The Cockatoo-man approaches, and, gravely gazing on the sick man, begins to probe with his knuckles, to find the exact spot where lies the pain. Having determined this, he commences to rub down or shampoo the body, from the part affected, towards one of the extremities, either the feet, the hands, the head, or the ears—his object being to force Jahnac out at one of these points. During the operation, he frequently blows upon his fingers with great solemnity, as if to disperse the infection of the evil one. Suddenly ceasing his rubbing and seizing the patient by the hair of his head, or back of the neck, he treats him to a most energetic shaking; and thus he proceeds, with alternate rubbing, and blowing and shaking, until Jahnac is forced out of the afflicted one, and appears in the hand of the operator, in the shape of a small piece of wood or quartz. The cure being thus satisfactorily performed, this bit of wood or stone is handed over to the individual from whom it was extracted, and by whom it is cherished ever afterwards as an object of peculiar value.

Such are the wonderful powers supposed to be possessed by these men, and, to those who believe all that they have credit for, innumer-

able are the miracles they perform. It is needless, however, to enlarge on the subject. I have related sufficient to prove the influence they have over the minds of the savages, their dupes. How they contrived to gain this influence appears extraordinary, as I am not aware that they possess one qualification superior to their neighbors;—but that they have gained it, and that they do their best to retain it, are equally true.

This is the extent of the influence of superstition on this people, and there I think it ceases; but here, also, must be noted a vague and partial idea which they appear to entertain of a state of being hereafter. I say partial, in as much as it applies but to one portion of the community, and that is to the young men, who, they say, upon taking their departure from this world, go to the moon, or to a place beyond it, where they remain in the midst of abundance of Kangaroos, upon which they have unlimited feasting, an idea conveying to the mind of an Australian a picture of the very essence of true felicity. But those dying old and infirm enjoy no such happiness;—on the earth, where they lived and died, there they remain, and conclude their career by furnishing a repast for the wild dog.

The traditions current amongst these people, like those of most other barbarous tribes, usually relate to some familiar object or event. Nevertheless, they generally contrive to confer on them an originality and marvellousness, not only amusing, but tending also in a great measure to enlighten us relative to the ideas and modes of thought of those from whom they are obtained. As specimens, let me relate one or two narrated to me by a native youth, as we lay around our bush fire; and in doing so, I shall endeavour to follow, as much as possible, the peculiar and simple language of my swarthy companion.

"The Kangaroo," said he "now jumps far—very far; he jumps too like the frog, but it was not always so. A very long time ago it was not all jump, jump, jump. No, he then walked all the day, and when the black man was hungry, he did not run after the Kangaroo, as he now does, for the whole day, but arose from his fire, and knocked him down with his Waddie, and so he ate plenty, and without trouble. One day a Frog came up out of the River to take a walk and look at the country, and away he went, jump, jump, jump, and then sat down and looked about him, again he started, jump, jump, jump, and once more sat down in the glare of the Sun. And so he went on jumping and resting until he found himself in the midst of the Kangaroos, who were crawling about eating the grass with their fore paws to the ground, and noses very low, and backs very high. The Frog laughed when he saw the

hind legs of the Kangaroo, so much like his own, so long and so strong, used in crawling along like a miserable Opossum or Bandicoot, and he thought the Kangaroos very lazy and very foolish, and so he commenced to talk with them, and demanded why they did not jump with their long legs as he did. The Kangaroos replied that they knew but of one way of using their legs, and that way was as he then saw them doing. The Frog said: No, long legs are made for jumping, try and do as I do; and off he started jump, jump, jump, and jump also went the Kangaroos, then jump, jump, jump, the first jump awkward, but improving as they leapt, until at last away they bounded altogether, Frog and Kangaroos, and the Kangaroo was glad when he jumped away from the Black man; but the Black man said it was no good, and he was sulky with the Frog."

It is the Frog accordingly that the Kangaroo has to thank for the first idea of that system of locomotion which he now employs, and it is the Frog too, according to the same native belief, that the Australian has to blame for having to exert those same powers in order to supply himself with food.

The following was the purport of the native youth's account of the manner in which fire was diffused over the land, although the language may differ somewhat from his narrative.

A long long time ago, a little Bandicoot, (a small and sharp nosed animal, not unlike our Guinea Pig,) was the sole owner of a fire-brand, which he cherished with the greatest jealousy, carrying it about with him wherever he went, and never once laying it aside or allowing it out of his own special care; so selfish was he in the use of his prize, that he obstinately refused to share it with the other animals, his neighbors; and so they held a general council, where it was decided that the fire must be obtained from the Bandicoot either by force or strategy. A Hawk and a Pigeon were deputed to carry out this resolution, who, having formed their plan, awaited their opportunity to accomplish it.

This Bandicoot lived on the banks of a small stream where he amused himself during the sunny hours of the day in walking and frisking about. It was on one of these occasions that the Hawk and Pigeon ventured to try their chance, and thus went about their work. The Pigeon strolled down the bank of the river where the Bandicoot was walking; the Hawk, at the same time, kept flying about in their vicinity. Coming up with the Bandicoot, the Pigeon entered into conversation with him, and asked him for a portion of the fire he carried with him. The Bandicoot as usual refused his request. The Pigeon then asked him why he continued so selfish as not to divide

his fire with his neighbors. The Bandicoot replied that the fire was his alone, by right, and therefore it was his intention to maintain his claim, and to keep it to himself. The two continued to wrangle, when suddenly the Pigeon, seizing, as he thought, an unguarded moment, made a dash to obtain the prize. The Bandicoot quickly saw that affairs had come to a crisis, and, in desperation, determined to set matters at rest effectually; he therefore threw the fire towards the water, there to quench it for ever. But fortunately for the Black man, the sharp eyed Hawk was hovering near the river, carefully watching the whole transaction, and seeing the fire falling into the water, he made a dart towards it, and with a stroke of his wing, knocked the brand far over the stream into the long dry grass of the opposite bank, which immediately ignited and the flames spread over the face of the country. The Black man then felt the fire and said it was good.

I shall conclude this sketch by mentioning a species of trial by ordeal,—a singular and by no means impartial method of testing suspected guilt. Occasions for its exercise are not rare.

One of the tribe, for instance, is found dead; having fallen by the hands of violence, suspicion falls upon some member of the tribe and he is called upon to prove his innocence; he proceeds therefore to kill a kangaroo. Having cooked a portion of this, he gives it to the nearest relative, or adopted brother of the murdered man to eat. If this meat goes down the individual's throat smoothly and without obstruction, and no ill effects follow, it is proof that the suspicion is unfounded, and the accused is accordingly looked upon as guiltless. But if on the contrary the meat stick in the throat of the judge, or afterward cause pain or any disagreeable sensations in the stomach, it is proof positive of the guilt of the party suspected, and he has to answer for the deed. It may be seen at a glance that this is a one-sided proceeding, as the result will, in many cases, to a considerble extent, depend upon the feelings and good will of the party most interested, the accuser: who, in giving his decision, can of course please himself whether or not he allow the meat to stick in his throat on its way down, or can as easily exhibit subsequent symptoms of pain or convulsions, should such be necessary.

I have thus endeavoured to give some idea of the Australian savage in his wild state. Had I been of a more mature age when thrown amongst the natives of Western Australia there is little doubt but that much interesting information could have been added in illustration of the subject I have attempted to elucidate. Before concluding, however, I may be permitted to answer the question frequently put

to me: "Whether the condition of the Australian has been improved by his intercourse with the White man?" The question admits of no doubt or hesitation in framing a reply; and I regret to say it must be answered in the negative. It is a strange fact, but one no less painful than true, that, wherever the white man plants his foot, the native of the soil gradually disappears. Unable to withstand temptation, he acquires the vices without partaking of the benefits of civilization. To this may be further added the fruits of his own natural spirit of treachery and revenge; which unhappily neither the civilization nor the Christianity of the white man has affected in any perceptible degree. Incapable of adapting himself to the changes which agriculture, and a numerous settled population, effect on a wild country, his former means of subsistence disappears, and that which has displaced it lies entirely beyond his reach. Disease and want accordingly work their will on the miserable savage, and his extinction is speedy and inevitable.

The Australian above all others is specially exposed to these evils, and the last of his race must soon be numbered with the things that were. Already every vestige of the native population of Tasmania has vanished from that beautiful island, although within so recent a period as my visit to it, the Tasmanian was still to be seen living on his native soil. The various tribes on the coasts of Australia are fast following in his wake, and most of those who form the subject of this paper, have, I believe, by this time passed away from that strange world of the Southern Ocean, which is now so rapidly filling with a new and hardy population of industrious settlers, derived—it may almost be said without figure of speech—from every nation under heaven; but controlled and guided in the progress of civilization by the hardy, practical Anglo-Saxon race.

DISCOVERY OF INDIAN REMAINS, COUNTY NORFOLK, CANADA WEST.

BY DANIEL WILSON, LL.D.
PROFESSOR OF HISTORY AND ENGLISH LITERATURE, UNIVERSITY COLLEGE, TORONTO.

During the progress of agricultural operations in the course of last autumn, Mr. James W. Wilson, a farmer resident on the third lot, thirteenth concession, in the township of Windham, County Norfolk, ploughed up a skeleton, along with Indian relics, some of the characteristics of which are peculiar, and calculated to confer a special in-

terest on the discoveries. The remains were met with accidentally when ploughing above the decayed roots of a large pine stump; and unfortunately the skull—which escaped the edge of the ploughshare and was perfect when found,—was carelessly handled, and broken into fragments. Having visited that district during the summer, some researches then made by me with a view to the discovery of traces of Indian occupation, had suggested the likelihood of such remains being regarded by me with interest. Accordingly the greater number of pieces of the fractured skull, along with various portions of the principal bones of the skeleton, and the accompanying relics, were forwarded to me through the kind intervention of my friend Dr. Covernton, of Simcoe, and I have succeeded in putting the pieces of the skull together, so as to present it in a restored form, complete, with the exception of part of the occipital bone.

The first impression formed from a view of this skull, and the seemingly disproportionate delicacy of such portions of the skeleton as accompanied it, was that it was part of a female dwarf, of the old Indian race; and this tended to give additional interest to any details in reference to its discovery. The skull is delicately formed, the cerebral developement, especially in the frontal region, unusually large; and while the jaws are prognathous, the malar bones and the zygomata are comparatively small and slender in their proportions, very markedly so indeed for one of Indian birth, and the under jaw is of light and delicate structure. In the superior maxillaries the dentes sapientiæ are fully formed, though not come down, and the frontal consists of a single bone, without the slightest trace of any suture being apparent. The entire cranium, apart from the bones of the face, presents a striking contrast in the largeness of its cerebral developement, and its symmetrical proportions, to another Indian female skull in my possession, obtained from an ancient cemetery on the Oak Ridges, County of York, and evidently that of a full grown adult. While such are the characteristics of the skull, the bones of the skeleton are small, slight, and delicate in structure. These various appearances seemed to corroborate the first convictions of the abnormal character of the skeleton, and to suggest the idea already referred to, of its possibly being that of an Indian dwarf, though more careful observations have not tended to confirm this supposition.

In addition to the bones of the skull, the various portions of the skeleton forwarded to me included those of the upper and lower extremities, along with the principal parts of the pelvis, and these I submitted to Dr. E. M. Hodder, who kindly permitted me to avail myself of his well-known skill and experience. The conclusion

arrived at from his observations on them, he thus communicates to me: "I have carefully examined, measured, and compared, the several portions of the pelvis. The result of this has impressed me with the belief that the bones belonged to a female child of small size, but not of dwarfish stature, and who had not yet reached the period of puberty.

In the pelvis the union of the illium, ischium, and pubis,—which at the approach of puberty become firmly united or ankylosed together, —had not commenced. In the measurements which I have been able to make of the fragments,—due allowance being made for the attrition of their processes and fractured surfaces,—there is not that marked and striking difference which would exist had they belonged to a dwarf, neither is there any trace of deformity in the bones of the body: a result generally met with in persons of that description. I am therefore led to the conclusion, not only from the examination of the bones of the pelvis, but from the attenuated appearance of the long bones which you have in your possession, that they belonged to a child not exceeding eleven or twelve years of age, who was of a scrofulous constitution, and who died of some lingering disease, most probably consumption."

The skeleton to which these remarks refer was turned up in a hollow, on ground which has been many years cleared, and under the roots of a pine tree of the very largest size, the pine stump had been long removed, and only some of the lateral roots remained, so that the interment belongs to a period anterior to the commencement of the Anglo-Saxon settlements on the shores of Lake Erie. The body lay east and west, under the main root of the pine tree, and along with the skeleton there had been deposited rude clay pottery, a round ball of gypsum, a bone bodkin, and a stone gouge or chisel. The pottery is of the usual description, of rude burnt clay, decorated with incised lines, crossing one another with sufficient regularity to form ornamental patterns round the border; and one fragment is perforated, indicating a vessel designed for suspension; but the pieces forwarded to me are too small and imperfect to show more than that they have belonged to more than one vessel. It is unfortunate that this sepulchral deposit,—evidently presenting some features of peculiar interest, —should have been brought to light by the rude ploughshare, which here, as elsewhere, generally defaces and destroys more than it reveals. From the different character of the fragments of pottery, there would appear to have been, at least, three vessels in the grave, one of them considerably thicker, and probably larger than the others. The broken fragment of a large thin flat stone, ground to a sharp edge, was also found, and the whole contents of the grave appear to have indicated

the traces of Indian sepulchral rites employed under special circumstances, and practised with peculiar care. The discovery of the skeleton, as in various other cases, lying directly under the roots of a large tree, naturally suggests the idea that the latter is altogether of subsequent origin and growth, and hence that its size and age supply some evidence tending to fix the period to which the inhumation may be assigned. It may be, however, that in some cases the grave was hollowed out beneath the roots of a full grown tree, which, would serve alike as a protection to the sacred remains deposited beneath, and also as a monumental grave-post, on which might be painted the inverted symbols, that told of the departed. If such should prove to have been a practice of Indian sepulture, it will suggest additional caution as to the inferences to be drawn from the size and supposed age of the trees found over such graves; but there can, under no circumstances, be any doubt as to the one now in question belonging to a period anterior to the settlement of the Norfolk district by the white man. Indeed, Mr. Paul Kane informs me that he has never seen any pottery resembling the specimens found in this grave, in use among any of the tribes of the North West, although fragments of such are of frequent occurrence in the district, and must once have formed a common object of native manufacture there.

In the Canadian Journal for October, 1855, * special directions were given with a view to the formation of a Collection of Ancient Crania, illustrative of Canadian Ethnology, and some of these may be recalled with advantage, in the hope of securing a more careful attention to the preservation of such relics as those above described. Collections of this nature are exciting the highest interest among men of science both in Europe and America. A section of the British Association for the Advancement of Science is devoted to this special department, in connection with Geographical discovery, and recent exploring expeditions have had their attention particularly directed to the same subject.

When the importance of such evidences of the physical characteristics both of extinct and living races, in relation to historical investigation, as sepulchral remains disclose, is thus becoming so widely appreciated, it appears to be desirable that Canada should not lose the opportunity of contributing her share to the elucidation of ethnological science, afforded by her numerous public works, as well as by the rapid progress in the clearing and settling of wild land. Such a collection of native crania as that with which Dr. Morton has en-

* Canadian Journal, Old Series, Vol. iii. p. 345.

riched the Cabinet of the Academy of Sciences of Philadelphia would form a valuable addition to the museum of the Canadian Institute, and many facilities exist for its attainment. Every year agricultural operations are extending into new districts, and breaking up virgin soil. In the progress of clearing the ancient forests, and bringing the land into cultivation, places of sepulture must frequently be invaded, where the remains of the long-buried chief lie undisturbed, alongside of specimens of the rude arts which furnish proofs of the condition of society to which he belonged. Railway and other operations are like manner leading to extensive excavations in regions hitherto u··touched by the spade or plough; and these also frequently expose to view similar relics of the ancient or more recently displaced aborigines; though it is just cause of regret that they have hitherto, in so very few cases, been rescued from destruction. When, however, we remember the apathy with which many educated men have witnessed, and even countenanced the destruction of interesting memorials of the past, in the old world, it is scarcely to be hoped that the rude railway navy, or the first agricultural explorers of the wild lands of the North and West, will greatly interest themselves in objects of scientific curiosity; but now that the members of the Canadian Institute are scattered over nearly every district of the Province, it may be hoped they will be found prepared for hearty co-operation in the accumulation of facts, and in the preservation of the material evidences whereby the ancient history of this continent and its people may be elucidated.

In many cases the condition in which the skulls and other remains of the former occupants of our Canadian clearings are found, is such as to present no obstacle to their preservation. It is to be noted, however, that the more ancient such remains are, the greater is the interest and value they are likely to possess. No indications have yet been noticed of a race in Canada corresponding to the Brachycephalic or square-headed mound-builders of the Mississippi, although such an approximation to that type undoubtedly prevails throughout this continent as, to a considerable extent, to bear out the conclusions of Dr. Morton, that a conformity of organisation is obvious in the osteological structure of the whole American population, extending from the southern Fuegians, to the Indians skirting the Arctic Esquimaux. But such an approximation—and it is unquestionably no more—still leaves open many important questions relative to the area and race of the ancient mound-builders. On our northern shores of the great chain of lakes, crania of the more recent brachycephalic type have unquestionably been repeatedly found in comparatively modern native graves. Such however are the exception, and not the rule. The pre-

vailing type, so far as my present experience extends, presents a very marked predominance of the longitudinal over the parietal and vertical diameter; while, even in the exceptional cases, the brachycephalic characteristics fall far short of those so markedly distinguishing the ancient crania, the distinctive features of which some observers have affirmed them to exhibit. In point of archæological evidence of ancient occupation, moreover, our northern sepulchral disclosures have hitherto revealed little that is calculated to add to our definite knowledge of the past, although the traces of ancient metallurgic arts suggest the probability of such evidence being found. The discovery of distinct proofs of the ancient extension of the race of the mound-builders into these northern and eastern regions, would furnish an addition of no slight importance to our materials for the primeval history of the Great Lake districts embracing Canada West.

Such ancient osteological remains, of whatever type, are likely to be in a very fragile state, and will require much care in their removal. As it is not to be doubted that some are to be found among the members of the Institute, to whom investigations of this nature will present a just object of careful and persevering research, it may not be useless to add a few hints for collecting and preserving such ancient remains. It is not to be overlooked that, to those who have made such the subject of special study, the entire skeleton frequently possesses features of interest and value, as evidence of peculiar distinctions of race, or as traces of habits and conditions of life. It is manifestly, however, only under very rare and peculiar circumstances, as in that of the Norfolk County Grave described above, that it can be expedient to attempt the preservation of the whole of the skeleton; but as the determination of the sex has a very marked bearing on the relative form and proportions of the skull, the pelvis may be considered as, next to it, the most important part to be secured or specially observed.

In reference to crania, it must be borne in remembrance that it is desirable to possess the whole of the bones of the head and face, including the lower jaw and the teeth. The slender and fragile bones of the nose are of special importance, and when remaining in their place should be carefully protected from injury. In all cases they are highly characteristic, and in none more so than in the races of American Indians, whose strongly marked profiles derive much of their character from the prominence and peculiar form of the nose. It is also to be observed in the case of remains found under circumstances indicative of great antiquity, and consequently possessing peculiar value for the purpose which the Ethnologist has in view, that though the bones may be wholly disjointed and even fractured, if the whole,

or the greater number of the fragments be collected, and carefully packed so as to protect them from further injury, it may be quite possible to rejoin them, and so reconstruct the cranium, or such other portions as may be desired.

When ancient barrows, grave-mounds, or other sepulchral depositories, are explored with the express purpose of adding to archæological or ethnological data, the zeal of the investigator is likely to suggest due care in prosecuting the research; but in Canada it is to be presumed that, in the great majority of cases, such remains will be discovered by chance, and their preservation from further injury in the hands of their original exhumers will be more a matter of accident than design. By and by, however, we may hope to create an intelligent interest in this department of scientific inquiry, and so find zealous explorers of the sepulchral chronicles of Canada, as well as of those of Egypt, Britain, or Central America. To such, the following additional hints, derived from practical experience, may be of some value.

In exploring any locality in search of such memorials of the past, whether it be a grave-mound, ossuary, or cemetery, that is uncovered, —the ruder instruments of excavation, such as the pick-axe and spade, should be laid aside as soon as any portion of a skull or skeleton has been exposed. The whole must then be cleared from the surrounding earth by means of some light implement, such as a garden trowel, with the assistance of the hand. In removing the earth, strict attention should be paid to any small objects contained in it: as the practice of the Indians of this continent, as well as of most other savage races, of burying weapons, implements, personal ornaments, and relics of various kinds, with the dead, is well known. And here the distinctions of sex, above referred to, become of special interest, so that it is of great importance to avoid mixing the contents of two or more graves, before the peculiarities of each are noted. With the male skeleton will generally be found the weapons of war and the chase, and the peculiar decorations of the warrior or the priest, while that of the female is accompanied with domestic implements, personal ornaments, and other relics, properly pertaining to her sex.

Numerous personal ornaments, however, which closely correspond to those used in civilized life as parts of female decoration, are reserved by the savage exclusively for his own personal adornment; and hence, an additional reason for carefully apportioning to each skeleton its accompanying relics.

In order to avoid injuring the most essential parts of the skel-

eton, it is advisable for the explorer, where he can do it, without great inconvenience, to pursue the final process of laying it bare, by proceeding from the feet towards the head. No parts of an ancient uncoffined skeleton are so difficult to recover perfect and complete as the bones of the hands and feet; but these are frequently portions of considerable moment. The small size of the hands has been noted by Mr. Stephens as characteristic of the ancient temple builders of Yucatan, and the same feature has been observed in reference both to the hands and the feet, in various primitive races. In seeking to exhume these, as well as the larger bones, they ought not to be moved from the inclosing soil when they indicate the slightest fragility, until the earth has been cautiously removed all round them so as to admit of their being lifted out. Where the skull has been fractured, or any of the bones of the face are displaced by the pressure of the earth, every fragment should be carefully collected; and if the soil has been damp, or the bones are rendered soft by moisture, they should be exposed to the sun, before being wrapped up in paper.

Care must also be taken to note all the circumstances attendant on the discovery, which are likely to throw any light on the characteristics of the race, their mode of sepulture, their arts, or customs; due discrimination being made between the contents of the different sepulchral deposits, when more than one has been explored. Nothing should be trusted to memory, but all the facts noted at the moment and on the spot. Some of the most important facts to be observed are: the position of the body: whether lying at full length, on the back or side, or with the knees bent or drawn up; also, the direction of the body, and the position of the head in relation to the points of the compass.

The nature and relative position of any relics, such as urns, implements, weapons, &c., should next be carefully noted; and among such, particular attention is to be paid to animal remains, such as the bones and skulls, horns or teeth, of beasts, birds, and fishes, and marine or fresh-water shells. It is a common fashion among savage tribes to hold a burial feast over the grave of the dead, and such relics may tend to throw considerable light on the habits of the people, as well as on the period to which they belong.

In transmitting ancient skulls, they should be first wrapped up in paper—an old newspaper will be found the most suitable for the purpose. Where there are detached pieces, each should be put in a separate wrapper. The whole may then be placed in a box with hay, which furnishes an inclosure sufficiently elastic to protect the most fragile bones from injury during carriage.

With these and all other ancient relics, the object of the intelligent collector is not the mere gratification of an aimless curiosity, or the accumulation of rarities of difficult acquisition, but the preservation of objects calculated to furnish valuable scientific or historical truths. As, however, such remains lose much of their value when the locality and circumstances of their discovery are unknown, it is extremely desirable not only to attach to each skull, package of bones, or accompanying relics, the name and description of the locality where they have been found, but also as soon as possible to mark this neatly and indelibly upon the object itself. Where more than one skull has been procured, and any of them are in a fragmentary state, it is scarcely necessary to add that the utmost care should be taken to keep the several portions of each skull distinct from the others; as even where it may be possible afterwards to separate them, this must always be attended with much additional labor, and generally with some uncertainty. In most cases the greater number of the teeth, if not already loose, will be apt to fall out so soon as the skull becomes dry; it is therefore extremely desirable to prevent those belonging to different skulls from becoming mixed. If this is attended to, there can be no difficulty in correctly replacing them. When perfect they add considerably to the value of such remains, as indications of the physiognomical characteristics of the race to which they pertain, while their condition supplies evidence of the nature of the food, and the consequent habits and degree of civilization of the race. Finally, however, it may be added that even very imperfect osseous fragments, and relics of an apparently trivial character, are frequently well worthy of preservation; and many valuable and interesting deductions may be based, by the intelligent scientific observer, on what would appear to others insignificant trifles, or even, perhaps, a mere handful of rubbish.

AN EXAMINATION OF LEGENDRE'S PROOF OF THE PROPERTIES OF PARALLEL LINES.

BY THE REV. GEORGE PAXTON YOUNG, M. A.,
PROFESSOR OF LOGIC AND METAPHYSICS, KNOX'S COLLEGE, TORONTO.

In order to establish the properties of parallel straight lines, Euclid assumed it as an Axiom, that "if a straight line meet two other "straight lines, so as to make the interior angles on the same side of "it less than two right angles, these straight lines, being continually

"produced, will at length meet on the side on which the angles are, "that are less than two right angles." As this so-called Axiom is far indeed from being self-evident, many attempts have been made by geometricians, both ancient and modern, to demonstrate the properties of parallel lines without its aid. Playfair, in his edition of Euclid's Elements, discusses the principal of these; distinctly shewing the unsatisfactory character of them all, except that of Legendre, which he pronounces "strictly demonstrative." It may be proper to mention, that Legendre has treated the subject of parallel lines in two different ways, one in the text of his "Elements of Geometry," and the other in the notes to that work. Playfair considers the former method "quite logical and conclusive," as well as the latter: only objecting to it, that it is "long and indirect," and too "subtle" for "those who are only beginning to study the Mathematics." But, as the admission of Legendre himself is on record, that this method is *not* conclusive; as it is, in fact, palpably the reverse—taking for granted what requires proof, as much as Euclid's Axiom does; no further attention need be given to it. In the present paper, I am to speak only of the proof advanced by Legendre in the Notes to his Geometry. This proof was keenly assailed by Sir John Leslie; whose strictures, which proceeded upon an entire misapprehension of Legendre's meaning, were refuted by Playfair in an article that appeared in the Edinburgh Review for July, 1812. Since that time, the validity of Legendre's reasoning seems to have been admitted by the general consent of mathematicians. Having been recently led, however, to examine the subject, I feel myself unable to concur in this verdict; and I venture to bring my objections under the notice of the Institute: which I do, not merely because the point in dispute is one of considerable interest in itself, but also, and more especially, because its settlement has an important connection with what may be called the philosophy of Mathematics—that is, with the question as to the principles on which Mathematical reasoning proceeds.

Legendre endeavours to make it appear, without the assistance of any special Axiom, that C, the third angle of a triangle ABC, is determined from the other two, A and B, independently of the magnitude of c, the intervening side. If this be made out, all the properties of parallel lines can easily be deduced. The difficulty is, to demonstrate the fundamental position: but here it may be well to quote Legendre's own words. "Soit l'angle droit égal à l'unité, alors les angles A,B,C seront des nombres compris entre 0 et 2; et puisque $C = \phi(A,B,c,)$ je dis que la ligne c ne doit point entrer dans la fonction ϕ. En effet, on a vu que C doit être entierement determiné

par les seules données A,B,c, sans autre angle ou ligne quelconque, mais la ligne c est heterogene avec les nombres A,B,C; et si on avait une equation quelconque entre A,B,C et c, on en pourrait tirer la valeur de c en A,B,C, d'où il resulteroit que c est egale à un nombre, ce qui est absurde. Donc c ne peut entrer dans la valeur de C, et on a simplement $C = \phi(A,B.)$" Leslie committed the unaccountable mistake of supposing the argument here stated, to be, that "that the line c is of a nature heterogeneous to the angles A and B, and therefore cannot be compounded with these quantities"—whereas the argument plainly is, that c, which is a line, cannot be expressed in terms solely of A, B, and C, which are numbers. "The quantities A, B, C," says Playfair, in his exposition of Legendre's reasoning, "are angles; they are of the same nature with numbers, or mere expressions of ratio, and, according to the language of Algebra, are of no dimension. The quantity c, on the other hand, is the base of a triangle, that is to say, a straight line, or a quantity of one dimension. Of the four quantities, therefore, A, B, C, c, the first three are of no dimensions, and the fourth or last is of one dimension. No equation therefore can exist, involving all these four quantities and them only: for if there did, a value of c might be found in terms of A, B, and C; and c would therefore be equal to a quantity of no dimensions: which is impossible."

In this reasoning it is assumed, that, because C is *determined by* A,B,c, therefore C can be *expressed in terms of* A,B,c. Now Legendre does not prove that when a quantity is determined by certain others, it can be expressed in terms of them; and I affirm that *such a principle, without limitation, is not true.*

For example, consider the angle C of the triangle A B C. And let it be observed that I mean the angle itself, that is, the inclination of a and b to one another, and not the numerical value of the angle, calculated upon the supposition that a right angle, or any other angle, has been assumed as a unit of measure. The angle C is *determined by* the sides a,b,c; yet it cannot be expressed in terms of these quantities alone; because *the value of an angle can only be indicated by pointing out its relation to some other angle or angles*; and therefore cannot be expressed by means simply of lines. It is true that *the numerical value* of C may be expressed in terms of a,b, and c: viz, in an equation where only the ratios of a,b, and c occur, the ratios being numbers. Thus, if $b = \beta a$, and $c = \gamma a$, we might have

$$\text{numerical value of } C = f(\beta,\gamma.)$$

But this is altogether a different thing from saying that *C itself*, the angle properly so called, the inclination of a and b to one another,

can be expressed in terms of a,b, and c. Now if C itself (not its numerical value, but the absolute angle) is determined by a,b, and c; and if, nevertheless, it cannot in the nature of things be expressed in terms of a,b, and c; Legendre's demonstration, the very foundation of which is, that a quantity which is determined by certain others, can be expressed in terms of them, must be pronounced erroneous.

Should it be maintained that C (the angle itself) may be expressed in terms of the numbers β and γ, *a right angle being understood to be the unit of measure*; or more fully, thus:

$$C = \text{right angle} \times f(\beta,\gamma);$$

I reply that in the same manner the line c, in Legendre's reasoning, may be expressed in terms of A,B,C, *some line L being understood to be the unit of linear measure*; thus:

$$c = L \times f(A,B,C.)$$

I am inclined to believe, from metaphysical considerations, that it is impossible to demonstrate the properties of parallel lines without a special axiom. As it would be difficult, however, to bring out the grounds of this belief without entering into a somewhat lengthened discussion of the nature of our conceptions of geometrical magnitudes, I content myself in the meantime with the above remarks on Legendre's treatment of the subject. Had the reasoning of that distinguished mathematician been valid, it would have been a standing and conclusive refutation of any theory of our conceptions of geometrical magnitudes, in which the impossibility of proving the properties of parallel straight lines without a special axiom was involved. But as Legendre's demonstration, like all others in which the same thing has been attempted, has been shewn to be erroneous, the ground is clear; and a theory of our geometrical conceptions, such as has been referred to, is at least not exposed to the ready-made fatal objection that it is at variance with unquestioned fact.

REVIEWS.

Narrative of the Expedition of an American Squadron to the Chinese Seas and Japan, performed in the years 1852, 1853, *and* 1854, *under the command of Commodore M. C. Perry, U. S. Navy, by order of the Government of the United States. Compiled from the original notes and Journals of Commodore Perry and his Officers, at his request and under his supervision.* By Francis L. Hawks, D.D., LL.D. Washington: A. O. P. Nicholas, Printer, 1856.

When Columbus set sail, in 1492, on his memorable voyage of discovery, he was specially stimulated and encouraged in his venturous expedition by the conviction that the Asiatic continent stretched away so far eastward from Europe into the unexplored ocean, that it could be most easily reached by sailing westward, and so, as it were, meeting it on the way. The special points, accordingly, towards which the great discoverer of this New World aimed were Cathay and the Island of Cipango: in other words, China and Japan. It is needless to say that an authentic knowledge of these countries is of an older date than the recent expeditions of England and the United States: known as they have undoubtedly been, by means of the narratives and travellers' tales of such old authors as Marco Polo, the Venetian, our English Mandeville, and Mendez Pinto. With the last of these travelled for a time the catholic Xavier; though such good company has not saved that gasconading Portuguese from the title of "Prince of liars!" Nevertheless, the narrative compiled by Dr. Hawks from the intelligent notes and observations of the American officers, lifts the veil from scenes hitherto altogether hid from European or American eyes. Dutch, English, Russian, and American adventurers have attempted to penetrate the mystery by turns; but at best, it has been but a mariner's glimpse we have had of the "Golden Zipango" of Marco Polo. Nor does even this American expedition reveal to us greatly more than the all-important fact that the gates have at length been opened, and that this strange scene of an old civilization, in some respects more remarkable than even that of China, is about to disclose all its quaint and picturesque inner life to the outer barbarian world.

Europeans have learned to look without surprise, on the evidences of a civilization far older than their own, which China can boast of; on gun-powder, the compass, with its magnetic needle, wood-engraving, and above all, the printing press, only re-discovered for Europe, if not derived from the older use in Cathay. But in the Japanese we see an eastern people, not only similarly gifted, and working out a

civilization which was in advance of that of Europe in the fourteenth century, but who exhibit little of that dread of innovation which has so singularly arrested the development of the national intellect of China. The American Commodore found he had to deal with a government, shrewd, intelligent, firm of purpose, and far-seeing in its policy; while the acquirements in mathematics, geography, and languages, and the general knowledge of the sciences, were such as would discredit no European Court. It became manifest moreover, in the course of his intercourse with this interesting people, that they too have their conservative and liberal parties in the State: the sticklers for precedent and routine, who adhere to the "good old ways," and devoutly protest against all innovation; and the advocates for progress who, in replying to the President's letter, protest against a bigoted adherence to ancient laws as unworthy of *the spirit of the age*. In effecting satisfactory arrangements with the Japanese Government, accordingly, great tact and skilful diplomacy were found absolutely requisite. "Not an article of the treaty was made but upon the most serious deliberation by the Japanese.....probably nothing but the exercise of the most perfect truthfulness and patience, would ever have succeeded in making with them a treaty at all." How far the official explanations, processions, and formal state ceremonial and parade, in which the Commodore deemed it politic to indulge, precisely merit so superlative a designation as that of "the most perfect truthfulness," may surely admit of question. When, for example, we read of his reply to the inquiries of the Japanese Commissioners relative to the number of his proposed official retinue, that "It is the custom of the United States, when an officer of high rank bears a communication from the President to the Sovereign of another country, for him to go with such an attendance as is respectful to the power to which he is sent:" it is difficult to avoid some remembrance of republican state-official battles with European Court lackeys, on the all important questions of regulation small-clothes, yellow waistcoats, and round hats! Here is the manner in which the same republican simplicity manifested itself when it was desirable to produce a "moral influence" on an Asiatic Court:

"The marines led the way, and the sailors following, the Commodore was duly escorted up the beach. The United States flag and the broad pennant were borne by two athletic seamen, who had been selected from the crews of the squadron on account of their stalwart proportions. Two boys, dressed for the ceremony, preceded the Commodore, bearing in an envelope of scarlet cloth the boxes which contained his credentials and the President's letter. These documents, of folio size, were beautifully written, on vellum, and not folded, but bound in blue silk velvet. Each seal, attached by cords of interwoven gold and silk with

pendant gold tassels, was encased in a circular box six inches in diameter and three in depth, wrought of pure gold. Each of the documents, together with its seal, was placed in a box of rosewood about a foot long, with lock, hinges, and mountings, all of gold. On either side of the Commodore marched a tall, well formed negro, who, armed to the teeth, acted as his personal guard. These blacks, selected for the occasion, were two of the best looking fellows of their color that the squadron could furnish!"

It is much to be regretted that the narrative of the American Expedition to Japan could not have been prepared for us by the pen of the distinguished officer under whose able guidance it was brought to a successful termination. Whatever advantages may spring from the well-known learning and special acquirements of the editor, his work certainly lacks the freshness and vigor of personal narrative, and in the hands of the gallant Commodore, it may be presumed we should have escaped exhibitions of such questionable taste as the eulogies and laudations of the United States and its officers, here "compiled from the original notes and Journals of Commodore Perry and his officers, at his request and under his supervision," and "published by order of the Congress of the United States." This is the more to be regretted as it was so totally uncalled for in a narrative really creditable to the nation, and got up in the same liberal style as other works recently issued from the government press at Washington. At the same time it is only justice to the compiler to quote the statement in his preface, that "every word of the work was read to the Commodore in MS, and received his correction before it went into the printer's hands; every proof-sheet also was read by him before it was sent back to the press."

The illustrations are numerous, and, though in the case of the wood-cuts, careless and defective printing materialy detracts from their effect, many of them are curious and characteristic. This is specially the case with the colored fac similes of native drawings, which exhibit not only great freedom of outline, but also quaint touches of humor,—as in the "Crossing the Oho-e-ga-wa river,"—and strikingly contrast with the more familiar specimens of Chinese art.

One of the examples of Japanese illustrative art described in the "Narrative" is a Child's Book, purchased in Hakodadi for a few Chinese copper "cash." After commenting on the knowledge of perspective, and other proofs of advancement in art which its illustrations display, its contents are thus further described:

"On another page there is what appears to be some Tartar Hercules, or Japanese St. Patrick, clearing the land of reptiles and vermin, and the doughty destroyer is brandishing his sword in most valiant style. This is drawn with a freedom and humorous sense of the grotesque and ludicrous, that are rarely found

in similar books prepared for the amusement of children with us. In one of the illustrations there is a quaint old shopman peering through a pair of spectacles stuck upon his nose, and made precisely like the double-eyed glasses just now so fashionable. A glass globe of gold fish, which have awakened the hungry instincts of a cat that wistfully watches their movements in the water, is among the pictures. A couple of chairmen, who have put down their sedan to take their rest, are engaged lighting their pipes; and a professor, seemingly of Phrenology, is standing amid the paraphernalia of his art, whatever it be, and is taking the measure with a pair of compasses of a bald-headed disciple. All these scenes occur among the illustrations of this little book. All show a humorous conception, and a style of treatment far in advance of the mechanical trash which sometimes composes the nursery books found in our shops. A people have made some progress worth studying who have a sense of the humorous, can picture the ludicrous, and good naturedly laugh at a clever caricature.....

There were no printing establishments to be seen either at Simoda or Hakodadi, but books were found in the shops. These were generally cheap works of elementary character, or popular story books or novels, and were evidently in great demand, as the people are universally taught to read, and are eager for information. Education is diffused throughout the Empire, and the women of Japan, unlike those of China, share in the intellectual advancement of the men, and are not only skilled in the accomplishments peculiar to their sex, but are frequently well versed in their native literature. The higher classes of the Japanese, with whom the Americans were brought into communication, were not only thoroughly acquainted with their own country, but knew something of the geography, the material progress, and contemporary history of the rest of the world. Questions were frequently asked by the Japanese which proved an information that, considering their isolated situation, was quite remarkable, until explained by themselves in the statement that periodicals of literature, science, arts, and politics, were annually received from Europe through the Dutch at Nagaski; and that some of them were translated, republished, and distributed through the Empire."

Here it is obvious that effectual steps have at length been taken, for opening up free intercourse with an inquiring, sagacious, and highly intelligent, though suspicious, people. The Americans are justly entitled to all honor for their successful carrying out of an expedition which can scarcely fail to prove advantageous to the whole civilized world,—and not the less so that it is the result of peaceful and friendly negotiation, and not of a barbarous warfare against a sensitive but weak nation. When we consider, with the natural surprise of the members of the American Expedition, that the Japanese were found quite ready to converse intelligently with them about railroads, telegraphs, daguerreotypes, Paixhan guns, steamships, the Mexican war, &c., as subjects already familiar to them, we cannot fail to appreciate the intellectual powers and cultivation of this remarkable people. They have no such self-sufficient faith in their own intellectual supremacy as with the Chinese bars all further progress; and when we consider that in the fourteenth century they were not

less advanced than western Europe in the chief elements of civilization, we can scarcely evade the question: "What has arrested their progress?" nor avoid the suggestive answer which the contrasting Christianity of the freest and most civilized states of the Old and New World present, when compared with the degraded worship of this otherwise enlightened people. On this subject the following brief compendium is suggestive:—

"Whatever may be the moral character of the inhabitants of Simoda, it might be supposed, from the great number of places of worship, that they are a highly devotional people. Though the peculiar religions of the Japanese seemed to be sustained in a flourishing condition, the people are rather remarkable for their toleration of all kinds of worship, except that of the Christian, for which, in consequence of the political intrigues of the Roman Priesthood, centuries ago, they have an intense hatred, carefully inculcated by those in authority, who keep alive the traditional enmity engendered at an epoch when the Portugese were expelled from the Empire. The Buddhist and Sintoo worships are those most prevalent in Japan, and the lower classes are strict but formal devotees, while it is suspected that the higher and better educated, are indifferent to all religions, and entertain various speculative opinions, or seek refuge in a broad scepticism."

The description of the Japanese "Praying Machine" may not inappropriately complete this subject.

"There was a curious contrivance found in one of the burial places at Simoda, consisting of a tall post, placed upright, and being square, it presented four surfaces on each of which was one or two inscriptions or prayers. The post was nearly eight feet in length, and near the centre, at a convenient height to be reached by the hand, was affixed vertically a wheel, moved readily on an axle that passed through the post Two small iron rings were strung upon each of the three spokes of the large wheel. Every person who twisted this instrument in passing was supposed to obtain credit in Heaven for one or more prayers on the post, the number being graduated according to the vigor of the performer's devotion, and the number of revolutions effected. The jingle of the small iron rings was believed to secure the attention of the Deity to the invocation of the devotional, and the greater the noise, the more certain its being listened to. This praying by wheel and axle would seem to be the very perfection of a ceremonious religion, as it reduces it to a system of mechanical laws, which, provided the apparatus is kept in order,—a result easily obtained by a little oil, moderate use, and occasional repairs,—can be readily executed with the least possible expenditure of human labor, and with all that economy of time and thought which seems the great purpose of our material and mechanical age. Huc, in his interesting account of his travels in Thibet, speaks of an improvement on the machine, where the apparatus was turned by water-power, and very appropriately styles it a Prayer Mill. In the course of the progress of the Japanese in the mechanical arts, this, with their usual readiness for adopting new improvements, will no doubt be introduced, or perhaps the more effective power of steam will be applied to their Praying Machines, and with the introduction of Steam boats and Railroads, may commence an era of locomotive devotion!"

We have not attempted in this brief notice any comprehensive an-

alysis of the work, of which only one portion is yet published. Issued from the official press of Washington in a massive quarto volume, and accompanied also, we should add, with a series of maps which constitute an important feature of the work; it has been re-printed in a cheap form, by Messrs. Appleton & Co., of New York, for general circulation. The official publication, however, will be followed, as speedily as the labors of the government press can produce them, by three other volumes, some of the contents of which may be expected to present even more valuable features, than the interesting, though somewhat diffuse, narrative of Dr. Hawks. The first of these forthcoming volumes will be devoted chiefly to Natural History; the second is set apart for the Astronomical Observations; and the third will complete the work by furnishing an account of the Hydrography of the Expedition.

D. W.

Typical Forms and Special Ends in Creation: By Rev. James McCosh, LL. D., Professor of Logic and Metaphysics, in the Queen's University in Ireland, and George Dickie, A. M., M. D. Professor of Natural History, in the Queen's University, in Ireland.

Writers on Physico-theology have for the most part been accustomed to restrict themselves within what Dr. McCosh, with his coadjutor Professor Dickie, consider too narrow a field. They have labored—and with all success—to point out instances of design in the works of nature; but have stopped here, as if this exhausted their case. Physico-theology has thus been virtually identified with Teleology. But this, the writers of the work before us think, is doing injustice to the subject. Equally significant, in their opinion, with the special ends contemplated in creation, is the circumstance, that, in the contrivances made with a view to these ends, a general plan or pattern has been adhered to. Physico-theology—or, to employ the much better name suggested in the work under review, Cosmology, an excellent term, which deserves to be rescued from the unworthy uses to which it has hitherto been put—comprehends, besides the science of SPECIAL ENDS, or Teleology, the science of TYPICAL FORMS, or Typology.

When a man builds a house, he has in view certain *special ends*. He constructs windows, to admit light; doors, for ingress and egress; and so forth. But at the same time, it will be invariably found, that, at least in some measure, the architect follows a *general*

plan, which is not in itself indispensable for the main purposes on account of which the house is built. He proceeds on a principle of Order, as well as on one of Special Adaptation. He makes his building according to a certain style, suited to the prevailing taste of the period; and in no style of architecture are the windows and doors, and other parts of the structure, arranged without some regard to symmetry. Witness—as illustrative of the same point—the general resemblance in the forms of the weights used in a merchant's shop—the regularity in the plaits of a wicker basket—the mould in which a water-jug is cast—and the countless devices for ministering to the sense of beauty, irrespectively of the direct and proper use to which an article of manufacture is intended to be put. It would probably be impossible to mention a single object fashioned by human intelligence, in which, while some special end is aimed at, the influence of the principle of order is not at the same time manifest. Now, what thus holds good regarding the works of man, holds good also regarding the works of God. While special adaptations are every where met with in nature, the Creator has been pleased, for the most part, if not invariably, to conform himself to a general type or pattern. It was at one time a subject of fierce controversy among scientific men, whether the phenomena of the universe are to be explained by reference to the principle of Adaptation, or to that of Order; one party, with Cuvier, maintaining the former opinion; and another, with Geoffrey St. Hilaire, the latter. But both sides (as has often happened) were so far right, and so far wrong. The question between the disputants was: Adaptation *or* Order? The truth of the case is: Adaptation *and* Order united. On the one hand, for instance, the eye was expressly fitted to be an instrument of vision; on the other hand, however, a general plan is discernible, according to which the eyes of all creatures are formed; and only such departures have been made from the typical form—the normal eye, as we may term it—as were rendered necessary or desirable by the circumstances in which particular animals were designed to live.

The law, that the works of nature, while exhibiting special adaptations, are formed upon a general plan, did not altogether escape the notice of the reflecting minds of antiquity. They had glimpses of it, though dim and imperfect. The formal and scientific exposition which it has received of late from several eminent writers, has been one of the fruits of the progress of physical investigation; and Drs. McCosh and Dickie are entitled to the highest praise for having gathered together into a focus all the light which the different natural sciences, as far as we are at present acquainted with them, shed upon

this interesting subject. In particular, they have made admirable use of the most recent discoveries in Animal and Vegetable Physiology; shewing, that, in every animal and plant, a system of serially repeated parts (Homotypes) can be traced; that we likewise meet, in each of the great leading divisions both of the animal and vegetable kingdoms, with a system of answering parts (Homologues); and that, moreover, when we compare the two organic kingdoms with one another, we can, to a certain extent, detect parallelisms in developement, (Homœophytes.) In the course of their discussion of these points, our authors advance a theory regarding the structure of plants, which distinguished botanists, though hesitating in the meantime positively to accept, appear to regard as by no means unworthy of consideration. It is now universally acknowledged that all the parts of a plant are formed on one or other of two types, the stem or the leaf—a discovery due (strange to think) to a poet, whose delight in nature and loving observation of its forms, enabled him to detect what the mere men of science not only had overlooked, but were long reluctant to admit, even after it was pointed out. The sepals, the petals, the stamens, the pistils, are—not indeed metamorphosed leaves, as Gœthe rather loosely termed them—but parts formed on the model of the leaf. In like manner, the branches, in all their subdivisions, with the roots, must be classed typically with the stem. Buds and seeds are virtually repetitions of the entire plant. This is now (we say) an established doctrine; but Dr. McCosh— for the idea would seem to have originated with him—is of opinion that the generalization may be carried still further, and that the stem and leaf have themselves a common typical form; so that only a single primitive model must be recognised, after which all the parts of a plant, without exception, are constructed. We merely advert to this theory as a proof of the suggestive character of the work under review, and of the original and independent thinking which it contains. Among the minor illustrations given of the principle of order, we were much struck with the chapter on the colors of plants. To a careless observer, nothing in nature would seem to be more irregular than the distribution of color; yet even this is found to be guided by laws pretty well defined. Most interesting it is to notice, that, as a general rule, colors in nature are associated on the very principles which artists have pointed out as necessary, in order that an effect pleasing to the human eye may be produced. There are harmonies of color as truly as of musical sounds; and in the aspect of creation ungrateful discords never appear. Professor Dickie believes that he has established certain conclusions regarding the relation of form and color in the flower, of

which it may be sufficient to mention the following; viz: "in regular corollas the color is uniformly distributed, whatever be the number of colors present"; and, "different forms of corolla in the same inflorescence often present differences of color, but all of the same form also agree in color."

We have hitherto spoken of the principles of order and of adaptation, as though they were perfectly distinct from one another; yet it is not to be understood that this is, strictly speaking, the case. Our authors, while they have illustrated the two principles separately, look upon order—and, we think correctly,—as nothing else than adaptation of a higher and less obvious kind than is seen in the arrangements popularly regarded as the best illustrations of design. Their opinion—an opinion first advanced by Dr. McCosh in his treatise on the Divine Government, physical and moral—is, that the final cause of the typical forms of nature, is to aid the intelligent creatures of God in their study of what he has made. Were there no uniformity of structure and appearance in the objects around us; were those typical characters wanting, on which natural classification depends; physical science would be impossible. In a world not constructed on the principle of order, rational creatures would be unable to make any thing beyond a very slight advancement in their acquaintance with the works of Him who called them into being. Confusion on this point is apt to arise from our failing to contemplate the possibility of what may be termed non-mechanical purposes. Professor Owen justly pronounces it absurd to suppose "that every segment and almost every bone which is present in the human hand and arm should exist in the fin of the whale, because they were required in such number and collocation for the movement of that undivided and inflexible paddle." Would it be right to conclude, however, that the instance of order here specified cannot be referred to the principle of adaptation at all? By no means. The correspondence between the fin of the whale and the human hand and arm is not indeed necessary for the function which the fin has to perform: but it aids the comparative anatomist in his investigations; and the purpose of the Creator, in establishing this and similar homologies, may just have been to simplify the task of the student of nature. But we may quote the words of our authors:

"Without some such governing principle (as that of order,) nature would be incomprehensible by human intelligence, and this because of the very number and multiplicity of the objects which it presents, each eager to catch our notice; and the mind, in trying to apprehend them, would have felt itself lost, as in a forest through which there is

no pathway, or as in a vast storehouse, where the seeds of every species of plant on the earth's surface are mixed in hopeless confusion. By what means is it that man is enabled to arrange into groups the objects by which he is surrounded, and thus acquire a scientific knowledge of them, and turn them to practical purposes? Plainly by reason of the circumstance that there are numberless points of resemblance and correspondence between them. Scientific men have so long been familiar with this process that they are not impressed by it as they ought, and seldom do they enquire into the ground on which it proceeds. It is only when something new, such as the discovery of homologies in the animal kingdom, comes to light, that they are led to reflect on what has been too common to be specially noticed. But if they but seriously reflect on the subject, they will find that it is because of the universal prevalence of points of resemblance and correspondence, that man is enabled to group the infinity of objects which fall under his view, into classes and sub-classes, which can be comprehended by the intellect, and treasured up in the memory." And again:

"*Everything has, after all, a final cause.* The general order pervading nature is just a final cause of a higher and more archetypal character. In the special principle we have every organ suited to its function; in the more general principle, we find all the objects in nature suited to man, who has to study and to use them. Professor Owen has declared that his practical assistant found himself greatly aided in setting up the bones of the skull, by proceeding on the principle that they were constructed on the vertebrate type. Lecturers on anatomy find their students following them much more readily when they expound the skeleton on the archetypal idea. It is only by proceeding on some such method that the nomenclature of comparative anatomy can be retained by the memory. Without some such principle there would require to be one set of names for the bones in man, another set for the bones in quadrupeds, and a third and a fourth set for the bones of birds and fishes. By the discovery of homologous parts running through all, it has been found possible to devise a common nomenclature, admitting of application to all vertebrate animals. But let it be observed that it is not the unity of nomenclature which gives the unity to nature, but it is the unity of nature which has given a unity to human science, and the nomenclature which science employs."

With the view expressed in these quotations we fully agree. Taking for granted that there is a God, "the Almighty Maker of heaven and earth;" and seeking reverently to interpret the order,

"standing behind, as it were, and in reserve of the principle of special adaptation;" it does commend itself to our minds as a thing not unworthy (but the reverse) of the Divine Architect, to limit himself, in those creatures of his hand which were designed to come under our notice, to a few well-defined patterns; out of condescension to the weakness of our faculties, and from a desire that we might not be utterly bewildered in our efforts to make ourselves acquainted with his works.

Another view of the subject, however, has been taken. It has been supposed that there are certain typical forms which, in themselves, and altogether irrespectively of their adaptedness to the minds of men or of other finite intelligent beings, are agreeable to the Creator; that there are arrangements with which the Divine mind is pleased, in virtue of their essential harmony—models which it delights to contemplate, for their intrinsic grace or beauty. The poet or painter who has completed a composition to which the highest efforts of his genius have been devoted, will dwell upon the glorious creation of his own mind with emotions of admiration and ecstacy, arising solely from his view of what the poem or picture is in itself, and having no reference to the light in which others are likely to regard it. Even so (it is conceived) the Divine Being may "rest in his love" and "joy over" the Cosmos which he has produced; feeling that in itself, and quite apart from its relation to the minds of finite intelligences, it is "very good."* Not, by any means, that the rela-

* We cannot forbear quoting here one of those fine passages which give such a charm to the scientific works of Dr. Hugh Miller. After referring to the boundless variety of beauty by which the ichthyolites of the Old Red Sandstone are distinguished, he adds: "Nor does it lessen the wonder, that their nicer ornaments should yield their beauty only to the microscope. There is unity of character in every scale, plate and fin—unity such as all men of taste have learned to admire in those three Grecian orders from which the ingenuity of Rome was content to borrow, when it professed to invent—in the masculine Doric, the chaste and graceful Ionic, the exquisitely elegant Corinthian; and yet the unassisted eye fails to discover the finer evidences of this unity: it would seem as if the adorable Architect had wrought it out in secret with reference to the Divine idea alone. The artist who sculptured the cherry-stone consigned it to a cabinet, and placed a microscope beside it; the microscopic beauty of these ancient fish was consigned to the twilight depths of a primeval ocean. There is a feeling which at times grows upon the painter and the statuary, as if the perception and love of the beautiful had been sublimed into a kind of moral sense. Art comes to be pursued for its own sake; the exquisite conception in the mind, or the elegant and elaborate model, becomes all in all to the worker, and the dread of criticism or the appetite of praise almost nothing. And thus, through the influence of a power somewhat akin to conscience, but whose province is not the just and the good, but the fair, the refined, the exquisite, have works, prosecuted in solitude, and never intended for the world, been fraught with loveliness. Sir Thomas Lawrence, who finished with the most consummate care, a picture intended for a semi-barbarous foreign court, was asked why he took so much pains with a piece destined, perhaps, never to come under the eye of a connoisseur. "I cannot help it," he repplied, "I do the best I can, unable, through a tyrant feeling, that will not brook offence, to do any thing less." It would be perhaps over bold to attribute any such over mastering feeling to the Creator; yet certain it is, that among his creatures well nigh all approximations towards perfection, in the province in which it expatiates, owe their origin to it, and that Deity in all his works is his own rule."—*Old Red Sandstone, Ch. V.*

tion of the typical forms in nature to our minds is denied. On the contrary, that is not only recognised, but is held as demonstrating that man—intellectually as well as morally—was made in the image of God. The patterns according to which creation is fashioned, and which we may therefore regard as expressing what is pleasing in the Divine sight, are the very same with those which afford the highest gratification to a pure and cultivated human taste. God would thus appear—it is contended—to have constituted our understandings with as great a conformity to himself, as it was possibly for finite intellects to have to the infinite. In regard to this interpretation of the order of nature, our authors express themselves as follows: "We are indisposed to advance a single word against this view; possibly it may be as true, as it is certainly striking and sublime. It is certainly a doctrine which cannot be disproved; we may venture to doubt whether it admits of absolute proof. Do we know so much of the Divine nature as, *a priori*, to be able to affirm with certainty, how that nature must manifest itself in creation? There may even be presumption implied in declaring, in some cases, that the harmonies of nature are after the taste or character of God; for example, that complementary colors are more beautiful to His eye, as they are to ours, when seen in collocation, than non-complementary colors."

The theory upon which Professors McCosh and Dickie here—somewhat hesitatingly—pass sentence of disapproval, is one which—striking and sublime as it undoubtedly is, and calculated, when first announced, to fill and carry away the mind—we cannot accept. Our authors, indeed, have said nothing tending to shew that it is erroneous. The only thing which they adduce in the shape of argument against it, is contained in the sentence about complementary colors above quoted—a sentence which, as it stands, is pointless. There may be presumption (we are told) in declaring that it is a character of the Divine mind to delight in certain arrangements of colors, rather than in others. Now, perhaps there *may*: but surely it is too slight a mode of dealing with the subject, to assert this without a word of explanation, and, having done so, to pass on. *Why* may there be presumption in making the declaration in question? In the absence of anything to evince that the declaration is presumptuous, those against whom the statement of our authors is directed, might answer—and it would be sufficient—that they cannot see where the presumption lies. The main objection which we feel to the theory under consideration, is, that the typical forms which we discern in nature depend upon our sensitive modes of perception, and therefore exist

only to beings organised as we are. We believe that this is true of the typical forms of nature universally; but we shall confine our remarks to the instance of *color*, to which our authors refer, and which may be most easily treated. The colors which excite our admiration in the flowers of the field, in the bright plumage of the birds, or in the rainbow spanning the sky, have no existence apart from ourselves. It seems, therefore, a contradiction to say that the Divine Being delights in such colors, as intrinsically suitable to his nature; and that their harmonies and melodious combinations would—even had neither man, nor any similarly constituted beings, ever looked out upon creation — have still rendered the flowers, the birds, the rainbow, objects of grateful contemplation in his sight. Let us for a moment assume that the doctrine of perception taught in what is termed the Scottish school is correct. On that doctrine, the sole connection between an external object—for example, a rose —and the colors popularly supposed to be inherent in it, is, that it acts as a stimulus, more or less remote, through means of which our nervous organism is affected; and it is the affection thus excited in the living nerve, that determines the colors which we fancy ourselves to see in the object.* Should the organism be similarly affected by any other stimulus, however different — even by an extra-organic stimulus—the same colors would appear to present themselves to our view. Now we do not say that we agree altogether with this doctrine: but supposing it to be correct, what then? Color depends upon organization; so that if we consider the face of nature, as it must appear to the Creator, to whom no organization can be ascribed, it is impossible to speak of it as colored at all; without, at least, using the word *colored* in some sense entirely different from that in which, when describing our own perceptions, we speak of it as colored. No doubt, the order of the universe, as regards the colors with which it is invested, is, like its order in every other particular, perpetually present to the Divine mind; but the point to be observed, is, that *this is not an Order which exists irrespectively of organized sensitive creatures, or can be conceived apart from them.* A doctrine of sensitive perception, which should approximate more nearly than that of the Scottish school, as above stated, to what we ourselves consider the truth, would only render the conclusion which has been established, more obvious.

We are disposed, therefore, to be content with the explanation

* Reid supposes that the nervous affection is the arbitrarily constituted antecedent to the sensation of color: Sir William Hamilton, that the sensation of color consists in the mind's immediate apprehension of the nervous affection.

which our authors give of the fact that nature is formed on certain prevailing types or patterns—an explanation which makes the Order of the universe only a peculiar kind of adaptation. And this will shew in what light we must regard a criticism that has been passed upon the work before us in a contemporary review. "There is a difficulty," it has been said, "lying at the very threshold of the discussion, which the learned authors have not troubled themselves to engage with; viz: How is the existence of these antagonist principles (of order and of special adaptation) compatible with the doctrine of the Divine unity? If one Being is the author of order and law; diversity and multiplicity must be already given. If He is a designer, contriver, adapter; a primordial homogeneous material must be coexistent with Him. Is the one God to be identified with the principle of order, or with the principle of variety? The forces are really antagonistic, void against form, unity against multiplicity, the uniform against the various, the homogeneous against the heterogeneous, and death against life. Neither is victorious o r the other. If form issues from void, it sinks back into it; if variety diversifies the uniform, it is again overcome by it; if life emerges from death, it is again absorbed into it. The professors have not, as it seems to us, precluded a dualistic doctrine."* Now, upon these apparently profound, but in truth, hazy and somewhat unmeaning sentences, we remark *in the first place* that order and adaptation are not "antagonistic principles." On the contrary, we believe with Drs. McCosh and Dickie, that the order of nature is adaptation of the highest kind: it is the Creator adapting his works to the capacities of the intelligent beings, by whom they are to be studied. But *in the second place*, as it is affirmed that the recognition of the principle of adaptation in nature would involve the conclusion that there must have been two independent principia rerum, what ground is there, we ask, for such an assertion? Not the slightest. We do not mean to attempt proving the Divine unity; but we deny that there is any thing incompatible with the Divine unity, in the notion that the world exhibits design. Where is there even the semblance of contradiction in our supposing that there is a living God, the sole self-existent Being, who created the world, and created it endowed, in its various parts, with those properties, and standing in those mutual relations, which the terms *Order* and *Adaptation* set forth? Why, if he be a designer, contriver, adapter—does it follow that a primordial homogeneous material must be coexistent with Him? When a human workman, indeed, fits together the parts of a watch, he employs his skill upon existing materials; but we must

* Westminster Review, April, 1856.

not conceive of the Divine operations, as if they were analogous to those of finite creatures like ourselves. What absurdity is there in believing that God created the world, as a Cosmos, already "teres atque rotundus," with all its arrangements and adaptations complete and perfect in the very instant of its flashing into being? "Is the one God" (it is said) "to be identified with the principle of order, or with the principle of variety?" The assumption on which this question proceeds, viz: that adaptation implies variety, (that is, a variety or multiplicity of primordial principles,) we again deny; and if asked whether the one God is to be identified with the principle of order or with that of adaptation, we answer—pantheistically, with neither; but, as the author of nature, with both: both being at bottom the same.

We have sought to interpret the typical forms and special ends in creation, from the Theistic position, supposed to be already attained; but they may also be considered from another point of view—the Apologetic; that is to say, we may inquire what is the value of the evidence which they furnish for the Divine existence.

The Cosmological argument for the Being of God is based, in both its branches: the teleological and the typological, on the doctrine of probabilities. Why must we in any case suppose intelligence, to account for special adaptation or for order? Because, where the traces of adaptation or of order are of a marked kind, all probability is against their being accidental. To take an illustration which, since the days of Cicero, has become common-place: we find a number of words arranged in such a manner as to form the Paradise Lost. Could this have happened by chance? Strictly speaking, it might. If the words composing the poem were shaken together in a bag, and then drawn out, one after another, by a man blind-folded; and if this process were repeated indefinitely; there is a positive chance—which, in fact, by increasing the number of trials, can be made as great as we please—that, after a certain number of times, the words would be drawn out in the precise order which they have in the poem. Even on a single trial, there is a chance, which any person acquainted with the elements of mathematics is able to calculate, in favour of such a result. But the fraction expressing the amount of the chance is so small, that, for all practical purposes, it may be taken as zero. We never hesitate to assert, therefore, that the words composing the Paradise Lost, could not have been fortuitously thrown into their present order; while at the same time, it will be seen that our certainty of this is nothing else at bottom than an immense probability. Now such precisely—as far as its essential nature is concerned—is

the conviction which we feel, on the one hand, that the innumerable and varied special adaptations, and, on the other hand, that the order, manifest in the universe, have been the result of intelligence; only, in either of these cases, the unlikelihood of the effect being due to chance, is so great as to transcend, not only the power of numbers to express, but even of imagination to conceive it.

From this it follows, that, if we desire to arrive at a strictly scientific persuasion of the existence of God—a persuasion having the character of absolute certainty, and in which there shall be no place for even the most infinitesimal element of doubt—we must have recourse to other than Cosmological considerations. Whether we argue from the special adaptations, or from the order, of nature, we cannot possibly infer more than that there is an incalculable probability in favour of the conclusion that the universe has been fashioned by intelligence. But what is of still greater moment: even were it absolutely certain that the order and special adaptations which we perceive in nature, must be ascribed to an intelligent Being, this is not tantamount to saying that the Being whose agency we recognise, is *infinite*, or that the universe was *created* by Him. Our authors admit that Cosmology is insufficient to prove the Being of an infinite Creator. "It is not pretended," they observe—after giving some instances of the principle of order—"that these facts do of themselves prove that there is a living and personal God, clothed with every perfection. But they are fitted to deliver us from several painful and degrading notions, which may be suggested by the human heart in times of unbelief, or by persons who have been lost in a labyrinth built by themselves, and who are not unwilling that others should become as bewildered as they are. They prevent us from feeling that we, and all things else, are the mere sport of chance, ever changing its procedure, without reason and without notice, or, what is still more dreadful, that we may be crushed beneath the chariot wheels of a stern and relentless fate, moving on without design and without end. They show us what certainly looks very like a method pursued diligently and systematically—very like a plan designed for some grand end; so very like it, that it behoves the sceptic to take upon himself the burden of demonstrating that it can be anything else. Taken along with their proper complement; the special adaptation of parts, they exhibit to us an enlarged wisdom, which prosecutes its plans methodically, combined with a minute care, which provides for every object, and every part of that object."

Some persons, in their zeal for the great fundamental doctrine of religion, may be displeased at our plainly affirming the inadequacy

of the Cosmological argument to prove that there is a God; but no good end is ever served by the concealment of truth. We apprehend that it would be doing a serious injury to Natural Theology to attempt to maintain the ground, that the Divine existence can be proved—in the proper sense of the term—either from the special adaptations, or from the order, of the universe. Cosmology has its use: which is, however, to enlarge our conceptions of God, rather than to prove that there is a God. Details like those contained in the work before us, are invaluable, as illustrating the perfections of the Creator, and leading our minds to a lively apprehension of His universal presence, and of His wise and powerful and beneficent agency; but it is impossible that they can be felt to have much apologetic weight, where a question as to the Divine existence is seriously raised; and Natural Theology—especially considering the assaults to which it is in the present age exposed—will not be efficiently defended, till this is thoroughly understood. It is high time for those who aspire to grapple scientifically with the mighty problem of the Divine existence, to seek something more than a popular solution of it: yea, to seek what must of necessity be an unpopular solution of it. Pantheism is now making its influence more decidedly felt than ever; and against its deadly errors, we must have other aid than a continuation of Paley, and other champions than Burnet Prize Essayists.

While persuaded that the doctrine of the Divine existence has the warrant of scientific, no less than of religious certainty, we are convinced, at the same time, that this can be made to appear, only as the result of lengthened and profound metaphysical investigation. Far be it from us to insinuate that the simple faith of the great mass of Christians, who believe in God, while yet they are utter strangers to Metaphysics, is not well founded. We hold on the contrary, that their faith is warrantable,—scientifically so,—though they themselves are unable to explain precisely what its warrant is. The common belief suffers injustice, not from us, but from those who speak as though Cosmology were its sole; or main foundation; and who—when they cannot altogether shut their eyes to the fact that a proof resting upon such a basis must needs be defective in the most essential points—endeavor to buttress up their feeble case by insisting that the conviction of the Divine existence which may be obtained from Cosmology has at least as much in its favor as the beliefs upon which the ordinary business of life proceeds, and is amply sufficient for practical purposes. For our part, we protest against the supposition that the faith which mankind at large have in an infinite, self-existent Be-

ing, the Creator of the universe, is of this unsatisfactory and imperfectly grounded character. We maintain that it is not a mere probable persuasion, but absolute strict knowledge, requiring only to have its real nature unfolded and its perfect validity formally exhibited.

Before parting with Drs. McCosh and Dickie, we must express our high admiration, not merely of the scientific expositions which they have brought forward, but likewise of the general tone in which their work is written. A vein of pure and refined sentiment runs through every part of it, and there are occasional passages of remarkable sweetness and moral beauty. Take the following as an example:

"It is indeed of vast moment to have the mind stored with a variety of noble images to enliven and elevate it: to be as Quintilian says —*incitamenta mentis*. This end is much promoted by an early training among natural objects which are picturesque; by travelling at a later period of life into foreign countries, and by the opportunity thus afforded of holding communion with Nature in her grander forms and of inspecting the noblest products of the fine arts. But, while gathering these material pictures, let the young man and the old man not forget that there are others which he should not be losing, and which, if he part with, his gain will be more than counterbalanced by his loss. For these are images which it is still more important to have treasured up in his mind; they are the images of domestic peace, the images of home and friends, of the affectionate mother, (we can never have more than one mother) and devoted wife, and kind sisters and smiling children; and to these let us add, by personal intercourse with them, or by elevated reading, the images of the great and good, of heroic men who toiled and bled for noble ends, and of equally heroic women who lost sight of themselves in works of disinterested love and sacrifice. These are in themselves vastly more exalted, and ten thousand times more exalting, than all your statues draped and undraped, about which connoisseurs so talk and rave; they are fitted to become excitements to all excellence, and he who has been at the pains to collect them and hang them around the chambers of his mind, is like one dwelling in a portrait gallery, from which the forms of ancestors are looking down upon him, with a smile, and exhorting him to all that is great and good."

Nothing is wanted to render this exquisite passage perfect, except the absence of a little stiffness and formality. But our authors while always clear in their style are at times deficient in ease and gracefulness of expression.

There is a chapter, of some parts of which we regret to be under the

necessity of recording our decided disapproval: on the "Typical Systems of Nature and Revelation." We abstain from further comment in the mean time; but earnestly hope that the able and (generally) judicious authors will revise the chapter referred to, and that future editions of so valuable a production as that which we have had under review, will be purged from the only considerable blemish which the work, in its present state, exhibits.

G. P. Y.

Bothwell: A Poem in six parts. By W Edmondstoune Aytoun, D. C. L., Author of "Lays of the Scottish Cavaliers, &c," W. Blackwood and Sons. Edinburgh and London, 1856.

Leaves of Grass. Brooklyn, New York, 1855.

In the works named above we have two not unmete representatives of the extremes of the Old and of the New World poetic ideal: "Bothwell," the product of the severely critical, refined, and ultra-conservative author of the "Lays of the Scottish Cavaliers;" and "Leaves of Grass," the wild, exuberant, lawless offspring of Walt Whitman, a Brooklyn Boy, "One of the Roughs!"

The historical poem has been heralded by rumor with her hundred tongues; and expectation has been whetted by anticipations naturally suggested by the promise of a work destined for posterity, from the caustic pen already glittering in the "Bon Gaultier" ranks, and trenchant in the satiric pages of "Firmilian; a Spasmodic Tragedy." He who has lashed, with such biting keenness, the poets and the critics of his day; and laughed to scorn, alike the metaphysical poetics of an "In Memoriam," the morbid tristness of "A Life-drama," the transcendental theosophy of a "Festus," and all the vagaries of a Carlyle, a Ruskin, or a Gilfillan: must be assumed to offer something which he, at least, believes to approach more nearly the true requisites of poetic perfection. More than one of the *dramatis personæ* of "Firmillian" have a character for critical reprisals, not overlooked by the caustic author of that "spasmodic tragedy;" yet here he enters the lists, and, doffing all quaint humor and satiric guise, he gravely flings down his knightly gauge of battle, as if he had never sported with the mummers, and made game of the literary guild of modern cavaliers.

The hero of Professor Aytoun's "Bothwell," is that grim Scottish Baron, the murderer of Darnley, and the ravisher of the unhappy Mary of Scotland: in himself dark enough for all the shadow that

might be required to set off a theme otherwise neither deficient in poetry nor romance In dealing with his subject the poet claims credit for having taken no liberties with history. "I have not deviated," he says in his preface, "from what I consider to be the historical truth;" thereby, as it seems to us shackling the free wings of his muse to extremely little purpose; since his conscientious adherence to historic truth, only brings out more prominently the neglect of that higher truth of nature, involved in the one all-pervading conception of the dungeoned ruffian thus communing with his remorseful conscience in six coherent cantos of smoothly flowing verse. Such professions of adherence to literal history are altogether misplaced; for nobody out of the nursery wants to study history in rhymes. But our dissatisfaction with the claim finds other grounds, when we discover that the history adhered to is the old vulgar popular conception, which pictures Mary of Scotland an angel, Knox a morose fanatic, and Elizabeth of England a wrinkled and jealous shrew! The following picture of Darnley may pass without dispute:

"She wedded Darnley—and a fool
In every sense was he,
With scarce the wit to be a knave
If born in low degree.
But folly, when it walks abroad
In royal guise and strain,
Will never lack for knavery
To loiter in its train.

Folly walks *in royal strain* here, we presume, for the sake of the rhyme. But what shall we say of the portraiture of Elizabeth?—the sole sinner, according to the historic bard, even in the unpatriotic defections of Scotland's nobles:

But at the gate the Temptress stood,
Not beautiful nor young;
Nor luring, as a syren might,
By magic of her tongue;
High and imperious, stately, proud,
Yet artful to beguile,
A woman, without woman's heart,
Or woman's sunny smile;
By nature tyrannous and vain,
By king-craft false and mean—
She hated Mary from her soul,
As woman and as queen!
* * * * * * *
What mattered it that flattering knaves
Proclaimed her Beauty's Queen,

And swore in verse and fulsome rhyme,
That never since the birth of time,
Was such an angel seen?
Each morn and eve, her mirror gave
Their wretched words the lie;
And though she fain would have believed,
She could not close her eye.

John Knox is dealt with in like manner, in a piece that reads not unlike an anti-sabbatarian Westminster Review article turned into verse! With such history we could have pardoned a pretty free use of the poet's license. But to return to the hero of the poem: the wild career of Bothwell is familiar to the student of Scottish story, and is not without materials for the poet's pen. Its close is nearly coeval with that of Mary's royalty and freedom; and with a poetic justice rare in actual history, the remaining years of her betrayer's life were passed in a Danish dungeon, where, listening to the moaning voices of the lonely sea, and preyed on alike by the tortures of ungratified ambition and remorse, he at length died a raving maniac. The poet lays his scene in this Danish fortress of Malmoe, in the lone dungeon of which he presents Bothwell as his own biographer, wailing forth in bitter retrospect the strange romance in which he acted so prominent a part. In giving form to this, the author must be acredited with the somewhat rare merit among modern poets, of actually saying what he means, in sober intelligible verse, nor once indulging in hidden meanings, such as elude the unreflective reader—still less in the mysticism and metaphysical subtleties of poetics, which not only leave all readers in doubt of what is meant, but a good many in greater doubt whether they ever had a meaning known to writer or reader! The author of "Bothwell" has, moreover, as in duty bound, kept steadily free from all spasmodic exuberance of fancy. Perhaps it may be thought by some that he even verges on the opposite extreme of insipidity and common place.

The following opening scene, representing the captive writhing in his dungeon, within sound alike of the Christmas revels of his jailors, and the wild swoop of the wind and wave on the northern sea, is well designed for awakening the sympathy of the reader, and may be accepted as one of the most vigorous passages in the whole poem:

Cold—cold! The wind howls fierce without:
It drives the sleet and snow;
With thundering hurl, the angry sea
Smites on the crags below.
Each wave that leaps against the rock
Makes this old prison reel—

God! cast it down upon my head,
And let me cease to feel!
Cold—cold! The brands are burning out,
The dying embers wane;
The drops fall plashing from the roof
Like slow and chilly rain.
Cold—Cold! And yet the villain kerns
Who keep me fettered here,
Are feasting in the hall above,
And holding Christmas cheer.
When the wind pauses for its breath,
I hear their idiot bray,
The laugh, the shout, the stamping feet,
The song and roundelay.
They pass the jest, they quaff the cup,
The Yule-log sparkles brave,
They riot o'er my dungeon vault,
As though it were my grave.
Ay, howl again, thou bitter wind,
Roar louder yet, thou sea!
And drown the gusts of brutal mirth
That mock and madden me!
Ho, ho, the Eagle of the North
Has stooped upon the main!
Scream on, O eagle, in thy flight,
Through blast and hurricane—
And when thou meetest on thy way
The black and plunging bark,
Where those who pilot by the stars
Stand quaking in the dark,
Down with thy pinion on the mast,
Scream louder in the air,
And stifle in the wallowing sea
The shrieks of their despair!
Be my avenger on this night,
When all, save I, am free;
Why should I care for mortal man,
When men care nought for me?
Care not? They loathe me, one and all,
Else why should I be here—
I, starving in a foreign cell,
A Scottish prince and peer?"

The captive, thus dungeoned on a foreign strand, recalls to memory the wild incidents of love and crime, and unavailing remorse; but it may be questioned whether the poet has not lost, by this artifice, the vigor and life of action, as well as the richer variety which would have been begot by his own direct recital of the tale. The most charitable fancy challenges the truthfulness of such an autobiographic

monologue, coherently running on from canto to canto; prologued and epilogued with these measured ravings of despair. The diction is perfect, the verse sweet, and only too smoothly written, and the imagery such as a "Firmilian" critic must pronounce unexceptionable. We are anxious to exhibit the poet at his best; and here accordingly are a couple of scenes painted from the landscape around the Scottish capital. They can scarcely fail to provoke a comparison with passages in "Marmion," where Scott has drawn a richer inspiration from the same magnificent panorama:

Methinks I can recall the scene,
That bright and sunny day;
The Pentlands in their early green
Like giant warders lay.
Upon the bursting woods below
The pleasant sunbeams fell;
Far off, one streak of lazy snow
Yet lingered in a dell.
The westlin' winds blew soft and sweet,
The meads were fair to see;
Yet went I not the spring to greet
Beneath the trysting tree.
For blades were glistening in the light,
And morions flashing clear:
A thousand men in armour bright
Were there with jack and spear.
A thousand men as brave and stout
As ever faced a foe,
Or stemmed the roaring battle-tide
When fiercest in its flow.

This is unexceptionable, yet what does it amount to? The ideas are old as the Pentland hills, and even some of the lines seem scarcely new. The other passage deals with a scene almost unrivaled in its luxurious combinations of all that is grand and beautiful and picturesque in art and nature. The rugged crags, and vales, and grassy peaks of Arthur's Seat, looking out, on the one hand, on the castle-crowned city, on the other, on the hill-engirdled sea; the ruined chapel and holy-well of St. Anthony; the Abbey and palace of Holyrood rich with the memories of seven centuries; and, add to all, the Poet's eye, repeopling them with the most romantic of all their old historic dramas:—all these, and this as the result:

The troopers in procession wound,
Along the slant and broken ground,
Beneath old Arthur's lion-hill.
The Queen went onward with her train;
I rode not by her palfrey's rein,

But lingered at the tiny rill
That flows from Anton's fane.
Red was the sky; but Holyrood
In dusk and sullen grandeur stood.
It seemed as though the setting sun
Refused to lend it light,
So cheerless was its look, and dun,
While all above was bright.
Black in the glare rose spire and vane,
No lustre streamed from window-pane;
But, as I stood, the Abbey bell
Tolled out, with such a dismal knell
As smites with awe the shuddering crowd,
When a king's folded in his shroud—
Methought it said "Farewell!"

One more specimen we select from the fifth canto, in which, and still more in the concluding one, the captive, having traced out the chequered incidents of his wild career, rises to a more elevated tone, as he gives utterance to the last fierce wailings of remorse and despair:

Beneath the flags that, day by day,
Return dull echoes to my tread,
A grave is hollowed in the clay:
It waits the coming of the dead—
A grave apart, a grave unknown,
A grave of solitude and shame,
Whereon shall lie no sculptured stone
With legend of a warrior's name.
O, would it yawn to take me in,
And bind me, soul and body, down!
O, could it hide me and my sin,
When the last trumpet-blast is blown!
O, might one guilty form remain
Unsummoned to that awful crowd,
When all the chiefs of Bothwell's train
Shall rise from sepulchre and shroud!
How could I meet their stony stare—
How could I see my father's face—
I, the one tainted felon there,
The foul Iscariot of his race?"

In contrast with this we have named the effusions of the Brooklyn Bard. If the accredited author of "Firmilian" has now shown us what a poem ought to be, assuredly Walt Whitman is wide of the mark. Externally and internally he sets all law, decorum, prosody and propriety at defiance. A tall, lean, sallow, most republican, and Yankee-looking volume, is his "Leaves of grass;" full of egotism, extravagance, and spasmodic eccentricities of all sorts; and heralded

by a sheaf of double-columned extracts from Reviews— not always the least curious of its singular contents. Here, for example, is a protest against the intrusion of the British muse on the free soil of the States of the Union, which must surely satisfy the most clamant demand for native poetics and republican egotism:

"What very properly fits a subject of the British crown, may fit very ill an American freeman. No fine romance, no inimitable delineation of character, no grace of delicate illustrations, no rare picture of shore or mountain or sky, no deep thought of the intellect, is so important to a man as his opinion of himself is; everything receives its tinge from that. In the verse of all those undoubtedly great writers, *Shakespeare, just as much as the rest*, there is the air which to America is the air of death. The mass of the people, the laborers and all who serve, are slag, refuse. The countenances of kings and great lords are beautiful; the countenances of mechanics are ridiculous and deformed. What play of Shakespeare represented in America, is not an insult to America, to the marrow in its bones? How can the tone—never silent in their plots and characters—be applauded, unless Washington should have been caught and hung, and Jefferson was the most enormous of liars, and common persons, North and South, should bow low to their betters, and to organic superiority of blood? Sure as the heavens envelop the earth, if the Americans want a race of bards worthy of 1855, and of the stern reality of this republic, they must cast around for men essentially different from the old poets, and from the modern successions of jinglers and snivellers and fops."—and here accordingly is something essentially different from all poets, both old and new.

The poet, unnamed on his title page, figures on his frontispiece, and unmistakeably utters his own poem:

> "I celebrate myself,
> And what I assume, you shall assume;
> For every atom belonging to me as good belongs to you.
> I loafe, and invite my soul;
> I lean and loafe at my ease—
> Observing a spear of Summer grass."

Such is the starting point of this most eccentric and republican of poets; of whom the republican critic above quoted, after contrasting with him Tennyson, as "The bard of ennui, and the aristocracy and their combination into love, the old stock love of playwrights and romancers, Shakespeare, the same as the rest,"—concludes by confessing his inability to decide whether Walt Whitman is "to prove the

most lamentable of failures, or the most glorious of triumphs, in the known history of literature."

Assuredly, the Brooklyn poet is no commonplace writer. That he is startling and *outré*, no one who opens his volume will doubt. The conventionalities, and proprieties, and modesties, of thought, as well as of language, hold him in no restraint; and hence he has a vantage ground from which he may claim such credit as its licence deserves. But, apart from this, there are unmistakeable freshness, originality, and true poetic gleams of thought, mingled with the strange incoherencies of his boastful rhapsody. To call his "Leaves" poems, would be a mistake; they resemble rather the poet's first jottings, out of which the poem is to be formed; the ore out of which the metal is to be smelted; and, in its present form, with more of dross than sterling metal in the mass.

To find an extractable passage is no easy task. Here a fine suggestive fancy ends in some offensive pruriency; there it dwines into incomprehensible aggregations of words and terms, which—unless Machiavelli was right in teaching that words were given us to conceal our thoughts,—are mere clotted nonsense! Were we disposed to ridicule: our selections would be easy enough; or gravely to censure: abundant justification is at hand. We rather cull—not without needful omissions—the thoughts that seem to have suggested the quaint title of "Leaves of Grass."

"Loafe with me on the grass.....loose the stop from your throat,
Not words, not music or rhyme I want: not custom or lecture, not even the best,
Only the lull I like, the hum of your valved voice.

.....

I know that the hand of God is the elderhand of my own,
And I know that the spirit of God is the eldest brother of my own,
And that all the men ever born are also my brothers....and the women my sisters and lovers,
And that a kelson of the Creation is love;
And limitless are leaves, stiff or drooping in the fields.
A child said, what is the Grass? fetching it to me with full hands;
How could I answer the child?....I do not know what it is any more than he.
I guess it must be the flag of my disposition, out of hopeful green stuff woven.
Or I guess it is the handkerchief of the Lord,
A scented gift and remembrancer designedly dropped,
Bearing the owner's name some way in the corners, that we may see and remark, and say Whose?
Or I guess the grass is itself a child ...the produced babe of the vegetation.
Or I guess it is a uniform hieroglyphic,
And it means, Sprouting, alike in broad zones and narrow zones,

Growing among black folks as among white,
Kanuck, Tuckahoe, Congressmen, Cuff,
I give them the same, I receive them the same.
And now it seems to me the beautiful uncut hair of graves.

.....

.....

All truths wait in all things.
They neither hasten their own delivery nor resist it,
They do not need the obstetric forceps of the surgeon,
The insignificant is as big to me as any,
What is less or more than a touch?
Logic and sermons never convince,
The damp of the night drives deeper into my soul.

.....

I believe a leaf of grass is no less than the journeywork of the stars,
And the pismire is equally perfect, and a grain of sand, and the egg of the wren,
And the tree-toad is a chef-d'œuvre for the highest,
And the running blackberry would adorn the parlors of heaven,
And the narrowest hinge in my hand puts to scorn all machinery,
And the cow crunching with depressed head surpasses any statue,
And a mouse is miracle enough to stagger sextillions of infidels."

This passage is far from being the most characteristic of the poem, and even in it we have stopped abruptly for one line more, and ..... Yet this will show that the punctuation is as odd as any other feature of the work; for the whole is full of conceits which speak fully as much of coarse vain-glorious egotism as of originality of genius. Any man may be an original, whether in the fopperies of the dress he puts on himself or on his poem. We are not, therefore, disposed to rate such very high, or to reckon Walt Whitman's typographical whims any more indicative of special genius, than the shirt-sleeves and unshaven chin of his frontispiece. If they indicate any thing specially, we should infer that he is a compositor by trade, and, for all his affectations of independence, could not keep "the shop" out of his verse. But that he sets all the ordinary rules of men and poets at defiance is visible on every page of his lank volume; and if readers judge thereby that he thinks himself wiser than all previous men and poets—we have no authority to contradict them. That some of his thoughts are far from vain or common place, however, a few gleanings may suffice to prove; culled in the form, not of detached passages but of isolated ideas,—lines, or fragments of lines:—

"The friendly and flowing savage....Who is he?
Is he waiting for civilization or past it and mastering it?"

"The welcome ugly face of some beautiful soul."

"The clock indicates the moment....but what does eternity indicate?"

"Afar down I see the huge first Nothing, the vapor from the nostrils of death,
I know I was even there....I waited unseen and always,
And slept while God carried me through the lethargic mist,
And took my time....and took no hurt from the fœtid carbon."

"See ever so far....there is limitless space outside of that,
Count ever so much....there is limitless time around that.
Our rendezvous is fitly appointed....God will be there and wait till we come."

These doubled and quadrupled points, let us add, pertain to the original, whatever their precise significance may be. Here again is a grand idea, not altogether new; and rough in its present setting, as the native gold still buried in Californian beds of quartz and debris. Nevertheless it is full of suggestive thought, and like much else in the volume—though less than most,—only requires the hand of the artist to cut, and polish, and set, that it may gleam and sparkle with true poetic lustre:—

"A slave at auction!
I help the auctioneer....the sloven does not half know his business.
Gentlemen look on this curious creature,
Whatever the bids of the bidders they cannot be high enough for him,
For him the globe lay preparing quintillions of years without one animal or plant,
For him the revolving cycles truly and steadily rolled.
In that head the allbaffling brain,
In it and below it the making of the attributes of heroes.
Examine these limbs, red, black or white....they are very cunning in tendon and nerve;
They shall be stript that you may see them.
Exquisite senses, lifelit eyes, pluck, volition,
Flakes of breastmuscle, pliant backbone and neck, flesh not flabby, good sized arms and legs,
And wonders within there yet.
Within there runs his blood..the same old blood..the same red running blood
There swells and jets his heart....There all passions and desires....all reachings and aspirations:
Do you think they are not there because they are not expressed in parlors and lecture-rooms?
This is not only one man....he is the father of those who shall be fathers in their turns,
In him the start of populous states and rich republics,
Of him countless immortal lives with countless embodiments and enjoyments.
How do you know who shall come from the offspring of his offspring through the centuries?
Who might you find you have come from yourself?"

" Great is life..and real and mystical..wherever and whoever,
Great is death....sure as life holds all parts together, death holds all parts together;
Sure as the stars return again after they merge in the light, death is greater than life."

Such are some of the "Leaves of Grass," of the Brooklyn poet who describes himself on one of them as:

"Walt Whitman, an American, one of the roughs, a Kosmos!"

But if the reader—recognising true poetry in some of these,—should assume such a likeness running through the whole as pertains to the blades of Nature's Grass, we disclaim all responsibility if he find reason to revise his fancy.

In the two very diverse volumes under review it seems to us that we have in the one the polish of the artist, which can accomplish so much when applied to the gem or rich ore; in the other we discern the ore, but overlaid with the valueless matrix and foul rubbish of the mine, and devoid of all the unveiling beauties of art. Viewed in such aspects these poems are characteristic of the age. From each we have striven to select what appeared most worthy of the space at command, and best calculated to present them to the reader in the most favorable point of view consistent with truth. And so we leave the reader to his own judgment, between the old-world stickler for authority, precedent, and poetical respectability, and the new-world contemner of all authorities, laws, and respectabilities whatsoever. Happily for us, all choice is not necessarily limited to these. The golden mean of poesie does not, we imagine, lie between such extremes. There are not a few left, both in England and in America, for whom old Shakspeare is still respectable enough, and poetical enough,—aye and free enough too, in spite of all the freedom which has budded and bloomed since that year 1616, when his sacred ashes were laid beneath the chancel stone whose curse still guards them from impious hands. Nevertheless we have faith in the future. We doubt not even the present. When a greater poet than Shakspeare does arrive we shall not count him an impossibility.

D. W.

SCIENTIFIC AND LITERARY NOTES.

GEOLOGY AND MINERALOGY.

ORIGIN OF ROCK CLEAVAGE.

Few subjects connected with the physics of Geology have attracted of late years more attention than that of rock cleavage. Long considered, in accordance with the views of Sedgwick, as the result of a peculiar crystalizing force produced by electrical action or by heat, its origin has more recently been attributed, and evidently with truth, to the effects of mechanical causes. In other words, cleavage in rocks may be regarded as the result of enormous or long-continued pressure, exerted at right angles to the direction of the cleavage planes. Amongst those who have chiefly labored in support of this latter view, the late President of the Geological Society of London, Daniel Sharpe, with Mr. Sorby, and Professor Tyndall, may be especially cited. Observations of great interest on this subject will be found in some of the recent numbers of the Philosophical Magazine.

MEAN DENSITY OF THE EARTH.

According to the computations of the Astronomer Royal, based on his late pendulum experiments at the Harton Coal Pit, South Shields, the mean density of the Earth is equal to 6.566. This value is about one degree higher than any previously obtained.

The Rev. Samuel Haughton of Trinity College, Dublin, in a paper communicated to the Philosophical Magazine for July, 1856, has deduced from these experiments, by another mode of calculation, the value 5.480.

The officers engaged on the Trigonometrical Survey of the United Kingdom, have also taken up the question of the Earth's density. Observations on the deflection of the plumb-line at Arthur's seat, Edinburgh, conducted by Colonel James, R. E., and re-calculated by Captain A. R. Clarke (proceedings of the Royal Society, May 8, 1856,) give for the Earth's mean density, the value 5.316. A further set of observations on the Stack Mountain, Sutherlandshire, pointed out by the late Dr. Macculloch as the best adapted in all Scotland, for the estimation of the Earth's density by the deflection of the plumb-line, are also promised.

We have collected the above, and other earlier results, into the following table:

A. Estimated by Plumb-line Deviation.

1. From Dr. Maskelyne's observations on the Schehallien Mountain in Perthshire, (corrected by Hutton)	4.9999
2. From Colonel James' Observations on Arthur's Seat (The first calculations gave 5.14.)	5.316

B. Estimated by the Ball Apparatus.

3. By Cavendish (corrected by Baily)	5.448
4. By Cavendish (corrected by Schmidt)	5.52
5. By Reich, in Freiberg (1837)	5.44
6. By Baily (mean result of over 2,000 observations)	5.67

C. *Estimated by Pendulum Movements upon and beneath the Earth's surface.*

7. By Airy, (Astronomer Royal)	6.566
8. Do. Do. (computed by the Rev. G. H. Haughton)	5.480

MINERALOGICAL NOTICES.

Lake Superior Copper.—M. Hautefeuille (Comptes Rendus, July 21, 1856) has detected the presence of Mercury in the argentiferous copper of Lake Superior. A sample of 200 kilogrammes, shewed, according to his analyses, the following composition:

Copper	138.560
Silver	10.906
Mercury	0.038
Veinstone	50.496
	200.000

Stafsfurtite.—The so-called compact boracite, from the salt beds of Stafsfurt, near Magdeburg, is considered by G. Rose (Pog. Ann. 1856, No. 5) to be distinct in its crystalline structure from the ordinary or monometric boracite, although according to Karsten's analysis it agrees with this in composition. It dissolves, however, with rapidity in heated hydrochloric acid (the solution depositing hydrated BO^3 on cooling;) and it fuses likewise with great ease. These effects may arise, nevertheless, from admixtures. G. Rose has bestowed upon it the name of Stassfurtite, but its assumption as a distinct species is at least premature.

Carnallite.—A soluble substance occurring with the above, has been analysed by Oesten in the laboratory of H. Rose. In its composition it is essentially a double chloride of potassium and magnesium after the formula (K Cl + 2 Mg Cl) +12HO. H. Rose has named it Carnallite, in honor of Herr Von Carnall, of the Prussian mines.

Tachhydrite.—Rammelsberg has examined a kindred salt from the same locality as the above. His analysis leads to the formula (Ca. Cl. + 2 Mg. Cl.) + 12HO. He has called the substance Tachhydrite, in allusion to its rapid deliquescence when exposed to the air. It occurs in rounded yellow masses, transparent to transludecent, and distinctly cleavable in at least two directions.

Voigtite.—This mineral (see above, p. 484) is named after M. Voigt, of the Saxe-Weimer mines.

Leucophane and Melinophane.—Rammelsberg (Pog. An. 1856, No. 6) has analysed specimens of these minerals, and proved their mutual identity. He deduces from his analyses: the formula Na Fl + (3 CaO, 2 SiO^3 + Be^2O^3, SiO^3.) For descriptions of these substances, see Dana's System of Mineralogy, 4th Ed., vol. 2, p. 182-3.

Vanadinite.—Rammelsberg has also given an analysis (with notice of the crystalline form) of Vanadinite from the limestone of Mount Ovir, near Windisch—Kappel in Carinthia. The substance is isomorphous with the pyromorphite group of minerals. System. Hexagonal. Prism $\infty\,\overline{\omega}$, on pyramid $\overline{\omega} = 130°$; $\overline{\omega}$ over polar edge =142° 30'; a (vert. axis.) to $\breve{a}$, as deduced from the latter angle=·727 : 1·0. Sp. gr. =6·886. Formula, as given by Rammelsberg, [Pb Cl + 3 (3 PbO

PO^5)] + 15 [Pb Cl + 3 (3 PbO, VO^3)]. Hence it appears that PO^5 and VO^3 are isomorphous.

ERRATUM.—In the note on Graptolites (p. 388) for Bryoza read Bryozoa.

The Curator of the Institute will feel greatly obliged by the loan of any specimens of Graptolites or Trilobites in the possession of members.

E. J. C.

ETHNOLOGY AND ARCHÆOLOGY.

INDIAN REMAINS.

The principal facts contained in the following notice of the discovery of Indian remains in the vicinity of Orillia, County of Simcoe, accompanied with tropical marine shells, and copper and other relics, are derived from an account in a recent number of the Toronto *Globe*. Indian mounds have been repeatedly opened in that neighbourhood; and we have in our possession crania and sepulchral relics found in one of these, which was explored in 1854. One of the skulls betrays unmistakeable evidence of the stroke of the tomahawk with which the old Indian met his death. The relics in the present case, however, have been found in hollows to which it would appear the term *Burrow* is applied: probably as a distinctive variation from that of the old Saxon Barrow, or Sepulchral Mound.

"About six miles from Orillia the North River crosses the Coldwater road, which runs on the old portage between Lake Couchiching and the Georgian Bay, and forms a natural valley with low heights on each side. On the northern height, about a quarter of a mile from the road, an Indian burrow was found last spring. Perhaps," adds the writer from whom we quote, "our readers may understand by a burrow a raised mound of a peculiar shape, but such is not the case. It is merely a slightly depressed hollow, of an oval shape, about ten feet in length, and eight in breadth. Sometimes it is difficult to distinguish it from the depression caused by the roots of a fallen tree. The discoverers of the one in question, on removing the surface earth, came upon layers of bones in various stages of decay and near the bottom they found a number of copper kettles, two large shells, some beads made of bone, and a quantity of hair. No pipes or tomahawks were found. The number of dead interred there must have been at least from 150 to 200, as one individual counted no less than 70 sculls that were thrown out, exclusive of those left in the burrow. The kettles are of superior workmanship, of various sizes, in excellent preservation, and tastefully formed; all of them have had iron handles, some of which are much corroded or entirely gone. A few have rims of iron, very much decayed around their tops."

Some of the beads have also been described to us as of glass, coarsely made; and the shells appear to have been specimens of the large tropical pyrulæ, repeatedly found along the shores of our northern fresh-water lakes, furnishing unmistakeable evidence of an intercourse carried on with the Gulf of Mexico, or the regions of Central America. In the present case the accompanying relics appear to indicate no very remote date for the sepulchral depository. From the iron rims and handles of the vessels, and the glass beads, they must at least be assigned to a period subsequent to the intercourse of the Indians with Europeans;

and the remains of some of their fur wrappings indicated a much shorter interval since their deposition.

The writer in the *Globe*, while hesitating to offer any very decided opinion, is inclined to believe that the remains are those of warriors, slain in battle. The chief grounds for this view are stated as follows:—

1. "In the spring, a skeleton was found at a short distance from the burrow, with every evidence of having been struck down by a tomahawk.

2. The height, where the remains were found, is one admirably fitted for a battle field.

3. The bodies seem to have been hastily interred. Most of them had on their ordinary dresses. A few remains of these were found with the fur yet perfect, the skins neatly sewn, and the fringe-like ornaments peculiar to Indian dresses, still distinct and undecayed. The corpses appear to have been hastily thrown in, and little or no earth thrown over them, as the only covering found over them was that formed by the accumulation of leaves that have fallen since their interment."

The relics, however, with which these human remains were accompanied seem irreconcileable with this view of the case. There was not only an absence of weapons of war,—which we cannot suppose would have been entirely removed when such objects as copper kettles, and the cumbrous tropical shells were left; but the latter are not objects with which a war party would be likely to burden themselves. The so-called burrow was more probably an Ossuary, into which the remains of the dead were promiscuously heaped, in accordance with known Indian customs, after the final honors and sacrifices had been rendered to the deceased. One of these Ossuaries, in the Township of Beverly, from which specimens of the same class of tropical shells were procured, has been noticed in this Journal, (Old Series, vol. III, p. 156.) The depression by which the locality of these recently discoved relics was indicated, is no doubt mainly ascribable to the decay of the human remains interred there. Dr. Schoolcraft speaks of some of these cemeteries as "Sepulchral trenches or Ossuaries, in which the bones of entire villages would seem to have been deposited;" and the appearance of hasty and partial inhumation described above has been noted in other examples.

The locality where these relics have been found appears to present a rich field for investigation; and it is gratifying to find such discoveries meeting with the attention evinced on this occasion. The narrator of the above facts observes: "The elevated ground that lies between Lakes Simcoe and Huron, seems to have been, in former ages, a favorite home of the Red Man. Abounding with numerous valleys, and studded with hills of various sizes, it has formed an admirable field for those sudden surprises and those stealthy attacks that distinguish Indian warfare. From its central position, it was probably a battle field for the hostile tribes residing in Canada, on the one hand, and the north-western nations on the other. This advantageous position of the district was discerned by the military genius of Sir John Colborne, who, with his wonted sagacity, foresaw that only amid those glens and wooded heights could a successful resistance be made to an invasion from the neighboring States. He accordingly matured a scheme for settling the district with military colonists, and establishing a chain of Indian settlements along the line of portage that connects Lake Couchiching and Georgian Bay. Various circumstances, however, prevented his plan from being successfully

carried out. This whole section of country is studded with Indian remains. In many places Indian burrows have been discovered, containing the remains of dead bodies, pottery, copper kettles, pipes, and other articles peculiar to the Red man. And a few years ago, a farmer in the township of Medonte found the remains of a small manufactory of pottery, in which were utensils of all kinds and sizes in various states of preparation. The writer of this has visited the spot. It lay on the side of a rocky eminence, and resembled one of those limekilns so common throughout the Province." As no knowledge of the potter's art seems to have survived among our north-western tribes, an account of the discovery of this native potter's kiln with a minute notice of its contents, and the condition in which they were found, if still recoverable, would be well worth putting on record.

SANDWICH ISLANDERS.

In the *Montreal Medical Chronicle* of June last, an interesting communication on "Diseases peculiar to the Sandwich Islands," from the pen of Dr. John Rae, a Canadian physician resident there, supplies some curious particulars relative to the physical idiosyncracies developed among the natives by contact with Europeans. Many of these are cutaneous diseases, but accompanied with peculiar symptoms, painfully suggestive of their origin from the vices of Europeans. One of these diseases, termed by the natives the *puupuu*, manifests its presence by red boils appearing at various parts, sometimes over the whole body. These ultimately form into fleshy prominences, projecting a quarter of an inch from the surface, and frequently an inch in diameter, which break and discharge. But what struck Dr. Rae as peculiar, when treating some of these cases, at Kaoli Hana, Mani, he thus describes:

"I was here first led to remark the extraordinary vigor with which the renovation of skin and cuticle goes on among this race. Although, in these cases, the original skin had been completely destroyed, yet, in a month or two, the scars were scarcely perceptible, being only noticeable, on a cursory view, by a more polished surface, and requiring a close inspection to trace the line of demarcation between the old and newly organized substance."

We shall not follow Dr. Rae into the purely professional details of his subject, but some of his observations on the changes produced on the natives by "the breaking up of the old order of things," consequent on European intrusion, are possessed of a wider interest. After referring to the increasing frequency of prevailing maladies, and to the effects resulting from a change of diet, consequent on the partial adoption of European habits; he adds the following remarks in reference to the influence of dress, which admit of a very extensive application:

"Again, the general adoption of something like the dress of civilized men, seems to have produced a change in their habit of body, which, physiologically, and perhaps ethnologically, is worthy of notice. Their hue has less of red and more of black in it. It would seem, that, when the surface of the body is exposed to the skyey influences, there is a greater rush of blood to the minute external vessels, reddening the hue. The whole person becomes, in a measure, face. May not this be one cause of the change of complexion which to a great extent has taken place in the Celtic and Germanic races? We know from Cæsar and Tacitus, that even in the severe winters of the Germany and France of those days, the hardy natives scorned much encumbrance of clothing as a mark of effeminacy,

and that fair hair and blue eyes were universal; cœrulei oculi rutilæque comæ. The present Gaul is generally swart, and so are very many Germans; and civilization a thousand years since gave these a general and warm covering to the whole person. Howeve· ..at may be, the alteration in hue, which I have noted, is a fact of which I have no doubt. It has been accompanied by a greater susceptibility to cold, and to the inroads of those diseases which that susceptibility produces."

D. W.

CHEMISTRY.

Chinoline.—Greville Williams has published *in extenso* his very beautiful researches upon the products of the distillation of cinchonine. Formerly chinoline was supposed to be the sole product, but Williams has shewn that it is a complex body containing two or more homologous alkaloids. He has now examined various chlorides, oxysalts and double salts of chinoline, also the action of æthylic, methylic and amylic iodides upon it, by which substitution bases are produced. Moreover, he has proved that lepidine, which accompanies chinoline, is also to be found in coal-tar, and he has succeeded in obtaining æthylo-lepidine. He has also discovered a new base in coal-tar, which he names cryptidine. These three are homologous nitrile bases. Chinoline, $C^{18}H^{7}N$,
Lepidine, $C^{20}H^{9}N$,
Cryptidine, $C^{22}H^{11}N$.

Iodine.—Kletzinsky denies the assertion of Chatin, that the absence of iodine from the air, is one of the causes of goitre and cretinism, inasmuch as he found no iodine in the air of Vienna, which is free from those complaints. This experiment was continued over a period of four months, and the potash-solution, through which the air was passed, was found to contain no iodine, but unmistakable traces of nitric acid. Ch. G. 329.

Test for Iodine.—Knop substitutes bromate for the iodate of potassa, employed by Liebig in testing for iodine, in those cases where a reducing agent, such as sulphurous acid, is present, by which of course iodine would be separated from the iodate. An excess of the bromate must be avoided, as the blue colour is destroyed. Ch. G. 332.

Nitric Oxide.—A. Brüning has examined the action of nitric oxide upon anhydrous sulphuric acid, and arrives at the conclusion that the nitric oxide absorbs one equivalent of oxygen from the sulphuric acid, forming sulphurous acid, and nitrous acid, which latter then unites with two equivalents of sulphuric acid, forming the solid substance described by Prevostaye and Rose, and which the latter considered to be a compound of nitric oxide. Ch. G. 332.

Fluorescence.—Von Babo and Müller have observed that the flame of sulphuretted hydrogen has remarkable power in producing fluorescence, as exhibited by a solution of quinine, an ætherial solution of chlorophyll, green and violet crystals of fluor-spar, and more especially by the yellowish-green uranium glass. Ch. G. 329.

Sulphate of Nickel.—Marignac has found that the quadratic crystals of sulphate

of nickel contain six and not seven atoms of water. At a temperature of 59°—68° F., he obtained rhombic crystals with 7 H O, at 86°—104° F., quadratic crystals with 6 H O, and at 122°—158° F., monoclinometric crystals with 6 H O. These remain transparent above 104° F.; at ordinary temperatures, they gradually become opaque, without loss of weight. Dimorphism, therefore, exists in the salt with 6 H O, but not in that with 7 H O.

From solutions of sulphate of magnesia at 158° F. of sulphate of zinc at 131° F., and of sulphate of cobalt at 122° F., he obtained compounds analogous in composition, and isomorphous with the above mentioned monoclinometric crystals. Ch. G. 329.

Silver.—Deville finds that silver is rapidly dissolved by hydriodic acid with evolution of hydrogen, especially if heat be applied; the iodide separates in large hexagonal prisms; palladium is also attacked, but slowly. Gold and platinum do not evolve any sensible amount of hydrogen, but are gradually dissolved. while all the common metals are dissolved with remarkable energy by hydriodic acid. Deville is inclined to class silver with mercury or even with lead.

Sesqui-Salts of Manganese.—Carius prepares the anhydrous sulphate of the sesquioxide, by forming an artificial brown oxide, by passing chlorine through a solution of carbonate of soda, in which proto-carbonate of manganese is suspended. *This, when dry, is triturated with sulphuric acid into a thin paste. The mixture* being heated in an oil bath, oxygen is evolved, but at 230° F., the evolution stops, and a violet gray mass is produced. At 270° the green sulphate is formed. It can be washed with nitric acid, and heated to 266° to drive off excess, and is then pure. It is very easily decomposable, and can only be kept in closed tubes, By absorption of water, hydrated sesquioxide is produced. It is not soluble in diluted sulphuric acid, unless some of the proto-salt be present, when it readily dissolves, forming a red solution.

Antimony.—Rose mentions some experiments by Weber to determine the atomic weight of antimony, the terchloride was precipitated by sulphuretted hydrogen, and the chlorine determined as usual; unless tartaric acid be used, a little chlorine remains with the sulphide. In this way, the number 1503.67 was obtained, agreeing closely with that of Schneider, viz., 1503. Rose adds that many years ago he determined the atomic weight from the two chlorides, and found 1513.14 and 1508.3.

Non-precipitation of Metals.—Martin has made some experiments on the influence of strong hydrochloric acid in preventing the precipitation of metals by sulphuretted hydrogen. Lead, cadmium, antimony, tin, mercury, bismuth, copper, and silver, are not wholly precipitated unless a large quantity of water be employed. Lead requires the smallest quantity of acid to retain it in solution, and the other metals in larger quantity, in the above order. The portion of the chlorides of copper, mercury, and bismuth, which remains dissolved, is converted into sub-chloride.

Arsenic Acid.—E. Kopp having prepared large quantities of this substance as a substitute for tartaric acid in the discharge style of calico-printing, was led to examine the different hydrates. $As O^5 + 4$ aq. separates from the gently evaporated solution in large crystals, heated to 202° F., a creamy substance, consisting of little needles, is formed, which is the terhydrate, $As O^5 + 3$ aq. If the solution be heated up to 284° or 356° F., rectangular prisms are formed, they are

hard and brilliant, having the formula $As\ O^5 + 2$ aq. If kept at 392° for some time, and then raised to 402°, the liquid becomes pasty, and at length forms a nacreous white mass of, $As\ O^5 +$ aq.

The different hydrates, heated to a dull red heat, give the anhydrous acid, which is quite inert, being insoluble in water, ammonia, &c., and not reddening litmus. It gradually liquefies.

Kopp found that if the hands be exposed to the arsenic acid, they at length swell considerably, and serious symptoms may be produced, washing with lime water seems to counteract its effects; the acid could be detected in the excretions, and although no alteration in general health was observed, a very visible increase took place in the weight of the body.

Phosphoric Acid.—Reissig has given a modification of Reynoso's process for the determination of this acid by means of tin; the acid being separated from the oxide by means of sulphuretted hydrogen, and determined by magnesia and ammonia. The process seems to give excellent results, and to be free from some of those objections, which render Reynoso's method inapplicable. Ch. G. 331.

H. C.

ENGINEERING AND ARCHITECTURE.

PRESERVATION OF TIMBER.

Plans for the preservation of timber have frequently attracted the attention of men of science, as wood is the most common material used in the arts, and from the acids contained in the sap, the decomposition of the woody fibre speedily commences, where these remain after the vital principle is extinguished by felling the tree. The method employed to eradicate the sap in the ordinary way is by cutting the tree into planks, and exposing the surface of such to the action of the atmospheric air during the heat of Summer. It is found that, according to the climate, from one to two years' exposure, render planks sufficiently seasoned or free from sap, but for large beams, joists, or girders, three or four years, or even a longer time, is necessary. Expensive means have been adopted in England, France, and on the continent of Europe, to imitate this natural process of drying, by placing the beams and planks in a large chamber of wood or metal and passing a current of air through the chamber by means of a fan at a heat considerably more elevated than the natural temperature. This system, although a very good one, involves too great an expense to render its adoption universal: and the joist or plank has to remain from two to three, or even four weeks under this action of hot air, before it is fully seasoned. Another and greatly simpler plan, adopted with some success, is by laying the trees, when fresh felled, in a running stream, when it is found that, after some weeks of immersion, the current has washed out the sap from the minute pores, and substituted the water of the stream.

The principle adopted in Mr. Kyan's patent process was the exhaustion, by means of an air pump, of a large cylinder, into which the wood to be seasoned was placed, and when fully exhausted, a solution of corrosive sublimate (chloride of mercury,) was allowed to flow in and enter the pores. Another process adopt-

ed by Mr. Kyan, was the injection of the same solution by direct pressure; but, in both cases, the great expense prevented the general adoption of plans otherwise perfectly successful.

The consideration of these methods have induced an engineer of Hamilton, Mr. Wm. G. Tomkins, to apply the same ideas more directly and more simply, and we propose to give a short description of a patent obtained by him, from his Excellency the Governor General, dated May 16, 1856, which in its heading enumerates the benefits to be derived as follows: "This Patent consists in the simple manner of inserting in the body of a tree different chemical compounds, by a hydrostatic process, or, by a hydrostatic apparatus, and in the use of a pneumatic apparatus for exhausting and drawing off the sap from a newly felled tree, or by vessels of compressed air, forcing out the sap, thereby seasoning the wood and rendering it more sound and marketable."

The manner in which this is effected, is of the utmost simplicity, and can be performed in a few hours at a nominal cost. A tree, newly felled and full of sap, or one in which the sap has been retained, by its lying immersed in water, is laid on the ground and the end cut off by a cross-cut saw, at right angles to the axis of the tree. On to this end is fixed a cap of metal, held firmly by small bolts, which pass through a ring kept in its place by screws or wedges. This hollow cap forms an air-tight chamber, and into the back a pipe is screwed, to connect with a vertical pipe of a quarter inch bore, and a cistern at twenty-five or thirty feet above, for the hydrostatic apparatus, or with a receiver and an air-pump for the pneumatic apparatus. By the former process it will be found that, with a head of 25 feet, and pure water in the cistern, a tree of 16 feet in length is permeated by the water in a few seconds, and a stream of sap will run continuously from the other end. By using the pneumatic apparatus, a pressure of 14lbs. to the square inch, equal to a head of water of 28 or 30 feet, will be acting by the weight of the atmosphere, drawing, or so to speak, sucking out the sap which falls into the receiver prepared for it, rendering the tree in a few hours perfectly free from sap; and this without any danger of warping or splitting which constantly takes place in the slower process of seasoning. The quantity of sap which is extracted by this mode equals from 20 to 40 per cent. of the weight of the tree, and hence the saving in carriage, by rail, by ship, or by canal, is of the utmost importance, besides having lumber worth ten per cent. more in the market, as its elements of decay have been withdrawn. After having abstracted the sap, the end of the tree may be immersed in a preservative liquid of any kind, such as corrosive sublimate, sulphate of copper, alum solution, or solution of sulphuric acid, to render the entire body of the tree free from dry-rot and incombustible; or if desirable, a coloring matter may be applied to dye the whole body of the tree, of any hue which may be wanted. In like manner, also, the patentee has impregnated a tree by the hydrostatic process, in a few hours, with the same substance. A tree twelve feet long became brilliantly red throughout in the course of three hours, with two penny worth of logwood: and all other dye stuffs may be used in the same manner. He proposes in his patent, likewise, to use heated air in the pores of the tree, either by the pneumatic process drawing it through the tree, or by compressing the heated air to 10 or 12 pounds to the inch; and then, as it were, blowing out the sap. Either mode may be adopted, and the expense is trifling. In our large Canadian saw mills, where 250 or 300 logs are passed under the saw in the day, all might be prepared the previous day with one or two pumps, and a

sufficient number of caps, the fixing of which would not occupy more than the attention of one man. The pumps at a cost of $30 or $40, would be worked by the motive power of the mill. The utility of this simple invention cannot be overrated, when we consider that Canada produced in 1853 the enormous quantity of 218,480,000 feet of lumber, and 38,740,000 cubic feet of squared timber, which would be worth, as declared by the Government accounts, £2,355,255. This is entirely for export, and we may safely estimate that the quantity required for home consumption, for railroads, bridges, shipping, houses, &c., must considerably exceed double this quantity. Any method which can be adopted to prevent the ravages of dry rot and decomposition, must prove an absolute saving to the country to a very considerable amount. These processes which we have briefly attempted to describe, seem to embody the requirements of simplicity and easiness of application; and, if they are proved by practical experience to accomplish all that their patentee promises, could be introduced, at a very slight expense, in the largest as well as the smallest lumber mills. With such a simple method, our houses and bridges might be made capable of lasting an indefinite period.

It is worthy of notice, in reference to these processes, that they serve in some degree to illustrate the small amount of pressure which nature seems to employ in the growth of trees. We here find, that with a head of twenty-five feet, water is driven, in about thirty seconds through a tree 16 feet long; so that in the natural process of the sap rising, the pressure must be scarcely perceptible, and probably, is nothing more than capillary attraction. When looking at the end of a beach or oak log, with its extremely minute pores, it would scarcely be believed that so slight a pressue could force the water through its minute channels, yet such appears to be the case, and it is owing to this wonderful provision of nature, that by the processes detailed above, these same pores may be employed as means of drying and seasoning the wood; or conveying through them, to the innermost heart of the tree, chemical substances, to render it incombustible, or completely to impregnate it with any coloring matter we may desire.

Scarcely anything strikes the observant traveller fresh from Europe, on his first arrival in Canada, more than the extent to which wood is used; especially in great public works, such as Railway viaducts, and bridges of all kinds, in piers and esplanades, and in many parts of the most substantial buildings, for which stone or iron would alone be considered suitable in Europe. The cause of this is obvious, from the great abundance, slight cost, and facility in working, of the wood; and if to these important qualities we can only add something of the permanency of stone and iron, by such economical processes as those referred to above; and further render it incombustible, as has been effectually, though not yet economically done, by Kyan's methods, the value of the results to Canada would be almost incalculable. One, if not both of these most desirable objects, Mr. Tomkins, of Hamilton, believes he has attained; and we can only hope his processes will be fairly and fully tested; and that if they prove successful he may meet with the reward he will be so fully entitled to.

F. W. C.

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST—AUGUST, 1856.

Latitude—43 deg. 39.4 min. North. Longitude—79 deg. 21 min. West. Elevation above Lake Ontario, 108 feet.

Day.	Barom. at temp. of 32°.				Temp. of the Air.				Mean Temp. + or − of the Av'age.	Tens. of Vapour.				Humidity of Air.				Direction of Wind.			Mean Direction.	Velocity of Wind.					Rain in Inches.
	6 A.M.	2 P.M.	10 P.M.	MEAN	6 A.M.	2 P.M.	10 P.M.	ME'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 A.M	2 P.M	10 P.M	Result.	ME'N	
					°	°	°	°	°																		
1	29.694	29.656	29.581	29.6395	59.2	81.3	71.4	71.20	+ 4.23	.426	.525	.402	.485	87	51	62	67	Calm.	S S E	E N E	S 70 E	0.0	9.2	3.8	3.11	5.00	...
2	.575	.455	.437	.4843	65.4	80.5	70.4	72.60	+ 5.75	.477	.605	.579	.559	78	60	81	73	N E b N	S E	N	N 80 E	3.8	8.8	13.4	0.97	6.42	0 145
3	.496	.550	—	—	65.3	74.1	—	—	—	.481	.629	—	—	79	77	—	—	N b E	S	N b E	N 8 E	13.4	9.2	5.5	3.50	5.69	...
4	.606	.610	.623	.6158	61.9	74.7	62.5	67.17	+ 0.37	.440	.436	.433	.454	82	52	78	71	N E b N	S	N W	S 14 E	3.6	7.8	4.7	1.21	4.38	...
5	.656	.633	.654	.6463	62.2	78.3	68.9	70.63	+ 3.83	.371	.614	.402	.454	68	.64	58	61	N b W	S b W	N b E	N 62 W	6.4	10.0	3.3	1.67	5.94	...
6	.649	.612	.582	.6085	64.3	77.5	68.9	70.58	+ 3.82	.460	.484	.419	.459	78	53	61	64	N N W	S W b S	N	N 12 W	10.3	12.2	9.5	2.67	7.36	...
7	.540	.405	.388	.4357	62.4	68.2	65.3	66.50	— 0.18	.432	.551	.449	.486	78	83	74	77	N N E	N b W	N W b N	N 83 W	4.0	3.6	8.5	3.43	5.69	0.090
8	.405	.438	.497	.4483	62.5	68.2	61.4	63.82	— 2.85	.418	.481	.444	.444	75	72	84	77	S W b S	S S W	W	S 75 W	8.8	10.8	7.2	5.96	7.01	0.035
9	.548	.553	.574	.5615	61.0	74.3	58.7	64.77	— 1.78	.451	.601	.384	.472	86	73	79	78	W S W	W	N W b W	N 56 W	6.0	8.8	3.6	6.54	7.61	...
10	.561	.459	—	—	56.4	72.9	—	—	—	.394	.509	—	—	89	67	—	—	Calm.	S S W	S W b W	S 40 W	0.0	15.8	3.2	5.38	6.38	Inap
11	.434	.407	.402	.4125	61.2	79.8	58.0	67.63	+ 1.20	.436	.401	.356	.379	83	40	76	61	W S W	W b N	S W	N 83 W	4.2	15.8	2.6	7.16	7.81	0.020
12	.371	.360	.388	.3757	61.4	71.4	57.2	63.52	— 2.32	.446	.592	.374	.450	84	80	82	78	N W	W	N N W	N 80 W	2.6	11.2	5.0	5.81	7.87	0.040
13	.394	.374	.445	.4050	54.2	67.7	62.8	63.67	— 2.57	.458	.392	.488	.418	87	60	88	74	Calm.	S W	N	S 85 W	0.0	4.0	3.5	1.49	4.63	...
14	.496	.490	.590	.5250	58.0	73.4	59.1	63.10	— 3.13	.397	.373	.344	.360	84	47	70	66	N W b N	S S W	N N W	N 59 W	10.4	14.0	10.4	5.76	9.31	...
15	.602	.601	.685	.6252	53.8	67.5	57.1	59.88	— 6.27	.357	.423	.372	.383	87	64	82	76	N W	S W b S	N N W	N 48 W	6.8	8.0	6.0	6.15	8.39	0.050
16	.692	.685	.730	.7075	55.6	68.3	57.1	60.73	— 5.30	.366	.375	.345	.361	85	55	76	71	N W b N	S W b S	N N W	N 31 W	7.6	7.5	9.2	5.56	7.78	0.085
17	.753	.719	—	—	57.4	70.4	—	—	—	.352	.395	—	—	77	54	—	—	N b E	S b W	S W b W	S 33 W	12.5	10.2	2.0	3.18	5.00	...
18	.628	.532	.381	.5087	58.0	67.8	61.5	62.17	— 3.67	.419	.397	.439	.419	86	60	82	77	S E b E	E S E	E N E	S 86 E	1.7	11.0	7.5	5.81	6.65	...
19	.257	.201	.174	.2043	61.9	60.4	30.7	61.13	— 4.63	.437	.470	.489	.462	81	92	94	88	E b N	E S E	N N E	S 87 E	9.3	14.8	5.0	5.75	7.26	0.405
20	.182	.215	.257	.2178	58.1	70.5	61.7	64.27	— 1.28	.438	.454	.417	.446	92	63	77	77	N W b W	N N W	N W b N	N 34 W	5.0	18.2	17.3	15.22	15.92	...
21	.331	.308	.485	.4107	60.7	64.1	60.4	62.52	— 2.92	.488	.428	.381	.430	94	.73	74	79	N N E	S b W	N b W	N 3 W	7.0	3.6	8.0	5.11	6.86	...
22	.524	.537	.519	.5277	57.8	73.6	62.5	65.18	— 0.17	.406	.467	.491	.466	87	58	80	78	N b W	S S W	S W	S 28 W	3.0	10.4	2.3	2.56	4.90	0.735
23	.462	.411	.470	.4498	61.1	74.0	62.6	66.45	+ 1.30	.490	.603	.457	.516	93	74	83	82	S E b E	S W	W b N	N 82 W	4.8	13.8	5.5	6.14	8.63	...
24	.477	.486	—	—	63.2	72.3	—	—	—	.483	.608	—	—	86	79	—	—	N W b N	N N W	N N W	N 15 W	19.4	16.4	9.5	10.46	10.63	0.020
25	.563	.616	.710	.6355	50.3	67.7	44.5	50.88	— 13.85	.316	.248	.236	.252	88	53	81	70	Calm.	N N W	Calm.	N 11 W	0.0	20.5	0.0	8.98	9.09	...
26	.756	.733	.737	.7428	46.7	64.6	54.6	56.58	— 7.95	.271	.312	.308	.299	86	.53	74	68	N N W	S b W	W N W	S 29 W	0.2	9.2	2.4	2.77	3.41	...
27	.756	.701	.680	.7070	47.6	70.0	55.7	59.17	— 5.15	.297	.425	.364	.374	91	.60	84	77	Calm.	S b E	Calm.	S 1 W	0.0	11.0	0.0	2.32	2.80	...
28	.599	.465	.460	.5045	54.9	72.2	62.5	63.88	— 0.25	.370	.428	.423	.423	88	.56	76	74	Calm.	S W b W	N	S 87 W	0 0	12.2	16.5	3.08	5.47	0.055
29	.476	.463	.543	.5013	55.5	61.9	54.8	57.73	— 6.08	.346	.328	.333	.328	80	.60	80	71	N W b W	W N W	W N W	N 65 W	3.2	12.8	4.4	8.57	8.78	...
30	.600	.626	.672	.6390	48.8	67.1	52.1	57.60	— 6 02	.302	.285	.256	.304	89	.44	66	66	N W b W	S S W	N W b N	N 68 W	5.4	12.4	2.8	4.13	6.60	...
31	.743	.797	—	—	51.3	66.4	—	—	—	.312	.293	—	—	85	38	—	—	Calm.	N b W	N	N 1 E	0.0	11.7	9.5	8.32	8.62	...
M	29.5310	29.5072	29.5238	29.5208	57.90	70.58	60.48	63.59	— 2.17	.401	.450	.402	.419	85	.62	.77	.73					5.14	11.13	6.20		7.03	1.680

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR AUGUST.

Highest Barometer ..... 29.797 at 2 p. m., on 31st } Monthly range=
Lowest Barometer ..... 29.174 at 10 p. m., on 19th } 0.623 inches.

Highest registered tembperature..... 82°7 at p. m., on 2nd } Monthly range=
Lowest registered temperature..... 41°5 at a. m., on 26th } 41°2

Mean maximum Thermometer..... 73°74 }
Mean minimum Thermometer..... 52°95 } Mean daily range = 20°79

Greatest daily range ..... 31°5 from p. m. of 12th to a. m. of 13th.
Least daily range..... 8°3 from p. m. of 19th to a. m. of 20th.

Warmest day..... 2nd ... Mean temperature..... 72°60 }
Coldest day..... 25th ... Mean temperature..... 50°88 } Difference = 21°72.

Greatest intensity of Solar Radiation ..... 98°5 on 12th } Monthly range=
Lowest point of Terrestrial Radiation ..... 32°5 on 28th } 66°0

Auroral Light observed on 5 nights, viz., 6th, 22nd, 23rd, 24th, and 31st; possible to see Aurora on 22 nights; impossible to see aurora on 9 nights.

No Snow this month. Raining on 12 days,—depth 1.680 inches—raining 23.6 hours.

Mean of cloudiness =0.48; most cloudy hour observed, 2 p. m., mean =0.63; least cloudy hour observed, 10 p. m., mean, =0.25.

Sum of the Atmospheric Current, in miles, resolved into the four Cardinal directions.

North.	South.	East.	West.
2601.46	1230.88	606.96	2253.63

Resultant direction of the wind, N 50° W.; Resultant Velocity 2.87 mils

Mean velocity of the wind..... 7.03 miles per hour.

Maximum velocity ..... 24.6 miles per hour, from 4 to 5 p. m. on 20th.

Most windy day..... 20th...Mean velocity 15.92 miles per hour.

Least windy day ..... 27th...Mean velocity 2.80 ditto.

Most windy hour ...2 to 3 p. m.....Mean velocity 10.75 ditto.

Least windy hour ...11 to Midnight.....Mean velocity 3.86 ditto.

Mean diurnal variation = 6.89 miles.

2nd—Thunderstorm, 10 p. m. till midnight.
9th—Shooting Stars numerous at night.
15th—Slight Thunderstorm, noon to 1 p. m.
16th—Imperfect Rainbow at 5 p. m.
18th—Imperfect Halo at midnight.
23rd—Heavy Thunderstorm, 3 to 7 a. m.

Lightning not accompanied by thunder occurred on 5 days.

Very heavy falls of Dew almost every night during the month.

The mean temperature of the month and the quantity of rain that fell were respectively 2°5 and 0.974 inches below the average, and the mean velocity of the wind 2.18 miles above the average of 9 years; the month, therefore, may be regarded as cold, dry and windy.

The total displacement of air during the month was equal to that produced by a wind blowing from N 50° W with an uniform velocity of 2.87 miles.

The total displacement during the months of August of the last 9 years, was equal to that of a wind from N 57° W velocity 0.89 miles.

COMPARATIVE TABLE FOR AUGUST.

Year.	Temperature.					Rain.		Wind.		
	Mean.	Diff. from Aver.	Max. obs'd.	Min. obs'd.	Range.	Days.	Incl's.	Resultant. Direction.	Resultant. Velocity.	Mean Force or 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	67.5	+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	4.55 miles.
1849	66.3	+0.2	79.5	51.4	28.1	10	4.970	N 73° W	0.59	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	4.62 "
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 29° E	0.87	4.23 "
1854	68.0	+1.9	98.1	47.0	51.1	5	0.455	N 62° W	1.75	4.74 "
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	2.87	7.03 "
Mean	66.06	...	84.09	46.19	37.89	9.5	2.654			4.85 miles.

MONTHLY METEOROLOGICAL REGISTER AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST, SEPTEMBER, 1856.

Latitude—43 *deg.* 39.4 *min. North.* *Longitude*—79 *deg.* 21 *min. West.* *Elevation above Lake Ontario,* 108 *feet.*

Day.	Barom. at temp. of 32°. 6 A.M.	2 P.M.	10 P.M.	Mean.	Temp. of the Air. 6 A.M.	2 P.M.	10 PM	M'E'N	Mean Temp. + or — of the Av'age.	Tens. of Vapour. 6 A.M.	2 P.M.	10 P.M.	M'N	Humidity of Air. 6 A.M.	2 P.M.	10 P.M.	M'N	Direction of Wind. 6 A. M.	2 P. M.	10 P.M.	Resultant Direction.	Direction of Wind. 6 A.M	2 P.M.	10 P.M.	Result'.	M'E'N	Rain in inches.
1	29.965	29.968	29.943	29.9587	50.1	61.6	49.0	53.87	— 9.17	.287	.303	.294	.295	.81	.57	.86	.74	N N E	S E	S E b E	East	7.8	7.6	2.8	4 66	6.22	...
2	947	907	866	.9035	48.5	67.1	50.3	56.37	— 6.37	268	254	271	268	80	39	75	63	N E b N	S	S E b E	N 89 E	8.0	6.7	4.6	2.47	5.33	...
3	858	808	787	.8155	49.9	68.3	52.8	58.73	— 3.70	252	386	354	335	71	57	90	70	N N E	S E b E	E S E	S 69 E	2.4	4.5	2.2	3.91	4.46	...
4	853	812	803	.8200	50.4	75.1	60.8	63.47	+ 1.35	303	428	414	402	84	51	80	72	E N E	S b E	E S E	S 70 E	3.0	5.4	6.2	2.47	3.82	...
5	806	777	765	.7777	56.7	66.4	63.7	63.10	+ 1.27	381	500	536	493	84	80	93	87	N E	S E b S	S W b S	S 20 E	4.0	3.0	6.0	1.64	3.07	0.240
6	727	697	731	.7205	64.3	74.1	67.1	68.55	+ 7.12	544	630	601	595	93	78	93	88	S W	S W b S	N b W	S 27 W	4.2	11.6	2.2	2.82	5.86	...
7	762	662	—	—	62.6	58.9	—	—	—	484	429	—	—	88	88	—	—	E	E	N E b E	S 88 E	15.0	18.5	2.0	6.72	8.70	0.505
8	711	692	729	.7143	54.6	73.2	59.7	63.35	+ 2.62	389	532	440	454	93	67	87	81	W b N	S W b S	S W b W	S 52 W	5.0	13.3	5.2	5.65	5.99	...
9	739	670	601	.6628	56.2	75.6	65.0	66.35	+ 6.00	337	479	485	435	76	56	80	69	S W	S b E	S b E	S 8 W	6.5	12.2	1.2	3.28	3.72	...
10	554	398	318	.4055	66.1	75.1	73.1	71.83	+11.78	586	683	681	646	94	81	86	86	S W b S	S W	W b N	S 64 W	2.6	15.6	13.0	9.71	10.69	0.725
11	358	438	589	.4748	65.7	71.8	56.7	64.70	+ 5.05	501	305	315	357	82	40	70	61	W	W b N	N N W	N 60 W	7.0	24.0	6.6	12.41	13.10	...
12	616	549	412	.5210	47.7	62.5	60.0	57.50	— 1.73	268	338	416	357	82	62	82	77	N N W	S S E	N E b E	S 18 E	5.5	8.5	2.0	3.52	6.25	0.225
13	331	467	625	.4853	57.4	67.6	53.8	59.53	+ 0.68	383	359	321	359	83	54	79	73	W	N W	N W	N 62 W	6.2	21.0	6.0	12.33	12.59	0.020
14	697	651	—	—	45.4	66.0	—	—	—	277	372	—	—	92	60	—	—	N W b W	S S E	S W	South	1.2	5.5	5.8	2.63	4.24	...
15	539	481	667	.5687	53.1	72.5	53.1	60.82	+ 2.90	359	474	291	377	90	61	73	72	Calm	N N W	W N W	N 56 W	0.0	14.2	8.5	8.89	9.75	...
16	728	751	741	.7365	50.4	63.2	54.6	57.22	— 0.30	303	332	341	330	84	59	82	72	N N W	S b W	N N E	S 57 W	5.0	8.2	2.0	1.24	5.57	...
17	597	497	527	.5432	54.2	66.5	59.9	60.62	+ 3.62	368	412	447	429	90	65	88	83	S	E	N E	N 79 E	3.0	7.0	10.6	4.44	5.78	0.640
18	445	317	458	.4043	58.9	68.0	58.1	60.27	+ 3.65	474	3.1	262	368	97	58	55	72	E b N	W S W	W S W	S 42 W	9.4	22.4	10.2	8.15	11.83	0.050
19	528	541	586	.5573	53.2	64.1	52.8	57.28	+ 1.17	242	266	267	250	61	45	68	56	S W b W	S W b W	W	S 60 W	7.8	17.6	5.3	9.40	10.26	...
20	637	655	769	.6910	42.7	61.0	48.9	52.43	— 3.17	240	231	248	248	89	44	73	66	N W b N	W N W	N W b N	N 62 W	1.3	16.7	1.0	6.28	6.72	...
21	774	723	—	—	42.7	49.7	—	—	—	230	301	—	—	85	86	—	—	Calm	N W b W	N W b N	N 28 W	0.0	13.0	3.8	1.93	3.97	0.020
22	685	632	610	.6363	37.4	55.0	48.1	47.67	— 6.97	193	251	263	240	87	59	80	74	N W b N	S b W	N N W	N 33 W	1.4	7.6	5.0	1.15	4.12	...
23	582	541	508	.5365	42.7	52.8	44.5	47.37	— 6.85	223	251	226	232	82	64	78	73	W N W	W S W	N W	N 32 W	5.8	4.0	7.4	4.83	5.74	...
24	463	423	519	.4725	38.8	51.3	41.5	44.43	— 9.32	195	228	202	218	83	62	78	76	W N W	N W	W	N 48 W	2.4	10.6	2.2	6.26	6.59	0.015
25	482	333	341	.3812	41.8	54.2	50.3	48.47	— 4.77	215	290	277	260	82	70	78	77	W S W	S W b S	S W	S 35 W	2.0	15.0	2.9	6.11	6.33	Inap
26	395	434	584	.4775	45 1	60.7	48.2	52.65	— 0.08	263	320	269	290	89	62	80	75	Calm	N W	N W b W	N 79 W	0.0	5.6	2.0	4.82	5.15	...
27	670	637	672	.6648	43.8	59.4	52.8	52.32	+ 0.10	243	287	304	285	86	58	77	74	W N W	S b W	E b N	S 18 E	3.2	3.2	4.2	1.52	4.34	...
28	617	401	—	—	49.5	61.5	—	—	—	314	345	—	—	89	64	—	—	E b N	E b N	W b N	S 59 E	4.0	11.4	19.5	2.77	8 48	0.015
29	480	490	463	.4725	47.8	53.8	48.1	49.90	— 1.42	284	311	304	307	88	76	92	87	S W	S S W	S S W	S 30 W	0.8	0.6	1.2	1.57	1.57	1.195
30	315	195	151	.2050	43.4	51.6	46.8	46.98	— 3.83	265	286	293	287	95	76	94	90	Calm	W N W	W b N	S 84 W	0.0	6.4	17.6	5.05	5.58	0.455
M.	29.6158	29.5800	29.6059	29.6001	50.80	64.33	54.59	57.15	— 0.34	.322	.366	.351	.351	.85	.61	.81	.75					4.15	10.70	5.64	...	6.53	4.105

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR SEPTEMBER.

Highest Barometer . . . . . 30.013 at 8 a. m. on 1st } Monthly range=
Lowest Barometer . . . . . 29.149 at 4 p. m. on 30th } 0.864 inches.

Highest registered temperature . . . . 78°4 on p. m. of 8th } Monthly range=
Lowest registered temperature . . . . 35°0 on a. m. of 22nd } 43°4

Mean maximum temperature . . 66°69 } Mean daily range = 21°03
Mean minimum temperature . . 45°66 }

Greatest daily range . . . . . 29°5 from p. m. of 11th to a. m. of 12th.
Least daily range . . . . . 10°0 from p. m. of 7th to a. m. of 8th.

Warmest day . . 10th ... Mean Temperature . . . 71°83 } Difference=27°40.
Coldest day . . . 24th ... Mean Temperature . . . 44°43 }

Greatest intensity of Solar Radiation . . 92°2 on p. m. of 9th } Monthly range=
Lowest point of Terrestrial Radiation . 25°5 on a. m. of 25th } 66°7

Aurora observed on 3 nights, viz.: on the 8th, 16th and 26th; possible to see Aurora on 20 nights; impossible to see Aurora on 10 nights.

Raining on 13 days; depth, 4.105 inches; duration of fall, 54.9 hours.

Mean of cloudiness=0.49; most cloudy hour observed, 4 p. m., mean=0.55: least cloudy hour observed, 8 a. m., mean=0.41.

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

North.	South.	East.	West.
1212.64	1496.85	1001.26	2398.08

Resultant direction of the wind, S 79° W; Resultant Velocity, 1.98 miles per hour.

Mean velocity of the wind . . . . 6.53 miles per hour.
Maximum velocity . . . . . 27.8 miles per hour, from 10 to 11 a. m. on 13th.

Most windy day . . . . . 11th—Mean velocity, 13.10 miles per hour.
Least windy day . . . . . 29th—Mean velocity, 1.57 do

Most windy hour . Noon to 1 p. m—Mean velocity, 10.91 do } Difference
Least windy hour . . . 5 to 6 a. m.—Mean velocity, 3.96 do } 6.95 miles.

Thunderstorms occurred on the 10th, 12th, and 17th.

Lightning, not accompanied by Thunder, on 19th, 22nd, and 26th.

Rainbow (very perfect) at 3.30 p. m., on the 24th.

Hailstones mingled with the rain at 7 a. m., on 13th.

First Frost of the season, a. m., on the 21st.

Heavy Dew very prevalent during this month.

COMPARATIVE TABLE FOR SEPTEMBER.

YEAR.	TEMPERATURE. Mean.	Difference from Average.	Maximum observed.	Minimum observed.	Range.	RAIN. No. of days.	Inches.	WIND. Resultant. Direction.	Resultant. Velocity	Mean Velocity.
	°	°	°	°	°			°		
1840	54.0	— 4.0	70.2	29.4	40.8	4	1.380	—	—	—
1841	61.3	+ 3.3	79.9	37.5	42.4	9	3.340	—	—	0.26 lbs.
1842	55.7	— 2.3	83.5	28.3	55.2	12	6.160	—	—	0.45 "
1843	59.1	+ 1.1	87.8	33.1	54.7	10	9.760	—	—	0.57 "
1844	58.6	+ 0.6	81.5	29.6	51.9	4	Impft	—	—	0.26 "
1845	56.0	— 2.0	76.8	35.3	43.5	16	6.245	—	—	0.34 "
1846	63.6	+ 5.6	84.0	39.0	45.0	11	4.595	—	—	0.33 "
1847	55.6	— 2.4	74.8	38.1	36.7	15	6.665	—	—	0.33 "
1848	54.2	— 3.8	80.9	29.5	51.4	11	3.115	N 71 W	2.38	5.81 miles
1849	58.2	+ 0.2	80.6	33.5	47.1	9	1.480	N 75 W	0.69	4.23 "
1850	56.5	— 1.5	76.0	31.7	44.3	11	1.735	S 65 W	1.02	4.78 "
1851	60.0	+ 2.0	86.3	33.4	52.9	9	2.665	N 14 E	1.03	5.45 "
1852	57.5	— 0.5	81.8	36.1	45.7	10	3.630	N 77 W	0.53	4 60 "
1853	58.8	+ 0.8	85.4	36.1	49.3	12	5.140	N 5 E	1.05	4.30 "
1854	61.0	+ 3.0	93.1	36.3	56.8	14	5.375	N 23 W	1.42	4.31 "
1855	59.5	+ 1.5	81 7	36.1	45.6	12	5.585	N 20 E	1.29	7.61 "
1856	57.1	— 0.9	77.3	37.4	39.9	13	4.105	S 79 W	1.98	6.53 "
Mean	58.04	...	81.39	34.14	47.25	10.7	4.436	—	—	5.29

METEOROLOGICAL TABLE FOR KINGSTON, 1854.

Latitude, 44 deg. 13.30 min. North; Longitude, 76 deg. 31.51 min. West. Height above level of the Sea, 280 feet.

Observations made at 9½ A. M., and 3½ P. M., at the Office of the Royal Engineers.

	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Mean.
Mean Temperature	21.5	17.15	29.	38.25	54.46	62.5	70.	67.	57.5	46.5	35 25	22.5	43.47
Highest Temperature	50.	43.	51.5	61.	79.	86.	87.	89.5	83.	69.	63.	44.	...
Lowest Temperature	14.5	−10.	−18.	10.	30.	39.	48.	46.	29.	25.	13.	−14.	...
Mean Maximum Temperature	29.	27.	35.1	44.8	65.77	71.	80.	77.	67.	54.	41.5	26.	...
Mean Minimum Temperature	14.	7.3	22.9	31.7	43.15	54.	60.	57.	48.	39.	29.	19.	...
Mean height of Barometer	29.728	29.646	29.432	29.716	29.645	29.613	29.681	29.687	29 752	29.745	29.499	29.533	29.6395
Highest Barometer	30.338	30.304	30.136	30.205	30.003	29.962	29.989	29.918	30.164	30.129	30.154	30.274	...
Lowest Barometer	29.123	29.167	28.999	29.221	29.383	29.297	29.378	29.434	29.394	28.974	28.828	28.105	...
Mean of Cloudiness	.5	.5	.4	.45	.24	.3	.30	.3	.94	.45	.725	.7	...
Mean direction of the Wind	W by N	W by S	W	N N E	S W	S E	S W	S W	N	W by S	N by W	N E	...
Mean pressure in lbs.	1.5	1.	1.25	1.	.95	.56	.5	.55	.92	1.04	1.5	1.9	...
Number of days Rain	3	3	9	6	5	10	4	6	8	8	4	4	70
Total amount of Snow (inches)	11	20	4	2	...	...	...	...	...	...	...	21.5	...
Number of days Snow	14	12	5	3	...	...	...	...	...	...	10	9.	53
Number of fair days	15	13	17	21	26	20	27	25	22	23	16	18	243
Number of Thunder storms observed	...	...	1	...	...	3	3	2	1	...	...	...	...

GENERAL REMARKS.—Lake completely frozen over 8th January. Navigation of Lake Ontario opened 11th April—that of River St. Lawrence to Montreal on 25th April.

MONTHLY METEOROLOGICAL REGISTER, ST. MARTIN, ISLE JESUS, CANADA EAST—AUGUST, 1856.

(NINE MILES WEST OF MONTREAL.)

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

Latitude—45 *deg.* 32 *min. North. Longitude*—73 *deg.* 36 *min. West. Height above the Level of the Sea*—118 *feet.*

Day.	Barom. corrected and reduced to 32°			Temp. of the Air.			Tension of Vapor.			Humidity of Air.			Direction of Wind.			Velocity in miles per hour.			Mean direction of Wind.	Rain in Inches.	Snow in Inches.	WEATHER, &c. A cloudy sky is represented by 10; A cloudless sky by 0.		
	6 A.M.	2 P.M.	10 P.M.	6 A M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6A.M.	2P.M.	10PM	6 A. M.	2 P.M.	10 P.M	6A.M.	2P.M.	10 PM				6 A. M.	2 P. M.	10 P. M.
1	29.802	29.863	29.808	61.9	91.0	66.9	.527	.638	.600	96	46	89	sw by s	W	s by w	0.00	0.62	0.42	w ° 11 s	...	...	Clear.	Clear.	Clear.
2	.767	.708	.612	70.6	93.2	75.7	.623	.739	.670	86	46	78	SE by s	W S W	s by w	0.07	2.04	0.72	w 30 s	...	...	Clear.	Clear.	Do.
3	.448	.552	.712	74.0	75.0	62.0	.881	.739	.528	82	86	94	S S W	S S W	NWbW	4.07	2.63	3.42	w 15 s	0.660	...	Cir. 10.	Cir. Str. 4.	Cir. Str. 3.
4	.754	.728	.726	61.9	76.0	63.3	.499	.406	.516	89	45	89	N N W	sw b w	sw b w	0.23	1.64	0.02	w 15 N	0.060	...	Do. 4.	Do. 4.	Do. 10.
5	.704	.768	.805	63.5	75.0	62.7	.546	.578	.528	91	67	93	N by E	NE by N	S S W	0.01	0.07	1.36	N 5 E	...	...	Do. 10.	Do. 10.	Do 10.
6	.756	.895	.662	61.4	64.4	62.8	.560	.565	.559	96	92	96	N N E	N by E	NE b E	1.28	10.20	12.15	N 30° E	2.100	...	Rain.	Rain.	Do. 10.
7	.587	.501	.551	65.0	72.5	66.3	.586	.704	.615	93	90	96	N by E	S S W	S	13.02	0.55	0.87	N 20° W	0.796	...	Cir. Str. 10.	Rain.	Rain.
8	.556	.683	.641	64.9	77.2	62.5	.571	.681	.551	98	74	95	S S E	S S W	S by E	0.70	1.70	0.06	s 12 W	0.261	...	Rain.	Cir. Str. 6.	Cir. Str. 9.
9	.641	.612	.696	61.0	79.8	64.4	.521	.692	.560	98	71	90	W by S	S W	SWbyW	0.00	0.48	2 72	S 11 W	...	...	Cir. Str. 8.	Cir. Str. 4.	Str. 2.
9	.641	.612	.696	61.0	79.8	64.4	.699	.559	.555	89	55	89	W S W	W b S	S S W	1.42	7.17	7.07	W 34.5	...	...	Cir. Cm. St. 6	Do. 8.	Clear.
10	.703	.640	.664	62.1	80.2	65.2	.699	.559	.555	89	55	89	S	S W b W	SWhy W	1.32	2.63	1.70	S 40 W	Inp	...	Clear.	Cr. Cm. St. 8.	C. S. 4, Lt. Th.
11	.470	.588	.491	64.2	63.0	64.1	.565	.650	.534	94	58	89	S	S W b W	S W by W	0.08	2.26	0.02	E 40 S	0.060	...	Cir. Str. 8.	C. C. St. 8.	Do. 2.
12	.517	.484	.427	60.9	62.0	60.1	.467	.512	.514	89	90	94	N W	E by S	S by W	0.08	2.26	0.02	E 40 S	0.060	...	Do. 6.	C. St. 8.	Str. 10.
13	.456	.531	.558	61.1	69.4	59.4	.483	.601	.487	89	85	94	S W	S W b W	S W by W	2.33	6.76	2.57	W 54 S	...	...	Clear.	C. C. 2.	Clear.
14	.561	.491	.605	67.0	75.3	59.8	.506	.607	.426	76	71	84	W	W by N	N W by N	0.57	7.42	0.06	W 11 N	...	...	Cum. 2.	C. St. 2.	Cir. Str. 8.
15	.667	.707	.652	62.0	74.0	61.2	.472	.617	.456	84	74	84	N W	W by N	W by N	1.72	7.52	4.72	W 11 N	...	...	Cir. Str. 4.	C. C. St. 6.	Cir. Str. 4.
16	.721	.801	.814	60.8	71.1	60.9	.494	.630	.499	94	90	87	W by N	S W	W by S	1.82	0.77	4.63	W 23 N	0.739	...	Cir. Cum. 4.	C. St. 4.	C. C. S. 8, AB.
17	.808	.806	.887	58 9	73.4	54.0	.478	.628	.571	94	78	94	N N E	S	N W b N	1.77	2.03	0.00	N 34 E	...	...	Cir. Str. 10.	Do. 6.	Clear.
18	.810	.853	.776	58.8	79.2	61.2	.462	.659	.483	93	67	89	NE by N	S S E	E	1.20	1.81	1.50	E 55 S	...	...	Cir. Cm. St. 4.	C. C. Str. 4.	Clear.
19	.603	.619	.821	62.4	80.4	61.2	.528	.787	.483	90	78	89	SE by E	S E	S S E	4.91	2.30	4.14	S 34 E	...	...	Nimb. 10.	Cum. 2	Cir. Str. 10.
20	.547	.417	.406	59.6	62.0	59.0	.478	.472	.478	94	82	94	E N E	NE by E	E by S	8.92	11.55	7.60	E 24 N	4.102	...	Cir. Str. 6.	C. Str. 10.	Do. 10.
21	.400	.411	.446	46.2	59.0	54.2	.282	.422	.426	86	85	94	S E	S E	E by N	16.09	9.79	0.63	E 16 S	0.732	...	Cr. Cm. St. 4.	C. C. Str. 6.	Clr. Aur. Bor.
22	.476	.512	.617	60.1	73.1	59.6	.467	.480	.478	89	61	93	N	W	W	0.60	1.49	0.14	S 40 W	...	...	Cir. Str. 10.	Rain.	Cir. Str. 10.
23	.664	.612	.659	64.7	67.0	61.0	.534	.593	.511	89	89	93	E	E S E	S S W	1.00	0.07	0.00	S 24 W	Inp	...	Do 10.	Do. Thunr.	Clear.
24	.513	.472	.609	60.8	69.1	63.0	.511	.521	.467	94	70	89	W N W	N	N N W	0.00	1.25	0.77	N 11 W	0.030	...	Cir. Str. 4.	Cum. Str. 6.	Do.
25	.631	.519	.692	56.6	59.8	43.1	.363	.441	.252	70	84	85	W N W	N N W	W by N	3.59	5.20	12.51	N 34 W	...	...	Clear.	C. Str. 4.	Cir. Str. 4.
26	.788	.749	.818	49.5	61.6	47.7	.312	.383	.312	86	71	87	S W	W	S W	3.37	7.47	19.00	W 20 N	...	...	Cir. Str. 9.	C. Str. 4	Clear.
27	.887	.865	.901	50.0	70.4	56.4	.340	.515	.432	89	70	91	NE by E	W N W	S E	2.30	2.72	0.16	W 24 N	Inp	...	Cr. Cm. St. 8.	C. Str. 8.	C. St. 8, Light.
28	.804	.644	.400	58.4	76.4	64.2	.462	.659	.566	91	74	94	S E	S S E	S S W	0.16	0.26	4.57	S 12 E	...	...	Rain.	C. Str. 8.	C. Str. 4.
29	.448	.458	.525	62.0	72.2	56.8	.538	.638	.432	97	82	94	S by W	S b W	W	3.22	1.13	7.03	S 8 W	0.333	...	Cir. Str. 6.	Do. 4.	Clear.
30	.578	.613	.734	56.0	72.3	52.5	.326	.473	.326	87	64	81	W b S	W	W N W	9.00	11.60	4.55	W 11 N	0.040	...	Clear.	Clear.	C. St. 2, Au. B
31	.801	.853	.982	53.6	63.5	46.3	.293	.411	.282	80	71	86	W N W	W N W	N N W	3.02	8.05	11.73	W 33 N	...	...			

MONTHLY METEOROLOGICAL REGISTER, ST. MARTIN, ISLE JESUS, CANADA EAST—SEPTEMBER, 1856.

(NINE MILES WEST OF MONTREAL.)

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

Latitude—45 *deg.* 32 *min. North. Longitude*—73 *deg,* 36 *min. West. Height above the Level of the Sea*—118 *feet.*

Day.	Barom. corrected and reduced to 32° Fahr.			Temp. of the Air.			Tension of Vapor.			Humidity of Air.			Direction of Wind.			Mean direction of Wind.	Velocity in miles per hour.			Snow Inches.	Rain in Inches.	Weather, &c. A cloudy sky is represented by 10; A cloudless sky by 0.		
	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.		6 A.M.	2 P.M.	10 P.M.			6 A.M.	2 P.M.	10 P.M.
1	30.122	30.056	30.072	40.6	68.2	50.1	.260	.422	.326	.90	.62	.86	NW b W	W S W	W by S	w 11 N	5.35	1.32	3.07	...	...	Frost. Clear.	Clear.	Clear. Aur. Bor.
2	.046	29.952	.004	50.2	79.4	58.8	349	597	457	92	61	89	W by N	S W	S S W	s 23 w	0.00	2.80	0.00	...	...	Cir. Str. 4.	Do.	Do.
3	.023	29.882	29.885	51.0	83.0	59.9	371	621	426	90	57	84	W by S	W S W	S S W	w 35 s	0.02	1.21	0.22	...	...	Fog.	Do.	Do.
4	29.933	.854	.932	54.9	82.3	64.1	418	571	452	93	54	76	W	W S W	W by S	w 23 s	2.00	5.05	4.35	...	...	Clear.	Do.	Do.
5	.921	.940	.904	62.2	85.8	64.4	472	692	534	84	58	89	S W by S	S S W	S S W	s 34 w	1.55	7.65	0.18	...	...	Do.	Do.	Cir. Str. 10.
6	.846	.744	.788	64.0	86.1	69.9	534	787	634	88	65	90	S W by W	W by S	W by S	w 28 s	1.74	5.61	0.86	...	0.023	Cir. Str. 10.	Cir. Str. 4.	Do. 8.
7	.950	.948	.902	48.8	65.0	55.1	261	449	372	74	71	84	E N E	S E	N E b E	E 34 N	16.48	5.82	3.72	...	...	Clear.	Do. 8.	Rain.
8	.714	.744	.808	54.6	74.1	60.3	418	532	468	94	64	89	N W b W	W N W	S W by S	W 11 N	3.52	0.60	3.75	...	0.500	Rain.	Do. 4.	Cr. St. 2. Aur. Br.
9	.910	.829	.786	55.5	74.8	64.4	418	617	534	91	74	89	N W	S W	S S E	S 40 W	0.12	1.55	0.12	...	Inp	Clear.	Do.	Ninb. 10.
10	.701	.504	.485	64.5	80.3	71.1	565	761	715	93	76	93	S S E	S S W	S W by S	S 27 W	0.21	3.90	4.07	...	0.266	Do.	Do. 8.	C. St. 8. Dis. thu.
11	.341	.514	.600	64.0	69.6	60.1	565	541	399	94	76	77	W	W by S	W b S	W 11 S	6.95	6.45	18.01	...	0.670	Cir. Str. 10.	Do. 6.	Str. 2.
12	.757	.662	.684	53.4	63.9	52.0	361	476	349	87	79	87	N E	N W	S	W 40 N	5.22	0.74	1.42	...	...	Clear.	Do. 4.	Cir. Str. 8.
13	.556	.498	.635	48.9	64.1	49.1	336	425	326	93	71	93	S E	N N W	N W b N	N 34 W	0.06	4.92	5.86	...	0.660	Rain.	Rain.	Do. 2.
14	.799	.772	.800	53.4	70.0	52.1	315	515	349	76	70	87	N N W	W by S	S	W 10 S	7.57	2.07	1.62	...	...	Clear.	Cir. Str. 4.	Cir. 2.
15	.583	.541	.648	50.2	66.0	50.7	361	544	349	96	85	92	S S E	S S E	W S W	S 10 E	0.08	0.75	4.20	...	0.283	Str. 2.	Rain.	Cir. Str. 4.
16	.814	.781	.844	46.3	66.3	48.1	303	505	302	93	66	86	W b S	N W	W N W	W 34 N	1.02	11.93	4.24	...	...	Clear.	Cir. Str. 4.	Do. 10.
17	.856	.793	.750	45.6	50.3	47.3	315	326	313	96	87	93	W S W	E N E	N E by E	E 34 N	1.80	0.17	0.35	...	0.283	Rain.	Do. 10.	Do. 8.
18	.667	.538	.491	45.8	69.0	66.6	319	550	568	99	77	79	N E b E	N E by E	W by S	E 34 N	0.70	6.35	4.56	...	Inp	Cum. Str. 10.	Clear.	C. St. 10. Dis. thu.
19	.576	.737	.817	49.7	68.3	55.7	281	400	351	80	58	79	W by S	S W b W	S S W	W 34 S	4.21	15.60	12.18	...	...	Clear.	Cir. Str. 4.	Clear.
20	.807	.752	.822	33.6	74.2	55.4	349	485	372	81	55	84	W	W	S S W	S 34 W	0.91	0.15	1.70	...	...	Do.	Cir. Cm.	Do.
21	.858	.785	.817	42.0	63.6	50.8	263	345	326	90	59	87	S S W	W by N	W b N	W 1 N	0.41	0.41	1.31	...	...	Do.	Cir. Cm. Str. 4.	Str. 10.
22	.791	.713	.779	49.8	61.0	46.2	336	362	303	90	66	90	N E by E	E N E	E by S	E 34 N	0.01	2.21	2.71	...	...	Cir. Cm. St. 4.	Cir. Str. 4.	Clear.
23	.654	.591	.551	46.2	53.0	49.4	304	386	349	96	93	93	N by W	N N E	N W	N 34 E	3.85	0 61	5.96	...	0.133	Rain.	Rain.	Str. 4.
24	.394	.383	.501	48.0	51.6	44.6	324	326	261	93	81	86	W N W	N	W S W	N 14 W	0.29	8.85	10.00	...	0.030	Cir. Str. 8.	Cir. Str. 8.	Cir. Aur. Bor.
25	.605	.551	.452	43.0	58.0	51.0	252	346	337	85	70	87	W S W	S W	S by W	S W	8.57	9.52	6.40	...	Inp	Clear.	Do. 6.	Cir. Str. 10.
26	.536	.505	.627	49.6	66.7	52.1	312	464	349	86	72	88	S S W	W S W	S S W	S 30 W	4.05	2.45	0.17	...	Inp	Cir. Str. 8.	Do. 2.	Do. 2. Dis. thu.
27	.699	.797	.841	47.3	60.2	46.7	337	393	282	98	75	86	W S W	W	N N W	W 11 S	2.87	2.22	3.12	...	...	Do. 10.	Do. 8.	Clr. Aur. Bor.
28	.889	.771	.783	41.0	68.2	50.0	257	470	314	96	69	82	E N E	S S E	S E by S	S 23 E	1.27	3.75	3.81	...	...	Cl. Light frost.	Clear.	Do.
29	.776	756	.765	55.0	64.9	52.1	347	425	304	84	71	80	S by E	S S E	S E by S	S 11 E	3.42	23.80	6.22	...	...	Cir. Str. 6.	Cir. Str. 8.	Do.
30	.684	.526	.276	51.1	56.3	54.2	337	385	400	87	84	93	E N E	E S E	E N E	E 11 N	8 40	8.51	14.10	...	0.723	Do. 9.	Do. 10.	N. 10. R/n. D.T.

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

Barometer	Highest, the 31st day	29.982
	Lowest, the 21st day	29.400
	Monthly Range	0.582
	Monthly Mean	29.649
Thermometer	Highest, the 2nd day	97°.6
	Lowest, the 26th day	39°.4
	Monthly Range	58°.2
	Monthly Mean	63°.20
Greatest Intensity of the Sun's Rays		118°.4
Lowest Point of Terrestrial Radiation		38°.1
Amount of Evaporation		2.61
Mean of Humidity		.834

Rain fell on 15 days, amounting to 9.913 inches—it was raining 72 hours 45 minutes, accompanied by thunder and lightning on 3 days.
Most prevalent Wind, W. N. W., 360.20 miles.
Least prevalent Wind, S., 2 miles.
Most windy day, the 26th; mean miles per hour, 9.94.
Least windy day, the 1st; mean miles per hour, 0.34.
Most winday hour, from 6 to 7, p.m., on the 25th, 20.20 miles per hour.
Total amount of miles traversed by the Wind, 2450.80; which being resolved into the Four Cardinal Points, gives, N. 621 miles; S. 242.30 miles; W. 1018.20 miles; E. 569.30 miles
There were 269 hours and 20 minutes calm during the month.
Two days cloudless during the month.
Aurora Borealis visible on three nights.
Occultation of Jupiter by the Moon, on the 19th, visible.
Meteor in S., at 7.25 p.m., on the 26th passing from *K* to *Y. Serpentis*.
The Electrical state of the Atmosphere has been marked by rather feeble Intensity.
Ozone was in large quantity.
The mean temperature of the month is 1°.64—less than that of last August. The rain exceeds 6.113 inches the rain of last August; and is the most rainy August on record.
First Frost on the 26th.

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

Barometer	Highest, the 1st day	30.122
	Lowest, the 30th day	29.276
	Monthly Mean	29.730
	Monthly Range	0.846
Thermometer	Highest, the 6th day	87°.9
	Lowest, the 1st day	34°.9
	Monthly Mean	57°.89
	Monthly Range	53°.0
Greatest Intensity of the Sun's Rays		103°.9
Lowest Point of Terrestrial Radiation		34°.2
Amount of Evaporation		2.34
Mean of Humidity		.821

Rain fell on 14 days, amounting to 3.571 inches; it was raining 55 hours and 20 minutes—and was accompanied by thunder and lightning on 4 days.
Most prevalent Wind, W by S.
Least prevalent Wind, N E.
Most windy day, the 29th; mean miles per hour, 31.99.
Least windy day, the 3rd; mean miles per hour, 0.48.
Most windy hour, from 1 to 2, p.m., on the 19th—26.2 miles.
Total amount of miles—2799.5; resolved into the Four Cardinal Points, gives, N. 471, S. 589.5, W. 1249, E. 490.
There were 243 hours 10 minutes calm during the month.
There were 4 days perfectly cloudless.
Aurora Borealis visible at observation hour on 4 nights.
The electrical state of the atmosphere has been marked by moderate intensity.
Ozone was in moderate quantity.

POSTSCRIPT.

The Editor has to acknowledge various Works forwarded to him, from time to time, by the Publishers and others, and begs to state that all such donations are added to the Library of the Canadian Institute. These will accordingly be duly recorded, along with the other additions to the Library and Museum, purchased or presented during the Summer recess, in the Report annually submitted by the Council to the Institute, which will be printed in a subsequent number of the Journal.

This number closes the first volume of the New Series of the Canadian Journal. With the commencement of the new volume it is purposed to record in each number, a list of Books and Periodicals received; reserving to the Editing Committee the further selection of those for special notice, which shall appear to them best suited for the objects aimed at in the issue of a Periodical for circulation among the members of the Canadian Institute.

Reports of the Twenty-Sixth Meeting of the British Association for the Advancement of Science, held at Cheltenham; and of the Tenth Meeting of the American Association, held at Albany, N. Y., in August last, are unavoidably delayed till a future number, owing to the pressure on our available space, for Meteorological Tables and Index, to complete the concluding number of the volume.

ERRATA.

Page 357, line 11 from foot, for *of an unit* read *of* R_1

" 358, " 6 " " R_k " R_{k-1}

" 388, last line, for *Bryoza* read *Bryozoa*.

INDEX.

REVIEWS.

SCIENTIFIC AND LITERARY NOTES.

GEOLOGY AND MINERALOGY.

LITERATURE AND FINE ARTS.