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THE

CANADIAN JOURNAL

OF

INDUSTRY, SCIENCE, AND ART:

CONDUCTED BY

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NEW SERIES.

VOL. I.

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CANADIAN INSTITUTE.

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THE CANADIAN JOURNAL.

NEW SERIES.

No. I.—JANUARY, 1856.

PRELIMINARY ADDRESS.

The first number of the "Canadian Journal" was published in August 1852, under the direction of the Council of the Canadian Institute, as "a medium of communication between all engaged or interested in scientific or industrial pursuits." As the organ of the Canadian Institute, it has contributed to the advancement of that society and shared in its success, until the number of members and subscribers has outgrown the original issue, and led to the closing of its first series.

A few words will suffice to define the objects aimed at in this new Series. The advancement of Canada in commercial and agricultural prosperity during recent years, is without a parallel in the history of the British Colonies; and there is abundant reason for believing that it is even now only on the threshold of a career of triumphant progress. It must be the desire of every well-wisher of the province, that this advancement in industry and material wealth, should not be unaccompanied by some corresponding manifestations of intellectual vitality. There is no reason why Canada should not have her own literature and science, as well as her agriculture and commerce; and contribute her share to the greatness of the British Empire by her mental as well as her physical achievements. Already the published Reports of the Magnetic and Meteorological Observatory have made the name of Toronto familiar to European savans; and the labors of the Provincial Geological Survey, under the guidance of Mr. Logan, have contributed results, the scientific value of which is universally recognised. But, meanwhile, such students of science as Canada has,

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stand, to a great extent, isolated in relation to each other, and look mainly for the appreciation of their labors to their scientific brethren in Europe. If Mr. Logan meets with copper or coal in the course of his geological survey, he communicates it to Canada, and all her journals give welcome circulation to the fact; but if his palæontological researches among our Canadian strata disclose novel truths in relation to the structure of the *Graptolite*, he goes to Paris or to London with the discovery, and communicates it to his scientific brethren—as Mr. Dawson originally published his Acadian geological observations,—through the medium of English Societies' Transactions. Thus the science of Canada has, as yet, no recognised or independent existence, and its students, if they would place themselves in *rapport* with those of other lands, can only do so by a sacrifice analogous to the naturalization by which a foreign emigrant attains to the privileges of American citizenship.

Subjects requiring such a medium of communication cannot be profitably treated of in a popular form. An enquiry into the action of the solar rays on nitrate of silver would doubtless appear sufficiently "caviare to the general," and yet its direct daguerrean photographic results are among the most popular of modern technological processes. The world hails with grateful plaudits the completion of an electric telegraph, forgetful of the indifference and incredulity awarded to such preliminary labours as those of Galvani, of which it is the product. If, therefore, we are to acquire such honors and rewards for ourselves, we must be contented to pursue the process through all its preliminary stages; and if we would have an economic and utilitarian science, the first step must be to afford facilities and encouragement for those who devote themselves to science, not for such utilitarian results, but for its own sake, for its abstract truths, and without a thought of the economic rewards to which they lead.

For such students of science, few as they must of necessity be in a new country like Canada, a medium of communication is required, to furnish a means of intercourse among themselves, as well as of interchange of thought and discovery with the scientific world at large. Such a medium this Journal is designed to afford. It is impossible to speak too modestly of its immediate operations. Science cannot be called into being by a wave of the editorial goose-quill, nor will a provincial literature rise up to meet the first demands consequent on the discovery of its absence. Yet here, perhaps, we may not unfitly apply the trite proverb: "*c'est le premier pas qui coûte.*" In some of these first steps we must claim the forbearance of the

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general reader. Perhaps it may be permissible to note as one of the most essential characteristics of European scientific journals that they recognise no such class of readers. No communication can be too minute, technical, or abstruse for them, so long as it involves any element of scientific truth; and we trust to have the concurrence of all our readers in our purpose to open the pages of this Journal to strictly scientific communications, however unattractive the form may be in which they are presented.

In such departments as Geology and Mineralogy, Philology, Ethnology, Chemistry, or Mathematics, if this Journal does not prove an altogether premature and untimely birth, occasional communications must be looked for in a form appreciable only by a very limited class of its readers. Such communications, however, we have rather to fear than to hope, will be few; and the greatest amount of success which can now be anticipated, is to sow a few of the first seeds for a future harvest of science. In so doing it may be permitted to one Provincial journal to cater for something higher than popular gratification. Nevertheless it will be seen that our aim is essentially practical, and while we seek rather to make the Journal useful than popular, the latter element will not be overlooked. Nor need it be so. Science has also its popular aspects, and literary criticism may legitimately embrace much which has charms for a variety of tastes. Enquiries into the varied resources and the mineral wealth of the country, and reports of the progress of the great engineering works of the Province must possess attractions for a still greater number. The disclosures of Geology include points appreciable by all as of the highest practical importance. Chemistry eliminates from recondite processes simplifications in the productions of the commonest manufactures, and discovers products of great commercial value. And while those enquiries yield such returns, the students of Natural Philosophy, Agricultural Science, and Natural History, have in each of their departments fields of investigation which cannot fail, when zealously explored, to contribute results of widely varied interest.

By and by, we doubt not, Canada will be able to maintain a literature which shall embrace independent representatives in each department of knowledge. But the time for such a division of labour lies still in the future; and meanwhile the conductors of the "Canadian Journal" must ask equally for the charitable judgment of the scientific and of the popular reader. Specially would they crave the generous forbearance of the men of science of Europe, among whom it is hoped that those communications may be received in exchange for the scientific records of their long matured labours, and of the

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fruits of their well-organised system of mutual cöoperation. These first efforts cannot be otherwise than feeble, and the steps of their progress slow and unequal. But if the progress be real, however slow, they are well contented to find their reward in the hope that other men shall enter into their labours, and reap where they have sown.

DISPLACEMENT AND EXTINCTION AMONG THE PRIMEVAL RACES OF MAN.

BY DANIEL WILSON, LL.D.

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

Read before the Canadian Institute, December 1st, 1855.

Among the many difficult problems which the thoughtful observer has to encounter, in an attempt to harmonise the actual with his ideal of the world as the great theatre of the human race, none assumes a more intricate and inexplicable aspect than the displacement and extinction of races, such as the Anglo-Saxon has witnessed on this continent for upwards of two centuries. In all ages history discloses to us unmistakeable evidence, not only of the distinctions which civilization produces, but of the fundamental differences whereby a few highly favoured races have outsped all others; triumphing in the onward progress of the nations, not less by an innate constitutional superiority, than by an acquired civilization, or by local advantages. And if we are still troubled with the perplexities of this dark riddle, whereby the Colonists of the new world only advance by the retrogression of the Red Man, and tread, in our western progress, on the graves of nations, it may not be without its interest to note some unmistakeable evidences of this process of displacement and extinction, accompanying the progress of the human race from the very dawn of its history.

One, and only one record supplies any authoritative or credible statement relative to the origin of the human race. Geology has indeed, by its negative evidence, confirmed in its response the inspired answer of the patriarch: "Enquire of the former age, and prepare thyself to the search of their fathers, for we are but of yesterday;" but it is to the Mosaic record we must turn for any definite statement on a subject concerning which the mythologies of all nations have professed to furnish some information. Every attentive reader of the Bible must have observed that the Book of Genesis, or the Beginning, is

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divided into two separate and perfectly distinct histories: the first, an account of the Creation, and the general history of mankind till the dispersion: the Genesis properly so called, extending over a period of considerably more than two thousand years and contained in the ten first chapters, and nine verses of the eleventh; while the remaining chapters, and indeed nearly the whole of the historical Books of the Old Testament, are exclusively devoted to the one selected race, that of Abraham and his descendants.

Looking then to the first of these, and to its narrative in relation to the immediate descendants of Noah, the recognised protoplasts of the primary subdivisions of the human family, we perceive that certain very marked and permanent differences are assigned to each. Ham, the father of Canaan, by negation, is left without a blessing, while Canaan is marked as the progenitor of a race destined to degradation as the servant of servants. The blessing of Shem is peculiar, as if it were designed chiefly to refer to the one branch of his descendants, "to whom pertained the adoption, and the glory, and the Covenants, and the giving of the Law, and the service of God;" but to his various descendants a special rank is assigned in the world's future; special, predominant in relation to some branches of the human family; but yet inferior and of temporary duration when compared with the destinies of the Japhetic races, who, enlarging their bounds, and encroaching on the birth-right of the elder nations, are destined to "dwell in the tents of Shem," and Canaan shall serve them.

Thus from the very first we perceive that one important subdivision of the human family is stamped, *ab initio*, with the marks of degradation; while another, the Semitic, though privileged to be the first partaker of the blessing, to be the originator of the world's civilization, and to furnish the chosen custodiers of its most valued inheritance, through the centuries which anticipated the fulness of time: yet the nations of this stock are destined to displacement, for "Japhet shall be enlarged, and shall dwell in the tents of Shem."

Thus, also, from the very first we perceive the origination of a strongly marked, and clearly defined distinction between diverse branches of the human family; and this, coupled with the apportionment of the several regions of the earth to the distinct types of man, distinguished from each other not less clearly than are the varied *faunæ* of these regions, seem to leave no room for doubt that the *Genus Homo* was as clearly sub-divided into diverse varieties, if not into distinct species, as any other of the great mammalian types of species ranged over the earth's surface according to a recognised law of geographical distribution. At the same time it is apparent that such assigned differences do not, thus far, affect the question of the unity of the race.

To the claim of a common manhood for those strongly marked and greatly diversified sub-divisions of the human family, including its most immobile and degraded types, Shakespear has furnished no inapt reply:—

> "Aye, in the catalogue ye go for men;
> As hounds, and greyhounds, mongrels, spaniels, curs,
> Shoughs, water-rugs, and demi-wolves, are cleped
> All by the name of dogs: the valued file
> Distinguishes the swift, the slow, the subtle,
> The housekeeper, the hunter, every one
> According to the gift which bounteous Nature
> Hath in him clos'd; whereby he doth receive
> Particular addition, from the bill
> That writes them all alike: and so of men."*

Looking then to the recorded descendants of the Noahic forefathers of the human family, we can, partially at least, trace their primitive subdivisions and occupation of the ancient earth. The sons of Japhet, the final inheritors of preeminence are first recorded as dividing among them "the isles of the Gentiles," a term which, looking to the geographical limits known to the ancient world, may be assumed, with little hesitation, as referring to the islands of the Eastern Mediteranean, and probably the Grecian Archipelago, with the adjacent coast lands of Asia Minor, and of Europe.

There have been ingenious attempts made to assign to each of the Noahic generations their national descendants: the Cymri from Gomer, the Getæ from Magog, the Medes from Madai, the Ionian Greeks from Javan, &c.; but the majority of such results commend themselves to our acceptance at best as only clever guesses at truth. A considerable number of the names which occur in the Noahic genealogy undoubtedly remain very partially disguised by subsequent changes, as the appellations of historic or surviving races and kingdoms; of some of them, indeed, it appears from their dual or plural number, or their peculiar Hebrew termination, that they are used in the Mosaic record, not in reference to individuals, but to families or tribes, out of which nations sprung. Some of those have disappeared, or been transformed beyond the possibility of tracing the relations between their ancient and modern names; but of the most remarkable of the Hamitic descent we can be at no loss as to their geographical areas. The Canaanites occupied the important area of Syria and

* Macbeth, Act III, Scene i.

Palestine; and Nimrod, the son of Cush, moving to the eastward, settled his descendants on the banks of the Euphrates; so that of the distinctly recognisable generations of Ham, it is in Asia, and not in Africa, that we must look for them, for centuries after the dispersion of the human race.

But the Semitic races were also to share the Eastern Continent before they enlarged their area, and asserted their right to the inheritance of the descendants of Ham. By Nimrod, the grandson of Ham, the settlements along the valley of the Euphrates were originated, "and the beginning of his kingdom was Babel, and Erech, and Accad, and Calneh, in the land of Shinar," all sites of ancient cities which recent exploration and discovery seem to indicate as still traceable amid the graves of the East's mighty empires. But the eponymous of the rival kingdom on the banks of the Tigris was Asshur, the son of Shem, and in that region also it would appear that we must look for the locality of Elam, (Elymais), as well as others of the generations of the more favoured Shem; while nearly the whole habitable regions between their western borders and the Red Sea, appear to have been occupied from this very dawn of human history, by the numerous Semitic descendants of Joktan, the protoplast of a branch of the human family to whose pedigree a special and curious attention is devoted in the Sacred Genealogies. By an expressive figure of speech Shem is spoken of as the father of all the children of Eber, of whom came Joktan and his sons, whose "dwelling was from Mesha, as thou goest unto Sephar, a mount of the East," and of whom as surely descended Mohammed and the Semitic propogators of the monotheistic creed of the Koran; as came the Hebrews, according to Jewish belief, and through them, the great prophet of our faith, from Eber, the assumed eponymous of those whom we must look upon, on many accounts, as important above all other Semitic races.

Deriving our authority still from the Sacred Records, we ascertain as the result of the multiplication and dispersion of one minutely detailed generation of the sons of Ham, through Canaan, that for eight hundred years thereafter they increased and multiplied in the favoured lands watered by the Jordan, and stretching to the shores of the Levant; they founded mighty cities, accumulated great wealth, subdivided their goodly inheritance among distinct nations and kingdoms of a common descent; and upwards of eleven hundred years thereafter, when the intruded tribe of Dan raised up the promised judge of his people, the descendants of Ham still triumphed in the destined heritage of the seed of Eber. At length, however, the Semitic Hebrew accomplished his destiny. The promised land became his possession, and the remnant of the degraded Canaanite his bond-servants. For another period of like duration, a period of more than eleven hundred years, the Semitic Israelites made the land their own. The triumphs of David, the glory and the wisdom of Solomon, and the vicissitudes of the divided nationalities of Judah and Israel, protracted until the accomplishment of the great destiny of the princes of Judah, constitute the epos of those who supplanted the settlers in the historic lands lying between the mountains of Syria and the sea, when first "the Most High divided to the nations their inheritance, when he separated the sons of Adam, and set the bounds of the people." Then came another displacement. The Semitic Hebrews were driven forth from the land, and for eighteen hundred years, Roman and Saracen, Mongol Turk and Semitic Arab, have disputed the possession of the ancient heritage of the Canaanite.

For very special and obvious reasons the isolation of the Hebrew race, and the purity of the stock, were most carefully guarded by the enactments of their great Law-giver, preparatory to their taking possession of the land of Canaan; yet the exclusive nationality, and the strictly defined purity of race admitted of exceptional deviations of a remarkable kind. While the Ammonite and the Moabite are cut off from all permissive alliance, and the offspring of an union between the Hebrew and these forbidden races is not to be naturalized even in the tenth generation, the Edomite, the descendant of Jacob's brother, and the Egyptian, are not to be abhorred; but the children that are begotten of them are to be admitted to the full privileges of the favoured seed of Jacob in the third generation.

This exception in favour of the Egyptian is a remarkable one. The ostensible reason, viz., that the Israelites had been strangers in the land of Egypt, appears inadequate fully to account for it, when the nature of that sojourn, and the incidents of the Exodus are borne in mind, and would tempt us to look beyond it to the many traces of Semitic character which the language, arts, and civilization of Egypt disclose. Mizraim, the son of Ham, and the brother of Canaan, is indeed ordinarily regarded as the first inheritor of the Nile valley, and this on grounds fully as conclusive as those on which other apportionments of the post-diluvian earth are assigned; but along with the direct evidence of Scripture, we must also take the monumental records of Egypt, which shew that that land was speedily intruded on by very diverse races, and that by the time its civilization was sufficiently matured to chronicle by pictorial and ideographic writings the history of that cradle-land of the world's intellect, its occupants stood in a relation to each other precisely similar to that in which we find the Semitic and Hamitic populations of Palestine in the days of Joshua. The ethnological affinities of Egypt are certainly Asiatic rather than African, although she stands isolated, and in some important respects unique in relation alike to the ancient and the modern world. The ethnologist must be tempted to look for the congeners of the ancient Egyptian rather among the Semitic Asiatics, speaking and writing a language akin to her own, than among the Berber, Ethiopian, or Negro aborigines, of Africa. But around the shores of that expressively designated *Mediterranean* Sea how striking are the varied memorials of the world's past. A little area may be marked off on the map, environing its eastern shores, and constituting a mere spot on the surface of the globe, yet its history is the whole ancient history of civilization, and a record of its ethnological changes would constitute an epitome of the natural history of man. All the great empires of the old world clustered around that centre, and as Dr. Johnson remarked in one of his recorded conversations: "All our religion, almost all our law, almost all our arts, almost all that sets us above savages has come to us from the shores of the Mediterranean." There race has succeeded race; the sceptre has passed from nation to nation, through the historical representatives of all the great primary subdivisions of the human family, and "their decay has dried up realms to deserts." It is worthy of consideration, however, for its bearing on analagous modern questions, how far the political displacement of nations in that primeval historic area was accompanied by a corresponding ethnological displacement and extinction.

It is in this respect that the sacred narrative, in its bearings on the primitive sub-divisions of the human family, and their appointed destinies, seems specially calculated to supply the initiatory steps in relation to some conclusions of general, if not universal application. However mysterious it be to read of the curse of Canaan on the very same page which records the blessing of Noah and his sons, and the first covenant of mercy to the human race, yet the record of both rest on the same indisputable authority. Still more, the curse was what may strictly be termed an ethnological one. Whether we regard it as a punitive visitation on Ham in one of the lines of generation of his descendants, or simply as a prophetic foretelling of the destiny of a branch of the human family, we see the Canaanite separated at the very first, from all the other generations of Noahic descent as a race doomed to degradation and slavery. Nevertheless, to all appearance, many generations passed away, in the abundant enjoyment, by the offspring of Canaan, of all the material blessings of the "green undeluged earth;" while they accomplished, as fully as any other descendants of Noah, the appointed repeopling, and were fruitful and increased, and brought forth abundantly in the earth, and multiplied therein, even as did the most favoured among the sons of Shem or Japhet. When some five centuries after the Canaanite had entered on his strangely burdened heritage, the progenitor of its later and more favoured inheritors was guaranteed by a divinely executed covenant, the gift to his seed of that whole land, from the river of Egypt to the great river, the river Euphrates, the covenant was not even then to take place until the fourth generation, because the iniquity of the Amorites—one of the generations of Canaan, used by synecdoche for the whole—was not yet full. When that appointed period had elapsed, and only the narrow waters of the Jordan lay between the sons of Israel and the land of the Canaanites, their leader and lawgiver, who had guided them to the very threshold of that inheritance on which only his eyes were permitted to rest, foretold them in his final blessing: "The eternal God shall thrust out the enemy from before thee, and shall destroy, and Israel shall dwell in safety alone." No commandment can be more explicit than that which required of the Israelites the utter extirpation of the elder occupants of their inheritance: "When the Lord thy God shall bring thee into the land, and hath cast out before thee seven nations greater and mightier than thou, thou shalt smite them and utterly destroy them; thou shalt make no covenant with them, nor shew mercy unto them." Nevertheless we find that the Israelites put the Canaanites to tribute, and did not drive them out; that the children of Benjamin did not drive out the Jebusites; but, according to the author of the book of Judges, they still dwelt there in his day; and so with various others of the aboriginal tribes. So also, the Gibeonites obtained by craft a league of amity with Israel, and they also remained—bondmen, hewers of wood, and drawers of water, yet so guarded by the sacredness of the oath they had extorted from their disinheritors, that at a long subsequent date we find seven of the race of their supplanters, the sons and grandsons of the first Israelitish king, sacrificed by David to their demand for vengeance on him who had then attempted their extirpation.

Even more remarkably significant than all those evidences of a large remnant of the ancient Hamitic population, surviving in the midst of the later Semitic inheritors of Canaan, is the appearance of the name of Rahab, the harlot of Jericho, in the genealogy of Joseph, as recorded by Mathew. The purity of descent of the promised seed of Abraham and David was most sacredly guarded through all the generations of their race, yet even in that line a singularly remarkable exception is admitted; and the son of Ham, and the seed of Canaan, have also their links in the genealogy of the Messiah.

Turning to another portion of the same subject, we trace in the Noahic genealogies the primitive occupants of ancient Phœnicia among the descendants of Ham, while, looking to other and independent sources of evidence pertaining to the people of historical Phœnicia, we find them a race philologically Semitic, but in so far as their mythology and legislation, and those of their Carthaginian offshoots, supply data, we should class them as a race psycologically Hamitic. The legitimate inference would seem to be, that in Phœnicia, as in Palestine, the Semitic and Hamitic races were brought together by the extension of the former over the area primarily occupied by the latter; and that then, unrestrained by any of the checks which so materially circumscribed the tendency to intermixture between the conquerors and the conquered, in the inheritance of the Hebrews, a complete amalgamation took place, though with such predominancy of the later intruded Semitic conquerors, as history supplies abundant illustrations of in the well-detailed pages of more recent national annals.

From all this it would seem to be justly inferred that ethnological displacement and extinction must be regarded in many, probably in the majority of cases, not as amounting to a literal extirpation, but only as equivalent to absorption. Such doubtless has been the case to a great extent with the ancient European Celtæ, notwithstanding the definite, the distinct historical evidence we possess of the utter extinction of whole tribes both of the Britons and Gauls, by the merciless sword of the intruding Roman; and such also is being the case with no inconsiderable remnant of the aboriginal Red Indians of this continent. Partially so it is the case even with the Negro population of the United States, in spite of all the prejudices of cast or colour. It is impossible to travel in the far West of this American continent on the borders of the Indian territories, or to visit the reserves where the remnants of the Indian tribes displaced by us in Canada and the States, linger on in passive process of extinction, without perceiving that they are disappearing as a race, in part at least by the same process by which the German, the Swede, or the Frenchman, on emigrating into the Anglo-saxonised States of America, becomes in a generation or two amalgamated with the general stock.

I was particularly impressed with this idea during a brief residence at the Sault Ste. Marie this summer (1855). When on my way to Lake Superior, I had passed a large body of Christianised Indians, assembling from various points both of the American and the Hudson's Bay territories, on one of the large islands in the River Ste. Marie, and while waiting at the Sault a considerable body of them returned, passing up in their canoes. Having entered into conversation with an intelligent American Methodist missionary, who accompanied them, I questioned him as to the amount of intermarriage or intercourse that took place between the Indians and the whites, and its probable effects in producing a permanent new type resulting from the mixture of the two very dissimilar races. His reply was: "Look about you at this moment, comparatively few of these onlookers have not Indian blood in their veins;" and such I discovered to be the case, as my eye grew more familiar with the traces of Indian blood. At all the white settlements near those of the Indians, the evidence of admixture was abundant, from the pure half-breed to the slightly marked remoter descendant of Indian maternity, discoverable only by the straight black hair, and a singular watery glaze in the eye, not unlike that of the English Gypsey. The Indian may remain uncivilized, and perish before the advance of civilization, which brings for him only vice, famine, and disease, in its train; but such is not the case with the mixed race of a white paternity. Much, perhaps all of their aptitude for civilization may come by their European heritage of blood, but the Indian element survives even when the all-predominating Anglo-Saxon vitality has effaced its physical manifestations.

In this manner the ancient Celtic element of European ethnology doubtless still asserts no inconsiderable influence. The Briton of Wales retains nearly all his early characteristics; his philological and physiological peculiarities are alike unchanged. The Cornish Briton on the contrary retains only the last of these, his language having ceased to be a living tongue; while the continental Gaul has not only resigned his language for a neo-latin tongue, but he has so intermingled his blood with Roman, Frank, Norman, Iberian, and Arab, that he is no longer looked upon, like the Welshman or Irish Galwegian, as a pure Celt. Yet few, if any, doubt the predominance of the Celtic element, or hesitate to trace to that source, many of the characteristic peculiarities wherein the Frenchman differs so essentially either from the continental German or the Anglo-Saxon. In a like manner, though doubtless in a much less marked degree, it may be that the Red Indian of America may leave some permanent traces of his intermixture with that race by whom he is being displaced, proving here also that absorption, and not absolute extirpation, plays a part, at least, in the extinction of modern as well as primitive aboriginal races, when left to the operation of natural causes.

ON SOME NEW SALTS OF CADMIUM AND THE IODIDES OF BARIUM AND STRONTIUM.

BY HENRY CROFT, D.C.L.
PROFESSOR OF CHEMISTRY, UNIVERSITY COLLEGE, TORONTO.

Read before the Canadian Institute, January 12th, 1856.

Von Hauer has lately taken up the examination of the double chlorides and bromides of cadmium, the existence of which was first noticed by me in 1842, in a preliminary paper read before the Chemical Society of London. The investigation being interrupted very shortly after its commencement by my removal to Toronto, had never been resumed, and in the short paper laid before the Chemical Society, the formulæ had not been fully established, with the exception of that of the sodium compound, viz., Cd Cl + Na Cl + 3 Aq, which has since been confirmed by Von Hauer.

For the two cadmio-chlorides of potassium, the two cadmio-chlorides of ammonium, and the cadmio-bromide of potassium described by me in 1842, Von Hauer proposes the following formulæ :—

2 K Cl + Cd Cl	K Cl + 2 Cd Cl + H O
2 N H^4 Cl + Cd Cl	N H^4 Cl + 2 Cd Cl + H O
2 K Br + Cd Br	K Br + 2 Cd Br + H O

Von Hauer endeavours to establish the existence of three classes of salts, which he denominates chloro-sesquicadmiates, chloro-monocadmiates, and chloro-bicadmiates, represented generally by the following formulæ : 2 R Cl + Cd Cl + X H O — R Cl + Cd Cl + X HO, and R Cl + 2 Cd Cl + X H O ; and in a second paper he states that he has succeeded in preparing a number of double salts with the chlorides of barium, strontium, calcium, magnesium, manganese, &c. &c., which seem to support this theory.

The only examples of the monocadmiates as yet described are the sodium salt (1842) and Von Hauer's barium compound.

Na Cl + Cd Cl + 3 Aq
Ba Cl + Cd Cl + 4 Aq

In my former paper I mentioned the existence of a double iodide of cadmium and potassium, for which in an anhydrous state I proposed the formula K I + Cd I. As this, if correct, would place the salt in the class of the iodo-monocadmiates, and as according to Von Hauer those compounds are difficult to obtain, at least with the chlorides, I have made a few experiments on the subject of the double iodides and bromides, the results of which are as follows :—

Cadmio-iodide of Potassium.—Iodide of cadmium and iodide of potassium were mixed in atomic proportions (equal equivalents) and evaporated over sulphuric acid,—the double salt being exceedingly soluble in water separated only when the solution was reduced to a very small bulk and the crystals formed were not very perfect. They were in the form of distorted octohedra, acquiring from the extension of certain faces a resemblance to a rhombic prism with dihedral terminations. The fact that they were octohedra was proved by measurements made by my colleague, Professor Chapman.

1.788 grammes dried between bibulous paper gave :—

Water......................	0·096 =	5·36	
Sulphide of cadmium......	0·338 =	14·70	cadmium.
Iodide of silver	2·275 =	68·74	iodine.
Sulphate of potash.........	0·4603 =	11·62	potassium.

1.771 grammes very carefully dried in bibulous paper and afterwards over sulphuric acid, gave :—

Water......................	0·876 =	4·94	
Sulphide of cadmium	0·3520 =	15·46	cadmium.
Iodide of silver	2·2675 =	69·17	iodine.
Sulphate of potash.........	0·4183 =	10·60	potassium.

These numbers lead to the formulæ K I + Cd I + 2 H O.

			Cal	*I*	*II*
K	1	488·94	10·67	11·62	10·60
Cd	1	696·77	15·21	14·70	15·46
I	2	3171·14	69·21	68·74	69·17
H O	2	225·00	4·91	5 36	4·94
		4581·85	100·00	100·42	100·17

An analysis of the anhydrous salt made in 1·42 gave the following numbers, agreeing closely with the calculation :—

		Cal
K	11·47	11·22
Cd	16·46	15·99
I	72·85	72·79
	100·78	100·00

Cadmio-iodide of Sodium.—Iodide of Sodium was prepared by treating a solution of soda with excess of iodine, decomposing by sulphuretted hydrogen, warming, neutralizing with carbonate of soda and crystallizing.

The crystals are as described by Mitscherlich, who gives the formula Na I + 4 H O, while Girand found a quantity of water, which would lead to the formula Na I + 5 H O.

2·108 dried in bibulous paper, lost on heating 0·4393 = 20·83.

2·36 dried in bibulous paper and afterwards over sulphuric acid, lost on heating 0·46 = 19·49.

The formula Na I + 4 H O requires 19·44.

Iodide of cadmium and iodide of sodium were mixed in equal equivalents, and evaporated over sulphuric acid. The double salt separated in long brilliant prisms, which deliquesce very rapidly in a moderately damp atmosphere; they appeared to be four-sided prisms, but owing to their rapid deliquescence their form could not be accurately determined.

1·0285 grammes dried in bibulous paper gave :—

Water....................	0·1450	=	14·09
Sulphide of cadmium...	0·1950	=	14·74 cadmium.
Iodide of silver	1·2400	=	65·14 iodine.
Sulphate of soda.........	0·2218	=	6·98 sodium.

1.4844 grammes gave :—

Sulphate of soda......... 0·2783 = 6·06 sodium.

These numbers lead to the formula Na I + Cd I + 6 H O.

		Cal		I	II	
Na	1	287·20		5·95	6·98	6·06
Cd	1	696·77		14·43	14·74	
I	2	3171·14		65·65	65·14	
H O	6	675·00		13·97	14·09	
		4830·11		100·00	100·95	

Cadmio-iodide of Ammonium.—Iodide of ammonium, obtained by digesting iodine with hydrosulphide of ammonium was mixed with iodide of cadmium, in the proportion of equal equivalents; the solution on evaporation over sulphuric acid to a very small bulk, gave crystals similar in appearance to those of the potassium compound, remaining unchanged in a tolerably dry atmosphere. Heated in a tube it fuses and loses a considerable quantity of water.

1.7625 grms. gave

Sulphide of Cadmium 0.3685 = 16.26 Cadmium.

Iodide of Silver........ 2.3775 = 72.66 Iodine.

These numbers lead to the formula NH^4 I + Cd I + 2 HO.

			Cal	
NH^4	1	225.00	5.21	
Cd	1	696.77	16.14	16·26
I	2	3171.14	73.44	72·66
HO	2	225.00	5.21	
		4317.91	100.00	

Cadmio-iodide of Barium.

Iodide of Barium mixed in the same proportions with iodide of cadmium gave a mass of crystals which deliquesced so rapidly that it was impossible to examine their form.

2,281 grms dried in bibulous paper and weighed as quickly as possible, gave

Iodide of Silver.. ...	2.5405	=	59.98 Iodine.
Sulphate of Baryta...	0·6495	=	16.73 Barium.
Sulphide of Cadmium	0.3790	=	12.92 Cadmium.
Water as loss.........................			10.37

These numbers lead to the formula Ba I + Cd I + 5 HO.

			Cal	
Ba	—1—	854.85—	16.17—	16.73
Cd	—1—	696.77—	13.18—	12.92
I	—2—	3171.14—	59.99—	59.98
HO	—5—	562.50—	10.66—	10.37 as loss.
		5285.26	100.00	100.00

Cadmio-iodide of Strontium was obtained in the same manner. It crystalizes in large clear crystals efflorescent in very dry, but deliquescent in a moderately damp atmosphere. When heated it easily loses iodine, and absorbs carbonic acid. Owing to this circumstance the quantity of water in the following is rather too large, and of the iodine too small.

1.8105 grms gave

Loss on heating.........	0.3225	=	17.81 water.
Sulphate of Strontia....	0.4225	=	11.11 Strontium.
Sulphide of Cadmium ..	0.2720	=	11.68 Cadmium.
Iodide of Silver..........	1.9370	=	57.80 Iodine.

These numbers lead to the formula Sr I + Cd I + 8 HO.

			Cal	
Sr	—1—	545.60—	10.27—	11.11
Cd	—1—	696.77—	13.11—	11.68
I	—2—	3171.14—	59.68—	57.80
HO	—8—	900.00—	16.94—	17.81
		5313.51	100.00	98.40

Owing to the small quantity of salt in my possession the crystals could not be obtained quite free from all admixture, and the analysis does not agree very perfectly with the calculation, but sufficiently so to establish the formula.

From these experiments we may conclude that Iodide of Cadmium combines with alkalic and earthy iodides in the proportion of equal equivalents; the formulæ of the new compounds just described being as follows:

$$K\,I + Cd\,I + 2\,HO$$
$$NH^4\,I + Cd\,I + 2\,HO$$
$$Na\,I + Cd\,I + 6\,HO$$
$$Ba\,I + Cd\,I + 5\,HO$$
$$Sr\,I + Cd\,I + 8\,HO$$

In this respect they partly correspond with, and partly differ from, the Zinco-iodides described by Rammelsberg in Poggendorff's Annalen, B. 43; the formulæ of which are as follows:

$$K\,I + 2\,Zn\,I$$
$$NH^4\,I + Zn\,I$$
$$Na\,I + Zn\,I + 3\,HO$$
$$Ba\,I + 2\,Zn\,I$$

In analyzing the above mentioned cadmio-iodides, the iodine was first precipitated by nitrate of silver, the excess of silver separated by hydrochloric acid, and the cadmium precipitated by sulphuretted hydrogen, &c., &c.

If we attempt to separate the cadmium at once as sulphide, we meet with the difficulty alluded to by Stromeyer, viz., that iodide of cadmium is decomposed very slowly by sulphuretted hydrogen.

Some experiments were made to ascertain whether this difficulty of decomposition is owing to the existence of a double salt of sulphide with iodide of cadmium, but without any favorable results.

Cadmio-bromide of Sodium.—This salt crystalizes from a mixture of equal equivalents of the two bromides in small brilliant six-sided plates, grouped together so as somewhat to resemble the analogous double chloride. Owing however, to the small amount of bromine in my possession, the quantity of salt obtained was but little, and the crystals were not so free from an admixture of other salts as to yield a satisfactory analysis.

1.316 grms. gave

Loss by heating.........0.1465	=	11.13	Water.
Sulphide of Cadmium...0.4219	=	24.93	Cadmium.
Bromide of Silver 1.7355	=	56.13	Bromine.
Sulphate of Soda.........0.2750	=	6.76	Sodium.

The numbers although not agreeing very well with the calculation, seem to lead to the formula $Na\,Br + 2\,Cd\,Br + 5\,HO$.

			Cal	*I*
Na	1	287.17	5.47	6.76
Cd	2	1393.54	26.58	24.93
Br	3	2998.89	57.21	56.13
HO	5	562.50	10.74	11.13
		5242.10	100.00	98.95

It will seem from this that the bromide and chloride of cadmium have a tendency to form bi-cadmiates, and di-cadmiates (sesqui-cadmiates of Van Hauer) while the iodide forms only mono-cadmiates.

In preparing the above compounds the following observations were made on the crystalized iodides of barium and strontium.

Iodide of Barium may be prepared by digesting iodine with the sulphide of barium, or with hydrate of baryt- and separation of the iodate, the solution on evaporation yields fine needles of hydriodate of baryta, according to Gay Lussac. The anhydrous salt is not deliquescent according to Gay Lussac, but very much so according to Henry. The composition of the so-called hydriodate has not been ascertained.

The salt was prepared according to the second of the above mentioned methods, and also by neutralizing hydriodic acid with carbonate of baryta. The solution yielded tolerably large yellowish prisms, massed together so that the form could not be determined. In a damp atmosphere they deliquesce, but in a dry one effloresce, forming a white powder.

When heated they melt in their water of crystalization, swell up and decrepitate strongly, forming a white mass which fuses on further application of heat, and on raising the temperature still higher evolves iodine. The yellow color of the salt is due to the mother liquor.

1.071 lost on heating... 0.273 = 25.49 Water.
1.803 " " 0.466 = 25.84 "
1.803 gave sulphate of Baryta 0.804 = 26.20 Barium.

These numbers require the formula Ba I+7 HO.

			Cal	*I*	*II*
Ba	1	854.85	26.48	26 20	
I	1	1585 57	49.13		
HO	7	787.50	24.39	25.49	25.84
		3227.92	100.00		

Iodide of Strontium was formed in the same way; it crystalizes in six-sided tables, deliquescent in a damp, efflorescent in a dry atmosphere, exhibiting when heated the same characters as the salt of barium.

1.693 lost on heating............ 0.391 = 23.09 Water.

" gave Sulphate of Strontia 0.662 = 18.62 Strontium.

The formula seems to be Sr I+6 HO.

				Cal
Sr	1	545.60	19.44	18.62
I	1	1585.57	56.51	
HO	6	675.00	24.05	23.09
		2806.17	100.00	

REMARKS ON A CANADIAN SPECIMEN OF THE PROTEUS OF THE LAKES.

BY J. GEORGE HODGINS,

DEPUTY SUPERINTENDENT OF SCHOOLS FOR UPPER CANADA.

Read before the Canadian Institute, December 15th, 1855.

The imperfect knowledge which exists in relation to the history and habits of this singular class of reptiles, added to some peculiarities in the specimen which forms the special object of remark, are, it is hoped, sufficient to confer on the subject of this paper a special interest in the estimation of Canadian Naturalists. The specimen referred to was procured from the Bay of Toronto, Lake Ontario, and having been caught and preserved for some time, alive, it afforded opportunities of observation of the habits of reptiles of this class, such as are not probably of very frequent occurrence.

Dr. Williamson, the gentleman into whose possession it first came, and who has presented it to the Provincial Museum in the Normal School Building, obtained the specimen from some boys who were fishing with a hook baited with a worm, off Tinning's Wharf in this City, on the 22d of June last. It suffered some ill treatment at the hands of its captors, which probably hastened its death. Immediately on getting the animal into his possession, Dr. Williamson placed it in a vessel filled with soft water, mixed with a little mud and *debris*. It appeared lively at first, and on being touched would move about by the aid of its tail, with all the appearance of life and vigor. The water was changed daily and a few worms were given to it from time to time, but it never seemed to have any inclination to touch them.

Dr. Williamson furnishes the following information in reference to it: "The Proteus was out of the water only while I carried it from Tinning's wharf to my house—it may be half an hour. I placed it in a bucketful of rain water when I arrived at home in the evening. On the following day it was out of the water again while I carried it to the Normal School, say a quarter of an hour. On arriving there it was put into a basinful of lake water, where it remained for a day or two, until we had a tin cistern prepared for its reception, when it was transferred to that and placed in it in mud and water. It did not thrive among the mud, but grew sluggish, recovering, however, always upon changing the water. After being thus kept for three or four days, clean water was substituted, and worms supplied in abundance. There was no other kind of food offered to it; but a very fine leech (exceedingly active) was observed in the cistern with it a day or two before it was removed to die. The leech was not thicker than a stout knitting needle, and did not appear to have preyed on the animal—although it was suggested at the time that it might have had something to do with its demise. I cannot avoid the conclusion from all I saw about this specimen of the Proteus of our lakes, that it might have lived much longer had it not been injured by trampling on it at the wharf, by the boys who captured it, and from whom it had received considerable injury, including, as I believe, the loss of the fifth toe of one of the legs, the indications of which are still traceable on the foot, showing that it must have corresponded with the other limb."

Its breathing was active and regular, and the motion and appearance of the three fringed sponge-like branchial tufts on each side of the head, as they were dilated and compressed were most graceful and beautiful. The dilation and compression of these branchiæ were generally simultaneous and uniform; but at times they were irregular and feeble, more particularly towards the close of its life. The color of the upper surface of the animal during life was olive green, somewhat mottled, and tinted here and there with shades of black. The under surface was of a light brown color. Its length is about twelve inches. It has four legs, with four toes on the anterior and five on the posterior. The member of the posterior limb to which the designation of a fifth toe is given, is, however, peculiar, and constitutes, indeed the special characteristic of the specimen in question, which appears to distinguish it from other and well-defined species of this branch of the Batrachian family of reptiles. It would rather suggest the idea of a quadrumanous thumb, were not all natural analogies opposed to such a supposition in relation to an animal so low in the scale of nature; to the superficial observer it appears indeed more like an elongated heel, but a close inspection clearly discloses indications of three claws or sub-toes. From one of the hind feet this toe has disappeared—probably broken off when captured. Indeed marks of abrasure are visible, and the indications of the wound may still be observed, notwithstanding the limb having since healed. The head is very much depressed, the mouth truncated, with a minute nostril at either angle of the upper lip, eyes pretty well forward in the head, which although when alive not very apparent, are now, from the action of the spirits of wine in which it is preserved distinctly visible. During life the skin was quite smooth and was covered with a glutinous milky fluid. As these animals are popularly held to be poisonous, experiments were tried with portions of this fluid on the tongue of a frog and common turtle, but without any apparent result. The tail is long and vertically compressed, as in all such aquatic animals, so as to serve as a rudder and means of propulsion in the water. Amphibious as the animal undoubtedly is, it was never tested otherwise than by observing it at intervals coming to the surface of the water, apparently to take in a mouthful of fresh air, as it invariably opened its mouth for an inhalation. It is clear however, from the construction of the fringed *branchiæ*, that it could not remain long out of the water without serious injury to those delicate formations.

To this it may be further added that the animal seemed harmless and inoffensive. It did not avoid the light, nor seem to withdraw itself suddenly on the approach of an observer, as though actuated by fear. It would open its mouth when irritated, but without seemingly making any effort to snap or bite. On the 8th of July it died, having lived about two weeks from the time of its capture.

The specimen under examination evidently belongs to the Perennibranchiate group of Batrachians. Besides the genus Proteus, this group includes also the Axolotl, Siren, and Menobranchus. The Menobranchus lateralis, a genus believed to be peculiar to North America, is found in the Mississippi, and in the great lakes, Superior, Huron, Michigan, Erie, and Ontario.*

Major Delafield, whose attention was specially directed to the Menobranchus, obtained some specimens from Lake St. Clair, more than thirty years ago, and he states that the animal frequently

* Dr. H. Boys, of Barrie, in a letter to Professor Croft, in reference to the specimen exhibited to the Canadian Institute by Mr. Hodgins, remarks: "The animal is common enough in Lake Ontario; I generally used to find a specimen or two every season thrown upon the shore killed by the boys. It seems to inhabit chiefly the vicinity of the wharves in Toronto, and I think I was told that the fishermen often catch it in dragging the point of the Island."

attains the length of two feet. Two other species of this genus are known: the Menobranchus Maculatus, found in the Alleghany River, and in Lakes George and Champlain; and the Menobranchus Punctatus,* found in the Santee River, South Carolina, which is said to be most useful in that State, in ridding the rice fields of destructive and noxious vermin. These species have all four toes on each foot.

The specimen in question measures only twelve inches in length, so that it is small in comparison with those obtained by Major Delafield from Lake St. Clair. It appears to me to differ more or less from each of the varieties pertaining to this continent; and more especially from the *Menobranchus lateralis*, or Proteus of the Lakes, in having a much flatter head, one more toe on each of the posterior feet, and that of a very peculiar conformation, as before described. It has no lateral stripe of black, nor is it spotted like the species found in the Alleghany and Santee Rivers. The points of difference therefore between this specimen and the genus Menobranchus are so important that I can scarcely consider it as identical with the Proteus of the Lakes or the other species referred to. The only remaining competitor is the Proteus of New Jersey, which is briefly noticed in the seventh volume of Silliman's Journal (p. 68). This animal, though said to possess the same number of toes on each of its feet, differs in color, and in the absence of any external nostril—which in our specimen is very apparent. It approaches, however, nearer to an exact resemblance of this specimen than any of the preceding genera; but not sufficiently near to establish its identity with it. I am therefore impelled to the conclusion, after comparison and investigation, that the specimen is a distinct branch of the Batrachian family, and may be considered as a new genus—the *Proteus Canadensis*—its chief points of difference being in the flatness of its head, the absence of any lateral stripes, and the formation of the fifth toe on the foot of the posterior leg.

As an amateur, I have to claim the indulgence of the members of the Institute for any want of clearness or scientific accuracy in this paper. If I have not sufficiently established the point aimed at, still I trust the members of the Institute will agree with me in the conclusion that even, if so marked a difference in one of an interesting class of reptiles is not sufficient to constitute it a distinct genus; that difference is nevertheless such as to merit their notice and careful observation.

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† The *Iconographic Encyclopedia* distinguishes these reptiles by the terms, *Necturus lateralis* (a drawing of which is given), *N. maculatus* and *N. punctatus*. J. G. H.

REPORT OF COMMITTEE.

The Committee appointed by the Canadian Institute to report on a specimen of the Proteus of the Lakes, exhibited at a meeting of the Institute on the 15th of December, 1855, by J. G. Hodgins, Esq., and supposed by him, for reasons assigned in his paper, to be a new genus, for which he suggested the name of *Proteus Canadensis*, have arrived, after a careful examination of the specimen, at the following conclusions:—

First, that the supposed fifth toe on one of the hind feet, is an unnatural or "monstrous" development of a second foot, exhibiting three, or more strictly, four toes—the central or larger division shewing a very perceptible union of two of the abortive organs.

Secondly, that in its dental characters, the position of the nostrils, the form of the lips and head, the general condition of the skin, and other particulars, the specimen in question corresponds exactly with the *Menobranchus Lateralis*, to which the Committee would consequently refer it.

The Perennibranchiate Batrachians include four genera, characterised as follows:

A. *Palatal teeth in several rows. Teeth also in several rows on the inner surface of the lower jaw.*

Siren:—Hind limbs undeveloped.

Axolotl:—Two pairs of limbs. Toes, four in front; five behind.

B. *Palatal teeth in a single row. No teeth on the inner surface of the lower jaw.*

Menobranchus:—Toes, four in front; four behind.

Proteus:—Toes, three in front; two behind.

The single row of palatal teeth, exclusive of the row upon the intermaxillaries at the margin of the mouth, places Mr. Hodgins' specimen in the second or higher group, and the number of the toes proves it to belong to the genus *Menobranchus*. Its further agreement with the Menobranchus *lateralis* has been already pointed out. According to the American naturalists, the occurrence of a dark lateral stripe, from which the name of the species was originally derived, is by no means a constant character.

ON THE VALUE OF THE FACTOR IN THE HYGROMETRIC FORMULA.

BY CAPTAIN A. NOBLE, R. A., F. R. S., QUEBEC.*

Read before the Canadian Institute, 12th January, 1856.

The results of the accompanying table for computing the dew point from readings of the dry and wet bulb thermometers, are derived from observations taken at Quebec during last winter, by Mr. Campbell and myself. These results will be obvious at a glance; but a few remarks upon the instruments employed, and upon the degree of reliance to be placed upon them may not be uninteresting.

The dry and wet bulb thermometers (for which we were indebted to the kindness of Professor Cherriman, director of the Magnetic Observatory, Toronto) were made by Negretti and Zambra, and their index errors were ascertained above 32° by Mr. Glaisher, and below 32° by ourselves, by comparison with a Kew standard. The divisions upon these thermometers were too small to read 0.1° with great accuracy, and in discussing our observations at low temperatures we were, in consequence, obliged to reject such as would, with an error of 0.1° in the reading, introduce a considerable error in the factor.

You will observe that the table does not extend below −16°, although we have repeatedly, every winter, the mercury below −20°, and occasionally below −30°. The only thermometer, however, which we could trust as a wet bulb in investigations so delicate was not graduated below −16°.

For obtaining the dew point by direct observation, we used the condensing hygrometer invented by M. Regnault. We obtained dew with this beautiful little instrument at all temperatures, (limited by the graduation of the thermometer, −35°,) the only requisites when the thermometer is very low being time and pure ether.† I can testify from experience that this hygrometer obviates all the inconveniences of Daniell's which M. Regnault enumerates in his Hygrometrical Researches.

In order to shew the reliance that may be placed upon our results, we have put opposite each factor in the table the probable error and measure of precision of the single data, (from which the factor (f) was derived,) and also the probable error, measure of precision and limits of certainty of the adopted factor. The nomenclature and

* This paper was originally prepared in the form of a letter addressed to C. R. Weld, Esq., Sec. R. S., London.

† The ether we employed below −20° was the first that passed over, resulting from the distillation of washed ether with quicklime.

notation are those employed by Encke in his Memoir on the Method of Least Squares.

The measure of precision (h), as was indeed to have been expected, decreases with the temperature. This fact is not, however, of so much importance as might at first appear; for the dew point is given by the equation

$$T = t - f(t - t');$$

where T is the temperature of the dew point, t that of the air, $(t-t')$ the difference between the dry and wet bulb thermometers, and f the factor, whose value is given in the table.

Now taking the temperatures 42° and 22°, it appears from the table that the probable error of f, from a single observation, is at the latter temperature three times as great as at the former, but $(t-t')$ is, on an average, about three times as great at 42° as at 22°. Hence the probable error of the dew point at both temperatures is very nearly the same.

We have extended our table to 51° for the purpose of comparison with the "Greenwich factors." I must however remark that it is probable that the factors above 40° are rather greater than they would have been had the observations discussed extended through a longer space of time, the majority, at these temperatures, having been taken last spring, when the air was very remarkably dry; and experience shews thatwhen $(t-t')$ is unusually great the deduced factor, instead of being more accurate, is generally much too large.

As an instance I may cite an observation taken on the 21st April, when the temperature of the air was 43.6°, that of evaporation was 31.6°, and that of the dew point was 3.2°. The fraction of saturation on this occasion was only $\frac{19}{100}$, and the factor derived from this observation was 3.4, being much the largest deviation from the adopted mean, 2.53. The cause of this discrepancy is doubtless owing to the heat that the wet bulb thermometer derives from the radiation of surrounding objects, and, were observations sufficiently numerous, it might conduce to accuracy were the factors calculated for every degree of difference in the value of $(t-t')$.

We purpose instituting a comparison between two wet bulb thermometers placed in similar boxes, the one coated with lampblack and the other with polished daguerreotype plates.

Below 32° our results do not appear to coincide with the factors deduced from the Greenwich observations, and the cause of the discrepancies must be left to time. As, however, we have had considerable experience at these temperatures, I may perhaps be doing service to observers in bringing before their notice two causes of error, to which we have found ourselves particularly liable when the thermometer is near 32° :—1st. If the air is a little above, and has been below 32°, there will frequently be a small button of ice at the foot of the wet bulb thermometer which is not easily perceived, and which will keep it at 32° when the temperature of evaporation is really above that point. 2nd. It is well known that under certain circumstances water may be cooled below 32° without freezing, and an example will perhaps best shew the error which this may occasion. Let us suppose that the temperature of the air is 27°, and that when the thermometer is wetted it sinks to 26° and then rises. Should it rise very slowly the probability is that 26° is the true temperature of evaporation, but if rapidly, the rise may be due to the conversion of the water into ice, and it will be prudent to observe whether or not the thermometer again commences to sink. We have frequently observed this phenomenon, and I am quite at a loss to what to ascribe its uncertainty. It has occurred both in a high wind and a calm, (the thermometers are protected from the full force of the wind,) and it also appeared to be quite uncertain at what temperature the water would freeze.

I am obliged to admit that the limits of certainty of the factors below zero are not so close as could be desired. This is partly attributable to our having to reject many observations made with a thermometer which was broken before its index errors were fully ascertained. Mr. Campbell and I must claim the indulgence of those who know the difficulty of taking observations requiring so much time and accuracy, at such temperatures, and frequently at six o'clock in the morning.

Temperature of Air. (t)	Factor. (f)	Number of Observations. (m)	Probable error of a single datum. (n)	Measure of precision of a single datum. (h)	Probable error of the adopted factor $\left(R=\frac{n}{\sqrt{m}}\right)$	Measure of precision of the adopted factor. $(H=h\sqrt{m})$	It is, therefore, an equal chance that the true factor lies between.
48° — 51°	2.31	21	.30	1.590	.07	7.287	2.24 & 2.38
46 — 47	2.38	13	.26	1.822	.07	6.569	2.31 — 2.45
42 — 45	2.53	41	.40	1.189	.06	7.613	2.47 — 2.59
40 — 41	2.63	17	.41	1.163	.10	4.796	2.53 — 2.73
38 — 39	2.83	25	.48	.999	.09	4.994	2.74 — 2.92
34 — 37	3.02	64	.43	1.114	.05	8.912	2·97 — 3.07
32 — 33	3.33	25	.63	.767	.12	3.835	3.21 — 3.45
30 — 31	3.81	22	.61	.775	.16	3.633	3.65 — 3.97
28 — 29	4.40	27	.66	.723	.13	3.756	4.27 — 4.53
24 — 27	5.46	43	.82	.577	.13	3.787	5.33 — 5.59
22 — 23	6.06	15	1.20	.397	.31	1.535	5.75 — 6.37
20 — 21	6.93	6	1.40	.341	.57	.834	6.36 — 7.50
18 — 19	7.13	21	1.44	.331	.31	1.517	6.82 — 7.44
16 — 17	7.60	20	1.76	.271	.39	1.209	7.21 — 7.99
14 — 15	8.97	17	1.72	.277	.42	1.141	8.55 — 9.39
12 — 13	10.30	20	2.53	.188	.56	.842	9.74 — 10.8.
10 — 11	11.50	11	2.19	.218	.66	.723	10.84 — 12.16
8 — 9	13.06	8	4.63	.103	1.64	.292	11.42 — 14.70
6 — 7	15.30	7	3.66	.130	1.38	.345	13.92 — 16.68
0 — 5	16.23	14	1.87	.255	.50	.955	15.73 — 16 73
-1 — -4	19.37	10	4.11	.116	1.30	.367	18.07 — 20.67
-5 — -10	21.64	6	4.65	.102	1.90	.251	19.74 — 23.54
-11 — -16	37.83	6	10.96	.044	4.48	.107	33.35 — 42.31

Fig 1.

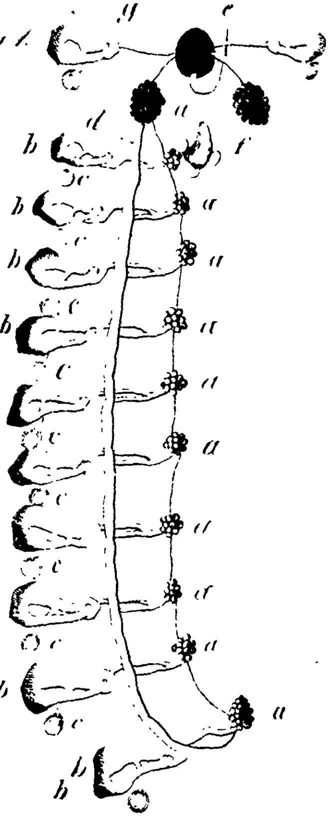

Fig 2.

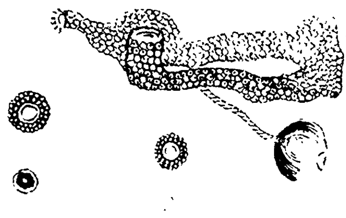

Fig. 3

NOTES ON SOME POINTS IN THE ANATOMY OF THE LEECH.

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Read before the Canadian Institute, December 15*th*, 1855.

Dugès, Home, Jones, and other distinguished anatomists, in their descriptions of the structure of the Leech have assigned to certain highly developed parts in this Annelid, functions which it was by no means clear to many more recent observers, could legitimately be performed by them. It was reserved, however, for Dr. Williams, of Swansea, a highly distinguished comparative anatomist, to unravel the mystery, and to furnish proof of the errors into which his predecessors had fallen.

The existence of an elaborate circulating system seemed to necessitate an ærating one equally developed in character; but spiral vessels, on the type of insecta, no where being seen, the vascular-walled pouches, occupying the lateral regions of the body, seemed to be the organs of respiration, supplied freely with blood by vascular hearts. While many doubted the existence of so special an organization for respiration in this creature as was described, no one before Dr. Williams had assigned them to the generative apparatus, and as I believe that the observations which have been repeated here confirm the results arrived at by the Naturalist of Swansea, I thought it of sufficient interest to bring the subject before the Institute. I cannot, however, agree with Dr. Williams that the generative organs are rightly described, even by himself. In order to understand the subject, as now unfolded to us, it may be more advantageous to state the opinion of one of the highest authorities.

Mr. Jones, in his "Animal Kingdom," observes: "Two lateral vessels are appropriated to the supply of the respiratory system, and in them the blood moves in a circle quite independent of that formed by the dorsal artery and ventral vein, although they all communicate freely by means *of cross branches*, those passing from the lateral vessels to the dorsal being called by Dugès dorso-lateral, while those which join the lateral trunks to the ventral canal are the latero-abdominal branches. The movement of the blood in the lateral or respiratory system of vessels is quite distinct from that which is accomplished in the dorso-ventral system or systemic.

On examining one of the respiratory pouches, its membranous walls are seen to be covered with very fine vascular ramifications, derived from two sources; the latero-abdominal vessel gives off a branch which is distributed upon the respiratory sacculus; and there is another very flexuous vascular loop derived from the lateral vessel itself, which terminates by ramifying upon the vesicle in a similar manner. The walls of the loop are extremely *thick* and *highly irritable;* but on tearing it across, the internal cavity or canal by which it is perforated is seen to be of comparatively small diameter, so that we are not surprised that, although such appendages to respiratory sacs were detected and well delineated, their nature was unknown, *and they were supposed to be glandular bodies appropriated to some undiscovered use.*

The female sexual organs are thus described by the same observer: "The ovigerous, or female sexual organs, are more simple in their structure than those which constitute the male system; they open externally by a small orifice situated immediately behind the aperture from which the penis is protruded, the two openings being separated by the intervention of about five of the ventral rings of the body. The vulva or external canal leads into a pear-shaped membranous bag which is usually, but improperly, named the uterus. Appended to the bottom of this organ is a convoluted canal which communicates with two round whitish bodies; these are the ovaria. This description, therefore at once makes a vast disproportion between the male organs and the female, giving to the latter an unknown preponderance over the former; for all anatomists are agreed as to the physiological import of the rows of glandular bodies known as the testes. Now we will contrast with the above the statements and observations of Dr. Williams.

The testes are observed under the character of small white granular bodies, disposed at short distances in a longitudinal series on either side of the ventral median line of the body. When forcibly compressed, a white fluid exudes, which under the microscope is found to consist of nothing but sperm-cells, in various stages of evolution. To each of these testicular bodies two minute threads are attached. The larger and more obvious of these threads extends outwards at right angles with the median line, and joins a considerable chord running parallel with the median line. Examined in section, both the transverse threads and longitudinal chord prove to be tubes filled with fluid thickly charged with sperm-cells, a true male secretion. The longitudinal tube is common to *all* the testicular bodies; it begins at the most posteriorly situated of these bodies, and ends in that most anteriorly placed, median and azygos, to which the intromittent organ is appended; meeting at this mesial organ the corresponding duct of the opposite side. In addition to the tubulus just described as proceeding from the testes, another much smaller one may be detected on minute dissection running directly outwards, crossing underneath the large longitudinal duct and becoming united to the base of the ovarian utricle. Traced in the direction of the head, the longitudinal duct is seen to enter into a glandular body, which in size is considerably greater than the testes situated posteriorly to it on the same side. In minute structure this body is precisely the same as the bodies of the testicular series; like them it is filled with sperm-fluid; the interior is a cavity. The secreting glandular structure is disposed around the circumference; the secreted product is thrown into the enclosed hollow. This description applies also in every particular to the other testicular bodies, which are like the former, hollow orbicular glands. The large longitudinal duct which serves as a common channel of communication between all the testes, emerges out of the gland under the character of a duct of greatly reduced size. This small tubular thread, traced with minute care, may be followed into the median glandule to which the penis is appended. In the median line also, and some little distance posteriorly to the body just described, may be remarked a pear-shaped sacculus from the unattached fundus of which a cæcal coiled tubule is prolonged. Between this saccular and the other parts of the reproductive system, no communication of any description can be discovered. It seems simply destined to receive the intromittent organ developed in connection with the gland situated in advance of it on the median line.

It may be inferred from the character of the whole system of the testicular bodies, that the penis is not an ejaculatory organ; it seems subservient only to the purposes of sexual stimulation. By all anatomists, from the date of the first description of M. Dugès, this *sacculus* has been regarded as an uterus, and as, in fact, constituting the whole of the female element of the generative system. The convoluted cæcal tubule pendent from the fundus of this sacculus, including some undiscoverable gland structures on either side of it, are commonly indicated as the ovaria. Such anatomists, whilst entertaining opinions so remote from the truth, and withal so little probable on physiological grounds, never could have *seen* these parts. An ovarian system so utterly disproportionate to the testicular, *if it were true*, would find no precedent or parallel in the whole series of invertebrate animals.

In all hermaphrodite animals the female elements of the generative organs are invariably superior in size, more elaborately organized, and more important as constituent parts of the whole organism, than the male: wherefore should the converse of this rule obtain in the Annelida? A cursory glance at the organic necessities of the animal system should have sufficed to convince the physiologist that such a simply organized sac, so uncomplicated in structure, so unprovided with stromatous tissue for the production and development of ova, could not have proved adequate to those profound functions involving in intimate sympathy every other of the organism which are concerned in the continuation of the species. It was the necessity, thus perceived on theoretical grounds, for some series of organs which would *reasonably* answer to the general characters of a female system, which first led the author to the discovery of that which now remains to be explained.

In the Leech, the female system consists of a greater number of separate parts than the male, amounting to fifteen or seventeen on either side, while the testicular bodies are only nine. This system is composed of a linear succession of a bagpipe shape, membranous sacculi, contracting at both ends into two separate ducts. One of these ducts, terminates an orifice communicating externally. It is through this office that the ova and young escape from the ovarian utricle into the external medium. In the Leech, the ova in *this* duct, in every case yet examined, present an obviously greater degree of development than those which are found in the duct which communicates with the neighboring testis. At certain seasons of the year, in the Earth-worm, this duct, which may be called the *inferior* duct of the ovario-uterine organ, is crowded with living young, emerging from the ova; and in process of final extrusion through the external orifice. The *hatched young* in the Leech have never yet been seen actually by the author in this situation, although the parts are accurately correspondent in the two worms. He cannot yet therefore state of the Leech what he can from actual observation of the Earth-worm, that it is viviparous; the *superior* duct of each ovarian uterus passes underneath the common longitudinal chord and opens into the true testicular duct, the two channels becoming united into one, just before entering the substance of the gland. It is desirable here to warn the anatomist, that in practice the demonstration of this fact demands great patience and minuteness of dissection.

The author now desires to solicit special attention while he attempts to explain the nature of the connexion which, according to his view, subsists between the male organ or testis on the one hand, and the egg-producing and egg-incubating organ or ovarian uterus on the other. It will, he trusts, suffice to elucidate satisfactorily the mechanism of *self-impregnation*. The testicular bodies secrete a true sperm-fluid, the cells of which can readily be detected by the eye both in the duct which leads to the great longitudinal chord, and in that which conducts into the ovarian uterus. The male seminal fluid travels from the testes into the ovarian uterus along the superior of these ducts. It may be actually detected in the cavity of this latter organ, where it comes into immediate contact with the ova whereby impregnation results. The ova thus fertilized travel gradually onward, and reach the inferior half of the ovarian uterus. As in the Leech, these ova may be discovered *as ova* at a point in the oviduct very near the outlet, it is probable that this Annelid is oviparous. This fact, which is little material, may be readily determined by examination instituted at the right season. The curved ovario-uterine membranous organ is really the part to which Dugès applied the name of "the cardiac vasiform heart," and which M. Quatrefages has denominated "la poche secrétrice!!" Dugès made a near approach to a correct *descriptive* anatomy of this organ. Quatrefages' delineations are extravagantly erroneous. To each ovarian uterus a beautifully delicate vesicle is attached. It is connected with the superior duct, or that which leads directly from the testis into the ovario-uterine saccule by means of a very slender tubule rising from the vesicle. This vesicle is the far-famed "respiratory sacculus" of the Leech; the duct communicating between it and the superior half of the ovarian uterus is the wondrous *respiratory heart vessel*, which for half a century has challenged the admiration of anatomists!

Let it now be seen what rational and probable physiological explanation these parts will bear. In the first place, it is obvious that there exists in this Annelid a direct communication by means of an open duct between the male and female elements of the reproductive system; that this system opens externally *only* at the orifice of the oviduct; that these orifices are designed for the extrusion of the ova or young from the body of the parent, and not for the reception of the sperm-fluid into the ovario-uterine tract; that the male fertilizing secretion passes directly along the duct into the ovarian uterus; and that thus the process of *self*-impregnation is *literally* accomplished, for it is not the sperm-fluid of *another* individual that fecundates the ova, but that of the *same* individual.

That conclusion may be affirmed with confidence, since the median copulative saccule into which the intromittent organ of *another* individual is inserted terminates in a convoluted cæcal tubulus. Between this median organ and the great bilateral series of ovario-uterine organs there is no communication whatever. If, therefore, during the union of two individuals a fluid is emitted by the male organ into the interior of the sacculus, it requires no further argument to shew that it can proceed no further, that it can reach no *other* part of the reproductive system. In congress therefore these two parts can subserve no other than the purposes of first: mechanically uniting the individuals, and secondly: of stimulating the sexual organs. During those periods when the fertilizing fluid is not required for the office of fecundation, it is probably discharged externally as a superfluous excretion in part through the intromittent organ. According to this explanation, to the larger testicular bodies should be assigned the mechanical uses only of seminal receptacles, compressing what they may contain, either backwards into the ovario-uterine organs, or forwards to be expelled through the penis as an excretion. The penis therefore is the only means *common* to the whole male system by which it communicates with the exterior, the so-called "respiratory sacculi," being the means by which each testis separately communicates with the exterior.

It is with considerable diffidence that I express a doubt as to the correctness of Dr. Williams' observations on two points, and as my dissections induce me to do so, I will now briefly refer to the annexed diagram, Plate 1, Fig. 1, to illustrate what I believe to be the true history of the organs which are respectively called ovipero-uterine sacs and testes.

The following references to figure 1, on the plate, will enable the reader to apply the observations offered here to the results which dissection exhibits with the aid of the microscope:

(*a*) *Ovaries.* (*b*) *Testes.* (*c*) *Vesicula Seminalis.* (*d*) *Common duct.*
(*e*) *Intromittent organ and bulb.* (*f*) *Uterus* (?) *or pouch.*
(*g*) *Termination of common duct in bulb.*

Except by Dr. Williams, hitherto no chain of connexion has been described between the so-called testes; they are in all the drawings shown as attached to the duct common to each so-called testis and sac. In my dissection made from the dorsal region, I find that a delicate vessel passes, as represented in the annexed plate, between each gland, forming an intimate communication between them. All these glands terminate in a common duct at the base of the intromittent organ.

Dr. Williams and others have described the base of this last-named instrument as possessing also a gland-structure, but no such structure exists; on the contrary the bulbous expansion evidently possesses contractile walls and presents no glandular appearance.

The so-called uterus is, as Dr. Williams states, a sacculus, terminating in a cul de sac, and I can find no trace of connection between it and the other bodies. In shape it is somewhat like the human stomach, and on its lesser curvature enfolds a glandular mass.

From the structure and position of the respective organs above described, it certainly seems that we ought to reverse their supposed offices; instead, therefore, of describing the glandular bodies at present considered testes, as such, it is much more reasonable to assign them to the ovarian system and to consider the uterine sacs of Williams as the male organs of generation. A few of the arguments which tend to support such an opinion are that the spermatic fluid is invariably projected from organs, while the germ fluid or ova are more silently propelled along ducts or tubes. Again, Williams curiously enough makes the following statement which is important: "It is here essential to add that the ova are first produced in a stromatous layer which constitutes one of the coats of the ovarian uterus, and that a large number of them are contained in a common capsule until they attain a certain degree of development, after which they may be recognized near the outlet of the oviduct in a single and free state. *Ova are never found in the so-called respiratory* saccules, but on the contrary and invariably, *a small quantity of sperm-fluid*. Each of these sacs is perforated at the point where it is attached to the integument by an orifice which opens directly externally. This vesicle which from the date of the writings of Dugès has been described as 'the respiratory sac,' is a true vesicula seminalis; *it is designed to receive* the superfluous portion of the sperm secretion as it passes from the testes to the ovarian uterus. Spermatozoa can always be discovered in the vesicles." According to the above plan the sperm-fluid must overflow the common duct and then pass by a second lateral duct into the distant and detached vesicula seminalis. Surely there is no such complication in nature. On the contrary the following is the simple and intelligible mode which she adopts: The bodies described as testes are the ovaries, these open into the common duct; the structures designated ovarian-uteri are the testes with their attached vesicula seminalis; these bodies possessing, as shown by Williams, irritable contractile walls, discharge the sperm-fluid into the common duct and thus fertilize the germ-fluid.

The office of the detached sac, said to be an uterus, and supposed by Williams to be a mere arrangement for attaching individuals in copulation, seems to be really more strictly a uterus, although on this point more proof is needed. My reasons for inclining to the old opinion is that during this last summer I twice found Leeches with a circlet of young Leeches attached to the mouth of this curious sac, and in a specimen presented to the Institute, not only are the young ones shown so situated, but after the death, or more probably in the death of the Leech, ova were extruded and now lie in the glass cell with the parent. These ova are spherical and of a peach color.

This fact I think indicates that the fertilized ova are deposited in the uterus which as quickly as hatched attach themselves for a time to the orifice of the outlet, as shown in Fig. 3.

Fig. 2—*Vascular Contractile Testes, &c.*
Fig. 3—*Leech with Young Ones.*

COLEOPTERA COLLECTED IN CANADA.*

By William Couper, Toronto.

For synonyms, &c. see Melcheimer's Catalogue.

ELAPHRUS

CLAIRVILLEI, Kirb. N. Z. 4, 61.

Antennæ and head black, the latter glossy, minutely punctured and slightly tinged bronze-green, having a transverse elevated line in front, and a conoidal elevation on top between the eyes in which is a deep pit; thorax black, glossy, longer than wide, and impressed thus: ·Y·—with a slight tinge of copper bronze on the dorsal margin; elytra of the same color as thorax, each contains 21 circular impressions, punctured and tinged with blue, and surrounded by an elevated ring—the punctures in the region of scutellum are much smaller than the marginal series; beneath green and copper bronzed; femoræ rufous at the base. Length 4 lines. Island of Toronto.

Kirby describes his insect as having the base of the posterior femoræ rufous; in my specimen they are all rufous at the base. Sir J. Richardson captured only the single described specimen, otherwise, had there been duplicates to examine, he would probably have given the color as characteristic to the whole, and not confined to the posterior femoræ alone. In my specimen all the elytral impressions are ringed; in Kirby's, the rings of the marginal series are obsolete.

? INTERMEDIUS, Kirb. N. Z. 4, 62. Lec. Ann. Lyc. 4, 448.

Antennæ black, set with short rigid hairs, thickest at the apex; head bronzed copper, minutely interspersed with bright green the space between the eyes less elevated than in *E. Clairvillei*, and occupied by a central longitudinal impression; thorax of same color as head, the Y impression is not so deep, but the side-punctures are more distinct than in the latter species; elytra minutely punctured, and with less brilliancy—the copper color darker, with a quadrangular series of impressions without any elevated ring. Some of the

* See, for previous notes, *Canadian Journal* (Old Series) 1855.

impressions have a slight elevation in the centre—marginal series smaller, and in some specimens nearly obsolete; body beneath bronze-green; femoræ green, tibiæ rufous. Length 4 lines. Island of Toronto.

The sutural quadrangular elevation which unites the elytra "just before the middle" in Kirby's specimen, is almost obsolete in the above; in every other respect it agrees with his description. Kirby's insect was taken by Sir John Richardson, at Great Bear Lake, in lat. 66°—67°.

NECROPHORUS

? MELSHEIMERI, Kirb. N. Z. 97.

Jaws black, minutely punctured, and tufted on each side beneath the base with orange-colored hairs; head black, minutely punctured in front, with a subtrapezoid orange-colored nostril-piece, and a transverse sulcus between the antennæ: eyes black, smooth, lobed behind—the lobes punctured and set with short rigid hairs; knob of the antennæ orange-colored; neck ringed with yellow hairs; thorax margined, punctured, dilated and obliquely depressed anteriorly; scutellum bell-shaped, black and punctured; elytra black, densely punctured, the shoulders elevated, with two longitudinal abbreviated obsolete lines, and two orange-colored toothed bands—the anterior is transverse, but the posterior one does not reach the suture: both connect with the deeply orange-colored epipleura; postpectus on each side covered with tawny hairs; posterior femoræ truncate at the apex; tibiæ toothed and dilated; body beneath black, and densely punctured. Toronto, not common. Length 8½ lines.

OBSCURUS, Kirb. N. Z. 97.

Head black, finely punctured in front, and without a rhinarium or nostril-piece; the sides of the latter obliquely furrowed and separated transversely by an abbreviated line; has no prominent lobe behind the eyes; posterior part of the neck ringed with tawny hairs very distinctly seen when the head is bent down; antennæ black, three last joints of the knob orange-colored; thorax dilated, margined—the margin punctured, with a longitudinal groove through the disc; scutellum triangular, slightly elevated; elytra black, densely punctured, the anterior sutural region slightly depressed, the shoulders and two longitudinal lines elevated, as in the last species; epipleura deep red, from which an anterior dentated band of the same color nearly reaches the suture—the posterior one is kidney-shaped, and reaching neither epipleura nor suture; body beneath black; postpectus covered with short glossy hairs; the tibiæ are dilated and toothed. Toronto, not common. Length 8½ lines.

NECROPHILA

TERMINATA, Kirb. N. Z. 103.

Antennæ and head black, the frontal impression between the eyes oblong; thorax minutely and confluently punctured, margined yellow—the discoidal spot black, and very slightly lobed at the sides, with a yellow sphenoid spot inserted posteriorly; elytra brown black, and minutely punctured, with two longitudinal obsolete ridges and a row of distinct punctures on each side of the suture—yellow at the apex; beneath black. Length 9 lines. Toronto, not common.

AFFINIS, Kirb. N. Z. 103.

Head and antennæ black, the frontal impression not so deep; thorax pale yellow, very finely punctured—discoidal spot smaller and differently formed than in the last species—the lateral lobes are larger and more oblique—the posterior part is rather of a deltoid form and slightly sphenoid in the centre with yellow; elytra of a brown silky color, with the same irregular elevations and sutural rows of punctures as in *terminata;* the apex of elytra yellow, body beneath, and legs black. Length 9 lines. Toronto, rare.

This and the preceding species are nearly related to *N. Americana*, Linn., the true northern type of the genus. Kirby describes four species which he states are closely related to the latter. *N. Canadensis* is evidently the ♀ of *Americana.* I have noticed invariably both the form of the thoracic discoidal spot, and the color of epipleura, to vary in almost every specimen; also, in the smaller specimens the sutural termination of elytra are not so acuminate; probably it may be, as he states, a sexual character.

LATHROBIUM

PUNCTICOLLIS, Kirb. N. Z. 86. Erichs. p. 604.

Head obovate, minutely punctured; antennæ, mandibles and palpi dark chesnut; thorax " oblong square with all the angles rounded, punctured, but not thickly;" elytra of a dark chestnut color, longer than wide—not much longer than thorax, and thickly punctured; posterior part of the body black, and covered with very short glossy hairs; beneath black glossy; legs bright mahogany; tibiæ armed with a spine. Length 5 lines. Toronto, common. Taken in lat. 54°—*Kirby.*

DERMESTES

LARDARIUS Linn. Fabr. El. 1, 312. Le Règne Animal, Insectes, tab. 36, fig. 10.

Head and thorax black, the latter with several minute yellow spots; scutellum black; elytra posteriorly black, glossy—base yellow, with three black dots, thus ∴ on each elytrum. Length $4\frac{3}{4}$ inches.

Common in Canada. It feeds indiscriminately on all animal substances, and is found throughout summer, on the Island of Toronto, in putrified fish.

BYRRHUS

? CYCLOPHORUS Kirb. N. Z. 117.

Thorax dark chestnut color, glossy, and intermixed with short cinereous hairs; scutellum very black and triangular; elytra not so dark as the thorax, glossy and covered with short rust-colored hairs; three longitudinal stripes on each, and a transverse double band of pale cinereous hairs in form thus ≈; body beneath and legs dull ferruginous. Length $2\frac{1}{4}$ lines. Taken by Mr. F. H. Ibbetson, at the Lake of Two Mountains.

The naturalists to the northern expedition captured only one specimen, which Mr. Kirby describes as having *two* black stripes on the elytra, and its length $3\frac{1}{4}$ lines. Mr. Ibbetson's specimens vary in size; they are evidently related, as in some of them the third stripe is obsolete.

BRACHYS

TESSELLATA Fab. El. 2, 218. *ovata*, Web. Obs. Ent., p. 78; *aurulenta*, Kirb. N. Z. 162; *aerosa*, Mels. Pr. Acad. 2, 148.

Body obovate, black-blue, glossy; antennæ black-blue, shorter than thorax; head has a sinus in front, and covered with glittering copper-colored decumbent hairs; thorax transverse, impunctured, lobed and impressed on each side posteriorly, and interspersed with copper-colored decumbent hairs; scutellum transverse, smooth, impunctured, rounded anteriorly, and acuminate posteriorly; elytra with three longitudinal ridges—the two inner ones are not so distinct as the external one, which is more acute, running from the shoulder in an undulated line nearly to the apex of elytrum. The elytra are minutely punctured in double rows, those on each side of suture are very distinct; ornamented with copper spots and undulated silver bands formed of decumbent hairs; beneath dark-blue, glossy, truncate at the apex. Length $2\frac{1}{2}$ lines.

The northern species of Brachys are small, but extremely beautiful; in habit they vie with the larger *Buprestidæ*. In summer they are found on the upper surface of the leaves of oaks, on which they subsist. Common in the neighborhood of Toronto.

RHINARIA

SCHOENHERRI Kirb. N. Z. 203. Sch. Cur. 7, 369.

Body oblong, pear-shaped, covered with hoary pile; antennæ black, and nearly the length of the head, the knob ovate, acute; the rostrum sub-cylindrical, with three slightly elevated oblique lines in front joining between the eyes, the latter are round, prominent; thorax rather narrowest anteriorly, and more granulate than the head; scutellum conspicuously white; elytra with nine perfect rows of punctures, and from the density of the pile in some specimens they are not quite visible: on each elytrum there are three longitudinal white stripes, and four rows of distinct black tufts—depressed at the apex; tibia clavate. Length 6½ lines. Toronto, rare.

The genus *Rhinaria*, founded by Kirby (Linn. Trans. xii, 430, *t.* xxii, *p.* 9), from the above typical form, and the only species as yet discovered north of Mexico.

LEPTURA

VAGANS, Oliver, 73, 46. Lec. J. Acad. 2d. 1, 337. *brevis* Kirb. N. Z. 182.

Head black, thickly and minutely punctured, and interspersed with erect hoary hairs; antennæ 10-articulate, the four first joints are black, and the fifth to apex are yellow at the base; thorax globose, anteriorly constricted, posteriorly depressed, deeply and confluently punctured, having some erect hairs of the same color as on the head; scutellum "linear, covered with decumbent hairs;" elytra densely and deeply punctured, rounded and spread apart at the apex, with a lateral longitudinal stripe, commencing behind the shoulder, "of the color of the yolk of an egg;" beneath black, minutely punctured; legs with yellow decumbent hairs. Length 5 lines. Toronto, rare.

The elytra in this insect are wider across the shoulders, and the "body shorter in proportion to its width."

SCALARIS, Say, J. Acad. 278.

Entirely dark ferruginous above, of a silver gloss beneath, antennæ 10-articulate, the third joint from base shortest; head much inclined, interspersed with slender erect silken hairs, and minutely punctured posteriorly—separated from the thorax by a conspicuous ring; thorax minutely punctured, somewhat narrower in front, with a central abbreviated depression—the posterior angles acute; scutellum triangular; elytra shorter than the body, covered with ferruginous decumbent glossy hairs, which occupy the greater part of the anterior, thence they extend on each side of the suture—the mark is compressed twice.

In this insect the elytra are remarkable for their great marginal compression towards the apex. Length 1 inch 2 lines. Taken by Mr. Ibbetson, at Manitoulin.

NOSODERMA

? OBCORDATUM Kirby (Boletophagus), N. Z. 236.

Body oblong, depressed, of a rusty color above; antennæ with large globular articulation at base, and the apical joints thicker than the antecedent ones; head short, eyes black; thorax granulate, of same width as elytra—the sides depressed, rounded posteriorly, with two anterior obtuse angles, and finely serrated beneath—disc elevated, on which are several tubercles; scutellum black, elevated; elytra with three ridges longitudinally arranged—the two anterior form a series of tubercles, and the exterior reaches from base to apex, where there are two large tubercles on each elytrum—margin of a darker color, and densely serrated beneath. Length 4 lines. Toronto, rare.

In some characters it agrees with Kirby's specimen. The rare occurrence of the species in this neighborhood prevent a determination of the sexes at present. Their attachment to *Boleti* and other vegetable excrescences confine them to old forests.

OPLOCEPHALA—NEOMIDA

BICORNIS. Oliv. Ent. 3, 55. Kirb. N. Z. 235 (Arrhenoplitis). *virescens* Lap. 23, 341. *Hispa* F. Mant. p. 215.

♂ Antennæ black, the three first joints attenuated and rufous; clypeus armed with a pair of minute teeth; head dark green, glossy, armed behind the eyes with a pair of cylindrical vertical horns, which are rufous at the apex; thorax rounded at the sides and minutely punctured; scutellum triangular; elytra dark green, glossy, slightly furrowed and punctured in the furrows; beneath black, glossy, and punctured; legs rufous. Length 2 lines.

♀ same color as ♂; the head is transversely impressed between the eyes, and unarmed.

This species is one of the most common of our fungivora; in summer they devour fungi and other excrescences on decayed trees, and in winter they hybernate and are found congregated in large numbers under the bark.

STATYRA—ARTHROMACRA

AENEA Say, Long's Exp. 2, 287. *donacioides* Kirb. N. Z., 237.

Antennæ longer than the head and thorax, tawny-yellow, black at base—11-articulate: 3d to 10th of equal length, downy and ringed with black—apical articulation longest; above black-bronzed, glossy, with a slight tint of green—thickly and irregularly punctured; thorax cylindrical; elytra wider than thorax, rounded posteriorly; body beneath glossy, breast densely punctured; femoræ clavate; joints of tarsi tawny-yellow. Length 5 lines. Toronto, on young oak trees. Rare.

One distinctive character by which this insect may be determined is, that the tarsi are conspicuously dilated, and, behind the cysts the joint supporting the ungues is surrounded by a transparent ring at the base. At "first sight," its resemblance to a *Donacia*, as Mr. Kirby states, is merely from color; that alone probably led him to name it as above cited. No species of *Lagridæ* are known to frequent aquatic plants, while the *Donacidæ* are entirely confined to marshy localities.

REVIEWS.

Acadian Geology: An Account of the Geological Structure and Mineral Resources of Nova Scotia and portions of the neighboring Provinces of British America. By John William Dawson, F.G.S.* Edinburgh: Oliver & Boyd. 1855.

The author of this well-timed volume has been favorably known to the scientific world for some years, by the publication of various able memoirs on points connected with the geology of Nova Scotia. These have appeared principally in the Proceedings and Journal of the Geological Society of London, in the Proceedings of the Royal Society of Edinburgh, and in the Journals of the Legislature of Nova Scotia. In the work now before us, Principal Dawson has gathered together the results of his personal observations during the last ten or twelve years on the geology of the districts cited above. The mass of valuable facts thus collected, is here presented to the public in a very readable form; and the work is furthermore liberally supplied with a number of well-executed views and wood cuts, besides a large geological map of the entire province of Nova Scotia, Prince Edward's Island, and part of New Brunswick. To be thoroughly appreciated, Mr. Dawson's book should of course be read in Nova Scotia itself, or employed as a guide to the numerous interesting localities of which it contains descriptions. But, apart from its local value, the work is not without many points of general interest; and in its masterly treatment of the leading questions which come under review, it may be referred to with profit by all interested in the progress of geological inquiry. Take, for instance, the following description of certain alluvial deposits of marine origin, spread in places along the deeply indented coasts of the Bay of Fundy:—

"The western part of Nova Scotia presents some fine examples of *marine alluvial soils.* The tide-wave that sweeps to the north-east, along the Atlantic coast of the United States, entering the funnel-like mouth of the Bay of Fundy, becomes compressed and elevated, as the sides of the bay gradually approach each other, until in the narrower parts the water runs at the rate of six or seven miles per hour, and the vertical rise of the tide amounts to sixty feet or more. In Cobequid and Chiegnecto Bays, these tides, to an unaccustomed spectator, have rather the aspect of some rare convulsion of nature than of an ordinary daily phenomenon. At low tide, wide flats of brown mud are seen to extend for miles, as if the sea

* Principal of McGill College, Montreal.

had altogether retired from its bed; and the distant channel appears as a mere stripe of muddy water. At the commencement of flood, a slight ripple is seen to break over the edge of the flats. It rushes swiftly forward, and, covering the lower flats almost instantaneously, gains rapidly on the higher swells of mud, which appear as if they were being dissolved in the turbid waters. At the same time the torrent of red water enters all the channels, creeks, and estuaries; surging, whirling and foaming, and often having in its front a white, breaking wave, or "bore," which runs steadily forward, meeting and swallowing up the remains of the ebb still trickling down the channels. The mud flats are soon covered, and then, as the stranger sees the water gaining with noiseless and steady rapidity on the steep sides of banks and cliffs, a sense of insecurity creeps over him, as if no limit could be set to the advancing deluge. In a little time, however, he sees that the fiat, "hitherto shalt thou come and no farther," has been issued to the great bay tide: its retreat commences, and the waters rush back as rapidly as they entered.

The rising tide sweeps away the fine material from every exposed bank and cliff, and becomes loaded with mud and extremely fine sand, which, as it stagnates at high water, it deposits in a thin layer on the surface of the flats. This layer, which may vary in thickness from a quarter of an inch to a quarter of a line, is coarser and thicker at the outer edge of the flats than nearer the shore; and hence these flats, as well as the marshes, are usually higher near the channels than at their inner edge. From the same cause, the more rapid deposition of the coarser sediment, the lower side of the layer is arenaceous, and sometimes dotted over with films of mica, while the upper side is fine and slimy, and when dry has a shining and polished surface. The falling tide has little effect on these deposits, and hence the gradual growth of the flats, until they reach such a height that they can be overflowed only by the high spring tides. They then become natural or salt marsh, covered with the coarse grasses and *carices* which grow in such places. So far the process is carried on by the hand of nature; and before the colonization of Nova Scotia, there were large tracts of this grassy alluvium to excite the wonder and delight of the first settlers on the shores of the Bay of Fundy. Man, however, carries the land making process farther; and by diking and draining, excludes the sea water, and produces a soil capable of yielding for an indefinite period, without manure, the most valuable cultivated grains and grasses. Already there are in Nova Scotia more than forty thousand acres, of diked marsh, or "dike," as it is more shortly called, the average value of which cannot be estimated at less than twenty pounds currency per acre. The undiked flats, bare at low tide, are of immensely greater extent.

The differences in the nature of the deposit in different parts of the flats, already noticed, produce an important difference in the character of the marsh soils. In the higher parts of the marshes, near the channels, the soil is red and comparatively friable. In the lower parts, and especially near the edge of the upland, it passes into a gray or bluish clay called "blue dike," or, from the circumstance of its containing many vegetable fragments and fibres, "corky dike." These two varieties of marsh differ very materially in their agricultural value. It often happens, however, that in the growth of the deposit, portions of blue marsh become buried under red deposits, so that on digging, two layers or strata are found markedly different from each other in color and other properties; and this change may be artificially produced by digging channels to admit the turbid red waters to overflow the low blue marsh.

The red marsh, though varying somewhat in quality, is the best soil in the province, and much of it compares favorably with the most celebrated alluvial soils of the old and new worlds. The following analysis of recently deposited marsh mud from Truro, will serve to show the composition of this kind of soil.

	Moisture,	·5
	Organic matter,	1·5
Soluble in Water.	Chlorine, } as common salt,	·095
	Soda, }	·115
	Potash,	·013
	Sulphuric Acid, } as gypsum,	·073
	Lime, }	·061
	Alumina,	·005
	Magnesia,	·004
Soluble in Hydrochloric Acid.	Carbonate of Lime,	3·60
	Oxide of Iron,	2·74
	Alumina,	1·20
	Magnesia,	·11
	Soda and Potash,	·3
	Phosphoric Acid,	·09
	Silicious Sand (very fine),	88·00

So valuable is this soil, though nearly destitute of organic matter, that it is found profitable to cart it upon the upland as a manure. Its best varieties have now been cropped without manure for more than two centuries without becoming unproductive; though there can be no question that under this treatment a gradual diminution of its fertility is perceptible. The weakest point of the marsh land, judging from the above analysis, is its small proportion of phosphates. It is probable, however, that this is in part compensated by the presence of fish bones and other matters of organic origin, which do not appear in an analysis. Yet I have no doubt that the cheapest manure for failing marsh will be found to be bone dust or guano, which, by supplying phosphates, will restore it nearly to its original condition. There seems no reason to suppose that a soil with the fine mixture of mineral ingredients present in the marsh mud, requires any artificial supply of ammoniacal matters. Draining is well known to be essential to the fertility of the marshes, and many valuable tracts of this land are now in an unproductive condition from its neglect. The fertility of failing marsh may also be restored by admitting the sea to cover it with a new deposit. This remedy, however, involves the loss of several crops, as some years are required to remove from the new soil its saline matter. It is, however, observed, that in some situations the newly diked marsh produces spontaneously a crop of couch grass and other plants, the seeds of which must have been washed into the sea by streams and deposited with the mud.

The low or inner marsh, which I have previously mentioned, under its other names of blue marsh and corky dike, is much less valuable than the red. It contains, however, much more vegetable matter, and sometimes approaches to the character of a boggy swamp; so that when a quantity of it is taken out and spread over the upland, it forms a useful manure. It emits a fetid smell when recently turned up, and the water oozing from it stains the ground of a rusty color. It produces in its natural state crops of coarse grass, but when broken up is unproductive, with the sole exception that rank crops of oats can sometimes be obtained from it.

The chemical composition of this singular soil, so unlike the red mud from which it is produced, involves some changes which are of interest both in agriculture and geology. The red marsh derives its color from the peroxide of iron. In the gray or blue marsh, the iron exists in the state of a sulphuret, as may easily be proved by exposing a piece of it to a red heat, when a strong sulphurous odour is exhaled, and the red color is restored. The change is produced by the action of the animal and vegetable matters present in the mud. These in their decay have a strong affinity for oxygen, by virtue of which they decompose the sulphuric acid present in sea water in the forms of sulphate of magnesia and sulphate of lime. The sulphur thus liberated enters into combination with hydrogen, obtained from the organic matter or from water, and the product is sulphuretted hydrogen, the gas which gives to the mud its unpleasant smell. This gas, dissolved in the water which permeates the mud, enters into combination with the oxide of iron, producing a sulphuret of iron, which, with the remains of the organic matter, serves to color the marsh blue or gray. The sulphuret of iron remains unchanged while submerged or water-soaked; but when exposed to the atmosphere, the oxygen of the air acts upon it, and it passes into sulphate of iron or green vitriol,—a substance poisonous to most cultivated crops, and which when dried or exposed to the action of alkaline substances, deposits the hydrated brown oxide of iron. Hence the bad effects of disturbing the blue marsh, and hence also the rusty color of the water flowing from it. The remedies for this condition of the soil are draining and liming. Draining admits air and removes the saline water. Lime decomposes the sulphate of iron, and produces sulphate of lime and oxide of iron, both of which are useful substances to the farmer.

This singular and complicated series of processes, into all the details of which I have not entered, is of especial interest to the geologist, as it explains the causes which have produced the gray color and abundance of sulphuret of iron observed in many ancient rocks, which like the blue marsh have been produced from red sediment, changed in color from the presence of organic matter. It also explains the origin of those singular stains, which, in rocks colored by iron, so often accompany organic remains, or testify to the former existence of those which have passed away."

In Nova Scotia, as in Canada, a wide break in the geological scale, occurs below the drift, although of a less extensive character than with us. Two formations—one of vast importance—absent in Canada, are there met with. These are the Permian (?) and the Carboniferous formations: the latter occupying in New Brunswick and Nova Scotia proper, a wide extent of territory. Devonian and, without doubt, Silurian strata likewise occur there; but the beds of these epochs are in general much disturbed, and rendered metamorphic by igneous action. From their less altered positions, however, numerous fossils have been collected, some of which are figured in the present work. The occurrence of still older metamorphic rocks, chiefly associated with the granites of the Atlantic coast, is also shewn to be exceedingly probable.

Much doubt at one time existed as to the true age of the red sandstone strata of these regions. Sir Charles Lyell was the first to prove that a considerable portion belonged to the Lower Carboniferous period. Satisfactory proofs of the posterior age of another portion, are entirely due to Mr. Dawson's researches. The only debateable point that remains for future elucidation, affects the question as to whether these newer strata belong to the Permian or to the Triassic epoch. The author's opinion referring them to the former, is probably the correct one. In Nova Scotia, this upper formation is chiefly limited to the inner coast of the Bay of Fundy; but it appears to occupy, on the other hand, the entire area of Prince Edward's Island. At Walton, near the mouth of the Shubenacadie, N. S., Mr. Dawson met with it resting in slightly inclined beds on the upturned edges of the lower strata; and he gives in his book, from one of his earlier papers communicated to the Geological Society, an exceedingly interesting section illustrative of this want of conformability between the two formations. The new red sandstone in Nova Scotia is every where traversed by extensive outbursts of trap belonging to the same geological period. Cape Blomidon, Cap d'Or, and other bold and picturesque headlands of the Bay of Fundy, are thus constituted. These trap localities offer to the mineralogist a rich harvest of zeolitic and other specimens. As in the older trap of Lake Superior, native copper is also present, but in comparatively small and unimportant quantities. Following Dr. Jackson and others, Mr. Dawson attributes the origin of the copper to deposits from solutions by electro-chemical action: although he states at the same time, "why this deposit should have occurred in trap rock does not appear very obvious"; and, furthermore—"when we take a piece of native copper from Lake Superior or Cap d'Or, with the various calcareous and silicious minerals which accompany it, nothing can be more difficult than to account on chemical principles for these assemblages of substances, either by aqueous or igneous causes." There can be no doubt that the precipitation of metallic copper by natural voltaic agencies is a phenomenon of actual occurrence; and, looking, amongst other circumstances, to the small amount of copper present in the trap of Nova Scotia, we might be justified, were further considerations kept out of view, in adopting the author's conclusions for that particular locality. But, with regard to the origin of the Lake Superior copper, occurring in such vast and apparently inexhaustible masses in the more ancient trap of that district, we hold the opinion of Agassiz and other observers, to be the true one, viz.—that, like the igneous rock with which it is so intimately blended, the copper is itself of igneous origin. If we allow the copper to be an igneous product, its occurrence in these igneous rocks of different geological ages, and in widely-remote localities—as in the Silurian trap of Lake Superior, the Triassic or

Permian trap of Connecticut, New Jersey and other States of the Union, in the same trap of Nova Scotia, of Baumholder in Rhenish Prussia, &c., becomes clearly intelligible; whilst, on the electro-chemical theory, its connection with this igneous rock, as truly stated by Mr. Dawson, is without any obvious explanation. This alone would be a strong argument in favor of its igneous origin; and when we consider the enormous amount present in the Lake Superior trap, and the absence of secondary products, such as must have resulted from the precipitation of this immense volume of metal from an aqueous solution, the case becomes still further strengthened. The only real objection to the igneous view, arises from the presence of zeolites and calc-spar, often in the closest association with the copper. Allowing the zeolites present in most traps, to be, as a general rule, after or secondary products arising from a decomposing process in the trap itself, we cannot obviously apply this argument to the copper. We know furthermore that many basalts—tough and unweathered—actually contain both zeolites and carbonates as constituents of their mass. That such constituents, moreover, cannot in all cases at least, be the result of alteration and decomposition, is plainly proved by the presence of *metallic iron* in certain basalts, as shewn by the interesting researches of Dr. Andrews. Nay, our author himself, in a very able discussion of the facts connected with the formation of the iron veins of the Cobequid Hills, assigns to *ankerite*—a compound of the isomorphous carbonates of lime, protoxide of iron, and magnesia—an eruptive or igneous origin. His views, in this respect, may not meet the approbation of all geologists, but we regard them as perfectly legitimate. An extensive examination of very numerous specimens of vein-stones and mineral aggregations, with particular reference to this question, has established in our mind the firm conviction that carbonate of lime does at times undoubtedly originate, or crystallize, from a directly igneous source. Indeed, all modern researches tend to shew, that there exists in nature scarcely a single mineral substance which is not sometimes produced by aqueous and sometimes by igneous agencies. With regard to the occurrence under particular conditions of hydrated minerals and carbonates in trap rocks, we may call to mind that volumes of steam and emanations of carbonic acid are largely given off from modern lavas, not immediately after their transmission from the volcanic orifice, but so soon as their temperature has cooled down below a certain point. If, by various readily-conceivable causes, the emission of these products be prevented, the formation of hydrated and carbonated compounds becomes a necessary result. In certain Etnean lavas, known by the somewhat loosely-applied term of Cyclophyre, the substance of the rock consists essentially of analcime and augite.*

Briefly to sum up our review of this vexed question, it appears to us that two phenomena have here mainly to be accounted for. First, the connexion of the copper with trap of different ages and localities; and, secondly, its association with carbonates and hydrated minerals. The former is satisfactorily met by the igneous hypothesis, but left altogether unexplained by the adoption of the electro-chemical or voltaic theory. The second phenomenon, if apparently opposed to the igneous explanation, is, when rightly considered, equally opposed to the other view. A single example, beyond the objections already cited, will suffice to uphold our assertion. It is well known that the Lake Superior copper frequently bears, even to the minutest striæ, the most distinct impressions and moulds of the accompanying calcite crystals—shewing incontestibly that these crystals must have been consolidated prior to the consolidation of the copper. Now, we have found, by actual experiment, that calc-spar in aqueous solutions of copper salts, is readily converted on the surface into malachite: whereas, the calc-spar crystals of Lake Superior, when extracted from their cupreous matrix, are perfectly white and unaltered upon the surface. Malachite, moreover, according to Whitney and Foster (Second Report, p.101), is all but unknown in the district, except as a mere superficial product due to the present action of the atmosphere. On taking leave of this subject, it should finally be pointed out, that carbonate of lime—equally with quartz, the zeolites, &c.—is a *non-conductor:* and hence in artificial precipitations of copper by the process under consideration, no deposit will take place upon this mineral unless its surface be coated with graphite or some other conducting substance.†

The most important rock-group of Nova Scotia belongs to the great carboniferous epoch. The coal-bearing rocks of this system,

* Some very interesting remarks and experiments by Professor Bunsen of Marburg, on the artificial formation of zeolitic silicates by heat, may be seen in Von Leonhard's Jahrbuch for 1851, p. 861. See also the Annual Address of the President of the Chemical Society of London (Professor Daubeny) for 1853.

† Two other views have also been advanced in elucidation of the origin of these copper deposits. One assumes the copper to have been produced by the action of the trap on copper pyrites and other ores; but this theory fails to explain the occurrence of copper sulphides associated with the same erupted rock in neighbouring localities. The second theory supposes the copper to have originated from the reducing action of free hydrogen on volatile copper compounds, as Cu Cl. In controversion of this, the unparalelled amount of the copper may be referred to. At the same time, the origin of the little veinlets and arborescent ramifications may perhaps be rightly attributed to some effect of the kind in question; but their deposition within zeolites and other non-conducting bodies, by electro-chemical action on metallic solutions, is certainly devoid as yet of any satisfactory explanation.

so largely developed in the province, are not only of the greatest economic value, but also of the highest interest in a purely scientific point of view. The following synoptical arrangement of the rocks of this group, as occurring in Nova Scotia and New Brunswick, is given by Principal Dawson:

SYNOPSIS OF THE CARBONIFEROUS ROCKS OF NOVA SCOTIA.

UPPER OR NEWER COAL FORMATION.

Grayish and reddish sandstones and shales; with beds of conglomerate, and a few thin beds of limestone and coal, the latter not of economic importance.—Thickness 3,000 feet or more.

Characteristic Fossils.—Coniferous Wood, Calamites, Ferns, &c.

Localities.—Cumberland north of the Cobequid mountains, Northern Colchester, Pictou. Well exposed in the Joggins coast, and in the coast of Northumberland Strait west of Pictou Harbour.

LOWER OR OLDER COAL FORMATION.

Gray and dark-coloured sandstones and shales, with a few reddish and brown beds; valuable beds of coal and ironstone; beds of bituminous limestone, and numerous underclays with *Stigmaria.* Thickness 4,000 feet or more.

Characteristic Fossils.—Stigmaria, Sigillaria, Lepidodendron, Poacites, Calamites, Ferns, &c. Erect trees *in situ.* Remains of Ganoid Fishes, *Cypris, Modiola,* and Reptiles of three species.

Localities.—Cumberland north of Cobequid mountains; Pictou, especially East River; Port Hood, Inhabitants Basin, and other places in Inverness and Richmond; Eastern part of Cape Breton; parts of Colchester south of Cobequid mountains. Finest exposures: South Joggins, and near Sydney, Cape Breton.

LOWER CARBONIFEROUS OR GYPSIFEROUS FORMATION.

Great thickness of reddish and gray sandstones and shales, especially in upper part; conglomerates, especially in lower part; thick beds of limestone with marine shells, and of gypsum. Thickness 6,000 feet or more.

Characteristic Fossels.—Productus, Terebratula, Encrinites, Madrepores, and other marine remains in limestones. *Coniferous Wood, Lepidodendron, Poacites, &c.*, in shales and sandstones. Scales of Ganoid Fishes very abundant in shale, associated with lowest beds, in which are also small coaly seams and bituminous beds.

Localities.—Northern Cumberland, Pictou, Colchester, Hants, Musquodoboit in Halifax county, Guysboro' in part, parts of Inverness, Richmond, Cape Breton, and Victoria.

The actual superposition and arrangement of all this great thickness of beds are ascertained by the examination of coast and river sections, in which portions of the series are seen tilted up, so that they can, by proceeding in the direction toward or from which they incline, be seen to rest on each other. There is one coast section in the province so perfect that nearly the whole series is exposed in it. On the other hand, there are large areas in which the lower portion alone exists, and perhaps never was covered by the upper portions; and there are other areas in which the upper members have covered up the lower, so that they appear only in a few comparatively limited spots.

The area occupied by carboniferous rocks in Nova Scotia and New Brunswick is very extensive; and in Nova Scotia it is divided by ridges of the old metamorphic rocks into portions which may for convenience be considered separately. These are—

1. The Cumberland Carboniferous district, bounded on the south by the Cobequid hills, and continuous on the north-west with the great Carboniferous area of New Brunswick.

2. The Carboniferous district of Hants and Colchester, including the long band of carboniferous rocks extending along the south side of the Cobequids, and that reaching along the valley of the Musquodoboit river.

3. The Carboniferous district of Pictou, bounded on the south and east by metamorphic hills, and connected on the west with the Cumberland district, and that last mentioned.

4. The Carboniferous district of Sydney county, bounded by two spurs of the metamorphic hills.

5. The long stripe of Carboniferous rocks extending from the Strait of Canseaus westward through the county of Guysboro'.

6. The Carboniferous district of Richmond county, and southern Inverness.

7. The Carboniferous district of Inverness and Victoria counties.

8. The Carboniferous district of Cape Breton county.

To the first of the above geographical divisions—the Cumberland district—belongs the celebrated South Joggins section, so well known to geologists by Mr. Logan's elaborate description and measurements, comprising 14,571 feet of vertical thickness.* A graphic and very interesting account of this remarkable line of coast, illustrated by numerous drawings, is given in Mr. Dawson's book; and the other Carboniferous districts are also described in an equally comprehensive manner. But brief extracts from this portion of the work would be doing it an injustice, and hence we pass on to a concluding quotation, embracing a summary of what may yet be expected from future geological researches in these interesting regions :—

"As a fitting sequel to my account of the present state of our knowledge of Acadian geology, I may shortly mention in conclusion, the most promising directions of future enquiry, and the extent of the work that remains to be done.

The carboniferous system has for some time been the most productive field of investigation, and its structure in those localities where the best sections occur is well known. Its geographical limits, however, and its structure in the more inland and less exposed localities, require much farther study; and the extent and value of the coal-seams, ironstone, manganese ores, limestone, gypsum, freestone, &c., are yet imperfectly known, and well merit public as well as private efforts for their exploration. The fossil remains of this system still afford a large field for discovery. The great interest of the discoveries already made, shows that Nova Scotia is equal to any country in the world in the opportunities which it offers in

* "In 1841"—states our author in another part of the volume—"W. E. Logan, Esq., now provincial geologist in Canada, made a short tour in Nova Scotia, and contributed a paper on the subject to the Geological Society of London. In 1843, Mr. Logan in passing through Nova Scotia on his way to Canada, visited the South Joggins, and executed the remarkable section which he published in 1845 in his first Report on the Geology of Canada. This section, which includes detailed descriptions and measurements of more than fourteen thousand feet of beds, and occupies sixty-five octavo pages, is a remarkable monument of his industry and powers of observation."

this department; and in a country where so many curious relics of the ancient world are constantly being exposed and washed away in the coast cliffs, even persons themselves unacquainted with geology may advance the interests of science by preserving such specimens, and making them known to those who can decide on their scientific value.

The metamorphic districts present a large and almost unexplored field. The valuable metallic deposits already found in them encourage the expectation that farther useful discoveries may be made. The unravelling of the relations of these disturbed and altered beds would require long labour and much thought from the most practised and acute observers. The fossils which occur in the less altered portions of their margins are very numerous, and well deserve the attention of palæontologists, as belonging to an outlying portion of the great Devonian and Upper Silurian area of North America, far removed from the districts in which the fossils of that period are best known. This ground may in part be occupied by private observers and mining surveyors, but I have no hope that it will be fully worked out without the aid of a public survey.

The trap and new red sandstone of the Bay of Fundy are a vast storehouse of curious and beautiful minerals, of great interest to students in mineralogy. These rocks also furnish excellent opportunities for studying the phenomena of volcanic action as it existed in the secondary period. The solitary reptilian jaw found in Prince Edward Island holds forth the hope that, in the many miles of coast cliff of the new red in that island and in Nova Scotia, other discoveries of similar character may await zealous collectors.

In the surface gravels and drift, and in fissures of rocks laid open by excavations, fossil remains, whether of large animals like the mastodon, or of shells or land plants, should be carefully sought for. The deposition of marine mud in the Bay of Fundy has afforded many interesting illustrations of geological facts, and may afford more; and the agency of coast-ice in removing the masses of rock, and otherwise acting on the shores and cliffs, is a subject at present of much interest, and one of which the shores of the Acadian provinces present many illustrations."

In concluding our remarks on this important contribution to geological science, we must not omit to mention that the value of the work is much enhanced by a great number of chemical examinations of various samples of coal, undertaken by Principal Dawson himself.

E. J. C.

The Song of Hiawatha. By H. W. Longfellow. Boston: Ticknor & Fields. 1855.

A new poem by Longfellow might have been imagined to be an announcement welcome to all men, but especially to his countrymen—not generally indisposed to a sufficiently ostentatious pride in relation to all that is their own. Not such, however, is the case with this, the most genuinely native song that has yet given voice to the wild wood-notes of our ancient forests. Heedless of time or place, Longfellow should have made his Indian Cadmus reason like one of Milton's metaphysical devils, or a German professor of the nineteenth century, and all would have admired. But as it is, American critics seem to vie with one another in casting contempt and ridicule on a poem, which in a fine flow of simple, musical verse, artless and yet most artful, embodies the myth of the New World's heroic age. True, it has not anywhere the deep earnest meaning to be found even in Tennyson's quaint "Medley." But from its absence from this poem, it would be unjust to assume that the poet is therefore incapable of such. Sufficient is it that much of the profoundly suggestive thought of the "In Memoriam" would be as much out of keeping with this tenderly simple Indian epos, as the scholastic theses of mediœval doctors, if transferred from the school of Salerno of "The Golden Legend," to the Indian council lodge. Nevertheless "Hiawatha" has its inner meanings too, finely suggestive to the sympathetic mind; and appealing, not unsuccessfully, in its simple utterances, to those:

"Whose hearts are fresh and simple,
Who have faith in God and Nature,
Who believe that in all ages
Every human heart is human;
That in even savage bosoms
There are longings, yearnings, strivings
For the good they comprehend not,
That the feeble hands and helpless,
Groping blindly in the darkness,
Touch God's right hand in that darkness,
And are lifted up and strengthened."

The monotonous cadence of the verse has been imitated by satiric critics, who have found no difficulty in turning it into burlesque and vulgar parody; while others, seeking a new point of attack, assail its originality, and find that the measure of the Indian "Hiawatha" breathes not of the forests of the wild West, but is stolen, in every note, from the old songs of Europe's Northmen. An amusing confusion in some of the charges thus advanced, betrays the ignorance of their originators of the essential difference in race and language between the Ugrian Fin and the true Scandinavian Norseman. The evidence, moreover, adduced, and complacently accepted, in proof of the poetic theft, is, oddly enough, in the form of *ex post facto* English translations. One Philadelphia critic, indeed, presents his extract from the old Finnish epic of "Kalewala," as confessedly "done into English from the German translation" of Anton Schiefner. Fancy a couplet of Pope produced in evidence of a theft from old Homer! Yet here the extravagance is even more glaring, for it is the translation of a translation in which we are to recognise the original.

Longfellow's familiarity with both the ancient and modern languages of northern Europe is well attested, and no doubt he knows, much better than his critics, that the alliteration and verbal repetitions, on which chiefly rest the evidences of his supposed plagiarism from Finnish or Norse poets, is not only adducible from the ancient poems of Scandinavia, but from those of his own fatherland—both Celtic and Anglo-Saxon. It is no very rare blunder of the shallow critic to mistake for something peculiar and individual, a characteristic common to a whole age. The following extract from Layamon's "Brut d'Angleterre" may suffice as an early example of the alliterations and verbal recurrences which so puzzle the critics of New York, but were nevertheless familiar to their Anglo-Saxon forefathers ages ago, in that semi-Saxon translation of the thirteenth century. To Layamon's old version we add our own Canadian one, not as an attempt to convert its simple inventory into *poetry* like that of Longfellow, but merely to shew the ease with which such verse may be rendered into the measure of "Hiawatha:"—

"Tha the king igeten hafde
And al his mon-weorede,
Tha bugen ut of burhge
Theines swithen balde.
Alle tha kinges: and heroe here-thringes,
Alle tha biscopes: and alle tha clarckes,
Alle tha eorles: and alle the beornes,
Alle tha theines: alle tha sweines,
Feire iscrudde: helde geond felde.
Summe heo gunnen œrnen,
Summe heo gunnen urnen,
Summe heo gunnen lepen,
Summe heo gunnen sceoten,
Summe heo wræstleden
And wither-gome makeden," &c.

Both Kemble and Thorpe have edited this ancient translation of Wace's "Brut," but in the absence of their versions, we take the semi-Saxon from Ellis, and in the following rendering of it into modern English, adhere pretty closely to the literal text:—

There the king then having feasted,
And his multitude of warders,
Forth there hastened out of burgh
All the people very quickly.
All the kings and throng of servants,
All the bishops, all the clergy,
All the earls, and all the nobles,
All the thanes, and all the peasants,
Gaily mantled, thronged the meadows
And betook them to their pastimes.

Some contended with their arrows,
Some contended with their lances,
Some contended in the races,
Some contended in the leaping,
Some contended in the wrestling,
And in games of emulation, &c.

Alliteration is the earliest form of rhyme, and is characteristic of all the old poetry of northern Europe. We find it in full use, alongside of Latin in rhyming leonines, in the "Piers Ploughman," temp. Edward III., the immediate precursor of the regular rhyming heroics of Chaucer. Its revival in the, so called, rhymeless octosyllabics of "Hiawatha" was too delicate a chord for the dull ears of critics, open only, like those of their American Mocking-bird, to stolen sounds; yet in the following, the alliteration, though irregular and intermittent, is as musical as any rhyme:—

"Thus continued Hiawatha:
That this peace may last forever,
And our hands be clasped more closely,
And our hearts be more united,
Give me as my wife this maiden,
Minnehaha, Laughing Water,
Loveliest of Dacotah women.
* * * *
And the lovely Laughing Water
Seemed more lovely, as she stood there,
Neither willing nor reluctant,
As she went to Hiawatha,
Softly took the seat beside him,
While she said and blushed to say it:
I will follow you my husband!
This was Hiawatha's wooing;
Thus it was he won the daughter
Of the ancient Arrow-maker,
In the land of the Dacotahs!"

The verse to our ear is charming. The models assumed to have suggested its form and measure, were free to all poets, just as nature is free to them, and here is the one poet who has turned them to account in a song of the forest echoes. Its alliterative monotone is unmistakeably suggestive of the child-like simplicity with which the unsophisticated Indian improvisatore may be conceived to well forth his rythmic tale to willing ears. Yet this monotone is most skilfully used. It is like the music of a Paganinni, bringing melody from one string, such as meaner artists expend in vain all the appliances of their art and instruments to equal. A singularly pleasing combination of monotone and variety is effected by the recurrence of the same idea, and of the words, in successive and in distant lines; sometimes with a scarcely perceptible variation, like the first slight turn of the kaleidoscope, the same and yet changed: a trick of art which—instead of looking to ancient and foreign originals—we fancy to have its model in another of America's own native poems, "The Raven," of that reckless outcast genius, Edgar Allan Poe. To us at least, all dissimilar as the two poems are, in rythm, and in idea, the music of the one rings in the ear with a memory of the other, as of changes rung on the same village bells.

The art with which all art is concealed is not the least source of the charm of "Hiawatha." It has nothing artificial about it; none of the modern drawing-room fopperies with which Macpherson overlaid his Celtic "Ossian." Nothing incongruous brings the fashions of Broadway into the forest glades; but all its metaphors and similes take their tinge from the wilds of the far west, even when giving form to thoughts which the Indian has scarcely realised. How graphic is this:—

"As unto the bow the cord is,
So unto the man is woman;
Though she bends him, she obeys him,
Though she draws him yet she follows,
Useless each without the other!"

How finely, too, the very profoundness of the forethought of the Indian Cadmus, who would teach his people letters and the art of picture-writing, is tempered into consistent harmony with the forest children and their simple arts, by the introductory illustrations:—

"In those days, said Hiawatha,
Lo! how all things fade and perish!
From the memory of the old men
Fade away the great traditions,
The achievements of the warriors,
The adventures of the hunters,
All the wisdom of the Medas,
All the craft of the Wabenos,
All the marvellous dreams and visions
Of the Jossakeeds, the Prophets!
Great men die and are forgotten,
Wise men speak; their words of wisdom
Perish in the ears that hear them,
Do not reach the generations
That, as yet unborn, are waiting
In the great mysterious darkness
Of the speechless days that shall be!"

It is not necessary to occupy space with large quotations. The reader who enters into the true feeling of this genuine song of the New World, will find himself borne along with something of the exhilarating pleasure with which it may perchance have been his fortune to glide down some of our great rivers in an Indian's birch canoe; and will not willingly pause till he reaches the beautiful closing scene of Hiawatha's departure. Hiawatha, like the Arthur of the Britons, or the Barbarossa of Germany, is to come again. But now he has waved his farewell, launched his canoe, and whispered to it "westward!"

"And the evening sun descending
Set the clouds on fire with redness,
Left upon the level water
One long track and trail of splendour,
Down whose stream, as down a river,
Westward, westward, Hiawatha
Sailed into the purple vapors,
Sailed into the dusk of evening.
And the people from the margin
Watched him floating, rising, sinking,
Till the birch-canoe seemed lifted
High into that sea of splendor,
Till it sank into the vapors
Like the new moon, slowly, slowly
Sinking in the purple distance.
And they said: Farewell forever!
Said: Farewell, O Hiawatha!
And the forests, dark and lonely,
Moved through all their depths of darkness,
Sighed: Farewell, O Hiawatha!
* * * *
Thus departed Hiawatha,
Hiawatha the beloved,
In the glory of the sunset,
In the purple mists of evening,
To the regions of the home-wind,
Of the Northwest wind Keewaydin,
To the Islands of the Blessed,
To the Kingdom of Ponemah,
To the land of the Hereafter!"

D. W.

What is Technology?—An Inaugural Lecture. By George Wilson, M.D., F.R.S.E., Regius Professor of Technology, Edinburgh University. Edinburgh, Sutherland & Knox. 1855.

During the past year a new chair has been established in the University of Edinburgh, viz., that of Technology, to which Dr.

George Wilson, Director of the Industrial Museum of Scotland, has been appointed.

The establishment of this chair has excited considerable interest on account of its being new, not only to the University of Edinburgh, but also to all the British Colleges, although it always has its place in the Continental seats of learning. Moreover, the real meaning of the term, and the extent and range of subject embraced by the professorship, were so little understood, as to give rise in the minds of some to apprehensions of interference with already existing chairs. Professor Wilson, in his inaugural and introductory lecture, has defined very clearly the meaning of the term and the extent of the science, and has shown at the same time that his teaching need not in the slightest degree interfere with that of his brother professors.

Technology, the *Science of the Arts*, or as generally restricted, the *Science of the Useful Arts*, has never heretofore been admitted as a separate branch of study in any of our Universities, although from the practical nature of the subjects treated of, it must be allowed to be one of the greatest importance. Great advantages must undoubtedly be derived from young men, when about to enter on the world, having an opportunity of attending lectures in which the various manufactures are minutely described, the numerous improvements which are constantly taking place elucidated, and the scientific principles on which the varied processes depend, fully explained.

In the instance now referred to, and under the present talented incumbent, we may expect that the usefulness of the chair will be very great, and widely acknowledged, especially from its connection with that exceedingly valuable institution, the National and Industrial Museum of Scotland.

"The Industrial Arts included in the domain of Technology admit of a simple division into mechanical and chemical arts, according as they are mainly related to Physics or to Chemistry." It is to the latter division that Professor Wilson's attention will be principally directed, although several of the subjects of which he proposes to treat, belong more strictly to the former; for instance, the process of carding, spinning and weaving; the use of electricity in the electric telegraph; the employment of the same agent in electrotyping, and the action of light in photography. The two latter subjects stand midway, as it were, between the physical and the chemical divisions. Among the subjects which are properly treated of in a course of lectures on Technology, the following may be mentioned: The economy of heat and light, the different means of ventilation, the nature and properties of the various fuels, their employment in furnaces and lamps for the production of light and heat, and the construction of such apparatus, the manufacture of gas for illuminating purposes, of candles, soap, matches, gunpowder and other explosives.

A very important branch is that which treats of the manufacture of pigments and the application of colors to textile fabrics. The application of chemical science to the processes of dyeing and calico printing, has produced the most important changes during the last twenty or thirty years, and much still remains to be done in this department. The manufacture of the different alkalies and of those of their salts which are of industrial importance, the extraction of the various metals from their ores, and the preparation of the numerous useful compounds formed by them, the manufacture of china, pottery and glass in all their different varieties; the processes of paper-making, glass-etching and staining, of printing and engraving, of cooking, baking, and preserving meats, of manufacturing sugar and starch, as well as an infinity of others too numerous to mention, all come within the range of this most extensive science.

In the University of Berlin and in others in the larger towns of Germany, the plan is adopted of illustrating the lectures, not merely by specimens of the various manufactures and accurate sectional models, but also by personal inspection of the factories themselves. Every week the lecturer makes an excursion to some foundry, gas-work, porcelain manufactory, brewery or other factory, which he has been describing during the week, and gives to his students on the spot what may be compared to the clinical lectures of the physician. Such a plan has great advantages, but is only applicable in large towns where manufactories abound. In Canada a Professor of Technology would be rather restricted in his selections.

The importance of the subject of Technology is, at present, so obvious that it is to be hoped the example of Edinburgh will be speedily followed by other Universities both in England and in this country. One or two passages from the Lecture which has suggested these remarks, will serve to illustrate its style and mode of treatment of the subject. After some preliminary observations, the definition of the science is thus specified in certain of its relations:—

"It is by a quite conventional limitation, that the word Art, τεχνης (*technes*,) denoted by the first dissyllable of Technology, is held to signify useful, utilitarian, economic, or industrial art, for the useless arts, such as legerdemain, or the art of conjuring, are eminently technical, and still more so are the worse than useless arts, such as cheating at cards, and other sorts of dishonest gambling.

"Nor is the limitation less conventional which excludes the Fine Arts from the domain of Technology; for no arts call for more skilful workmen than Painting, Sculpture, aud Music, and none are more technical in their modes of procedure. Far less are the Fine Arts excluded, because they are regarded as useless or hurtful. The Technologist avoids them for exactly the opposite reason. Poetry, Painting, Sculpture, Music, and the sister arts, are in the highest degree useful, inasmuch as they minister to the wants of the noblest parts of our nature; but in so ministering they excite such emotions of pleasure, or its inseparable correlative, pain, that the sense of their usefulness is lost in the delight, or awe, or anguish, which they occasion. So much is this the case, that while men thank each other for the gift of bread when hungry, or of water when they are thirsty, or of a light to guide them in the dark, they return no thanks for a sweet song, or a great picture, or a noble statue; not that they are unthankful for these, but that the duty of thanksgiving is forgotten in the pleasure of enjoying, or the strangely fascinating pain of trembling before a work of creative genius.

"And the artist himself, singularly enough, in a multitude of cases, makes no complaint at this thanklessness, and counts it no compliment to his work to call it useful. The end of Æsthetic or Fine Art, he will tell you, is the realisation of beauty, not utility; as if the latter were rather an accidental or unavoidable and unfortunate accompaniment of the former, than the welcome inseparable shadow which attends it, as the morning and evening twilight, tempering his brightness, go before and after the sun. But such a description of the aim of his labours, though natural to the artist, is unjust to his art. The true object of Æsthetic or Fine Art is not beauty, but *utility, through or by means of beauty.*

"It may be that the poet, the painter, the sculptor, the musician, often think only of the emotional delight which their works will awaken in the hearts of their brethren. But these works, in the very act of delighting, serve those whom they delight. It is surely as useful a thing, on occasion, to fill the eager ear with music, or the longing eye with the glories of form and colour, or the aching heart with thoughts of joy, as it is to fill the hungry stomach with food, or to clothe the naked body.

"It is not, then, because the utility of the Fine Arts is questioned, that they are excluded from the domain of Technology. Neither is it because the feeling of their usefulness is lost in that of their delightfulness; but because they are not useful in the sense of being *indispensable.* The Utilitarian Arts do not stand contrasted with them, as loving ugliness or hating beauty; they have no direct concern with either. Their defining characteristic is not that they deal with what is beautiful or unbeautiful, but with what is *essential* to man's physical existence. The Fine Arts are, in a certain sense, superfluous arts. The savage does not know them. The great mass of civilized mankind pass from the cradle to the grave, almost untouched by their charms. Few men can spend more than a small portion of their lives upon them. Even the greatest artists are such only at long intervals. Shakespeare was not always poetising, or Raphael painting, or Mendelssohn singing. Lengthened seasons of unproductive sadness mark the lives of them all. Like the fabled pelican, they feed others with their life-blood; and it would almost seem as if, in proportion to the delight which they gave to others, they were miserable themselves. Wordsworth, whose own life was a happy exception to this rule, declares of his brethren as a class, that 'they learn in suffering what they teach in song.' 'A thing of beauty,' Keats has told us, 'is a joy for ever,' but no poet has affirmed that it is a joy at all times."

Again, the fancies employed in the illustration of the following contrast between the products of instinct and reasoning intelligence, are happily put before the student of Technology :—

"It is with every-day life, and every-day cares, that Technology, in one aspect, has to do; with man, not as 'a little lower than the angels,' but 'as crushed before the moth,' and weaker than the weakest of the beasts that perish; with man as a hungry, thirsty, restless, quarelsome, naked animal. But it is also the province of Technology to show, that man, because he is this, and just because he is this, is raised by the industrial conquests which he is compelled to achieve, to a place of power and dignity, separating him by an absolutely immeasurable interval from every other animal.

"It might appear, at first sight, as if it were not so. As industrial creatures we often look like wretched copyists of animals, far beneath us in the scale of organisation, and we seem to confess as much by the names which we give them. The mason-wasp, the carpenter-bee, the mining caterpillars, the quarrying sea-slugs, execute their work in a way which we cannot rival or excel. The bird is an exquisite architect; the beaver a most skilful bridge builder; the silk-worm the most beautiful of weavers; the spider the best of net-makers. Each is a perfect craftsman, and each has his tools always at hand. Those wise creatures, I believe, have minds like our own, to the extent that they have minds, and are not mere living machines, swayed by a blind instinct. They will do one thing rather than another, and do that one thing in different ways at different times. A bird, for example, selects a place to build its nest upon, and accommodates its form to the particular locality it has chosen; and a bee alters the otherwise invariable shape of its cell, when the space it is working in forbids it to carry out its hexagonal plan. Yet, it is impossible to watch these, or others among the lower animals, and fail to see that, to a great extent, they are mere living machines, saved from the care and anxiety which lie so heavily upon us, by their entire contentment with the present, their oblivion of the past, and their indifference to the future. They do invent, they do design, they do exercise volition in wonderful ways; but their most wonderful works imply neither invention, contrivance, nor volition, but only a placid, pleasant, easily rendered obedience to instincts which reign without rivals, and justify their despotic rule, by the infallible happiness which they secure, There is nothing, accordingly, obsolete, nothing tentative, nothing progressive, in the labours of the most wonderful mechanicians among the lower animals. It has cost none of these ingenious artists any intellectual effort to learn its craft, for God gave it to each perfect in the beginning; and within the circle to which they apply, the rules which guide their work are infallible, and know no variation.

"No feathered Ruskin appears among the birds, to discuss before them whether their nests should be built on the principles of Grecian or Gothic architecture. No beaver, in advance of his age, patents a diving-bell. No glow-worm advocates, in the hearing of her conservative sisters, the merits of new vesta-lights, or improved lucifer matches. The silk-worms entertain no proposition regarding the substitution of machinery for bodily labour. The spiders never divide the House on the question of a Ten Hours Working Bill. The ants are at one on their Corn-laws. The wasps are content with their Game-laws. The bees never alter their tax upon sugar; nor dream of lessening the severities of their penal code: their drones are slaughtered as relentlessly as they were three thousand years ago; nor has a solitary change been permitted since first there were bees, in any of their singular domestic institutions.

"To those wise creatures the Author of All has given, not only infallible rules for their work, but unfaltering faith in them. Labour is for them not a doubt, but a certainty. Duty is the same thing as happiness. They never grow weary of life; and death never surprises them. Wonderful combinations of individual volition, pursuing its own ends, and of implicit surrender to Omnipotent will, subduing all opposition, they are most wonderful in the latter respect and are less to be likened to us, than to perfect self-repairing machines, which swiftly raise our admiration from themselves, to Him who made and who sustains them.

"We are industrial for other reasons, and in a different way. Our working instincts are very few; our faith in them still more feeble; and our physical wants far greater than those of any other creature.

"Had the assembled lower animals been invited to pronounce upon what medical men call the 'viability,' or managers of insurance offices 'the chances of life,' of the first human infant, their verdict would have been swift, perhaps compassionate, but certainly inexorable. The poor little featherless biped, pitied by the downy gosling, and despised by the plumed eaglet, would have been consigned to the early grave, which so plainly in appearance awaited him; and no mighty Nimrod, with endless lion slaying hunter-sons, would have been seen to dawn in long perspective above the horizon, and claim the fragile infant as their stalwart father.

"Yet the heritage of nakedness, which no animal envies us, is not more the memorial of the innocence that once was ours, than it is the omen of the labours which it compels us to undergo. With the intellect of angels, and the bodies of earth-worms, we have the power to conquer, and the need to do it. Half of the industrial arts are the result of our being born without clothes; the other half of our being born without tools."

We refer to this able lecture rather for the purpose of commending the subject which it advocates, than its own literary merits, to the notice of our readers, but the above quotations, brief as they are, will suffice to shew that it has attractions no less on the latter score, than on the former.

H. C.

Junius Discovered. By Frederick Griffin. Boston: Little, Brown & Co. Toronto: A. H. Armour & Co. 1854.

"Junius Discovered" is the somewhat bold title attached to a volume, the first work of a Canadian author, who tells us that his pen has hitherto been untried, and that his native city and home of Montreal, in which it has been produced, possesses no public library, and few private literary resources of any avail to the student who undertakes the solution of this intricate and long vexed question. In spite of such obstacles to success our Canadian author has produced an interesting contribution to the miscellany of "Junius" literature, which has hitherto met with undue neglect. His great error lies in the conversion of the *may be* into the *must be*, which characterises so much of the logic employed in this favourite controversy.

Junius, occupying such a social rank or official position as furnished to him information of the most vital importance in relation to public men and measures in the eventful political era from 1767 to 1772, writes his series of carefully elaborated pseudonymous letters for the *Public Advertiser*, with the certainty that every sentence was watched by those whom he assailed with such acute vigour and bitterness, and that, as he says, in writing to Woodfall: "I must be more cautious than ever. I am sure I should not survive a discovery three days; or if I did they would attaint me by bill." What more certain, therefore, than that he purposely misled, in many instances, by his allusions. This he himself unhesitatingly takes credit for defying his antagonists to trace him through his various disguises, or to discriminate between the real and assumed characteristics of one, whose own words make so appropriate a motto to this inquiry after the substance of the illusory *umbra* calling itself Junius: "there never existed a man but himself who answered to so complicated a description." Taunting one of his assumed detectors, he says: "But Horne asserts that he has traced me through a variety of signatures. To make the discovery of any importance to his purpose, he should have proved either that the fictitious character of Junius has not been consistently supported, or that the author has maintained different principles under different signatures." What then is the value of the unknown quantity: truth, mixed up, for the very purpose of deception, with all this fiction? Till that is determined how shall we ever know whether we are taking our portraiture from the substance or the shadow; from the living original, or from the masked and disguised decoy, purposely stuffed out and set up to deceive? Nevertheless, because Junius uses such phrases, as: "*every ignorant boy* thinks himself fit to be a minister;" therefore he could not be less than fifty! Because he says to Sir W. Draper, a Cambridge man: "You might have learnt *at the University* that a false conclusion is an error," &c., therefore "Junius was educated at Cambridge!" And because, when familiarly making use of terms of law, he adds: "do not injure me so much as to suspect I am a lawyer, I had as lief be a Scotchman;" therefore he was *no* lawyer! Would not this logic be quite as good, under all the circumstances, if it affirmed the very opposite conclusion? Certainly, at least, the latter sentence has not prevented a Scotch philosopher, Sir David Brewster, from adding a *Mac* to the name of Junius, and putting him in kilts!—any more than the "fact" of his being "a Cambridge man," has prevented the discovery, by Grattan, and other equally competent judges, "from the internal evidence of the style, that Burke was the author of Junius." "Among other instances," says Curran, "Grattan used to insist upon it that no living man but Burke could have written that passage in one of the letters to the Duke of Grafton: 'You have now fairly travelled through every sign in the political Zodiac, from the Scorpion in which you stung Lord Chatham, to the hopes of a Virgin in the house of Bloomsbury.'"

By logic not much better, or worse, Junius has long since been identified as single-speech Hamilton; Butler, Bishop of Hereford; Major General Lee; Lieut. Col. Barré; Lord Ashburton; Lord Lyttleton; Lord George Sackville; the Earl of Chatham; the Duke of Portland; Wilkes; Horne Tooke; and Sir Philip Francis; to say nothing of sundry names of little note among the contemporaries of the long-sought letter-writer, yet not on that account less likely to include the true one. He has now been incontestably proved to have been a Peer, to have been a member of the House of Commons, to have been a Bishop, a Lawyer, a General, and a Colonial Governor; and equally certain to have been none of the six! Writer after writer has undertaken to solve the riddle; volume has succeeded volume from able pens, in support of their several favourities; and when our Canadian discoverer of Junius adds to these one more, he must not complain if we ask for conclusive proof before we can admit that THOMAS POWNALL, Governor of Massachusetts Bay, is the real and unquestionable Junius.

The following passage may suffice to give some idea of our author's style and treatment of his subject. The emphatic italics and capitals are his own. Having established, as he conceives, Governor Pownall's authorship of the well-known "Letter to an Honorable Brigadier-General," immediately after his return from America in 1760, he goes on to say:—

'Having now re-landed our worthy governor in his native country, and exhibited him in such close connexion with the earliest of the writings of Junius, as—at the least—to raise in the mind of the most doubting reader, some faint idea that, *after all*, our conjecture of the identity of the two, may, *possibly*, be well founded; we resume the narrative of such of the remaining events of Governor Pownall's life, as tend to establish the truth of our hypothesis.

'The energy and ability of such a man could not be allowed to remain long idle;

and, accordingly, we find him, a few months after his return to England, foregoing his appointment to the governorship of South Carolina, and accepting, with the rank of colonel, the office of comptroller general of the expenditure and accounts of the extraordinaries of the combined army in Germany, under the command of Prince Ferdinand, of Brunswick.

'In this appointment, we find why—in the language of Dr. Good—"Junius appears to have uniformly entertained a good opinion of, or at least, a partiality for, Lord Holland;" and why—in Junius' own words—he should "wish Lord Holland may acquit himself with honour," namely, from the charge of peculation, made in the petition of the city of London, presented to the King, July 5, 1769;—and why Junius "designedly spared Lord Holland and his family." His lordship was paymaster-general of the forces, from July 5, 1757, to June 8, 1765; and Governor Pownall, on accepting the comptroller-generalship, became one of his deputies, and bound to render to him the accounts of the office. In Lord Holland's "*Answer*" to "*Observations on the accounts of the paymaster-general*," to be found in the note A, immediately after the letter to Woodfall, No. 5, July 21, 1769, is the following paragraph:—"The accounts of Lord Holland for the years 1757, 1758, and 1759; likewise the accounts of his deputies, attending the army in Germany, from the commencement to the end of the late war, are also before the auditors for their examination, and his Lordship's account for the year 1760, is almost ready to be delivered to them." We learn, here, that Mr. Comptroller-General Pownall's accounts "to the end of the late war" had been transmitted to the auditors for examination; and, from an obituary notice of him, published in the year of his death, that they had been "examined and *passed with honour*." It is not at all improbable that Governor Pownall received his appointment on the recommenuation of Lord Holland; and hence, the partiality of Junius to his lordship. We may also well suppose, that the great anxiety of Junius to remain unknown, would prohibit his entering upon the discussion of any subject—such as that of the public accounts of Lord Holland, as paymaster-general, connected as they, necessarily, must have been, with his own, as comptroller-general—that might bring his real name into prominence, and tend to direct towards him the attention of the legion of hunters who were in busy and constant search for the "mighty boar of the forest."

'The notice of Governor Pownall's appointment, as comptroller-general, gives us also occasion to explain a passage in the *Miscellaneous Letter IV.*, dated Aug. 25, 1767, which has puzzled every one who has attempted to solve the Junius mystery; and has, in many, induced the belief, that Junius must have been a member of the military profession. Speaking of Lord George Townshend (the before-mentioned brigadier-general), and his brother, Charles, Junius says,—"I am not a stranger to this *par nobile fratrum*. I have served under the one, and have been forty times promised *to be served* by the other." Paradoxical as it may seem (and considering the rank of colonel, which accompanied the appointment of comptroller-general as merely honorary rank), the civilian Governor Pownall could properly use, in its military sense, the expression,—"I have *served under* the one"—in reference to either the military or the civilian of the two brothers Townshend. Not long after Brigadier-General Townshend's return from Canada, he joined the allied army in Germany, and made a campaign with it, under Prince Ferdinand. During the same campaign, and in the same army, but in a civil department, Governor Pownall served; and, of course, in as truly a military sense as if he had belonged to the commissariat or medical departments, he *served under* General Townshend, although he might not have been under his *immediate* command. Thus much for the military brother:—now for the civilian. On the 24th of March, in the same year, the Right Honorable Charles Townshend was appointed Secretary at War; and as, to a certain extent, and in a general sense, the whole army may be said to be under the direction of—and, consequently, to *serve under* the Secretary at War; so each individual of the army may, in a general sense, be held to *serve under* him, although he may be, like Charles Townshend, *only a civilian.* The civilian Governor Pownall then, as comptroller-general, in Germany, while the civilian Charles Townshend was Secretary at War, in England, might, without any great stretch of conscience, say—and in a military sense too—that he had *served under* Charles Townshend, although neither the one nor the other of them, was, in a strict sense, a soldier: —the former was *of*—but not *in*—the army,—and the latter was neither *of*—nor *in*—but *over* the army; and both were non-combatants.

'A consequence of the treaty of Paris, of Feb. 10, 1763, was, the breaking up of the office in the army, in Germany, held by Governor Pownall, and his return to England; soon after which, he took up his residence at RICHMOND, where, it will be recollected, the court of George the Third, was established during the period in which Junius, as chief public political censor, *reigned* in England, unseen, unknown, but not unfelt.'

This, it must be admitted, is somewhat vague and indefinite, for the evidence that should so conclusively prove the "discovery" of Junius; and we rise from the perusal of the volume as a whole, notwithstanding the ingenuity of its line of argument, with an unsatisfactory sense of intangibility in the proof led on behalf of the new claimant for the Junius laurels. Much of this is no doubt inseparable from the very nature of the inquiry, and if some inconceivable discovery, such as it seems too late now to hope for, does not withdraw the mask, it is only by a series of ingenious inferences and analogies that this literary riddle has any chance of being solved. Nevertheless, we must confess to a sense of disappointment at finding our author following the example of previous writers in recognising resemblances between "*peculiarities*" of the Junius letters and of those of their assumed author, which are for the most part only peculiarities of his period; and what shall we say of such logic as this:—

'Notwithstanding all the *labour* of the author, and the corrections made by the original printer and publisher, "numerous errors of grammar and construction," says Mr. Butler, in his *Reminiscences*, "are to be discovered in these celebrated letters;" and to the like effect says Dr. Good and Lord Brougham. If such be the case then with writings originally prepared for publication, and subsequently, on republication, corrected, and recorrected, it is scarcely reasonable to look for the elaborated composition of the letters of Junius, in the private letters of Governor Pownall, written as these were without a view of their ever passing beyond the circle of his and his correspondent's immediate friends. The impartial reader will no doubt bear this in mind, whenever he catches the Governor *tripping in his* *grammar*, and will set down any occasional defect in grammatical construction, as another presumption in favour of the Governor's identity with Junius.'

The emphatic italics are the author's own! Still more are we disappointed with the subsequently discovered " evidence of so decisive a character," added in the appendix. Something of a greatly more decisive character must be produced, ere the justness of the title of "JUNIUS DISCOVERED" will be generally conceded to our Canadian knight-errant in this well contested field of literary adventure. But it is much to accomplish, in being able to produce a claimant for the laurels of Junius, concerning whom many arguments tend to suggest that he *may be* the true one. And this much we conceive Mr. Griffin to have established.

D. W.

A Treatise on Analytical Statics, with numerous examples. By J. Todhunter, M. A., Fellow and Assistant Tutor of St. John's College, Cambridge. Cambridge: Macmillan & Co. 1853.

Some twenty years ago a bulky octavo volume was published at Cambridge, entitled "The Mathematical Principles of Mechanical Philosophy," by Mr. Pratt, of Caius College. A second edition of that work was published in 1841, and since then it had continued to be an acknowledged text book in the University. It was in fact by far the most perfect book published on the subject of mechanical philosophy taken as a whole, and until the last few years the separate parts on Statics and Dynamics were about the best treatises which the English student could take up on those subjects respectively. And though, since the publication of Mr. Sandeman's admirable treatise on Dynamics of a Particle, and Mr. Griffin's valuable Syllabus of Dynamics of a Rigid Body, the dynamical portion of Mr. Pratt's work had become antiquated, it was still felt to be an indispensable to the mathematical student, as containing a vast mass of information much of which was not easily procurable elsewhere. This book has lately become out of print, and Messrs. Macmillan, of Cambridge, appear to have resolved to re-publish the statical and dynamical portions of it separately, and the task of preparing the former for publication was undertaken by Mr. Todhunter.

We are sorry to have to say that we are disappointed with the result. The disappointment is increased when we compare this book with Mr. Todhunter's other publications, which are so admirably adapted for the purposes of tuition: and especially do we regret the defects of this book because in spite of them we feel no doubt that it will become a recognised text-book on the subject—the general arrangement being very good, and the execution of a great part of it equally so, and the collection of examples being at once bountiful and judiciously selected. And yet in spite of this the book is disfigured by so many defects, and contains so much that absolutely demands the aid of the teacher, that it contrasts most unfavorably with the clear and systematic treatises which the author has published on the Differential Calculus, and on Analytical Geometry. Some of these objectionable points we will proceed to point out—our space will not admit of our entering into a detailed examination of the work.

Perhaps the portion of the work which most disappointed us was the first chapter, containing an exposition of the fundamental principles upon which the science is made to rest. There was unquestionably enough room for improvement: in fact we rather suspect that we should have treatises upon statics in sufficient abundance, if it were not that many a would-be author is diverted from the task by the dread of that unhappy preliminary chapter—"Introduction and Definitions," as it is called in Mr. Pratt's book—Mr. Todhunter, we suppose by way of making some variation, leaves out the "and" and calls *his* first chapter "Introduction, Definitions." Unfortunately this variation in the heading gives but too faithful a representation of the changes made in the chapter itself. Of course when a writer professes, as Mr. Todhunter does in his preface, that his work may be considered as a "re-publication with large additions," of a former treatise, we have no right to complain that a great portion of the new work—the main body of the essential propositions—should be substantially the same as in the earlier book. But we think that we have a right to complain when we find the self-same bald unsatisfactory definitions put forth in 1853 which passed muster some ten or fifteen years before. Nor is this all. Mr. Pratt's "Introduction and Definitions" are really taken almost literally from Poisson's Introduction to his "Traité de Mécanique." Out of this Introduction Mr. Pratt has taken the definitions in the harsh and almost pedantic form in which they are found in the original, and has intermingled some explanatory matter of his own. All this explanatory matter the new editor has ruthlessly swept away, and gives us Poisson, and nothing but Poisson—except indeed where the translation is occasionally defective. Let us give an example or two. Poisson opens his treatise with the abrupt announcement that "La matière est tout ce qui peut affecter nos sens d'une manière quelconque." This Mr. Todhunter has rendered "Matter is every thing that affects our senses." If we *must* have a definition of matter, surely it is worth while to make the wording as little liable to objection as may be: and Poisson's own words evidently shut out one verbal objection to which Mr. Todhunter's is liable, though it is only fair to remark that this imperfection is common to Mr. Pratt's version. Both the English writers, following Poisson, proceed to *define* "a body" as "a portion of matter limited in every direction, and consequently of definite form and volume"; the mass of a body as "the quantity of matter which it contains"; and a material particle as "a portion of matter indefinitely small in every direction." This is the substance of the first sentence in Mr. Todhunter's book, and we would ask in what respect the student is made wiser by reading these dry dogmatic definitions. And above all, why should such a form be adopted in 1853 for the commencement of a treatise on Statics? We have advanced a good deal in freedom of using analytical methods since Poisson wrote his treatise. Then the method of formal statement of definitions (derived apparently from the synthetical systems of the older geometry) was still in repute—and a writer must needs begin his treatise with a string of definitions, because Euclid does so. Hence, as far as we can see, that propensity to *over-define* which too often characterises English works on mathematics. We met with an instance lately which well illustrates this propensity: the author of a treatise on Dynamics published a few years ago at Cambridge, (Professor Wilson) after remorselessly defining almost every thing he can lay his hands on, tells us with a half-doubting forbearance, that "It would be useless to attempt to define space and time. No explanation could in any way render the ideas clearer." But in the sentence which immediately follows that which we have quoted, Professor Wilson does point out a distinction which the writers on "Introductions and Definitions" in treatises on Mechanics generally would do well to bear in mind. After saying that space and time require no definition, he adds, "The measures of them on the contrary require the greatest attention." It is, we conceive, because this distinction is attended to that the commencement of the later French treatises on Mechanics—such as those of Poinsot or Duhamel for instance,—is so much more attractive than the corresponding part of the works of Poisson and his translators. In the former writers we are allowed to have an idea in our own mind concerning the *mass* of a body, but when we come to the point where it is needed, we are told how mass is to be estimated numerically—we are informed when two bodies are said to have the same mass—then that the unit of mass is chosen arbitrarily—and that when we say that the mass of any body is represented by a certain number, as *n*, we mean that the body might be divided into *n* parts, each having the same mass as that which has been assumed as the unit. This definition of the mode of measuring mass is practically useful: but whose ideas were ever extended by being informed that the mass of a body is the quantity of matter which it contains? We may notice another illustration of the way in which the tendency to formal dogmatic definition has led M. Poisson and his followers into grievous difficulties. It is deemed necessary to define a state of motion—"A body," says Mr. Todhunter, translating Poisson, "is in motion when the body or its parts occupy successively different positions in space." And then, inasmuch as it would be somewhat hard to make this a working definition, the idea of relative motion is introduced in the following remarkable expressions: "but since space is infinite in extent, and *in every part identical*, (partout identique) we cannot judge of the state of rest or motion of a body without comparing it with other bodies, (or with ourselves M. Poisson adds) and for this reason all motions which come under our observation are necessarily *relative* motions." Now this complicated and objectionable sentence is rendered necessary entirely by the preceding formal definition of motion. Had this been omitted, we should have escaped the difficulty altogether. Thus Poinsot and Duhamel, granting us the privilege of understanding the meaning of the word 'motion,' proceed to explain the terms absolute and relative motion: shew that while we cannot be sure that any particle in the universe is really at rest, we may yet separate the idea of the motion of a particle from the idea of the material body itself; that we may conceive, that is, that a body might be absolutely as well as relatively at rest; and thus they come to the definition of force, or perhaps we had better say to the statement in a statical form of the principle of the inertia of matter, viz. that some cause must always be required to produce a motion in a body at rest, and that to such a cause we give the name of *force*.

And this will lead us to say a few words as to the grounds upon which theoretical mechanics are or ought to be based. Before we do so, however, we would most seriously protest against any imputation of quibbling or hair-splitting in making these objections to verbal definitions. Such defects are grievous hindrances to the usefulness of a book, as every one knows who has had experience in teaching. A tutor puts such a book as that of Mr. Todhunter into the hands of a pupil previously ignorant of the subject: the pupil finds the book commencing with a series of definitions, on which he naturally imagines that the science is to be built. The first of these, and a fair sample of them is, "Matter is whatever affects our senses" —passing over the objection arising from imperfect translation, he comes to his tutor next morning, and asks whether light and electricity are matter, as they certainly affect our senses. Tutor points out that the definition is rather loosely worded: points out that it might perhaps be made less imperfect by adding the words 'or that through which impressions may be conveyed to our senses': rather doubts whether such an addition will do much good, and finally remarks after all it is scarcely worth while wasting time over it, as the definition is not one of any practical value. Upon which the pupil stares, doubts, and finally asks whether then the definition had not better have been left out? To which query the reply is necessarily in the affirmative—after which the pupil's faith in the necessity and usefulness of the introductory chapter is probably reduced below zero; and after a few more examples of the kind it will be very difficult to induce him to pay attention to explanations and distinctions that are really essential.

We must now say a few words as to the fundamental principles on which the science of statics is made to rest, and the grounds on which they are required to be received. There are, we conceive, two grand principles on which the whole of the science depends, viz. the inertia of matter, and the transmissibility of force. The former principle as applied to Statics is this: "A body once at rest will remain at rest unless some force is applied to it: and any single force applied to a body at rest will necessarily set it in motion." In other words, matter has no power either to move itself or to prevent force moving it. This principle appears again in Dynamics, as the first law of motion, and the complete statement of the principle will be that "Matter has no power of itself to change its state of rest or motion," remembering that a body's state of motion is changed when either the direction or the rate of its motion is altered. This principle then is a fundamental one: it is one which lies at the very root of our systems of Mechanics: how are we to establish its truth? Or can we establish its truth at the outset? And especially can we so establish it as to trust the proof of it in the hands of a beginner? These questions M. Poisson, and after him both Messrs. Pratt and Todhunter answer in the affirmative. Poisson's remark, according to Mr. Todhunter's version, is as follows:

"All bodies are capable of motion (sont mobiles), but matter cannot spontaneously move itself, for there is no reason why a particle should begin to move in one direction rather than another. It is in fact a matter of ordinary experience that when a body is passing from a state of rest to a state of motion, we can always attribute the change to the action of some external cause."

This 'external cause' is further explained by Poisson, as one "sans laquelle nous concevons que ce corps pourrait d'ailleurs exister."

Now the sentence above quoted really appeals to two utterly different sources for support of the main proposition. The first argument is what we should say might be called an *argumentum ad ignorantiam.* We should object to it, not only because it is using a very dangerous argument on very doubtful ground, but because it fairly brings us into collision with the metaphysician. We say that it is a very dangerous argument ; and we say this because we conceive that an appeal is really made here to the reader's own mind to form an idea *a priori* of what necessarily *must* be the nature of material bodies—an appeal, which in many cases would obviously lead to a wrong result: which is in fact virtually an abandonment of the inductive method. If any one from long familiarity with the reasoning here employed should be inclined to defend it, we would refer him, as an easy *reductio ad absurdum ;* to the use made of this mode of arguing by Mr. Gregory, who employs it to shew that the 'atom' of chemistry is most probably spherical, "since no reason can be assigned why one dimension should exceed another." It is indeed very difficult to set any formal limitation to the cases in which this argument may be safely used. Certainly, however, it would be a very unsafe guide in speculating upon the physical properties of matter, in which manner it is really used here. The second objection to the argument is perhaps even more formidable. At any cost we must keep clear of Metaphysics in the commencement of a physical science. If the fundamental truth of Statics is to be made to rest upon popular conceptions of time or space, any writer on Metaphysics who attacks those conceptions involves our system of Statics also in doubt. This should not be: if for example a Metaphysician insists that space and time instead of being real existences are merely modes of thought necessary to a finite mind, we should be able to answer (whatever may be our opinion of his theory) that our science is occupied exclusively with results of which these same finite minds take cognizance—that our process is to collect laws from observed facts, and then to trace out the remote consequences of those laws: and that consequently our results, whether accounting for or predicting phenomena apparent *to us*, may be depended upon, however metaphysical speculations might interfere with the objective correctness of our assertions. This answer we clearly cannot make if our belief of the inertia of matter in any way depends upon our persuasion that "space is infinite in extent and every where identical." Again, if the principle in question is to be established by an appeal to *experience*, it must be made in a much more guarded manner. When we speak of a body passing from a state of rest to a state of motion, both the rest and the motion must be *relative:* and it should at least be pointed out that we are obliged to draw an inference concerning a particle *absolutely* at rest, from the examination of a body *relatively* at rest. And when we come to consider the case of a body passing from a state of relative rest to one of relative motion, it is necessary to guard our language by another restriction, which may tend to increase the embarrassment of the learner. The *cause* to which the change of state is to be referred may be one applied either to the body observed or to the system relatively to which its state of rest or motion is estimated. A carriage is suddenly stopped and a person riding in it is, to use the popular language, thrown suddenly forward. He passes from a state of rest to a state of motion with regard to the carriage, exactly because *no* force is applied to him, and the case is an illustration, not of the statical but of the dynamical aspect of the principle of inertia, viz., that the body once in motion will continue to move unless some external cause be applied to stop the motion. So that if the statical principle of inertia is to be established by an appeal to experiment it must be in language somewhat more extended than that used by our Author, unless, indeed, his book is intended merely as a peg to hang lectures on. Before quitting this point we would state that our own impression is in favor of treating these fundamental principles, in the case of beginners, not exactly as axioms, but as facts which the learner must for the time take on trust. It is not until the mind has become familiar with the ideas of force, and of rest and motion, absolute and relative, that, as a general rule, it can take in the train of thought upon which such principles depend. It seems to us to be not only the easier but the safer course (and we would suggest this as a practical consideration to those of our readers who are engaged in teaching) to assume, and to tell the pupil that we assume, the truth of such principles as the inertia of matter and the transmissibility of force: build up the whole system of Statics and Dynamics provisionally, and then turn back and explain the foundations upon which such assertions rest, viz. that the more nearly the conditions of these laws are fulfilled the more nearly are their assertions verified; and that their truth may be considered established conclusively when we compare with observation the results of our system of Physical Astronomy which rests entirely upon the correctness of these principles.

The consideration of these elementary points has detained us so long that we shall have space only very briefly to notice some of the remaining points in Mr. Todhunter's book which appear to deserve attention. The main body of the work is a re-print of Pratt's Treatise, and the proofs are almost everywhere clear and satisfactory. Where Mr. Todhunter has made extensive additions of his own, as in the chapter on the centre of Gravity, they are such as to make us very greatly regret that he did not throw aside Poisson and Pratt, and publish a work of his own. The book as it stands is well adapted to the wants of a student at Cambridge, or at any University where the Cambridge system is followed. It is not adapted, as Mr. Todhunter's other works so emphatically are, to the use of persons reading by themselves, and, which is, in some respects, to be regretted, it does not fit in very well as one of a series of the same author's writings. In Mr. Todhunter's Differential Calculus, he treats the subject entirely by the method of Differential Co-efficients; he has only a short chapter on Differentials, and even there he studiously avoids the use of infinitesimals. In his Co-ordinate Geometry he is at much pains to adhere to this system, but in the Statics, as might be expected, he is almost compelled to resort to infinitesimals; and certainly a person whose ideas on the Differential Calculus were entirely derived from Mr. Todhunter's book on that subject would be rather amazed at the boldness with which Differentials are treated in the latter treatise. In some cases this boldness seems to us carried almost to excess. Thus, for example, when he is investigating the conditions of equilibrium of a string stretched over a cylinder, he has to consider the equilibrium of an indefinitely small element of the string, PQ. This element is kept at rest by the tensions at P and Q, and the resistance of the cylinder, *i.e.*, the resultant of the normal reactions at the several points of the element, which, says Mr. Todhunter, is ultimately in the direction of the normal at P. This is perfectly true, but it seems to us to want at least some explanation. The student's objection is that if we are at liberty to consider the normal action at the extreme point Q of the element as coincident with the normal action at P, we might also consider the direction of the tangential actions at the two points as ultimately coincident, which he finds is not the case; and it requires a clearer insight into the doctrine of infinitesimals than the student will generally possess to see that the error in taking the directions of the normal actions as coincident will be of a higher order than that in treating the tangential actions in a similar manner, and that therefore in taking the limits the former error will disappear. Perhaps the best mode of remedying this defect would be the addition of a chapter on infinitesimals when a new edition of the Differential Calculus is called for. We have not examined the book before us with sufficient care to be able to say much as to the accuracy of the printing. One strange blunder, arising we presume from the printer, we may point out for the benefit of any of our readers taking up the book. It is at the end of article (186) where he is finding the approximate expression for the tension at the lowest point of the catenary, where in subtracting two expansions the first term of the difference is omitted. (The left hand side of each of the two last equations should be $\sqrt{k^2} = h^2 - k$). There is also, a few lines above, a singularly careless mistake, the points of support being described as nearly *in the same straight line*, instead of in the same horizontal line.

Before we conclude, there is one point to which we should wish to call the attention of our mathematical readers. In the chapter on the Composition of Forces, Mr. Todhunter gives us first Duchayla's proof of the Parallelogram of Forces, (we wish he had substituted Duhamel's far more elegant demonstration) and then adds Poisson's proof which does not assume the principle of the transmissibility of force. In passing we may remark that we never could see that this was any recommendation of this class of proofs. Writers are accustomed to say that proofs such as Duchayla's will not apply to the case of forces acting on a particle of fluid, or that the proof is imperfect because the proposition would be true even if the transmissibility of force did not hold, by which if they mean anything they must mean if no such thing as a rigid body ever existed. Such objections seem to us about equivalent to saying that a brick house cannot be built by means of a wooden scaffold. The rigid connections introduced into such proofs are purely imaginary, and when the result is established it matters not the least of what body the particle acted upon may form a part. But to return to M. Poisson's proof, to which our attention was directed by finding it in Mr. Todhunter's book. It may sound a bold assertion to make concerning a proof published by such a man as Poisson, but we cannot help coming to the conclusion that it is a complete fallacy. We cannot give the proof at length, but the following general description of it will enable us to point out where the fallacy lies. Assuming that the direction of the resultant of two equal forces will bisect the angle between the directions of the two forces themselves, he takes two equal forces, P, inclined at an angle $2x$, whose resultant is R, and assumes $R = P f(x)$; his object being to determine the form of the function f. By resolving each of the forces P into two equal forces, Q, inclined at an angle $2z$; he arrives at the equation

$$f(x).\ f(z) = f(x+z) + f(x-z) \ldots\ldots\ldots(1)$$

This functional equation he has to solve, *i.e.*, he has to find the most general solution, and to limit it by considerations derived from the special problem before him. This he proceeds to do as follows: "We see at once that $f(x) = 2 \cos c\, x$ is *a* solution, c being any constant quantity. We proceed to shew that this is the *only* solution, and that $c=1$." Mr. Todhunter, perhaps, scarcely conveys Poisson's meaning here. His words are: "Or je dis que cette expression de la fonction $f(x)$ est la seule qui satisfasse a l'équation (1), et que de plus dans la question qui nous occupe la constante c est l'unité."

As far as we can make out, the reasoning which follows is *not* intended to shew that the equation (1) admits of no other solution, (which we are required to take upon M. Poisson's assertion) but only that in the particular case before us $c = 1$. The steps by which it is endeavored to prove this are as follows. First, it is asserted that it is evidently true that $c = 1$, or that $f(x) = 2 \cos x$, when x is zero, for then the directions of the two forces P would coincide, and the resultant R would be $2P$, and we must therefore have $f(0) = 2$. Again he shews that the conditions of the problem are satisfied by assuming $f(x) = 2 \cos x$ in another particular case, viz., when $x = 60^\circ$ in which case the resultant $R = P$, which involves the assertion $f(60^\circ) = 1$ which as $\cos 60^\circ = \frac{1}{2}$ is satisfied by writing $f(x) = 2 \cos x$. A most ingenious proof is then inserted to shew that if the relation $f(x) = 2 \cos x$ is satisfied for $x = 0$ and for any other value of x, it must be satisfied for *all* values of x. The proof of this assertion is derived entirely from the equation (1) itself, and inasmuch as the object in view is altogether to choose from the different solutions of the equation that one which suits the physical problem which led to it, we might *a priori* doubt the usefulness of such a course. In effect the reasoning is worth nothing. In the first place that $f(0) = 2$ may be deduced at once from equation (1) by putting $z = o$, and the succeeding reasoning literally gives us no information whatever. If, indeed, it could have been said that unity was the *only* value of c which would satisfy the conditions of the problem when $x = 60°$, the proposition would be established, but, unfortunately, this is not the case, for an infinite number of values might be given to c such that the conditions of the problem might be satisfied in this particular instance. For example we might put $c = 5$, for then we should have

$$f(60°) = 2 \cos (5 \times 60°) = 2 \cos 300° = 1,$$

as it should be: and the fallaciousness of Poisson's reasoning is at once apparent from this, that the very same words which he employs to shew that $f(x) = 2 \cos x$ is the proper solution of (1) might be employed to shew that $f(x) = \cos 5x$ ought to be selected.

We may notice that a very simple mechanical consideration will suffice for the selection of the true value of c, if it be granted that the solution of (1) is necessarily of the form $f(x) = 2 \cos cx$. When $x = 0$, the equal forces P act in the same direction and the resultant is the greatest possible; when $x = 90°$, the angle between the forces is 180°, and the resultant is zero, and it does not seem too much to assume that as x increases from 0°, to 90°, the resultant will diminish *continuously*. This being granted it is at once evident that c must be unity, for $\cos cx$ must vary from unity to zero continuously, as x varies from 0° to 90°. We are by no means prepared to say that this form of proof of the parallelogram of forces *can* be made perfect. The solution of functional equations always involves more or less of doubt and obscurity, and what is called the the "general solution" of such an equation is by no means necessarily *most* general that can be conceived. Certainly Mr. Todhunter deserves our thanks for giving us the classical proposition of Poisson instead of the method which had been substituted by Mr. Pratt, which is just as unsatisfactory as Poisson's and much more clumsy. We could have wished, however, that Mr. Todhunter had called attention to this singular fallacy. It seems scarcely fair to the student to put a proof in his hands, especially with such a name attached to it, without giving him so much as a hint that it contains anything unsatisfactory.

G. C. I.

SCIENTIFIC AND LITERARY NOTES.

GEOLOGY AND MINERALOGY.

GEOLOGICAL MAP OF CANADA.

The Special Correspondent of the *Montreal Gazette*, writing from Paris, on the 22d of November last, remarks:—M. Elie de Beaumont, President of the Geological Society of France, considers the small edition of the Geological Map of Canada, which has been published here, so excellent, that he has requested Mr. Logan to allow it to be introduced into the bulletins of the Society. It is one of the prettiest specimens of geological chromo-lithography that has issued from the press. The scale is one-tenth of Bouchette's Map of Canada. There are twenty-two colors on the map, representing the formations, and these have required fourteen lithographic blocks to print them.

WOLFRAM.

A well-crystallized specimen of Wolfram (the manganese variety 2 [FeO, WO^3] + 3 [MnO, WO^3), a mineral it is believed hitherto unremarked in Canada, has been lately met with in a granitic boulder, near Orillia, C. W. A detailed notice will be given in a future number. E. J. C.

FOSSILS FROM THE ESPLANADE CUTTINGS, TORONTO.

From this spot some good casts of the following fossils may be obtained:—Chætetes lycoperdon; Glyptocrinus decadactylus (stem fragments); Modiolopsis modiolaris,' Ambonychia radiata; Murchisonia gracilis, Pleurotomaria subconica; Orthoceras lamellosum, . coralliferum (or a species of Endoceras?) It is perhaps unnecessary to state that the above belong to the Hudson River group of the Lower Silurians. E. J. C.

GEOLOGY OF SCOTLAND.

A recent paper read by Sir R. Murchison to the Geological Society, announces the discovery of Upper Silurian fossils, in the parish of Lesmahagow, in Lanarkshire. The fossils were first found by Mr. Sliman, a native of the district, which has since been visited by Sir Roderick and Professor Ramsay. The succession of rocks from the coal and mountain limestone downwards is traced in Nethan and Logan waters, which are branches of the Clyde flowing north-eastward from the borders of Ayrshire. The rocks mentioned are followed by conglomerates and flagstones representing the old red sandstone, under which are dark gray, slightly micaceous. flag-like schists, containing crustaceans of the genera of Pterygotus and Eurypterus, with the Lingula cornea and Trochus helicites (shells). On the ground of these fossils, Sir Roderick considers the flag-like schists as the equivalents of the upper Ludlow rock, or tilestones of England. In the geological map of Scotland, therefore, a track of country about ten miles broad, colored as old red and coal by Dr. M'Culloch, must now be added to the Silurians. C. M.

COMPOSITION AND FORMATION OF STEEL.

At a recent meeting of the Boston Society of Natural History, Dr. Jackson gave an account of some researches into the composition and manner of formation of different kinds of steel.

As commonly known, steel is a combination of carbon and iron, made by heating flat bars of pure iron, in combination with charcoal. The carbon is first converted into oxide of carbon, and then unites with the iron as carburet. The result of this process is known as blistered steel, from the bubbles generated by gases upon its surface. Shear steel consists of parallel plates of pure iron and steel, welded by folding and uniting the bars of blistered steel. Cast steel is fused in pots of the most refractory material, and differs from cast iron which likewise contains carbon, in this respect, that cast iron is a mixture of coarsely aggregated matters, graphite and iron, whilst cast steel is a chemical combination of carbon and iron.

From the researches of Berthier, it is known that manganese will form an alloy with iron. When iron is mingled with a considerable portion of manganese, a brittle compound results; but when combined with a very small proportion of manganese, a steel of very fine quality is obtained, which has this advantage over carbon steel: carbon steel becomes coarse when tempered in thick masses, from segregation of the particles of carbon; but no such trouble arises with magnesian steel. Parties in England have lately introduced excellent wire for piano-forte strings, made of this kind of steel, as well as for cutting instruments, and other purposes. In the wire, Dr. Jackson has found 1.12 per cent. of manganese, and has established the fact that it resists, to a very remarkable degree, the action of hydrochloric acid. Sixteen years since, Franklinite iron was manufactured by Mr Osborn into very hard and fine steel. This steel required tempering at a lower heat than carbon steel. Many of our manganesian irons might be manufactured into steel, by the simple process of fusion, and a steel of uniform character might be made without previous cementation with carbon.

Dr. Jackson explained the reduction of iron in blast and reverberatory furnaces. Manganesian iron ore is reduced to pure iron, or "comes to nature," in the language of the workmen, with much greater rapidity than carbon iron; hence the two metals are often mixed to "come to nature" at a good time, requiring less care and watchfulness on the part of the workman. Manganesian iron makes the best bar iron.

PHYSIOLOGY AND NATURAL HISTORY.

FREAKS OF NATURE.

The following singular illustration of the tendency of wild animals, when domesticated, to change their uniform natural color, is exhibited in a way both curious and unusual. A writer in the "Scottish Press" says:—Mr. Souter, of Boxgrove, has a game fowl which, four years since, was perfectly black, the second year it was brown, the third white, and at the present time it is speckled black and white.

Though more in accordance with ordinary operations of nature, the following example of animals changing their color with the season of the year, is interesting as occurring in our own vicinity. The Rev. Thomas Schreiber remarks in a note to the Editor:—Is the following circumstance a freak of nature, or is it a happy dispensation of Providence, mindful for every contingency to provide for the safety of the animal creation? Last summer several rabbits, black and grey in color, were turned out on the grounds about the Homewood, Toronto; during the autumn their progeny were of the same color: since the snow has covered the ground two litters have shewn themselves, one litter of seven *completely snow white*, the other litter of six, two of which are snow white, the others greyish white; a casual passer by, though close to them, would not discern them unless they were in motion.

HYACINTHS IN GLASSES.

The following mode of procedure may perhaps be only partially suitable to our keen Canadian winter climate, but the hint is worth noting for those who delight in these beautiful and fragrant substitutes for the summer Flora:—A correspondent of the *Field* says—"The following I have found to be an excellent way to start the roots of hyacinths for water (an uncertain process sometimes). I found it out by accident, and it may have been noticed by others before; but I have never seen it in print. I had potted 50 or 60, and placed them in a cool shade to plunge in saw-dust, but the weather being favorable for out door work they were left for a week or ten days. On looking at them, they had by rooting forced themselves out of the soil, and emitted a perfect circle of roots; this induced me to place all my roots intended for glasses this year, in small pots filled with light soil, just large enough to take the bulb (the motive for this was to keep the roots close, so that when they were about one inch long they would go into the neck of the glass without breaking). The roots soon filled the glasses, and this ensures a fine bloom; they were kept in a cool dark cupboard for a month, then gradually put into light and heat, the latter very moderate, the hyacinth being impatient of much and rapid heat."

ETHNOLOGY AND ARCHÆOLOGY.

INSCRIBED SIDONIAN SARCOPHAGUS.

At the November meeting of the Syro-Egyptian Society of London, Mr. Ainsworth gave some details of the discovery at Sidon of a Sarcophagus, with a Phœnician inscription on it. Dr. Benisch read a translation of the inscription by the Rabbi Isidor Kalisch, with remarks on the mode of decipherment. This translation was compared with others made by Dr. Dieterich, of Marburg; by the Duc de Luynes, in Paris, and by Mr. W. Turner, and a writer signing himself E. E. S., in the Journal of the American Oriental Society. Only comparatively slight discrepancies distinguish these independent translations, made almost simultaneously on both sides of the Atlantic, thus leaving no room to question that here we have another of the fruits of the singular impetus given to philological and palæographical research by the successful labors of Young and Champoleon. The language of Phœnicia, after being lost for upwards of two thousand years, is thus being deciphered, and its secrets placed within our reach by living scholars.

SKULLS OF THE ANCIENT ROMANS.

At the recent meeting of the British Association at Glasgow, a paper was read before the Ethnological section by J. B. Davis, F. S. A., "On the Skulls of the Ancient Romans." Three skulls were exhibited to shew the high cerebral development. One of these skulls was found in a sarcophagus at York, and another under the Via Appia. The teeth of two of them were stained with verdigris, from contact with the copper coin placed in the mouth to pay Charon, the ferryman to Hades. In one case, the fare, an obolus, was found beside the skeleton.

Dr. Black made a few remarks upon the general characteristics of the Roman skull, an example of which, found in a Roman shaft at Newstead, Roxburghshire, along with an iron spear, and a quantity of Roman pottery, is figured in Wilson's "Prehistoric Annals of Scotland," and its measurements given.

Mr. Cull added several observations upon the types of the Anglo-Saxon and Celtic skull, remarking that the round head which characterised the modern Irish was not the type of the ancient Celtic skull, which latter was elongated like that of the Anglo-Saxon.

OPATE INDIAN GIRL.

Considerable interest was excited some little time since, both in America and Europe, by the exhibition of a dwarf Indian boy and girl, about whom very marvellous fictions were told, affirming their having been carried off from a city of Central America, where the ancient Astec race and institutions still exist intact. The success which attended this exhibition, and the interest taken in the subject by some of the first scientific men, such as Latham, Owen, Burke, &c., have led others to follow the example, and there has recently been exhibited in some of the American cities a young female called an "Opate Indian," from her being affirmed to be a representative of the Opate Tribe; one of those occupying Sonora, a range of country from 28° to 30° N. latitude, and about 33° of longitude W., from Washington. It appears, however, that whatever be the native place of this singular female, she is no proper representative of her tribe, but presents, in the most remarkable characteristics, an abnormal condition, peculiar to this individual instance. A singular growth of hair on her face along with a remarkable formation of her gums, giving to her face somewhat of the prognathous approximation to a mussle, have led some to the conclusion that she was not purely of human origin; while others have equally hastily shown an inclination to look on her as a type of the transitional stage by which theorists have been disposed to assume the development of the ape into man. In the month of September last, the members of the Natural History Society of Boston took advantage of her visit to that city, to have her present at one of their meetings, for the purpose of examination, and Dr. Kneeland read a communication in reference to her, from which we extract the following notice :—

This girl, who is 22 years of age, four feet six inches in height, and of the weight of 112 lbs., is probably a member of some Indian tribe, inhabiting the Sierra Madre Mountains. These mountains run, for the most part, parallel to the Gulf of California, through the Mexican States of Sonora and Cinaloa; their distance from the sea varies from 200 to 50 miles, and in the neighborhood of Mazatlan, they come still nearer to the coast. This girl has been called an *Opate* Indian. The Opate Indians are described by Mr. Bartlett, in his Personal Narrative, as a quiet agricultural people, living in thickly populated villages, noted for their bravery against the Apache tribe, and altogether superior to their neighbors, the Yaquis. But, on the other hand, she is said to have been obtained from the Sierra Madre Mountains in Cinaloa, in the neighborhood of Copala, which town is just on the edge of the mountains, about midway between Mazatlan and Durango. The girl, without doubt, belongs to some one of the Indian tribes between the Sierra Madre Mountains and the Gulf of California, in the Mexican provinces of Sonora and Cinaloa.

It is affirmed that her tribe live in caves, in a naked state, on an equality with brutes, and partake of their food. That would degrade her to a level with the Digger Indians of California, but these, though very degraded, are yet far above the brutes. The locality of the Digger Indians is several degrees further North than the Sierra Madre range. This resemblance to the brute is mentioned, as the popular belief seems to be, in her case as in the Aztec children, that she is a specimen of a race, half human and half brute.

The girl is modest, playful in her disposition, pleased with playthings like a child, and, at times, rather hard to manage, from her obstinate and impulsive character. She is intelligent, understands perfectly everything said to her, can converse in English, and also in Spanish; she has a good ear for music, and can sing tolerably well; she can also sew remarkably well, and is very fond of ornament and dress. Her appearance is far less disgusting than representations of her have shown her to be, although the enormous growth of hair on the face, and the prominence of the lips, from diseased gums, give her a brutish appearance. Her hair is long, very thick, black and straight, like that of the American Indian; hair, of the same color and character as that on the top of her head, grows on the forehead, quite to the eyebrows, varying from one half to an inch in length, having been partially cut off in the middle of the forehead; the eyebrows are very thick and shaggy, and the lashes remarkably long; the hair also grows along the sides and also of the nose, upper lip, cheeks, and about the ears, which are large, and with very large lobes; the chin is also well supplied with a black, fine beard, two or three inches long; the arms are hairy for a woman, though not for a man; on other parts of the body, there can be said to be no unusual growth of hair; there is great mammary development.

I have measured her head carefully, and it does not differ much from the average of these races, as given by Dr. Morton:—

	Long. diam.	Par. diam.	Front. diam.	Inter-Mastoid. Arch.	Occip. Front. Arch.	Horizontal Periphery.
Ordinary.	6.7 in.	6.	4.9	14.6	13.1	20.
Opate.	6.3	5.5	4.2	13.5	13.	20.

She has, therefore, a well-proportioned, though small brain. Her head varies somewhat from that of an American Indian. There is no characteristic prominence of the vertex, no flatness of the occiput or forehead, no want of symmetry in the two sides; the shape of the cheeks and the complexion are hardly Indian. The space between the orbits is large, and the eyes are very black and piercing; there is no obliquity to be noticed, as in the Mongol. The nose is flat, quite unlike the aquiline nose of the Indian, and yet not like that of the Negro. The mouth is very large, and the lips prominent, and rather thick; the gums are in a curious condition, being swelled all around, so as to rise above and conceal the teeth; they are not sensitive, and are so hard as to allow her to crack hard nuts with them. The growth in the upper jaw is chiefly a hypertrophy of the bone, and in the lower jaw, principally a disease of the gums resembling "vegetations." The molars, bicuspids, and canines are normal, though the latter are imbedded in the abnormal gum, while the back teeth are behind it. She has a decided chin, which would indicate her humanity, if nothing else did. She has a well formed arm, and a small symmetrical hand; she has also small feet. She is a perfect woman in every respect, performing all the functions of woman regularly and naturally.

She is evidently human, and nothing but human. She is quite unlike the mixed African—Is she an American Indian? It may be here remarked, that her complexion, soft skin, hair, and shape of the head, face and nose, remind one more of an Asiatic than an American type. Her disposition too is mild and playful, her manners gentle and communicative, differing from the sullen, taciturn, and forbidding ways of the Indian. It is well known, that some authorities maintain that the California Indians are of Asiatic origin,—Malays, who have been thrown in some way on the American shore, from the Pacific Islands. The notion also prevails among many of the tribes bordering on the Gulf of California, (among the Ceris, for instance,) that they are of Asiatic origin. The girl seems either of Asiatic origin, or of Asiatic and American Indian mixed. She is no specimen of a degenerate race, but an exceptional specimen, such as occurs, not unfrequently, in all races. Hairy women have lived before her, without any suspicion of brute paternity. The conformation of her mouth, in so far as it is abnormal, is more likely the result of disease, than a character of a tribe.

CHEMISTRY.

Ozone.—Dr Andrews has made a series of experiments on Ozone as derived from various sources. He finds that from whatever source it is obtained, its properties are always the same, contrary to the statements of some chemists. He fully confirms the idea that ozone is not a compound body, but oxygen in an altered or allotropic condition.

Protoxides of Iron, Manganese and Tin.—These oxides which are difficult to obtain by the ordinary processes, can be readily formed, according to Liebig, by heating the protoxalates of the metals, after they have been dried at about 250° F. The protoxide of iron is not quite free from metallic iron, the oxide of manganese is green, and burns when touched with a red hot body, the oxide of tin behaves in a similar manner, and the formation of these two compounds may be used as a good class experiment. Liebig confirms Rammelsberg's formula for the artificial protoxalate of iron, differing from the native salt (Humboldtite) by half an equivalent of water.

Iodo-nitrate of Silver.—Dr. Schnauss has examined the salt composed of iodide and nitrate of silver, first observed by Preuss. It is obtained by boiling the iodide with a strong solution of the nitrate, and crystallizes in acicular crystals. It blackens very rapidly when exposed to day-light, much more so than its constituents, and this probably accounts for the sensitiveness imparted to iodide films by the presence of free nitrate, a fact well known to photographers. Schnauss gives the formula $Ag\ O.\ N\ O^5 + Ag\ I$, but Weltzien, who has examined what seems to be the same salt, gives the formula $2\ Ag\ O.\ N\ O^5 + Ag\ I$.

Salts of Cadmium.—Von Hauer has published two papers on various double chlorides of cadmium, (see page 13 of this number), and throws out the suggestion that a subchloride may exist corresponding to Marchand's suboxide. Greville Williams has obtained analogous combinations of chloride of cadmium (and of bismuth and uranium) with organic alkaloids.

Double Cyanides.—By acting o the ferri-cyanide of potassium, with ammonia or soda and grape sugar, Reindel has obtained curious salts of the formula $K^3\ N\ H^4,\ Cy^4 + 2\ Fe\ Cy$ and $K^3\ Na,\ Cy^4 + 2\ Fe\ Cy$.

Oxygenation.—Kuhlmann has shown that certain essential oils possess the power not only of absorbing oxygen from the atmosphere, but also of communicating it to bodies susceptible of oxidation, and he shews how this fact may become of importance as affecting the colours used in painting, which may be changed by this as well as by other causes. He compares the action of oil of turpentine in these cases to that of the blood in respiration.

Hydrated Silica.—Liebig has found that the solubility of silica depends essentially upon the circumstance whether or not a sufficient quantity of water for its solution is present at the moment of its separation. If a solution of a soluble silicate, the strength of which per cubic centimetre is known, be gradually diluted with measured quantities of water, a point may be arrived at when, on the addition of acid, the fluid remains perfectly clear, and no silica is separated. In this way water can dissolve as much as one five-hundredth of silica.

Ammonia and its salts materially diminish the solubility of silica.

Action of Carbonates.—Rose has carefully examined the circumstances under which insoluble or nearly insoluble salts, such as the sulphates of baryta, strontia, and lime, &c., are decomposed by alkaline carbonates. When the soluble salt formed is capable of decomposing the insoluble salt produced, the decomposition is hindered, and can only be effected by constant removal of the soluble salt, or employment of an excess of the decomposing salt.

When no such decomposing action of the resulting soluble salt upon the insoluble one takes place, the decomposition goes on in accordance with the ordinary laws of affinity. An alkalic carbonate decomposes sulphate of baryta, and an alkalic sulphate decomposes carbonate of baryta, hence very imperfect decomposition can be produced from equivalent weights of these salts. An alkalic carbonate can decompose sulphate of strontia, but an alkalic sulphate has no effect upon carbonate of strontia, hence in this case a nearly complete decomposition is effected. The same is the case with the sulphates of lime and lead, and is doubtless connected with the partial solubility of these sulphates, for if the smallest quantity were to be formed and dissolved in the fluid, it would be immediately decomposed by the action of the alkalic carbonate.

Cement.—M. Sorel announces the formation of a very hard and durable cement by the action of chloride on oxide of zinc. The analogous chlorides may be substituted for that of zinc. The cement may be poured into moulds like plaster, becomes as hard as marble, is not affected by cold, moisture, or even by boiling water, and is but slowly acted on by strong acids. It has been long used as a cement for stopping teeth. It can also be employed as a very hard and durable paint.

Strength of Bases.—Rose has found that there is no more certain means of ascertaining the strength or weakness of the basic properties of the different metallic oxides than treating them with solutions of inodorous ammoniacal salts, especially of chloride of ammonium. All metallic bases of the composition 2 R + O and R + O decompose the ammonia salt, while those of the formula 2 R + 3 O, and others containing still more oxygen are unable to effect the decomposition even after long boiling. The only exception is in the case of glucina, but many chemists have been inclined to rank this among the oxides of the formula R + O, and very recently Debray has concluded that glucina must be regarded as an earth which has no analogue, standing midway between the bases R + O and 2 R + 3 O.

In a later paper Rose inclines to the formula 2 G + 3 O for glucina. He finds that glucina exposed to the heat of a porcelain furnace forms a dense caked mass, of specific gravity 3·021 and exhibiting under the microscope regular prismatic crystals like the native alumina or corundum. Alumina, when heated in the same manner, acquires a density of 3·99 or 4·0, and if from these numbers the atomic volumes be calculated for alumina and glucina, the numbers 157 and 160 are found, which agree very closely.

According to the formula G + O the atomic volume would be 52·3, and this should agree with that of magnesia. If this latter earth be heated in a porcelain furnace it is obtained in a crystalline form, and exactly similar in its properties to the *periclase* from Vesuvius. Its specific gravity is 3.694, and its volume 71. The oxide of nickel, examined by Genth, has the same volume. Hence there is no analogy between these two oxides and glucina. From these and other reasons Rose does not consider that the decomposition of ammoniacal salts by glucina warrants any alteration in the present formula.

Alcoholic Compounds.—Mercaptan.—Hermann has obtained Butylic mercaptan $C^8 H^{10} S^2$, analogous in its properties to the rest of the class.

Benzoic Alcohol.—Cannizzaro, by acting on toluene (derived from commercial benzine) with chlorine, has obtained the monochlorinated toluene which is identical with chloride of benzœthyle, when this is treated with acetate of potash, acetate of benzœthyle is formed, which with potash give benzoic alcohol $C^{14} H^8 O^2$.—By means of the monochlorinated toluene, and cyanide of potassium, cyanide of benzœthyle is readily obtained, and this with caustic potash yields toluic acid, a compound belonging to a higher series.

Propylic Alcohol.—Dusart produces propylene by the deoxidation of acetone; this is effected by distilling gradually a mixture of equivalent portions of acetate of lime, and oxalate of potash, dried as carefully as possible. The propylene is conducted into bromine, and the bromide of propylene purified by distillation. By the action of an alcoholic solution of potash, the compound $C^6 H^5 Br$ is obtained, which, heated with sulphocyanide of potassium, gives the oil of mustard. If the propylene be conducted into sulphuric acid and the product distilled with water, propylic alcohol is formed, as in Berthelot's process for forming common alcohol from olefiant gas.

Alcohol.—Marx has shown that the formation of alcohol from olefiant gas and sulphuric acid, lately proved by Berthelot, was described twenty-seven years ago by Hennel, in his paper on the formation of ether.

Bisulphocyanide of œtherine.—Sonnenschein has succeeded in replacing the chlorine in the chloride of œtherine by sulphocyanogen, producing a compound homologous with oil of mustard.

Amylic Alcohol.—Pasteur has found that amylic alcohol consists of two bodies, which he calls active and inactive alcohols, the one possesses a rotatory power on the plane of polarization, the other possesses none. The alcohols cannot be separated directly, but the sulphamylate of baryta is found to consist of two salts, one of which is 2½ times more soluble than the other, the soluble one yields the active alcohol.

Sugars—Berthelot has re-examined the sugar of the Eucalyptus, and gives to the crystalline manna-like substance the name of Melitose. It does not act upon oxide of copper until after boiling with sulphuric acid, it is capable of fermentation but yields half its weight of a body, which is incapable of fermenting even after treatment with sulphuric acid, and which he calls Eucalyne. He has also examined a peculiar kind of sugar, said to be derived from the Pinus Lambertiana of California, he calls it Pinite, it is insusceptible of fermentation, and does not reduce oxide of copper.

Propionic Acid.– Limpricht and Von Uslar have endeavoured to prove that butyracetic acid is distinct from propionic, and that it is decomposed under certain circumstances into acetic and butyric acids. In the course of their investigations they also prepared and examined the anhydride of propionic acid, propionic ether, propione, propylal and propylene, the three last obtained by the distillation of dry propionate of baryta.

Stearone.—Heintz has shown that stearone $C^{35} H^{35} O$ is really produced during the distillation of dry stearate of lime, a fact which had been disputed by Rowney.

Hlienkamp has examined the action of sulphite of ammonia on nitrobenzole and nitrotoluole, and has obtained two new acids.

Rammelsberg has examined the composition and crystalline forms of the tartrate of ammonia, and the double tartrate of potassa and ammonia.

Muhlhauser has examined the products of the action of nitric and hydrochloric acids upon the protein compounds, and has found among others a volatile body, chlorazole, which is poisonous, burns the skin intensely, possesses a powerful odour, and explodes when strongly heated.

Fulminuric or Isocyanuric Acid.—Liebig and Schischkoff have described under these names a new tribasic acid isomeric with cyanuric acid, but forming entirely different salts with bases, obtained by the action of alkalie chlorides or iodides upon fulminating mercury. Many of the salts are finely crystallized and explode when heated.

Ononine.—Hlasiwetz has examined the body obtained by Reinsch from the root of Ononis spinosa, he finds that it is decomposed by baryta into an acid and a new glucosogenous body, which he calls Onospine, this again by dilute acids is resolved into sugar and a crystallizable substance Ononetine. The decomposition is analogous to that observed in populine.

Amides.—Rowney has examined a considerable number of the amides of fatty acids.

Veratrine.—Merck has made some experiments upon pure veratrine and some of its salts, and gives as the formula of the alkaloid $C^{64} H^{52} N^{2} O^{16}$.

Igasurine.—Desnoix announces the the existence of a third alkaloid in nux vomica in addition to strychnine and brucine; it remains in the mother liquor after these two have been precipitated by lime. In its properties it is exceedingly similar to brucine.

Volatile bases.—Greville Williams has published in the Chemical Gazette of November last, the valuable paper read before the meeting of the British Association, on the basic constituents of coal tar, and on chrysene. The communication is not of a nature to allow of an abstract.

Napthaline.—Dusart has obtained two new compounds of napthaline, by acting on the protonitrate with potash and lime. He calls them nitrated phthaline and nitrophthalinic acid. From the former he obtained a new alkaloid Phthalidine having the formula $C^{16} H^{9} N$.

Nitroglycerine has been examined by De Vrij, who gives the formula $C^{6} H^{6} (N O^{4})^{2} O^{6}$. He prepares it by gradually adding 100 grms. of glycerine of specific gravity 1·262, to 200 cubic centims of monohydrated nitric acid cooled down to 14° F. As soon as the two liquids have united to a homogeneous mass, a quantity of sulphuric acid equal to that of the nitric acid, is gradually added, keeping the temperature below 32° F. the whole time to avoid an explosion. To purify it dissolve in ether and wash with water. It explodes at a temperature above 320, and also when struck.

Coumaramine.—An artificial alkaloid has been obtained by Frapolli from nitro-coumarine.

H. C.

LITERATURE AND THE FINE ARTS.

SAMUEL ROGERS.

SAMUEL ROGERS, the last survivor, if we except Walter Savage Landor, of the poets of England whom we specially associate with the age of Scott and Byron, died at London on the 18th of December, at the advanced age of ninety-three. His rank among England's poets has long been assigned to him, and we cannot doubt that posterity will confirm the decision which two generations of his cotemporaries have attested in regard to the author of "Italy" and the "Pleasures of Memory." It may be that the biographer of the poet will now produce to us some further evidences that the poetic genius which manifested its powers for a brief period so vigorously, preserved the same power in later years, however rarely put forth; but it is a singular fact that he who has just passed away from the circle of admiring friends and cotemporaries, belonged as a poet entirely to a former generation. Our recollections only embrace the exhibitions of the poet's refined æsthetic tastes as manifested in the wedding of his verse to the younger sister art. The illustrated editions of the "Pleasures of Memory," and "Italy," chiefly by the pencils of Stothard and Turner, constitute an era in the history of English art. It was not merely the lavish expenditure of the wealthy poet, in the adornment of the offspring of his genius; for great as that was, it was probably equalled in the outlay for some of the ephemeral literary "Annuals" of the same period. But the exquisite taste of the poet was employed with such a delicate tact in guiding the artistic illustrations, that its influence only became fully apparent, when publishers seeking to rival his success, in vain employed the same arts and devices, only to be mortified by the discovery that even Turner shone in the pages of Rogers with an inspiration which their money could not purchase from his pencil.

The poet's house in St. James's Place, was a perfect treasury of art. In the preliminary steps for illustrating his poems he is reported to have spent £10,000. Many drawings made for the purpose were not used, the work in its completed form preserving to us only the choice selection of the poet's taste, from the contributions of art to illustrate his muse. The paintings which adorned the poet's residence, though comparatively few in number, were gems of their kind, and of these he has bequeathed to the nation three well-known pictures—the Titian "Noli me tangere;" the Giorgione, a small picture of a Knight in Armour; and the Guido, "Head of Christ crowned with thorns."

The correspondence of Rogers, if given to the world, as doubtless it will be in part at least, will furnish illustrations not only of the literary history of the nineteenth century, but also of the closing era of the previous one, when men flourished as his literary cotemporaries, whom we have learned to class among the ancients. His life must also embrace in its narration many historical reminiscences of other kinds, of no less lively interest.

"The biography of Samuel Rogers," says the *Times*, "would involve the history of Europe since George III., then in the bloom of youth, declared to his subjects that 'he gloried in the name of Briton.' It is now more than a quarter of a century since that monarch was carried to his grave in extreme age, worn out with mental and bodily disease. Let us take the most notable historic drama of the century, 1793-1815—the rise, decline and fall of Napoleon Bonaparte.

"This was but an episode in the life of Samuel Rogers. He was a young man of some standing in the world, fully of an age to appreciate the meaning and importance of the event, when the States General were assembled in France. *If we* remember right he actually was present in Paris at or about the time, and may have heard with his own ears Mirabeau hurling defiance at the court, and seen Danton and Robespierre whispering to each other that their time was not yet come. Let us go back to other events as standards of admeasurement. As the war of the French Revolution and that against Napoleon Bonaparte were episodes in the ripe manhood, so was the American war an episode in the boyhood of Rogers. He was of an age to appreciate the grandeur, if not the political meaning of events, when Rodney won his naval victories and when General Elliott successfully defended Gibraltar.

"He could remember our differences with our American colonies, and the battles of Bunker's Hill, Brandywine and Germantown, as well as a man now in manhood can remember the three glorious days of July and the Polish insurrection. To have lived in the days of General Washington, and to have heard discussions as to the propriety of admitting the independence of the North American Provinces, and to have been alive but yesterday seems well nigh an impossibility, but such was the case of Samuel Rogers. When he opened his eyes upon the world, that great and powerful country which is now known as the United States of North America, was but an insignificant dependency of the Mother country—a something not so important as the Antilles are at the present moment."

Some such remarks might doubtless be made with equal truth of any illiterate beggar, dying at the same advanced age in the parish workhouse; but we must remember that the poet had advantages which few of his time enjoyed. Born at Newington Green on the 30th July 1762, the son of a wealthy London banker, he enjoyed far more opportunities, and far greater means for observation, intellectual culture, and intercourse with men, than the titled Byron. The perusal of Beattie's Minstrel, it is said, first inspired him with the poet's longings, and having composed some verses which he deemed fit for the critic's eye, he proceeded to the well-known house in Bolt Court, Fleet Street, to submit them to the awful tribunal of the seer. The young poet rapped tremblingly at old Sam Johnson's door, and then his heart failing him, he ran off before it was opened. When next he summoned courage to knock and wait, it was only to learn that the great critic and moralist then lay a-dying.

Such associations with a past so remote to all our ideas as the age of Johnson, naturally suggest other ideas akin to those found to pertain to the deceased poet. A writer in the *Daily News* says—"We have seen Moore die in decrepid old age; yet did Moore, in his boyhood (when he was fourteen), delight in Roger's 'Pleasures of Memory.' When young Horner came to London to begin his career, he found Rogers a member of the King of Clubs, the intimate of Mackintosh (who was his junior), Scarlett, Sharpe, and others, long gone to the grave as old men—and one, Maltby, who was a twin wonder with himself as to years. The last evening that Mackintosh spent in London before his departure for India was at Rogers's. It was Rogers who 'blabbed' about the duel between Jeffrey and Moore, and was the cause of their folly being rendered harmless; and it was he who bailed Moore; it was he who negotiated a treaty of peace between them; and it was at his house that they met and became friends. Moore names him as one 'of those agreeable rattles who seem to think life such a treat that they never can get enough of it.' There was much to render life agreeable to a man of Rogers's tastes, it must be owned. He saw Garrick, and watched the entire career of every good actor since.

All the Kembles fell within his span. He heard the first remarks on the 'Vicar of Wakefield,' and read, damp from the press, all the fiction that has appeared since, from the Burneys, the Edgeworths, the Scotts, the Dickenses, and the Thackerays. As for the poetry, he was aghast at the rapidity with which the Scotts, Byrons, and Moores poured out their works; and even Campbell was too quick for him—he, with all his leisure, and being always at it, producing to the amount of two octavo volumes in his whole life. Somebody asked, one day, whether Rogers had written anything lately. Only a couplet, was the reply—(the couplet being his celebrated epigram on Lord Dudley). '*Only* a couplet?' exclaimed Sydney Smith. 'Why, what would you have? When Rogers produces a couplet, he goes to bed, and the knocker is tied, and straw is laid down, and caudle is made, and the answer to inquiries is that Mr Rogers is as well as can be expected.' Meantime, he was always substantially helping poor poets. His aids to Moore have been recently made known by the publication of Moore's Diaries. It was Rogers who secured to Crabbe the £3,000 from Murray, which were in jeopardy before. He advanced £500 to Campbell to purchase a share of the *Metropolitan Magazine*, and refused security. And he gave thought, took trouble, used influence, and adventured advice. This was the conduct and the method of the last of the patrons of literature in England."

"For half a century," says the *Times*, "his house was the centre of literary society; and the chief pride of Mr Rogers lay not so much in gathering round his table men who had already achieved eminence as in stretching forth a helping hand to friendless merit. Wherever he discerned ability and power in a youth new to the turmoils and struggles of London life, it was his delight to introduce his young client to those whom he might one day hope to equal."

If we turn for a moment from the congenial arena of literary life to the scene of noise and strife which the politics of the early years of the reign of George III. present, we find the poet already enlisted on the side of progress, and associating with men whose names are foremost on the pages of British history in that eventful age, when the foundations of empire were laid on this continent by the colonists who then dictated terms to the mother country. "Let us carry back our minds," says the biographer last quoted, "to the days of Wilkes and the Duke of Grafton, and remember but the mere names of the statesmen who have administered the affairs of the country from that time to the present, and we will have present to our recollection a list of the associates and friends of Rogers. It is, however, to the literary history of the century we must mainly look for a correct appreciation of Rogers's career. He not only outlived two or three generations of men, but two or three literary styles. The Poet of Memory, as he has been called, must not be rashly judged by the modern student, whose taste has been partly exalted, partly vulgarized, by the performances of later writers—we are speaking of a cotemporary of Dr. Johnson. Rogers must have been a young man some 20 years old when the great lexicographer died, and, therefore, a great portion of Johnson's writings must have been to him cotemporary literature. Let those who are inclined to cavil at the gentler inspirations of Rogers think for a moment what English poetry was between the deaths of Goldsmith and Johnson and the appearance of Walter Scott's first great poem. Cowper redeems the solitary waste from absolute condemnation at the most unfortunate epoch in our literature. Rogers no doubt formed his style upon earlier models, but he was no servile copyist; he could *feel*, without any tendency to apish imitation, the beauties of such authors as

Dryden and Pope. The poem by which his name is principally known to the public will always remain among the classical pieces of English literature, while some of his smaller poems will never cease to hang in the memory of men while the English language is understood. It must have been by an extraordinary combination of position, of intellectual and social qualities, of prudence and of wisdom, that the same man who was the friendly rival of Byron, Wordsworth, and Scott, talked finance with Huskisson and Peel upon equal terms, exchanged *bon mots* with Talleyrand, and was the friend of all the eminent men and of many of the indigent and miserable who flourished and suffered during three parts of a century."

COUNT VALERIAN KRASINSKI.

The Edinburgh papers announce the death of this venerable and distinguished foreigner, which took place on the 22d December. He has resided in Edinburgh for the last eight years, and was familiarly known to its literary circles, where his singularly comprehensive stores of historic knowledge, his extraordinary memory, and his pleasing and courteous manners, ever made him a welcome guest. He belonged to one of the noblest of Polish families, was a native of the ancient Polish province of White Russia, and took a leading part in the Revolution of 1830. On the termination of the struggle, the Count came in 1831, among the crowd of exiles who sought refuge in Britain, and the last work which occupied him was the preparation of a final appeal to the British nation on the subject of Poland. His advocacy of Polish restoration, however, was not revolutionary, but conservative. His first literary production during his exile was a translation of Borolowski's "Court of Sigismund Augustus," an historical romance. Next appeared his "History of the Polish Reformation,"— a work which at once established Count Krasinski's reputation as one of the most eminent historical writers of the day, and which having subsequently been translated into German and French, acquired for him European renown, and won for him flattering notices from the most distinguished men of letters in all countries, as well as from crowned heads, among whom was the late King of Prussia, who bestowed upon him the gold medal for literary merit. In 1847 he delivered in Edinburgh a course of lectures on "Panslavism and Germanism," which were shortly afterwards published. His "Religious History of the Slavonic Nations" appeared in 1853. Early last year he commenced the publication, in parts, of a "History of Poland," the materials for which he had long had in preparation. Besides the works now mentioned, Count Krasinski contributed occasionally to some leading periodicals. Though often subjected to great privations, he ever resolutely rejected the most brilliant offers made to him by Russia, and even declined the more flattering and honorable overtures made to him by the King of Prussia, preferring a life of honest, though not painless, independence in a free country to the golden chains of the destroyer of his native land, or even the service of a monarch whose country has borne an unenviable part in the history of that destruction.

SIR GEORGE BALLINGALL.

The death of Sir George Ballingall, M.D., Professor of Military Surgery in the University of Edinburgh, took place on the 4th of December last, at his country residence, Altamount, near Blairgowrie. He had filled the chair of Military Surgery in the University for thirty two years, his appointment dating from 1823. He was a Fellow of the Royal College of Surgeons, Edinburgh; a Fellow of the Royal Society; an Honorary Member of the Royal College of Surgeons, Ireland; and a member of the Medical Societies of Paris, Vienna, St. Petersburg, and Berlin. Sir George began his career in the army, and was for some years Surgeon to the 33d Regiment of Foot. The profession is indebted to him for several valuable contributions to medical literature, the chief of which are: "Observations on the Diseases of the European Troops in India;" "Observations on the Site and Construction of Military Hospitals;" and "Outline of Military Surgery."

ROBERT MONTGOMERY.

English papers record the death of the Rev. Robert Montgomery as one of the events of the closing year. If popularity, as proved by the sale of numerous successive editions, could have proved the author of "The Omnipresence of the Deity," "Satan," &c., to be a poet, this writer had abundant credentials, some of his volumes having gone through fourteen editions. Long since, however, Wilson, in Blackwood, exposed his vapid and hollow pretensions, and Macaulay in the Edinburgh Review, anatomized him with his keen critical scalpel. To the latter notice of him, included in the collected Essays of the historian, we may possibly owe some remembrance of him by posterity, such as his own turgid verse could not secure for him.

AMERICAN SCULPTRESS.

The correspondent of the *Toronto Leader*, writing from Rome, November 5th, remarks:—"What prevents a woman from being a sculptor*ess?* One of Mr. Gibson's students is a young lady, from Boston Mass., of the name of Hosman. This Miss Hosman promises to rival her countryman, Powers. She is not a mere chiseller: she is a woman of original ideas and uncommon energy of execution. The greatest sculptor of the age speaks of her talents in a very flattering way. She has in hand a model of the Cenci, the young lady who is the victim of Shelly's powerful tragedy of the Cenci. There was hardly any object in Rome that I so much wished to see as the Palace of the Cenci, if it still existed, or anything relating to it, if it existed no more; and here I find a young American lady carrying into effect her own original idea of treating this subject in sculpture. It has never before been so treated. Portraits of the youthful victim there have been. I saw one this morning, taken by Guido, the morning before her execution. It was in the studio of Ratti, an Italian artist. Ratti has not merely given the portrait, but the whole scene; the judge, the victim, and Guido taking her portrait. Hon. Mr. Ross has purchased this picture. The model which Miss Hosman is making represents the victim lying in prison before her execution. She lies on her left cheek, with her right arm folded round her head, and her left arm hanging down. Mr. Gibson says, there is a month's work on this model still to be done. I also saw a finished statue by Miss Hosman. It was Œnone, the sheperdess. The execution was very good."

It is scarcely necessary to remark that this is by no means the first example of the successful practice of the sculptor's art by a lady; though the "Beatrice" of Shelly's "Cenci" is a subject of rather singular choice for a lady artist. The works of the Hon. Mrs. Damer's chisel are well known in England; the more recent Joan of Arc, of the French d'Orleans Princess, is familiar to us all, at least by statuette copies; and Properzia Rossi, the celebrated female sculptor of Bologna, has had her artistic achievements recorded, both in prose and verse.

MONUMENT TO THE SCOTTISH POET NICOLL.

An appeal has lately been made to the friends and admirers of the poet Nicoll for subscriptions to erect a monument to his memory, which is being favourably responded to. It is proposed to place the monument on a piece of ground granted by Colonel Richardson Robertson, of Tulliebelton, on Ordie Braes, near the poet's birthplace. Nicoll's remains lie in Leith kirkyard, and are still without a stone to mark the spot.

MEMORIAL TO LIEUTENANT BELLOT.

A monument to the memory of the late Lieutenant Bellot, of the French navy, who perished in the last Arctic expedition, has been erected on the west wharf of Greenwich Hospital. It is a very prominent object from the river, and consists of an obelisk of Aberdeen red granite, highly polished.

BRITISH OBITUARY OF 1855.

Within the last twelve months what a gap has been made in the memorable roll! The sagacious and indefatigable Truro,—the earnest and philosophic Molesworth,—the enterprising Parry,—the warm-hearted and upright Inglis,—the scientific De la Beche,—the learned Gaisford,—the reforming Hume,—the harmonious Bishop,—the financial Herries,—the diplomatic Adair,—the poetical Strangford, also a diplomatist, with Ellis and Ponsonby, his fellow-labourers in the last-named category,—the gifted Lockhart,—Miss Ferrier and Adam Ferguson, connected, too, with Sir Walter Scott,—Lord Robertson, the convivial Judge,—Lord Rutherfurd, his acute compeer,—Miss Mitford and strong-hearted Currer Bell,—Colburn, the godfather to half the novels of the last half century,—Sibthorp the eccentric,—the travelled Buckingham,—Park the sculptor,—Gurney the short hand writer,—O. Smith, the preternatural,—the centenarian Rogers,—Black of the *Morning Chronicle*,—the life-preserving Captain Manby,—Archdeacon Hare,—Jessie Lewars, the friend of Burns,—the injured Baron de Bode,—and a long file of titled names distinguished in all the pursuits of life.—*Bentley's Miscellany.*

LITERARY GOSSIP.

Lady Emmeline Stuart Wortley, daughter of the Duke of Rutland, may be mentioned among the popular verse-writers recently deceased.

Sidney Dobell, the author of "Balder," and better known by his *nomme de plume* of Sidney Yendis, is reported to be engaged on a series of Lyrics suggested by the incidents of the war. His share in the "War Sonnets" produced by the joint labors of Alexander Smith and himself may be accepted as a good foretaste of what may be expected from him.

Longfellow is engaged, it is said, on a translation of Dante, which is already so far advanced that it is expected to be ready for the press some time during the present year.

Mrs. Oliphant, the authoress of "Passages in the Life of Mrs. Margaret Maitland, of Sunnyside," which won such high and well-merited praise from Lord Jeffrey, has produced a continuation of that work under the name of "Lilliesleaf," which is spoken of by English critics as fully equal to the first. It is not generally known that this talented Scottish authoress was only in her nineteenth year (then Miss Margaret Wilson) when she produced the work which won the plaudits of the veteran critic.

Mr. Robert Chambers is now engaged on a narrative of his visit during the past summer to Iceland and the Faroe Islands. Some interesting geological observations may be anticipated from it.

Mrs. Gaskell has undertaken to prepare for the press a biography of Charlotte Bronte, the lamented authoress of "Jane Eyre."

The Rev. Dr. W. L. Alexander, of Edinburgh, has nearly ready for the press a Life of the late Dr. Wardlaw.

The *Dublin University Magazine* has been purchased for £750 by Messrs. Hurst and Blackett of London. It will henceforth be published there. Our readers are probably aware that the *Edinburgh Review* is in like manner a Cockney, having been for years Edinburgh only in name; but its place is well supplied by the native *North British Review.*

The *Piedmontese Gazette* announces that Silvio Pellico's correspondence will shortly be published, and invites all those who are in possession of letters of that eminent writer, and wish them to appear in the collection, to send them to M. G. Stefani, at Turin.

The oldest work in the Russian language, says a writer in the *Literary Gazette*, was produced in 863, and was a translation from the Greek of the Holy Scriptures. The Russian language is allied to the Sanscrit, but the old Sclavonian dialect—that which is used in the offices of the Church—approaches it more closely than the modern tongue. The latter is overladen with Tartar, Mongol, Turkish, Polish, and German words.

The news of Macaulay's resignation of his seat in Parliament, while it affords abundant excitement in the arena of politics, has its full interest in a literary point of view. Already one of the Scottish papers rumours the fifth volume of his history completed in MS., and further portions of the work far advanced.

MILTON AND NAPOLEON.

A correspondent communicates the following curious statement to the Notes and Queries:—"Among some books purchased at Puttick & Simpson's two years since, was a copy of Symmons' 'Life of Milton.' Having lately occasion to examine it more than I had hitherto done, I found it contained many notes and remarks in the handwriting of a former possessor, J. Brown. Who this gentleman was I know not, and the following note must be taken on *his* authority, not mine:—

"In this 'Life of Milton,' by Dr. Symmons, p. 551, is a note to which this notice may be appended:—

"Napoleon Bonaparte declared to Sir Colin Campbell, who had charge of his person at the Isle of Elba, that he was a great admirer of our Milton's 'Paradise Lost,' and that he had read it to some purpose, for that the plan of the battle of Austerlitz he borrowed from the sixth book of that work, where Satan brings his artillery to bear upon Michael and his angelic host with such direful effect:—

'Training his devilish enginery, impal'd
On every side with shadowing squadrons deep,
To *hide the fraud.*'

"This new mode of warfare appeared to Bonaparte so likely to succeed, if applied to actual use, that he determined upon its adoption, and succeeded beyond expectation. A reference to the details of that battle will be found to assimilate so completely with Milton's imaginary fight as to leave no doubt of the assertion.

"I had this fact from Colonel Stanhope, who had just heard it related by Colonel Campbell himself. Colonel Stanhope was then at Stowe, the Marquis of Buckingham's, where I heard it repeated. It has never to my knowledge been in print, nor have I ever heard the circumstance repeated. Colonels Stanhope and Campbell have been long dead. The time of my hearing the above was 1815."

D. W.

MISCELLANEOUS.

MATERIALS FOR TEXTILE FABRICS.

The late Paris Exhibition contained ample proof that the colonies of Great Britain could produce an inexhaustible supply of vegetable fibres adequate to all the requirements of our textile manufactures in lieu of the flax and hemp of Russia of which the war is to a large extent depriving us. When the supply of rags fell short of the demand for paper-making, attention was turned to the vegetable kingdom for a substitute, and not one, but many ligneous fibres were speedily discovered, of acknowledged suitableness for the purpose. The paper-makers, however, found that, in order to take advantage of these discoveries, expensive alterations would be required in their existing machinery; and in the meantime, the supply of rags, which had been kept up on the Continent in the expectation of increased prices from the demand for cheap newspapers, has become sufficient for ordinary wants; although newspaper proprietors have not been relieved of the extra price laid upon their paper during the scarcity of rags. The capability of India to supply this country with substitutes for Russian flax and hemp, was demonstrated in the collection of products exhibited at Paris by Dr. Royle; and a corresponding collection from Jamaica, prepared by Mr. N. Wilson, of the Botanic Garden in that island, exhibited an equal capability on the part of our colonies in the West Indies. There is now a reasonable prospect that sugar, their staple product, will no longer be an unremunerative article of produce. But with the revival, as we fondly trust, of the prosperity of these fine colonies, the proprietors have an opportunity of pushing their enterprise into other and more lucrative fields of production. The *Kew Garden Miscellany* for November, edited by Sir W. J. Hooker, contains extracts from a report on the Jamaica Botanic Garden, deserving the careful consideration of proprietors in that island. The report bears testimony to the increasing desire for growing new plants and adopting new staples in Jamaica, as well as for a more extended and varied cultivation of the island, in order to meet the exigencies of its altered condition. Numerous plants have been introduced by Mr. Wilson, who has tested their fitness for the soil and climate, and who finds that the island now "possesses the finest fibres and the greatest number of textile plants in the world, hitherto of no avail in the country in general, and held of little value by individuals, but which may now be turned to the greatest account in a national point of view." No fewer than *fifty one* of the samples of fibres shown at Paris from Jamaica were the products of plants indigenous to the island, and all suited more or less for textile purposes, from the coarse cocoa-nut coir to filaments rich as those of the finest silk. We subjoin an extract from this important and seasonable report:—

For the Plantain, Pinguin, and all similar herbaceous plants, machinery is absolutely necessary to separate and clean the fibre advantageously; when this desideratum is accomplished, and with one or two years' practice, there is nothing to prevent Jamaica competing with any part of the world of ten times the same extent. The inducement to do so cannot be much greater than it is at present. I find, by a statistical account, that the imports of flax into the United Kingdom during 1853, amounted to 94,163 tons, 14 cwt., and, at the exhorbitant price of £110 per ton, to which the average price of foreign flax has already risen, it shows a sum of £10,358,007, which has been paid in cash for foreign flax fibre last year; and since the prohibition of Russian hemp into European markets, prices and demand are increasing daily.

"My motive for laying before you my views on this subject, and preparing the samples of fibre for your inspection, is, that I am anxious to submit to you, and through you to the agriculturists and people in general of this island, the desirability and advantages in an individual and national point of view to be derived from the adoption and extensive cultivation of fibrous plants. As I have already mentioned, the great scarcity, exhorbitant price, and widely-spreading demand for fibre throughout the world, render the materials of which it is manufactured of much importance, particularly in this country, where labour is scarce and dear, and agriculture at its lowest ebb. Many of these fibres will be found of superior quality, and produced in greater abundance than any grown in temperate regions.

"I have made a very moderate calculation of the produce of an established field with Plantains, which I find to be as follows:—

	£	s.	d.
An acre planted with suckers, at ten feet apart, will contain 435 plants, and the first year will produce as many bunches of fruit worth 6d.	£10	17	6
Each stem will yield 1 lb. of finely-dressed fibre, worth 6d.	10	17	6
Amounting in sterling money in all to....	£21	15	0

METEOROLOGICAL OBSERVATIONS.

The present number contains the Monthly Meteorological Reports for November 1855, in continuation of the series hitherto published in the Canadian Journal; and those for December, along with the abstracts of the various observations for the past year would also have been included, but for unavoidable impediments incident to the starting of the new series, with a different size of page, which render the materials formerly used for setting up the Monthly Meteorological Registers of the various Canadian observers no longer available.

The December number of the Journal contains three papers on the subject of Meteorological Observations in Canada, from which it will be seen that a very little time must elapse before a greatly extended staff of observers will be in full operation throughout all the settled districts of Upper Canada; and the impetus thus given to such labors in this important department of science, cannot fail to be productive of valuable results. The example set by the Upper Province, will, it may be confidently anticipated, stimulate those at the head of the scientific and educational institutions throughout British North America to follow its example, and thus contribute some of the links in the great chain of philosophical researches in Physical Geography and Magnetism, now embracing so widely extended an area of the globe.

Already symptoms of an intelligent and increasing interest in this subject are apparent. Professor Williamson, of the University of Queen's College, Kingston, has intimated to the editor his intention of enlisting as one of the contributors to this branch of scientific observation, and furnishing to the Canadian Journal monthly tables from Kingston, corresponding with those already due to the Meteorological and Magnetic observations made at the Provincial Observatory of Toronto University, and to the indefatigable labors of Dr. Smallwood, at St. Martin's, Isle Jesus, Capt. Noble, and Mr. W. D. C. Campbell, at Quebec, and Dr. Craigie, at Hamilton. It has been resolved by the Canadian Institute, after mature deliberation, that its duties in relation to this department of science shall be strictly limited to publishing the observations supplied by the various scientific laborers throughout the Province: but even this, it is obvious, must speedily become both an onerous and very responsible duty, as the stations multiply through the Province, and the number of volunteer observers increase. Meanwhile the work is not incompatible with the general features of this Journal, but the period is probably not far distant when the Institute may find it advisable to publish in a distinct and independent form the Meteorological and Magnetic Journal of British North America.

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETIC OBSERVATORY, TORONTO, CANADA WEST.—NOVEMBER, 1855.

Latitude. 43 deg. 39·4 min. North. Longitude. 79 deg 21 min. West. Elevation above Lake Ontario, 108 feet.

DAY.	BAROMETER AT TEM. OF 32 DEG.				TEMPERATURE OF THE AIR.				Mean Temp + or − of the Average.	TENSION OF VAPOUR.				HUMIDITY OF THE AIR.				DIRECTION OF THE WIND.				VELOCITY OF THE WIND.				RAIN IN INCH.	SNOW IN INCH.
	6 A. M.	2 P. M.	10 P.M.	MEAN.	6 A.M.	2 P.M.	10 P.M.	MEAN.		6 A.M.	2 P.M.	10 P.M.	MEAN.	6 A.M.	2 P.M.	10 P.M.	MEAN.	6 A. M.	2 P. M.	10 P. M.	MEAN.	6 A.M.	2 P.M	10 P.M.	MEAN.		
	°	°	°	°	°	°	°	°	°					°	°	°	°										
1	29·476	29·600	27·725	29·616	49·2	51·8	39·5	46·9	+6·5	0·316	0·226	0·161	·237	·92	·60	·67	·73	S W b W	N W b N	N	N 14 W	7·0	11·2	11·2	10·24	Inap	...
2	·770	·794	·838	·805	37·4	45·3	37·3	40·0	− 0·2	·177	·167	·156	·163	·79	·56	·71	·67	N N E	E b N	N N E	N 39 E	8·8	6·2	8·6	7·24	...	...
3	·852	·804	·831	·829	31·2	42·4	32·8	35·4	−4·6	·149	·175	·150	·157	·84	·65	·80	·77	N	E N E	N	N 21 E	4·1	5·8	8·8	7·28	...	...
4	·924	·924	...	...	29·1	41·8	...	...	...	·127	·158	...	...	·78	·60	...	...	N	S b E	E N E	E 20 N	8·2	4·2	5·4	5·60	...	...
5	·873	·769	·663	·760	42·7	50·7	46·8	48·6	+ 7·1	·223	·275	·265	·254	·82	·76	·84	·82	E	E b N	E	E 12 N	9·4	14·4	11·0	11·89	...	...
6	·627	·610	·569	·602	47·0	52·7	49·8	49·6	+10·5	·257	·277	·311	·295	·84	·71	·88	·84	E	E	E 6 S	E 2 S	9·4	9·1	6·5	7·84	1·030	...
7	·498	·503	·612	·556	48·8	53·1	47·4	49·6	+10·6	·330	·375	·290	·328	·97	·95	·90	·93	E	S S W	N W b N	N 20 W	6·4	2·0	4·2	6·01	1·005	...
8	·806	·866	·978	·894	37·8	49·3	43·6	43·1	+ 4·5	·197	·245	·204	·214	·87	·71	·73	·77	W b N	S S W	N N W	W 2 S	9·0	5·4	9·6	6·02	...	...
9	30·080	30·160	·997	30·079	36·3	45·2	41·7	40·9	+ 2·5	·175	·202	·214	·193	·82	·68	·82	·76	N N W	E S E	S E b E	East.	5·4	5·5	7·8	6·35	...	...
10	29·881	29·744	·752	29·790	39·3	47·7	46·3	44·5	+ 6·5	·195	·235	·248	·233	·82	·72	·80	·80	E N E	E b S	E b N	E 4 N	4·5	5·8	2·0	4·53	...	...
11	·775	·742	...	...	47·0	48·9	...	...	...	·267	·280	...	...	·94	·82	...	...	E b N	E	E N E	E 13 N	5·0	16·2	16·2	13·89	1·026	...
12	·625	·491	·648	·590	51·3	52·8	48·1	50·1	+12·6	·355	·374	·328	·341	·96	·96	·99	·95	E	E	S W	S 16 E	11·1	5·5	10·6	8·87	1·120	...
13	·795	·817	·854	·828	42·5	54·1	42·0	45·8	+ 8·6	·221	·178	·196	·205	·82	·43	·74	·68	S W b W	W S W	W b S	W 36 S	10·0	16·0	6·0	9·05	...	...
14	·887	·874	·882	·872	35·7	53·5	44·1	44·0	+ 7·1	·164	·216	·176	·196	·84	·61	·62	·68	W N W	S W b S	N W	S 37 W	1·2	11·8	0·4	3·15	...	...
15	·824	·615	·432	·616	43·4	47·7	48·3	47·0	+10·5	·190	·272	·317	·269	·68	·84	·95	·84	Calm	E b S	Calm	S 41 E	0·8	6·2	0·5	3·97	0·130	...
16	·295	·628	·806	·631	53·6	38·1	30·2	38·4	+ 2·1	·315	·133	·124	·181	·86	·58	·74	·74	N N W	N N W	N	N 32 W	20·0	26·0	5·8	16·07	...	...
17	·882	·523	·334	·575	25·9	33·3	36·3	30·7	− 5·1	·106	·136	·213	·147	·74	·71	·100	·84	N E	E	E b S	E 20 N	12·8	35·2	4·5	17·08	0·180	0·5
18	·683	·729	...	...	29·4	33·6	...	...	...	·140	·152	...	...	·85	·71	...	...	W	W b S	W N W	W 3 N	7·2	14·2	19·2	15·71	...	0·5
19	·792	·833	·955	·885	29·4	32·0	26·9	28·[illegible]	− 6·2	·145	·136	·094	·130	·89	·75	·63	·80	W b S	W	W	W 8 N	12·2	21·7	10·0	12·91	...	Inap.
20	30·001	·973	·775	·903	23·7	31·2	32·7	29·2	− 5·6	·113	·158	·172	·146	·86	·91	·93	·89	N N W	E S E	S E	S 44 E	4·5	3·0	12·0	6·88	...	2·0
21	29·394	·402	·667	·503	37·2	35·7	29·4	34·[illegible]	+ 0·0	·211	·155	·096	·152	·89	·66	·58	·73	S S W	W b S	N W b N	W 26 N	10·4	18·4	26·5	19·88	..	Inap.
22	30·004	·989	·856	·946	23·7	29·8	29·1	27·5	− 6·6	·109	·128	·123	·120	·83	·78	·76	·79	N b W	W b N	W S W	W 2 S	10·6	12·2	7·7	9·50	...	...
23	29·502	·141	·289	·321	37·2	42·0	37·0	37·[illegible]	+ 4·1	·149	·171	·160	·163	·67	·65	·72	·72	S W b S	W S W	W	W 6 S	21·8	20·5	22·0	23·21	0·005	...
24	·752	·843	·775	·793	23·0	31·3	32·7	28·[illegible]	− 4·9	·103	·124	·168	·126	·81	·71	·92	·80	N W	W b N	S W b W	W 18 N	25·9	16·0	10·0	10·27	...	...
25	·552	·204	...	...	36·3	40·8	...	...	...	·134	·240	...	...	·62	·95	...	...	S S E	S W	W b N	W 39 S	8·8	7·2	15·2	11·93	0·100	...
26	·312	·318	·614	·425	34·6	40·2	32·3	35·9	+ 3·4	·155	·172	·137	·161	·77	·70	·75	·76	S W b W	W b N	W b N	W 7 N	14·2	23·1	10·5	14·61	Inap.	...
27	·350	·147	·029	·22[illegible]	32·7	45·5	40·9	39·5	+ 7·3	·139	·162	·162	·157	·74	·54	·64	·65	S W b W	W S W	S W b W	W 31 S	13·2	13·6	15·0	13·83	...	Inap.
28	28·983	·085	·283	·137	38·8	37·6	20·8	31·1	− 0·7	·156	·148	·073	·127	·66	·66	·63	·68	W S W	N b W	N N W	N 30 W	14·7	20·6	20·5	18·16	...	...
29	29·419	·490	·628	·52[illegible]	19·5	28·9	23·9	24·8	− 6·7	·090	·087	·126	·10[illegible]	·82	·54	·85	·77	N W b W	W	W b S	W 20 N	10·6	19·5	8·0	10·93	...	...
30	·711	·593	·484	·585	23·3	38·1	36·3	32·7	+ 1·6	·109	·151	·168	·137	·84	·66	·79	·73	W b W	S W b S	S W b W	S 44 W	4·6	18·0	10·5	11·38	...	...
	29·677	29·637	29·667	29·661	33·3	42·7	37·7	38·6	+ 2·4	0·188	0·193	0·186	0·190	·82	·69	·78	·74				W 24 N	9·74	13·08	10·54	10·81	4·590	3·0

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR NOVEMBER.

Highest Barometer.........30·131, at 8 A. M. on 9th } Monthly range: = 1·148 in.
Lowest Barometer ....28·983, at 6 A. M. on 28th }

Highest registered temperature, 59° 2 at P. M. on 15th } Monthly range: = 43°7.
Lowest registered temperature, 15° 5 at A. M. on 29th }

Mean maximum Thermometer, 45° 50 } Mean daily range: = 16° 76.
Mean minimum Thermometer, 28 74 }

Greatest daily range 26° 5 from P. M. of 28th to A. M. of 29th.
Least daily range ... 7° 6 from P. M. of 30th to A. M. of 1st December.

Warmest day...12th...Mean temperature: = 50° 13 | Difference: 25° 33.
Coldest day..... 29th...Mean temperature: = 24° 80 |

Greatest Intensity of Solar radiation = 67° 0 on P. M. of 14th.
Lowest point of Terrestrial radiation = 12° 0 on A. M. of 26th.

Monthly range......... 55° 0

Aurora observed on 5 nights, viz.. 3d, 5th, 12th, 16th and 18th.
Possible to see Aurora on 19 nights.
Impossible to see Aurora on 11 nights.
Raining on 8 days, raining 57·2 hours, depth 4·590 inches.
Snowing on 6 days, snowing 11·0 hours, depth 3·0 inches.
No thunder or lightning recorded this month.
Mean of Cloudiness, 0·60.

SUM OF THE ATMOSPHERIC CURRENT, IN MILES RESOLVED INTO THE FOUR CARDINAL DIRECTIONS.

North.	West.	South.	East.
2376·86	4009·65	1454·73	1911·88

Mean direction of the wind W 24 N.
Mean velocity of the wind ...... 10·81 miles per hour.
Maximum velocity .... 36·5 miles per hour from 9·30 to 10·30 P.M. on 21st.
Most windy day .... 23d, mean velocity: 23·21 miles per hour.
Least windy day .... 14th, mean velocity: 3·15 do
Most windy hour .... 2 to 3 P. M., mean velocity: 13·11 per hour.
Least windy hour .... 2 to 3 A. M.. mean velocity: 8·62
Mean diurnal variation .... 4·49 miles.

The mean temperature of November 1855 was 1° 8 above the average of the las 16 years, and the depth of rain that fell 1·564 inches above the mean.

The mean velocity of the wind was 4·56 miles per hour above the average of the last 8 years, and is the greatest for any month yet recorded in the observatory.

In looking out for the periodic display of meteors, from the 11th to the 14th, about 30 were observed on the 12th, between 10h and 15h; and 17 on the 13th between 8h and 14h. At 14h 40m of the 12th a brilliant meteor 3′ in diameter appeared in the west at a point 45° above the horizon, from whence it descended vertically. Its course was marked by a belt of light, 3′ in diameter, whose color changed from deep red to green and white, and which lasted 10s with undiminished splendor; the luminous path continued visible at least 1m 30s.

YEAR.	TEMPERATURE.					RAIN.		SNOW.		WIND.	
	Mean.	Diff. from Aver.	Max. obs'd.	Min. obs'd.	Range	Days.	Inches.	Days.	Inches.	Mean Division	Mean force or Velocity.
	°		°	°	°						
1840	35·9	−0·9	54·4	20·5	33·9	5	1·220	8	...	......	......
1841	35·0	−1·8	63·2	7·6	55·6	8	2·450	5	...	......	0·91 lb.
1842	33·3	−3·5	50·6	7·6	43·0	9	5·310	10	...	......	1·22 "
1843	33·5	−3·3	51·2	14·4	36·8	10	4·765	7	1·2	......	0·59 "
1844	34·9	−1·9	49·8	12·0	37·8	8	imp't.	4	8·0	......	0·48 "
1845	36·8	0·0	58·8	7·6	51·2	7	1·105	4	5·0	......	0·53 "
1846	41·3	+4·5	55·5	8·2	37·3	12	5·805	2	0·4	......	0·64 "
1847	38·6	+1·8	58·2	7·8	50·4	11	3·155	3	Inap.	......	0·36 "
1848	34·5	−2·3	49·3	16·5	32·8	9	2·020	3	1·4	W9°N	4·81 miles
1849	42·6	+5·8	56·7	28·4	28·3	10	2·815	2	1·0	N39W	4·78 "
1850	38·8	+2·0	62·3	18·1	44·2	7	2·955	1	Inap	N42W	5·27 "
1851	32·9	−3·9	50·1	16·5	33·6	5	3·885	6	6·7	W39°N	4·70 "
1852	36·0	−0·8	50·4	18·7	31·7	7	1·775	2	2·0	W31°N	6·50 "
1853	38·7	+1·9	54·1	14·4	39·7	15	2·125	6	2·7	N1°E	5·52 "
1854	36·8	0·0	54·9	15·1	39·8	13	1·115	4	1·3	W1°S	7·58 "
1855	38·6	+1·8	54·1	18·7	35·4	8	4·590	6	3·0	W24°N	10·81 "
Mean	36·76		54·60	15·13	39·47	9·2	3·026	4·6	2·5		0·67 lbs.
											6·25 miles

MONTHLY METEOROLOGICAL REGISTER, ST. MARTIN, ISLE JESUS, CANADA EAST—NOVEMBER, 1855.

(NINE MILES WEST OF MONTREAL.)

BY CHARLES SMALLWOOD, M. 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.			Velocity in miles per hour.			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.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.			6 A.M.	2 P.M.	10 P.M.
1	29.696	29.680	29.857	39.7	48.4	41.1	.245	.349	.254	.91	.96	.95	S S E	S S W	N N W	2.52	3.52	1.66	0.306	...	Rain.	Rain.	Clear.
2	.990	.978	994	31.5	44.5	33.0	190	310	187	96	71	90	N N E	E N E	N N E	3 00	13.21	9.33	...	...	Clear.	Cum. St. 9.	Clear, Aur. Bor.
3	30.009	30.042	30.048	30.1	41.6	29.6	168	207	161	99	71	89	NE by N	NE by N	NE by N	8.10	9.01	3.51	...	...	Str. 4.	Do. 4.	Do.
4	.094	.047	.190	28.1	43.8	30.0	166	209	169	90	69	90	NE by N	NE by N	E	7.45	4.40	0.12	...	...	Clear.	Clear.	Do.
5	.209	.174	.100	26.2	39.1	35.0	156	181	200	96	73	94	E N E	E S E	E by N	1 46	1 80	3.16	...	...	Do	Do.	Do. Aur. Bor.
6	29.991	29.906	29.906	31.6	51 1	41.0	185	274	253	95	70	90	SE by E	SE by E	SE by E	5.93	7.63	9 91	...	...	Do.	Do.	Do. Do.
7	.857	.704	.730	40.1	57.0	49.5	245	385	350	91	81	90	S E	SE by E	N by W	4.12	1.55	0.41	Inapp	...	Cir. Cum. Str. 5.	Cir. Cum. Str. 8.	Str. 10.
8	.784	.921	30.010	47.1	51.2	39.1	323	279	234	94	71	91	W by N	W by N	W S W	5.18	14 30	1 13	0.396	...	Str. 10.	Cir. 1.	Clear.
9	30.198	30.231	.265	32.7	47.0	32.5	197	277	191	95	80	95	W by N	S W	S W	4 97	3.71	0.36	...	...	Clear.	Clear.	Do.
10	.121	29.987	29.964	30.0	48.2	39.0	176	261	224	94	74	89	NE by N	S S E	S	0.14	0.80	1.01	...	...	Do.	Cir. Str. 10.	Str. 10.
11	.084	30.100	30.102	38·2	48.6	40.2	226	281	227	91	80	85	NE by N	N E	NE by N	0.00	5.51	10 51	...	...	Cir. Str. 8.	Cir. Cum. Str. 4.	Clear.
12	·154	.044	29.914	36.8	43.4	42.4	214	252	263	99	85	92	NE by E	NE by E	NE by E	19.92	9.32	12.11	...	...	Do. 6.	Cir. Str. 10.	Rain.
13	29.817	29.900	.939	41.0	53.2	42.5	263	323	233	99	79	85	S	W S W	W S W	11.70	11.50	8.10	1.751	...	Rain.	Cum. 4.	Clear.
14	.964	.845	.909	39.6	55.7	43.7	234	331	252	95	72	85	S W	S W	S W	10.63	8.58	5.70	...	...	Light Cum. 4.	Clear.	Do.
15	30.045	.965	.775	31.6	46.1	37.0	185	246	179	96	75	76	N W	E by N	NE by E	1.45	0 67	4.00	Inapp	...	Clear.	Cir. Str. 9.	Str. 10.
16	29.284	.498	.901	36.0	41.0	26.5	221	191	165	99	70	90	E S E	W N W	W N W	6.60	13.30	23.64	0.995	...	Rain.	Do. 6.	Do. 4.
17	30.120	30.044	.874	20.2	25.0	23.1	114	123	100	87	79	76	N by W	NE by E	E N E	11.23	6.31	13.65	...	2 74	Clear.	Str. 10.	Snow.
18	29.629	29.784	.752	21.0	26.7	20.1	126	157	156	93	94	96	N	W S W	SE by E	11.69	6.41	5.37	...	...	Cum. Str. 4.	Cir. Str. 10.	Cir. Str 8.
19	.795	.842	.984	22.0	25.0	13.1	131	123	083	94	79	82	W	W by N	W by N	14.75	13.90	16.36	...	...	Do. 6.	Str. 10.	Clear, Aur. Bor.
20	30.173	30.153	30.170	1.0	19.2	8.8	048	080	066	95	64	93	W S W	W	W by N	8.00	4.23	5 08	...	..	Clear.	Clear.	Do.
21	29.847	29.590	29.521	12.0	18.1	18.6	085	106	124	88	87	99	NE by E	NE by E	NE by N	2.54	10.40	18.51	...	3.40	Cir. Str. 10.	Snow.	Snow.
22	30.051	30.069	30.070	5.4	20.1	15.6	058	103	108	92	87	91	W by N	W by N	SW by W	5 57	11 36	5.05	...	1.20	Clear.	Clear.	Cir. Cum. 5.
23	29 802	29.290	29.140	20.0	32.6	34.6	121	199	210	93	94	96	S	S S E	SW by W	9.85	7.76	8.50	0.100	...	Cir. Str. 10.	Cum. Str. 10.	Rain.
24	29.661	30.124	30.081	9.0	24.1	13.2	064	103	082	90	68	82	N W	W S W	W S W	35.00	29.71	8.46	...	..	Clear.	Clear.	Cir. Str. 10.
25	29.827	29,552	29.279	21.0	28.9	34.1	118	179	192	88	95	99	S E	SE by S	S S E	5·05	4.00	10.52	...	1.00	Cir. Cum. Str. 8.	Snow.	Rain.
26	.271	.341	.886	36.0	34.2	30 1	220	195	177	99	91	91	W S W	W S W	N W	18.00	0.51	6.30	0.377	...	Rain.	Sleet.	Cir. Str. 3.
27	.606	.421	.210	21.8	34.8	32 5	134	214	199	95	92	95	SW by W	N E	S S E	23.18	0.42	4.30	Inapp	...	Cir. Str. 10.	Cir. Str. 4.	Do. 10.
28	29 010	29.025	.285	36.0	37.8	21.3	230	218	092	97	71	91	S W	S W	N W	8.44	5.17	17.00	Inapp	...	Do. 10.	Do. 8.	Do. 10.
29	29.469	.457	.042	8.1	17.0	12.7	065	084	096	93	73	82	W by S	W N W	W N W	10 08	11.67	17.76	...	..	Do. 10.	Clear.	Clear, Aur. Bor.
30	.857	.862	.772	12.2	27.7	26.7	094	137	161	88	82	94	W S W	W S W	S by E	10 00	7 22	4.05	...	...	Clear.	Cir. Str. 10.	Cir. Str. 6.

MONTHLY METEOROLOGICAL REGISTER, QUEBEC, CANADA EAST, NOVEMBER, 1855.

BY CAPT. A. NOBLE, R.A., F.R.S., AND MR. WM. D. C. CAMPBELL.

Latitude, 46 *deg.* 49.2 *min. North; Longitude*, 71 *deg.* 16 *min. West. Elevation above the level of the Sea*, 200 *Feet.*

Date	Barometer corrected and reduced to 32 degrees, Fahr.				Temperature of Air.				Tension of Vapor.				Humid'y of Air.				Direction of Wind.			Velocity of Wind.			Rain in Inch.	Snow in Inch.	REMARKS.
	6 A.M.	2 P.M.	10 P.M.	MEAN.	6 A.M.	2 P.M.	10 P.M.	Mn.	6 A.M.	2 P.M.	10 P.M.	MN.	6 A.M	2 P.M	10 P.M	MN.	6 A.M.	2 P.M.	10 P.M.	6 A. M.	2 P. M.	10 P. M.			
					°	°	°	°																	
1	29.657	29.592	29.790	29.680	37.5	42.5	40.0	40.2	.188	.267	.210	.222	.84	.99	.86	.90	Calm.	Calm.	W	0.0	0.0	7.2	.620	...	
2	.933	.909	.976	.939	32.7	38.0	34.8	35.2	.166	.267	.137	.190	.89	.89	.68	.82	Calm.	E	N W	0.0	15.2	10.0	...	...	2nd. At 2 a.m. Auror visible thro'h a break in the clouds.
3	30.037	.935	.935	.969	31.1	34.1	30.1	31.8	.119	.101	.120	.113	.68	.51	.72	.64	E	E	Calm.	8.0	5.2	0.0	...	...	
4	29.992	30.032	30.114	30.046	27.0	37.3	32.4	32.2	.127	.170	.167	.155	.85	.77	.91	.84	Calm.	W	Calm.	0.0	3.8	0.0	...	...	
5	30.158	.114	.116	.129	29.6	45.1	37.9	37.5	.144	.155	.202	.167	.87	.53	.89	.76	W b N	Calm.	N W	2.0	0.0	2.0	...	...	
6	.061	29.889	29.944	29.965	34.8	47.0	39.2	40.3	.182	.166	.173	.174	.90	.51	.72	.71	E	S E	S E	2.0	2.0	3.8	...	...	
7	29.875	.860	.634	.723	35.3	47.3	48.0	43.5	.184	.230	.243	.219	.90	.72	.74	.79	Calm.	Calm.	Calm.	0.0	0.0	0.0	.303	...	
8	.594	.957	.894	.815	47.3	46.5	38.0	43.9	.311	.256	.210	.259	.97	.82	.92	.90	Calm.	N W	N W	0.0	8.0	7.2	.079	...	
9	30.056	30.099	30.176	30.110	33.1	41.8	32.0	35.6	.154	.121	.132	.136	.82	.48	.73	.68	N W	N	Calm.	3.8	10.0	0.0	...	...	
10	1.67	29.977	29.868	.004	31.1	39.2	37.7	36.0	.127	.155	.169	.150	.73	.65	.77	.72	Calm.	N N W	Calm.	0.0	2.0	0.0	...	...	
11	29.973	30.074	30.215	.087	37.7	44.4	38.2	40.1	.186	.184	.160	.177	.83	.64	.70	.72	W b N	E	E b N	3.8	11.3	17.9	...	...	
12	30.308	.230	.066	.201	31.9	35.3	37.1	34.8	.138	.138	.165	.147	.77	.67	.75	.73	E N E	E N E	E N E	21.3	27.8	25.4	1.118	...	
13	29.917	29.755	29.756	29.809	34.8	39.0	38.8	37.5	.202	.236	.226	.221	1.00	1.00	.96	.99	E N E	Calm.	W	21.6	0.0	2.0	.402	...	
14	.782	.670	.775	.744	34.5	48.0	37.0	39.8	.200	.206	.173	.193	1.00	.62	.79	.80	Calm.	W N W	N W	0.0	5.2	12.4	...	...	
15	.926	.900	.753	.860	31.7	38.0	35.2	35.0	.133	.115	.149	.132	.75	.51	.72	.66	N W	W N W	E N E	7.2	8.0	13.4	.304	...	
16	.298	.220	.717	.412	33.2	40.3	25.1	32.9	.173	.190	.091	.151	.91	.77	.66	.78	E S E	W N W	N W	9.3	12.9	9.3	.066	...	
17	.898	.943	.864	.902	20.5	25.1	20.4	22.0	.062	.062	.065	.063	.54	.45	.57	.52	N W	N W	E N E	3.8	5.2	14.3	...	2.0	
18	.649	.623	.675	.649	19.0	21.0	24.3	21.4	.087	.115	.125	.109	.81	.99	.94	.91	E N E	E N E	Calm.	25.0	3.8	0.0	...	3.8	
19	.527	.644	.835	.669	24.8	20.1	10.5	18.5	.123	.058	.047	.076	.93	.51	.63	.69	N N W	N N W	N N W	2.0	15.6	10.0	...	...	
20	.954	.989	.991	.978	6.4	18.1	12.4	12.3	.045	.060	.074	.060	.71	.58	.90	.73	W N W	W	Calm.	6.2	5.2	0.0	...	...	20th. A good Auroral arch, 20°.
21	.876	.758	.522	.719	7.8	19.8	21.0	16.2	.066	.085	.112	.088	.98	.75	.06	.90	Calm.	E N E	E N E	0.0	7.2	15.2	...	2.0	
22	.733	.728	.842	.768	17.2	22.7	15.4	18.4	.076	.070	.066	.071	.77	.55	.72	.68	W S W	W S W	W S W	5.2	5.2	3.8	...	...	22nd. At 10 p.m. a colored circle 24° in diameter round the moon, colors very brilliant.
23	.643	.215	28.875	.244	19.6	25.1	31.7	25.5	.092	.113	.166	.124	.83	.82	1 00	.88	W S W	Calm.	Calm.	2.0	0.0	0.0	...	3.0	
24	.258	.635	29.812	.568	13.4	10.1	5.2	9.6	.060	.041	.037	.046	.71	.55	61	.62	W N W	W N W	Calm.	32.2	15.6	0.0	...	1.5	
25	.758	.579	.215	.517	12.6	21.0	26.8	20.1	.065	.099	.148	.104	.78	.85	1 00	.88	Calm.	Calm.	E	0.0	0.0	7.2	...	3.5	
26	.088	.120	.207	.138	30.3	34.6	26.0	30.3	.169	.144	.090	.134	1.00	.72	63	.78	Calm.	W	N W	0.0	5.2	11.5	...	...	
27	.407	.331	.092	.277	13.1	17.8	19.0	16.6	.059	.058	.087	.068	.70	.57	81	.69	W N W	W N W	E N E	8.8	3.8	7.2	...	3.0	
28	28.990	28.946	.079	.005	23.0	24.6	23.4	23.7	.123	.135	.128	.129	.98	1.00	1 00	.99	E N E	E	Calm.	11.3	3.8	0.0	...	6.0	
29	29.194	29.206	29.436	.279	14.2	15.2	14.3	14.6	.068	.064	.061	.064	.77	.70	.69	.72	W	N W	N W	11.5	3.8	13.9	...	...	
30	.599	.684	.614	.632	10.5	19.4	21.7	17.2	.062	.070	.095	.076	.83	.64	.80	.76	N W	W N W	Calm.	13 9	10.0	0.0	...	...	
M	29.7443	29.7139	29.7269	29.7284	25.86	31.95	28.45	28.75	.1297	.1377	.1343	.1339	.835	.692	.796	.774				6.6	6.5	6.5	2.892	24.8	

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

Barometer	Highest, the 9th day	30.265
	Lowest, the 28th day	28.997
	Monthly Mean	29.838
	Monthly Range	1.268
Thermometer	Highest, the 7th day	58°.
	Lowest, the 20th day	00°.8
	Monthly Mean	31°.58
	Monthly Range	57°.2

Greatest Intensity of the Sun's Rays .... 105°.7
Lowest Point of Terrestrial Radiation .... 2°.1
Mean of Humidity .... .884

Rain fell on 10 days, amounting to 3.926 inches; it was raining 50 hours 30 minutes.
Snow fell on 4 days, amounting to 8.34 inches; it was snowing 30 hours 10 minutes.
The most provalent Wind was W N W—704.10 miles.
The least prevalent Wind was East—5.00 miles.
The most windy day was the 24th; mean miles per hour, 24.37.
The least windy day was the 10th; mean miles per hour, 0.65.
Most windy hour, from 7 till 8, a. m.. on the 24th—38.10 miles.
The total distance traversed by the Wind was 5794.10 miles; resolved in the Four Cardinal Points, gives N 1389.80 miles, S 667,90 miles, E 834.80 miles, W 2901.60 miles.
Aurora Borealis visible on 6 nights—might have been seen on 13 nights.
Zodiacal Light visible, but fainter than in October; its elongation on the 6th day did not exceed 50°.
The electrical state of the atmosphere has been marked *generally* by moderate intensity, and the 1st, 19th, 25th and 28th days, indicated a high tension of a negative character.
OZONE—was in moderate quantity.

REMARKS ON THE QUEBEC METEOROLOGICAL REGISTER FOR NOVEMBER.

Maximum Barometer, 6 a.m. on the 12th	30.308
Minimum Barometer, 10 p.m. on the 23rd	28.875
Monthly Range	1.433
Monthly Mean	29.7284
Maximum Thermometer on the 7th	48°.8
Minimum Thermometer on the 12th	5.0
Monthly Range	43.8
Mean Maximum Thermometer	34.38
Mean Minimum Thermometer	21.81
Mean Daily Range	12.57
Mean Monthly Temperature	28.75
Greatest Daily Range of Thermometer on 16th	22°.5
Least Daily Range of Thermometer on 29th	5°.6
Warmest Day, 8th. Mean Temperature	43.9
Coldest Day, 24th. Mean Temperature	9.6
Climatic Differences	34.3

Possible to see Aurora on 14 Nights.
Aurora visible on 14 Nights.
Total quantity of Rain, 2.892 inches.
Total quantity of Snow, 24.8 inches.
Rain fell on 7 Days.
Snow fell on 8 Days.

NOTE.—The columns Tension and Humidity in this Table are derived from observations with Regnault's Hygrometer.