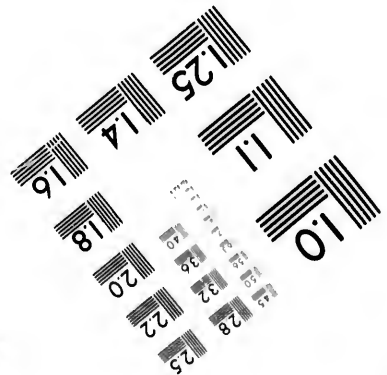
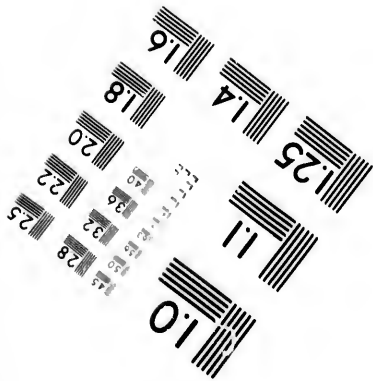
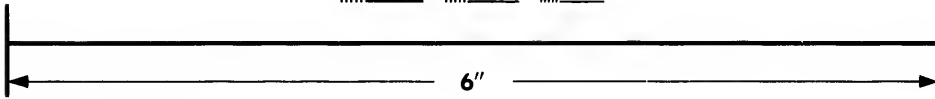
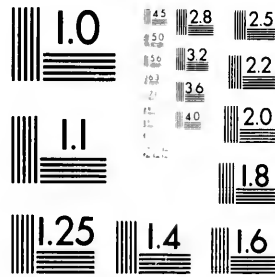


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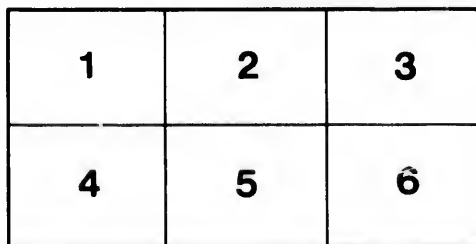
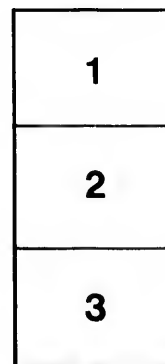
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BEING AN
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The Study of Natural History and the use of Natural History Museums,

AN ADDRESS:

DELIVERED AT THE

Inauguration of the University of New Brunswick

JUNE 27TH, 1872,

BEING AN APPEAL FOR ASSISTANCE TOWARDS THE ESTABLISHMENT OF A UNIVERSITY AND PROVINCIAL MUSEUM.

By L. W. BAILEY, M. A.,

Professor of Chemistry and Natural Science in the University,

FREDERICTON.

H. CHUBB & CO., STEAM JOB PRINTERS,

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ADDRESS.

MAY IT PLEASE YOUR EXCELLENCY,

MR. PRESIDENT AND GENTLEMEN OF THE SENATE.

Ladies and Gentlemen :

You are, I presume, already familiar with the general purpose of our meeting to day, as well as with the origin and nature of the Encœnial festival, whose annual recurrence thus summons to her side not only the authorities and graduates of our University, but all who are interested in her welfare and progress, and in that of the great cause of education which she represents.

You are too, no doubt, also aware of the nature of the task which the custom if not the ordinances of the University prescribe for him whose duty it is to address you on this occasion. With to-day another academic year will have passed away; to-day the University hands back to those by whom they were entrusted to her care another band of *workers*—a band provided at least with the instruments for good and, let us trust, not indisposed to employ them aright; to-day it is *my* part to express, however inadequately, the tribute of respect and gratitude which we must all feel for those through whose wise forethought and generous liberality the means of equipping such laborers in the great fields of Truth and Progress have been placed within our reach.

I cannot, however, even enter upon the performance of my task without being reminded thereby of the painful circumstances through which this otherwise pleasant office has again fallen to my lot, circumstances which, as I need scarcely remind you, have deprived this institution as well as the community in general of two of its best known and most valued members. The two most familiar of all the familiar faces which we have been wont to see upon these occasions are no longer with us. Death has been amongst us with a heavy hand, and in the hearts of some of us at least has left a blank not to be again supplied on this side of the grave.

He whose place, had he been spared to us, it would have been to occupy this platform to-day, had already been removed at the time of

our last Encœnial gathering, and when, upon that occasion, I was called upon to read his eulogy in the words of another, the deep shadow of that other's own approaching end was already upon us; we all felt the gloom of his absence, and though hoping against hope, refused to entertain the idea of the loss which slowly, but all too surely, was soon to follow. Though feeling as I do this loss with the added sense of personal bereavement, I am yet certain that in this community, where Prof. d'Avray was known so well, no words of mine are necessary to add to the respect and esteem in which his memory is held by every class. As a Professor most thorough, yet at the same time patient and forbearing: as a man remarkable for his native gentleness and rare amiability of character: as a friend ever ready to afford assistance by kindly counsel, or if necessary, even by more material aid, there are but few who came into contact with him, in whatever relation of life, but were bettered by that contact, few but received some lasting benefit, to which they may always look back with grateful recognition.

For more than twenty years his entire energies were devoted to the cause of education in this Province, the greater portion of the time in the direct service of this institution, and although, through all that lengthened period, separated from the friends and associations of his youth, a re-communion with whom he often ardently desired, he never failed even until within a very short time of his decease, in the conscientious and cheerful discharge of all his duties. By his sad removal this University has lost an efficient and faithful officer, his colleagues a warm and attached friend, this community one whose memory will long be cherished in the hearts of all who knew him.

"Now doubtless unto him is given
A life that bears immortal fruit
In such great offices as suit
The full grown energies of Heaven."

But painful as are some of the associations of the day, it must be made one of sadness only. It is or should be a day for thankfulness and for hope also—a day for mutual counsel and encouragement, a day in fine on which to consider carefully the nature of the work in which we are engaged, our several obligations in relation to that work, and the best means by which the sphere of our usefulness may be enlarged.

It is to this latter subject that I desire more particularly to call your attention to-day, and though, in so doing, my remarks may seem to some to savor too much of an alms-seeking character, I would never

was called, heless urge them upon your attention, feeling deeply as I do that the shadow subject to which I am about to refer is one of very great importance all felt that not only as concerns the best interests of this University, but indirectly d to enter that of the entire community.

as soon t It is probable that a portion of my hearers will remember that, on sense of he last occasion on which I had the honor of addressing them from omunity, his platform, I took the opportunity then afforded me to suggest to are neces, those interested in the welfare of the institution, and through it in that is held b the higher education in this Province, the advisability of establish- same timi in connection with the former a Museum of Geology and Natural gentleness, istory, or rather of extending and placing in a suitable building, as a ford assist, asis for future enlargements, the valuable collections in these depart- al aid, ther, ents already in the possession of the University. I at the same time relation c, ook occasion to state, although necessarily in a somewhat cursory one lastin, anner, my views as to the purposes and uses of such a Museum, and recognition, he absolute necessity then existing for increased accommodations, not devoted t, mply as a means of displaying and using the collections to the best of the tim, vantage, but even for their simple preservation. Since that time I ugh all the, ve not failed, on all fitting opportunities, to bring the same matter ations of hi, fore the attention of the public, but so far, I regret to say, without ired, he ye, ail. The Museum still remains in its former overcrowded condition, cease, in th, and much valuable material, otherwise directly available for purposes of y his sad re, struction or reference, is stowed away in a practically useless form, icer, his col, await the day when public aid or private munificence shall enable us nose memor, turn it to due account.

This result, I think, can only be due either to an imperfect apprecia- tion of science-culture itself as a part of a well-devised scheme of educa- tion, or else to a misunderstanding of the part which natural history useums play as auxiliaries in the affording of such culture. Upon ese two subjects therefore, I will, with your permission, offer a few , it must nec, ditional observations.

thankfulnes I think I need scarcely dwell, even did my time permit me to do so, ement, a da, any very great length upon the consideration of the first topic to ork in which I have adverted. That the study of the Natural Sciences affords at work, an, means and an invaluable one for intellectual training, that they give be enlarge, ope for an amount of mental discipline not surpassed by any other y to call you, anch of study, while in particular directions their use is attended may seem th, advantages not attainable at all from any other sources, is, I think, would never, ially admitted by all who in late years have given their attention

to the subject, and more particularly by those who, as practical educators and as possessing a full knowledge of all the different systems which have been proposed, are best qualified to give an opinion upon their merits.

These advantages, I think, are chiefly the following:—

1.—That the methods of scientific enquiry being for the most part strictly inductive, leading up the mind by successive steps from simple and apparently isolated phenomena to the grandeur of universal truth, they possess all the merits of a *logical system*, calling forth equally with the latter the highest power of the intellect, while at the same time they deal with objects and phenomena with which they are not merely ideal, but have a real tangible existence, and can always be appealed to as verifying or disproving the conclusions which may be reached.

2.—That by such appeal to actual facts the powers of *observation* become unfolded equally with the more purely reflective ones, the student being thus taught to employ and train to their fullest extent all the different faculties of which he is possessed. By being taught to distinguish what is essential from what is comparatively trivial and unimportant, he is at the same time better fitted for those positions in whatever they may be, which require a prompt and accurate judgment.

3.—That such studies are calculated to produce originality of thought and habits of self-reliance, the phenomena to be observed, though based upon comparatively few and simple truths, being infinitely varied in their manifestations, and therefore requiring something more than mere book knowledge or an effort of the memory to master them.

4.—That the objects contemplated being for the most part remarkable for their beauty, as well as for their orderly arrangement and evident adaptation to wise and beneficial ends, they tend to cultivate the aesthetic and purely imaginative powers of the mind, giving to the individual a keener sense of the beautiful in Art, Poetry and Literature, the latter being often successful just in proportion as they are faithful reproductions of Nature. The religious element of our being is at the same time aroused, the creature being made to bow in humble adoration before the infinite work of an Infinite Creator.

And (5) lastly, such studies are essentially practical, and suited to their applications to the wants of our every day existence.

“The influence,” says Dr. Lardner, “which the study of Natural Science exercises upon the intellectual faculties merits serious attention. The course of investigation through which the mind is conducted

uch studies habituates it to ascend from effects to causes, yet never advancing a step without submitting the deductions of reason to the severe tests of experiment and observation. While such studies lead heretofore to a habit of lofty speculation, they never permit the imagination to wander, inasmuch as the material verification is rigorously placed in juxtaposition with the speculative hypothesis."

"I am satisfied," says Dr. Carpenter, the distinguished Registrar of the University of London, "by no inconsiderable experience of different modes of education, that Natural Science, if judiciously taught, is second in value to no other subject as an educational *means*, and that it may be made to call forth a more varied and wholesome exercise of the mental powers than almost any other taken singly. * * "

Listen again to the words of Prof. Agassiz:—

"The time has come when scientific truth must cease to be the property of the few, when it must be woven into the common life of the world; for we have reached the point where the results of science touch the very problem of existence, and all men listen for the solving of that mystery. When it will come and how, none can say; but this much at least is certain that all our researches are leading up to that question and mankind will never rest until it is answered. If then, the results of science are of such general interest for the human race, if they are gradually interpreting the purposes of the Deity in creation and the relation of man to all the past, then it is well that all should share in its teachings, and that it should not be kept, like the learning of the Egyptians, for an exclusive priesthood who may expound the oracle according to their own theories, but should make a part of all our intellectual culture and of our common educational systems."

And that the estimate placed by these distinguished men upon the value of the Natural Sciences as a means of educational training is a just one, and is but the expression of a feeling which will sooner or later gain universal acceptance, is, I think, indicated by the constant and rapid progress which science education has made and is making in all those countries which are pre-eminent no less for their intellectual than for their material development. Not only has the study of the natural sciences been introduced into the curricula of Universities from which until recently they have been systematically excluded, but so great is the esteem in which they are held, and so important is it considered that each of their branches should receive the fullest and the best treatment, that separate and special Professorships have been established for each of their different subdivisions. Special science schools too are everywhere springing into existence, and the large

numbers of students who attend them and the important positions which their graduates are called, not simply in connection with the arts and sciences, but in every situation of life, bear ample testimony to their utility.

Of course it is not to be expected, perhaps it is scarcely to be desired, that such a special science-school should be established here. Such schools to be thoroughly successful, require a much larger staff of Professors and much larger endowments than we can at present reasonably hope for, as well as proximity to some large industrial centre where the practical applications of the different branches of study may be seen at the same time with their theoretical exposition. Such objections, however, do not apply to the study of simple Natural History and there is no reason why the latter should not be taught, and taught to the fullest extent consistent with the means at our disposal and the wants of the student. Nature does not require the assistance of large communities, nor the noise and smoke of busy factories for a right understanding of her laws: her operations are incessant and universal and the means of their study may be had at all times and in every place. Will any one undertake to say that the results of such teaching are altogether unimportant, and that, because we cannot hope to rival the great institutions which derive their support directly from such large and wealthy communities as those to which I have referred, there is still no work for us to do in this direction? Must our young men remain in comparative ignorance of those facts and principles upon which the well-being and progress both of themselves and the entire country so greatly depend—the principles of Chemistry, without which they can enter *intelligently* upon scarcely a single branch of manufacturing industry, of Mineralogy and Metallurgy, the want of which is apparent in almost every attempt at mining so far undertaken in this Province, of Botany, upon which the maintenance and culture of our forest trees and their adaptation to many useful purposes, so largely depend, and finally of Zoology and Comparative Astronomy, without which it is impossible to understand the organization even of our own frames,—or are they to be compelled to seek abroad that information

NOTE.—It may not be without interest in this connection, more particularly to those who have wont to cry out against university education as an expensive luxury, and who grudge a donation even of a few hundred dollars only towards promoting its efficiency, to call their attention to one single instance where a very different spirit is manifested with reference to the latter. I refer to the case of Harvard University (one only however among many where in the neighboring States a similar generosity has been displayed,) where, in the single department of Natural Science alone, there are no less than *five* distinct museums, with a staff of not less than *twenty-five* Professors, and to the perfecting of which there has been devoted, in the aggregate, no less a sum than a *million and a half of dollars!*

which is denied them at home? For my part I believe that much of the success which many of our graduates have attained, more particularly as competitors in the medical profession, is due to the fact that the study of Natural History, in a practical way, is here made an important and essential portion of the regular collegiate course.

While urging, however, the continuance of such studies, and increased facilities for pursuing them, I would not have you regard me as desiring that they should supplant or even curtail the pursuit of other and more purely literary studies. On the contrary I think that the latter should be fostered and encouraged, and, as essential prerequisites for the attainment of the highest culture, should form a necessary, perhaps predominant part of the collegiate curriculum. But as you are aware there are many to whom such studies are more or less distasteful, as well as others who, either from defective early training or from other considerations, may not be able to pursue these latter to advantage, and for such, I think, some special provision should be made, some arrangement by which they may be able to devote themselves more directly and exclusively to studies which, while affording an equal amount of mental discipline, will at the same time fit them better for the active and practical duties of life.

It may perhaps be said that provision has already been made for such students in the system of partial and special courses which, as you are aware, our University offers, and which we have of late years been endeavoring to perfect and extend. This, however, is and can be only partially the case so long as the means and appliances of instruction in such partial courses remain deficient or inadequate. Remember that the more important branches of these latter are, as I have said, essentially practical in their character, and it is only in a practical way that they can be taught efficiently. Chemistry for example, one of the most important of these branches, must, to be taught effectually, be taught experimentally, by actual synthesis and analysis, yet this, except to a limited extent, we are at present unable to do for the want of a more commodious and suitably constructed laboratory; for the study of Metallurgy and Mining again, there should be not only a well-arranged general cabinet of ores and minerals, but special collections,

accompanied by models and sections, to show the actual mode of occurrence of these latter and of the means employed for their extraction—collections for the making of which we possess many of the materials, but which at present lose much of their value from the want of room

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for their proper display; and lastly, the study of Natural History at large, to be productive of real and lasting benefit, must be pursued with the assistance and constant employment of the actual and tangible organic beings from which its principles have been deduced.

And this leads me to the consideration of the second portion of the subject, viz.: the purpose and use of Natural History Museums, particularly in connection with institutions of learning, and the necessity which exists for the enlargement of that now in our possession. what I have said of the value of Natural History training is correct; surely it is a matter of importance that the subject should be properly approached, and that in its teaching those methods should be employed which experience has shown to yield the best results. Now Natural History being, as I have before remarked, an observational study, and essentially practical in its methods and tendencies, is never so well learned as by actual practice, under proper guidance. The mind of the student must from the outset be accustomed to the contemplation of actual sensible objects and not to mere intangible ideas, which even if they are thoroughly understood, leave a far less lasting impression upon the mind. And it is here, I think, more than anywhere else, that popular judgment with reference to Natural History Museums is at fault. These are too apt to be regarded entirely apart from the educational influences; each is supposed to be a mere collection of curiosities, a sort of "omnium gatherum" or lifeless menagerie, designed as partly implied by the unfortunate name they bear, solely for the purpose of amusement. And this, I fear, is too often the case where the collections are kept entirely apart from educational institutions, or at least where they are not employed as a means of intellectual progress or for the prosecution of original research.* But surely this cannot be said of such a museum as our own, the contents of which are employed almost daily in the actual work of instruction, where students especially interested in any particular branch of Natural History may find the materials as are necessary for the prosecution of their work, may any one, desirous of information relative to the animals, plants or minerals of this Province, may find them fully exemplified, and so arranged as to show at a glance their relationship to similar forms from all parts of the world. These relationships can never be fully understood

*A good illustration of this fact, and one greatly to be regretted, is furnished by the Museum of the Mechanics' Institute in St. John. The latter contains a considerable amount of really valuable material, but so entirely without arrangement, so buried in dust, and so encumbered with that is absolutely worthless, as to be almost entirely useless for the furtherance of its purpose, which is that of instruction.

natural history at least the practical benefits derivable from their study can never be justly obtained, simply through the agency of pictorial illustrations, no matter how ably these latter may be supplemented by verbal explanations. The student must be *taught to teach himself*, to see, feel and handle for himself, to pull to pieces, if necessary, in order that, by comparison, he may be able to reconstruct in his mind the original fabric. It is this principle of comparison which really lies at the root of all natural studies, and which gives to them their highest interest as well as their great educational value. It is by this means that the mind is trained not only to observe but to generalize, to rise from the contemplation of mere detail to the grandeur of great principles. But, as I have said, it is only by familiarity with nature herself that we can hope to understand her laws. "I have satisfied myself long ago" says Agassiz, "that the great and elementary principles of our science are better understood when illustrated from Nature than when explained in a more abstract manner. In this way each student is, as it were, led to his own ideas, who himself over the road through which science has passed in its onward progress: and far from protracting his course, he soon finds that he is brought without preamble into the very sanctuary of science."

There is yet another light in which this subject may be viewed. The University is or should be the head of the educational system of the Province, and as the students of the different schools look forward to her as affording the final goal of their educational career, so the University should in turn endeavor to reflect back something of her influence upon those schools themselves, gradually elevating their standard, and thus rendering their scholars better fitted to profit by their university course, when they shall have become the direct students of the latter. This is already being done and to an important extent, by our graduates, who, as you are aware, are now filling as teachers positions of the greatest importance and responsibility in different portions of the Province. But this may also be done in another way. Among the subjects taught in these schools, and introduced, I believe, among the most important, plants or improvements in our general school system, is the teaching of botany and some other branches of natural history, by means of elementary textbooks. This is very well so far as it goes, but, as I have said, merely text-books in such subjects are not sufficient. The interest which seldom fails to be excited in the minds of the young by descriptions or illustrations of the wonders which everywhere surround them, is one which can only be fully satisfied by some actual knowledge and real vis-

ible insight into the latter, and how is this to be obtained? Of course how it would be impossible for all the students of the different schools, even many of our immediate vicinity, to have direct access to such a Museum, how a that which I am anxious to establish, but there is no reason why the teachers, many of whom now spend several months every year at the Training School in Fredericton, should not have that access, and being thus led to see the possibility of collecting and arranging natural objects, be also led for themselves, or with the assistance of the scholars, to make similar collections, and thus to add very greatly to the interest and the utility of the subjects taught by them. I think that we have in this matter a duty to perform not only for our students but for the community in general. It is truly surprising with so much fondness for natural objects as actually prevails here, which is shown by the numerous and well-stocked conservatories as well as by the general taste for the cultivation of flowers observable in our midst, there should be so little real knowledge of the structure and physiology of plants, of their relations to each other or of the laws which govern their geographical distribution,—subjects which are very generally taught and well taught in the schools of the neighboring republics.

I may add that to facilitate this object it is not impossible that arrangements may be made for special courses of lectures on chemistry and natural history, to which the teachers of the training school and others, male or female, may be admitted.*

But it is not merely in its educational aspect that I would urge this subject upon your attention. I believe it to be a matter of great practical importance to the entire Province that there should be, somewhere within its limits, a representative collection of its animals, plants, minerals and economic products of all sorts—a collection which shall be complete as possible in all these several departments, and one to which appeal may always be made whenever information with reference to either of the latter is desired. The nucleus of such a Museum we already possess, and thanks to the liberality or the exertions of a number of friends by whom the importance of the subject is duly appreciated, our University can even now boast a cabinet unequalled by that of any other institution in the Maritime Provinces; but are our efforts to which I have alluded can be regarded as anything like complete?

*I am aware that such a course would add materially to my own labors, already sufficient onerous, but as this labor is all that I have to offer in return for that more material support which I still confidently hope for, I shall not on that account shrink from its performance.

? Of course how many directions may profitable exertions be made, and upon schools, how many subjects do such exertions and such collections tend to a Museum throw a light—subjects in which every one of us should have an interest, and why those which are of the very highest importance in their bearing on the future advancement of this Province? The nature and distribution of our rocks, our soils, and their relations to the geological structure of the country, the age and productive capacity of our rock-formations, the limits of the distribution of our native plants, as dependant upon the varying conditions of warmth or humidity to which they are subjected, and of the climate. I allude to the physical features of the country: the changes of climate, and the means, which are affecting this district as a consequence of the removal of our forests, and the best means to be employed for the preservation of our woods here, and the extent to which our wild plants may be rendered useful or those of other countries acclimatized: the nature of our insect fauna, including the recognition of the hurtful species and of those by which the latter may be kept in check: the peculiarities of our marine fauna, and the best methods to be adopted for the preservation of the same, or for the restocking of our rivers where the latter have become depleted—these are but a few of the questions which might be mentioned upon which the intelligent preparation of such collections as I have alluded to would have a direct and practical bearing.

Nor must we forget the suggestive aspects of such collections, basing our estimate of their value simply upon the greater or less completeness with which they may seem to embody or to illustrate the extent of our present knowledge. It is impossible for any one to foresee when or where an object, previously supposed to be thoroughly known and perspicuous, plants, maps deemed of little moment, may not suggest to the observer some new principle, impossible to say what result of Nature's handiwork may lead one to what be the means of perfecting if not of altogether originating some new and useful practical process. It has been well said that Art takes Nature as her model, and there can be no doubt that with a more general acquaintance with her laws and methods of working much more information of the very highest value and utility would be obtained. Indeed there is scarcely a branch of theoretical or applied knowledge which does not find in Nature its most perfect consummation. Even the loftiest and the purest forms of Art, Poetry, Sculpture and Painting derive from her their highest inspiration, and the precepts of our religion their most forcible illustrations.

An illustration of this fact which has recently met my notice is so

striking that I may be pardoned for reproducing it here entire. It is contained in the Proceedings of the Boston Society of Natural History and is as follows:—

“Dr. Kneeland exhibited several specimens of glass, marble and other stones, engraved, carved and grooved by the action of sand driven by a blast of air or steam. The surface being covered by perforated paper or a stencil plate, the parts exposed by the perforations are cut rapidly and accurately, while the covered parts are untouched, protected, and supposed by the elasticity of the paper or thin metal.

He drew attention to this industrial process as illustrating the advantage of diffusing, as a common branch of knowledge, information of the forces of nature, and, in this instance, on dynamical geology. This process, which promises to revolutionize one of the most extensive of the industrial arts, is simply carrying out what natural forces have been doing to the surface rocks of our continent for ages.

Sands carried by strong and steady winds, passing over rocks, soon wear them smooth or cover them with grooves and scratches, as noted and figured by Mr. Blake in the granite rocks at San Bernardino, California; see Pacific R. R. Reports, vol. 5, pp. 92 and 231. Quartz, when there were found polished, the softer feldspar being cut away; while the latter had been protected by garnets, projections were left, and they not by the hard garnets, pointing like fingers in the direction of the wind. On the surface of the great Colorado desert the pebbles are often polished by the drifting sand or variously grooved according to the hardness of their substance. Prof. J. Wyman also mentions that the windows on Cape Cod have sometimes holes worn in them by the drifting sands blown by the winds.

It is the tendency of modern education to pay less attention to the dead languages and to ancient history, as a means of culture, and to neglect the practical and living issues of the day, and especially to confine a knowledge of natural phenomena with the elementary instructions of the school-room. In this particular instance, it is altogether probable that, if the grooving of rocks by the wind-driven sands, long known to both geologists and physicists, and by them turned to no practical account, had been equally well known to our intelligent and skilful mechanics, the process here illustrated would have been invented years ago, and by this time have attained a high degree of perfection. The same reasoning will apply to other departments of natural and physical science, and goes to show the wisdom of those educators who are endeavoring to

entire. To diffuse a knowledge of scientific principles and phenomena among the people."

Again, I would ask you to consider the nature of the objects which should be exhibited in such a Museum as that to which I have alluded. Remember whose handiwork they are and for what purpose they were made. Can you suppose that all the vast multitudes of living beings which have preceded us on this earth and whose countless remains are being daily disinterred have no lesson for us to learn? That they were created for no other purpose than their own short-lived pleasures, or simply as a means of helping to build up the solid framework of the earth itself, of which their buried remains form so considerable a portion? Are there no connecting threads between those past populations of our globe and those which are now spread over its surface? And is there nothing in the present distribution of plants and animals, in the varied forms which they present, in their adaptability to the most diverse circumstances and conditions of life, and in the wonderfully simple and harmonious plan which, notwithstanding all their differences, shows them all to be constructed on one or the other of a few simple patterns of growth,—is there, I say, nothing but amusement to be found in the contemplations of such objects? Are they not rather, as the material expression of Creative thought, worthy of our most careful and serious—I had almost said reverential—study? Are they not, equally with His written Word, a manifestation of the wisdom, Power and Goodness of God, and as we consider it a sacred duty that a knowledge of the former should be as widely distributed, as the latter is explained and made as easily accessible as possible, so, it seems to me, and for like reasons, we ought to devote our best energies to the pursuit of both. We need not fear that the two will clash. We may differ in our interpretations of either of them, we may, in our imperfect acquaintance with both, see points of apparent disagreement between them, but of one thing we may be assured, viz., that if both are the works of God, both must be true, and that it is our ignorance and not the facts themselves which are to be credited with that disagreement.

And in what better way, let me ask, can we obtain this perfect knowledge of the ways of God in Nature than by the study of Nature herself, by the collection and preservation of natural objects, and by the attempt to arrange these latter in such a way as to convey, readily and accurately, to the mind of an observer something of that unity

of thought which really underlies them all and which binds them together into a consistent whole. To quote again from one who has done so much to place the study of Natural History on a true basis: "If I mistake not," says Prof. Agassiz, "the great object of museums should be to exhibit the whole animal kingdom as a manifestation of the Supreme Intellect. Scientific investigation in our age should be inspired by a purpose as animating to the general sympathy as was the religious zeal which built the cathedral of Cologne or the Basilica of St. Peters. The time is passed when men expressed their deepest convictions by these wonderful and beautiful religious edifices; but it is my hope to see, with the progress of intellectual culture, a structure arise among us which may be a temple of the revelations written in the material universe. If this be so, our buildings for scientific objects can never be too comprehensive, for they are to embrace the infinite work of Infinite Wisdom. They can never be too costly, so as to secure permanence and solidity, for they are to contain the most instructive documents of Omnipotence."

It is this recognition of Creative Thought as underlying the material universe, and to which we endeavor to give expression in the arrangement of our cabinets, which, as it seems to me, affords the most fitting answer to those who see in the work of the naturalist only a tendency to materialism, a deification as it is often termed, of Nature itself. Naturalists do indeed deify Nature, but only in the sense that in they recognize the constant presence and controlling power of a Deity above and beyond Nature, and not power only but an infinite wisdom and beneficence, the attributes of God as expressed in organic and inorganic forms. Without such a recognition, without the idea of something apart from and above all material things, our collections become not useless only but meaningless—their systematic arrangement to which I have referred, and which is but a reflection of the perfect order which pervades the Universe, would be impossible; contrivances, so simple, so varied, and yet so perfect, by which the different forms of animal and vegetable life are adapted to their various and very diverse conditions, would lose the greater part of their interest for they could then be regarded only as the work of chance; the precious relics of the past would cease to interest us, for they could have no bearing upon the present or the future; the whole of Nature, in short, would become a mere chaotic mass of facts, without purpose, method or coherence. With such a recognition on the

and the world is but another Word, another Revelation, whose every portion is fraught with deepest meaning, and whose every portion it is the high aim of the naturalist to study and unfold, no phenomenon being so obscure and no object so insignificant as to be deemed unworthy of his notice, if haply thereby he may be led to read that Word aright.*

But I must not delay you longer with the consideration of this subject here. I have, I think, said enough to convince you of its importance, remains for you to see that it is not again forgotten. May I not indulge the hope—a hope, the fulfilment of which would, I assure you, be the most acceptable reward for anything I have myself done or may be able to do in this direction,—that the day is not far distant when the example so nobly set by the Thayers, the Peabodys, the Vassars and the Hornells of the neighboring Republic may find worthy imitators here, and that a Museum may, with their assistance, arise among us, which shall be not only a monument of their liberality, but a source of pleasure, pride and usefulness to every inhabitant of this City and Province?



It may be of interest to those by whom the foregoing address may be perused, and to whom the objects therein advocated may commend themselves, to know something of the actual condition and wants of the University Museum as it now stands, and of the direction in which, with increased accommodations, it may be profitably enlarged. With this object in view I may be permitted to append the following extracts from my Encyclopaedical address of 1869:—

“The varied and very valuable collection now contained within the University Museum, was the original work, and is the most enduring monument, of its lamented founder, the late Dr. James Robb. Undertaken with a keen sense of its importance and usefulness, and prosecuted

“There is a scientific reverence—a reverence of courage—which is surely one of the highest forms of reverence; that, namely, which so reveres a fact, that it dare not overlook or falsify it, see it never so minute; which feels that because it is a fact it cannot be minute, cannot be unimportant; that it must be a fact of God; a message from God; a voice of God, as Bacon has it, crested in things; and which therefore, just because it stands in solemn awe of such paltry facts the scolopax feather in a snipe's pinion, or the jagged leaves which appear capriciously in certain honeysuckles, believes that there is likely to be some deep and wide secret underlying them, which is worth years of thought to solve. That is reverence; a reverence which is growing, thank God, more and more common; which will produce, as it grows more common still, fruit which generations yet unborn shall bless.”—Science—by Rev. Chas. Kingsley.

with an untiring determination to make it the most complete, accurate and thorough representation of the Mineralogy, Geology and Natural History of the Province, as well as the means of a direct comparison of the natural products of New Brunswick with those of other countries. The labors of its originator soon served not only to place the collection upon a secure and permanent basis, but to do much towards its extension and enlargement. When deprived of the further continuance and benefit of these labors, the materials in the possession of the University had already exceeded the limited accommodations for their preservation and display, and much that might be profitably retained and employed in illustration and instruction was necessarily removed or stored away in a practically unavailable form for future use. These difficulties have constantly and rapidly increased to the present hour, when it becomes absolutely necessary to reject large quantities of material which, with proper and ample facilities for their arrangement and display, would not only add greatly to the completeness of the collection, but also enhance to a very considerable degree its practical usefulness.

Under these circumstances it would seem as though the time has now come for the construction of a building especially devoted to the arrangement and preservation of this most valuable collection, which is already far more complete than any other in the Lower Provinces, and capable of becoming, with comparatively little effort, the representative Museum of Acadia. To convey a more just appreciation of the value of our Museum and to give some conception of the extent, variety and importance of the objects which it already illustrates, it may be uninteresting to present here a brief synopsis of its present collections and of their general mode of arrangement.

They may be briefly summed as follows, beginning with

THE MINERAL KINGDOM.

1. A collection of simple minerals, including more than 250 from New Brunswick, over 100 from other portions of Acadia, and over 500 from various foreign localities in Europe and America, representing more especially the great mining districts of the old world.
2. A collection of rocks, representative of the lithology and geology of New Brunswick, and arranged in duplicate series, the one illustrative of the special character of the different counties, the other of their more general relative and geological age.
3. A similar series of foreign rocks, over 400 in number, representing principal rock-formations of Europe.

4. Similar specimens from the most interesting localities in Nova Scotia, Prince Edward Island, Canada and the United States.
5. A collection of the economic minerals of Acadia, including
Such as may be used for the amelioration of the soil (Limestone, Gypsum, Marl, Peat, &c.)
Burning materials (Coal, Albertite, Shale, Petroleum, Peat.)
Minerals for cleansing and polishing (Graphite, Infusorial Earth, &c.)
Materials for Grinding, &c., (Pure Silica, Sand, Grindstones, &c.)
Materials for the manufacture of Porcelain, Stoneware, Pottery, (Kaolin, Clay, Sand, &c.) Fire Clays.
Building Stones—(Granites, Freestones, Limestones, Slates, &c.)
Ornamental Stones, (Marble, Granite, Porphyry, Serpentine, &c.)
Gems, (Amethyst, Agate, Carnelian, Rock Crystal, Tourmaline, &c.)
Ores of the Metals, (Iron, Copper, Lead, Zinc, Antimony, Manganese and Gold.)
Mineral Salts, (Common Salt, Alum, Barytes, &c.)
Mineral Paints, (Ochre, Barytes, &c.)
Hearth-stones, Furnace Stones, Hones, Flags, &c.
- We have next the

ANIMAL KINGDOM.

This department includes, besides a valuable anatomical and osteological collection, numerous specimens, preserved dry or in alcohol, of the Mammals, Birds, Reptiles, Fishes and Invertebrates of the Province, besides many valuable and interesting objects of Natural History from other localities.

[Since the date of the above notice this portion of the cabinet, which is regarded as of special importance, and is in daily use for the purposes of instruction, has received many and very important additions, more particularly as regards our native birds (through the kindness of Mr. G. A. Boardman, of Milltown,) and the department of marine invertebrates (from the Smithsonian Institute; Peabody Academy of Science, Salem, Mass.; and the Chicago Academy of Sciences.) It is still very deficient, however, in the departments of Fishes and Insects.]

Next follows the

VEGETABLE KINGDOM.

1. A collection of New Brunswick Plants, over 700 in number, and representing the greater part of the species at present known to exist in the Province.
 2. A collection of North American Plants, including many forms peculiar to the western as well as the more eastern States.
 3. A collection of European Plants, embracing authentic and type specimens from the celebrated Herbaria of Profs. Hooker and Balfour.
 4. Numerous Vegetable Curiosities, Monstrosities, &c.
- [This department is supplemented by the private collection of the Curator, embracing in addition to duplicate series of North American Plants, an extensive collection from the Island of Cuba, besides others from California, Florida and Australia; also a large collection of Algae, both American and foreign.]

We have next the

PALAEOLOGICAL CABINET.

1. The fossils of New Brunswick—from which, in many cases, the age of rock-formations have been determined. [Some of these fossils, such as Primordial Trilobites and Devonian Insects, are of peculiar interest, as being the earliest known representatives of their type on the continent, and in the latter case, in the world.]

2. Fossils of Nova Scotia, including many fine specimens from the celebrated coal-sections of the Joggins, Pictou and Cape Breton.

3. Canadian and North American Fossils characteristic of the different periods of American geological history.

4. A collection of foreign Fossils, 500 in number, arranged according to an eminent French Palaeontologist, Bronn.

To the above may be added a large number of Miscellaneous Articles such as

Models of Crystals; Sopwiths Geological Models; Models of Iron and Steel Furnaces, &c.; Pottery Works and Tools; Glass Furnaces, Iron Rollers, &c. Furnace Products, Slags, &c.

Maps—Geological and Physical; Charts.

Plates—Chemical, Anatomical, Botanical, Geological, &c.

And finally, a

MICROSCOPICAL AND HISTOLOGICAL CABINET.

Embracing (in all over 200 slides,)

- a. Animal Tissues (Bones, Teeth, Muscle, Glands, Lungs, &c.)
- b. Vegetable Tissues, (Wood, Seeds, &c.)
- c. Sections of Fossils, &c.
- d. Objects for illustrating the phenomena of polarized light.

Such is the condition of our Cabinet at the present time, a condition certainly upon which to congratulate ourselves, but as certainly not one capable of great improvement, but in the better display of what we already possess and in the addition to many departments of articles in which we are now deficient.

The advantages attending the possession and use of such a collection are almost too obvious to need enumeration, yet I would briefly call attention to a few of them, as bearing upon their educational value, and the consequent importance of their direct connection with a scientific learning like our own.

1. In the first place then, they present in a condensed and systematic form an epitome of all organic and inorganic nature. They exhibit, side by side, natural objects from all quarters of the globe, illustrating their relationships and contrasting their differences, and thus afford a clear

sight into the great laws of the universe of which they are but the outward expression.

2. They enable those interested in the study of the animals, plants, minerals or other natural products of the Province, to compare the specimens from the latter with those of other countries, and thus with greater certainty and precision to determine their character and to pronounce upon their value.

3. They furnish a standard of reference for settling all doubtful points arising as to the mineralogy, geology or botany of the Province.

4. They are invaluable as a means of instruction, enabling students to acquire an actual and practical acquaintance with the subjects of their study, such acquaintance serving to imprint the characters of the latter upon the memory far more indelibly than can any merely verbal or printed descriptions.

5. They awaken a desire for further acquaintance with the objects illustrated, and arouse fresh exertions to increase the number and completeness of those illustrations.

6. They greatly facilitate the labors of the instructor, by enabling him to appeal directly to the objects described in proof of the truths he may be endeavoring to explain.

7. And lastly they may aid in the general progress of knowledge by collecting and preserving facts and objects, the relations of which to those in other parts of the world, may assist in the discovery of new truths, and the deduction of great and universal principles.

It follows as a natural consequence of many of these facts that the most profitable and advantageous locality for such a collection is in direct connection with a seat of learning. Public Museums, independent of what we call literary institutions, although far from being without their value, fail for the most part to confer those practical benefits which similar collections in colleges and universities are sure to afford. The casual visits to the former are, without the aid of a guide, apt to confuse rather than to instruct, while the latter, used in the daily illustration of natural laws and organic forms, become storehouses to the student, wherein, with a skilful proper guidance, he may for himself trace out and acquire a knowledge of those laws which it is his object to unfold.

To fully accomplish this result it is desirable that such collections, when made, should be so arranged and displayed as to enable those interested in the study to acquire the desired information with the least possible difficulty. The objects exhibited should be so arranged in suit-

able cases as to display conspicuously their most important and characteristic features. They should not be so crowded as to confuse sight, nor so separated as to make their comparison difficult. They should, moreover, be room not only for the most unique specimens, but also for all such as illustrate possible variations from the typical form. And lastly, there should be sufficient space for the future requirements of the Museum, for the storing of duplicate specimens to be used in exchange with other institutions, and for the purposes of classification.

These objects, I need scarcely say, cannot be attained within the walls of the present University building, where the space which is now occupied by the Museum and Library is already wanted for the accommodation of resident students. They can only be fully and satisfactorily accomplished by the erection of a new building, especially designed for this purpose. Such an edifice, if properly constructed, and stored with our rapidly increasing collections of natural objects, would become not only a means of imparting a higher and more perfect instruction to the students of the University, but would at the same time become an object of interest to the community in general.

Such a building might readily answer other purposes at the same time with those of the Museum. With suitable construction it may be made to combine the Library as well, and (as is very desirable) a Chemical Laboratory. Another advantage attendant upon the possession of such a building is, that it would, in its Library, furnish an ample Hall now much desired, for the annual University public examinations, well as perhaps, for the Encoenial celebrations, the meetings of the associated Alumni, and other kindred purposes.

I may observe in addition to the above remarks that the objects which, in the event of increased facilities, I propose to devote more particular attention in the future, are chiefly the following:—

1. The preparation of a special cabinet illustrating the structural and physical characters of minerals, including their Crystallographic relations to Heat, Light, Electricity, Cohesion, Gravity, &c.

2. A metallurgical collection, designed to illustrate the various aspects presented by the more important ores, the mineral accompaniments of the latter, and the processes employed for their extraction.

3. A *local* "Cabinet of Phenomenal Geology," showing the mode of operation and results of some of the more important geological agencies.

and character (Water, Heat, Pressure, Concretionary action, &c.,) as illustrated from provincial examples.

4. The completion of the Entomological Cabinet (now scarcely begun) with more special reference to the Insects injurious to vegetation, and typical forms by which the multiplication of the latter may be kept in check.

5. The extension of the Cabinet of Archaeology, more particularly by the collection and preservation of the relics of the aborigines of this province.

6. The enlargement of the Botanical collection by the addition of specimens from different portions of the Province, with a view to illustrate their distribution over its surface, and the influence, if any, of soil, climate, moisture, &c., upon their growth.

To which may be added, in general, the completion as far as possible, the entire collection as a *representative local museum*, together with the addition (by exchange) of foreign specimens, so far as these may be necessary for illustrating groups not represented here or which may be useful for purposes of instruction.

Donations either towards a Museum fund, or towards the increase of the Cabinet will be thankfully received and duly acknowledged.

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