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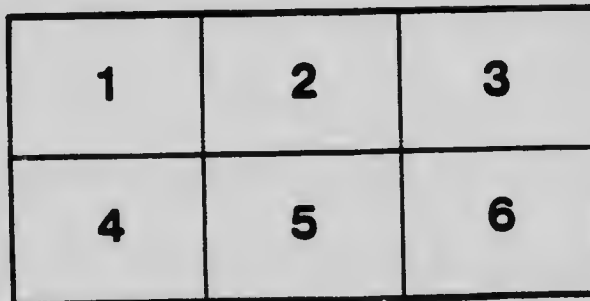
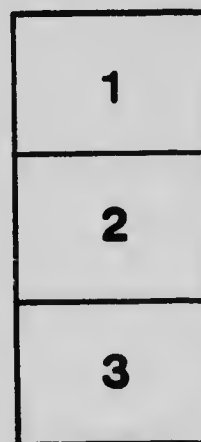
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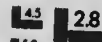
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**ADDRESSES**

DELIVERED  
ON THE OCCASION OF  
THE  
PRESENTATION OF A PORTRAIT  
TO  
**PROF. N. F. DUPUIS**

APRIL 30TH, 1901



JACKSON PRESS



## ADDRESSES

DELIVERED ON THE OCCASION OF THE PRESENTATION OF A  
PORTRAIT TO  
PROFESSOR N. F. DUPUIS.

APRIL 30TH, 1901.

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The presentation of the portrait was made at Convocation, on Tuesday afternoon, April 30th, 1901, Chancellor Fleming in the chair. Prof. James Ross, of Montreal, being called upon, spoke as follows:

*Mr. Chancellor, Members of Convocation, Students of Queen's, Ladies and Gentlemen:*

Who is the greatest among the children of men? This question is an old one; the answer has changed with the ages, and it still varies according to the character and ideals of the man who gives it. The warrior chief wrecking nations, the conscienceless statesman robbing them under forms of law, the graphic story-teller charming successive generations, the discoverer of the secrets of Nature have each had his day. In the century into which we are entering with such hopefulness and enthusiasm, I venture to think that the educator will receive his just meed of praise and be crowned chief among his fellows. The secrets of nature are wonderful, but the hidden things of the human soul are more marvellous and more valuable still; and he who can so handle the facts of nature and of mind as to draw the soul out of the mists which at first surround it, and make it conscious of its own great powers and of the wondrous possibilities of its surroundings, is our chief benefactor. The discoverer of a new star deserves recognition, but the discoverer of a thoroughly original and creative intellect deserves a crown. We have more stars now than we know what to do with, but we cannot have too many men.

Those master minds who have attained eminence in the intellectual world are almost a unit in ascribing the awakening of their mental life to the teachers who had a genius for wak-



ing truth attractive and of so opening new departments of it as to stimulate enthusiasm and thrill the whole inner nature with joy. In a sense every man must educate himself. Books, instruments, travel, teachers, are but helps in the process. It may be done in exceptional cases without any of them. But among the agencies helpful in mental training, by far the most influential, is the living soul which plays with its mighty forces upon the spirit of the learner. No environment can mould a man like a truly powerful and versatile mind which understands him, sympathizes with him, and which moves upon him like the Spirit of the Eternal upon the primal abyss, quickening its chaotic potentialities into the order and beauty of life.

What are the influences which have made this University a power in our young country and which have given her an ever enlarging constituency where even those who loved her could once see only limitations and lessening prestige? What strange magnetism is it that has grappled the hearts of her sons to her as if with hooks of steel and bound them into a brotherhood whose solidarity and joyous enthusiasm are the wonder of those less highly favoured? Something is doubtless due to the character of the men whom she has drawn to her class-rooms, but the central secret of her power has been the genius of the teachers who drew them. How varied have their gifts been! Who could delineate their excellencies or fully describe the debt which we owe them!

Some of them were not very remarkable for teaching power, their strength lay elsewhere. Many of us can recall one who seldom succeeded in an experiment and whose peregrinations on the blackboard could be followed by only a chosen few. Yet the moral fibre of his soul had the power of arousing a universal and ardent love that followed him to the grave, and no man's memory is greener in the hearts of the Alumni of Queen's. To his simple-hearted goodness, his untiring efforts to promote the welfare of the humblest student, his enthusiasm for learning, all who knew him will offer an unstinted tribute of praise.

It is our gladsome privilege, to-day, to do homage to one of the fathers who remain with us, to one whose power of unfolding truth would have given distinction to any seat of learning, to one whose influence on the life of this University for

mor. than thirty years has been like the forces of nature, widespread, powerful, and pervasive, and yet so even and noiseless that, like them, it is apt to be overlooked, forgotten, or easily assumed as a matter of course.

[Here the portrait was unveiled by Mr. J. R. Lavell.]

Professor Dupuis, in the name of the Graduates of Queen's who have enjoyed the benefit of your teaching, we beg you to do them the honour of accepting from them this portrait of yourself as a slight recognition of their appreciation of your many and multifarious labours for the welfare of this institution and for the fuller mental and physical equipment of its students.

It may have seemed to you, when you contemplated our Scottish reticence and the limitations amid which you have been long suffered to labour, that you have toiled in vain and spent your strength for naught. We assure you, that, while we have undoubtedly forgotten many of the formulas you have taught, we all carry in our hearts, grateful recollections of the mental stimulus, the spiritual inspiration, derived from your instruction; and we regard with wonder, and hold in the very highest esteem, your unwearying diligence in the service of our Alma Mater.

We find it difficult in your presence to express our estimate of the share you have had in her attainment of a position so gratifying to us, all of which is only the prediction of what is to be. The experience of maturer years and long familiarity with the difficulty of thoroughly awakening the human soul have deepened our early conviction of the wisdom of your methods. We remember with admiration the simplicity and directness of your prelections, your wise economy of explanation, and especially your singular accuracy and precision in experiment, wherein you have so unvaryingly honoured nature that she has honoured you with a success which has become proverbial. The most conclusive proof that this world is rational, that it has been built up by a far-seeing intelligence, is to behold a mind analyzing the processes of the Creator, predicting the exact results to be reached by the experiment and then displaying the elements falling into their places with the exactitude of the Infinite Reason.

We have often wondered at your apparently unlimited versatility. The number of things you can do has filled us with amazement and taught us humility. We have specialized so much, in order to get the very best development of one small part of man, that we are in danger of degrading human nature. Indeed, civilization has already arrested the development of manhood by leaving out of account every part of the man, except the fraction required to make the head or the point of a pin, or rather, to superintend the machine that makes it. A comic artist has pictured the men of forty centuries hence, as little more than animated brains with some feeble, attenuated fragments of a body attached, just enough to roll the big head into a flat bowl of soup that it may absorb some nourishment. But a true education is not the cultivation of one or two organs, it is the quickening of the whole complex soul. Gifts of brain to think, to originate, of eye to perceive and judge of proportion of beauty, of ear to interpret harmony of sounds, of hand to give artistic and permanent embodiment to thought, are all necessary to complete manhood. Now, the limitations under which you have always had to carry on the education of those committed to your tutelage, are deeply regretted by all the friends of this University, and we trust that your facilities may soon be enlarged.

But these limitations have not been an unmixed evil, they have called forth, in an eminent degree, the qualities of which I have spoken. The man is always greater than machines.

I have heard of a student of Queen's, who came down to McGill, and saw all the fine testing and assaying appliances that we have there. Your Principal was afraid that he would be dissatisfied with the equipment of Queen's, and would regret that he had resolved to take his course here. He was much comforted when he heard that the student in question had said, he was glad he had gone to Queen's because Professor Dupuis taught his men to make their own kit, to be largely independent of expensive laboratories, to construct, out of the materials within their reach, wherever they may happen to be, the means of conquering Nature and wrenching her secrets from her breast. This is the highest kind of education. It shows the soul how to triumph over barriers which impede its progress, and to transform them into stepping stones to wider usefulness and greater power.

This portrait may serve to preserve the features into which successive generations of students have looked with profound respect. The painter has skilfully caught the right expression and his work is very creditable to Canadian art. But what honour would he have gained if he could have depicted the soul, if he had been able to lay bare the workings of the spirit which penetrates to the heart of truth, calls forth the highest powers of other minds, and reigns a king over things not made of clay.

We trust that you may be yet long spared to inspire the students of to-day and to-morrow where you have taught so long, to set before the world further treasures from your garnered wisdom, and to confer additional lustre upon the University you have helped to build. We hope that in the evening of life's well-spent day you will rejoice in the brilliant achievements of the men whom you have clothed with power, and that you may see your work here passing over into the very best hands.

Mr. J. R. Lavell, B.A., M.P., of Smith Falls, then spoke on behalf of Prof. Dupuis' old students, testifying to their affectionate regard, and to their appreciation of the Professor's teaching and training.

Prof. Dupuis, in accepting the portrait, spoke as follows:

In connection with an episode in the life of Carlyle, Leigh Hunt wrote a little poem, the last stanza of which I shall repeat to you:

Say I'm sorry, say I'm sad,  
Say that health and wealth have missed me,  
Say I'm growing old, but add,  
Jenny kissed me.

I do not quote this beautiful little poem, because I ever had a sweetheart, or even a particular friend of the name of Jenny, but because in it the poet seems to me to have most happily expressed the forgetting of those things which we are accustomed to look upon as the miseries of life, sorrow, sadness, ill-health, poverty, and old age, forgetting all on a memorable occasion, and in a moment of joyous satisfaction.

I am somewhat in that position to-day. I look back with a sort of contempt upon the difficulties of the past, the struggle against adverse circumstances, the burning of the midnight oil, the anxiety, the work and study which frequently became a weariness to both mind and flesh. I relegate these to the distant background, in presence of this graceful act of my old students on whose behalf the efforts were made and the difficulties overcome.

It is not that I have any particular regard for the gift as being a portrait of myself. I never was a dude; I never parted my hair in the middle or admired my countenance in the glass; and now that I have no longer any hair to part, and my face is becoming careworn and marked with the lines of age, I do not see any reason for admiring that face when transferred to a bit of canvass. But I must always admire the geniality and the skill of the artist, and still more the sacrificing spirit of the graduates which has been the means of calling forth the artist's efforts.

I feel that Byron did not include all the sweet things of life in his celebrated stanzas in "Don Juan," for it is certainly sweet to be reminded that your work in life has not been in vain, but that it has been useful to some one, and that it has been appreciated by those for whom it was performed.

And standing here to-day, from the fullness of my heart, I thank every one of my old students for the part which he has contributed to the pleasure of this moment, which must be to me an ever memorable occasion, and a long-drawn out sweetness to sooth the evening years of life.

Incidents like the present are enough to inspire any man to try and make greater efforts in the future than he did in the past. But to those who have done practically their best, and are drawing near to that stage which is symbolized by the sere and yellow leaf, the inspiration can have little effect, for it is too much to hope that they will be able to any extent, either to increase the output of their labours, or to improve upon their general character.

And now I ask your indulgence for a little, while I make a few remarks upon my life and work in this University. In doing so I can assure you I am not moved by any vain feeling of egotism, for I think that my friends will not charge me with being immodest in spirit, but a foolish sense of modesty would

in this case, prevent the utterance of some of the very things I wish to say. I have tried to do well, but I see many cases in which I might have done better if I had been wiser. My life here has been somewhat unique, and not along the lines of the life of any other professor in the institution, in that I am not now teaching, any one of the five subjects which engaged my attention during the first thirteen years of my labours as a teacher here.

When I first came on the staff, Wordsworth's little poem, "We Are Seven," was not applicable to the Senate, unless you counted in the janitor, faithful John Cormack, for we were only six. One of these now lives in Scotland, one in Montreal, three sleep in Cataraqui, and like Job's servant, "I only am left alone to tell thee" of those early days of Queen's College.

I had to teach the subjects now taught by six men, namely, Chemistry, Mineralogy, Botany, Animal Biology and Geology. Of course I did not do the work of six men, but I made the work of one man go as far as I could.

These were days of both scientific and financial poverty in Queen's, and although the scientific condition has somewhat improved, the financial state has very much the appearance of having become chronic. Such a thing as a laboratory within the College precincts was unknown. In a dimly-lighted room in the basement of the building, now occupied by Principal Grant as a residence, was a heterogeneous collection of glass tubes and bottles and chemicals done up in paper parcels, and minerals and fossils and geological specimens, without order or arrangement. Much of this was the debris from a quasi chemical department attached to the Medical College but belonging to Queen's, and which had not been successful in introducing its subject into the Arts course.

The first year of my incumbency, and the most weary session I ever put in at Queen's, was very largely lost in lecturing on Chemistry without any means of putting life into the lectures by experimentation. However, after some time a room was found and this chaos was brought into some sort of order. But the appliances were extremely meagre and the supply limited, and no means were forthcoming to remedy the defects.

How could any man, whatever his powers, be successful in teaching an experimental subject under such conditions,

for the first chemical laboratory of Queen's came into existence only two years before I ceased to teach the subject.

But the ingenuity with which Nature endowed me, and a mechanically trained hand and eye were of singular advantage to me, and more than one piece of apparatus which under the stress of necessity I constructed in those days, is still serving a purpose in the science department, and bids fair to outlast its maker. In the face of these difficulties I gave many lectures, and got the reputation, justly or unjustly, of being a brilliant experimenter; and that my teaching was not altogether unsuccessful I infer from the fact that many of the graduates who have contributed to this occasion, sat in my class-room in those days, and among whom I count by no means least, those two friends who have so gracefully presented the picture.

It was the necessities of this pioneer work that led me to form the high opinion which I hold of the value of manual training of a superior kind to every person who proposes to follow a pursuit in which delicate apparatus is employed. No man is properly prepared to deal with an experimental subject who has not had such a training, and were it more common, there would be less experimenters with fingers which are all thumbs.

But I must not weary you with too many minute details. My first intimate acquaintance with Queen's goes back thirty-seven years, and she was in the midst of her most perilous times only a year or so later. What with the Wier-George turmoil in the University, separating even the students into hostile factions, and the Stewart-Dickson embroglio, which culminated in the separation of the medical faculty and its formation into an independent institution, bearing the very pretentious name of the Royal College of Physicians and Surgeons, and both capped with the withdrawal of that little but important pittance of help known as the Government grant; it was a question whether Queen's would survive or not. And at a meeting to consider ways and means I distinctly remember one of the medical professors proposing to place the university under the wing of the Medical College, for medical students were more numerous than arts, thus reversing the ordinary state of affairs. Little did he dream, at the time, of the difficulties which the near future had in store for his own institution.

A fully attended meeting of the old kirk ministers and elders was held in St. Andrew's Church in this city, to discuss as to whether an effort should be made to keep up the University, or whether it should be abandoned. After much deliberation the wiser course prevailed, and we see to-day how wise it was. This was the origin of the first endowment fund.

From this onward Queen's was for a number of years very poor in both money and students, but she was hopeful. I lectured on a certain part of my work for a whole session to only two students, and they both survived it and are living men to-day. And my late colleague, Professor Mowat, did still better, for he and a solitary student discussed Hebrew verbs throughout a session, sitting on opposite sides of the stove, and the sneering cry went abroad, "what is a college without students."

For about thirteen years I lectured to both arts and medical not conjointly as is done to-day, but in separate classes. The arts classes occupied the buildings known as the residences, and the medical classes, the building which was expressly built for them and which they occupy now.

Matters then went on quietly for a few years until the university authorities discovered, quite suddenly, that they were in need of residences for a few professors, and that by taking over the medical building for university purposes, the buildings then occupied might be transformed into residences. And so the medical building was seized upon, and with short notice the Royal College of Physicians was hustled into the street, whether to live or die was quite a matter of indifference to the authors of the act. I thought then, and I have always thought that a more unfriendly and uncharitable act could not have been perpetrated upon a sister institution, and especially in the face of the fact that the residences were not a crying necessity of the time.

But the trustees little knew of what sturdy stuff the Professors of the Royal College were made. They refused to succumb to the frigid coldness of a sister's charity, and forthwith engaged for a single session, a building about two miles from here on the Montreal road, and now used as the House of Industry. For all of us, but for me in particular, that was a session of especially hard work.



For after completing my day's work at the University I had to walk two miles through sun and storm, fair weather or foul, for five evenings in the week, carry in my hands such means of illustration as I could, lecture an hour, and then walk two miles to my home again. It required some courage to stick to a cause which appeared to be so near a collapse as the Royal then was, but we determined, one and all, to work for it and support it as long as we had students, for we felt that if it went down there could never be another Medical College in Kingston. And for some inscrutable reason we had students and a considerable number of them. And from that number I count some of my oldest and best friends among the Medical men of the country to-day.

In the following and subsequent sessions the Royal College had its home in a building near the foot of Princess Street, once occupied by the Commercial Bank, and there it remained until it removed to its present, which was also its first quarters.

Such is a brief sketch of the experience of the Medical College during the early days of my connection with it.

The people of Kingston and the University have to-day cause to be thankful that men were found willing to champion and support with their best efforts an institution surrounded with difficulties as the Royal College then was. And if I could in any way exclude myself, I would be inclined to say all honor to the men who stood by it in the time of trial, for they carried it through the valley of the shadow of death, and brought it forth a living energetic thing of action to become as it is to-day a new and yet an old faculty of Queen's having in it all the elements necessary to a vigorous and continuous growth.

When through the efforts of Principal Grant and the liberality of friends this building was erected, a small room in the corner of the building was set apart as a chemical laboratory, and I took some pains in arranging it and in designing special conveniences in the class room, and expected to settle down into some kind of a fixed and quiet course of life. This was not to be, however, and within two years I was consulted as to my willingness to be transferred to the chair of Mathematics.

It might be pertinent to ask why the authorities wished to change me from the department of Chemistry, where my experimental and constructive abilities were of the highest value

to a subject like mathematics where such qualifications are practically in no demand. I cannot answer the question; but I can answer the somewhat cognate question as to why I was willing to make the change. It was for three reasons:—First, I was willing to do whatever was thought to be for the best interests of the University; second, Mathematics was my first love among subjects of study, and I am certain it will be my last; third, I had and I still have a higher idea of Mathematics than I have of Chemistry as an educational subject, and I do not say this with the intention of disparaging the latter subject in the least, but because I believe that although an experimental subject may be of the highest interest and value in many ways and for many purposes, yet as a means of mental training it is not equal to those subjects which deal more with the abstract and draw more fully upon the powers of the mind in itself.

To those who know no better, and who have not had experience in the matter, it may appear as a very simple thing for a teacher in middle life to change from one subject to another quite incognate; in reality it is anything but simple, it is a serious loss. Of course everything is not lost. The experience which you have gained in teaching largely remains with you; but years of work spent in bringing your subject to that high state of form and efficiency which may be most profitable and acceptable to your students, all that is lost, and to some extent your professional life has to begin anew.

Having made the change I did not come into a very goodly heritage, for Mathematics from the modern point of view was at a low ebb in the College, and it has never been, as far as I know, a white-headed boy with the authorities which control the University. Hard and unceasing work offered the only hope for a better state of things.

For years I had to do this alone; then with a temporary assistant from year to year; and more recently with a permanent one, which has given me great relief, but for which I have to do a considerable amount of work outside of my own department. But I am glad to be able to say that the labour has not been in vain. A goodly number of young men and women who find their way to Queen's to make a special study of Mathematics are to be found in the honour classes, and wherever our higher graduates come into contact with those from other insti-

tutions, as at Johns Hopkins and Clark Universities, we have no reason to be ashamed of them. I say this not in a spirit of boastfulness, for I am not given to boasting, but in one of thankfulness. And I do not believe that there is a better, more thorough, or more modern undergraduate course in Mathematics to be found in any College in America, if in the world, than in Queen's. And if I did believe so I would try to inspire my students to rise to the higher ideal.

I may be permitted to say that my relations with my students have always been of the pleasantest kind. I have tried to treat them as gentlemen, in recent years as ladies and gentlemen, and they have given me, in return, all the respect that any person has any right to ask for. Whatever their failings, I have never discouraged them by comparing their brains to those of a hen or any other fowl, and I never rose to the occasion to call one of them a fool. This may have been a weakness on my part, but it has worked well. And standing here to-day I thank all the students individually and collectively, who have attended my classes for the past third of a century, for assisting to make my life a series of pleasant sessions and happy memories, instead of a succession of disagreeable labours burdened by unpleasant associations.

But I have said enough and possibly too much about myself. I must now ask your indulgence for a few minutes while I say something about my special subject, Mathematics.

I have spoken from this platform a great many times, on various subjects, but never upon Mathematics. My beloved is getting jealous, and urges me to say a few words about her. I am not going to call it the queen of the sciences, or say it is the only science, or tell you that it is the one subject worthy of study or that it will make kings of men, or anything so bigoted and silly. But the subject has certain features which are characteristic and to be found in no other subject of study.

The Spiritualist holds that the mediumistic property is due to a new sense which, although potential in every person, has in only a few received a sufficient degree of development to make it a distinctive power.

Somewhat in the same way the great Evolutionist, Dr. Alfred S. Wallace, believes that the mathematical faculty is the most recent development of the great faculties of the mind. If this be so, and there are many things in favour of the view, the

mathematician must be somewhat further advanced than his non-mathematical brother, in the great process of evolutionary development. Be this as it may, however, many things about the subject stand out in bold relief.

Mathematics is one of the oldest of subjects, as we have a written treatise upon it coming down from 3,700 years before Christ, and in the oldest known remains of civilization, going back some 7,000 years B.C., there are ample evidences of the applications of elementary mathematical principles. And yet if we except a few subjects which were born in the nineteenth century, no other great subject of human study has made as much progress as mathematics during the past hundred years. And the progress has been, not only in the volume of the matter and results attained, but also in new processes and new views, so that a great mathematician like Newton or Euler, would quite fail at first to recognize the fullness and completeness of the subject could he come upon the scene of human action to-day.

This was noted by Lord Kelvin at the British Association Meeting in Toronto, a few years ago, when he said that when he was a young man, "Fourier's theorem was thought to belong to the higher mathematics, but now it was found quite common in text books." The same remark would apply to many other theorems, and there are more good mathematicians in the world now than ever before, although, of course, the old adage applies, there is still room at the top.

In some ways mathematics is a unique subject and stands in marked contrast to others. Thus every man is an economist, and a politician, and a philosopher, and a theologian in his own way. But every man is not a mathematician, and does not profess to be so.

The student of practical science requires a work shop, and a paraphernalia of tools and appliances of various kinds, and can do little without them.

The mathematician needs no laboratory but his brain, and no tools except a pencil and paper and the instruments of his own thoughts.

The philosopher is concerned about the existence or non-existence of an external world. The mathematician, as far as his subject is concerned, does not care two straws whether there be an external world or not. His higher life is spent in

proximity to the imaginaries and the infinities, and his highest thoughts and conceptions find no correspondent in the external world.

It is just here that the philosopher fails to understand the mathematician, or to enter into his realm of thought; and he must always do so unless he becomes a mathematician. Thus, the philosopher denies the possibility of a four-dimensional space, and thinks the mathematician an idiot who speaks of such a thing. But space finds its mathematical relations in Euclidian Geometry, and only those analytic ideas which are interpretable in Geometry can have any relation to space as we know it. But the mathematician deals with analytic concepts which transcend Geometry, and therefore transcend the known world of reality; and as an analytic idea space of four dimensions is just as reasonable as space of any other number of dimensions, for it is merely the extension of symbols from a lower plane of thought to a higher.

A conception of the last century known as the doctrine of the imaginary is of such a nature that that called the imaginary cannot possibly be imagined. The philosopher and the man of common sense may say that such a concept cannot serve any trustworthy purpose. The mathematician knows better. He knows that the doctrine of the imaginary has nearly doubled his mathematical knowledge, that it has harmonized results and simplified methods, that it has given him a peculiar power over analytic operations, and that it has so completed his Algebraic concepts that nothing mathematical can possibly exist outside of them.

And these results, this generalizing and harmonizing, are due to the labours of successive generations of mathematical thinkers, extending over a period of fully five thousand years, from the ancient Egyptian Ahmes, down through Greek, and Indian, and Arab, and Moor, and European to Klein and Poincarre, and Hermite, and a host of workers to-day.

And yet we hear people, who would stick on the *pons asinorum*, or if not on that on some bridge a little further on, say that mathematics are dry and uninteresting and unprofitable. To them it may be even worse than the fabled sour grapes; but surely a man should be modest in the presence of great things which he can never know or understand.

There seems to be a general impression abroad that the mathematician knows nothing but mathematics, that he is inflexible and unimpressionable, despising literature and sentiment, or treating them with indifference. This impression is not deducible from the facts. It is true that he is not an expert at sensationalism like the novelist, and he does not mar his language by continually quoting from Greek or Latin authors, like the classicist, but he is not such a stick after all. Many of them enjoy all the higher literature to their full capacity, and no capacity can be more than filled. Many of them like Leibnitz and Des Cartes, have written extensively on subjects outside their specialty; some of them, like Pascal, have been noted theologians and controversialists; others, like Newcomb, have written acceptably on economics; some have been possibly good poets, and a goodly number have occupied their hours of recreation with music or art.

In England it is a common thing for the great church officials and theologians to have been wranglers at Cambridge. But a very different tradition prevails at Queen's, the higher mathematics being confined quite exclusively to non-theological students. It is not my purpose to attempt an explanation of this difference, but it is just possible that too familiar contact with a subject which is positive, exact, demonstrable and non-controversial, might not be the best suited for those who propose to follow a more or less dogmatic and controversial profession.

However, no inducement of any kind, as far as I know, has ever been held out to any student to pursue a course in mathematics. And yet there is no dearth of students in the honour classes. Love and admiration for the subject, coupled with the possession of a mathematical taste, have so far been quite sufficient. And I presume that as long as the subject is properly taught there will always be a sufficient number of young men and women interested in the pursuit of the "bewitching science" to keep the teachers from growing rusty or the subject from falling into desuetude.

But what is Mathematics? Different persons would give different answers to the question. The business and commercial man would say that it consisted in arithmetic and book-keeping, and general commercial and business mathematics. The surveyor, that it comprised the knowledge of Geometry,

Algebra and Trigonometry, as applied to the principles and processes of all kinds of surveying. The astronomer would extend it to the measuring and weighing of worlds, and the calculation of the orbits and places of the members of the solar system, etc.

All these things would be correct in their way, for mathematics is many sided and includes all exact relation. But all of these do not constitute Mathematics.

Many people appear to think that the subject exists for the sole purpose of working out theorems and devising formulas which may find their application in effecting the solutions of the various problems which occur in the prosecution of the experimental sciences. For the theories of Heat, of Light, of Electricity, Astronomy and Physical Chemistry, all are mathematical, and would be nothing without Mathematics.

And it is true that these subjects form a large body of Mathematics, and that in them the science finds its great field of practical utility. But to say that these form the whole of Mathematics is just as reasonable as to say that the whole of the arable land in the world constitutes the whole of the earth's surface. There are arid wilds and mountain fastnesses which delight the explorer and the pioneer, but which will never be cultivated, and there are mountain heights that have never been climbed. The true mathematician pursues Mathematics for its own sake, regardless of any practical application which the results of his labours may have. And it is through him and him alone, that the subject has reached that unique beauty of form and completeness of generalization which characterizes it.

But I must not detain you too long, so I will close after quoting from a recent writer:

“In the minds of eighteenth century mathematicians their science existed for the sake of its applications. Forgetfulness of this was, in their eyes, reprehensible, or even immoral. The question was, what would a given piece of mathematics do? They liked smooth running and elegant machinery—there was economy in this; but they were not sedulous that it should have symmetry; idle admiration of its beauty they hardly approved. If it was excessively complicated and intricate, that was regarded rather as a feature to be proud of than as a blemish. Were the complete revolution that the nineteenth cent-

ury wrought upon the ideal of Mathematics not notorious, one could soon convince himself of it by looking over almost any modern treatise, say Salmon on 'Higher Plane Curves.' That volume, for example, would be found replete with theorems, hardly any of which hold good for any curves that could really exist. . . . . Modern Mathematics is highly systematic. A simple theme is chosen, some conception pretty and charming in itself. Then it is shown that by simply holding this idea up to one's eye and looking through it, a whole forest that before seemed a thick and tangled jungle of bushes and briars is seen to be in reality an orderly garden. The word *generalization* really cannot be fully understood without studying modern Mathematics: nor can the beauty of generalization be in any other way so well appreciated.

"There is no need here of throwing out extreme cases. Far from that; it is precisely in the extreme cases that the power and beauty of the magic eyeglass is most apparent and most marvellous. Let me take back the word 'magic' though; for the reasonableness of it is just its crowning charm, I must not be led away from my point to expatiate on the reposefulness of the new Mathematics. . . . . Suffice to say that it is so reasonable, so simple, so easy to read, when the right view has once been attained, that the student may easily forget what arduous labours were expended in constructing the first pathway to that lofty summit, what mastery of intricacies far beyond the reach of the first century masters."

"It must not be supposed", said Jacobi, one of the great simplifying pioneers, especially in the field of elliptic function, 'that it is not to any gift of nature that I owe such mathematical powers as I possess; no, it has come by hard work, hard work; not mere industry, but brain-splitting thinking, hard work; work that has often endangered my health.' And if Mathematics can be called great, as it certainly can, such were the men who made it great.

And to Jacobi's testimony, I can only add that nothing in this life comes to a man, that is really worth having, except through hard work. For it is work, good, honest, faithful work that can lift a man out of the blues and make "the wheels of life gae down hill screeven."

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