EDUCATION OF THE PAST,

AND

EDUCATION OF THE FUTURE;

ADDRESS

DELIVERED APRIL 4th 1864, AT THE
INAUGURATION OF A CHAIR OF
INDUSTRIAL SCIENCE IN GIRARD COLLEGE;

BY

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PHILADELPHIA,
Pupils' Press, Girard College.
1864.

In the month of February, 1864, *the Councils of the City of Philadelphia established, in conformity with the proposition of the Directors of Girard College, a new Chair in that Institution, namely that of Industrial Science.*

This Professorship was offered to, and accepted by Dr. P. H. Vander Weyde, Professor of Chemistry at the New York Medical College, and of the Natural Sciences and higher Mathematics, in the Cooper Institute, New York.

Standing here, a stranger among you, and coming to occupy the newly created Chair of Industrial Science in an Institution, the equal of which in magnanimous philantrophy (1) is not to be found on the surface of our globe, it is very natural for me to expect that you will be desirous to hear my opinion and principles on the all important subject of Education; and it is very natural also, that I should feel myself bound (allow me to use a common expression) to define my position.

Let this be my apology when alluding to myself.

It has always been my good fortune to be connected or intimately acquainted with Educational Institutions; this was a natural consequence of the tendency of my mind, which always induced me to explain to myself and others all that interested me; yet notwithstanding that I have repeatedly tried to give up teaching, and have for instance practised medicine in the City of New-York during several years, I have always returned to my first love: *to be a Teacher.*

The Institute from which I come, and with which I had the honor of being connected from the beginning of its career, the Cooper Union of New-York, although it is intended like the Girard College for the promotion of Education, has however selected an entirely different field of labor; namely the increase of knowledge among the masses, and on that field I have labored for the last five years, and have practically experienced the advantages and disadvantages thereof.

The Girard College has not been founded merely to increase the knowledge of more or less educated persons, it takes charge of the whole education, of at present 600 Orphans, materially and morally as well as mentally; here in lies its great advantage; and the satisfaction a teacher may enjoy in the progress of pupils placed in such enviable circumstances, compensates fully for the more brilliant but superficial satisfaction, I thus far obtained, by daily lectures on the most important and entertaining departments of the natural sciences, before a mixed and continually varying audience. (2)

Within my knowledge there exists only one Institution, which in its operations and results, may be compared with the Girard College ; a short account of it may be interesting on this occasion. It is founded in the cities of *Delft*, *Utrecht*, and *Leiden*, (*Holland*,) by a Legacy of Lady van Renswoude, who left a considerable amount of real estate and stock, and three large buildings, one in each city, in order to give to orphans, to be selected for *superior intelligence* from the public Asylums, *a better education than is usually received at the public schools*. I am acquainted with the opera-

tion of this Institution, the home treatment is similar to that received here, and the mental training to that of our higher classes, somewhat farther extended; the pupils may select any vocation ; it is usually one requiring more intelligence than the common trades viz: Architect, Engineer, Surveyer, Practical Chemist, Manufacturer, Officer of the Navy, or of the Engineer corps in the Army, etc. but one singular provision in the will of this Lady shows in her theological opinions a similarity to those of STEPHEN GIRARD, she stipulates that under no circumstances whatsoever, should any of the pupils of her college be prepared to become a Clergyman or Religious Preacher.

This Institution has been in operation for more than a century, and some of the most intelligent men in Holland, whose merits were Heroism in war, Discoveries in Sciences, Improvements in the Arts, or Enterprise and Integrity in Commerce, received their education in that establishment.

The Girard College is in fact such a learned institution combined with a large orphan home, it must be such if the will of the noble founder is to be carried out, and I will now investigate what principles must be the foundation of our judgement, in the choice of the branches of education, and of the manner in which they must be taught.

To make a wise selection we must not permit ourselfs to be governed by old European traditions, but look around as it were, upon neutral ground, consider the wants of the 19th century on the American Continent, throw if possible a prophetic glance into the future, and become persuaded of the immence difference between the

Education of the Past and *Education of the Future.*

The last expression will be the theme of a few remarks which I will take the liberty to bring before you, on this occasion.

They will chiefly apply to mental Education, this being the speciality to which my life has been devoted.

I will only say in regard to physical training that we will have to return to the habits of the Ancients, and renew part of their Gymnastic and Athletic Exercises which in our day are too much neglected.

In regard to moral training, I might state my experience, that we attain much when an intelligent mind in a healthy body, is constantly kept occupied by diversified mental exercises, alternated with physical occupations ; I always found that when keeping young men busy in such a manner, exciting their interest in some scientific, artistic or material subject, there was less need for moral exhortations or corrections.

Mental training, the discipline of the mind, is obtained only by study; therefore from time immemorial study was resorted to, not so much because of the absolute necessity of learning the things which were studied, as for the purpose of educating the mind of young persons.

In olden times when very few useful branches of Science were discovered, very few really useful things were studied; for instance in the time of Shakespeare men who understood the Latin and Greek Authors, were ignorant of the most common rules of Arithmetic, which in our Age are considered absolutely necessary for every man and woman to know, while the reading

of the classic Authors in the original language is now considered a mere accomplishment, of value to be sure, but not of absolute necessity for every well educated person.

That STEPHEN GIRARD was a man with a clear and intelligent mind who understood this, appears from his expressly stating in his will: that he does not recommend the study of Latin and Greek, but he prescribes the study of French and Spanish; it proves him to have been a man who understood the mental wants of the future.

In the choice of the branches of instruction in our schools, we are still too much led by the customs inherited from former ages, when education was exclusively literary; the simple reason of this was, that there was nothing else worth studying; the study of the branches of Natural science had not progressed far enough to deserve the name of a Science.

In our nineteenth century however, all the different branches of this study have by the admirable efforts of human genius, been elevated to the most perfect Sciences, made more perfect still by the application of Mathematics, of which the Ancients (it must be acknowledged) did know the fundamental truths, but only as abstract speculations with very limited practical applications.

At present the sciences pertaining to the study of Nature, are of such a character that they give more discipline to the faculties of the mind, and at the same time impart an amount of information, more necessary than any other knowledge we may obtain.

Man being an integral part of Nature, his existence depends entirely on its laws; therefore the Science of Nature is the first he must begin to understand.

Notwithstanding all this, after we have been submitted to a regular classical University Education, we are still ignorant of the causes of many of the most common natural Phenomena, and almost strangers to Sciences appertaining to the study of Nature, unless some personal taste, aided by exterior circumstances makes up for this deficit in our mental training. The cause of this I will presently refer to.

One great advantage in substituting the study of Natural sciences for part of the literary training among persons of mental abilities below the average capacities, is: that when they study a language (say Latin or Greek) half, it is of little use, and that half is soon forgotten, the time was lost, and all the benefit derived was some exercise of their memory for words; however when they study a course of Natural Philosophy or Chemistry half, that half is of immense benefit, not only as an exercise in memory and judgment, but of material benefit in thousands of circumstances in later life.

Now I hope not to be considered as underrating the advantages of a classical Education; I know there is great danger of such a judgment upon me from men who have received such an education and know its inestimable value to their own happiness, men are too apt to underrate any thing with which they are imperfectly acquainted, and therefore the

Natural Sciences are not estimated at the right value they deserve, as compared with the classic studies, being at present very imperfectly studied in all our schools and colleges.

Far from underrating any subject of study, I claim to stand on Catholic ground, having given instruction 35 years ago, first in Languages, and then in Arts, Mathematics and the Natural Sciences. I know by experience what was most valuable to my pupils and myself, what they and I forgot, and what we could not forget.

I will now speak of the reasons why our knowledge of the natural sciences is not greater and more universal; notwhitstanding it is true that those sciences figure in the programme of the course of most educational Institutions and of all Universities, it is equally true and deplorable, that they do not receive a due share of attention, at all to be compared with the care devoted to the literary branches; and even if they receive this attention, they are taught in a very inefficient way, forgetting that Nature cannot be studied by books alone, like for instance Literature and History, it being the study of *Things* and not of *Words*.

And here I must re-call to your attention an expression in Mr. Girard's will, stating his wish that the pupils should be taught *Facts and Things rather than Words and Signs*.

Most other branches of study are too much treated in the traditional way in which literature is taught, namely by books alone. All teachers know that pro-

gress in Arithmetic and Algebra depends very little on lessons learned in books, but on practical exercise in calculating on the slate; that Geometry is well understood only, when the pupil can draw his figures on the blackboard, and demonstrate without his book; that in Geography the book without the maps would be of little benefit, (travelling with the pupils would be better still, but costing too much time and money, good maps are a very efficient substitute.) So far those branches are taught in the right way, but if we go a step further, in the study of Nature, we find that Astronomy is often taught from books alone, in place of taking the pupils under God's starry heavens, which are open to the inspection of every one; the result is that they know the words alone, and not the things themselves. A gentleman in New York told me, that after he had attended lectures in Mathematical Astronomy, in Columbia College, and graduated there, he was a perfect stranger among the stars and could not tell one planet from another; he afterwards built an observatory on his house, and is now an Astronomer, by taking the heavens as teacher, in place of the books alone.

In Natural Philosophy and Chemistry we find often that the whole study consists in learning a lesson from a book; this may be excused for two reasons: the necessary apparatus cannot always be had, because the expense of buying and of keeping it, and experimenting is a separate art; however well founded this excuse may be, the objection stands there, that in the study of Nature, natural phenomena, seen by observations and experiments, should be our teachers, and to understand those sciences, we should understand

the things themselves, in place of words and phrases from the books.

The father of Medicine Hippocrates says: *"Science and Opinion are two, the first causes us to know, the second to ignore."*

The fact is we know only that which by observation and reflection we have deduced from Nature itself; true science is only that what has been assimilated in our mind. Do we really understand any branch of Natural Philosophy when we know completely and correctly the opinions of all Authors on the subject? Certainly not, we know then only the literature of that branch; and how often is this knowledge confounded with the true knowledge of the facts themselves.

This Literary or rather historical investigation is only necessary to become acquainted with what others before us have investigated, but the most prominent truths must be demonstrated before all our senses by experiment and observation, then only do we really know and understand.

This is the key to explain the Progress and Discoveries of our age. History is there to prove this; I will give only one single illustration: Why did the natural Sciences and Medicine in particular, remain entirely stationary during the period of more than thousand years in the middle ages? Only because the dogmatic theories of GALEN were universally adopted as the absolute unalterable truth, and the denial of those dogmas was considered a sacrilege. The great BACON was the first who announced to the world that *"Man,*

the Product, the Servant, and the Interpreter of Nature knows and comprehends only so much as he has experienced practically about Nature's laws, more he does not know, more he cannot know." But PARACELCUS with all his faults and errors, deserves the honor of being acknowledged as the first who practically denied all scientific authority, and who substituted for it the direct investigation of Nature by observation and experiment. Compare this with *Van Helmont* the Alchemist, who also undertook the reform of the Natural Sciences, but based his system, not on observations but on his own imagination. Those two strongly contrasting reformers are only the types of men found in all ages, even in our own.

The best guarantee against such unfruitful imaginary theories, is, *sound instruction in the Natural Sciences* based on actual experiment and observation; the only objection against which is that it is so infinitely more laborious than studying mere lessons from books. But when we look at the kind of Labor to be performed that labor is a delight when we have the means at our command in the form of suitable apparatus. Every experiment we perform before a class is a question to nature if our view is correct, and Nature is always ready to give an answer, if questioned in the right way; in the result of the experiment we read that answer, we reason, we progress in intellect, teachers as well as pupils, and let me here point out that when studying in such a way, the course of Natural Philosophy becomes a recreation to the pupils after philological studies. In this way pupils will accomplish more in the same time, because they are entertained when studying.

All those men who recently have made themselves prominent in introducing reforms in education, advocate a more thorough study of the Natural Sciences as the best means to develop the practical judgement, the sense for true beauty, (as the mind is continually occupied with subjects, where the most perfect adaptation to the purpose is the characteristic property,) the formation of a taste appreciating truth, consistency, unity in variety, etc. and finally a firm persuasion of the divine great cause of all nature, which persuasion ought to lie at the foundation of all religious belief.

Another reform to be accomplished by devoting more time to the study of Nature, (the direct product of the divine mind) in place of the exclusive study of literature, the product of human ingenuity or —— folly) will be a change in the perverted public taste. Let us look for a moment at the result of the almost exclusively philological education, which was given to our population, and notice the monstrous amount of Novel writing and reading, by which thousands of our fellow men waste valuable time, and which taste is so unwisely nourished by most public Libraries, and even by newspapers.

The public has by this one-sided education been induced to overestimate the value of all possible kinds of literary productions, usually dished up in the form of history or poetry, also their authors, who sought a basis for fame or profit in this perverted public taste, dedicate their time and brains to the production of books in fact worthless, at the very best harmless, but sometimes injurious to humanity. It is acknowledged

that some of the productions of this day have a higher purpose, and aim at some social or moral reform, but they are exceptions, nine tenths of the books of this class are absolutely worthless.

Thus far I have spoken chiefly of one result of a more scientific education, which no doubt will be the *education of the future*, namely the formation of the mind of the generation to come somewhat different and better than the majority of the present generation; but there is another and perhaps more striking result, flowing out of this change, the personal material welfare of each individual; to appreciate this we have only to look at the difficulty sometimes experienced now a days by men of an exclusively philological education, to provide for themselves a lucrative standing in society, so easily obtained by thos whose education was founded on a scientific basis, being the true education of the 19th century and of the future, and therefore prepared for practical life in those days.

When we look around to see what men are at present successful by their learning, we find it to be not the literary characters and the poets, among whom success is a rare exception, but the scientific men, among whom (provided their science rests on a solid basis) success is the rule.

When we ask what men have in our time chiefly benefitted society? the answer is: by no means the producers of Literary or Poetical works; but those who have studied the natural sciences, and by glorious discoveries have extended the bounderies of human power.

To recapitulate the last few remarks, we may say in a common phrase, that it pays well to be a practical scientific man, but to be only a literary character or a poet, this does not pay.

But now I must apologize, not to the audience, but to the beautiful Sciences to which I have devoted my life, because I allowed myself to be carried away by the material views of the present age, in which the claims of a branch of study to our attention, is only measured by the material profits; as if the divine science of Nature had no other claims to our attention than the resulting mere pecuniary gain; let us take here the example of the bygone ages, when in the choice of the branches studied, pecuniary gain was out of the question altogether, and when the things known, were only studied for their intrinsic beauty, and for the enjoyment and happiness they produce when mastered by the mind. It is true, that at that time education was for the few, and that in this century, but especially in this part of the world, it must be for the many; therefore let the many obtain the same cultivation and refinement, at the same time preparing them for practical life, and let the few who have enjoyed the advantages of a classical education also appreciate the study of the Natural Sciences at their right value.

That those sciences have greater claims in an aesthetic point of view, than any other object of study whatsoever, may be easily demonstrated; I may however claim your attention not longer than to call as witnesses those men, and I am happy to add those women also, who after having studied the philological

branches exclusively, for the first time commence the study of any branch of the natural sciences, for instance: Botany, Chemistry, Physiology, Anatomy, etc. they all testify that the enjoyment is infinitely greater. I have had among my students in the N. Y. Medical College several young men, who after having enjoyed a finished literary education commenced the study of Anatomy practically in the Disecting room, and Chemistry in the Laboratory; they all unanimously declared that there exists no studies more interesting; even Ladies who in that College as well as in the Cooper Institute, attended my lectures, and who studied as faithfully as any Man, made to me often the remark that those studies were exceedingly fascinating. But just as fascinating is every branch of the natural sciences when studied in the right way.

And now in closing, Gentlemen of the Councils of Philadelphia, and Trustees of the Girard College, let me thank you for the confidence placed in me, to charge me with so responsible and influential a position, in which I hope to be able to exert, it is true, a very modest and quiet, but nevertheless powerful influence on the future of society.

To my Fellow Teachers I reach the hand of friendship, and do not doubt that we will harmoniously labor together to the accomplishment of our holy calling.

To the pupils of the College, I promise that I will with all my heart patiently aid their efforts to elevate their minds. I say: aid their efforts; for the teacher can only point out the way, the pupil must labor, and

must have courage and perseverance. In the paths of Science there is more than one hard road to travel; but however hard the roads may be, they are pleasant after all, they lead to happiness and satisfaction in later life. *Think always that the happiest man in all creation is he, who is conscious of having spent his boyhood in the right way.*

And now Ladies and Gentlemen receive my thanks for the attention with which you have honored my remarks.

NOTES.

(1) Page 4.

This expression is not used in a sense to underrate other similar Institutions, founded by liberal citizens, and which from time to time coming into existence, are each useful in the sphere they have selected. Of many it may truly be said that thus far they have no equal in the world. The periodical literature of Europe indicates that this kind of result of our republican institutions is there exciting surprise and admiration.

(2) Page 4.

This difference however is not as great as it would seem ; I must confess that the less favorable circumstances in which the pupils of the Cooper Union are placed in regard to the time they may devote to their private studies (†) is fully compensated by their love for Science, and the attention shown there to the lectures is quite exemplary. The five years I passed there, partly with scientific pursuits, preparing for publication new methods of teaching, but chiefly with practical teaching and lecturing every night, I will always remember with great satisfaction, and I carry with me the most pleasant reminiscense of the sympathy existing between my pupils, hearers and myself, founded on a common most intense love for scientific knowledge.

(†) These pupils are all the day occupied in some practical occupation, and having only the evenings at their disposal they devote them to private study and the attendance on the free course of Instruction given nightly at the Cooper Institute.

(3) Page 13

If Bacon has no other merits, this announcement surely contains an undeniable truth ; which however most inconsistently

he never brought into practical application. His education being altogether literary, he was ignorant of Mathematics, wrote the most conceited criticism against the astronomical system of COPERNICUS, simply because he did not understand it, and never discovered anythiug in the realms of positive science, or added anything to practical knowledge. The reason that his merits are much overestimated (notwithstanding his acknowledged bad character) is that his admirers are men of a onesided education, who think that Scientific discoveries may be accomplished by mental reasonings alone; no great discoverer ever followed the boasted Baconian method explained in his writings.

See Drapers History of the intellectual Development of Europe Page 516.

[4] Page 15.

I have lately heard the wish expressed, that the study of the Latin language should be introduced in the course of this College. The answer to this is already contained in what has been before remarked. Such a wish proceeds only from those not fully aware of the eminent influence the positive sciences exert in the present age, and of the impossibility of learning *everything*; therefore we would only be substituting something very useful and very ornamental, for something absolutely necessary to know. In the great extent of the branches to be studied, those of absolute necessity must of course stand foremost, and we can not expect pupils who at eighteen years of age have to be prepared for practical life, besides studying the indispensible branches of positive science, such as Mathematics, Mechanics, Natural Philosophy, Chemistry, Mineralogy, Technology, etc. and the very useful Philological studies as History, French, Spanish, and English Literature, also to devote a part of their time to the Classical branches in the form of Latin, etc.

The acute French author *La Fontaine* puts this in a forcible light when he tells us that to learn Hebrew, the Sciences, History etc. is to swallow the ocean:

Si j'apprends l'Hébreux, les Sciences et l'Histoire
Tout cela c'est la mer à boire.