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ADDRESS,

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INTRODUCTORY TO A COURSE OF LECTURES

ON

CHEMISTRY,

DELIVERED IN THE

Manchester Mechanics' Institution,

BY JOHN DAVIES,

Member of the Wernerian Society of Edinburgh, of the Literary and Philosophical Society of Manchester, &c. and Lecturer on Chemistry at the Manchester Medical and Mechanics' Institutions.

AND STRENGTHEN MAN WITH HIS OWN MIND.—BYRON.

MANCHESTER :

PRINTED AND PUBLISHED BY ROBERT ROBINSON,

ST. ANN'S-PLACE.

1829.



TO
BENJAMIN HEYWOOD, Esq.

FOUNDER OF THE MANCHESTER MECHANICS' INSTITUTION

AND

CHAIRMAN OF THE DIRECTORS,

THIS ESSAY IS RESPECTFULLY INSCRIBED BY

THE AUTHOR.

PREFACE

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PREFACE.

THE following Address formed the introductory part of the first Lecture in my course on Chemistry, at the Mechanics' Institution. I have, after some hesitation, committed it to the press, at the request of the Directors, and a number of the Subscribers. My own estimate of its merits would not have induced me to obtrude it, unsolicited, on the notice of the public.

As the commencement will appear somewhat abrupt, it may not be amiss to state, that I have omitted in the printed copy a few preliminary remarks of merely temporary interest, which were contained in the original. To preserve a unity of subject, and, at the same time, to avoid unnecessary extension of the address, I have also cancelled, at the close of it, a number of paragraphs explanatory of the nature and applications of Chemistry.

APPENDIX

The following address formed the introductory part of the
first lecture in my course on Chemistry at the Polytechnic
Institution. I have, after some hesitation, committed it to the
press in the pages of this *Journal*, and a number of the
Subscribers may own extracts of its matter which will have
indeed no to obtain it, unaltered, on the notice of the
public in any form. It has been printed in the
English language, and at the Polytechnic Institution
As the commencement will appear somewhat small, it may
not be worth to state, that I have written in the printed copy a
few preliminary remarks of merely explanatory nature, which
were contained in the original. The printer's name of subject
and of the time, to avoid unnecessary repetition of the
address, I have also omitted, at the close of it a number of
paragraphs explanatory of the nature and applications of the
matter, being such as were not in my original
manuscript, and which I have written in this form
It is the object of this address to introduce the
subject of the *Journal* to the notice of the
public, and to describe its nature and applications. It is the
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ADDRESS.



THE human system consists of two parts; that is to say, of body and of mind. Man is, in his material nature, nearly on a level with the inferior animals. When he makes particular comparisons he must, in many respects, feel his inferiority. In the power of enduring fatigue and privation; in strength, in speed, and in agility; in all other capabilities depending upon corporeal organs, whether to promote security, or to excite admiration, some humbler creature triumphs over him. His body itself has the same common origin with that of other animals; it has been formed of the ordinary elements of nature, and at the termination of his career it must be rendered up, to be again resolved into its primitive atoms, in order to constitute a part in fresh transformations. Of the same human body, some of the principles may form a component part of an obnoxious animal; while others may re-appear in the floweret, which attracts admiration by its fragrance and its beauty.

With respect, therefore, to his corporeal nature, man's pre-eminence is comparatively limited. It is consequently, to his intellectual faculty that he owes his relative importance. In every quality of his nature, apart from his mental qualities, he may find in creation some being which surpasses him. But in every thing connected with mind he is without a rival. In that he uniformly triumphs. He is there alone.

It is the mind of man which has sheltered him from the inclemency of the seasons; which to essentials has added comforts, and to comforts luxuries. It is the mind of man which has afforded him expedients for protection against his natural enemies; which has enabled him to render the inferior animals, many of which are far more powerful than himself, subservient

to his purposes; and to convert the incalculable energies of nature into resources of his own. Agencies obnoxious to him, and once apparently useless, have been changed into sources of pleasure, and advantage. The winds, which must have been only an annoyance to him when he was in his first state, now waft him over seas, on enterprises of profit or curiosity. Not only does the water, mechanically considered, serve him as a medium of conveyance; he has impressed it still farther into his service, by applying it as an agent to give motion to his machinery. Even in the state of vapour it has not eluded him; for in that state he has been able to apply it to his use, in one of the most extraordinary contrivances, which human genius has ever brought to perfection.

It is the mind, therefore, which has given to man pre-eminence in the creation. It is by his intellect that he has made stronger animals obedient to his will, and all nature minister to his comforts. It is in this quality that he bears the impress of the divinity. It is by his mind that he must be estimated, if he is to be seen to advantage.

The triumphs of genius are the grandest triumphs of human nature. They alone bid defiance to time and to circumstances. Of the blood stained trophies of the warrior which are acquired by pain, by disease, by sorrow and by death, the possession is often transitory. As they were gained at one period they may be lost at another. But the achievements of genius are immortal. They may be obscured for a time by the arbitrary decrees of despotic power; but they contain within them a principle of vitality which cannot be extinguished. In vain were the oppressions of Galileo, of Ferdoose, and of Tasso. Scorned and persecuted, "debased in the minds of men"—in their life time, the memory of them is now the proudest boast of their country. When all of glory and of power shall have departed from their birth place; when it shall be deserted and a ruin; their genius alone will shed a halo around it, and save it from oblivion.

If then the mind is of so great importance, how much must depend on its cultivation. We know how weak it is at first, and how susceptible it is of improvement. Hence the importance of education.

The mind is an active principle. It is never inert. It must always be engaged with something. It is therefore, of material consequence, that the ideas which it treasures up should be useful; that the discoveries which it makes should be subservient to good purposes. A man who knows little, may have as active a mind as the man who knows much; but the difference is this—that the former may be occupied with idle schemes and petty events, while the latter, supplied with the materials for reflection, may be forming a system of scattered facts, or enlarging the boundaries of human knowledge. The Brigand of Italy, or the Corsair of Egypt, whose life is devoted to the annoyance and destruction of others, has been known to manifest genius, which would have elevated his country, and feelings which would have adorned it.—It is not, therefore, the mere possession of talents, but the application of them, which leads to usefulness and distinction.

We ought to remember that it is never too late in life for a man to become a student. Examples demonstrate, that commencing at an advanced age, he may in fact, accomplish great undertakings. He cannot be too old to do something. It was late, in life, that Herschel became an astronomer; and no person ever effected more in that science. It was, it seems, late in life that Hutton became a mathematician; and yet how great were his attainments, how voluminous are his writings! It was late in life that the celebrated John Hunter devoted himself to surgery; and, if I mistake not, he is still regarded as one of the greatest ornaments of the profession. The same remark will apply to the chemical labours of Dr. Priestley, who made, perhaps, as many discoveries as ever were made by a single individual. It was, I believe, late in life that Mr. Dalton entered on the study of Chemistry; and he is now, unquestionably, the first chemist of the age. It is manifest, therefore, that a man may have great success in a pursuit, to which he has not devoted his attention, until he has passed the period, during which we expect the happiest results from the exercise of his mental faculties.

If we look into the profession of arms, we shall find the same principle verified. Cromwell was forty-three years old when he first assumed a military character,

and, of course, much older before he became invested with supreme authority. His contemporary Blake entered the army at upwards of fifty years of age, and acquired considerable distinction as a soldier prior to his being connected with the navy, where, in the post of admiral, he contributed to the glory of his country as much, almost, as any naval commander in the annals of Britain. We will terminate this list of distinguished names, by alluding to a man whose genius was almost an evidence of the supernatural powers, of which he professed to be the possessor. This was the celebrated Mahomet. In the early part of his life he was only a mule driver; and for upwards of forty years he remained in his original obscurity. But though the commencement of his splendid career was late, his energy made up for the disadvantage; and he soon became pre-eminent alike as an author, a soldier, and a statesman. Without the agency of wealth or the influence of dignified connections, he attained the greatest authority that any man ever possessed over his species; an authority, which was not only unparalleled in his life time, but which, with all the force that the most sacred veneration could impart to it, rivetted, as it still rivets, millions to his decrees. The enthusiasm of genius, which was peculiarly his, shed a magic influence over his actions.—Such achievements in any pursuit are the effects of decision of character, which whenever it is fully excited, enables a man to trample on the barriers which may, for a time, oppose his advancement. Opposition, poverty, age, want of leisure and even natural defects, yield to the all-prevailing influence of decision of character. As well might an attempt be made to stop a running stream, as the progress of such a mind: its career might, indeed, be obstructed for a moment, but the interruption would only cause it to augment its power, and, overflowing the impediment, to resume its course with increased and irresistible impetuosity.

Nothing can more promote the success of the student than confidence and perseverance. It is surprising what great undertakings a person may effect by well directed energy. One student may attain the object of his ambition, while another, in precisely the same circumstances, may be idly wasting his time in seeking for reasons why it would be vain for him to attempt.

A timid man will always find appalling obstacles in the way; while a man of confidence and activity may do almost any thing he wishes. "Nothing," says Sir H. Davy, "is impossible to genius aided by industry."

Many instances might be adduced of this unbending ardour, as it has been displayed by those who have raised themselves above the level of mere ordinary men.

An anecdote, illustrative of Herschel's perseverance, was related to me some time ago by an Italian artist, who had the good fortune to be intimate with the great astronomer before he acquired his celebrity. Herschel had spent some weeks in grinding one of his optical glasses, which chanced to break just at the time when it was near its completion. His disappointment was, of course, considerable. Instead, however, of throwing himself into a fit of passion, or resigning himself to despair, he shewed all the coolness and fortitude of a man whom nature seemed to have destined for great achievements, and simply exclaimed, in his foreign pronunciation, "Vell, I must make anoder." When the members of this Institution are engaged in any unsuccessful attempt in science; when the failure of any favourite effort almost induces them to relinquish the undertaking; let them keep in mind the example of our illustrious astronomer, and renew the task with his energetic and philosophical determination of, "Well, I must make another."

The usual complaint of those who have done nothing is a want of time. This is the specious but fallacious defence of the idle and the weak. Few men devote more time to any single object than what every man possesses. The person who has much leisure, too often suffers his mind to wander over many objects, and it becomes enfeebled by the variety.

Franklin, one of the most splendid specimens of human nature, whose great discoveries in science were the results of mere amusement during intervals of leisure, is an excellent example to shew, how much may be done in these subjects by a man, whose life appears to be engrossed by very different pursuits. Arkwright was, for many years, in an humble occupation, not very favourable to the developement of intellect; yet you need not be reminded how much he effected to promote the mechanical pre-eminence of his country, and how well

he was rewarded. Talent may, indeed, struggle with adversity for a time; but, if it be associated with perseverance and discretion, it will ultimately lead to honour, and to affluence.

In further confirmation of the principle for which I am contending, it has been remarked, by the eloquent Professor Playfair, in his posthumous memoir of Mr. Clarke, that "the author of the *Naval Tactics* was one of those men who, by the force of their own genius, have carried great improvements into professions which were not properly their own. The history both of the sciences and of the arts furnishes several remarkable examples of a similar nature. Fermat the rival, sometimes the superior of Descartes, one of the most inventive mathematicians of a most inventive age, was by profession a lawyer, and had only devoted to science the time that could be spared from the duties of a counsellor or a judge: about fifty years earlier, also his countryman Vieta had made a like digression from the same employment, and hardly with inferior success. Perrault, who, in the façade of the Louvre, has left behind him so splendid a monument of architectural skill and taste, was a physician, and not only practiced, but wrote books on medicine. Mr. Clarke is to be numbered with these illustrious men, having made great improvements in an art to which he was not educated, and in which early instruction and long practice, would seem more indispensable than in any other." It is remarked by Washington Irving in his highly interesting memoir of Columbus, that "let those who are disposed to faint under difficulties, in the prosecution of any great and worthy undertaking, remember that eighteen years elapsed after the time that Columbus conceived his enterprize, before he was enabled to carry it into effect; that most of that time was passed in almost hopeless solicitation, amidst poverty, neglect, and taunting ridicule; that the prime of his life had wasted away in the struggle, and that when his perseverance was finally crowned with success, he was about his fifty-sixth year. His example," adds his biographer, "should encourage the enterprising never to despair."

For the want of perseverance nothing can atone. A deficiency of this kind could not be compensated by any advantage. In literature and science men can only

obtain eminence by determined assiduity. But the student must be content to resign himself to a principal object. By attempting to do too much, we do less than we might. The scattered rays of the sun produce only ordinary effects; but when they are concentrated their power is inestimable. It is the same with the action of the human mind. Directed different ways at the same time its energy is feeble; but when its powers converge to one object it accomplishes all of which it is capable.

Method is in every thing we undertake of great importance. It gives facility and success. With the aid of a judicious arrangement almost any thing may be accomplished; but without it, the mind wanders in a labyrinth, and often retraces the unprofitable footsteps which it had already taken. Method is, in fact, the magnet of the mind. A good arrangement of time and of subjects gives to one man a greater advantage over another than is generally imagined. It constitutes in many cases the only difference between the successful student, whose mind is invigorated and enlarged; and the laborious trifler, who spends without advantage the time and the talent which might, under proper regulations, have been turned to a valuable account.

It is encouraging to reflect, that by well directed and vigorous efforts a man must to a certain degree succeed. Who were the men that have excited the respect and admiration of their posterity? Who, indeed, are the leading men in our own town? They are generally men who have risen as you may rise; who do not owe their elevation to the mere accidents of birth and connection; who are not of families which resemble a certain useful vegetable, with the best part of them in the ground: but, on the contrary, men who have the pride and pleasure to know, that it is to their own efforts that they are indebted for all that they possess; and that the same exertions which have enriched them have benefitted their country. The man who would rise to distinction must carve his own fortune, and coin a name for himself. A man of a superior mind does not require to be recommended by the "musty records of his ancestry." "He lives to build, not boast a generous race." Illustrious and affluent progenitors could as little have added to the fame, as they could have aug-

mented the genius, of Archimedes or of Homer, of Newton or of Shakspeare. To hereditary rank, when properly supported, a peculiar courtesy ought certainly to be paid: but it is to the man who is great by his own actions, who "stands forth as the architect of his own fame," who "shines before the world like sun rise from the dusk," it is to such a man that we owe the homage of our respectful and unqualified admiration.

The acquirement of learning ought to be considered as an instrument, not as an end. The individual who knows only one branch of science, and enlarges its boundaries by a single fact, is, as a student, worth more to his country and to the world, than the person who possesses himself, if it were possible, of the whole mass of human knowledge, without, at the same time, contributing something to its extension.

We find that men of the most fertile genius are sometimes of but limited information. Even Newton who gave to the world, "the enduring produce of immortal mind," was much less learned than many men of his time. The acquirement of learning, and the use of it, are operations so distinct, that too much attention to the former, often appears to paralyse the capacity for the latter. It is, I apprehend, on this account, that profound classical scholars, whose mental labours have been devoted to mere acquisition, generally evince so little originality of mind; and that the most useful discoveries and inventions have been made by practical men who possessed just knowledge enough for the purpose, and had prepared themselves to apply it by habits of reflection. Some knowledge however they must possess; and, as far as the sciences are concerned, that knowledge may be sufficiently attained, by any man, even of an advanced age, from the lectures and the library of the Mechanics' Institution.

Many persons labour under a serious error with respect to the study of science. The useful facts in any branch of knowledge are not so numerous, nor so difficult of attainment as is generally imagined. Take from a science all that is extraneous, and you may often reduce a bulky folio to the dimensions of a moderate pamphlet. He who really studies one good author upon any given subject generally acquires more infor-

mation upon it, than another who reads a great variety of books. One well compiled treatise on any science, such as that of Professor Leslie on natural philosophy, or that of Dr. Henry on chemistry, is therefore a complete library on the subject. You may soon learn any thing you wish to know, if you only proceed judiciously. It is a fine observation of Lord Bacon, and a little experience will convince you of its truth, that "both works and doctrines appear many, but are few."

This is not the occasion for me to expatiate in particular on the advantages resulting from Mechanics' Institutions. I would not weaken by my repetition the impression which has been made by the able addresses of our excellent chairman. I may, however, be indulged with a few remarks on the subject.

Perhaps there never has been a scheme devised tending so directly to combine an individual benefit and a general good.

To the individual the Institution furnishes at any rate a most agreeable way of occupying his leisure; it gives him habits which cannot fail to be beneficial; it opens to him sources of credit and of pecuniary advantage, and by raising him higher than he previously was in the scale of society, makes him feel the force of Bacon's observation, that "knowledge is power."

To the kingdom at large these Institutions are worthy of support. They augment the national resources, by circulating intelligence among the most useful class of the community; and by rendering more fertile the industry, the skill and the genius of those who have given to great Britain so much influence in her intercourse with every other country.

By reminding you of the leading arguments in favour of these institutions, I may weaken, in some degree, the influence of a work which has lately been published, and in which the author labours to convince the legislature, for whose interference he calls, that Mechanics' Institutions are pregnant with evils of a very appalling character. The author assumes, however, for the foundation of his reasoning, a postulatam, which surely will not be generally conceded; that the very perfection of society consists in the state in which learning of every kind is reserved exclusively for the higher ranks, while persons in humbler conditions of life are no more

enlightened than the implements with which they labour
 His reasoning, however, by shewing the evils and
 misery arising from the possession of knowledge would,
 if carried far enough, prove, if it proves any thing,
 that study must be pernicious to persons of every rank
 and condition: and hence the direct conclusion would
 be, that civilization is a great evil, and that wise men
 and philanthropists, instead of seeking to enlighten the
 world, should do all in their power to bring mankind
 back to the felicitous state of barbarity in which genius
 is useless and science unknown. Had this ingenious
 writer been educated on his own principles, he would
 never have been distinguished as the most plausible and
 eloquent assailant of **Mechanic' Institutions.**