

Address delivered at the opening of the Bath literary and philosophical institution on January the 21st, 1825, / by Sir George Smith Gibbes.

Contributors

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with the author's

kind regards

ADDRESS

DELIVERED

AT THE OPENING OF THE

BATH

LITERARY AND PHILOSOPHICAL

INSTITUTION,

ON JANUARY THE 21st, 1825,

BY

SIR GEORGE SMITH GIBBES, M.D. F.R. and L.S.

Fellow of the Royal College of Physicians, London;

Formerly Fellow of Magdalen College, Oxford;

Physician Extraordinary to Her late Majesty Queen Charlotte,

&c. &c.

AN ADDRESS.

IT would but ill accord with my feelings, did I not express my earnest wish that it be clearly and most distinctly understood, that I appear in this situation at the request of the Trustees, and the Gentlemen composing the Committee of this Institution. Their letter to me on this subject contained such flattering and gentlemanly expressions that (however incapable I might feel of being able to perform what may be expected of me), it was impossible for me to avoid acceding to their wishes, and gratifying those wishes to the best of my power.

If the task which is assigned to me this day, consist of a full explanation of those Sciences which are included in the Plan of an Institution of this kind, it would be the height of imprudence in me to come forward on this occasion. When I dwell on the years that are necessary, the required learning, and the philosophical feeling which must arise amongst mankind, before they have the refinement of mind which is required to institute inquiries on these subjects, I can hardly refrain from self-reproach, in daring to stand forward in this situation.

There were times, and those but just gone by, when the place which I now have the honour to occupy, might have been filled by very learned and scientific men; and there are others now who could most ably fulfil this as well as the other great objects of this Institution. But as a traveller, however slender his pretensions, may occasionally deviate into strange, but interesting regions, unvisited by the more profound inquirer; so may my moderate pretensions in the way of Science avail in giving some such hints as may lead to the fulfilment of those objects which we are met this day to describe.

It is one of the chief advantages, which arise from these collective Societies, that every Member has some opportunity of administering towards the accomplishment of their objects. They, who have ever engaged themselves in the pursuit of scientific inquiry, must know that there is much labour in following even a moderate course of such investigation. They must be aware of repeated want of success, and of much harrassing discomfort, before they can arrive at satisfactory conclusions.

Whatever be the extent of intellect, and however matured in its efficient operations, the wonders of Nature which we here explore, surpass its widest expansion, and often contradict its most abstruse speculations. Nature herself is our field of inquiry; and observation, uninfluenced by any prepossessions, is the foundation of our science. Real scientific experiments are nothing more than managed observations, faithfully made in the great field of the natural world.

We have more than a common right to expect success in the institution of an Athenæum, when we find, that within a few paces of this spot, and during a vigorous period of the Roman empire, there stood a Temple dedicated to the Goddess Minerva. It is not necessary for us to inquire for what attributes, or what qualities, the Ro-

mans worshipped Minerva in this place; it is certain they chose Bath for the scite of a Temple to her; and it is as certain, that the prepossessing natural character of Bath, as to its productions, and to its locality, offers itself as much to us for preference, as it did to the Romans.

But it is not on the present occasion that I mean to say, that Bath is to begin to be worthy of a Temple dedicated to Learning and Science; for ages past, this City has been the seat of more refinement, and of more elegance, than perhaps the Romans ever contemplated.—The Temple of Minerva, however great its heathen character might be, never breathed the sublime, the amiable, and pure spirit of Religion, which has been poured forth from edifices raised from its own august ruins. Neither can we bring any parallel between the rude conceptions the Romans had of Natural Science, and the present universally extended knowledge of it, and its immediate applicability to all the elegancies, the comforts, and the wants of mankind.

It is not for me to speak of Roman Literature; there are many present who might enter the lists with Roman ardour, even with the Romans themselves; who, to a complete acquaintance with what *they* knew, could add the experience of centuries that have passed since their time; and whose hearts, chastized by higher dispensations, now beat with the two-fold energy of Scholars and of Christians.

But I must leave to abler hands the management of this part of the subject; only premising, that exclusively of the description into which I shall now enter, of the subordinate departments of Mechanical and Chemical Science, this Institution is intended to include the whole range of Literary and Philosophical Inquiry, with the exception only of the polemical subjects of Politics and Religion.

The bare enumeration and recital of the several facts comprehended in Science generally, would be more than sufficient to occupy the time I could allot to myself in delivering this address. It is therefore necessary that I should altogether omit many parts worthy of investigation, and touch but lightly on others which deserve our most serious and protracted examination.

Were we to indulge in tracing the rise, progress, and general utility of the Science of Astronomy, we should feel but little disposed to fix our attention on other subjects; which, although when studiously investigated, afford equal satisfaction to the human mind, would appear as an intrusion upon one of the sublimest speculations we are capable of pursuing. The magnitude of the subject quickly arrests our deepest thoughts, when we develop the parts of the system of the universe; and we are lost in the boundless expanse of that space, wherein so many worlds float in regular and unceasing order.

We cannot for a moment hesitate to grant the most unlimited admiration to those powers of mind, which detected the laws by which these worlds are regulated; or to allow our minds to venerate that Power, which made the human intellect capable of comprehending such stupendous phenomena. This subject, I repeat, would be more than sufficient to occupy our attention indefinitely. There are many present (and I trust in the future succession of Members of this Institution, there will be many more) who are, and will be capable of effectually placing this Science in the position it deserves to hold among the several divisions of human learning.

It was in this City, that *Herschel* first gave promise of his future fame; and it was to the fostering care of his intelligent and kind patron, (who has only lately terminated a very long life) that *Herschel* was enabled to prosecute those inquiries, which have added so much lustre

to Astronomical Science. All who knew *Herschel* must be well aware of the boundless success of his experience; and of the information he was capable of imparting.—They must know likewise, that his acquirements were practically serviceable to mankind; and that in him were combined that unobtrusive modesty, and that humility, which are the most certain indications of a great mind.

But to proceed.—It is easy to shew the general adaptation of this Globe to the purposes of animated beings.—The Science of Astronomy points out the laws which govern the motions of the Sun, Moon, Planets, &c. by which the Earth is lighted, warmed, and cherished; and the trackless Sea made subservient to the uses of Man. Seasons, with the seed-time and harvest by which he is fed, are the easily-comprehended result of these motions; as well as day and night, exactly suited for his activity and repose. The Natural Philosopher traces these laws of the heavenly bodies, and finds them engaged in producing their effects on the inert matter of the Globe; thus establishing the simplicity as well as grandeur of these operations of Nature. The smallest atom of matter of which the Globe is formed, is involved with the largest Orbs in strict obedience to this general law.

By the acquaintance thus obtained of the general principles, Man is enabled to direct and adapt them to particular purposes, thus establishing himself, in accommodation and comfort, over the surface of the earth. Although the general laws of Nature can never be altered by Man, yet he has the power of applying them in an infinity of ways; and thus does an acquaintance with them enable him to produce the most unerring system of accommodation and comfort. However stupendous these operations of Nature between the worlds of inanimate matter; and however these mighty Orbs may be regulated in their several revolutions; what would it all avail, were there not

sentient beings capable of receiving life, accommodation, comfort and delight, the pre-ordained result of all this provision. Nay—what good purpose could be perceived, where there not beings capable of comprehending this mighty display of power? and of justly appreciating the moral effect of this sublime extension of infinite greatness and goodness. The whole range of the living Creation, then, is comprehended in the general Science of Natural History. From the lowest plant to the highest pitch of complicated organization, every subject becomes interesting to the admirers of Natural History.

I cannot avoid in this place calling your attention to the high advantages which such Institutions as this possess for the advancement of this Science. It is hardly possible for any individual, however great his power from wealth or learning, to collect, arrange, and display even an outline of the magnificent subjects of this Science. There are few who possess sufficient space in their ordinary dwellings for such an arrangement of the subjects of Natural History, as may give a clear view of any thing like a natural system. Natural History besides branches out into such a number of subdivisions, each worthy of being regarded as a separate Science, that no one person could hope to prosecute the whole subject with any prospect of success. I trust, that in the future advancement of the Institution, we shall not only have ample space for the display of the several parts of this immense field of inquiry, but that we shall have the honour of enrolling amongst our Members, individuals who will cultivate with ardour each portion of this most interesting and instructive Science. It is obvious to every one, how much value scientific arrangement possesses towards the advancement of knowledge. Every subject of Natural History becomes of consequence, as soon as its place is fixed in the general arrangement; and no subject is lost, if there be a place to

which it belongs, ready for its reception. There is not a part of this most interesting and beautiful Science that would not afford scope for a very extended dissertation. The whole range of the animal, vegetable, and mineral kingdoms is alike subservient to its views. Taken collectively, they form one stupendous result of creative power and wisdom—one magnificent display of divine intelligence and goodness. They exhibit, from one end of the world to the other, that mutual co-operation, which is as necessary to the existence of every individual part as of the whole, and they shew that one great plan has emanated from one great and good Cause.

There are some departments of Natural History which in a peculiar manner, at this period, call forth our interest and attention. Geology, a science of modern date, has been lately very successfully cultivated, and promises to reward its admirers with much useful and decisive information. It may be regarded as antiquarian ; for its subjects result from the debris of a former state of the world. Connected also with this, and deeply involving subjects of practical utility and importance is Comparative Anatomy. It is impossible for any man, who has the interests of general Science at heart, not to feel ashamed at speaking slightly of this branch of human research, or at dismissing it without strong expressions of attachment and respect. But this is not the time or place to enter upon so extensive a subject. There are many here who fully feel the importance of it, and who are capable, and I trust willing, to give their able assistance towards its cultivation.

If any question should arise as to the probability of a due succession of Members, capable of keeping up this Institution with proper success and spirit, we have not only to look around at the distinguished characters residing in this city, whose names I could, did I dare mention ; but to revert to those celebrated men who have oc-

casionally visited Bath within a few years past. Many must remember, as well as I do, the friendly disposition of *Mr. De Luc*, and the readiness he shewed to communicate his valuable information. He was a frequent visitor of Bath. It is also well-known how often we were honoured with the friendly and more than commonly interesting conversations and communications of *Mr. Watt*. And to shew the extent of advantage which arises from the due patronage of Men of Science, we need only recollect the beneficial results of the encouragement given by the illustrious Nobleman who then possessed Bowood. It was there that all the leading experiments were instituted that led to the present extended and applicable state of Chemical Science; it was there that we met all those who had the most successfully pursued the several departments of Science; and it was the chief attribute of that great man to impart to each Cultivator of Science, that feeling of acknowledged importance, so necessary to the encouragement of the individual engaged in the laborious researches of Philosophical Inquiry. It was to the facilities afforded by *Lord Lansdown*, that *Dr. Priestley* was led to cultivate, with so much success, those experiments in Chemical Science, regarding Permanently Elastic Fluids, from which have resulted such splendid and highly useful discoveries. The discoveries made by *Dr. Priestley*, even in those days, opened a grand field of experiment; for I heard him declare, that when he first began experimental research, he with difficulty could suggest to himself any important experiment; but that, after many years labour, he said, he found that he had collected so many objects of inquiry, that the age of man would not be sufficiently protracted to carry into effect one-half of them.

Nothing can more decidedly prove the advantage which accrues from granting facilities to scientific inquirers, than the use which was made by *Dr. Priestley* of the

Laboratory of Bowood. It was there, also, that the happiest recollections of my youth lead me to mention the pleasing instruction we were always sure of deriving from the experiments and conversation of *Dr. Ingenhousz*.—Whilst mentioning the names of *Herschel*, *De Luc*, *Watt*, *Priestley*, and *Ingenhousz*, and connecting them with Bath, and its immediate vicinity, we cannot despair of future valuable co-operation.

We must surely be firmly persuaded of good effects, when we find ourselves honoured by the Head of that same distinguished Noble Family, when we have him for our President; and when we know that he is endowed with those high qualities of intellect, and condescending attention to the interests of Science, which have already shed so beneficial an influence over the Scientific World. It would be very easy to shew, that it was really owing to the Noble Father of our illustrious President, that modern Science has attained its present pre-eminence; for although the Swedish Chemist, *Scheele*, had simultaneously developed with *Dr. Priestley* some of the facts of Pneumatic Chemistry, it was to the latter that we must attribute the discoveries that preceded the establishment of the *Lavoisierian* doctrine.

It would be unpardonable not to mention the contemporary of *Dr. Priestley*, who so much advanced this part of Natural Science, by his discoveries relative to Latent Heat, which have such an immediate reference to the practical, and to the now universally acknowledged application of the Steam-Engine—I mean, *Dr. Black*. A singular quietness in conducting, and patience and perseverance in managing experiments, could not fail of imparting to us, his Pupils, a full sense of the dignity and importance of philosophical research. If we were at all to enter into a description of the doctrines he delivered; of the important experiments which he, as well as those

before mentioned, instituted, the bare enumeration would far exceed the limits of this Address.

Although there are some instances of Philosophical Men, who have made important advances in discovery, with very feeble provision of wealth or patronage, as in the instance of the immortal *Scheele*; yet it cannot be disguised but that much depends on assistance in the means necessary for experiment. Even with the highly endowed mind of *Sir Humphry Davy*, I question much whether he would have been enabled to make his talents so splendidly effective, had he not had the support in the laboratory and apparatus afforded him by the Royal Institution.

It is by a participation in labour and expense, that these Institutions become of so much general importance. The present state of the country affords more scope, than at any former period, for the advancement of Science.—The several departments of Mechanics and Chemistry have an immediate reference to practical utility; and many experiments, which were formerly purely philosophical, now bring ample profit, by their direct influence on the useful arts. It is on this account, as well as on the increased diffusion of knowledge, that we may expect that Institutions of this kind will be well supported by Men of Wealth, Rank, and Power.

Natural Philosophy and Chemistry are so much interwoven with each other, that we can hardly separate them into two distinct Sciences. The former is however subject to mathematical investigation, and its laws are established upon the surest and most unerring principles of human reason; but the latter, in almost all its phenomena, defies calculation; for new powers are continually discovered which bear a direct influence over all the movements of terrestrial existencies. In consequence of the mathematical certainty of the principles of Natural Philosophy, a regular apparatus has been instituted to demonstrate and

illustrate all those laws of Nature, which are every where in activity externally among all the substances which form this Earth. As it is clear that the apparatus illustrative of the several departments of Natural Philosophy, as of Mechanics, Optics, Hydrostatics, &c. are essentially necessary to the instruction of younger people, and indispensable to those who teach, we may, I trust, look forward to the time when the funds of this Institution will be sufficiently ample to allow of a well-selected portion of such apparatus being purchased for the use of the Members.

Most of you must be aware of the elegance, as well as the utility, of the instruments connected with Natural Philosophy; I have not time now to enumerate them, much less to shew their correct adaptation to the purposes for which they are intended. But I cannot help mentioning a modern invention of *Mr. Babbage*: to whom we owe a machine, which performs labour hitherto deemed exclusively intellectual. It is for calculating and printing mathematical tables. The parts which perform the calculations have the disposal of 30,000 numerals; and should accident produce a momentary error, immediate correction is unavoidable. The power thus given to mere matter strikes the mind as incredible; but how great must be our astonishment to find, that this work of man's hands absolutely produces mathematical correctness, which the best exertion of his intellect had hitherto failed to obtain.

Excepting as far as the Atomic Theory applies, although that, perhaps, is not mathematically demonstrable, Chemistry is a science purely practical. No system has as yet been devised that illustrates or explains the later discoveries, which open a field of far greater extent than could have been imagined but a short time since. I allude to the wonderful experiments connected with Galvanism and Electro-Magnetism. I will only venture to assert, that this field offers a greater prospect of a rich harvest to in.

dustrious cultivators, than any former one in the extensive domains of Science.

I shall now speak of Science generally, and of its direct influence over the common concerns of mankind.—To eulogize the Steam-Engine is become common-place. Its value to this country may be estimated from calculations, which shew that Steam-Engines in England represent the power of 320,000 horses, equal to 1,920,000 men; which being in fact managed by 36,000 men only, add actually to the power of our population 1,884,000 men.*

The state of the country at this moment is without parallel in the records of either ancient or modern times. The field of wealth is cultivated, and its harvest is gathered in; but to manual efforts, which require the consumption of food, and the alternation of rest, is added a virtual increase of industrious population, of half the amount at least; an addition, consuming no food, and requiring no relaxation. By these means, time is also multiplied.—The Steam-Engine requires no rest; and the brightness of perpetual day can be emulated by Gas-Light. Knowledge has become the capital of the Manufacturers of our country; and the consequences are, private wealth and national prosperity increasing without limits.

There are calculations which authorize the belief, that one-sixth of the population of this nation derive their maintenance from Arts dependant on Machinery. The brief mention of some of the Arts which have been added to the scientific acquirements we had previously attained, will be sufficient to shew their importance, and lead to an appreciation of their possible effects. Among them will be found—Education by mutual Instruction; Navigation by the power of Steam; Illumination by means of Gas; Suspension Bridges and Piers; the almost incredibly quick Communication by Telegraphs; the Applica-

* Heywood's Liverpool Address.

tion of the Air-Pump to important operations in the Arts; the Hydraulic Press; the Safety-Lamp; Lithographic Engraving and Printing; and Chemical Discoveries of various kinds, applied to an infinity of useful purposes.

We might dwell with much satisfaction on the Literary History of Bath; but it would require a person far more able than myself to do justice to so important a subject. We call to our recollection the names of *Warburton, Pope, Fielding, Smollett, Goldsmith, Melmoth, Anstey, Harington, Parry, Falconer*—and may we not express a hope, that this city will not decline in literary celebrity; but that at a future day, some one may look to the present for bright illustrations of learning, and for models worthy to be held up for imitation.

I have now only to observe, that I hope and trust, however feeble this developement of the objects of the Institution may have been; yet, when nurtured and fostered by your earnest and well-applied solicitude, the Institution itself may advance in growth and strength; may be protected by well-founded, and general attention and regard; and attain, at no very distant period, the matured character of intrinsic value, and dignified durability.

FINIS.

