Address / by his Royal Highness the Prince Consort.

Contributors

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ADDRESS

BY

HIS ROYAL HIGHNESS THE PRINCE CONSORT.

GENTLEMEN OF THE BRITISH ASSOCIATION,

YOUR kind invitation to me to undertake the office of your President for the ensuing year could not but startle me on its first announcement. The high position which Science occupies, the vast number of distinguished men who labour in her sacred cause, and whose achievements, while spreading innumerable benefits, justly attract the admiration of mankind, contrasted strongly in my mind with the consciousness of my own insignificance in this respect. I, a simple admirer, and would-be student of Science, to take the place of the chief and spokesman of the scientific men of the day, assembled in furtherance of their important objects! — the thing appeared to me impossible. Yet, on reflection, I came to the conclusion that, if not as a contributor to, or director of your labours, I might still be useful to you, useful to Science, by accepting your offer. Remembering that this Association is a popular Association, not a secret confraternity of men jealously guarding the mysteries of their profession, but inviting the uninitiated, the public at large, to join them, having as one of its objects to break down those imaginary and hurtful barriers which exist between men of science and so-called men of practice—I felt that I could, from the peculiar position in which Providence has placed me in this country, appear as the representative of that large public, which profits by and admires your exertions, but is unable actively to join in them; that my election was an act of humility on your part, which to reject would have looked like false humility, that is like pride, on mine. But I reflected further, and saw in my acceptance the means, of which necessarily so few are offered to Her Majesty, of testifying to you, through the instrumentality of her husband, that your labours are not unappreciated by your Sovereign, and that she wishes her people to know this as well as yourselves. Guided by these reflections, my choice was speedily made, for the path of duty lay straight before me.

If these, however, are the motives which have induced me to accept your

flattering offer of the Presidency, a request on my part is hardly necessary that you will receive my efforts to fulfil its duties with kind indulgence.

If it were possible for anything to make me still more aware how much I stand in need of this indulgence, it is the recollection of the person whom I have to succeed as your President—a man of whom this country is justly proud, and whose name stands among the foremost of the Naturalists in Europe for his patience in investigation, conscientiousness in observation, boldness of imagination, and acuteness in reasoning. You have no doubt listened with pleasure to his parting address, and I beg to thank him for the flattering manner in which he has alluded to me in it.

The Association meets for the first time to-day in these regions and in this ancient and interesting city. The Poet, in his works of fiction, has to choose, and anxiously to weigh, where to lay his scene, knowing that, like the Painter, he is thus laying in the background of his picture, which will give tone and colour to the whole. The stern and dry reality of life is governed by the same laws, and we are here living, feeling, and thinking under the influence of the local impressions of this northern seaport. The choice appears to me a good one. The travelling Philosophers have had to come far, but in approaching the Highlands of Scotland they meet Nature in its wild and primitive form, and Nature is the object of their studies. The Geologist will not find many novelties in yonder mountains, because he will stand there on the bare backbone of the globe, but the Primary rocks, which stand out in their nakedness, exhibit the grandeur and beauty of their peculiar form, and in the splendid quarries of this neighbourhood are seen to peculiar advantage the closeness and hardness of their mass, and their inexhaustible supply for the use of man, made available by the application of new mechanical powers. On this primitive soil the Botanist and Zoologist will be attracted only by a limited range of plants and animals, but they are the very species which the extension of agriculture and increase of population are gradually driving out of many parts of the country. On those blue hills the red deer, in vast herds, holds undisturbed dominion over the wide heathery forest, until the sportsman, fatigued and unstrung by the busy life of the bustling town, invades the moor, to regain health and vigour by measuring his strength with that of the antlered monarch of the hill. But, notwithstanding all his efforts to overcome an antagonist possessed of such superiority of power, swiftness, caution, and keénness of all the senses, the sportsman would find himself baffled, had not Science supplied him with the telescope and those terrible weapons which seem daily to progress in the precision with which they carry the deadly bullet, mocking distance, to the mark.

In return for the help which Science has afforded him, the sportsman can supply the naturalist with many facts which he alone has opportunity of observing, and which may assist the solution of some interesting problems suggested by the life of the deer. Man also, the highest object of our study, is found in vigorous, healthy development, presenting a happy mixture of

the Celt, Goth, Saxon, and Dane, acquiring his strength on the hills and the sea. The Aberdeen whaler braves the icy regions of the Polar Sea, to seek and to battle with the great monster of the deep: he has materially assisted in opening these icebound regions to the researches of Science; he fearlessly aided in the search after Sir John Franklin and his gallant companions, whom their country sent forth on this mission, but to whom Providence, alas! has denied the reward of their labours, the return to their homes, to the affectionate embrace of their families and friends, and the acknowledgments of a grateful nation. The City of Aberdeen itself is rich in interest for the Philosopher. Its two lately united Universities make it a seat of Learning and Science. The Collection of Antiquities, formed for the present occasion, enables him to dive into olden times, and, by contact with the remains of the handiworks of the ancient inhabitants of Scotland, to enter into the spirit of that peculiar and interesting people, which has always attracted the attention and touched the hearts of men accessible to the influence of heroic poetry. The Spalding Club, founded in this City for the preservation of the historical and literary remains of the north-eastern counties of Scotland, is honourably known by its important publications.

Gentlemen!—This is the 29th Anniversary of the foundation of this Association; and well may we look back with satisfaction to its operation and achievements throughout the time of its existence. When, on the 27th September, 1831, the Meeting of the Yorkshire Philosophical Society took place at York, in the theatre of the Yorkshire Museum, under the Presidency of the late Earl Fitzwilliam, then Viscount Milton, and the Rev. W. Vernon Harcourt eloquently set forth the plan for the formation of a British Association for the promotion of Science, which he showed to have become a want for his country, the most ardent supporter of this resolution could not have anticipated that it would start into life full-grown as it were, enter at once upon its career of usefulness, and pursue it without deviation from the original design, triumphing over the oppositions which it had to encounter in common with everything that is ew and claims to be useful. Gentlemen, this proved that the want was a real, and not an imaginary one, and that the mode in which it was intended to supply that want was based upon a just appreciation of unalterable truths. Mr. Vernon Harcourt summed up the desiderata in graphic words, which have almost identically been retained as the exposition of the objects of the Society, printed at the head of the annually-appearing volume of its Transactions:—"to give a stronger impulse and more systematic direction to scientific inquiry—to promote the intercourse of those who cultivate Science in different parts of the Empire, with one another and with foreign Philosophers—and to obtain a more general attention to the objects of Science, and a removal of any disadvantages of a public kind which impede its progress."

To define the nature of Science, to give an exact and complete definition of what that Science, to whose service the Association is devoted, is and

means, has, as it naturally must, at all times occupied the Metaphysician. He has answered the question in various ways, more or less satisfactorily to himself or others. To me, Science, in its most general and comprehensive acceptation, means the knowledge of what I know, the consciousness of human knowledge. Hence, to know is the object of all Science; and all special knowledge, if brought to our consciousness in its separate distinctiveness from, and yet in its recognized relation to the totality of our knowledge, is scientific knowledge. We require, then, for Science—that is to say, for the acquisition of scientific knowledge—those two activities of our mind which are necessary for the acquisition of *any* knowledge—analysis and synthesis; the first, to dissect and reduce into its component parts the object to be investigated, and to render an accurate account to ourselves of the nature and qualities of these parts by observation; the second to recompose the observed and understood parts into a unity in our consciousness, exactly answering to the object of our investigation. The labours of the man of Science are therefore at once the most humble and the loftiest which man can undertake. He only does what every little child does from its first awakening into life, and must do every moment of its existence; and yet he aims at the gradual approximatlon to divine truth itself. If, then, there exists no difference between the work of the man of Science and that of the merest child, what constitutes the distinction? Merely the conscious self-determination. The child observes what accident brings before it, and unconsciously forms its notiou of it; the so-called practical man observes what his special work forces upon him, and he forms his notions upon it with reference to this particular work. The man of Science observes what he intends to observe, and knows why he intends it. The value which the peculiar object has in his eyes is not determined by accident, nor by an external cause, such as the mere connexion with work to be performed, but by the place which he knows this object to hold in the general universe of knowledge, by the relation which it bears to other parts of that general knowledge.

To *arrange* and *classify* that universe of knowledge becomes therefore the first, and perhaps the most important, object and duty of Science. It is only when brought into a system, by separating the incongruous and combining those elements in which we have been enabled to discover the internal connexion which the Almighty has implanted in them, that we can hope to grapple with the boundlessness of His creation, and with the laws which govern both mind and matter.

The operation of Science then has been, systematically to divide human knowledge, and raise, as it were, the separate groups of subjects for scientific consideration, into different and distinct sciences. The tendency to create new sciences is peculiarly apparent in our present age, and is perhaps inseparable from so rapid a progress as we have seen in our days; for the acquaintance with and mastering of distinct branches of knowledge enables the

eye, from the newly gained points of sight, to see the new ramifications into which they divide themselves in strict consecutiveness and with logical necessity. But in thus gaining new centres of light, from which to direct our researches, and new and powerful means of adding to its ever-increasing treasures, Science approaches no nearer to the limits of its range, although travelling further and further from its original point of departure. For God's world is infinite; and the boundlessness of the universe, whose confines appear ever to retreat before our finite minds, strikes us no less with awe when, prying into the starry crowd of heaven, we find new worlds revealed to us by every increase in the power of the telescope, than when the microscope discloses to us in a drop of water, or an atom of dust, new worlds of life and animation, or the remains of such as have passed away.

Whilst the tendency to push systematic investigation in every direction enables the individual mind of man to bring all the power of which he is capable to bear on the specialities of his study, and enables a greater number of labourers to take part in the universal work, it may be feared that that consciousness of its unity which must pervade the whole of Science if it is not to lose its last and highest point of sight, may suffer. It has occasionally been given to rare intellects and the highest genius, to follow the various sciences in their divergent roads, and yet to preserve that point of sight from which alone their totality can be contemplated and directed. Yet how rare is the appearance of such gifted intellects! and if they be found at intervals, they remain still single individuals, with all the imperfections of human nature.

The only mode of supplying with any certainty this want, is to be sought in the combination of men of science representing all the specialities, and working together for the common object of preserving that unity and presiding over that general direction. This has been to some extent done in many countries by the establishment of academies embracing the whole range of the sciences, whether physical or metaphysical, historical or political. In the absence of such an institution in this country, all lovers of science must rejoice at the existence and activity of this Association, which embraces in its sphere of action, if not the whole range of the sciences, yet a very large and important section of them, those known as the *inductive sciences*, excluding all that are not approached by the inductive method of investigation. It has, for instance (and, considering its peculiar organization and mode of action, perhaps not unwisely), eliminated from its consideration and discussions those which come under the description of moral and political sciences. This has not been done from undervaluing their importance and denying their sacred right to the special attention of mankind, but from a desire to deal with those subjects only which can be reduced to positive proof, and do not rest on opinion or faith. The subjects of the moral and political sciences involve not only opinions but feelings; and their discussion frequently rouses passions. For feelings are "subjective," as the German metaphysician has

it—they are inseparable from the individual being—an attack upon them is felt as one upon the person itself; whilst facts are "objective" and belong to everybody—they remain the same facts at all times and under all circumstances: they can be proved; they have to be proved, and when proved, are finally settled. It is with facts only that the Association deals. There may for a time exist differences of opinion on these also, but the process of removing them and resolving them into agreement is a different one from that in the moral and political sciences. These are generally approached by the *deductive* process; but if the reasoning be ever so acute and logically correct, and the point of departure, which may be arbitrarily selected, is disputed, no agreement is possible; whilst we proceed here by the *inductive* process, taking nothing on trust, nothing for granted, but reasoning upwards from the meanest fact established, and making every step sure before going one beyond it, like the engineer in his approaches to a fortress. We thus gain ultimately a roadway, a ladder by which even a child may, almost without knowing it, ascend to the summit of truth and obtain that immensely wide and extensive view which is spread below the feet of the astonished beholder. This road has been shown us by the great Bacon; and who can contemplate the prospects which it opens, without almost falling into a trance similar to that in which he allowed his imagination to wander over future ages of discovery!

From amongst the political sciences it has been attempted in modern times to detach one which admits of being severed from individual political opinions, and of being reduced to abstract laws derived from well authenticated facts. I mean Political Economy, based on general statistics. A new Association has recently been formed, imitating our perambulating habits, and striving to comprehend in its investigations and discussions even a still more extended range of subjects, in what is called "Social Science." These efforts deserve our warmest approbation and good will. May they succeed in obtaining a purely and strictly scientific character! Our own Association has, since its Meeting at Dublin, recognized the growing claims of Political Economy to scientific brotherhood, and admitted it into its Statistical Section. It could not have done so under abler guidance and happier auspices than the Presidency of the Archbishop of Dublin, Dr. Whately, whose efforts in this direction are so universally appreciated. But even in this Section, and whilst Statistics alone were treated in it, the Association as far back as 1833 made it a rule that, in order to ensure positive results, only those classes of facts should be admitted which were capable of being expressed by numbers, and which promised, when sufficiently multiplied, to indicate general laws.

If, then, the main object of Science—and I beg to be understood, henceforth, as speaking only of that Section which the Association has under its special care, viz. Inductive Science—if, I say, the object of science is the discovery of the laws which govern natural phænomena, the primary condi-

tion for its success is: accurate observation and collection of facts in such comprehensiveness and completeness as to furnish the philosopher with the necessary material from which to draw safe conclusions.

Science is not of yesterday. We stand on the shoulders of past ages, and the amount of observations made, and facts ascertained, has been transmitted to us and carefully preserved in the various storehouses of science; other crops have been reaped, but still lie scattered on the field; many a rich harvest is ripe for cutting, but waits for the reaper. Economy of labour is the essence of good husbandry, and no less so in the field of science. Our Association has felt the importance of this truth, and may well claim, as one of its principal merits, the constant endeavour to secure that economy.

One of the latest undertakings of the Association has been, in conjunction with the Royal Society, to attempt the compilation of a classified catalogue of scientific memoirs, which, by combining under one head the titles of all memoirs written on a certain subject, will, when completed, enable the student who wishes to gain information on that subject to do so with the greatest ease. It gives him, as it were, the plan of the house, and the key to the different apartments in which the treasures relating to his subject are stored, saving him at once a painful and laborious search, and affording him at the same time an assurrance that what is here offered contains the whole of the treasures yet acquired.

While this has been one of its latest attempts, the Association has from its very beginning kept in view that its main sphere of usefulness lay in that concentrated attention to all scientific operations which a general gives to the movements of his army, watching and regulating the progress of his impetuous soldiers in the different directions to which their ardour may have led them, carefully noting the gaps which may arise from their independent and eccentric action, and attentively observing what impediments may have stopped, or may threaten to stop, the progress of certain columns.

Thus it attempts to fix and record the position and progress of the different labours, by its Reports on the state of Sciences published annually in its Transactions;—thus it directs the attention of the labourers to those gaps which require to be filled up, if the progress is to be a safe and steady one; —thus it comes forward with a helping hand in striving to remove those impediments which the unaided efforts of the individual labourer have been or may be unable to overcome.

Let us follow the activity of the Association in these three different directions.

The Reports on the state of Science originate in the conviction of the necessity for fixing, at given intervals, with accuracy and completeness, the position at which it has arrived. For this object the General Committee of the Association entrusts to distinguished individuals in the different branches of Science the charge of becoming, as it were, the biographers of the period. There are special points in different Sciences in which it sometimes appears

desirable to the different Sections to have special reports elaborated; in such cases the General Committee, in its capacity of the representative assembly of all the Sciences, reserves to itself the right of judging what may be of sufficient importance to be thus recorded.

The special subjects which the Association points out for investigation, in order to supply the gaps which it may have observed, are—either such as the philosopher alone can successfully investigate, because they require the close attention of a practised observer, and a thorough knowledge of the particular subject; or they are such as require the greatest possible number of facts to be obtained. Here science often stands in need of the assistance of the general public, and gratefully accepts any contributions offered, provided the facts be accurately observed. In either case the Association points out *what* is to be observed, and *how* it is to be observed.

The first is the result of the same careful sifting process which the Association employs in directing the issue of special Reports. The investigations are entrusted to specially-appointed committees, or selected individuals. They are in most cases not unattended with considerable expense, and the Association, not content with merely suggesting and directing, furnishes by special grants the pecuniary means for defraying the outlay caused by the nature and extent of the inquiry. If we consider that the income of the Association is solely derived from the contributions of its members, the fact that no less a sum than £17,000 has, since its commencement, been thus granted for scientific purposes, is certainly most gratifying.

The question *how* to observe, resolves itself into two—that of the scientific method which is to be employed in approaching a problem or in making an observation, and that of the philosophical instruments used in the observation or experiment. The Association brings to bear the combined knowledge and experience of the scientific men, not only of this but of other countries, on the discovery of that method which, while it economizes time and labour, promises the most accurate results. The method to which, after careful examination, the palm has been awarded, is then placed at the free disposal and use of all scientific investigators. The Association also issues, where practicable, printed forms, merely requiring the different heads to be filled up, which, by their uniformity, become an important means for assisting the subsequent reduction of the observations for the abstraction of the laws which they may indicate.

At the same time most searching tests and inquiries are constantly carried on in the Observatory at Kew, given to the Association by Her Majesty, the object of which is practically to test the relative value of different methods and instruments, and to guide the constantly progressive improvements in the construction of the latter.

The establishment at Kew has undertaken the further important service of verifying and correcting to a fixed standard the instruments of any maker, to enable observations made with them to be reduced to the same numerical

expression. I need hardly remind the inhabitants of Aberdeen that the Association, in one of the first years of its existence, undertook the comparative measurement of the Aberdeen standard scale with that of Greenwich,—a research ably carried out by the late Mr. Baily.

The impediments to the general progress of Science, the removal of which I have indicated as one of the tasks which the Association has set for itself, are of various kinds. If they were only such as direction, advice, and encouragement would enable the individual, or even combined efforts of philosophers, to overcome, the exertions of the Association which I have just alluded to might be sufficient for the purpose. But they are often such as can only be successfully dealt with by the powerful arm of the State or the long purse of the Nation. These impediments may be caused either by the social condition of the country itself, by restrictions arising out of peculiar laws, by the political separation of different countries, or by the magnitude of the undertakings being out of all proportion to the means and power of single individuals, of the Association, or even the voluntary efforts of the Public. In these cases the Association, together with its sister Society "the Royal Society," becomes the spokesman of Science with the Crown, the Government, or Parliament,—sometimes even, through the Home Government, with foreign Governments. Thus it obtained the establishment, by the British Government, of magnetic and meteorological observatories in six different parts of the globe, as the beginning of a network of stations which we must hope will be so far extended as to compass by their geographical distribution the whole of the phenomena which throw light on this important point in our tellurian and even cosmical existence. The Institute of France, at the recommendation of M. Arago, whose loss the scientific world must long deplore, cheerfully cooperated with our Council on this occasion. It was our Association which, in conjunction with the Royal Society, suggested the Antarctic Expedition with a view to further the discovery of the laws of terrestrial magnetism, and thus led to the discovery of the southern polar continent. It urged on the Admiralty the prosecution of the tidal observations, which that Department has since fully carried out. It recommended the establishment, in the British Museum, of the conchological collection exhibiting present and extinct species, which has now become an object of the greatest interest.

I will not weary you by further examples, with which most of you are better acquainted than I am myself, but merely express my satisfaction that there should exist bodies of men who will bring the well-considered and understood wants of Science before the public and the Government, who will even hand round the begging-box and expose themselves to refusals and rebuffs to which all beggars are liable, with the certainty, besides, of being considered great bores. Please to recollect that this species of bore is a most useful animal, well adapted for the ends for which Nature intended him. He alone, by constantly returning to the charge, and repeating the same truths and

the same requests, succeeds in awakening attention to the cause which he advocates, and obtains that hearing which is granted him at last for self-protection, as the minor evil compared to his importunity, but which is requisite to make his cause understood. This is more particularly the case in a free, active, enterprising, and self-determining people like ours, where every interest works for itself, considers itself the all-important one, and makes its way in the world by its own efforts. Is it, then, to be wondered at, that the interests of Science, abstract as Science appears, and not immediately showing a return in pounds, shillings, and pence, should be postponed, at least, to others which promise immediate tangible results? Is it to be wondered at, that even our public men require an effort to wean themselves from other subjects in order to give their attention to Science and men of Science, when it is remembered that Science, with the exception of Mathematics, was until of late almost systematically excluded from our school and university education; —that the traditions of early life are those which make and leave the strongest impression on the human mind, and that the subjects with which we become acquainted, and to which our energies are devoted in youth, are those for which we retain the liveliest interest in after years, and that for these reasons the effort required must be both a mental and a moral one? A deep debt of gratitude is therefore due to bodies like this Association, which not only urges the wants of Science on the Government, but furnishes it at once with well-matured plans how to supply them with the greatest certainty and to the greatest public advantage.

We may be justified in hoping, however, that by the gradual diffusion of Science, and its increasing recognition as a principal part of our national education, the public in general, no less than the Legislature and the State, will more and more recognize the claims of Science to their attention; so that it may no longer require the begging-box, but speak to the State, like a favoured child to its parent, sure of his parental solicitude for its welfare; that the State will recognize in Science one of its elements of strength and prosperity, to foster which the clearest dictates of self-interest demand.

If the activity of this Association, such as I have endeavoured to describe it, ever found or could find its personification in one individual—its incarnation, as it were—this had been found in that distinguished and revered philosopher who has been removed from amongst us in his ninetieth year, within these last few months. Alexander von Humboldt incessantly strove after dominion over that universality of human knowledge which stands in need of thoughtful government and direction to preserve its integrity; he strove to tie up the *fasces* of scientific knowledge, to give them strength in unity. He treated all scientific men as members of one family, enthusiastically directing, fostering, and encouraging inquiry, where he saw either the want of, or the willingness for it. His protection of the young and ardent student led many to success in their pursuit. His personal influence with the Courts and Governments of most countries in Europe enabled him to plead the cause of

Science in a manner which made it more difficult for them to refuse than to grant what he requested. All lovers of science deeply mourn for the loss of such a man. Gentlemen, it is a singular coincidence, that this very day on which we are here assembled, and are thus giving expression to our admiration of him, should be the anniversary of his birth.

To return to ourselves, however: one part of the functions of the Association can receive no personal representation, no incarnation: I mean the very fact of meetings like that which we are at present inaugurating. This is not the thoughtful direction of one mind over acquired knowledge, but the production of new thought by the contact of many minds, as the spark is produced by the friction of flint and steel; it is not the action of the monarchy of a paternal Government, but the republican activity of the Roman Forum. These meetings draw forth the philosopher from the hidden recesses of his study, call in the wanderer over the field of science to meet his brethren, to lay before them the results of his labours, to set forth the deductions at which he has arrived, to ask for their examination, to maintain in the combat of debate the truth of his positions and the accuracy of his observations. These Meetings, unlike those of any other Society, throw open the arena to the cultivators of all sciences, to their mutual advantage: the Geologist learns from the Chemist that there are problems for which he had no clue, but which that science can solve for him; the Geographer receives light from the Naturalist, the Astronomer from the Physicist and Engineer, and so on. And all find a field upon which to meet the public at large, invite them to listen to their Reports and even to take part in their discussions,—show to them that Philosophers are not vain theorists, but essentially men of practice—not conceited pedants, wrapped up in their own mysterious importance, but humble inquirers after truth, proud only of what they may have achieved or won for the general use of man. Neither are they daring and presumptuous unbelievers—a character which ignorance has sometimes affixed to them—who would, like the Titans, storm heaven by placing mountain upon mountain, till hurled down from the height attained, by the terrible thunders of outraged Jove; but rather the pious pilgrims to the Holy Land, who toil on in search of the sacred shrine, in search of truth—God's truth—God's laws as manifested in His works, in His creation.