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BRITAIN'S PREMIER AS A SCIENTIST.

Mr. Balfour, President of the British Association. Delivered the Annual Address at the Meeting in Cambridge, His Subject Being the Electric Theory of Matter.

Sales in the second

zes matter, whether molar or molecular, help us to fight, to eat, and to bring CAMBRIDGE, Aug. 24-To most of ends to which research is primarily material masses, according to a simple into something which is not matter at up children, is but a by-product of the being unchangeable, it changes, when the members of the British Associadirected. If this be so, surely no haptance" that we owe some of the cruall. The atom is now no more than the qualities which do. Our organs .of law. To this ponderable matter he moving at very high speeds, with every cial discoveries on which both our elecchange in its velocity. Perhaps, how- tric industries and the electric theory tion the annual meeting is an occaspler selection could have been made relatively vast theatre of operations in sense-perception were not given us for would (in spite of Rumford) have prothan the quiet courts of this ancient ion of recreation as well as a serious ever, the most impressive alteration in which minute monads perform their bably added the so-called "imponder purposes of research; nor was it to university. For here, if anywhere, we of matter are ultimately founded; while business. From this point of view the able" heat, then often ranked among our picture of the universe required orderly evolutions; while the monads aid us in meting out the heavens of condition of the weather has been unby these new theories is to be sought ever baffled in the quest for an exat this very moment physicists, howtread the classic ground of physical themselves are not regarded as units dividing the atom that our powers of fortunate. It had rained during the discovery. Here, if anywhere, those night, and it has been raining for a who hold that physics is the true Scienthe elements, together with the two in a different direction. We have all, planation of gravity, refuse altogeth-"electrical fluids" and the corpuscular of matter, but as units of electricity; calculation and analysis were evolved so that matter is not merely explain- from the rudimentary instances of the great part of the day. The railway tia Scientiarum, the root of all the emanations supposed to constitute I suppose, been interested in the generally accepted views as to the origin lief, so satisfying to Mill, that it is a ed, but is explained away. Now, the animal. It is presumably due to these point to which I desire to call atten- circumstances that the beliefs of all light. trains brought in hundreds of memsciences which deal with inanimate bers and friends. Locomotion, howsimple and inexplicable property of nature, should feel themselves at home. THE UNDULATORY THEORY OF pendent planetary systems; and the tion is not to be sought in the great mankind about the material surroundever, was greatly hindered by the wet | For, unless I am led astray by too pargradual dissipation of the energy space. These obscure intimations divergence between matter as thus ings in which it dwells are not only weather, especially in the morning and | tial an affection for my own university, LIGHT. conceived by the physicist and matter imperfect, but fundamentally wrong. which during this process of concenearly part of the afternoon, and the In the universe as thus conceived the about the nature of reality deserve, I there is nowhere to be found, in any tration has largely taken the form of as the ordinary man supposes himself It may seem singular that down to Guildhall and other places of rendezmost important form of action between light and radiant heat. Follow out the been given to them. That they exist is think, more attention than has yet corner of the world, a spot with which to know it, between matter as it is say five years ago, our race has, withvous, which the hospitality of the municipal and university authorities its constituents was action at a dishave been connected, either by their theory to its obvious conclusions, and perceived and as it really is, but to out exception, fived and died in a world certain; that they modify the indiffertance; the principle of the conservatraining in youth or by the labors of it becomes plain that the stars now the fact that the first of these two of illusions; and that its illusions or had made available, were at times their maturer years, so many men emition of energy was, in any general ent impartiality of pure empiricism quite inconsistent views is wholly those with which we are here along visibly incandescent are those in midcrowded by sheltering visitors. Notform, undreamed of; electricity and nent as the originators of new and can hardly be denied. The common journey between the nebulae from based on the second. This is surely concerned, has not been about things withstanding this temporary drawnotion that he who would search out 'fruitful physical conceptions. I say magnetism, though already the subsomething of a paradox. We claim to remote or abstract, things transcendwhich they sprang and the frozen back, there was every indication that nothing of Bacon, the eloquent the secrets of nature must humbly jects of important investigation, played darkness to which they are predestinfound all our scientific opinions on ex- ental or divine, but about what men this, the seventy-fourth meeting of the prophet of a new era; nor of Darwin, no great part in the whole of things, wait on experience, obedient to its perience; and the experience on which see and handle, about those "plain ed. What, then, are we to think of association, will be successful alike slightest hint, is but partly true. This the Copernicus of biology; for my nor was a diffused ether required to we found our theories of the physical | matters of fact" among which commonthe invisible multitude of the heavenly in attendance and in popular and scimay be his ordinary attitude; but now universe is our sense-perception of sense daily moves with its most confisubject today is not the contribucomplete the machinery of the unibodies in which the process has been entific interest. The people of Camtions of Cambridge to the general verse. Within a few months, however, already completed? According to the and again it happens that observation that universe. That is experience; and dent step and most self-satisfied smile, bridge have vied with one another in and experiment are not treated as growth of scientific knowledge. I am of the date assigned for these deliverordinary view, we should suppose them facilitating the arrangements, so far Presumably, however, this is either bein this region of belief there is no concerned rather with the illustrious guides to be meekly followed, but as other. Yet the conclusions which thus cause too direct a vision of physical to be in a state where all possibilities ances of our hypothetical physicist, as it is in their power to do so. came an addition to this general con- of internal movement were exhausted. line of physicists who have learned or witnesses to be broken down in crossreality was a hindrance, not a help, in the struggle for existence; because hough this is the fourth meeting of profess to be entirely founded upon exexamination. Their plain message is taught within a few hundred yards of ception of the world, destined pro-At the temperature of interstellar the association in this town, it is fortydisbelieved, and the investigating perience are to all appearance fundathis building - a line stretching from foundly to modify it. About a hunspace their constituent elements would falsehood was more useful than truth; two years since the association last mentally opposed to it; our knowledge Newton in the seventeenth century, judge does not pause until a confession or else because with so imperfect a dred years ago Young opened, or re- be solid and inert; chemical action and met here. Thus novelty has added not in harmony with his preconceived ideas of reality is based upon illusion, and through Cavendish in the eighteenth, opened, the great controversy which molecular movement would be alike material as living tissue no better rea little to the appreciation of the prehas, if possible, been wrung from their the very conceptions we use in describthrough Young, Stokes, Maxwell, in sults could be attained. But, if this finally established the undulatory theimpossible, and their exhausted energy sent visit; but the fact that the presithe nineteenth, through Kelvin, who reluctant evidence. This proceeding ing it to others, or in thinking of it ory of light, and with it a belief in an could obtain no replenishment unless interstellar medium by which undulaconclusion be accepted, its consedent for this year's meeting is the needs neither explanation nor defence ourselves, are abstracted from anthorembodies an epoch in himself, down to quences extend to other organs of prime minister, and one of the most pomorphic fancies, which science forin those cases where there is an ap Rayleigh, Larmor, J. J. Thomson and some celestial collision, or travelled tions could be conveyed. But this disknowledge besides those of perception. distinguished sons of the university, covery involved much more than the into other regions warmed by newer parent contradiction between the utterhids us to believe and Nature compels the scientific school centred in the has given still further zest to the wel Not merely the senses, but the intelances of experience in different conus to employ. We here touch the fringe Cavendish Laboratory, whose physical substitution of a theory of light which suns. This view must, however, be come. Nor has it been left out of aclect must be judged by it: and it is nections. Such contradictions must of of a series of problems with which inspeculations bid fair to render the closprofoundly modified if we accept the count that this is the first time upon was consistent with the facts for one hard to see why evolution, which has electric theory of matter. We can no not need until the most filed to a solice of problems with which he which the chair of president of the asing years of the old century and the which was not, since here was the first so lamentably failed to produce trustnot rest until the reconciliation is ef- that most unsatisfactory branch of longer hold that if the internal energy fected. The difficulty really arises philosophy has systematically ignored. sociation has been occupied by a opening years of the new as notable as authentic introduction into the scien-statesman during his tenure of office them worthy instruments for obtaining the raw material of experience, should be when experience apparently says one This is no fault of men of science. verted into heat, either by its contrac-tion under the stress of gravitation or when experience apparently says one This is no fault of men of science. This and scientific instinct persists in They are occupied in the task of makdigious constituent - a constituent oredited with a larger measure of sucas prime minister. The desire to hear Mr. Balfour's adwhich has altered, and is still altering, cess in its provision of the physiologi THE UNALTERABLE FAITH saying another. Two such cases I ing discoveries, not in that of analyz by chemical reactions its dress was so great amongst members the whole balance (so to speak) of the cal arrangements which ments, or by any other interatomic have already mentioned; others will ing the fundamental presuppositions son in its endeavors to turn experivisitors and residents, that the corn ex-SCIENCE. composition. Unending space, thinly force; and that, were the heat so gen-easily be found by those who care to which the very possibility of making change, which is the largest building strewn with suns and satellites, made ence to account. What is the origin of this inerated to be dissipated, as in time it seek. discoveries implies. Neither is it the Now, what is the task which these in Cambridge, was crowded long beor in the making, supplied sufficient must be, through infinite space. its stinct, and what its value; whether it fault of transcendental metaphysifore the time for the proceedings to men, and their illustrious fellow-labormaterial for the mechanism of the NATURAL SCIENCE. whole energy would be exhausted. On be a mere prejudice to be brushed cians. Their speculations flourish on a begin. The exchange is an immense ers out of all lands, have set themheavens as conceived by Laplace. Unthe contrary, the amount thus lost aside, or a clue which no wise man Considerations like these, unless I different level of thought; their interoblong structure, but by placing the selves to accomplish? To what end led ending space filled with a continuous would be absolutely insignificant com- would disdain to follow, I cannot now est in a philosophy of nature is luke- have compressed them beyond the platform in the middle, instead of at these "new and fruitful conceptions" pared with what remained stored up discuss. For other questions there are, medium was a very different affair. limits of intelligibility, do undoubtedly warm; and howsoever the questions in one of the ends, the best possible to which I have just referred? It is and gave promise of strange developwithin the separate atoms. The system not new, yet raised in an acute form which they are chiefly concerned be suggest a certain inevitable incohermeans had been taken that the auoften described as the discovery of the ments. It could not be supposed that in its corporate capacity would be- by these most modern views of matter, answered, it is by no means certain ence in any general science of thought "laws of connecting phenomena." But the ether, if its reality were once addience should be brought within reach come bankrupt - the wealth of its on which I would ask your indulgent that the answers will leave the which is built out of materials providof Mr. Balfour's voice, whilst as befitthis is certainly a misleading, and in mitted, existed only to convey through individual constituents would be attention for yet a few moments. ted a learned body like the British my opinion a very inadequate, account interstellar regions the vibrations humbler difficulties at which I have ed by natural science alone.Extend scarcely diminished. They would lie AN EXAMINATION OF THE NEW hinted either nearer to or further from the boundaries of knowledge as you Association, the resources of science, of the subject. To begin with, it is which happen to stimulate the optic a solution. But though men of science may; draw how you will the picture in the provision of a sounding board, not only inconvenient, but confusing, nerve of man. Invented originally to side by side, without movement, with-VIEWS. and a temporary hanging roof of sa- to describe as "phenomena" things out chemical affinity: yet each one, and idealists stand acquitted, the of the universe; reduce its infinite fulfil this function, to this it could however inert in its external relations That these new views diverge violentteen, were effectively employed to im- which do not appear, which never have never be confined. And accordingly, the theatre of violent motions and of ly from those suggested by ordinary same can hardly be said of empirical variety to the modes of a single spaceprove the acoustic properties of the appeared, and which never can appear philosophers. So far from solving the filling ether; retrace its history to the powerful internal forces. Or put the observation is plain enough. No scienmeeting place. In other respects the to beings so poorly provided as ourproblem, they seem scarcely to have birth of existing atoms; show how from the point of view of sense percepmeeting place. In other selves with the apparatus of sense persame thought in another form. When tific education is likely to make us, in understood that there was a problem under the pressure of gravitation they the meeting. Mr. Balfour entered the ception. But apart from this, which is iant heat, and things to which sense star in the telescopic field gives notice solid earth on which we stand, or the to be solved. Led astray by a misconbecome concentrated into nebulae, into the meeting. Mr. Ballour each of a linguistic error too deeply rooted to perception makes no response, like the to the astronomer that he — and, perception to which I have already re- suns, and all the host of heaven; how, ferred, believing that science was con- at least in one small planet, they como'clock, accompanied by the outgoing be easily exterminated, is it not most organized bodies with which our tero'clock, accompanied by the buckyer. He inaccurate in substance to say that a intrinsically differ, not in kind, but in is witnessing the conflagration of a electric waves of wireless telegraphy, haps, in the whole universe, he alonecerned only with (so called) "phenom- bined to form organic compounds; how restrial fate is so intimately bound up, ena," that it had done all that it could organic compounds became was very cordially received. as consisting wholly of electric monads magnitude alone. This, however, is not world, the tremendous forces by which Mr. Balfour began with an apoloseek when investigating nature? The all. If we jump over the century which this far-off tragedy is being accombe asked to do if it accounted for the things; how living things, developin very sparsely scattered through the sequence of our individual sensations, getic reference to the fact that he was physicist looks for something more along many different lines, gave birt spaces which these fragments of matseparates 1804 from 1904, and attempt plished must surely move his awe. Yet about to follow the invariable practice than what, by any stretch of languthat it was concerned only with the at last to one superior race; how from ter are, by a violent metaphor, deto give in outline the world-picture as not only would the members of each "laws of Nature," and not with the this race arose, after many ages, of his predecessors by reading his ad- age can be described as "co-existence" scribed as "occupying." Not less plain , it now presents itself to some leaders separate atomic system pursue their inner character of physical reality; learned handful, who looked round dress. He was not sure that in so do- and "sequences" between so-called is it that an almost equal divergence of contemporary speculation, we shall relative course unchanged, while the disbelieving, indeed, that any such the world which thus blindly brough ing he was serving either the interests "phenomena." He seeks for something is to be found between these new find that in the interval it has been atoms themselves were thus riven viophysical reality does in truth exist, it them into being, and judged it, a of his audience or his own, but, in any deeper than the laws connecting postheories and that modification of the sible objects of experience. His object modified, not merely by such far- lently apart in flaming vapor, but the has never felt called upon seriously to case, he would do his best-an intimacommon-sense view of matter with knew it for what it was-perform reaching discoveries as the atomic and forces by which such a world is shatconsider what are the actual methods say, all this, and, though you may is physical reality: a reality which may tion which was received with general which science has in the main been by which science attains its results, deed have attained to science, in r molecular composition of ordinary mat- tered are really negligible compared applause. The address occupied about or may not be capable of direct percepcontent to work. What was this modiand how those methods are to be justiter, the kinetic theory of gases, and tion, a reality which is in any case inwith those by which each atom of it seventy minutes. It was, therefore, wise will you have attained to a s fication of common-sense? It is roughthe laws of the conservation and dissi- is held together. fled. dependent of it; a reality which constione of the shortest of the presidential ly indicated by an old philospohic dis sufficing system of beliefs. One thi pation of energy, but by the more and tutes the permanent mechanism of addresses of recent years, some of THE FEEBLER FORCES OF NAtinction drawn between what were INDUCTIVE THEORY. at least will remain, of which them having exceeded two hours in that physical universe with which our more important part which electricity called the "primary" and the "secand the ether occupy in any represenlong-drawn sequence of causes delivery. Mr. Balfour accomplished his immediate empirical connection is so TURE. If anyone, for example, will take up effects gives no satisfying explanation ondary" qualities of matter. The light and so deceptive. That such tation of ultimate physical reality. In common, therefore, with all other task with comparative ease. He show-Mill's logic, with its "sequences and and that is knowledge itself. Nature primary qualities, such as shape and reality exists, though philosopher ed no signs of the fatigue which a living things, we seem to be practically co-existences between phenomena," its science must ever regard knowledg PROGRESS OF ELECTRICITY. mass, were supposed to possess an exhave doubted, is the unalterable faith long parliamentary session might have "method of difference," its "method of as the product of irrational condition concerned chiefly with the feebler itence quite independent of the obof science; and were that faith per Electricity was no more to the natforces of Nature, and with energy in agreement," and the rest; if he will for in the last resort it knows been expected to cause. His voice was erver; and so far the theory agreed impossible to perish under the asural philosophers in the year 1700 than its least powerful manifestations. Chethen compare the actual doctrines of others. It must always regar clear, musical and penetrating, and his with common-sense. The secondary general manner vivacious. It is hardly saults of critical speculation, science, the hidden cause of an insignificant mical affinity and cohesion are on this science with this version of the mode knowledge as rational, or else scien qualities, on the other hand, such as as men of science usually conceive it, phenomenon. It was known, and had theory no more than the slight residin which those doctrines have been itself disappears. In addition, possible to give to the reading of a warmth and color, were thought to would perish likewise. If this be so, long been known, that such things as ual effects of the internal electrical arrived at, he will soon be convinced fore, to the difficulty of extract philosophic and scientific discourse the have no such independent existence if one of the tasks of science, and more amber and glass could be made to at- forces which keep the atom in being. of the exceedingly thin intellectual from experience beliefs which experience appearance of extemporaneous delivbeing, indeed, no more than the resultparticularly of physics, is to frame a tract light objects brought into their Gravitation, though it be the shaping fare which has been hitherto served ence contradicts, we are confr ery. Mr. Balfour faced the fact ants due to the action of the primary conception of the physical universe in neighborhood, yet it was about 50 force which concentrates nebulae into out to us under the imposing title of with the difficulty of harmon squarely, and did not make the atqualities on our organs of sense-per its inner reality, then any attempt to years before the effects of electricity organized systems of suns and satelinductive theory. There is an added the pedigree of our beliefs with t His reading, however, was ception; and here, no doubt, common tempt. compare the different modes in which. faultless. The matter of the address at different epochs of scientific developwere perceived in the thunderstorm. lites, is trifling compared with the atemphasis given to these reflections by title to authority. The more sense and theory parted company. You It was about 100 years before it was tractions and repulsions with which a train of thought which has long in- cessful we are was very generally pronounced to be need not fear that I am going to drag in explai ment, this intellectual picture has been detected in the form of a current. It we are familiar between electricallyterested me, though I acknowledge that their origin the more doubt admirable in its simplicity and orderly you into the controversies with which drawn, cannot fail to suggest questions was about 120 years before it was con- charged bodies; while these again sink admirable in its samplicity and of the deepest interest. True, I am nected with magnetism, about 170 years into insignificance beside the attractions. They have left abiding traces on more it never seems to have interested any- cast on their validity. The one else. Observe, then, that in order imposing seems the scheme precluded from dealing with such of before it was connected with light and and repulsions between the electric than one system of philosophy. They of logic sense-perceptions supply the we know, the more difficult it account of the work done in Germany these questions as are purely philo- ethereal radiation. But today there monads themselves. The irregular premises from which we draw our discover by what ultimate criteri and in America in relation to the subsophical by the character of this oc- are those who regard gross matter, molecular movements which constitute them the very possibility of an inde are not yet solved. In the course of knowledge of the physical world; it is claim to know it. Here, however, casion, and with such of them as are the matter of everyday experience, as heat, on which the very possibility of pendent physical universe has seemed ject dealt with, and that his natural they which tell us there is a phy- touch the frontier beyond which partiality for his own university seempurely scientific by my own incom- the mere appearance of which electric- organic life seems absolutely to hang, to melt away under the solvent powers sical world; it is on their authority that sical science possesses no jurisdi petence. But some there may be suf-ity is the physical basis; who think and in whose transformations applied of critical analysis. But with all this ed to have caused him unduly to apwe learn its character. But in order If the obscure and difficult regi praise the work of Cambridge. A few that the elementary atom of the chem- science is at present so largely con- I am not now concerned. I do not of causation they are effects due (in which lies beyond is to be surve) of the personal references in the adduce the specialists who rule by right ist, itself far beyond the limits of cerned, cannot rival the kinetic energy propose to ask what proof we have part) to the constitution of our or- and made accessible, philosophy, on either side of it to view with for-direct perception, is but a connected stored within the molecules them-that an external world exists, or how, dress, notably that to Lord Kelvin, gans of sense. What we see depends science must undertake the task. were well appreciated by the audience not merely on what there is to be seen, is no business of this society. We m system of monads or sub-atoms which selves. This predigious mechanism if it does exist, we are are able to oblegitimate domain which I may be are not electrified matter, but are elec- seems outside the range of our immebut on our eyes. What we hear de- here to promote the cause of knowled THE PRESIDENT'S ADDRESS. tempted during the next few minutes, tricity itself; that these systems dif- diate interests. We live, so to speak, pends not merely on what there is to in one of its great divisions; we shall to commit. Let me, then, endeavor to compare the outlines of two such pic-they contain, in their arrangement, promise of utilitarian value. It will questions to be asked by science. For, questions very proper to be asked by Mr. Balfour said: The meetings of hear, but on our ears. Now, eyes and not help it by confusing the lin philosophy; but they are not proper ears, and all the mechanism of per- which usefully separate one divisi this great society have for the most tures, of which the first may be taken and in their motion relative to each part been held in crowded centres of ception, have, as we know, been evolv- from another. It may perhaps not drive our mills; we cannot harness logically, they are antecedent to scipopulation, where our surroundings other and to the ether; that on these it to our trains. Yet not less on that ed in us and our brute progenitors by thought that I have disregarded wards the end of the eighteenth cenence, and we must reject the sceptical the slow operation of natural selection. differences, and on these differences account does it stir the intellectual answers to both of them before physinever permit us to forget, were such own precept-that I have wilfully tury, a little more than a hundred And what is true of sense-perception istepped the ample bounds within which forgetfulness in any case possible, how alone, depends the various quantities imagination. The starry heavens have cal science becomes possible at all. years from the publication of Newton's close is the tie that binds modern sciis, of course, also true of the intel- the searchers into Nature carry of what have hitherto been regarded from time immemorial moved the wor-"Principia," and, roughly speaking, My present purpose requires me to do as indivisible and elementary atoms; ship or the wonder of mankind. But if no more than observe that, be this erect upon the frail and narrow plat- your forgiveness. My first desire ence to modern industry, the abstract about midway between the epochresearches of the student to the labors and that while in most cases these the dust beneath our feet be indeed theory of the primary and secondary. the dust beneath our feet be indeed theory of the primary and secondary, form which sense-perception provides, been to rouse in those who like to compounded of innumerable systems, qualities of matter good or bad, it is the proud fabric of the sciences. Now, self, are no specialists in physics, making date and the present moment. atomic systems may maintain their of the inventor and the mechanic. This I suppose that if at that period the equilibrium for periods which, comparno doubt, is as it should be. The inwhose elements are ever in the most average man of science had been ask-ed to skatch his general conception of the one on which science has in the natural selection works through util- same absorbing interest which I feel terdependence of theory and practice ed with such astronomical processes as rapid motion, yet retain through un- main proceeded. It was with matter ity. It encourages aptitudes useful to what is surely the most far-reaching the cooling of a sun, may seem almost counted ages their equilibrium un- thus conceived that Newton expericannot be ignored without inflicting inthe physical universe, he would probjury on both, and he is but a poor ably have said that it essentially coneternal, they are not less obeditent to shaken, we can hardly deny that the mented. To it he applied his laws of struggle for existence, and, for a simithe dwancement of science, it is well that, now and again weighout choose our place of gathering in some spot tions, knowledge, not utility, are the which has ever claimed experimental support; and if in so doing I have been tempted to hint my own personal opinion that as natural science grows it leans more, not less, upon an idealthe universe, istic interpretation of even those who least agree may, perhaps, be prepared to pardon -London

fication roughly comparable to a knot literated by some new drawing on th in a medium which is inextensible, in-compressible and continuous. But scientific palimpsest, all will, I think, admit that so bold an attempt to unify whether this final unification be acceptphysical nature excites feelings of the ed or not, it is certain that these monmost acute intellectual gratification. The satisfaction it gives is sinfor ads cannot be considered apart from aesthetic in its intensity and quality. the ether. It is on their interaction We feel the same sort of pleasured with the ether that their qualities deshock as when, from the crest of som pend; and without the ether an elecmelancholy pass, we first see, far be-low us, the sudden glories of plain, tric theory of matter is impossible. Surely we have here a very extraorriver and mountain. Whether this vedinary revolution. Two centuries ago hement sentiment in favor of a simple electricity seemed but a scientific toy. universe has any theoretical justifica-It is now thought by many to constitute the reality of which matter is but tion I will not venture to pronounce There is no a priori reason that I know the sensible expression. It is but a of for expecting that the material century ago that the title of an ether world should be a modification of a to a place among the constituents of single medium, rather than a composthe universe was authentically estabite structure built out of sixty or lished. It seems possible now that it seventy elementary substances, eternal may be the stuff out of which that universe is wholly built. Nor are the and eternally different. Why, then, should we feel content with the first collateral inferences associated with this view of the physical world less surprising. It used, for example, to be Yet so it is. thought that mass was an original pro-

perty of matter, neither capable of explanation nor requiring it; in its nature essentially unchangeable, suffering neither augmentation nor diminution under the stress of any forces to which it could be subjected; unalterably attached to, or identified with, each material fragment, howsoever much that fragment might vary in its appearance, its bulk, its chemical or its physical condition.

THE NEW THEORY OF MATTER.

hypothesis, and not with the second? SECRETS OF NATURE. Men of science have always been restive under the multiplication of entittes. They have eagerly noted any sign that the chemical atom was composite, and that the different chemical elements had a common origin. Nor, for my part, do I think that such instincts should be ignored. John Mill,

if I remember rightly, was contemptuous of those who saw any difficulty in accepting the doctrine of "action at a

distance." So far as observation and THE PHYSICAL UNIVERSE. design when they are providing for a experiment can tell us, bodies do ac-But if the new theories be accepted, present need, possess no power of pretually influence each other at a dis-But the electric theory which we these views must be revised. Mass is vision, and could never, except by actance. And why should they not? Why have been considering carries us into not only explicable, it is actually ex- seek to go behind experience in obedicident, have endowed mankind, while a new region altogether. It does not plained. So far from being an attriin the making, with a physiological or bute of matter considered in itself, it which no argument can be adduced? ence to some a priori sentiment for confine itself to accounting for the mental outfit adapated to the higher is due, as I have said, to the relation So reasoned Mill, and to his reasoning secondary qualities by the primary, or physical investigations. So far as na. between the electrical monads of which I have no reply. Nevertheless, we canthe behavior of matter in bulk by the tural solence can tell us, every quality ****** behavior of matter in atoms; it analy- of sense or intellect which matter is composed and the ether in not forget that it was to Faraday's does not which they are bathed. So far from obstinate disbelief in "action at a dis-



like other pieces of matter, possessed employed in searching out the secrets those "primary" qualities supposed to of physical reality - for our discoveries be characteristic of all matter, whether in this field are the triumphs of but yesterday. The blind forces of natural found in large masses or small. election, which so admirably simulate

Not only becau church dignitary on account of his brilliant career, wil son be warmly w Dr. Davidson, who of all England comes with a ser not on a mere ho reason his stav might be expected and responsibilities the present time visiting Quebec, M ronto and other be the guest of H bany, and Bishop chusetts. In Octob central figure at t conference in Bost will return to Lond does not expect Chicago, St. Louis ies, urgently as he do so. It is intin early date, that his a second visit in a his present trip ha

Archbis

Something A

Visiting

is expected. UNION OF ALL

We cannot you h

of the statement, every appearance o underlying reason visit to Canada and is his great desire ward the union Inglish-speaking world over. The terbury, whose fin ligious pulse of the most other people, the minor differen and lesser Protest will be forgotten, a ism, like Roman come one organic porate body. Dr. I aware of the loss bear while Protesta divided among then ambition, we are play a prominent par tion of the church much of his sang that he looks for gre events in his own l

A FRIEND OF

Any action Dr. Da any statement he m to have the support English church as a Edward VII., betwe archbishop the mo

have long existed.

years as spiritual

Victoria gave many

the growth of that

both men prize. H

to the dying Queen,

his duty to prepare

of the younger men

family for confirmatio

negity he hore the ti

of the Closet." It is

king or queen during and remove any doub

arise in his or her

spiritual matters, No

toria nor King Edwa

Dr. Davidson to stan

chair for this purpose

away the time in fri

tion with the Clerk o

was the unholv custon

NOT AN "ORNAMEN

Archbishop Davidson

years old, and in app

thing but portentous.

story of a young lady his portrait, on which

"His Grace, the Archi marked innocently, "Y

Archbishop; but where

Apart from his strong,

there is not much in

about Randall Thoma

not appear to be great

ing, a speaker wishin

tion to Dr. Davidson's

seal, declared that he

the recipient of this

vealed the unconscious

dience, and in the lau

to learn that the pres

of Canterbury is a bro

IS BROAD-MINDED

Commenting on this

tache, in the New York

"This he shows by th

tions which he entert

clergy of different relig

tions. He was a warr

friend of the late Card

and has, when in Se

attended Presbyterian

even filled Presbyterian

he is the president of

England Temperance So

use of alcoholic bever moderation. Yet there

how living who has

a total abstainer, but

wrote of him:

ANT

humor.

erant gentleman, with a

lowed Dr. Davidson

After this one need

namental bishop."

it. On one occasion, a

quite aware of the

of the Georges.

of them. it is needles

functionary to stand a

ninistered the last ri

good service in behalf temperance in England, fures in its behalf which and championed in the in 1901 led to the enactm Moal Incortates law, w operation only since of last year, has done mount of good." It was Dr. Davidson w the benediction at the g

geon, for whom he had a

idmiration, and whose se

the one occasion, just be uently went to hear.