The Relation of Christian Educators to the Modern Phases of Science.

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Gentlemen of the Convocation.—In presenting you with a few thoughts in regard to the relation of the Christian educator to the modern problems of science, I must begin by saying that it is with much hesitation that I approach this subject, partly because it may seem, in some respects, a very hackneyed one, and partly from the great importance of the theme, and the consequent difficulty of dealing with it in any adequate manner. I am led to the attempt, however, partly because of that very importance which renders it so hard to treat aright, and partly because, two years ago, in this room and before this body, the gauntlet was openly thrown down to science, and has not yet been formally and fearlessly taken up.

The whole subject seems divisible into three main parts, viz.:

I. The fact of a long and lamentable controversy between Christian and scientific modes of thought.

II. The causes and reasons of this controversy.

III. The methods of its possible removal.

To these three points, Mr. Chancellor and gentlemen, I would, therefore, request your attention.

I. The fact of such controversy.

We are certainly living in one of the most remarkable periods of the history of our world,—one which is marked by such vast, rapid and varied developments of human progress, in its best and noblest forms, as no other age has seen. This great advance, complex and manifold as it is, we are wont well to sum up under the name of Christian civilization. If we examine it, we shall find it to have in general a twofold aspect, moral and material, and to owe its wonderful character to this fact: it is the expansion of human knowledge, culture, intercourse, and invention, guided and directed by the divine influence of the Christian religion. It is Christianity and civilization, distinct in their nature as heaven and earth, but united in their action on society, that make this world all that it is to-day, and all that it can hope to become in the future.

Between these two great forces, which together are engaged in the improvement and elevation of mankind, one would naturally suppose that there would be the warmest and closest sympathy; that the laborers in each department would look with joy and pride on the achievements of their co-laborers in the other. But such is not the case. To a limited extent, and in occasional instances, we do indeed find such a spirit displayed. But I fear that it is not overstating the facts, to say that the general attitude of science and religion toward each other has been, and still is, one of jealousy, of fear, and of either open or covert opposition.

In every contest which prevails among men, it is generally found that, whatever real and great grounds may exist, much of the estrangement is due to mutual misunderstandings. If these can be removed, the way to peace and harmony is made far easier than it would otherwise have seemed. In this view, let us see if it be not possible to trace some ways in which we, as Christian educators, may help to bring about a better state of feeling in this most unhappy contest between science and religion, in which, from our very position, we must, of necessity, in some degree take part.

Admitting, then, that such a conflict exists, as a great and lamentable fact, we seek to trace for a moment some of its leading causes.

All false and erroneous systems of religion, from their very nature, as founded in and relying upon ignorance, must inevitably hate and oppose the enlightenment of the human mind in almost any direction, as thereby their power is weakened and their downfall shadowed forth. Were our inquiry, therefore, concerned with the conflict between science and religion as it exists in pagan or Mohammedan lands, or even in those Christian countries which cherish any form of superstition, the answer as to the reason of such opposition would be easy and plain enough. But we are looking to the facts as they appear in our own favored country, and in the most advanced and enlightened communities of the globe. Why is it that here such a discord still exists? Why do we find it appearing among ourselves, somewhat as it does in lands overspread with superstition and ignorance?

If we look at the question, it is certainly grave enough to attract our most serious consideration.

Returning again to our former comparison, we see that in every human contest or disagreement, there are almost invariably faults and errors on both sides, which, in some degree, divide the responsibility between the two parties to the strife. So, undoubtedly, will it

be found to be here. The errors, the faults, are not confined to either side; and it will be the object of this paper to seek to point out impartially some of these causes.

Here we may as well define our position at once, as standing on the basis of faith in the Christian Scriptures, as embodying the revelation of Himself by the living God and personal Creator of the universe, and containing "all things that pertain unto life and godliness, through the knowledge of God and of Jesus our Lord." We have no desire to discuss this question, or any other, from any different stand-point, and would decline to enter at present into any debate that involves this position. It is to Christian educators, and to such alone, that this discussion is presented.

II. Turning now to the causes of the conflict alluded to, we find that there is one important reason which depends on the fundamental position of the Christian faith. Explain it as we may, the idea of a living, personal God is displeasing to many men, and they seek to avoid it by whatever means can be found. Both philosophy and science afford to such minds an endless series of opportunities for raising questions and difficulties as to the being or the personality of a God; and thus it comes to pass that there is, and has been, a long, active, and irreconcilable conflict between those who accept, and those who dispute, the fact of a Divine existence and control. The former class, of course, includes all religious writers and thinkers; the latter includes many men who have achieved intellectual eminence, not only in science, but in various departments of knowledge. Many of these, however, have been students of nature, and have used their discoveries and reputations in support of atheistic views. Thus, in the minds of many devout men, unacquainted with science, and judging the whole body of scientific thinkers by a part of their number, there has arisen a feeling of alienation and suspicion, which has contributed much to this estrangement.

If we go still deeper, however, and inquire, Why this disposition to exclude the idea of God, which has appeared so strongly in the writings of scientific and philosophical students? — we are unable to explain it, save in the light of that very revelation which such writers reject. Here we are told that the whole race is in some way morally perverted, and alienated from God and all true excellence, while retaining intact its intellectual capacities, and also a large residuum of domestic, social, and public virtue. If this be so, as both history and inward experience attest, it is easy to see why men, even of the highest intellect, do "not like to retain God in their knowledge."

"Professing themselves to be wise, they became fools," and "the fool hath said in his heart, there is no God."

There is little doubt that the disposition thus displayed by many men of science, lies at the root of much of the conflict alluded to. So far and so often as this tendency manifests itself, it cannot but awaken earnest opposition and remonstrance, and result in a feeling of jealousy and suspicion, on the part of believers in the greatest of truths.

But apart from an absolute and intentional advocacy of atheistic ideas, there is on the part of many scientific men a carelessness, or even a hostility, of expression toward religious truth, which awakens deep distrust. Even when this is not the case, there is often a certain kind of nature-worship, a glorification of science as the one and only agency in the advancement of humanity, and an utterly materialistic and secular mode of speech, which cannot but offend and repel many thoughtful minds, who would be ready enough to admit and approve any moderate statement of the claims of science. Professor Huxley, for instance, is a man who stands confessedly among the foremost naturalists of our day; and we honor and admire him, and rejoice in much that he has done. But when he tells us that "objects of sense are more worthy of attention than inferences and imaginations. You cannot see the battle of Thermopylæ take place. What you can see is more worthy of your attention,"—no earnest and thoughtful man can fail to recoil into opposition, both to the logic and to the sentiment. As for the reasoning, what can we see with the material eye? Forms and colors simply, sometimes fixed, sometimes changing. Philosopher, infant, idiot, animal,—all see these same things, and naught else. Cause and consequence, attraction and repulsion, atoms and forces, life and energy, all these are as unseen as the battle of Thermopylæ; and not only so, but they never have been or can be seen, save by the same mind, itself invisible, that conceives alike of nature and of history, of past, present, and future. As to the sentiment, let us weigh carefully all that Professor Huxley has taught us, and that is much, concerning zoölogical classification, and the doctrine of protoplasm, and then compare with it the influence exerted on the minds and hearts of men for over 2,000 years by the tale of the heroic leader and undaunted band, firm in their love and devotion to the laws and honor and freedom of their country, standing calmly to the death in that wild pass in Locris. Humanity is richer and nobler for it to-day, and will be to the end of time. Every truth has its value, and none is to be lightly esteemed;

but all that we have yet learned about protoplasm, or "Man's Place in Nature," is powerless to stir the heart and quicken the spirit and strengthen the hand, as does this ancient record, which is part of the world's best and noblest heritage. Nay, Professor Huxley himself tells us that, 'if he were compelled to choose between absolute materialism and absolute idealism, he should be compelled to accept the latter alternative;' and here the immortal man rises into expression above the mere student of physical science. But this intense secularity, this exclusive looking at the things that are "seen and temporal," repels and prejudices men of earnest moral and spiritual thought. Often it is but a manner of speech that such writers fall into unintentionally, but it is none the less unhappy in its results.

Quite apart from these tendencies that prevail among some men of science, there is a large class of unbelievers and opposers of religion, who have no claim to scientific consideration, and no real care for scientific interests, but who seize upon and magnify every actual or possible ground of difference between natural and scriptural truth, out of mere hostility to the latter. Such persons gain prominence frequently as popular lecturers, newspaper and magazine writers, etc., and create an amount of noise and of mischief totally out of proportion to their own caliber. They pervert and misrepresent science for the sake of assailing religion, and, like the brutal camp-followers of an army, create alienations that react upon the party in whose uniform and name their excesses are committed.

But these are only the more familiar of the many aspects of this subject. It now behooves us to see, on the other hand, if there be not grounds of controversy, less vital and less excusable, on the part of the religious world.

Among the first and most important of these, seems to us to be an underestimation of pure science, and an unfamiliarity with the spirit of scientific investigation. I do not allude here to that sordid view which delights in calling itself by the taking name of "practical," and which would measure the capacities and achievements of the human mind by the standard of cash-books and dividends. The spirit to which I refer is of a nature far more subtle and complex. In part, perhaps, it arises from a certain kind of moral and religious depth of feeling, which, although unhappy and overstrained, is yet an error only, and not a folly or a wrong. Many earnest men, whose hearts are strongly impressed with the moral necessities and responsibilities of our race, and by the fleeting character of all temporal and earthly objects, as compared with the unending life beyond,

have been unable to feel much interest in the pursuits of pure science, and have looked upon them as really of but little moment.

There is a great truth in this view, and a great error likewise. We respect the feeling from which it springs, while we regret the tendency that results. To some minds, it may be unavoidable to feel thus, overpowered by the sense of vast and endless issues depending on these few years which their fellow-men around them are hurrying through, careless, hopeless, and Godless. This is especially the case with some Christian ministers, whose hearts not only, but whose hands, are filled and burdened with a work of the greatest and most absorbing responsibility. But all forms of human activity and progress are so bound together that they cannot be separated; and any feeling of this kind would, if logically carried out, condemn the world to ignorance and stagnation.

There is yet another feeling somewhat akin to this last, but far less excusable. I think there is a lingering idea in many minds that there is something a little daring and irreverent in thus pressing into the inmost recesses of life and of nature. This idea, so far as we have it, is a faint echo of classical or other heathenism, of systems in which man was so nearly equal to the gods, that the latter had all the time to keep him at arm's length in order to their own "tenure of office." The universe was, in this state of belief, like some large manufactory, with a high board fence, from which the proprietors, who have pirated, bought, or invented, some improved processes, are forced rigorously to exclude all inquiring visitors, and so fasten up "Positively No Admittance" on every avenue of approach. The lingering remnant of this feeling, which, perhaps, is more wide-spread than would be readily admitted, is fainter now than it has probably ever been in the history of the world before. But it is well that we should note it as one element of our subject. It betrays itself in such common expressions as "daring investigators," or "wresting her secrets from unwilling nature," etc., which have no propriety save where actual hardship or peril is involved. It is the old idea of the jealousy of a miserable tribe of divinities, aroused by the power and energy of man:

> "Audax omnia perpeti
> Gens humana ruit per vetitum nefas.
> * * * *
> Nil mortalibus ardui est;
> Cœlum ipsum petimus stultitiâ, neque
> Per nostrum patimur scelus
> Iracunda Jovem ponere fulmina."

How grand is the contrast in the Old Testament Scriptures! "The heaven, even the heavens, are the Lord's, but the earth hath He given to the children of men," and that long-earlier utterance from God himself, giving universal dominion to our race, and issuing the command to subdue the earth. And not only in the Old Testament, but all through the Scriptures, while there is the most positive assertion of the weakness of human wisdom in the sight of God, and of its total inadequacy to help or save men in moral and spiritual relations, there is not a trace of this heathen idea of a divine jealousy of man's attainments in the study of nature. The whole suggestion should be relegated forthwith to the region of omens, witchcraft, and spirit-rappings.

But it is rather to a more general kind of estrangement between the religious and the scientific modes of thought and investigation,—a mutual want of intercourse, appreciation, and understanding,—that we must attribute a great deal of the difficulty. In this respect, the blame is about equally divided between the two sides; and the remedy lies, in part, with whichever will recognize the error. Our religious writers and thinkers hold aloof too generally from scientific men. They have not learned, or do not cultivate, a spirit of hearty interest in scientific achievements and inquiries. Looking upon the study of nature as something wholly foreign to their chosen field, a feeling grows up that "the Jews have no dealings with the Samaritans;" and the result is a great and mournful controversy.

If we should yet again recur to our former illustration, we should find it universally recognized that intercourse between nations is usually one of the surest safeguards against war; and that just in proportion as men and communities learn to know each other, visit each others' homes, and look in each others' faces, and feel the common humanity that lives and looks and speaks in each and all, so far does the idea of conflict become painful and abhorrent, and the possibility of peace and of harmony increase.

It is this holding aloof, this separation between our religious and our scientific thinkers, that more than anything else, perhaps, gives rise to this state of discord. Insomuch is this recognized as the prevailing condition of affairs, that any exception to it is regarded as unusual and singular. Scientific men are apt to regard with feelings, and even with expressions, of pleased surprise, a minister who can meet them in anything like free and intelligent converse on questions of recent scientific discovery. It is not, I think, overstating the

facts, to say that such cases are really rare. The consequence is, that between the expounders of these two great modes of thought there is little or none of that harmonizing and softening influence, that springs from the friendly comparison of even widely differing views.

Hardly to be separated from this last-mentioned cause, and in great part due to it, is the existence of a vast amount of positive ignorance, on each side, as to the well-known truths and principles of the other. This fact is one of the most conspicuous possible to those who have any real acquaintance with both departments, and yet it seems to be completely unknown or unheeded by the disputants. With what coolness and assumption do scientific writers all the time undertake to extend their reasonings into subjects wholly different in kind from those in which such reasonings are valid! How often are the rules of logic, and the well-known principles of philosophical reasoning, quietly dispensed with, in order to introduce the celebrated "methods of induction" into some new and untried field, wherein experimental or statistical tests are impossible, and induction therefore worthless. On the other hand, what surprising ignorance of familiar facts in recent science may be found "full-high displayed" in many reviews of scientific books and essays attempted in our religious journals. It would be ludicrous, if it were not so melancholy, to witness the treatment received in such quarters by many of the grandest achievements of our day. We no longer hear any question raised as to antipodes, or the motions of the earth; that is thoroughly past. But there are still to be found men of high intelligence and culture who hesitate about the clearest principles of geology, mock at the glacial era, and set themselves in the face of the whole grand series of conceptions which begin to entitle the modern student to the high name of "*interpres naturæ*," while no less ministering to an intelligent and earnest Christian faith. Two such volumes have been given to the American public within the past year, and they have attracted much attention. One of these, in particular, has been lauded to the skies in at least one leading religious journal; a work with a sounding Latin title, and coolly dedicated to the Supreme Creator, but occupied largely with an onslaught upon the grandest scientific generalization as to the Creator's method which the human mind has attained—the Nebular Theory of the universe. Either not knowing, or not caring to know, that this conception of the philosopher Kant, as well as of the astronomer Laplace, has long since passed into the recognized mental furniture of almost every student of physical science, and is receiving new and cumulative proofs from year to

year, the author of this treatise assails it with a tempest of convulsive rhetoric, only comparable to the frantic gong-beating of a "heathen Chinee," under the frightful apprehension of the sun's being swallowed by a dragon. The remedy, in both cases, is equally adapted to the nature and extent of the peril.

But the mischief which such writings are calculated to do is extremely grave. They widen terribly the breach between science and faith, and increase and multiply the difficulties and dangers to be encountered by many minds, in passing from the receptive stage of youth to the reflective stage of independent manhood. It is one of the saddest aspects of modern culture, this hostile position occupied by so many expounders of science and of religion. There are infinite shipwrecks,—shipwrecks of faith, usefulness, and heaven,—that have happened, and will happen, again and again, from this only cause. The fearful words of our Saviour in regard to "offenses," come forcibly to mind in dwelling on this theme; and I can scarce conceive of a higher responsibility resting on a Christian educator, than that of so training the minds that come under his charge that they shall be able to pass safely through these ordeals of intellectual conflict. But no man can lead others in a path that he does not himself know and follow; and hence it becomes every such guide and trainer of youth to look well to his own foundations and methods.

This want of acquaintance with scientific truth on the part of so many Christian writers and teachers, arises from several causes. Some of these I have already alluded to independently, viz.: (1) the absorbing claims and responsibilities of the ministerial calling, and the overshadowing weight of great moral themes; (2) a lingering half-doubt as to the legitimacy of the spirit of universal investigation; and (3), and most important, a want of sympathy and intercourse with men of scientific pursuits. Among other grounds I would mention the following as of most importance: (1) the want of proper scientific instruction in the course of education; (2) the lack of ready means for keeping pace with the vast and ever-widening progress of scientific research.

The want of proper scientific instruction in youth, is an evil which belongs to the past, but which need not, and, we may hope, will not be felt so much in the future. The men who graduate from our colleges now have generally some fair amount of information in the department of science, and some interest in it; in many cases this interest is very great, and it is only needful to refer for examples to the scientific culture and capacity of many of our most honored and devoted

foreign missionaries. But not all our colleges are careful and active in this matter even yet; and in our theological seminaries, where some acquaintance with science should be a matter of most earnest heed, what provision does it receive? We do occasionally hear of a course of lectures before a theological seminary by some gentleman,—perhaps able and eminent in science, perhaps otherwise,—on the "Relations of Science and Religion." The course may be one of great value and importance, as has been the case with some that have been given of late in such connections; but even then, half of those who attend it have never received any such previous training in the rudiments of the subject as would enable them to grasp the real import of the facts and distinctions cited. They hear of the origin of species and varieties, of the principles of structural classification, of the correspondence between the succession of types in time and their advancement in rank, etc., without, perhaps, being able to distinguish between a species and a variety, or having any clear idea of the differences which determine grade in structure, and which, therefore, lie at the basis of classification, and of all our reasonings on the order of rank and the development of life. If the lecturer is able and accomplished, he is above the majority of his hearers; and if such is not his character, he is likely only to do harm, and to occupy himself, and entertain his audience, with rhetorical demolitions of the glacial period, the nebular hypothesis, or the correlation of forces, to say nothing of the doctrine of evolution.

And here I am brought to the mention of two points, which are of vital importance in this whole discussion. These are, our growing system of "elective studies," and the character of our scientific text-books.

(A.) As to the elective system. It has long been, and still is, a great and perplexing question how to make our college education more effective, and to enable it to keep pace with the growth of human knowledge. The advantages of a classical training are unquestionable; but if we attempt to gain the full benefit of them, they occupy an amount of time which leaves little opportunity for the teaching of science, now becoming so highly important. Hence has arisen the anti-classical war, waged so energetically of late years in the name of science (though not largely by men of true scientific eminence), under the plausible title of The New Education.

As the result, we have seen the very wide adoption of a system of compromise, by which students are allowed to choose, in the later years of their course, between scientific study on the one hand and

the old curriculum of classical, literary, and, perhaps, philosophical instruction on the other. This seems at first sight very fair and suitable. Every student does as he thinks best in his unfledged wisdom, chooses those studies which fall in with his intended profession, and so everybody is satisfied. Gentlemen of the Convocation, fellow-instructors of youth, let us take warning in time! What will be the result of this system twenty years hence? It needs no prophet to foretell it. These same evils and perils which we have been lamenting to-day, instead of being modified and healed, will be greatly intensified. We shall have a Christian ministry wholly ignorant of science, and a body of scientific men ignorant, not only of classics, so necessary in scientific language, but of the laws and principles of philosophical reasoning. These results may be modified, perhaps, by care and watchfulness on the part of instructors; but a more pernicious and dangerous experiment in our college education it would be hard to devise. Every young man, eagerly looking forward to life, is anxious, of course, to make his college training go as far as it can toward fitting him for his chosen sphere. Inevitably, therefore, the intended naturalist drops philosophy and classics, which are, perhaps, wearisome and dull to him, just as soon as he can, and spends his last year or two in geological excursions and in the chemical laboratory. In like manner, the intended minister thinks he can dispense with scientific studies, and gives himself to Greek, philosophy, and rhetorical practice. Each, perhaps, saves a year and is crippled for a lifetime. That professional one-sidedness, from which arises so much of all this mournful separation and misunderstanding, is fostered and intensified, and a full, broad, liberal scholarship will soon become a thing of the past. It is easy to quote specious maxims about the advantages of concentrating energy on one subject, etc., but these will not do away with the facts. The true work of the college is totally distinct from that of the professional school: it is encyclopædic, not specific; and just so far as we try to combine the two, we shall miserably err. The college lays the broad foundations of general culture, on which the structure of professional scholarship shall be afterward reared; and if it take cognizance at all of the intended career of the student, its aim should rather be to supply and develop those forms of mental training from which his future course will tend by disuse to lead him away.

But, it will be asked, what is to be done? There is not time in the college course for all that it seems indispensable to have taught. I have not space now, nor would it fall altogether within the scope

of this essay, to enter upon such a discussion. But almost anything were better than such a perilous separation between professional modes of thought. It is bad enough certainly now, even before the men trained under the elective system have come forward into prominence. There is already plenty of loose logic in the reasoning, and of bad classics in the nomenclature, to be found in our scientific works, and plenty of ignorance of science in our theological and religious writers. Gentlemen of the Convocation, let it be our most earnest aim, in whatever manner and measure we can, to avoid increasing these evils. If the elective system has to be employed, let it be guarded with watchful care. Let a certain amount of scientific training, in principles rather than details, be rigorously insisted on for every man who passes through the college course, *especially* if he looks forward to the ministry; and likewise, let every "scientific course" be required to include the departments of mental philosophy and logic, and I may add, perhaps, of Christian evidences.

(B.) But I pass to the other point of weakness in our scientific instruction, that of text-books. I am sure that my friend, Professor Hartt, will bear me out in all that I may say on this point, and I rejoice that he is with us in this meeting, as representing the department of geology and natural history, in which I should otherwise stand "solitary and alone."

What sort of text-books have we in science? In chemistry and physics we are far better off than in the natural sciences proper; but even in the former the ideal book is very far from being at hand. In geology we have fortunately had Professor Dana's admirable volume for ten years past. But what is the geology of ten years ago, or, one might almost say, of five years ago, to-day? Many doubtful points have been solved, many missing links supplied, and many new and most important additions and modifications have arisen; others are arising from year to year, and almost from month to month. If the teacher is one who can supplement the text-book largely by lectures on these points, very much is gained; this is what every college professor is properly expected to do. But for the multitude of teachers who are not specialists, the men who have the principal work of an academy or seminary on their hands, this is generally impossible. The information of recent discoveries does not reach them; or if it does, it is only in such fragmentary and unreliable forms that they can make no real use of it. In the department of zoölogy the case is ten times worse. With the exception of elaborate works, too large and too expensive to be used by students as text-books, such as Carpen-

ter's Principles of Comparative Physiology, Owen's Anatomy of Vertebrates and of Invertebrates, Herbert Spencer's Principles of Biology, etc., we have no work on philosophical zoölogy that is worth naming. There are some few small text-books in this department; but they are superficial and merely descriptive, not entering at all into the real foundations of the science. One work on the principles of zoölogy, that is still largely in use, was from the first exceedingly weak and defective at many points, and has actually had no revision in more than twenty years that have elapsed since its issue!! What sort of knowledge can be gained from such a text-book to-day?

Here, again, there is an "evil under the sun," which calls for decided remark. I allude to the stereotyping of text-books in science. Such a work can no more be of high value, unless revised from edition to edition, than can the mirror of a solar microscope, unless made to follow the change of position of the sun. But when such a book is issued and puffed and advertised, the object is to "make it pay," and to run it through a number of editions with the least expense and the most profit. Of course, therefore, it is stereotyped; and then no pains are spared to keep it in use as long as possible unaltered, and to hide and palliate every defect that the constant advance of science may reveal or cause. After some years, notes or an appendix will be added, covering so much new matter as can be introduced without involving too great a change in the work, and it is then put forth with new energy. I have particularly in mind a most flagrant case that occurred within a year or two past, in which an eminent publishing house prepared in this way a revised edition of a text-book on chemistry. The book had been a good one in its day, and the reviser was an able and excellent man. But instead of simply announcing these facts, and commending the work on that basis, which would have been perfectly fair, the publishers, in their advertising journal, professedly "devoted to the interests of education," made a violent assault on the new system of chemical nomenclature, on the most flimsy grounds, dissuading teachers from adopting it by all the trivial arguments that could be urged. Their own revised volume, of course, followed the old method; and here was presented the spectacle of a so-called educational paper fighting against the progress and improvement of chemical instruction, in the interest of the publishers' cash-book. Every teacher will recall the bitterness with which some publishers seek to disparage the works of rival houses, and the harshness and grossness which have at times

made such publishers' circulars and "journals" worthy competitors with the lowest style of political newspapers.

We need, moreover, a wholly different kind of text-books for the teaching of science. The bane of all of them is the large proportion of detail that is given, and the small amount of principles. Details belong to the professional student; the principles should form part of the liberal education of every man and woman. Details are, of necessity, forgotten; principles can be retained: and if the latter be once mastered and held, any details that may be needed in after life can easily be gained; while no amount of half-remembered particulars will enable a man to grasp at will the general laws of a science; the former are of value only as they illustrate the latter. What is needed in the crowded years of a college course is a class of brief text-books, that shall clearly present the general principles in each department of science. These manuals should never be stereotyped, but should be revised every year or two, perhaps by a committee of professors appointed for the purpose, so as to make the instruction of our colleges and seminaries keep pace with the swift advances of science. They should then be thoroughly studied and recited upon by the class, while all the details which it is desirable or possible to bring in should be given by the professor or teacher in the form of lectures and illustrations. The professional scientific instructor can do this from his own resources; the general teacher, by means of reading and studying for the purpose.

Such manuals, moreover, would serve to supply another want to which allusion was made just now, viz.: that of some ready means by which men in all professions might gain, in brief compass, a trustworthy account of the progress of natural and physical sciences in their several departments.

I would earnestly suggest that the Board of Regents should take some action looking toward such a system, or at least that some committee be appointed among the professors of the State, to consider the possibilities and the means of its adoption. The Board might also require certain standard works in recent science, and the annuals of scientific discovery from year to year, to be placed in the library of every institution reporting to them, or partaking of the Literature Fund of the State.

But I have, perhaps, wandered too far from the immediate theme of this paper, and must pass rapidly on to its conclusion. In speaking of the frequent estrangement or want of sympathy which exists between religious and scientific thinkers, I have traced it largely to a

mutual ignorance of each others' real positions and views; and this ignorance, I have sought in turn to trace partly to certain defects in our system of instruction. The mention of these has led to a digression as to the possibility of improvements, hardly germane to the original subject.

One of the last and most important points worthy of especial mention as a cause of difficulty and alienation, is the harsh and captious mode of speech employed by many religious and other critics toward the views of men of science. How freely are such terms as "infidel," "materialist," "unbeliever," etc., applied to men who have really neither made nor intended any unkind allusion to religious men or religious truth, but whose discoveries have led them to the presentation of views which, marking an advance in scientific conceptions, involve, perhaps, some changes in the outward form of conceiving certain Scriptural statements. Instead of calm and fearless inquiry, they are met with stern and positive denunciation. Instead of looking to see what new and valuable expansion of even our Scriptural conceptions may be found, many religious men at once raise the cry of infidelity, and force the unhappy investigator of nature into a position of hostility which he never designed to assume. I myself was never more surprised than on finding the magnificent generalization of the Unity and Convertibility of Material Forces assailed on charges of this kind. Generation after generation this process has gone on, from the time of Galileo till to-day. Astronomy and geology have by this time come nearly through the conflict in triumph. Physics and zoölogy are now in the thick of the fight. The next generation will see them left in possession of the field; but, alas, will the battle be still raging along some farther line, or may we hope for a better day? The best minds in the Christian Church lament this state of things most deeply. It is but a week ago since an honored minister of the Presbyterian body expressed this strong regret and anxiety in a conversation with me, mourning over the unwise and hasty opposition which drives men of science into an unsought attitude of estrangement.

Then, too, apart from direct censure or criticism, there is a slurring, contemptuous mode of speech toward science, frequently indulged in by some writers, which is as unwise as it is unfair. Science is taunted with its frequent changes of views; as if any advancing knowledge must not, of necessity, so alter. Then there is the stock argument of the dissensions and disagreements among the expounders of science, as rendering the whole matter doubtful

and trivial; just as though every department of human thought,—history, philosophy, political economy, and last, but not least, religion, evangelical or other,—did not present the same spectacle, of men united in the possession of certain fundamental principles, but differing widely in their application to details. No one complains more frequently, or more justly, of the unfairness of this objection, than do religious teachers when it is urged by unbelievers as an excuse for neglecting the Gospel. But it is equally unfair in the other application, and should never be used by candid thinkers, however convenient it may be in default of any better. It is a sword which cuts only the hand that takes it.

All this is not only unfortunate, but useless; not only useless, but mischievous. Denunciation can always make enemies, but never friends. Some of the ablest writers and thinkers of our day have prejudiced and weakened their happiest efforts by a sharpness of manner that stands in painful contrast to the truth, the dignity, and the real fairness of their matter. Religious critics *must* learn to separate the spiritual truths of the Divine Gospel from the physical conceptions of creation gained from Milton's Paradise Lost. The image of God, still the distinguishing glory of humanity, even in this fallen state, must be recognized as in the spiritual character and not in the bodily frame. Until this is done, at least so far as to allow for the differing conceptions of workers in a different field, the strife must go on unceasingly to the bitter end,—how bitter I dare not say.

But the remedy, gentlemen of the Convocation, lies with the Christian educators of our country. If, along with an earnest spiritual faith, they shall teach caution, patience, and kindliness, a true and broad sympathy with the aims and methods of science, and the charity which "thinketh no evil," we may hope for better things in the days that shall come when our work is past.

But it will be said by some, that "the danger of a wide-spread infidelity is becoming very great. Science threatens to undermine all the foundations of faith. Shall we utter no warning and venture no reproof?" I reply, the greatest danger, by far, is that which arises from these very tendencies on which I have dwelt. The foundations of faith have suffered nothing from the adoption of scientific views which, in times past, were deemed just as dangerous as these which are now so dreaded. The Copernican astronomy, the ages of geology, the nebular hypothesis, have but expanded vastly our conceptions of the Creative power and wisdom, and left the spiritual energy of the Gospel purer than before, because less involved with unrelated physi-

cal ideas. Why, then, should the doctrine of the conversion of force, or of the development of species, awaken fears for the Christian faith? It is no new and strange ordeal through which it is called to pass, this eliminating of certain outward forms in which, for a time, it had been clothed. It is an experience which belongs to every age, and is essential to the life and development of the world. Let me not be misunderstood here. I do not speak of the spiritual, but of the physical, elements in our religious ideas. One of the leading American magazines for the coming month sounds this note of alarm in a strenuous article, that seems not only excessive, but undiscriminating as to these very distinctions that are so fundamental.

Such anxieties arise from a want of confidence in the Divine ordering of human progress, and are unworthy of the calm assurance that should be the mark, as it is the privilege, of every Christian believer. It is ours to look forward, and not back, to the Golden Age, to rest in joyful certainty of the coming of an era of wisdom, holiness, and peace. Every past century, through all the storms of history, has contributed to this result; and as believers in the word of God, we may not and cannot fear that His plans or promises shall fail. Our way is plain and our duty is solemn. Let us, as guides and teachers of youth, labor to impress upon their minds and hearts the inward grounds of spiritual confidence. Let us warn them against the timorous and doubting tendencies which go far to create the very conflict which they so much dread. Let us teach them to love and honor the work of science, and to base their faith on better and broader foundations than any that can be shaken by historical or physical discovery. The principles of the Gospel—ruin by nature, atonement by Christ, salvation by faith in Him — are eternal and unchangeable as He from whom they come; but the forms and vehicles in which they are received must change with the changes of human thought and progress. "Let us not, therefore, judge one another any more, but judge this rather, that no man put a stumbling-block, or an occasion to fall, in his brother's way."

It is difficult, however, for men to change conceptions, which are deeply planted in their minds, and associated, however needlessly, with great and cherished truths. The liberal and progressive man of to-day becomes the conservative and the reactionist of to-morrow. Thus it is well and wisely ordered that "the workmen die, but the work goes on." Nay, it must be so, that the work may go on. Let us follow fearlessly the advance of truth, seeking, in all these strifes and collisions, "the things which make for peace;" and when at

length we grow into the mental, as into the physical, rigidity of age, and can no longer keep up with the march of thought and knowledge, instead of doubting or despairing as to the result, let us leave the work to abler and stronger laborers, trusting the future of humanity to Him who "fainteth not neither is weary" in all the succession of ages; and let us rejoice that He, who has planned and guided all the laws and all the stages of the world's long epochs of development, will remove us from a sphere wherein our usefulness is ended, to a renewed condition, of power, energy, and purity, in the kingdom of His Son.