The Moral Relations of Physical Science.

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# ADDRESS.

An adequate account of the progress and the applications of physical science during the half century about to close, would be a narrative of singular interest. It would describe a series of events quite unparalleled. Within or nearly within that time, such results as these have taken place: Chemistry, by a succession of brilliant discoveries, has become a science, with vast associated sciences; Physical Geography, in several of its branches, Geology, Zoölogy, Mineralogy, Meteorology, has received nearly all of its accurate and scientific character; the laws of Optics have been further ascertained; the Telescope and Microscope well-nigh made over, disclosing systems of infinite and infinitesmal range, and the Photographic art suddenly created; Human Physiology has undergone a revolution, attended with important advances in Medicine and Surgery, and crowned by the discovery of anaesthetic agents; Agriculture has advanced with lengthened strides; Metallurgy and practical Mechanics have gained as much; the Steam-engine has received its perfection and its most important applications, in the car, the steamboat, and the manufactory; The Cotton-mill, with its world of wonders, has grown from nothing; the Cotton-gin is scarcely sixty years of age; the Gas light is of much younger birth; and the Electric Telegraph is but of yesterday.

At no time, consequently, have the Physical Sciences and their resulting Arts more completely filled the public mind.

The fact has been proclaimed alternately in honor, and in reproach, of the age. Some have boasted of the abandonment of the speculative and more purely intellectual for the physical and practical. Others have sneered at the "material and mechanical" cast of the times. Perhaps the extremes are, as usual, in the wrong. Natural Science and its applications can never deserve a sneer, till the doings of God and the well-being of man become contemptible. Yet possibly some of its votaries, in their enthusiasm, may at times have undervalued the studies which relate more directly to the intellectual and the moral nature. They have often exhibited this tendency in the inadequate grounds on which they have extolled their favorite pursuits. Natural Science, at least in its experimental portion, has commonly been advocated for its wonderful effect upon man's physical condition; its great enhancement of his comfort and material prosperity. This is, indeed, its primary and direct result. Nor can its efficacy here, be overrated. It has greatly increased man's comforts, multiplied his enjoyments, and soothed his sufferings. Yet laud it as we may on these accounts; if this be all, if its force be expended only on his physical necessities, if its utmost range be bounded by these three score years and ten, its virtue exhausted in pampering the life of the body, its highest end accomplished when it has made man live the grandest and the most luxurious of animals, and smoothed his passage to the grave; if it have subserved no loftier purpose in his destiny—this were to acknowledge it in its best estate altogether "of the earth, earthy." It would be hard for the ingenuous soul to check a saddened feeling, as it turned to its downward task for life.

We are relieved from such a necessity. We may rise above the low utilitarian view that considers science as tributary only to the animal nature, and view it as an end itself; science, the proper aliment and element of the human intellect; study of the manifold and glorious works of the Almighty, the appropriate business of him unto whom the Almighty giveth understanding.

I propose, however, on the present occasion to take a more decided view, and to show how, in the economy of Divine Providence, Physical Science even in its applied forms, is made to subserve higher purposes for the human race than to cherish the body or to expand and delight the mind. I wish to consider

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I wish to show how the Science of Nature, even in its experimental portions and in its applications to the arts, is made instrumentally to promote the moral elevation of the race; how, in the constituted course of things, it lends itself a fitting, an efficient agency to the cause of righteousness, and falls naturally into the great chain of better influences.

I assert no moral character nor recuperative energy in science or its applications. A higher influence must move its mechanism for good; but its mechanism is peculiarly fitted to be so moved. It offers facilities to the cause of righteousness, harmonizes with its operations, naturally aids in accomplishing its ends.

The sciences of observation and the sciences of experiment are distinguished by this: that the latter admit far more direct and varied applications to the uses of life. It is to these mainly that the public mind now turns, and to these more prominently the present argument may refer.

I. The most obvious mode in which Physical Science favors the moral elevation of the race is, that it relieves the constant pressure of physical necessities. It thereby affords men the indispensable means and opportunity of getting and of doing good. It accumulates the means of subsistence and of benefaction, and redeems the time for higher culture.

Employment is a good; incessant drudgery to the mere cravings of the body, is an evil. In blessing, the Lord placed our first parents in a fertile garden, to dress it and to keep it; in cursing, he made the sterile earth bring forth thorns and thistles and require man's anxious toil. But the same mercy

that provided a redemption from the bondage of sin, provided an escape from absolute slavery to bodily want, and an opportunity to rescue and to cultivate the higher nature. Only by some degree of accumulation can it be done; and accumulation to any extent is possible only by the aid of science. In the complete destitution of science man would be an animal, more than other animals forced to spend his whole time in pursuit of the lowest necessaries. He never is found thus destitute; his rudest implements are the faint dawnings of scientific skill. Races of mere fishermen and hunters, as found in Northern Asia, approach indefinitely to the condition and character of animals. When the human being begins to till the soil even in a rude degree, in the use of implements and the nature of the process he passes further from the sphere of instinct to that of science, and proportionately rises from the level of animal life. Supplies accumulate, leisure increases, mind and heart may expand. By further scientific applications the labor of cultivation is reduced and its product increased. At every step another portion of time is gained for the training of the family and for the higher offices of humanity. But the process still is incomplete. "Without machinery" it has well been said, "every populous community must sink into the state of China, where almost every one of that enormous population of three hundred and sixty millions, is laboriously working merely to obtain the scantiest food and simplest raiment; where no values can be saved for hospitals, for asylums for the blind or deaf and dumb, or for extensive scientific pursuits; and where every public calamity immediately disturbs the nicely balanced state of things, and exposes thousands upon thousands to starvation."

But science comes in higher forms; mechanism springs to work with breath of fire and muscles of steel; men in thousands are released for the labors of thought and love; the toil of community is lightened, their means of culture multiplied, and provision made, under a higher influence, for relief of all their woes. The strain has been taken from the aching sinews

of man, and thrown upon the brawny thews of nature; and the work is done, better and more. They toil and never tire, to give him rest. In the want of machinery, Athens gained her artistic ease and leisure from the toil of slaves; the Romans greatly from the wealth of conquered nations. In modern times we task, instead, the air and the water, and the fires of earth and heaven; the secret affinities, the invisible repulsions, the hidden powers that work the universe. We yoke the river on its ocean journey and set to work the idle winds; we chain the all-pervading fluid and bind the subtle vapor ere it vanish in thin air. The poor man has the luxuries of the once favored few, with leisure too, because in every article of clothing or convenience science has saved the labor of many scores of hands. We float upon the waves, perchance upon the errand of mercy, and the strength of four thousand galley slaves is in every stroke of the paddle wheel. We read at ease the daily news, while the single press from which it came, tended by half a score of men, is doing the work of two hundred and fifty thousand copyists. In many kinds of individual employment, science has rendered it possible to perform the same amount of business many times as soon, to turn over the same capital many times as often, while, by her remedies for man's physical failures, she has in various ways prolonged the average period of his usefulness.

It is thus that science has redeemed the time of the human race in vast amounts for higher uses. Nor is this effect confined to the benefits of any class. In different degrees every class reaps its fruits; in countries where inequality is greatest, it pervades the whole structure of society. Many are enabled to devote themselves to the work of elevation. The whole of society possesses greater leisure. And though, by reason of artificial obstacles, relief is unduly intercepted, and in many wealthy communities multitudes are toiling for the scantiest allowance; even they in many modes are reaping the fruit of beneficent effort which science has made possible. All the great efforts now in action to elevate

a degraded world, are working from the high vantage ground of time and capital which science has redeemed from the drudgery of animal life.

II. Another effect of science is, that by releasing man from the constant thraldom of the lowest wants, it tends to elevate him above a mere regard to their gratification. They lose to some degree their lordship over him. He ceases to be a mere animal. The lowest wants are not continually tasking his powers, nor therefore always awakening his desires. His thoughts can range on other things. They tend to higher topics. He is no longer bound hand and foot to the present and the sensual. His soul crawls out from among the clods, and with ever strengthening wings rises aloft. Other minds react on his. Observation and reflection follow; his powers expand; and though no moral influence can be said to have passed upon him, he becomes ever a more fitting subject for it; better qualified to recognise its power, to perceive its relations, to follow its obligations when assumed, and to exert its force. The more a man is imbruted to the indulgence of animal appetites, the less accessible to moral influence; the more habitually and completely bound down to the present and the seen, the less susceptible to that influence which deals with the future and the invisible. It is a clear gain to the cause of human welfare, when the thoughts and desires are elevated from these lowest objects though their range is still limited to worldly ends; when, if earthly, they are less earthy. The Chinese is a more hopeful, and will become a more reliable subject of the gospel, than the Bechuana, the Hindoo than the Hottentot. From peculiar favoring circumstances, the Sandwich Islanders have received the gospel in unwonted numbers; but how variable and uncertain is the control of moral influences over men deep sunk in sensuality, has been clearly shown in their religious history as compared with Armenian and Nestorian piety. The congeniality of civilized Art and Science with moral and religious influence, is plainly seen in the tendency of the gospel to introduce those arts and

sciences, and the proved necessity of introducing them for the gospel's best effect in heathen lands.

If it be said that these things tend to artificial wants; I deny that artificial wants, so far as they include the means of decency, comfort, convenience and even a degree of elegance, are evils. I affirm the contrary. The tendency may be abused; but it is the bane of many nations and many individuals that they have not artificial wants enough. They live like brutes, and like brutes they feel. It is the curse of many an Irishman that he wants nothing but a potato and a mud hovel where he and his swine can live in equal bliss. The consequence is that all appeals to a higher manhood and a higher life, are equally efficient upon him and the kindred occupants of his hut. Any thing which should release him from the more brutish modes and aims of life, whatever mark should to his own judgment more conspicuously distinguish him from brutish beings, and should serve to make him conscious of a higher dignity, would open new avenues of influence for his moral elevation. Thus even missionaries of the gospel have found the introduction of civilized modes of life, arts, dress, refinements, indispensable to the best success of their higher efforts; and thus in one of the Indian missions where, from a laudable desire of simplicity and economy, they introduced a ruder style of living with dishes of tin and other things proportional, they soon learned their mistake and conformed to the usages of common life.

If it be said there is danger of excessive devotion to artificial wants, I admit it; but affirm that inordinate engrossment in some of the objects that man alone can desire is better far than destitution of all the traits and apathy to all the motives of humanity.

III. Another effect of science in its applications, has been in several ways to act as a restraint upon vice and crime.

We ought not to overlook its influence in furnishing various employments for men gathered in dense masses. By its

countless multiplication of employments, it has offered to every man the privilege of congenial and successful occupation, and the assurance of ready demand for whatsoever he is best fitted to produce. And the lively stimulus and the ceaseless vigor of hopeful labor seem to fan and purge the very air it breathes. The place to hatch and rear the brood of vice is the crowded pool of idleness or the scene of spiritless, hopeless toil. Through the great masses that congregate in some populous land, otherwise to breed moral infection and to maraud upon each others' rights, the arts of civilization shoot off a thousand threads of order and of enlivening, virtuous activity; her myriad influences play through the scene in living streams.

By the betterment of man's physical condition, science has done much to remove the temptations of extreme destitution. Since the time, at least, of Agur's prayer, hopeless destitution of the comforts of life has been the fruitful source of crime. Utter poverty has tended to almost unavoidable neglect of decencies and consequent neglect of moralities dependant, to envy, to sourness of feeling, dissatisfaction with Divine arrangements and human law, to theft, unchastity and other vices and crimes. This is the well-known fact, resulting not from unequal distribution but from abject destitution. Now, it is the tendency of scientific improvements to remove that utter destitution which seems to obliterate all moral distinction, and to scatter more and more widely the necessaries of life. It reduces the amount of pauperism; and it enables, while a higher influence disposes, society to make suitable provision for unavoidable destitution. In England, with all its artificial obstacles, the same amount of labor will purchase for the farmer or mechanic twice the amount of food and many times the comforts of life, that it would a hundred and seventy years ago.

Science has thus strengthened the ties and influences of home, that nursery of virtue. It has aided to make the poorest home a pleasant place; to spread through the humblest family circle, comforts and decencies that shall bind its mem-

bers thither, elevate their sensibilities, and withdraw them from the scene of vice or temptation. The comfort once supposed to centre only in an English inn, has now transferred its residence to the homes of England. The peasant enjoys conveniences then acccessible, if at all, only to the Prince. "Few knights of the shire," says Macaulay, "had libraries so good as may now perpetually be found in a servant's hall." In all that invests the fireside with attractiveness, in comfort, elegance, education and the means of interest, science and art in two centuries have remodeled even the civilized world. The tavern-haunting husband it has called back to his paper and his book by the cheerful hearth; the roystering, night-walking boy to his studies, and the society of an intelligent mother and educated sisters. Nay, when he leaves the paternal roof, art has followed him still with the home influence. No longer has he severed those bonds for ever; space and time have well-nigh been annulled, that neighbors' eyes may be upon him yet and a mother's voice still reach his ear.

The more complicated relations and higher functions of advanced society, moreover, are incompatible with many forms of sin. It is impossible for the man imbruted by vice to hold his position or fulfil his expected duties.

More and stronger interests stand opposed to crime and bent upon its punishment. It strikes at the foundations of society's whole structure. Vengeance is no longer left to private revenge and a kinsman's arm. Society has been smitten. The indignation of a state burns against the culprit; a whole people have become the kinsfolk of a murdered man. If the origin of the sentiment be due to a higher source, its action has greatly been increased by broader relations introduced by science and art.

At the same time science still more effectually acts in restraint of crime by ensuring its detection and its punishment. Every advance in its application renders villany less secure. Incorruptible witnesses record the secret act; voices of nature tell the tale. Science detects the spurious coin, the adulterated

drug, the assassin's blow, the murderer's potion. In great and responsible establishments, some manufactory or some Bank of England, mechanism keeps truthful record of fidelity at dead of night, at the place of solitude. How many a mystery of iniquity has science penetrated. How has it rent away the superstitious sanctity in which crime once shrouded itself to do its dreadful work. What untold deeds of villany veiled in ruder times beneath the influence of an "evil eye," the magic power of the Great Medicine, the unearthly functions of the Witch, has she dragged forth to light. She construes the ancient obliterated bloodmark; long buried remains reveal to her the deadly draught. And he that did his damnable work in secret, shall find that his brother's blood cries out from the ground, and dead men do tell tales. Or the villain has fled from the scene of crime; on wings of steam he flew; no pursuit can overtake; he has reached the great metropolis; from coach to coach he has changed his passage; from labyrinth to labyrinth has wound his way; he stands at his door; the keenest scent can never track him—he is safe. But no! a lightning word shot by him on the way; a silent man watched his arrival, rode on his coach-box and followed his walkings; while his hand is on his door-latch, the gripe of the law is on the malefactor. "There," said the honest yeoman, pointing to the telegraphic wires, "there are the cords that hung John Tawell."

It would be impossible to point out the many modes in which science has contributed to the security of human life and possessions, from the hand of injury. It has done much to clear the land of robbers, to sweep the sea of pirates; and it has well been said that the discovery of gas and its application to light the streets, did as much to check street robberies in London as did the organization of a powerful police.

It may be objected that the varieties of crime increase in civilized lands. So they must; as the relations of men are multiplied, so must the opportunities of violating them increase. But variety and amount are very different things. If the vari-

eties of disease are greater here than thirty years ago, it will not follow there is more disease than when every one was sick with the same complaint. Moreover the actual number of offences must increase with increasing population, and must seem to be still more increased when every one is heralded through the land; and yet the proportion may be less. Some new forms of temptation will exist, though their aggregate force be less and the checks be stronger, and while some older forms die out. In support of our general position we might safely present the Sandwich Islands as seen by Cook, beside the worst state of Athenian, Chinese or Parisian society, and rest the subject there. We assert however not simply some restraint on immorality exerted necessarily by the action of science and art; but that, given a righteous influence existing in society, they act a most important part in aid of its restraints.

IV. But science in its applications has not put forth a negative power alone—a restraining influence. It has laid on men additional inducements to virtuous and beneficent action. Ever widening the range of human occupation and human desire, and contracting the sphere of individual labor, it has incalculably increased the ramifications of human relationship, and lengthened and strengthened the ties that bind men to each other.

The very intercourse and knowledge thus induced have done much to humanize men's feelings towards each other. It tends to peace. With nations as with individuals, how much does the sound of another's voice, the sight of the face or the grasp of the hand, to extinguish the unknowing prejudice or to preclude the sinister influence. It is hard for men to fight their neighbors; horrid to mar with wounds, features familiar to the eye. Hence savage tribes that have none but hostile intercourse, always are at war. Commercial nations incline to peace. From ancient grudge or sudden passion, Frenchmen and Englishmen may meet in deadly strife; Frenchmen with Frenchmen fraternize. The army brought to overawe a capi-

tal mingles with its citizens, and they are one. Rebellions were rooted out of the Scottish Highlands by the simple process, not of wasting them with armies, but intersecting them with roads. The steamships that dart across the ocean have well been called the shuttles that weave the great web of national and human union. And while we might hesitate to say that Railroads and Steamers and Manufactories are better than all Peace Societies and World's Conventions, we do affirm them to be powerful auxiliaries. Nor ought we in passing to omit the known fact that modern discoveries, instead of increasing, have diminished the horrors of war. While the relations of civilized life have necessitated many restrictions that humanity requires; modern warfare risks fewer but more decisive battles, and so far affords elements of calculation as seldom to prolong a hopeless contest. The horrors even of the battle field are diminished. Fighting from a distance and as portions of a great mechanism, each man no longer sees the foe who gave his wound to grapple with him in demoniac hate; less of personal malevolence prevails throughout and follows the defeated with thirst for blood. The battle which seated Edward IV on the throne of England, with half the numbers, was twice as bloody as that of Waterloo. The Roman loss alone on the field of Cannae was equal to that of French and Russians both in the bloody fight of Eylau. The strifes of ancient days will in general be found bloodier in proportion than those of modern days.

The common interests and mutual dependencies introduced by science and art increase the tendency to mutual good offices. Men need and are indebted to each other more. Reciprocal obligations and benefits tend to common sympathies. And not alone to common sympathies, but to reciprocal necessities. The complicated commerce, the extensive manufacturing and other interests dependant, force men into amicable relations. War become too costly a luxury for them to afford, too terrible a calamity for them willingly to undergo. Thus the great body of interests in Britain and America has more

than once proved too firmly joined for the strongest efforts of knavish demagogues; and thus, we trust, will North and South yet prove so closely knit together as to bid defiance to the ravings of a few thousand frothing madmen. Every advance in civilization renders man more necessary to his fellow, and brings the nations to a clearer recognition of common interests.

The operation of this principle and the natural growth of social respectability have concurred with the gospel, greatly to increase the value and the influence of the masses. With whatever drawbacks, their relations have been vastly changed. Working men can now be heard even in England and on the Continent; they can coöperate, they are regarded, and, to some degree, represented. Science and art, as well as Christianity, have served to raise them. The laws of reciprocity and of comity are, from necessity, better kept between the classes of legitimate society.

With every extension of human relationship new obligations bind the man to a virtuous life. In every tie, he gives a pledge to society, who hold him to his duties, depend on his fidelity, and have greater power to make him suffer for his vices. He has more at stake in a virtuous character, and they have more at stake in him. What is reputation to the savage? And what is it not to the civilized? Nor is it valuable to him as a good opinion merely; it comes home to him in every form of practical life. From an Arctic Expedition or a Dead Sea Exploration, down to a trading firm, a stage or a cotton corporation, men will and must reject him for his vices. A California Company will bind him with a pledge to abstain from gambling and intoxication—because he can not serve their turn without. In nearly every situation he has given virtual pledges of good behavior, and will forfeit his place and his bread by ill. More complicated relations and greater responsibilities resulting, have rendered the consequence a necessary one, and made it effectual.

Public sentiment, if it existed, would be of little avail

except where men were bound together as they are by the arts of civilized life. There, it is all but compulsory. It speaks with meaning in its tones. And since the dictates of conscience are imperatively seconded by the interests of society, the commanding voice of public sentiment must be in the main for virtue. Bound together, too, by the business relations of life, and stimulated by the force of that sentiment, a great amount of the means and influence of the irreligious is thus absorbed by men of higher aims, and made to subserve the moral and the philanthropic efforts to which otherwise it had never lent its aid.

V. Physical Science has afforded great facilities for scattering the seeds of light and religion. It has become the means of transmitting good influences far more widely, rapidly, and powerfully. At no period in the history of the world has it been possible for good men to act so efficiently for human welfare, as at the present time. Never has the Christian church stood on such a vantage ground; never seen the time when it would be possible so speedily to preach the gospel to every creature. The world is lying open before her. The want of Apostolic gifts is in some respects compensated by the vast physical resources placed at her disposal; had she but Apostolic faith how soon might she enter and occupy. From frozen sea to frozen sea almost every land has been explored. The supremacy of Science has opened the closed gates of Paganism to the Christian missionary; and in safety he may roam the plains of India, explore the cities of China, lift up his voice in sound of the muezzin's call, or sit in the Kraal of the Zulu. Wonderful applications of science have brought the distant nations to our doors; he can go and come; he labors there among the sympathies of home friends borne fresh on every breeze. He stands among those Pagans strong in Christian science, a superior being; a man to impress the intellect that he may reach the heart. Or he goes the almoner of temporal mercy, and moves with healing touch around the couches of disease. Science wins to him the gratitude of the suffering,

that he may minister to a soul diseased. Or he meets the learned champion of infidelity to confound him with the gross falsifications of physical science, with which, by a noticeable providence, God has suffered nearly every false religion to become entangled for their overthrow. He scatters broadcast that volume of eternal truth, which modern art has changed from a prince's luxury to a peasant-boy's gratuity.

Perhaps no more striking proof can be found of the degree to which God will make mere human discoveries subserve the interests of his kingdom, than the aid which the applications of science have rendered in the multiplication and distribution of the Bible. In the year 1274, a small-sized manuscript copy was sold in England for 1000 dollars. Four hundred years have scarcely elapsed since, by a single invention, the common price fell from 500 crowns to 60; a change so astonishing as to subject John Faust to the charge of dealing with infernal agents. Change after change have the men of science and of art devised, till now four thousand copies may be had for the former price of one, and the New Testament for a sum too trivial to mention. Three centuries ago (1553), it was computed that there were 117000 copies of the Bible among the English people; as late as 1777, there were supposed to be about four million copies in the world. In our day, Bible Societies alone, of which the oldest began in 1804, have issued forty million copies in about 200 different tongues. It is not because of increasing zeal alone, but increased facilities; four centuries ago, the resources of the world could not have done the thing. Through Heathendom and through Christendom the word of life is finding its way; it is roaming by thousands through the scenes of French infidelity and Spanish bigotry; it has invaded the seat of Papal superstition, and while edging its way through Florence, Pisa, and even into Rome itself, the moanings of His Holiness have filled the ears of the faithful.

This is but a specimen, prominent indeed, of the mode in which the leaven of light and righteousness is brought to act upon the mass of ignorance and evil, by the aid of science and art.

Good men are enabled to join their forces and act in concert; they can present a more unbroken column; every stroke is given with heavier power and wider sweep; exigencies of business are made more controllable by the common rules of morals, and violations shown to be without excuse. Art and science are facilitating even the observance of the Sabbath, by removing temptation and apology for its public violation; and in various modes promoting the support of religious institutions.

If it be asked why these facilities practically favor more the good than the evil influence; we answer: because the former has the energy, the self-denial, the union to wield them with effect, they become fitting instruments in its hand. Sin is too selfish to propagate sin with the highest success. It will do vast evil when it lies in the way; it does so spontaneously, often malignantly. But even its malignity can not prompt and sustain it in great self-denials, arduous labors and united efforts for such an end. It loves its ease, its property, too well. It has no fraternal union, but quarrels with its coadjutors. Combinations have been formed avowedly to corrupt mankind; but their life was short, their labors small. Maddened by the success of the Gospel in Calcutta, native opposers formed a stupendous scheme of education against the missions. A heavy sum was pledged, and all began with formidable show; but the money failed, and the scheme in three years came to naught. All the malignity of French infidelity, headed by Voltaire, could not sustain, much less perpetuate, an efficient organization against the Christian religion. In all such rival efforts, the trenchant weapons of art and science must become the weapons of victory to those that can wield them with the most devoted soul, the most deathless courage, the most united front, and the God of Hosts among them.

And with whatever deficiencies or counteractions, those facilities of moral influence have been so used that we may confidently say, the world has advanced with steps commensurate; it is proportionately better than it was at the beginning of this brilliant half-century of scientific progress. During that

time Christianity has made immense inroads upon the realms of heathenism. Some thousand circles of light have begun to radiate; scores of thousand hopeful converts have been made; an elevating and moralizing influence has been poured upon hundreds of thousands, yea, on millions more; the moral aspect of some nations completely changed; a humanizing power so broadly exerted that we must look far to find the human banquets, the funeral piles, and some of the more horrible forms of heathenism once common enough; and good seed has been sown whose mighty harvest may yet astound the nations. Toleration has been forced upon the Mussulman; spiritual life infused into dead Eastern churches. Romanism has been shaken heavily; the word of life placed in multitudes of Romish hands, and greater advances made toward religious liberty in Papal countries than in previous centuries; indications of promise are witnessed in the British Islands; and over most of Europe the well-being of the lower classes has become a prominent thought, and, with whatever deductions, their rights and influence have made unheard-of progress.

In our own country elevation of character and diffusion of morality have advanced with the facilities of information, action, and influence. Making all allowances for peculiar dens of filth and shame, for public and private immoralities that disgrace the land, and for the immigrant vice and ignorance that have clogged our upward movement, the remark is true of the country as a whole and of its most favored portions. Since New England became a mixed community, and no longer a Church, we believe there has been no time when virtue and morality, even there, have been so high. Croakers may inquire as they will why the former days were better than these; it is not so. No man who has taken pains to learn the *facts* of society as they existed fifty or a hundred years ago, will deny the following statements: Never, since the first generations, has there been a time when so much benevolent enterprise has been in action, or has so extended to

all classes of community, as in the last few years; never a time when irreligious men were more controlled by external morality; when so correct or so efficient a sentiment prevailed upon temperance; when the Sabbath was so generally observed in the public business of life, or when it was so hard for transgressors to face the prevailing sentiment; when the laws of chastity and propriety between the sexes were so well observed and so powerfully enforced by public opinion; when the poor, the insane, the idiot, were treated with so much humanity, the criminal with a justice so thoughtful and unvindictive; when the mass of community felt so justly upon the wrongs of their fellow-men; nor when the spirit of blood-shed was more abhorrent to the great body of the people, than at the present time.

In all these favorable changes through the world, science and art have not alone transmitted, but strenuously favored and enforced, the influences of the great renovating power, Religion.

But perhaps examples may be thought to show that the immediate effect of physical researches upon those that follow them, is unfavorable; and we may be pointed to men who have dealt so long with second causes, as to forget there needs a Great First Cause. We simply say that the Heavens declare the glory of God, and the firmament showeth His handy work; the invisible things of Him from the creation of the world are clearly seen, being understood by the things that are made. And they who lose themselves in second causes came with hearts corrupted to the contemplation. The study never perverted them, but they the study. And after all, it is a shallow brain that could hide itself beneath so thin a covering of sand; a slender intellect that thinks with some "nebular hypothesis" to make a universe without a Creator, or by some "equivocal generation," a chain of animal existence without a God to hold it up. Such have not been the great minds that have delved most deeply in the laws of nature; the Bacons, Newtons, Cuviers, Davys, Brewsters. Such is no legitimate influence of physical research.

Nor is there any ground to fear that the ascertained results of science shall ever clash with the teachings of the Bible. From the time when the heathen philosopher of Samos came near his death, for disturbing the peace of the gods by his theory that the earth moves round the sun, till the excommunication of Copernicus and the imprisonment of Galileo by the Romish church for a similar assertion, there has been a dim fear of collision between science and religion. It has been occasioned partly by the greediness with which infidels have laid hold of every science in succession and dragged it to the onset, in the hope that all the salient angles and broad exposures of the Bible, might present some point of weakness. History, chronology, archæology, astronomy, geology, ethnography, have they brought to the attack. Yet while we can not but recoil from their irreverent handling of the word of life, we have no solicitude. Religion has no fear. The God of Revelation will never prove himself a falsifier by the Book of Nature. No man shall dig from the bowels of the earth or overtake among the stars, a lie from the mouth of Jehovah. In tranquil expectation we wait the issue of their toilings, and thank these Canaanites, these hewers of wood and drawers of water, for the unpaid labor they are bestowing upon the walls of Zion. For though it may be years or generations, before the perfect adjustment shall be seen between the Book of Nature and of Revelation, we are sure that the history of the past is a prophecy of the future; and just as the chance-discovered manuscript, the chance-recorded fragment, the buried coin, the recovered sculpture, the silent homes of Egypt's dead, the ancient halls of Ninevitish revelry, utter their truthful tale for the Holy Book; even so shall the stars in their courses fight against its opposers, and a voice shall come from the deep places of the earth to confound them, and the strength of the hills shall be His also.

I have endeavored to show how in the wisdom of God, physical science, even in its practical relations, is made subsidiary to higher ends than animal necessities; how it is made

powerfully to subserve the moral elevation of the race. It is part of the grand system of means, whereby God is working out his great revealed scheme of mercy.

Gentlemen of the graduating class: Amid the circle of the Sciences, you have chosen one whose nature is eminently practical, and its work a work of mercy; peculiarly symbolical of that greater work, which God is carrying on for a dying race. It is yours to bring relief to many an aching frame, and delight to many an anxious home. You will be in many circles a more intimate guest than any other. Mingling there in the hour of tender feeling, standing by the bed-side at times of deep impression, you will enjoy means of influence for good such as few possess. May it be yours so to discharge your work of earthly mercy, as voluntarily to promote the higher end, to which every human art and science ought to be subject. Of what avail, gentlemen, will it be, if we minister only to the body? Skillful as you may be in your profession, Death will undo your work at last. So may you meet your responsibilities, that when patient and physician shall have met the inevitable lot, the whole achievement of your life shall not lie mouldering in the dust.