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## TO THE READER.

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WHILE travelling in the United States, during the last twelve or fifteen years, as a public lecturer and missionary of health, the question has been asked me a thousand times, What work have you written, not unlike your course of lectures, which may be regarded as containing the substance of your views on health? to which I have been obliged to reply, None at all.

For though the Library of Health, the Young Mother, the Young Housekeeper, and the House I Live In, contain much on this great subject, yet they are not exactly what is demanded. The Young Mother is designed chiefly to assist in the application of the laws of health to the physical education of the young; the Young Housekeeper is on food and cookery; the House I Live In is small; and the Library of Health is nearly out of print.

Many who have attended my lectures — among whom have been a few of our oldest and ablest physicians — have urged me to publish them, as a suitable work on this subject; but I have not, till now, found the necessary leisure. I have, at length, prepared them for the press.

They are not strictly physiological lectures; but, more properly, lectures on hygiene, or the laws of health. Our popular books in this department, — and so of our public lectures, — though good, in general,

as far as they go, are for the most part on anatomy and physiology, with a mere "sprinkling" of hygiene. They are like the trunk and limbs of a most invaluable tree; but they have not borne enough of foliage and fruit. My lectures are the reverse of this. They are chiefly and substantially on the laws of health, with continual appeals to anatomy and physiology as their basis. "To the law and to the testimony" has been my constant resort—not to whim or prepossession. *The law itself* will, for the most part, be found elsewhere.

In the style of the work I have not aimed at rhetoric, but intelligibility. For this reason I have preserved, as much as possible, the original form of lecture, instead of that of the more elaborate essay. On this account it may not bear so well the test of a criticism that looks only at externals; but for the "million," it is believed, it will be but the more acceptable.

It may be thought that the work, in some of its parts, is incomplete. This was intended. It would require several volumes like this to present, in detail, the whole circle of hygiene. My aim has been to make a selection of as many of the more important and material parts of a great system, or circle, as could well be brought within the compass of a single volume of moderate size. I have constantly studied brevity, and yet there will be found occasional repetitions of an idea, or sentiment; but the nature of the subject involves a necessity of repeating and reiterating, in order to be intelligible.

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# LECTURES

ON

## LIFE AND HEALTH.

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### LECTURE I.

#### PRELIMINARY REMARKS.

NEARLY two fifths of all who are born, even in our comparatively healthy United States, die under five years of age; so that, if there are seven hundred and fifty thousand births, in the whole country, the present year, only four hundred and fifty thousand of this number will be alive in five years from this time. The other three hundred thousand will have perished.

Of the four hundred and fifty thousand then alive, another portion — perhaps a hundred thousand or more — will perish in passing from childhood to youth; another hundred thousand in passing from youth to full manhood; a hundred thousand more — I fear two hundred thousand — before the climacterical age of sixty-three; and the remainder at a more advanced age. As it is in our protracted national wars, a few survive the terrors and dangers of powder and ball, and sword and bayonet, for nearly a century, so it is in the warfare of human life.

Now, what I have said is not only true of the seven hundred and fifty thousand born in 1853, but will be true, probably, of the seven hundred and fifty thousand born in 1854, and every subsequent year. In a quarter of a century, even if our population were to remain stationary, we should thus lose, below the early age of five years, no less than seven millions — a number nearly equal to one third of our whole present population.

This is a fearful mortality; but the truth should be told. No surgeon is fit to take charge of a sick or wounded patient who has not the courage to examine his wounds to the bottom, even though the examination should be painful. He should know the worst of the case and its circumstances.

Not far from one half of all who are born die of the numerous fevers which prevail. Nearly one fourth die of consumption and other complaints of the lungs. The remaining one fourth — including fifteen or twenty thousand who are stillborn, and a considerable number who perish from accidents — die of other diseases, chronic and acute. Among these are cholera, small-pox, bowel and liver complaints, syphilis, scrofula, apoplexy, palsy, heart complaint, cancer, neuralgia, and intemperance. This last is as truly a diseased condition of the system as any other. All our race, so far as we know, die of disease, — in other words, of violence, — and not in a natural manner.

But is it true, you will perhaps inquire, that all die of disease? Do not a few die, apparently, in good health? And do not a small number live on to old age, and come to a natural death? Do those persons who, like Jenkins, Parr, Pratt, Francisco, and Holyoke, attain to more than one hundred years, die of violence?

My reply is, that Parr, at the age of one hundred and fifty, was fed into disease. Dr. Holyoke died with a cancer on his stomach. So did Dr. Emmons, of Franklin. The former was over one hundred, the latter but little short of it. John Q. Adams and Hosea Ballou, more recently, died of violence — the one of palsy, the other of bilious fever.

There is no certain evidence to be had that since the patriarchal times any person has died a natural death. In my own sphere of observation — by no means narrow or isolated — I have never witnessed such a death. And as for dying in good health, there neither is, nor can be, any such thing.

But is it not a well-known fact, you will say, that the average duration of human life is increasing gradually, in all civilized countries; and are not our writers and lecturers on health apt to overlook this fact?

It is admitted that the average duration of human life until recently, *has* been increasing. But, according to our most accurate statistical tables and our current bills of mortality, there is much room for doubt whether this is the case at present. In Boston and a few other very highly civilized — rather, over-refined — places, it appears to have been, for the last twenty-five years, decreasing.

Admit it, however, to be otherwise. Admit, for the moment, that the average duration of life is very slowly increasing, — for we cannot possibly say more than this, — yet, by the side of such a statement we shall be obliged to place another very painful fact. The average amount of lost time, annually, from sickness and ill health, is also rapidly increasing.

There always was sickness in the world, it is true; at least it has been so from a very early period; but then there

has not always been as much of it as now, especially of *chronic* disease. In England, the average loss of time to an individual, in this way, is one year and five sevenths; and as nearly as can, at present, be ascertained, it is about a year and a half in the United States.

There is one thing more to be mentioned in this connection. This increase of chronic disease, and the protraction of human life, under unfavorable circumstances, proves a means of perpetuating a feeble and constantly-deteriorating race. Such a conclusion is not to be placed among the croakings of that chilling old age which places the world's golden period in the past; it is the result of a careful investigation of facts—facts, moreover, which lie within the broad and obvious range of plain, unsophisticated common sense.

For every body knows that consumptive, scrofulous, cancerous, gouty, and dyspeptic parents are constantly increasing, and that, by a law as irrevocable as that of the Medes and Persians, a debility corresponding, in some measure, to the ill health of those parents, is entailed upon all who follow them in bodily constitution. And now, if the art of medicine, and the little we know of the laws of health, are applied to correction rather than prevention,—to the mere work, important as it is, of prolonging the lives of those who are sickly, and placing them in a condition to perpetuate their race,—is it not plain that we are constantly multiplying our cases of chronic disease, and increasing the already frightful aggregate of human ill?

This state of things involves an immense loss. Life is too short to be curtailed so much by disease. The healthiest waste quite too much of their time. We sleep away about one third of it, which seems, of itself, like a heavy tax.

Then we waste another considerable portion of it in various other ways which might be named.

Who is there among us that does not spend whole years of life in a manner which even he himself cannot justify? Is it too much to affirm, that by sleep, and by what seems to be almost necessary trifling, we use up almost half of an average life of forty or fifty years? And is it not a serious thought, that from the remaining twenty or twenty-five years we must still deduct a year and a half of time consumed by ill health? Is man — such man as this — as happy as he might be?

And then, in addition to the mere loss of time, there is much of actual suffering. Not that we undergo a year and a half of pain to each person; still, those who are so ill as to lose their time do really suffer in a very considerable degree. Nay, is it not even true that mental pain is sometimes harder to be borne than any other?

The truth is, we cannot dive deep enough into the mind and soul to take the exact dimensions of this item of human unhappiness. No created being but angelic can compute the mighty aggregate to which these remarks refer. It is probably, in the overwhelming view of this aggregate, that some have been inclined to call the world itself a vale of tears.

But there is great pecuniary loss; for time is money, and we have seen how much time is lost by the individual who is sick — saying nothing of additional losses of the same kind, in the time of attendants, and nurses, and dear friends. The last item it would be difficult to compute, or even to approximate. The former will, of course, be equal to the value of the time of the individual for one year and a half. It may be several hundred dollars; it may not be one hundred.

The average to each individual can hardly be less than one hundred dollars. This, for the United States,\* is about twenty-five hundred millions of dollars for each generation or more than fifty millions of dollars a year.

Then we pay for physicians and medicine, at the lowest possible estimate, one hundred millions of dollars a year. This is only four dollars each, or twenty dollars for a family of five persons. I fear the actual expenditure is at least one third greater.

Some will shrink, I well know, even from this estimate. At least, they will say it does not greatly concern *them*, since they do not expend one fourth — they may think not one tenth — of twenty dollars for sickness in their families yearly, nor lose one tenth the time which has been mentioned. And a few will triumphantly tell us they have nothing to do either with physicians or medicine.

These individuals forget — perhaps they never knew — that all this, if true, has little to do with the taxation of which I have spoken. They do know, however, that if we have paupers or drunkards in the community, — men or women who produce nothing, — they *must* have, and *will* have, a living from those whose labor is productive. Just so with regard to losing time by sickness. In a community like our own, all persons, whether sick or well in their own families, are compelled to contribute — submit to taxation, rather — to pay the expense. The sick must be sustained — *are* sustained; and it is by those who labor, or *have* labored. I do not say the tax is exactly equal; but I do say it is not so unequal as many appear to suppose.

\* In all my estimates in this work, I have supposed twenty-five millions to be the present population of the United States.

Then, again, we sustain, as a people, a tremendous loss by the premature decline and death of consumptive people. This is a loss so heavy that it deserves a separate consideration. Consumptive people are usually among the most promising of our citizens, at least so far as their intellectual and moral development and cultivation are concerned. The old saying, "Death delights in a shining mark," is not wholly without foundation.

Instead of reaching the average limit of life, these individuals usually fall about fifteen years short of it. The value of these fifteen years of time, multiplied by seventy thousand, the supposed yearly number of victims to this disease, gives us a total yearly loss of one hundred and fifty million dollars. I think this estimate quite below the reality.

And once more: every child that dies prematurely is a loss of property. Let no one ridicule the idea of estimating the worth of children in dollars and cents. Some of our brethren of the human family know full well how to set a price on children as well as on adults; and I have yet to learn that white children are not worth quite as much as black ones.

Besides, I have authority on this subject. Horace Mann says that every child, at every age, even before he is old enough to earn any thing, is an investment of property to the exact extent of what it has cost to bring him up to that period. Here, then, is a yearly, national loss of at least fifty million dollars more.

The sum of these various aggregates is three hundred and fifty million dollars. This is an average tax of fourteen dollars yearly for each person, or seventy dollars for each family of five persons — a heavy tax for poor people to pay. And yet they are practically compelled to pay it. It is a sum that, in twenty-five years, if placed at annual interest, would amount to nearly five thousand dollars!

In short, our world is a diseased world. Many come into it with disease for their certain inheritance; others, with such tendencies to disease that they will hardly escape it. Others, though partially free from these tendencies at birth, soon acquire them. So that, in one way or another, to the eye of the medical man, the world seems more like a great hospital than any thing else.

And whence came this state of things? Whence is it that mankind are so prone to disease? A more important inquiry could hardly be raised. Let us see if there is any hope of answering it.

There are four different ways of accounting for it — perhaps more. First, disease is said to be of divine appointment. Secondly, it is thought to be the result of malevolent agency. Thirdly, it is deemed a matter of mere fate, chance, or haphazard. Fourthly, it is believed to be of human origin — the result of moral and physical transgression.

The first of these views is held by a far less numerous class than it once was. Time has been when it was quite common to speak of disease as being *sent* — as a judgment of Heaven, &c. People who died were said to be “smitten,” “cut down,” “snatched away,” &c.

But although this language continues to be used, it is almost without meaning. Very few, indeed, would offer such an insult to high Heaven as to defend the opinion that “smitten friends” are smitten arbitrarily. They cannot, in their reflective moments, be willing thus to throw blame on the great Creator.

That God has seen fit to inflict pain or death by what might be called an arbitrary stroke, in particular cases, — nay, that he may occasionally do something of the kind now, — is not denied. We contend only that such infliction is his “strange work.”

The number of those who believe that disease is of Satanic agency, directly or indirectly, is much greater. Indeed, there is a confused belief of this kind, which, though never written down in the form of a creed, very extensively prevails. The notion of being "struck with death" in the last stages of disease, to say nothing of powwows, charms, and incantations, among the more ignorant and superstitious of our race, fully confirms this opinion. So does the saying already referred to, that "Death delights in a shining mark" — and so do many others.\*

By many it is now believed that this prince and power of the air, in going about as a roaring lion, (both by himself and his minions,) seeking whom he may devour, very largely engages in this fell office. He is, as it were, throwing down his darts here and there, wounding one and killing another. Some, however, gravely begin to tell us that he only does his work by tempting men to wrong actions.

But the number of those who believe that neither God nor Satan sends disease, at least in any sense which is at all arbitrary, is much greater. Among these last, not a few regard the whole as a matter of mere chance or haphazard. Disease and death are subject to no rule or law whatever, so

\* Our old New England Primer has done some harm as well as a great deal of good. It has unwittingly given currency to many views which are not now generally received. For example, it has personified Death, and made him a sort of assassin, not so much in the dialogue between Christ, Youth, and the Devil, as in another place. No one can tell how much has been done to perpetuate error in the mind by the unnatural association of Death, in the shape of a skeleton, armed with a dagger, on which he is endeavoring to transfix a little boy, — and the *complet*, by the side of the picture, which reads as follows: —

" Youth, forward slips,  
Death soonest nips."

they tell us. "Why, there always was just about so much disease in the world, in some form or other, and there always will be. We may, indeed, in particular localities, and for a time, have fewer diseases; or they may change their appearance, or be less or more fatal; but, taking a thousand years together, things remain about the same as they were always."

Now, I will not stop to show the inconclusiveness of such a mode of reasoning as makes the past a measure for the future; nor to oppose the statements thus made by counter statements of my own. It is, perhaps, sufficient to say that such a belief belongs to a species of fatality alike common to Mohammedanism and paganism, but utterly unworthy of the sunlight of Christianity and Christian science. For even chance itself is subject to law.

A fourth and rapidly-increasing class (to which I belong) believe that man, as a race, is, for the most part, the author of his own miseries, especially his diseases. They believe it not only irreverent and wicked to throw the blame on any other source than human transgression, but absolutely unphilosophical and irrational.

They believe that God has established certain laws within the organic domain, as well as without it, which are as fixed — as immutable — as those which were given at Sinai. They believe that obedience to all law, whether natural or moral, has its appropriate reward, here or hereafter, or both. They also believe that disobedience to all law, whether natural or moral, has its fixed, and, except in the case of *special remission by a special provision*, has its appropriate and irrevocable penalty. In one word, they regard man as, under God, the artificer of his own health and happiness.

To express their views in other words, and very briefly they believe that, as a whole, disease is the product of manu

facture, just as truly and certainly as cloth, paper, or pins ; and that the world has been, unwittingly or otherwise, engaged in this manufacture for nearly six thousand years. And it is time, they think, to “turn the tables,” and manufacture health.

But how shall this be done, and by whom? How, I mean to say, shall health be manufactured?

My reply will be, in part, negative. I will endeavor to show, in the first place, how it *cannot* be manufactured.

Not by mere hobbyism. By *hobbyism* I mean an undue attachment to certain measures or schemes which, at most, are only partial in their application and tendency. Thus some have seemed to suppose that by the exclusive use of coarse bread, or the external and internal habitual use of cold water, health might be greatly improved, and life lengthened indefinitely.

Now, while I will allow no one to go beyond me in his estimate of the recuperative power of a system which is sustained by mere bread and water, I do not hesitate to say, that as a means of manufacturing health, they are of very different value to different individuals. Coarse or unbolted bread, for example, so indispensable to human health generally, is, in some few instances, of diseased tendency. I have known one chronic dyspeptic destroyed by it.

Besides, however excellent either or both these may be, they are neither of them the “immortal elixir.” There are many other things to be done or left undone, or taken or abstained from, before the world’s curse can be removed, and man fully restored to Eden. Health and long life depend on air, exercise, temperature, purity, and cheerfulness, as well as on food and drink. The latter must, indeed, be regarded, but the former must not be neglected.

Notwithstanding the fact, that very little attention has hitherto been paid to the laws of health or hygiene, it is remarkably true, that when a lecturer or teacher presents these laws in a proper manner and urges their acceptance, they seem, to many, so reasonable, and conscience is so much roused, that there is a determination to do *something*, were it only to quiet her upbraidings.

The awakened individual seizes, therefore, on some prominent point or topic, and gives to this his whole attention. He thinks on it, converses on it, practises it. Soon it becomes to him the all in all of reform. It is — so he supposes — the panacea for human ills. It will soon remove the curse. It will make every one a Hercules, a Samson, or a Methuselah. This I call *hobbyism*.

There is, however, a hobbyism which is of a worse kind than even this. Certain remedial agents are introduced and lauded to the skies: They are said not only to palliate or remove our ills, but to bring back the deteriorated constitution into a renovated and improved state, that will enable it to last almost forever. *They* are the elixir of human life; and Paracelsus\* — poor man! — lived a little before his time!

There is some slight apology for such hobbyism, I well know. Certain medicated preparations having been given to certain persons laboring under particular complaints, described by a particular name, say asthma or rheumatism, a few, as might have been expected, recovered under their use. Others, by hundreds or thousands, were apparently unaffected. Others, in great numbers, were made worse, and a few destroyed.

The few who have recovered under their use — rather, as

\* Paracelsus, who flourished in the sixteenth century, professed to have discovered an elixir of immortality. But, like other men, he died

I should say, notwithstanding their use — are requested to give their names and approbation, especially if they are among the *élite* of society. These two, or three, or half a dozen names are trumpeted through the length and breadth of the land. The boxes, and cartloads, and shiploads of the precious stuff, so lauded and commended, are almost beyond computation.

The thousands who are *not* benefited are not heard from, and those who are injured, more or less, seldom make any report. The dead tell no tales, of course. The reputation of the medicine is hence considered as established. Every one who has a complaint which can be “christened” asthma, or rheumatism, or consumption, must procure and try it, and the fortunate vender — not, usually, the discoverer — can build temples to *Æsculapius* eight stories high.\*

It is believed, by many, especially those who are themselves in the decline of life, that our world, generally, has begun a retrograde movement. Some even say that, as things are now going on, it cannot last more than two or three centuries. If there is ought to sustain this belief, it is the delusion of mankind with regard to medicine, especially nostrums. In few ways is there so much disease manufactured as by their use. They should be labelled *life-destroyers*.

One of the most painful features of this insanity in regard to medicine is, the fact that good men, in great numbers, are helping it on; not physicians and apothecaries alone, but multitudes of others. A respectable bookseller in Boston told me that he sold Brandreth's pills, from his bookstore, in about two years, to the value of more than twenty thousand dollars. Other similar confessions might be made.

\* Alluding to an apothecary's shop in one of our cities.

Nostrum dealing is a many-headed affair, that cannot, in little space, well be described. Powders, pills, panaceas, elixirs, vermifuges, and cough drops make only a part of this fearful armament, in battle array against health and life.

The evil would be more tolerable if our strength to endure it increased daily, as Milo's power to carry the calf increased all the while he was carrying it. But, alas! the reverse were more true. Our strength to bear with the evil is all the while diminishing; and where shall the end of these things be?

This view of medicine does not so much reject medicine entirely as it does its abuses. It would lop off from this supposed tree of life its excrescences. But I have yet more to say. The legitimate and approved use of remedial agents, like nostrum dealing, will accomplish nothing in the way of manufacturing health. It will, at most, only serve the purposes of mere patchwork — happy for mankind if it does even that.

Of course I do not here use the word *patchwork* reproachfully, for the work it indicates, as the world is, may be needful. The agriculturist, even, in our own region, seldom has a virgin soil to begin with. Broken down, if not diseased, by wrong culture, he is employed, much of his time, in endeavoring to patch it up. The parent, the teacher, the minister, in attempting to form or to reform human character, has much to do of mere patchwork. The lawyer, the civilian, the statesman, — how much these all have to do in the way of patching up broken civil law! Is it greatly to be wondered at, then, if custom has prescribed for the medical man little else but patchwork?

This tyrant custom, united with other influences, has hitherto allowed to medical men neither time nor disposition to

attend to the work of building up health, even if their medicine could do it. But it cannot. With the utmost stretch of charity on our part, and effort on his, the wisest medical man will only be able to keep the old tenement from falling down and crushing the occupant.

Nor will the very popular notion of the present day, that every person should be made his own doctor, — could it be realized, — accomplish much more. The labor, though divided among the million, would be patchwork still. It would manufacture no health. It would prevent no ills to which flesh is heir.

But the very notion itself is an absurdity. The oldest and wisest physicians — they who know most about the human constitution and the nature of medicine, and have, withal, a good fund of common sense — feel, most of all men, their own littleness and incompetency to the work in which they have been engaged; and some of them almost think their efforts have been worse than in vain. How, then, can the mass of mankind, who have their other occupations, expect better things of themselves? Who has the time or the means of acquitting himself more honorably than they, even on the patching plan, and much less as a manufacturer of health?

Besides all this, a merely superficial study of diseases by mankind generally, — and it could be no more than superficial, — with a view to their treatment, would lead to that continual thinking about ourselves — that turning of our thoughts inward — which would manufacture disease rather than health. Thousands of diseases are originated and tens of thousands aggravated in this very way.

But I have dwelt long enough on mere negations. I have said all, if not more than all I *ought* to say, about those means and agencies which never did and never can succeed in

manufacturing public health, but which must, on the contrary always diminish the general aggregate of this most invaluable commodity. Let us then recur to the question, What can be done? and consider it affirmatively.

Prevention is said, the world over, to be better than cure. Yet while, in all ages, we have sung the praises of prevention in theory, we have, in our practice, very little regarded it. Operatively and *indirectly*, it would do much in the way of manufacturing health; for, if you keep down weeds, the grass will grow, even though you sow no seeds; and in like manner, if you can prevent disease, health will spring up.

Much more than mere prevention is, however, required at our hands. In the present blaze of physiological light, we can, in ways and processes almost innumerable, manufacture human health to an extent not formerly dreamed of. A few of these processes will be mentioned in a general way, and — in this connection — in a general way only. Each of them, in order to do it justice, would require a full lecture at the least — some of them several.

1. In the first place, we must bring ourselves under the full influence of the elevating feelings, passions, and affections. I am accustomed to attach immense importance to every thing which belongs to the subject of physical hygiene, as is well known; but mental hygiene compared with that which is *merely* physical is like the sun in comparison with a mere taper. More bodily suffering has come to our race, through the medium of a wrong state of mind and heart, than from almost any other source whatever.

Thus anger, fear, grief, envy, jealousy, hatred, and even melancholy and discontent, have a tendency to cripple and destroy the vital energies of mankind beyond, in degree, what the unthinking can possibly conceive. Their “wear and

tear" of the constitution are almost incalculable. They not only aggravate all other diseased tendencies, but they tend directly to disease itself.

Hence it is that in order to manufacture health, in any worthy degree, there must be a reverse influence — an upward rather than a downward tendency. We must cultivate faith, hope, love, joy, peace, courage, general benevolence, and contentment — in a word, all the Christian graces. These, be it known, are as profitable for the life that now is as for that which is to come.

2. In the next place, and in order that health may be manufactured, we must cease from that unlicensed and abominable use of medicine to which I have already briefly adverted. Enough of suffering, and more than enough, comes to our race, through the medium of error connected with that dosing and drugging which are licensed, and therefore in a sense lawful; but this does not cover a tith of the ground which is now occupied by drugs and medicines.

Observe, however, it is the *abuse* of medicine to which I now refer. The regular physicians of the various schools give quite as much as it is desirable should be given, and they are giving less and less every year. No additions need be made at our hands to the quantity.

One of the greatest and most dangerous abuses of medicine is found in our modern maternal treatment. Mothers assume that they understand the constitutions of their own children, and know how to give them medicine, quite as well as the doctor. And they use their license with an unsparing hand. Our very closets have, to a frightful extent, been turned into apothecaries' shops — it were almost true to say that our steamboats and railroad cars have undergone the same change. And if we should come to travel by electro-magnetic power,

with lightning speed, it remains to be seen whether our mothers will be willing to wait for medicine for their children till they come to the various stations, or whether they will wish to give elixirs and "drops" as they pass along the wires!

3. We may manufacture a world of health, so to speak, by bringing our appetites — all three of them — into strict subjection to the great Creator's moral and physical laws; or, in the beautiful language of Paul, by yielding our members servants to righteousness.

The abuses of the appetite for drink, whether we refer to the extent or the intensity of their injurious influences, have seldom, if ever, been overrated. Indeed, I doubt whether they can be. An army of drunkards, whether ten thousand or thirty thousand, is no trifling affair. And yet it is highly probable that more of evil comes to the moral, social, and physical system, by the indulgence of this appetite short of what is called drunkenness, than beyond it.

But make the sin of intemperance, popularly so called, great as you please, — as great even as God makes it, — and it falls short, very far short, of the sin of intemperance, as connected with the use of food. I know very well that this position may be controverted; but I know also that it is defensible. Perhaps I may, hereafter, make it more intelligible.

There is a law which should come in here to illustrate this last point, or, as it were, render it more tolerable. The grosser and more stimulating things, in considerable quantity, are, after all, less permanent in their effects than smaller quantities. The system, in the former case, is roused to some degree of reaction so as to be able to throw off a part of the irritating or poisonous influence. But when this influence is inconsiderable, and yet continual, there is less of reac-

tion in proportion to the degree of irritation ; and the foe steals into every part of the great citadel of life.

Now, this law is not only applicable in comparing rum and brandy with wine and beer, or the excessive with the moderate use of either, but also in comparing any or all of these with the feebler but not less irritating and anti-vital substances so generally mingled with our food. I refer to our condiments or seasonings. They are all — unless we except salt — neither more nor less than medicine. They are all irritating, and some of them poisonous.

Few dishes come to our modern tables that are not, by their quality or their quantity, silently yet surely undermining the “house” we “live in ;” inducing or aggravating disease ; hastening our dissolution ; and making us vehicles for transmitting woes innumerable to generations yet unborn. These remarks are peculiarly applicable to those dishes which contain saleratus, mustard, pepper, catchup, and vinegar, and to the use of tea and coffee.

The manufacture of ill health by the undue indulgence of the appetite God has bestowed on us as *a race*, rather than as *individuals*, is believed to have been hitherto not enough considered. Some think it to be the source of more disease than any other cause whatever. But this is not the place for a full discussion of that subject. Obedience will restore, and more than restore, what has been lost by transgression ; so that here we have hope, too, of the manufacturing process.

4. A fourth way of manufacturing health is by breathing pure air. Thackrah, an eminent British writer, says, “Be it remembered that man subsists more upon air than upon his meat and drink.” The remark, though not wholly true, has truth in it.

For it is certain and undeniable that, while we eat and drink but a few times in twenty-four hours, we inhale air twenty to thirty thousand times. The character of our blood and of all the fluids and solids that go to make up these bodies of ours, depends very much upon the purity of that air.

Then it is also admitted that very little of the pure air of heaven is inhaled. Did mankind live more out of doors, the case would be greatly altered. But we spend one third of our time in narrow, unventilated bed rooms; and another third in rooms which are little better, except that we are not quite so immovable while in them. It is not more than eight hours in twenty-four that we breathe right.

Worse even than all this is true of a large part of our race. The female world, and the sedentary of the other sex, — making an aggregate of considerably more than one half of the whole, — scarcely ever breathe pure air at all. No wonder they have so many ailments, and as a race are growing feebler every year.

Before health can be manufactured on a large and liberal scale, more pains must be taken to secure the introduction of pure air to our lungs and blood. Not only must we have good food, that we may have good chyle, but so also must our air be good. It is necessary to the skin as well as the lungs.

5. Then, again, we most strangely abuse our nervous system, and this in a thousand ways. This latter, like many, if not most, other evils, begins in early life — at life's very threshold. And hence, as in the correction of evil in other cases, our efforts at amendment must begin there.

For at this early period of existence, instead of abusing our nervous systems, we ought to be constantly adding to our physical capital. I have not a doubt that an amount of

health of which few persons have any conception might be manufactured by a due attention, from the first, to the great laws of the cerebral and nervous systems.

6. But once more : although there are particular classes, in our busy American community, — especially in agricultural regions, — who do not suffer for want of proper activity of their locomotive system, yet, with a very considerable proportion of our mechanics and manufacturers, our students and our literati, it is far otherwise.

In the old world, not a few of the operatives become deformed by their too constant confinement to particular positions of body ; and some of them very seriously so. And although we are not yet doing, in this respect, as badly as our transatlantic brethren, we are following in the same train, to overtake them at no very distant day. We must have more varied and healthful, if not more abundant, exercise.

These, briefly, are some of the ways and means by which human health may be manufactured, and the curse which rests upon us, physically, be removed. But it is no part of my present intention, I repeat, to enter fully upon this subject. It will be more and more developed as we pass on.

Many, who have followed me with a kind of general interest thus far, will now turn back. “ We *know* a great deal better than we *do*, already,” they say, “ and why should we know more ? Would not the result be that we should only add sin to sin, and thus make the more sure our condemnation ? ”

But suppose it were liable to have that tendency ; does this absolve you from obligation to know the law still better than you now do ? You might say the same thing morally and religiously ; but would you *dare* to act accordingly ? Because your knowledge is in advance of your practice, morally

will you dare to shut your eyes against further light, or even further inquiry?

You ask, perhaps, what you can do. You have not the time nor the means, you will allege, to acquaint yourself with the code of physical law. You might, perhaps, find time to attend a course of lectures on the subject, now and then; but such lectures are not often within your reach.

And yet *something* can be done. I well know there are difficulties, serious ones; but I know, too, they can be met and overcome. Something, I repeat, can be done — something which is *worth* doing — something which will prepare the way for doing still more. I will endeavor to say what it is.

1. Every one can do what he already knows to be right. He is, in truth, bound to do this, as truly as he is bound to obey what he knows of the moral code. There is here no escape. He that knoweth to do good and doeth it not, to him it is sin. In other words, disobedience to physical law, when the law is clearly understood, becomes moral transgression.

Many who are in the habit of suffering from colds, headache, toothache, rheumatism, sore throat, and the like, well know the causes which are apt to excite them, for they often speak of them, and this, too, in the way of confession of their own carelessness. What less can they do than avoid their causes?

There is one caution necessary just at this point. It is to go to work in this matter on principle — not with fear and trembling. Some persons fall into the wretched habit of doing every thing of this sort, or avoiding every thing, with great solicitude, and anxiety, and watchfulness. They are timid about consequences. They fear and tremble too much

Such individuals should first count the cost of what they

are about to do, and never make a movement till fully convinced of its rectitude and necessity. But when they know it to be right, they should go forward in full faith. There should be no looking back, with Lot's wife. There should be no feeling the pulse, looking in the glass, or watching the internal movements. There should be no listening to *croakers*, either without or within.

This making changes in our habits, without full faith, is wrong, entirely so. "According to your faith be it unto you," and according to your faith only. He who is but half convinced of the importance of a work of reformation will never go forward without misgiving. He will be apt to invite the very evils he fears.

Others vainly expect immediate large results. If they do not find them — if they are not rid of their troubles, whatever they may be — in a few days, or a few weeks, and exalted to high and firm health, they give up the pursuit. They not only lack in faith, but also in perseverance.

It is said, by high authority, "He that doeth truth" (morally and religiously) "cometh to the light," and, "If any man will do my will, he shall know of the doctrine," whether it be true or not. And once more: "The path of the just is as the shining light, that shineth more and more unto the perfect day." I am of opinion that this is true physiologically. It would seem to be so from analogy. It certainly has proved so in my own experience.

When I was about sixteen years of age, and feeble, inclining strongly to consumption, I read of the cold shower bath, and resolved to use it. At that time, we had no costly apparatus. Necessity, however, that mother of invention helped me to contrive something, in a very simple form, which I used for a long time, and with benefit.

Now, I have studied the laws of health as much as most persons, perhaps I might say more. I have studied books and men. I trust I have learned something in both these ways. Yet I am not aware that in my whole life I ever made so much progress, in the same period of time, as while I used this shower bath.

Perhaps I might not be able to show, fully, the why and wherefore of all this. But I have no doubt the fact is explainable, in part, when we consider that this doing truth leads our attention to the subject, whether it be religion or hygiene. I was endeavoring to harden my constitution; it was natural that I should inquire how the shower bath could have a hardening effect; and, as I had no books, or almost none, I was thrown upon my own internal resources.

He that "does" truth, morally or physically, will, in my own view, whether we can explain the fact or not, find new light breaking in upon his path. Why should it not be so? Is this principle, in its application to morals, an anomaly?

2. Another thing may be done, at once, and by all. We may learn to trace the relation between cause and effect. Some, for example, tell us that their colds almost always come upon them *without* any cause; and so others say of their headaches and rheumatisms. Others, still, can almost always trace them to their proper causes. And what has been done by man, in this respect, man may do.

I grant, indeed, that there are difficulties in this matter. The greatest arises from the want of right training. Did parents and teachers make it their business, from the very first, to ask their children and pupils the reasons why a thing is so or so, it would not be as difficult as we now find it to search out the causes of our complaints. Teachers should ask the whys and wherefores in every thing else, as well as in arithmetic.

Diseases, more frequently than most persons are aware, have their origin in a great number and variety of small causes, rather than in a single larger one. The Mississippi does not burst out a Mississippi at once. It has its origin in a multitude of small streams and springs.

We may hence see why it is that so many either mistake the causes of their complaints, or think they come without any cause at all. And hence, too, the importance of cultivating the reasoning powers, that we may not only learn to believe in cause and effect, but also to trace effects to their right causes, and to do it habitually; especially in all matters pertaining to health.

The more deficient a person is in regard to ability to trace effects to their causes, the more confident he is of his superior skill in this very particular; and hence a bar to all further improvement. When, however, we find ignorance coupled with modesty and less of assurance, we may entertain hope. The man who feels his ignorance is beginning to be wise.

We may hope, in such a case, that mankind will not grow old in years without growing any wiser. We may hope they will not pass through the world without making it or themselves any better. We may hope they will be creatures of progress. We may hope they will not become stereotyped.

3. Most persons know well that they ought to live within their income. They have seen so much misery in the world around them which could be traced to a neglect of this rule as to deter them, one would think, from any unhappy tendencies in this direction. Thus, suppose a person has seen some misguided neighbor or friend, with moderate income, provoked by the demands of fashion to withdraw a few hundred dollars from his business capital. *It was only for once* '

But it succeeded so well in enabling his family to compete with their neighbors, that he ventured to repeat it again and again, till it ended in bankruptcy.

For a few years after the commencement of this downward course, all appeared unusually well externally. Our experimenter, or at least his family, seemed satisfied with the results. Most of his neighbors thought him actually more wealthy than before. But his factitious income only exalted him to render his fall so much the more conspicuous.

So it is in regard to health. Thousands draw, every year, and every day, upon their physical capital. In other words, they over-stimulate. They live too fast. Those who only look on may be deceived — often are so. They themselves may be so. I have known such cases by hundreds, if not by thousands. Some of you may have known as many. The increased redness and fulness, especially of the face, joined, perhaps, to much mental vivacity and a sparkling eye, may be, and often are, mistaken for an increase of health. Suddenly, however, in quite too many instances, the cord snaps. They are bankrupt.

How much better to live within our income than to borrow on the future! How unwise it is to live at the expense of life! They who do this are not manufacturing health, but disease. They are rousing to activity every latent tendency to ill, whether hereditary or acquired, as well as sowing the seeds of other diseased tendencies!

This comparison, borrowed from the business world, leads to another, equally pertinent. As it is in pecuniary matters, so it is in the manufacture of health — the more active capital a person can really use, and use profitably, the greater his gains. In other words, the more a person has, the more he can get.

So it is with knowledge and intellectual gains. Here the more a man has, the more he can get. This every body admits. So, too, in moral matters: the more progress we have made in excellence or holiness, the more we can make — other things remaining the same; this nobody denies. Must it not, in the very nature of things, be so?

Why, then, should it not be so in regard to health? The more health a man has, the more he can get. He who is feeble — with scarcely the means of holding on to life from day to day — can do but little in the way of adding to his stock or capital by manufacture or otherwise, though, from the nature of the case, the little he can do he is obligated to perform. He who has much already can do more.

Our meaning, when, as physiologists, we say this, is not that a person can be any more than perfectly healthy. But then health, like knowledge or excellence, is comparative. No one *is* perfectly healthy; none so strong in lungs, muscles, or nervous system, that they can be no stronger. Rather, the stronger these parts are, or any other, the more we can do for them to make them stronger.

4. It may be objected by many individuals among us, that a want of knowledge of the laws of health puts it out of their power to make any considerable acquisitions, should they attempt it. They are convinced that health may be manufactured; but notwithstanding all I have said, it seems to them beyond their reach.

Once, indeed, such knowledge was, as it were, locked up in the dead languages of the medical man's library. Within the last quarter of a century, it has, however, been brought out, and rendered into plain English, so that a tolerable knowledge of the house we live in is at every man's door.

“Yes, if he only had time to read,” you will say. And

has he not the time? He has as much time to read as Franklin had at some of those periods of his life when he actually read a great deal. Besides, it is not true that you have no time to read. You do read an immense amount; though much of it, I admit, is but the scum and froth of the newspapers.

But suppose it were true that you have no time to read, either on the manufacture of health, or any thing else; one thing remains, which, as Christian parents, or as friends of our common country, you are under obligation to do. You are to see that your children have this most necessary knowledge.

You are bound to see that anatomy, physiology and hygiene are taught—not in that profoundly scientific way which is desirable and even indispensable in the professional schools, but in a plain and popular manner—in all the schools of the land. If you have no other legacy for the next generation, you are bound to see that they possess this.

Here I have more than once been reminded of what was thought to be a slight discrepancy in my views. I have opposed, with all my might, the popular notion of having every one become his own physician, while here I come round, it is said, and indirectly recommend the same thing.

But is there any contradiction, after all? It is not the study of *disease* which I recommend, but the study of *the laws of health*. It is not cure, in any way, or any thing like it, but prevention. I would have people know enough to avoid the necessity of medicine or physicians, at least for the usual purposes.

5. This reminds me of one thing more you can do,—a very important thing,—and that immediately. At least, you can *begin* it immediately. You can endeavor to make a higher, nobler use of physicians than you have ever made before.

I have spoken, hitherto, as if they were condemned, for life, to the mere work of patching up the human constitution. The truth is, we have never made any other, any higher, demand on them. When we make the demand, it is to be hoped they will respond to it.

Physicians who are worthy of the name are modest men, for science is always modest. They prefer to pursue their usual routine in a plain, unostentatious way. But this they should not be permitted to do. They should be drawn out, nay, compelled, to do something more than, as a body, they have ever yet done in the way of preventing disease.

When I say that all good physicians are modest men, and that science is always modest, I do not by any means forget that they ought to sustain a higher character, at the present day, than that of friends and lovers of science. They should be philanthropists; they should be reformers.

Or if the public can hardly *claim* their services in the great cause of philanthropy, they ought to *volunteer* them. It is time for them to rise above their station, and actuated by motives which their position in society does by no means tend to inspire, endeavor to reform, at the least, their own profession.

What they can do, and should be compelled to do, by the public sentiment, I will not attempt to say fully, in this place; it would require a volume. It will occupy at least one lecture. I will only say, now, that as guides to the right physical education of our children, their aid would be invaluable. They might be instrumental in saving to society every year many thousands who now become useless.

There is nothing — there can be nothing earthly — for which parents could better afford to pay a liberal fee, than for the means of giving their children strong and healthy bodies,

by adapting their studies, their employments, their food, their drink, their amusements even, to their constitutions, temperaments, tendencies, &c.

As family friends and acquaintances, no less than as public men in whom you are accustomed to confide, they should be employed, if possible, to give public lectures on hygiene. One of our *savans* has said that such lectures are needed, every week, throughout the land. Let them be given, and let them be heeded.

The subsequent lectures will afford an intimation of what is wanted every where, as well as serve to fill up, imperfectly, the course which has been indicated by these preliminary remarks. They are not, however, intended as a full reply to the great question, What shall we do to manufacture health? but to lead the way to something, if possible, which is worthier and better. My business is, and has been for these thirty years, to act as a pioneer.

My hopes of the race to which I belong are very high. The laws of health, when fully understood and faithfully practised from the cradle to the grave, will prove a more important means of human advancement than the most sanguine among us have ever yet supposed.

The child of future blessed ages will not only die a hundred years old, but be healthy while he lives. And though the wicked cannot and ought not to live out half their days, the Christian world may. And such a world, and such blessedness, the laws of hygiene, regarded as God's laws, will do much to introduce.

## LECTURE II.

## THE MECHANISM AND LAWS OF DIGESTION.

## GENERAL REMARKS.

I HAVE, in the preceding lecture, stated my belief that we are at all times, and in all circumstances, under law; and that this law extends to all the movements and functions of our bodies, as well as of our minds. The work of digestion forms no exception to the truth of this rule, though some have vainly endeavored to prove it a matter of mere instinct, with which God and conscience have little to do. We are as much more strongly bound to "keep under our bodies," that is, to keep them under law, than Paul was eighteen hundred years ago, as the light of physiology shines more resplendently on our path than it did on his.

Your attention is invited, in the first place, to the mechanism and laws of digestion, not so much on account of the superior claims of the subject, in a course of lectures on health, as on account of its being first in the order of nature. Before the other functions — circulation, respiration, &c. — can be performed, the system must be supplied with something from which blood can be made — that fluid by means of which our bodies are nourished and sustained.

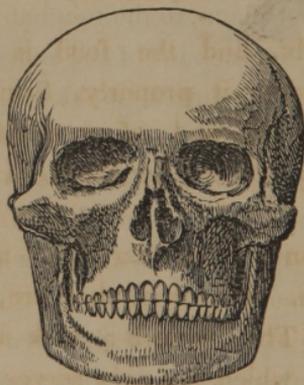
Digestion, in the truly physiological sense of the term, is not a mere work of the stomach, though it is a function in which that organ largely participates. It is influenced, and even controlled, in a greater or less degree, by a very extended circle of machinery. Nor is it a mere mechanical solution of the food in the saliva, gastric juice, bile, pancreatic

juice, and other fluids. It is indeed a solution, — a mechanical process, — but it is much more. It includes other changes, both chemical and vital — changes of great interest and importance.

In order to understand what these changes are, and consequently what the laws of health are, so far as the mechanism and process of digestion are concerned, we must examine somewhat in detail, the digestive machinery.

### I. THE MECHANISM OF DIGESTION.

The parts more immediately concerned in the great work of digestion are, the mouth, teeth, salivary glands, œsophagus, stomach, liver, pancreas, and small intestines. To these, Magendie, a French physiologist, adds the superior extremities, because with these we seize or apprehend our food and drink. Others add, to this already extended list, the brain and nervous system, the muscular system, and the skin.



The mouth and teeth  
of an adult.



The four different kinds of teeth.

The names of the *parts* have been mentioned here, rather than those of the more direct instrumentalities; for it is the saliva, gastric juice, bile, pancreatic juice, &c., that, in strict

ness of physiological language, should be regarded as the machinery or instruments of digestion.

The mouth and teeth need not be described. A representation of them is, on the whole, preferable. The situation of the salivary glands is highly favorable for proper action while we are masticating or chewing our food. They are on the sides of the face, near the angles of the lower jaws, and under the tongue. There are three of them on each side — six  
See the preceding page.



The salivary glands, as seen  
in their proper place.



The principal salivary glands,  
as seen by themselves.

These glands, if we eat slowly, and the food is of such a nature that we can masticate it properly, furnish the only needful drink for our food, and of a quality, too, which is best adapted, in every respect, for the work of digestion.

The pharynx and œsophagus conduct the masticated and duly-moistened food to the stomach. Together, they are, in the adult, about a foot in length. They furnish a thick and somewhat ropy fluid, called *mucus*, which not only serves to lubricate the passage, but is supposed, by many physiologists, to aid in the work of digestion itself.

When the mass which is swallowed reaches the stomach, it remains there for a time. This organ, in the adult, is usu-



ally said to hold from a quart to three pints ; but this is probably the smallest healthy size. Much, in this respect, depends on education and habit. There are stomachs to be found which will hold several quarts.

The watery parts of our food, beyond what is necessary to bring the whole mass to a proper consistence, together with the water of our drinks, are taken up by the absorbent vessels of the stomach, and carried directly into the circulation.



The stomach, with its entrance and outlet.

What remains is then ready to undergo a highly important change, called *chymification*. This is effected as follows :—

From the lining or mucous membrane of the stomach a fluid now issues forth, called *gastric juice*, whose office, after being mingled with the exterior portion of the mass of food in the stomach, is to change it into a grayish substance, of about the thickness or consistence of cream, called *chyme*. This, at first, appears to ooze from the membrane like the small drops of perspiration from the forehead and hands of the laborer. These small drops, however, soon unite to form larger drops, and ultimately small streams. This gastric juice is not the mere serum or watery part of the

blood, but a fluid which is secreted and formed from it, for a special purpose.

When one layer, so to call it, of the mass in the stomach, is formed into chyme, it is carried out of the stomach, or,

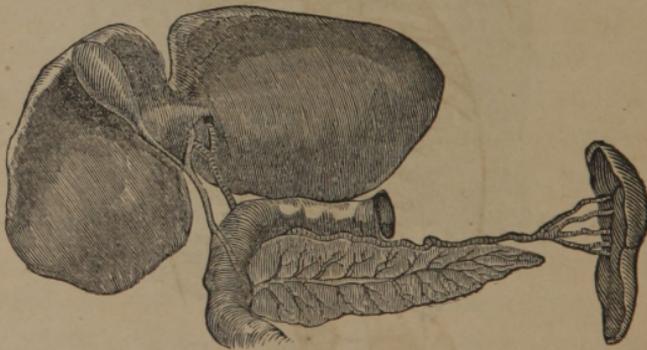


Here are seen, first, the œsophagus, next the stomach, and last the small intestines, constituting the whole alimentary canal, which is nearly thirty feet in length. The gall bladder may be seen on the left.

rather, beyond it, into the small intestines. This is performed by a kind of churning motion, which will be described hereafter. Another layer of chyme is thus formed and disposed of; then another; and so on, till the work is finished. This work of chymification, as a general rule, takes up from three to four hours; but circumstances so greatly vary it, that the exceptions may seem to exceed the general rule. Few persons so far conform to the laws of digestion as to render this process at all natural, or healthful.

The small intestines, which receive the chyme from the stomach, are some twenty-five feet or more in length, and very crooked. Over the internal surface of this long, winding canal, especially the first portion of it, the chyme is spread out, where it soon undergoes another change, not less important than the first.

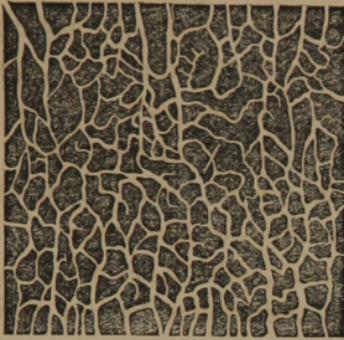
This change consists essentially in the addition to the chyme of two fluids, viz., the bile and the pancreatic juice and the formation, by what is called *secretion*, of a new substance, called *chyle*.



In this engraving, the stomach is removed to show the pancreas behind it. What you see on the right is the spleen, whose use is not well known. Above is the liver, turned up, so as to exhibit the gall bladder and the duct through which the bile flows into the intestines.

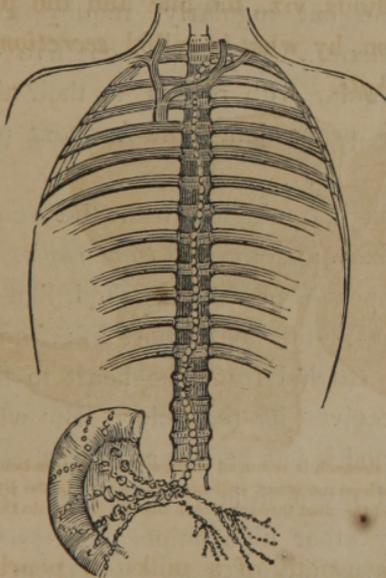
The chyle is usually of a milky or pearl-colored appearance. It is first seen in small vessels called *lacteals*, (milk

vessels,) whose mouths open, in great numbers, on the inner coat of the intestines.



This represents a portion of the small intestine laid open.

These lacteals, beginning thus, by their open mouths, in the lining membrane of the intestines, pass through what is called the *mesentery* to a large reservoir or repository, at



This is to exhibit the lacteals, the mesentery, the receptacle of the chyle, and the duct which carries the chyle to the vein at the left shoulder.

the back part of the abdomen, denominated the *receptacle of the chyle*. From this reservoir the chyle is carried, by a duct of considerable size, along upward, close to the spine, to a large vein near the left shoulder, into which it discharges its contents, which are thence carried, mingled with the dark, venous blood, to the right side of the heart, and afterwards to the lungs.

What remains of the food, such as the skins or rinds of vegetables, the seeds of fruits and other substances, which are insoluble, together with (in certain diseased conditions of the system) unchanged portions of the food, is carried along the canal, to be in due time ejected from the body. The time required for this may be greater or less, according to circumstances.

Something depends, in this particular, on the frequency or infrequency of our meals. They who eat but two or three times a day, and eat regularly, require more time than they who eat oftener. They who eat five or six times a day, or are irregular with regard to their times of eating, have, in the same proportion, more frequent peristaltic movements.

The chyle, though mingled with the venous blood and carried to the heart, appears still *to be chyle*. It has, indeed, many of the properties of a living fluid, like blood; but it is as yet imperfect—unfit to support life; nor is it nutritive till it has been carried from the heart to the lungs, when and where it receives its red color. But what the coloring matter of the blood is has been, and still is, a subject of much speculation, and not a little experiment. In practice, however, like many other nice points of physiology, these are matters of no great importance. We know that it is chyle when it is first mingled with the blood; we know that it is

blood after it has passed through the lungs. Perhaps this is enough.

Thus we have seen that the work of digestion consists of three or four separate processes. First, the preparatory process, in the mouth; secondly, the formation of chyme, in the stomach; thirdly, the change of chyme into chyle; finally, the change of chyle into blood. The last-mentioned process, however, is not usually considered as belonging to the work of digestion.

This description, though brief, sufficiently points out the offices of the organs concerned. The laws of digestion — as we shall see in passing — are, for the most part, based on structure, and derived from it; and are all in harmony with it. My constant appeal, in support of the doctrines I shall advance, both in this lecture and every other, will be “to the law and to the testimony.”

## II. PARTICULAR LAWS IN RELATION TO DIGESTION.

### LAW 1. *Our Food must be well masticated, and commingled with Saliva.*

Some have supposed that, if our food were properly reduced to pulp before entering the stomach, it made little difference how; but this is a great mistake. And yet, if the notion were true, teeth and salivary glands would still be quite convenient. Not every individual is so fortunate, in the journey of life, as to have always at hand warm water or any other solvent, or a pestle and mortar.

Much information on this subject has been obtained by the experiments of Dr. Beaumont, of Plattsburg. He had under his care, for many years, a young man with an un-

natural opening to the stomach from the outside of the body. This opening was an inch or so in diameter. You could look into it, and observe what was going on. He was obliged to wear a compress to prevent the food and drink from flowing out. I have had an opportunity of witnessing some of the experiments alluded to.

But aside from the evidence afforded by these and other kindred experiments, there are one or two strong reasons for believing that teeth should be used as preliminary to the work of digestion, in preference to the mill, the mortar, or the stewpan. The proper and reasonable use of the teeth preserves them from decay. The teeth on that side of the face which is least used — provided those of the other side are not grossly abused, as in cracking nuts — are well known, by every dentist, to decay soonest.

Another reason for this belief arises from the consideration that whenever we habitually substitute for saliva a quantity of liquid or liquid food which requires no mastication, nor very much insalivation, not only the teeth and the salivary glands, but the stomach, also, becomes diseased.

But if it is an established law that food should be well masticated and insalivated, it is manifest that no law was ever more frequently, more grossly, or more wickedly violated; and this in nearly every circumstance and condition of human life.

Those individuals violate it, of course, who bolt their food — an error which every where prevails, but nowhere more than in our own United States. Not one in a hundred but eats his food much too fast, and swallows it in pieces or masses quite too large.

It was humorously said of a farmer in Connecticut, in the days of cider drinking, that he drank so much cider that when

his large pieces of pork, beef, potato, and turnip fell down his throat, those who sat at the table with him could distinctly hear the cider dash against the walls of his stomach!

Some one says, we *do not* bolt our food, but *throw* it down our throats. And in order to apply still more forcibly the keen edge of ridicule, he says, we seem to be in a perpetual strife with each other, to see who can throw nearest the walls of the œsophagus without hitting!

An aged individual, who was accustomed to express, from time to time, as well she might, her abhorrence of a fretful temper in those around her, used to enforce her admonitions by an appeal, as she supposed, to the highest possible authority. "The Bible tells us," said she, "Fret not thy gizzard!" Now, if man, like some of the gallinaceous tribe, really has a gizzard, or if the stomach has teeth, then it may be proper to bolt our food. But the well-known consequences of this bolting admonish us to doubt, at least, whether the the old lady's version of the Bible was quite legitimate.

Digestion, as I have before said, is not solution, though it *includes* solution. Food not soluble cannot be chymified. Again: food not easily dissolved is not easily reduced to chyme. And when food naturally difficult of solution is crowded into the stomach in large, tenacious, or adhesive masses, how can the results be otherwise than evil?

Never before, perhaps, was a period known, in the history of the world, when there was so much premature decay and disease of the teeth. Dentists and dentifrices have come up into the length and breadth of our land, in number like the frogs upon ancient Egypt, and they are multiplying every year. Moreover, they are every year better and better sustained.

By the side of the last-mentioned fact, let us just place

another statement. Never before was so much "food bolted down the throats of the same number of people in the same period of time as those of the people of the United States during the last fifty years. Is there no connection, here, like that of cause and effect?

Were there a combination of all the powers of earth and hell, that stand opposed to the true interests of man, to destroy the human gums and teeth, and, so far as it could go, make man wretched, the results could not be much worse than what our eyes now behold. For it is not by bolting our food, alone, that we violate the great law I have endeavored here to illustrate. The same thing happens when food is hurried down by any other process. This may be done by heat, or oil, or even by simpler things than the latter, such as tea, coffee, and condiments.

We must not forget that heated food, as a general rule, is swallowed with more ease and rapidity than food at a lower temperature. Thus a person will eat half a pound of hot bread, or biscuit, or pudding, or a pound of warm potatoes, much sooner than the same amount by weight of the same substances when cold.

Perhaps it may be said that, in these instances, the undue heat excites an unusual flow of the saliva, which somewhat facilitates the process of swallowing. Still all is not as it should be; for whenever the saliva flows *too* rapidly, the teeth are not, and cannot be, used as much as they ought.

The same general remarks are applicable to the use of hot liquid or semi-liquid food, as compared with that which is cooler. Thus hot gruel, hot broths, hot hasty puddings, &c., are swallowed much sooner than the same food at a low temperature. In these cases there is very little action either of the salivary glands or the teeth.

Internal heat,— so to call it, — no less than heat which is indicated by the thermometer, hastens the eating process, and prevents the teeth, if not the salivary glands, from performing their appointed task. I refer, here, to the use of heating condiments — mustard, pepper, spices, &c.

One objection to the use of tea and coffee arises from the fact that they are usually taken hot. This, however, is not the principal objection. Taken between the mouthfuls of our food, as they commonly are, they prove a substitute for nature's own drink — the saliva; and are hence a twofold violation of the rule we are considering.

But whether taken in one form or at one temperature, or another, all drinking at meals — the use of the purest water not excepted — is a violation of this natural law of the human domain. God has set no less than six fountains in the mouth — three on each side — for the express purpose of furnishing drink at our meals; and whenever we eat right, as has been seen at page 49, the supply is sufficient.

Nor is it “according to law” to butter our food, or to eat it swimming with molasses, honey, milk, cream, and the like. Hot cakes, made of fine flour, especially hot short cakes, hot buckwheat cakes, &c., are bad enough; but how much worse when deluged with butter or any other liquid! In short, all our unnatural customs in regard to eating — our bolting, heating, buttering, peppering; sipping hot or cold drinks, &c. — are palpable violations of a law of the great Creator, implanted in our very structure, viz., that our food should be properly masticated and insalivated.

Other things and circumstances being equal, the more agreeable to our taste our food is, the more readily the teeth perform their work, the more freely the saliva flows, and, in all probability, the more healthful is its character. Perverted,

however, as our tastes are, — fallen with the rest of the system, — there are apparent exceptions to the truth of this remark. Some few persons bolt that food most of which they are most fond.

One thing should be remembered in this connection. When an individual becomes convinced of the superior healthfulness of an article, though at present it may be uninviting, or even disagreeable, to him, he may commence the use of it in moderation, but in full faith, and habit will ere long render it agreeable.

Thus, suppose a person becomes convinced of the natural superiority of unbolted or Graham bread. It is unpalatable to him now, and even scratches his throat. But let him begin and persevere in the use of it, and in process of time the saliva will begin to flow while he eats it, and it will at length go down his throat quite smoothly.

*LAW 2. Our Food should be taken at proper Intervals.*

Talleyrand, the famous French diplomatist, ate but once a day; and the Hon. Mr. Taliaferro, of Virginia, as I learn, does the same. The latter, moreover, if he misses his hour on a given day, omits his meal entirely till the following day; thus eating but one meal in two days.

O. S. and L. N. Fowler, phrenologists, have for several years, in their writings, advanced and defended the doctrine of eating only one meal a day. I do not know whether they are very persevering in their practice of it. The old Romans — some of them — are said to have had but one set meal a day; but I believe they had one or two of what we should call lunches or luncheons.

Another and a much more considerable portion of mankind, including most young children and savages, and not a

few semi-savages, eat at all hours, when they please. Not a few families of children I have known appear to eat almost all day long.

Between these two extremes — that of eating but once a day, and that of eating, as it were, all the while — we find many and very different customs or habits. Some persons eat two, some three, some four, and some five or six times.

There are many families who, during the short days of winter, eat but twice a day. Others there are, in small numbers, who eat but twice a day at any season of the year. Among these last are several highly-respectable gentlemen of the medical profession, among whom is the celebrated Dr. Jackson, the elder, of Boston.

Dr. J. takes his meals at eight A. M. and at two or three P. M. He is a man of excellent health — by no means an invalid. His singularity is the result of conviction and principle. He is seldom driven from his position by the strongest temptations.

The great majority of mankind, however, take three meals a day — generally at six to eight in the morning, eleven to two in the middle of the day, and five to eight in the evening. This is an arrangement in which science and common sense have alike concurred.

Still there are many hard laborers — farmers, mechanics, &c. — who verily think they require a fourth and fifth meal, especially at certain seasons of the year. These meals, however, are somewhat lighter in their character, and are called lunches or luncheons.

In fashionable life, particularly in the cities and towns, besides the common luncheon, a sixth meal is taken. This is very late, often as late as ten or eleven o'clock. It con-

sists, frequently, of the most heavy, indigestible things which could possibly be selected. It is not usually a set meal, or a public one. The food is placed on a sideboard, or table, in a part of the house not very conspicuous, and every one is permitted and expected to go to it and help himself. Sometimes, however, he helps others as well as himself, especially the pill carrier and the grave digger.

I have seen delicate females, who would not have said or done a vulgar thing for the world, but who, after making it their boast, at the regular meal hours, what small eaters they were, would go at ten o'clock at night, and eat quite a hearty meal of these indigestibles. No wonder they were delicate and nervous.

Three meals a day, for adults, is probably the highest or maximum number. It is at least the highest number compatible with good health; and there are some for whom two would be much better than three. Whether one is sufficient for the best purposes of the race, as a race, is a point yet unsettled.

Very young children need food a little oftener than adults. Their digestion is somewhat quicker, as are their respiration, circulation, &c. They have, however, been usually fed too frequently, as well as too irregularly. The youngest children scarcely need food more than five or six times a day.

What, then, shall we say to those mothers who nurse their babes, not only a dozen or twenty times a day, but also several times during the night? What, indeed, but that they are laying a foundation for much future suffering to the child, if not to themselves!

It is, on this account, hardly to be wondered at that Dr. Coles, in his *Philosophy of Health*, has gone to the strange extreme of inculcating the idea that the youngest child needs

food but three times in twenty-four hours. He is right, however, in his objections to nursing or feeding during the night. There is not the least necessity for that.

“But do not our very hard laborers, especially during the longest days and the great heat of summer, need food more than three times a day?” I shall doubtless be asked. “Would they not otherwise be apt to injure themselves by over-eating at their regular meals?”

I have seen both methods tried, and am fully convinced that the farmer, who takes but three meals a day, will perform his task with more ease, and be less worn out, at the end of haying and harvest, and other seasons of severe labor, than he who takes more.

They would faint away without any nourishment oftener than once in five, or six, or seven hours, some tell us. Or at least, they would experience such sensations of gnawing at the stomach and faintness, as would disqualify them for labor.

These objections, though made in perfect sincerity, are founded in utter ignorance of this whole subject. Every one ought to know that the food he receives does not nourish him, properly speaking, the next moment after he has swallowed it. It takes a considerable time to reduce it to blood.

The gnawing and faintness do not arise from want of nourishment, but from nervous exhaustion, and sometimes from self-abuse. It is this very eating so often, in many instances, that induces it. Drinking too much and too often has a similar effect. The more we drink, the more we may, and indeed *must*.

The truth is, that the stomach is one of those organs which require seasons of rest. It is, in part, a muscular or fleshy organ; and it is a general physiological law that the mus-

cles or moving powers, if kept moving too long, without cessation, become over-fatigued, and for the time injured.

Soon after food is taken, the muscular fibres that run lengthwise in the coat of the stomach contract and shorten it. Then, in the next moment, the fibres that encircle the organ contract in their turn, and extend it. This produces a kind of churning motion.

This motion continues till the food is reduced to chyme, of which I have already spoken. The length of time required for the completion of this work is ascertained, by Dr. Beaumont and others, to vary, as has been said at page 51, from two or three to five or six hours. The work of reducing chyme to chyle probably requires one or two hours more. During the whole time of chylication, the stomach, of course, has to work.

Now, if we eat but three times a day, the stomach, in all probability, can rest a little, if not between each meal, at least between some of our meals; but if four or five of these are taken daily, the result will probably be otherwise. The stomach will be kept at work all day, and will be unprepared for rest even at night.

For, as a consequence of keeping this organ employed all day long, the last meal, especially if we retire soon after taking it, — and still more certainly if it is not a *light* meal, — will not be wholly disposed of, but will, in part or in whole, lie undigested all night.

How many hard laborers and others, who have taken their lunches and their late heavy suppers, have slept, as they say, “like a log” all night, and waked unrefreshed in the morning; or, on the other hand, have tossed and dreamed all night, to wake next morning with a bad taste in the mouth and throat, and perhaps with headache!

For further proof that gnawing and faintness are not natural hunger, it should, I repeat, be understood that those who confine themselves to three meals a day, if their other habits are correct, have the least of it, and those who eat luncheons the most.

“But what is to be done, when we have this gnawing, and feel as if we should faint away?” My reply is, Do what a large and general experience has found best and safest. Drink a little water. Rest a few moments. Tell or hear a story. Do not work too violently.

Common sense, indeed, in this matter, sometimes prevails. We hear some few mothers, from time to time, advising their children not to eat between meals, lest it should impair their appetite. And it is worthy to be repeated, continually, that those adults who eat but two or three meals a day have the best appetites and the most enjoyment.

It will be objected, I know, that other animals eat at all times, just when they please. We must remember, however, that their stomachs — those of the ruminating animals in particular — are constructed somewhat differently from ours. We should also call to mind a very important fact of physiology, that under the incessant eating, by the human race, the walls of the stomach grow thin and feeble; whereas in beasts it is not so — God, in his wisdom, having ordered it otherwise. Thus we cannot always reason from the other animals to man.

The largest, heaviest, or most difficult meals will be best borne in the morning or at noon. Our evening meals should be light and dry. Hence, perhaps, the saying in regard to fruit, that it is gold in the morning, silver at noon, and lead at night.

The worst violation of the rule we are considering is the custom of eating late in the evening. It is still worse when

the food taken at this hour consists of indigestibles, and is alternated with wine and other unnatural excitants.

No wonder such persons suffer from nervousness, dyspepsia, and liver complaint. Nor is it much to be wondered at that those who are employed in groceries and other places where temptations abound — clerks, cooks, &c. — never have a firm appetite, and are frequently broken down before they have seen half the years divinely allotted to man.

The sum is this: Our meals should be taken at regular hours. One meal may suffice, provided we do not, like Talleyrand and certain idiots, make ourselves gluttons. Two are probably better. Three is the maximum number for adults. But whether the number be one, two, three, five, or fifty, they should be taken at regular hours, and nothing nutritious, nothing but pure water, should be taken between them.

In short, as may perhaps be more fully seen in another place, he who obeys the laws of digestion in general will not be greatly inclined to any other drink than water, either with his meals or between them; and many persons of very simple habits hardly require any drink at all.

Some there are who admit all this in a sort of general way, and yet do not come into the full spirit of it. They do not eat between meals, they say. And yet how often do we see them with a little fruit in their mouths, or chewing cloves or aromatic seeds, or indulging in a little milk and water, soda water, &c.!

“But is there any harm,” thousands are ready to ask, “in the use of milk and water, and other simply nutritious drinks? We verily thought milk and water, molasses and water, &c., were healthy.”

They are so, for some persons, especially when taken as food. But he who wishes to have his stomach rest between

nis meals must not throw into it, at these times, — that is, between his meals, — a particle of nutriment even in a fluid state; for, if he does, that organ, instead of resting, will be compelled to work to reduce it to chyme. Besides, the nutritious sediment of these drinks is harder of digestion than solid food, because it has had no mastication and insalivation.

Pure water does not set the stomach at work again, — I mean at the work of chymification, — for it is absorbed at once, without any change; while with every other common drink *but* water the result is otherwise.

This may be the proper place for saying that regularity in all our habits — our evacuations among the rest — is as necessary as regularity about our meals. Locke, the philosopher, taught that children should be trained to one evacuation of the bowels, and one only, a day. And the healthiest men I have ever known were of this habit. But the more meals we eat, and the more irregularity there is about them, the more irregular our evacuations become. Here is another reason, not usually adduced, for eating but three times a day.

The young of both sexes are exceedingly careless in regard to this matter. Instead of making it an almost sacred principle to obey promptly the calls of Nature, and at a regular hour of the day, they often bid her wait, and for the most flimsy reasons, till she ceases to utter her warning voice, and costiveness and all its progeny follow in train.

### LAW 3. *Food should be taken in proper Quantity.*

This law has been faintly alluded to several times already; but it requires further elucidation.

Attempts have been made to regulate this matter of quantity by weight and measure. Here, however, if nowhere else, “doctors disagree.” Some have assumed, as the stan-

dard a pound of dry bread, or its equivalent, a day ; some have said a pound and a half ; and some few, two pounds.

I have been the guest of a man who had his scales on the dinner table, and weighed out his dinner with great exactness. This habit may, to some, be useful ; but there is danger that it may lead us to watch, too closely for health, our sensations and feelings, and thus lead, inevitably, to dyspepsia.

One class of men there is, indeed, who might profitably weigh their food. Brought up in this land of abundance, they have acquired, gradually, very gluttonous habits. They may not, it is true, go quite as far as the Siberians, and eat fifteen or twenty pounds of flesh and fish, inclusive of two or three pounds of candles, a day ; but they go very far.

I have labored, while a boy, in the same field with men who would eat of bread, meat, and vegetables, — including a dozen or twenty apples, and two quarts of milk, — at least twelve or fifteen pounds of food, daily. And yet, as they could “work it off” better than most men, they were not conscious, at the time, of any injury.

It might do such persons good to weigh their food, at least for a few days. It might possibly do more than any thing else to cure them of their gluttonous habits. For most men, however, the practice of weighing food would be, as I said before, quite doubtful.

Whenever we can ascertain the exact size of the stomach in a particular individual, the size and strength of his other organs of digestion, his early habits, the waste induced by his daily employment, and many other things in regard to which there is a great difference among men, then — perhaps not till then — can we fix, definitely, upon quantity.

While, however, we can no more lay down fixed and

certain rules for every body, in this particular, than we can in regard to the required amount of sleep, clothing, or exercise, we can approximate to the truth in the case. We can lay down several rules which may be made highly serviceable.

In the first place, it is a rule of almost universal application, that we ought to eat less than we do. The testimony of all medical men and physiologists, as well as of many ancient and modern philosophers, is to this effect. Every body is inclined to eat much more than nature requires.

Among those who have given us their testimony is the Jewish King Solomon. He counsels us to put a knife to our throats in the hour of temptation. Franklin sometimes confined himself to very little food. Sir Isaac Newton was exceedingly rigid with himself. Under the same feeling, Dr. Dwight endeavored to subsist on twelve mouthfuls of food a day, but found it hardly sufficient. Louis Cornaro restricted himself to twelve ounces and a little wine.

President Jefferson was accustomed to say that no man, when he comes to die, ever repents of having eaten so little. Dr. Caldwell, the phrenologist, says we generally eat twice as much as the purposes of nature require. I might multiply these testimonies indefinitely.

Then, again, the Japanese, the Hindoo palanquin bearers, and the Turkish porters are, universally known to be small eaters. The former subsist very well on a handful of rice and a little fruit a whole day. The Hindoo will perform his tedious task with only a very small quantity of rice and curry. The porters on the Mediterranean, living on a slice of bread and a few figs, with perhaps a herring a day, will carry burdens which would crush most men.

The Roman soldiers, in the best days of Rome, subsisted on rations which would now be deemed as scanty as they

were simple. Had they lived fifteen years ago, they would have been called Grahamites. Yet they carried a weight of armor that would in these days be deemed insupportable, by human strength, for an hour together.

We forget that we are not nourished in exact proportion to the quantity of food we consume; that there is almost always in the stomach and intestines a surplus quantity of aliment; and that we tax too severely the vital forces when we compel Nature, day after day, to dispose of a burden which should never have been imposed on her.

Another error, closely connected with this last, greatly misleads us. They who have severe tasks immediately before them seem to think they must load themselves heavily with food. But no skilful teamster would treat his ox or his horse in this way. If he has a hard day's work before him, he feeds his animals liberally, not in the morning, but the night previous.

That *immediate* strength which men and beasts receive from food consists more in nervous gratification than any thing else. For immediate purposes, I know not but a dinner of sawdust, or chalk, would answer nearly as well, if it were equally agreeable to the taste. Perhaps it would be strictly correct to say that we are nourished and supported, during our forenoon labor, much more by the food of the preceding day than by the breakfast we have just eaten. This fact in hygiene; if universally known, might be of great service.

In the second place, it has usually been mentioned as an important rule, when we eat, to leave off hungry; or, in physiological language, we should contrive always to leave off with a good appetite.

I have elsewhere intimated that few persons know the

blessedness of a good appetite. "A little bit, but nice," satisfies them, especially if they have a cup or two of hot tea or coffee to destroy what little of appetite remains. And yet, so far as the matter of gustatory enjoyment is concerned, they seem to think themselves kings and priests.

A little reflection, however, or, if not, a little observation, might teach such people a very different doctrine. They might learn, one would think, that he alone is the man of true appetite, who, while he holds himself, as with a curb bit, scarcely knows any end of his power.

Grant Thorburn, a venerable octogenarian, is wont to say he never ate enough in his life. So is an aged friend of mine in Ohio. Both of these, probably, have good appetites. The last mentioned was found, in his eighty-sixth year, mowing thistles, barefooted. And in one of the severe days of January, 1852, when eighty-eight years old, I found him chopping in the woods.

In truth, it is strength of appetite, in no trifling degree, that gives to one man more native force and more power to endure than another. It is idle, and worse than idle, to talk of treading under foot the appetites. It would be to change mankind into more than triple eunuchs. The stronger our appetites — the whole of them — the better. They are as a beetle to impel us onward. They must, it is true, be wisely directed, or they will drive us to destruction. The head must be a helmsman to the ship, or we shall certainly make shipwreck.

There is, it is admitted, a wide difference between strength and irritability of an appetite. Most persons possess the latter, and as they know of nothing better, they call it a *good* appetite. They who are always eating seldom have a good appetite. The same might be said of the other appetites.

In general, then, I repeat, leave off, at every meal, with a good appetite. He who does this, and at the same time obeys all the other physical and moral laws, will seldom pass the line of health and safety. But if an individual only half masticates his food, the case is altered. He is in danger of going much farther, before he approaches the region of satiety, than if every thing was reduced to a pulp in the mouth and very slowly swallowed.

There is, indeed, a much higher and nobler rule than the last. This is to eat no longer — provided still you eat right — than the food refreshes you in body and in mind. Observe, I do not say *exhilarates* or *excites* you, but *refreshes* or *restores* you.

For, though we are not, as has been seen, greatly nourished by our food till it has been some time in the body, yet, if taken right, there is a happy effect produced upon the sentient extremities in the stomach, which tends to produce a degree of satisfaction — I might even say of cheerfulness.

Food, no less than drink, or any other sensual indulgence, within its appropriate limits, tends to make cheerful, or slightly to exhilarate. For this belief we have very high authority. Often in the Bible is the process of eating said to make merry. Not, I repeat, once for all, the merriment which tea or coffee produces, but one far less evanescent.

This rule it has been my own steadfast purpose, for many years, to follow; and though I will not say I have never, in a single instance, departed from it, yet I *may* say I have a thousand times profited from it, and can most cheerfully recommend it to others.

Much has been said by physiologists about the fever of digestion. Richerand observes, “ Digestion brings on a general action, analogous to a febrile paroxysm. As the stom-

ach empties itself, the spasm of the skin goes off, the shivering is followed by a gentle warmth, the pulse increases in fulness and frequency, and the insensible perspiration is augmented.”

This “fever of digestion,” consisting, as we shall see by examining his *Elements*, pp. 110–112, of a cold stage, a hot stage, and a sweating stage, like other fevers, “is particularly observable,” he adds, “in women of great sensibility.” And Richerand is by no means alone. He had his authorities, in great numbers, as he has his followers.

That this fever of digestion, in very many instances, really exists, I am not at all disposed to deny. It is only when the inference begins to be made that a fever is compatible with health — I had almost said necessary to it — that I am compelled to enter my protest.

Digestive fever, as I maintain, is as much a disease as typhus fever or brain fever. It is not a necessary appendage or condition of healthy action, but rather indicates a want of it. It is the penalty, like other diseases, of transgression.

Let mankind eat and drink as they ought, work as they ought, sleep as they ought, and do all things which bear upon health as they ought, (and what is there that does not have a bearing upon health?) and we shall probably hear no more about digestive fever. Or, if any were supposed to exist, it would be so trifling as to be unworthy of our notice.

In truth, the remark of Richerand, that this fever shows itself most readily in women of great sensibility, leads to the very conclusion to which I have arrived. Such persons, though they may not be very large eaters, most undoubtedly take too much for their feeble frames. Their vital energies are not sufficient to enable the digestive organs to dispose of their load without difficulty. Hence agitation and fever. It

is they alone who task their stomachs too much for their general strength who have any digestive or gastric fever.

I might not have been so particular in my notice of this error, but that another error has gone forth closely connected with it, and perhaps dependent upon it for its very existence. It is, that any considerable degree of exercise of body or mind, immediately after a meal, is injurious.

If a fever were really present, such an opinion might be very correct. But except in cases of gross violation of law, there is no fever that will be much increased by a reasonable amount of exercise. Very *violent* mental or bodily exercise might, indeed, do harm, but not in the way usually supposed.

Moderate action of the locomotive system, as well as of the brain and nerves, is not only entirely uninjurious, but actually favorable to healthy digestion. Away, then, with the antiquated and erroneous notion that a person can hardly eat a meal without having a paroxysm of fever that, for a time, unfits him for business.

Instead of retarding the march of body or mind, eating correctly should quicken our progress. I have said already that it makes us, and should make us, merry — somewhat so. We can work the better and the faster for it; and it is an excitement that is followed by little of what is called debility.

It is an old saying, and as true physiologically as it is morally, that prayer and provender hinder no man's journey. If I were compelled to travel fifty miles a day, or hoe an acre of corn, I would by all means sit half an hour at the dinner table.

To some persons I may seem to have wandered. But although I am at a little distance from the main road, I have,

all along kept my eye steadily upon it, and am now prepared to return to it.

The habit of eating too much and too rapidly is taught us, and that at a very early age. The child is no sooner old enough to desire food than he is over-fed. Nothing is more natural or more common than to urge him to take a little more, after he might otherwise desist. The stomach is thus unnaturally distended, and if the stuffing process is often repeated, it becomes enlarged. So, in truth, does the whole system. The deposition of fat beyond a reasonable plumpness, attractive as it renders the infant to most persons, is indicative of gluttony, or, if this expression seems too harsh, of over-feeding. This over-feeding is repeated and continued.

Who among us has not seen the tender infant pressed and pressed again to take a little more, after nature had already said, Enough? And then, in five minutes more, if it whimpered or cried a little, whether from pain or not, who has not seen the feeding process repeated, as if this were not only the remedy for hunger, but the panacea for every ill? No wonder children become over-fat, and in other respects misshapen. No wonder they gradually become gluttons. The stomach, like other muscular parts, enlarges by exercise. It is a wonder, perhaps, that they do not oftener become deformed, like our pet lambs, pigs, and puppies.

There is, however, one partial preventive of this deformity in the young human being, which is inoperative in the case of the pet animal, at least generally. These last I have seldom known to vomit. The human infant, on the contrary, when full to excess, oftentimes literally runs over, and thus is partially saved from destruction.

A story is told of the mothers in Surinam, which is much

in point, though it may not be exactly true. It is said that, when their very young infants are so full fed that they begin to "run over," they take them on their knees, and by a peculiar trotting motion endeavor to shake down the milk in their stomachs, as farmers shake down apples or ears of corn in a basket, in order that it may hold a little more.

Our mothers, in the United States, have not yet come to this; but they are bravely coming on — at least some of them. They crowd the stomach till it loses much of its tone and vigor; the child becomes flatulent; aromatics or wind-medicines are given; they afford relief for a time, but leave the stomach a little feebler than before; and thus the trouble goes on and increases.

The food which is prepared by a kind Providence, though obviously all it requires till it has teeth to eat something else with, is deemed quite insufficient. The poor creature, it is thought, will never "come to much" without something stronger. In order to have the child fat, and lusty, and strong, it must learn to eat — so it is thought — such food as makes *us* strong. A little, from time to time, of such food as we happen to have at the table, is fed to it — perhaps to eke out one of the full meals of its natural food, of which I have just been speaking.

As the child is at first quite indifferent about receiving the new and strange substances which are offered to it, and quite unacquainted with the process of mastication, they are sometimes masticated for him by the mother; or, if not by her, it is done by some person who has a mouth and set of teeth in worse condition than her own.

Perhaps it is a piece of apple which is administered, or a piece of potato. He scowls and slavers, and eschews it; but it must go down. The process is repeated, and again repeated,

—for mothers are apt to be very persevering here, — till at length it goes down with a good deal of facility.

It is not long, now, before the dear little creature comes to the table. Tied into his little chair, he is the most prominent object of attention and conversation; and all seem to vie with one another about the honor of feeding his stomach, and his rising self-consequence. He must, of course, like what the company like — down to the tea and coffee; and he must be literally stuffed with it. The process is repeated from time to time till the precious art of eating and drinking — teeth or no teeth — is consummated.

I have said consummated; but it is never consummated, or finished. The arrangement of modern tables is such that all persons are led into temptation — adults no less than children. When we have eaten about as much as our systems really require, a new dish comes on. Of this we must eat a little. Another comes, and perhaps another. It would be impolite not to taste them. We must eat, and be surfeited.

Impolite to refuse, did I say? Not to keep up the custom of stuffing ourselves and our children, at home and abroad, would be unpardonable. If the great end of cookery and housekeeping were to tempt people to indulgence and disease, it could hardly be improved.

Should the time ever come when a Christian housekeeper will endeavor to follow out the laws of physiology and hygiene, in regard to the preparation and distribution of food, she must have quite a different sort of people around her from the present generation, or she will only be laughed at.

Suppose such a person, in the full, practical belief that tea or pepper was hurtful, should withhold it from her guests, even though her most fashionable friends were with her, what atonement could she make for her transgression?

The laws of God have been, as yet, but little applied to matters of eating and drinking; or, rather, the laws on this subject have, so far as known, been regarded as a species of inferior law, which Christians are at liberty to obey or disobey, as they please. But these things ought not so to be. All law whatever is Jehovah's, and is to be obeyed. This matter will not be thus lightly regarded much longer.

The time is coming, and now is, when the dead in trespasses and sins — physical transgressions among the rest — shall hear the voice of the Son of God, and they that hear shall live. At least, they shall *begin* to live. It will be a long time before the physical part of the gospel will be fully understood and obeyed.

The time is not far distant, when the question, What shall we eat, or what shall we drink? will be asked, not so much of the stomach or epigastric centre, as of the higher organ, the head; not at the hands of fools or gluttons, but at the hands of Science and Christianity.

#### LAW 4. *Food should be of proper Quality.*

There are several items or particulars, under this general head, which shall be considered in order. First, Simplicity. Secondly, Nutrition. Thirdly, Freedom from Disease. Fourthly, Medication. Fifthly, Elementary Properties.

First. Our food should be *simple*. In fashionable life, the tendency is to the opposite extreme of this. Miss Leslie, in her collection of receipts for cooking, mentions eighteen ingredients of a single mince pie!

There are many things belonging to simplicity. I might speak of simplicity with respect to particular dishes, with respect to each meal, and with respect to exposure by cookery and other agencies which are liable to place the various

properties of our food, as it were, in conflict with each other.

Complicated or mixed food is objectionable, because it perverts still more our already perverted tastes; because it is less healthy; because it is not so economical; and because we lose by it, in the end, in gustatory enjoyment.

To every one of these points I suppose all will assent, except to the second. Here some will probably demur. They will ask what reasons there are for believing that simple food is any more healthy than that which is made up of a variety of articles. And it is right that the inquiry should be made.

Take, for example, the ripe, mealy potato. For the man of giant stomach, and giant physical powers in every respect, it is a most excellent article of food. It is especially valuable to such a person if he labors hard in the open air. Baked, boiled, steamed, or roasted, it is a simple article, and will of itself sustain men in life and health. Nor is it rendered very unwholesome by so slight a departure from nature's own simplicity as the addition of a little salt.

But suppose it not only cooked and salted, but mashed, buttered, and peppered. Is it now a simple article? Will it become so by the still further addition of gravy, or mustard, or vinegar? It is, on the contrary, far less healthy than before. Why so? It receives less mastication and insalivation; nor can the saliva it receives be so well mixed with, and incorporated into the mass. Nor can the gastric juice, when it reaches the stomach, act so well upon it.

All this would be strictly true, if the butter used were fresh. But if long salted, it is not only troublesome on account of its mixing less readily with other fluids, but because long salted butter is one of the most rebellious things which can be thrown into the human stomach.

If pepper is added, — a very common addition, by the way — it renders the whole mass in the stomach, not only hard of digestion, but irritating. The irritation may, indeed, hasten the mass through the stomach into the small intestines, but it does not favor the production of good chyme and chyle. Then, again, neither the butter nor the pepper adds much to the beauty of the complexion, or the smoothness and health of the skin. Of this, however, I shall have occasion to say more presently.

I have anticipated, a little, already. My object was rather to explain the meaning of the word *simplicity*, as I here use it, than to point to particular dishes which are complicated. Our cookery is nearly all of it of the latter character. “Mince pies” and “hash” do not stand alone.

Pies and pastry of every kind are preëminently compound dishes. Against these Dr. Paris, Dr. Pereira, Dr. Kitchener, and most other medical writers, have long and loudly inveighed. Even Peter Parley, in his Fireside Lectures, has pronounced them poisonous to the young, without qualification.

Compounded or complicated dishes are *made* dishes. Does any one ask what made dishes are? I will refer him to Professor Dunglison, to whom, as competent authority, I suppose no one will venture to object. In speaking of the present “complex condition of the culinary art,” he observes, “Every preparation of eggs, and every made dish, are more or less rebellious;” that is, as he defines it in another place, more or less indigestible. He had already mentioned the fact that we are constantly taking some preparation of egg.\*

By proceeding to gather up his ideas on this subject, we come to the conclusion, that all sorts of dishes into which butter, milk, cream, lard, saleratus, or any other shortening

\* See his Elements of Hygiene, p. 283.

enters, are *made* dishes, no less than those into which eggs enter.

If this is so, however, what a besom of destruction simplicity would be to most of our modern fashionable tables! Eggs, milk, lard, or butter goes into almost every thing eaten. Governor Hill, in his *Family Visitor*, a few years since, said that butter was a necessary ingredient in almost every dish. Are eggs, milk, and lard much less so?

The worst remains to be told. Instead of meditating a return to nature's simplicity, the great mass of society, even of those who profess to follow Christ, are going deeper and deeper into all that complication to which I have faintly adverted in the foregoing statements. The luxuries of to-day become the necessaries of to-morrow; and simplicity is fast becoming a stranger, if not an exile.

Secondly. Food should not be *too nutritious*. It would seem as if the common sentiment, so far as we have any public sentiment on the subject, were entirely the reverse of this. The finer every thing is — the more carefully we exclude every coarse particle — the better we seem to regard it. "As a general rule," says Dr. Dunglison, from whom I have just quoted, "all dishes that contain a large quantity of nutriment in a small space are more unmanageable by the stomach." And this consideration, by the way, is one reason why he objects so strongly to "made dishes," as being rebellious.

Much has been said, of late, about the superiority of unbolted wheat meal bread to that which is made of fine flour. The reasons given why the former is preferable are various. Some say it is sweeter. Others say the coarser parts are laxative in their tendency. Others say that the bran, as they call it, serves to distend the stomach,

Now, all these statements are true, and have weight, except that it is not strictly correct to speak of bran in this connection. For, properly speaking, there is neither bran nor flour about it. It is simply *meal*.

And yet the far more important reason in favor of the use of unbolted wheat meal is, that it is not so nutritious as that which is bolted. Whether it is not still too nutritious to be eaten long by itself, is not so well ascertained. However, I have no doubt that an addition of fruit, at one or two meals of each day, (which is far less nutritious,) would improve it.

All our grains should be ground coarsely, and without bolting. There should be no such thing known as a bolter. I do not mean by this, that oats and buckwheat should be used without separating the husks or shells which cover them, and which no human being could digest. Of course they should not. Even wheat, rye, barley, and maize may be washed and scoured before grinding.

On the principle we are now considering, milk is better than cream, butter, or cheese, because these last are more highly concentrated nutriment. So the lean meats of all animals are preferable to the fat parts.

Fat, however, which is nearly all pure nutriment, is objectionable on other grounds, as will yet be seen more fully, and is, in all ordinary circumstances, almost wholly indigestible. It was forbidden to the Jews, as was pork also. We are deceived in regard to this article, because we have so long confounded digestibility and solubility. For similar reasons to the foregoing, it is, that rice, peas, beans, &c., are not so healthy as several other kinds of food. Yet they are almost pure nutriment. With potatoes and other coarse vegetables, however, or with fruit, they do very well. The latter serve as a balance or check to the former.

It is, again, for similar reasons that potatoes, turnips, squashes, and many of our fruits, are so very healthy, especially when eaten with bread, which, even in its coarsest state, is rather too nutritious to be eaten much alone. These vegetables have in them but a comparatively small proportion of nutritious substance.

Does any one ask why it is that a considerable proportion of innutritious matter should be blended, in our stomachs, with the purer nutriment, in order to render the results most favorable to health?

We argue, on this subject, in the first place, from analogy. Man's organs do not seem adapted to any thing which is pure.\* The very oxygen gas, in order to be permanently nutritive in the lungs, must be diluted with about four parts of nitrogen, or azote, which may be regarded as innutritious.

The domestic animals do not long thrive on very pure nutriment. It is said, that at sea, when a storm has swept the fodder overboard, and nothing but grain is left for the horses or other animals which may happen to be on board, they will gnaw their cribs, and in various ways manifest uneasiness, and even grow thin, and lose their elasticity and vigor. But on mingling some coarse substance, which they can contrive to get into their stomachs, even though it were nothing more than very fine wood shavings, along with their grain, they soon improve. For similar reasons our

\* Some of the German writers maintain that man is not fit for pure truth, morally. Treviranus says, "Were the Father of our spirits to hold out to me in his right hand pure truth, and in his left the ever-active, longing desire after it, and offer me my choice, I would most humbly bow to the left, saying, 'Father, give me this; pure truth is fit for thee alone.'"

farmers, when there is a scarcity of hay, sometimes mingle cut straw with grain or meal for fodder.

Children, at first, have their food furnished them by the highest wisdom. This, the best of it, is about four fifths water, and not more than one fifth of it pure nutriment. And even cow's milk, whenever that is used, is far less than one half of it nutritive ; and, in the hands of some of our city milkmen, much weaker still !

But we have facts as well as analogies. They who live much on fat, pastry, rice, cheese, fine flour bread, sago, tapioca, &c., are very liable to be constipated or irregular in their bowels, and finally dyspeptic ; whereas, the world over, those persons are the healthiest, other things being equal, who live on coarse food.

Potatoes, taken alone, are hardly nutritious enough for the best purposes of human health. I know well what is said of the Irish and Scotch, and I am not ignorant of the numerous experiments which have been made which seem to justify a different conclusion ; but they do not satisfy me, because they have not been extended far enough.

That if we must eat any thing alone, potatoes are preferable to most other articles of food, I do not deny. But that even these alone are best for us, as a race, I have very many doubts. If we eat potatoes largely, we need a portion of bread with them. And so of fruits, as well as potatoes.

It becomes necessary to say, here, that although fat meat, rice, &c., are nearly pure nutriment, it does not thence follow that our digestive systems can extract the nutriment in exact proportion. It is highly probable, not to say certain, that the less nutriment an article contains, the more our organs can procure from it, in proportion to the quantity existing in it. Rice, for example, though nearly all nutritious, may not

afford to every person adequate nourishment; partly on account of the reason just alluded to, and partly for the want of saccharine matter. Some of the experiments of Magendie, a French physiologist, seem to strengthen this view of the case.

Fat meats, I again say, though easily enough dissolved, are with great difficulty digested. Indeed, it is doubtful whether they are, in ordinary circumstances, digested at all. Physiologists say that the whole course of nature, so far as our digestive apparatus is concerned, must be changed before this can happen. They say that the bile, which is alkaline, and which, in a natural course of things, should never come into the stomach, must first regurgitate into that organ. Is it so, then, that, in order to digest fat or oil, we must make soap tubs of our stomachs?

Thirdly. Food should not be *diseased*. The bare thought of using food which is diseased is disgusting, were it even possible to suppose it healthy. But this cannot be. Diseased food must be less readily elaborated into healthy chyme, chyle, and blood, than that which is free from disease; and must, in the nature of things, prove more irritating.

I need not agitate the question, in this place, whether any of the articles we use from the mineral kingdom are ever diseased, since I shall discuss this point hereafter. With regard to substances from the other two kingdoms, however, I have something to say.

Vegetable food is occasionally diseased. The history of the potato disease is well known. Grain is also sometimes diseased — rye, corn, and wheat. I have once or twice known a species of disease among apples, and have, in a few instances, suspected it among other fruits. Compared, however,

with animal food, and with mixed and highly-complicated dishes generally, vegetables are but little liable to disease. Whenever they are diseased, the disease, as in the case of ergot in rye, is easily detected.

Want of maturity, hotbed culture, and incipient decay can hardly be called diseases; for if they were so, it would be in strict accordance with physiological truth to say that a very large portion of our food, as it comes to our hands, is diseased, especially our fruits. Many of our summer fruits are in a state of perfection only a few hours, and some of them, as is well known, only a few moments. It is not safe to eat them before they are ripe, whether cooked or uncooked; but it is still less safe to eat them when they have begun to decay. Incipient putrefaction is *almost* disease.

The grinders of our grain are accustomed to say that they can sometimes detect, in the odor of the grain, the substances which were applied to the ground where it grew, as manures. If this is admitted to be true, it opens a field entirely new to the teacher and learner of the laws of health.

For who does not know that we are falling more and more into the habit, as a dense population, of forcing our vines, our fruits, and our grains, by recent hot, acrid manures? If, now, the particles of these foul substances can be detected in our grains, and in the fruits of our vines, &c., must they not be more or less unhealthy? They must, at least, be disgusting.

One thing, in any event, forces itself upon the inquiring mind. May it not be that the custom of stimulating our soils and obtaining large crops by hot manures — saying nothing of their disgusting character — is hurrying on too rapidly the wheels of life? Shall pecuniary gains be set over, in this way, against health?

It is a well-established fact that our domestic animals are, like man, the subjects of disease, only not to the same extent. Some of the wild animals are so; but in general their diseases are more acute and less complicated. They are not subject to scrofula, consumption, asthma, gout, or cancer.

No domestic animal among us is more frequently a sufferer from disease than the swine. He is not uniformly healthy when he runs wild in the woods, as in Maryland or Carolina; but in a state of confinement in our pens and other enclosures he is never healthy, and never can be.

I am not aware that the use of pork, with us, tends at all to leprosy, though I am pretty confident — nay, I am absolutely certain — that all predispositions to cutaneous complaints are apt to be roused by it into activity. And I have often ventured the inquiry, in my own mind, whether the divine prohibition of swine's flesh, three or four thousand years ago, ought not to give it a permanently suspicious character.

There are numerous reasons why hogs, more readily than most other animals, become diseased. From the fact that we have been accustomed, time out of mind, to confine them in order to make them fatten more rapidly, it has been hastily concluded, by some, that they do not need much exercise; and hence, without compunction of conscience, we confine them to the narrowest limits possible. But it ought to be known that what little exercise this animal does really require, is just as imperatively called for as if he were a cat or a squirrel, and that he suffers just as soon if it is withheld. If this is so, what animal of this sort can be found healthy?

Then, again, he needs pure air. His lungs, though smaller than ours in proportion to his whole frame, are yet constructed on the same general principle; and if he does not

need quite as much air as we, he needs it just as pure, and suffers just about as soon if he is deprived of it.

He needs wholesome food. True, he is, like man, somewhat omnivorous; that is, his capabilities have a wide range. He can subsist on mere offal, and almost every thing else. But, then, it is also true, and it ought to be more extensively known than it is, that he is as much improved by good food as man, and as much injured by bad food, hot drinks, &c.

Say you he will not fatten so fast? That may be true. It should, however, be remembered, that to fatten fast is one thing; to grow healthy, quite another. Luckily, the old association of fatness with health is beginning to pass away, except in the case of young animals. Fat pigs and fat babies are still regarded as healthy.

The swine, like other animals, needs a clean skin. Most persons will demur at this; but let them know it is true. The experiment of keeping a fattening swine clean has been tried several times, and always with satisfaction. The pork of the clean swine, moreover, is as sweet as that of the filthy one.

If this animal, when slain for the market, has not tubercles on his lungs, ulcers in his liver, or measles or hydatids elsewhere, most assuredly the fault is not ours, who feed and take care of him. We have done our best to render him diseased. For nothing is more certain than that confined and impure air, want of exercise, hot liquid food, and a dirty skin will make any animal diseased, whether brute or human; and if the swine is healthy in any degree, it is in spite of his treatment, and not on account of it. Most seriously do I doubt whether one swine in fifty, — the sucking pig perhaps excepted, — that comes to our best markets, is free from disease. The safest way for us, therefore, would be to abandon pork eating entirely.

But diseased swine are not alone. A professor of anatomy and physiology in one of our western colleges told me, a few years since, that the fat cattle in Northern Ohio and Michigan were extensively diseased in their livers. And I hear similar accounts, very frequently, from others.

The cow is often diseased. Dr. Clarke, a British writer of eminence, tell us that the milch cows of the city of Paris are almost always tuberculous. Tubercles, as you know, are what might be called the seeds of consumption. Their milk is indeed sweeter, and sometimes their flesh, when killed, but who would prefer it?

I remember a famous cow of my father's. No cow gave more or sweeter milk. Yet she was always feeble, had a bad cough, and had every external appearance of moderate consumption. Whether or not she was tuberculous, I cannot say positively; but I presume she was so.

Next to the swine, however, no fattened animal is so certainly diseased by the fattening process as the goose. I have known men who made it their business to buy up aged geese in autumn, feed and heat them, in a week or ten days, into liver disease, and then sell them at the highest market price.

The Strasburg mince pies, so famed in Europe and even in Philadelphia, are made of the engorged, half-putrid livers of geese, fattened in close, heated pens, to the floors of which their feet are sometimes nailed. Such, at least, is the testimony of several eminent physiologists; and I am not aware that the statement has ever been denied.

All stall-fed animals are diseased, more or less. They are at the least plethoric; and what is plethora but disease? They are usually more than this, however. Besides the diseases already mentioned, they are liable to worms, murrain, horn distemper, staggers, eruptive complaints, swelled glands, &c

The foregoing remarks, as will be readily perceived, are not applicable, in all their severity, to the unconfined, unrestrained occupants of fields and barn yards, though even these sometimes suffer from bad food, if not from bad air. Still less are they applicable to the beasts of the forest, the fowls of the air, and the fish of the sea.

And yet these animals, even these, are occasionally affected with disease. Noah Webster, in his excellent little book on Pestilential Diseases, tells us that certain kinds of fish on the Atlantic coast of America are known to become diseased, occasionally, and to die in great numbers. I have myself known a load of oysters, brought along in the country, to produce a sort of cholera — not fatal, but troublesome — in all who tasted them. And the old vulgar saying is known, as I suppose, to every body, that they are unhealthy during every month whose name does not include the letter *r*.

I have also heard sailors, when fishing off Cape Hatteras, during a calm, talk familiarly about the dolphin being diseased by sucking copper at the copper banks, and of boiling a piece of silver with the fish, to see whether it would be blackened by it; for, if so, it would, as they said, sicken them. I do not quote this for the sake of its *philosophy*, but for the sake of a fact.

The partridge is occasionally poisoned. The cause is unknown. It has often been supposed to be a poisonous berry. Whatever may be the cause, the fact is undeniable. Other facts of kindred character might be mentioned.

Some of the preparations of animal food, or the mixed dishes of which that forms a part, are peculiarly liable to be poisonous. Such is the sausage, especially the blood sausage, as it is called in Europe. In the kingdom of Wurtemberg hundreds have died from eating it.

The animal products, particularly cheese, are occasionally poisonous. About the year 1827, a hundred persons in Plymouth, Connecticut, were poisoned by eating of a single cheese. A part of them were my own patients. None of them died; but some of them barely escaped death. In Winchester, in Connecticut, several years before, a similar occurrence took place, and with similar results. Indeed, there have been many cases of poisoning from cheese. The nature of the poison which thus operates is unknown.

Of the poisonous nature of putrid animal substances the public are pretty well informed. Thousands have perished from this cause, among whom have been many excellent physicians and surgeons. They inoculated themselves, as it were, while dissecting dead bodies.

When I was very young, a near neighbor, while preparing some fat, a little putrid, for the process of *trying*, as it is called, cut her finger, upon which an inflammation came on, which soon destroyed her. But I shall advert to this subject again when I come to speak of food and cookery.

Fourthly. Food and medicine *do not belong together*. As a general rule, food and medicine are, in their action, incompatible with each other. In other words, when food is in the stomach, medicine should not be there; and when medicine is present in it, food should not be. They are antipodes to each other.

The common sense of some persons has led them, with regard to a few things, to the very same conclusion. In general, however, the world has gone to an extreme in this matter which borders closely on downright insanity.

Most medical men, of any science or skill, prescribe their medicine to be taken as far from meals as possible. Or, in any event, it is to be taken on an empty stomach, as it is

termed. There are very few, indeed, who wish to have their medicine taken with food.

You will say, perhaps, "But I do not understand you. The number of persons, in our American society, at least, who take medicine with their meals — so strange a course — must be few indeed ; hardly enough to require a passing notice."

It may be larger than you are aware. There are, it is true, very few who use rum or tobacco with their meals. A larger number use beer, cider, and wine ; all of which are medicines. But the number of even those is not so large as that of another class among us ; and is, it is hoped, daily diminishing.

This last-mentioned class embraces almost our entire community ; and the medicines to which I refer are used at almost every table. In truth, our modern tables would hardly be regarded as decently set, till one, or two, or three small medicine chests were found in the array of dishes.

It is not intended to affirm, in this statement, that nothing but medicine is found in the castors, at our tables ; for I have never examined one very closely. They may possibly contain, along with medicine, as simple articles as salt and sugar.

What I would aim at, however, is not the salt and sugar, if, indeed, these are found there, but the mustard, catchup, pepper, spices, and vinegar. The saleratus, I suppose, is not found there, but is incorporated with most of our dishes before they come to the table.

All these and sundry other articles, which, in one form or another, have come into modern use, are medicines. They always were so. They ever will be so. That they are never needed, I do not now undertake to affirm, but only that they should have no place at our tables, or with our food.

Let no one object to this definition of the term *medicine*. I know well that almost any thing, under particular circumstances may have a medicinal effect ; but I do not here use the word with this license. What I call medicines are substances not only wholly indigestible, but actually opposed to the natural, healthy action of the stomach and other organs, and tending to disturb the natural course and order of things, wherever they go.

Some individual may say, " I thought condiments had the effect to quicken the action of the stomach and digestive organs generally, rather than derange it ; as the spurs of the rider quicken the movements of the beast on which he rides." They do, indeed, quicken movement, at first ; as the presence of an enemy might rouse an individual to a posture, and if needful to overt acts, of self-defence. At least, this is a very common explanation of the state of things in these circumstances.

Thus, suppose a person has taken a heavy dinner of any ordinary dish. Or suppose he has taken but an ordinary dinner of something which is difficult of digestion. He now swallows half a gill or one third of a gill of brandy to prevent any evil effect. Let us watch the results.

The overloaded, oppressed stomach was suffering before, but not so severely as to prevent its slowly rallying to its aid, in removing the load, all the disposable vital forces of the system. But now comes a foe still worse. Infuriated by this unceremonious attack, a demand is made still more strongly for aid, and the foe is at length expelled into the duodenum.

"As this all ?" By no means. The cerebral and nervous system, the heart and arteries, and even the entire digestive apparatus, having been roused to exert themselves beyond their wonted ability, now fall back into a measure of inaction

or collapse, somewhat proportioned to their previous excitement.

And yet the state of things is not precisely what it was before the attempt was made to render aid to the suffering stomach. There is a loss of tone and energy in the parts that have been overworked, which is not so easily restored as some may be foolhardy enough to believe.

Now, I do not so much care what the substance is which has this effect. It is, to all intents and purposes, a medicine, and should ever be regarded as such. Of course the stronger or more active medicaments do more mischief than the weaker; but otherwise the difference is not very considerable.

Should doubts remain in the mind of any individual whether the contents of the castor deserve to be dignified with the name of *medicine*, let him make the following simple experiment — an experiment which, in essence, has been mentioned by many writers on this subject.

Cantharides — Spanish flies — are known to have the power of blistering the human skin, and are therefore admitted by all to be a medicine or poison. Now, place a plaster of these on one arm, and a plaster of bruised mustard, or red or black pepper, on the other. Which will soonest produce heat, and redness, and pains? Does not every body know? And are not mustard and pepper medicines?

So of saleratus, whether taken from the castor, or incorporated with the food by the cook. Dissolve a portion of it in water, put a piece of flesh meat in the solution, and let it remain as long as our food, with saleratus in it, is accustomed to remain in the stomach: will not the flesh be corroded? And is not such a substance a medicine?

Let me only add to the list of table medicines, already indicated, the two common and popular beverages, tea and

coffee. They should have been mentioned sooner, but that it was thought almost unnecessary to mention them at all.

These are medicines, if nothing else were. In truth, they are, in many instances, used as such. They are taken, especially tea, at evening, to soothe the nerves after they have been over-excited by a hard day's work. But if taken as medicine, they should be used by themselves, apart from food of every kind. Nature's tendencies are, indeed, in this very direction; for the strong coffee and tea drinker eats, at the time, but very little food. The narcotics take away his appetite.

There is a double objection to the common and free use of these two drinks — coffee and tea — as a beverage. It is not only combining medicine and food, but it is drinking with meals, which is obviously a palpable and inexcusable violation of one of the best established and best known physiological laws.

The separate use of tea and coffee, to which I have just referred, is but an extension or revival of the truly Oriental method of taking them. Many a Spaniard and Turk makes a whole meal of his coffee, and many a Chinese of his tea. The lazy Spaniard often calls for his cup of coffee before he is out of bed, and this suffices him for a meal till nearly noon.

I ought to state distinctly, in passing, that if the contents of the castor, or any other condiments, — salt, perhaps, still excepted, — are used at all, it should be by themselves. Whether we have our castor or condiments once a day, once a week, or once a year, we should use nothing else at that meal. This is the only physiological way of using these or any other table medicines.

Some may say, "But are you not behind the times? Have you not against you such men as Liebig, and Pereira, and

M. Gasparin, and Emmons? Not at all. Their arguments — Pereira, by the way, don't go with them — are as good for alcohol and opium, and even arsenic, as for tea and coffee. If these last — I mean tea and coffee — prevent waste, or save from waste, or are, as Dr. Emmons says, *saviors*, (of the body,) so are the former and stronger poisons. Yet Methuselah probably got along without any one of them.

Fifthly. The last item I shall consider in connection with the quality of food is the following: *Our aliments should contain all the necessary ingredients for building up or renewing the body. These are fibrine, albumen, and caseine.*

There is, however, another mode of division, viz., into the azotized and non-azotized substances. The former are nutritious; the latter furnish only carbon for combustion in the lungs. Many articles of food contain both these ingredients, though, of course, in very different proportions.

Wheat contains the best admixture of these two substances or elements; so that if it were best for mankind to live always on one kind of food, (which, however, is not the case,) this would be the best known article. It is even better than potatoes. It not only abounds in starch to burn, but also in gluten to nourish us.

Many suppose that vegetable substances do not contain much, if any, combustible matter for the lungs — i. e., carbon; but Dr. Carpenter, in his Physiology, says that “four pounds of starch — and how full of starch most vegetable substances are! — contain as much carbon as fifteen pounds of flesh.”

In general, however, as it must be admitted, the vegetable kingdom, while it furnishes us with a tolerable supply of carbon for pulmonary combustion, is richest in nutrition. Fat meats, especially, though they are almost all carbon, are very unsuitable food, because very difficult of digestion.

LAW 5. *Our whole System should be in a proper State.*

First. In order to secure healthy digestion, the digestive machinery itself must be in a good and healthy condition. The teeth, salivary glands, stomach, liver, pancreas, &c., must all be in a sound state, and must perform the work which Nature, in her wise plan, has assigned them.

I have more than once observed, that most persons confound solution and digestion. If a thing is dissolved, so as to pass through the system without uneasiness or pain any where in the abdominal region, — any pain, I mean, which can be readily referred to the stomach, — they suppose it is digested.

But those who understand the structure, extent, and laws of the digestive system, as I have described and pointed them out, can never, for one moment, think so. They know well that the chyme or the chyle may be imperfect, or even both. Or, if the chyme and chyle are perfect, they know that in consequence of inhaling bad air, or for other reasons, known or unknown, the chyle may not make good and perfect blood. The fitness of the blood to sustain life and health depends much more on the complete digestion of the food than most persons are aware.

There is, in short, every degree of what may be called healthy digestion, short of a state of things which is accompanied by perceptible suffering. The results of digestion, in other words, and the purity and health of the blood, will be in proportion, always, to the vigor of the digestive machinery.

Some digest their food so poorly that they barely contrive to keep themselves from the sick list. Others get along somewhat better, and others better still, all the way up to the favored individual who seems almost able to digest an iron wedge.

Secondly. But much of healthy digestion depends also upon the health and vigor of other organs, and in particular the cerebral and nervous system. No one can have his food digest well, however perfect the machinery, unless a good deal of what we call nervous energy is duly manufactured by the brain, and sent down to its aid. On this account it is that constant and severe study sometimes renders digestion imperfect. We use up — so to speak — all the energy the brain and nerves can manufacture, till there is none to spare for the purposes of digestion.

This lamentable result is doubtless often aggravated by neglect of exercise, constipation, &c. We are apt to neglect or despise the laws of the body, as if the latter were a mere appendage of the mind and soul; or as if they had no bond of connection or sympathy.

Every parent and educator should fully understand that, in order to secure the best bodily health, the mind should be fully and harmoniously developed, as well as properly cultivated. Here, as I believe, great advantage would accrue to mankind from the study, not of the science of mere “head feeling,” but of phrenology.

Thirdly. But the feelings and affections — the *moral* part of man — must also be right, in order to insure perfect digestion. Under the habitual influence of fretfulness, melancholy, envy, grief, fear, anger, hatred, &c., no person, however excellent the condition of his physical system, can long maintain this state of things.

Consider, for example, the effects of fretfulness. No person who is habitually fretful can be healthy in any particular whatever. The world might be challenged to produce an habitual fretter who is not, in some respect or other an invalid.

If this is so, some will say, it presents a very sad condition of things. Would it not be impossible, at this rate, especially in our American portion of the world, to find any specimens of perfect health? For who is there, it will be asked, that does not occasionally fret? Some fret about one thing; others about something else. Some fret on occasions only; others fret always. There are those who seem to have been born fretting, and it is ten to one if they do not go out of the world fretting.

There are, abroad, two kinds of fretting, as I have said before; just as there are two kinds of intemperance. There is the occasional outburst, and habitual worrying. The first is bad enough; but the last is as much worse for the physical frame as habitual *sipping* is worse than occasional drunkenness.

But if mere fretfulness is injurious to digestion, what shall we say of the other feelings and affections I have named, — so depressing in their nature and tendency, — such as grief, fear, and hatred? Are not these, in their habitual influence, still worse?

That God made us to grieve, fear, hate, &c., in certain circumstances, I know not that I could doubt. But that habitual indulgence of any depressing passion impairs health — that of the digestive system among the rest — is as true as any law of the mathematics.

Who has not known, for example, the immediate effects of grief and sorrow on the appetite? A person may be sitting at dinner, with as good an appetite as ever he had in his life, when suddenly he receives distressing intelligence. Are not his desire and relish for food gone in a moment? Now, can grief, in a large degree, be so suddenly operative, and yet the habitual indulgence of the same feeling,

only in a smaller degree, be without any effect? It is not so, most certainly.

When I was young, and read that "Whoso hateth his brother is a murderer," I wondered what it meant. And some wise commentators seem to have little more than wondered. But physiology has taught us that while it means what is commonly supposed, it means much more.

Whoso hateth his brother is not only in danger of becoming a murderer, — having already caught the *spirit* of murder, — but he *is* a murderer. He is certainly a suicide, though he cuts away the threads of life by inches, only. And a suicide is a murderer!

In order to be healthy, and, of course, in order to have good digestion, we need the full influence of all the elevating feelings and affections, rather than that of their opposites. We need especially to be cheerful. One writer on health has treated of cheerfulness as a fundamental law.

Some among us seem almost afraid to be cheerful. Our Savior, they say, often wept, but never laughed. How is this known? I have as much regard for antiquity as most men, but I cannot help distrusting such a notion as that, though of ever so long standing.

All the graces that Christianity, pure and undefiled, tends to inspire, — faith, love, joy, peace, contentment, and general benevolence, — are as conducive to the health of the body as to that of the soul. And I have sometimes wondered that this doctrine was not oftener made a part of our religious teaching.

### III. DISEASES OF DIGESTION.

Foremost in the list of diseases of the digestive system stands that many-headed monster, known, in past years, by

the name of *dyspepsia* — otherwise called, in plainer English, *indigestion*.

This strange, almost incurable, but seldom fatal complaint may be induced in various ways, and is doubtless aggravated by every form of physical and moral transgression. It is, nevertheless, for the most part, traceable to some of the various forms of disobedience to the laws of digestion.

It is, however, very frequently aggravated by ignorance, superstition, or quackery. No other class of invalids that I know have dabbled more with medicine, and been oftener the dupes of quackery, than dyspeptics. And among the thousands of patients I have had, affected with chronic disease, there were none I so much pitied.

Johnson, in his work on indigestion, has hit off the trials of dyspeptic patients, and their liabilities and disabilities, in his usual felicitous manner; and I must be excused if I attempt to copy one of his most striking pictures.

“Many an important undertaking has been ruined by a bit of undigested pickle; many a well-laid scheme has failed in execution from a drop of green bile; many a terrible and merciless edict has gone forth in consequence of an irritated gastric nerve. The character of men’s minds has often suffered from temporary derangements of the body; and thus health may make the same man a hero in the field whom dyspepsia may render imbecile in the cabinet.”

This is not the place for an essay on the treatment of dyspepsia. I will only say, that the first thing to be done in this way is to stop the wheels of rational life as much as possible, and only vegetate. Next, eat and drink very little. Lastly, use no medicine. And, in general, there must be a centrifugal tendency of mind and body.

By a centrifugal tendency, I mean simply a tendency

outward. The dyspeptic is apt to talk and think, almost incessantly, of his own complaints. Hardly any thing could be more injurious. The more he talks, and drugs and doses himself, the more he may.

He must obey the laws of God, moral and physical, as well as he can, and trust the rest to God and nature. He must cultivate also the love and habit of caring for others. He must, in one word, trust in the Lord, and do good.

Lientery is a frequent result of violating the laws of digestion. By lientery is meant a state of the system in which the food taken is either little more than dissolved, or very imperfectly digested. The stomach, liver, and intestines seem to be almost without action, and the food almost unchanged.

This state of things, I know, is not generally regarded as a diseased state, but rather as a constitutional habit. The patient is usually thin, and does not seem well nourished by what he eats; but the reverse is sometimes true, and he becomes corpulent.

Lientery is least troublesome when the muscular and cutaneous systems are most active, as in spring and summer. Much also depends on mode of employment. In the open air and sunlight, both of which improve the skin and increase the general vigor, the lienteric tendency is sometimes greatly diminished.

I am acquainted with one or two families who have been lienteric through several generations. But though harassed in this way, they hardly know it to be disease. They seem not to understand that any thing better can fall to the lot of humanity.

One of the evils incident to this state of things is, that it divests the individual of that energy and courage which are so necessary in this world, especially *moral* courage. His

religious faith is always feeble. You will seldom hear him speak on religion but he is talking about his religious coldness. This only makes him the colder himself, and helps to freeze others.

Diarrhœa is frequently greatly aggravated — perhaps sometimes induced — by violated digestive law. Or, as I shall say hereafter, diarrhœa is at first, for the greater part, a simple catarrh or cold on the bowels, which becomes aggravated by various other causes. The bowel complaints of summer and autumn have long been known to fall with greatest severity on those children and youth who are habitually guilty of transgressing the laws of digestion, especially those which relate to times of eating, and quality and quantity.

Thousands of people are habitually subject to acidity of the stomach, which is indicated by a burning sensation at the upper orifice of the stomach, often called *heartburn*. There is also a bad taste — sometimes acidity — in the mouth and throat, especially on rising in the morning. There may also be flatulence.

Connected with this state of things — often dependent upon it — are foul breath and a premature decay of the teeth. Of the latter I have spoken already. Induration and ulceration of the stomach are sometimes among the penalties of digestive transgression.

Nervous or sick headache is another of the penalties attached to this form of violated law. I have sometimes been surprised at the suddenness of the disappearance of this complaint after the cause had been removed by a return to the path of unsinning obedience.

Cold feet — so troublesome to thousands in these days — are not unfrequently dependent on a bad state of the stomach and digestive organs generally. The proof is found in the

fact that, when the tone of the stomach is restored, the coldness of the feet is no more heard of.

Drowsiness is very often either an effect or an accompaniment of derangement of the digestive system. It is, at least, a symptom of dyspepsia. I knew one man so sadly troubled with this affection, that he would sometimes fall asleep while eating his dinner.

Liver complaint is one of the long catalogue of ills which belong to this same general class. It is often aggravated — occasionally originated — by the use of greasy food and strong coffee. This disease is becoming fearfully common, and is often made worse by the interference of quackery. Hot rooms, hot drinks, a bad position, neglect of the skin, mental depression, too much animal food, and a thousand other causes, conspire, no doubt, to injure the liver. And yet many of these very causes operate to bring about this result by first bringing on dyspepsia.

Eruptive complaints, in many instances, — perhaps I should say most, — are the consequence of abuses of the stomach and other digestive organs. How often have I heard mothers speak of certain sores about the angles of children's mouths, and call them chestnut sores ! And how often have boils been traced, by the same sort of common sense, to substances equally crude and unwholesome !

A young woman in Dorchester was observed to have eruptions on her face at times, after which they would disappear for a season, and then return again. On inquiry, she told me the eruptions were caused by the ordinary salted butter of the table ; and that by abstaining from its use a few months, she could, at any time, get rid of her disease.

## LECTURE III.

## BREATHING AND VENTILATION.

## GENERAL REMARKS.

THE statement of Mr. Thackrah, that we subsist very largely on air, has already been alluded to. We receive food into our stomachs, at most, but a few times a day; whereas we receive air into our lungs some fifteen or twenty times a minute; and this air undergoes, in the lungs, a species of digestion. Sleeping or waking, in sickness and in health, the process goes on. The amount we consume of it is, moreover, very great, as may be seen by a moment's reflection. For we inhale, at every breath, in ordinary circumstances, about a pint. This is about fifty hogsheads a day.

Every part and portion of all this should be pure atmospheric air. It should not be in any way contaminated by unhealthy gases, by animal or vegetable emanations, or by having been breathed over by any living being. Neither should it be injured by combustion.

But before the great subjects of Breathing, and Ventilation or Purification, can be understood fully, it is necessary to attend, for a few moments, to the structure of the machinery designed by the great Creator for this special purpose.

## I. MECHANISM OF RESPIRATION OR BREATHING.

The lungs, or, as they are vulgarly called, the *lights*, are the principal instruments of respiration. They are, essentially, a mass of air bladders, placed in the upper cavity of

the body, or chest, which they always fill. In general, then, he who has a large chest has large lungs.

The size of the chest, and of its contents, depends on a great variety of causes. Among these are hereditary transmission, education, employment, and habit. Men who speak much, use their arms much, or labor much in the open air, generally have large lungs; while females, and those of our own sex who lead a sedentary, studious, or merely contemplative life, have their lungs less fully developed.



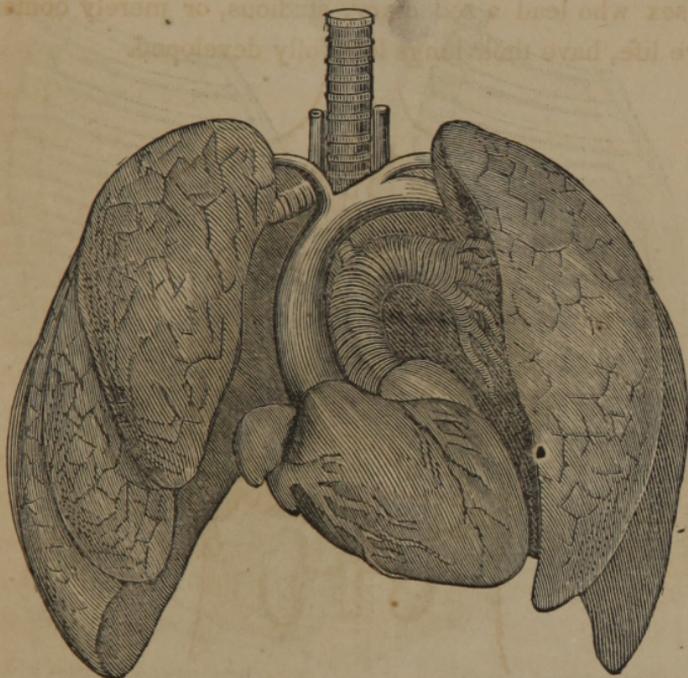
Outline of the Trunk.

I have said that we ordinarily inhale about a pint of air at once. The lungs are seldom quite full, and still less frequently are they quite exhausted. By an effort we can inhale several pints. It is seldom, however, that, in a quiescent state, the lungs hold a gallon.

The lungs, thus filling the cavity of the chest, rest on an arched or umbrella-shaped bridge, which crosses the body

obliquely, and separates the cavity of the chest from the cavity of the abdomen. This arched partition or bridge is called the diaphragm. It is, of course, convex upwards, and is, like the walls of the stomach, at once membranous and muscular.

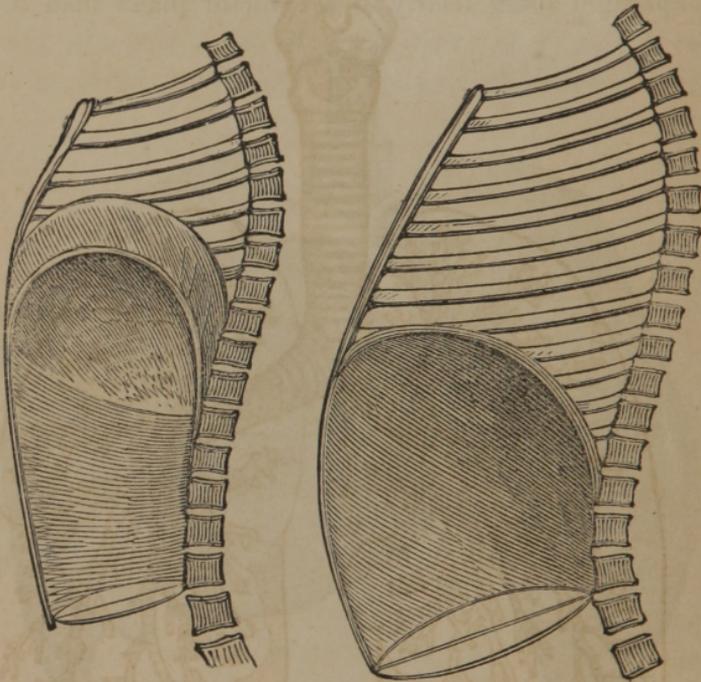
When we are about to inhale air, the muscular fibres in this membrane contract, or shrink, in such a manner as to bring the diaphragm more nearly to a level or plane than it was



The lungs.

before, and thus to enlarge the cavity of the chest, creating, in the first instant, a vacuum. But a vacuum, as it is well known, nature every where abhors; and as soon as there is a tendency in this direction, the air rushes in through the mouth and nostrils, and then through the windpipe, which lies in the fore part of the throat, and fills it. Literally the wind blows into the lungs.

Whether the word *windpipe* had its origin in this fact, I am not informed. A chimney flue or a stove pipe is a windpipe on a somewhat similar principle, only on a larger scale. There is this difference, however: the current of air is set a-going in one case, in consequence of rarefying the air by heat, and in the other by forcibly forming a vacuum.



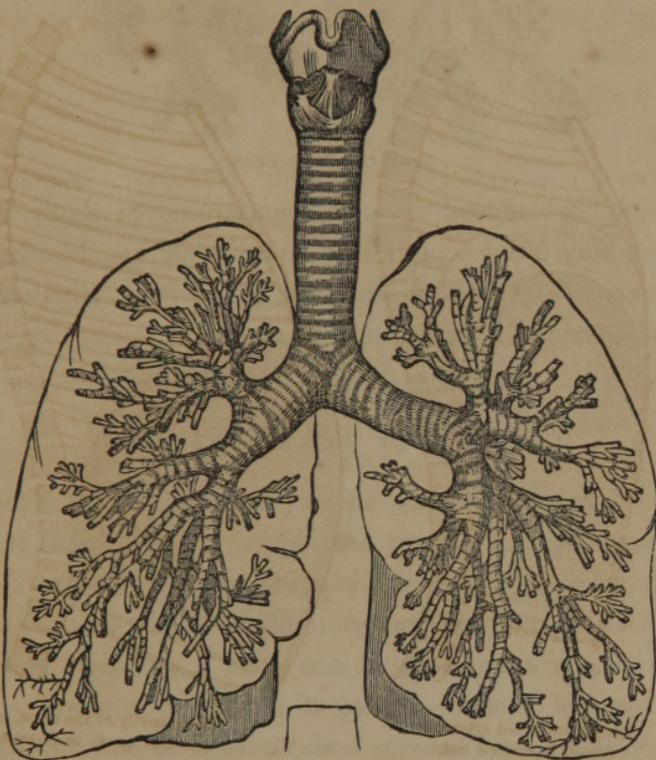
Chest contracted after the  
breath is thrown out.

Bony cavity of the chest, ex-  
panded, as in inspiration.

In forming this vacuum, however, the diaphragm should be assisted by a set of short muscles, called *intercostals*, lying between the ribs, and so applied that, when they all contract, — and they all *do* contract, when any one of them does, — they enlarge the whole cavity. They increase both its depth and its circumference. This, I say, *should* be the case. But owing to bad habits, induced by early education and in various

ways, they seldom contract much ; so that what is done at all is chiefly done by the diaphragm. We shall see, more particularly, why this is so, hereafter.

The air, having entered the lungs through the windpipe, is carried through the bronchial tubes. These last are simply branches of the windpipe. They begin at the top of the



Trachea and bronchial tubes.

chest. The lungs are in two great divisions, one for each side of the chest. The bronchial tubes divide and subdivide into branches almost innumerable.

These hollow branches of the windpipe — the bronchial tubes — at length terminate in clusters of air bladders, in size exceedingly small, but in number beyond computation

They have a slight resemblance, in shape, to clusters of grapes, but are, of course, much smaller. Some of them are not the hundredth part of an inch in diameter.



Air cells of the lungs.

These air bladders, we have seen, are never wholly empty, nor are they often so full that no more air can be admitted. They should be filled at all times, if possible; otherwise the lungs, sooner or later, become diseased.

## II. OFFICES OR USES OF THE LUNGS.

The lungs have many offices; some of more, others of less importance. There are, however, but three or four which anatomists and physiologists usually mention.

1. One of the most important offices of the lungs is to receive the chyle, and form it into blood. We might be tempted to regard this as a part of the digestive process. The truth is, it properly belongs both to digestion and respiration.

*How* is the chyle formed into blood? We are accustomed to say in general, without well understanding the nature of the process, that it is by the union of oxygen in the air cells of the lungs with that admixture of chyle and venous blood which is always found there, in such a manner as to impart vital energy to the chyle, and fit it to aid in building up or renewing the system.

2. The second office of the lungs is a depurating or cleansing office. The blood, to the extent of three gallons or more, in the adult, is sent by the heart to all parts of the body with great rapidity, to nourish it. In the performance of this duty, its vitality, heat, and nutritious powers are gradually exhausted, and it becomes loaded with carbon and other impurities.

The blood, with its impurities, comes back from all parts of the system through the veins to the right side of the heart, whence it is immediately sent, — commingled with the chyle, of which I have before spoken, — through what are called *pulmonary arteries*, into the lungs. By means of the very minute division and subdivision of these arteries in the lungs, it is, lastly, spread over the coats of the innumerable air cells which are found there. Here, from the thinness of these cells, it is supposed that the blood parts with its carbon, and becomes what the chemists call oxidated or oxygenated. I shall not in a brief lecture undertake to say *how* this oxidation takes place. It is sufficient for every practical purpose to know that the blood is depurated or cleansed by it.

3. Another office of the lungs is to serve as the great fire-place of the system; for though heat is probably generated more or less by all the more active and vital parts of the body, yet it is admitted, on all hands, that the work of calorification is especially performed in the lungs. Our power to resist cold or heat in excess depends more on the strength of our lungs than on every thing else.

One more pulmonary office remains to be mentioned. The lungs have power to transmit or transude much water in the state of vapor, which in warm air is invisible, but in cold or damp weather is discernible, as if it were a dense steam issuing from the body. Whether the lungs really absorb, — I mean in a natural and healthy state, — as it is known the skin

does, is not so well established. In extreme cases, however it is highly probable that, instead of transudation, their office is inverted, and they imbibe water, at least to some small extent. I have several times wholly abstained from drink from six to nine or ten months in succession. True, my food embraced fruits and many succulent vegetables; yet the fluid excretions of the body during these experiments appeared to exceed the amount of liquid existing in my food. Whence could this excess have been obtained except through the lungs?

### III. LAWS OF THE LUNGS.

**LAW 1.** *The Lungs should be made as capacious as possible.*

By this is not only meant that they should be made by education as *large* as possible, but that they should be expanded or distended as much as possible at every inspiration.

The importance of capacious lungs is every day seen. Men with large chests are not only stronger and less liable than others to diseases of these organs, but more tenacious of life generally. I have known instances where, for several days, life seemed almost extinct except in the lungs; and yet these, as a well-fortified citadel, still held out. They are also better able, as we have seen, to resist the extremes of heat and cold.

But their importance is revealed most clearly by science. If their great offices are to form and purify the blood, and if this purification depends chiefly on having an abundant supply of good air at all times within the vital domain, then does it not follow that, other things being equal, the larger the lungs are the better? And can we attach too much importance, in this point of view, to mere capacity?

Laborers, soldiers, sailors, housekeepers, and such mechanics as have widely-varied exercises and an abundance of free air, have larger lungs than those who are sedentary in their habits and are compelled to breathe bad air. Every one knows that, as a general rule, if temperate, they are the most healthy. Their inheritance is better. Injurious customs have not so much affected them as others. Their position of body is more favorable; they *sit* less, and when they *do* sit, they do not bend forward as much as others. Few things do more mischief to the lungs than standing or sitting day after day with the head and shoulders pitched forward, as in the case of tailors, shoemakers, stonecutters, engravers, and the like.

All the airy exercises and employments I have mentioned — and many others which might be named — tend to keep the cells of the lungs fully inflated, and by degrees to enlarge the whole cavity of the chest. I have sometimes thought, moreover, that those who are employed in the open air sing and converse more than others; and the Germans say that singing is so remedial as to cure even consumption.

LAW 2. *The Lungs must have free Motion.*

This rule or law is intended to apply to both kinds of motion — that of the diaphragm and that of the chest itself. Both are most sadly neglected, and the consequences are becoming fearful in the extreme.

The free motion of the diaphragm is overlooked from life's very threshold. The manner of holding infants in the arms is often very objectionable. I have seen the sternum, or breast bone, so distorted in this way as to leave quite a ridge at its junction with the ribs, something in shape like the keel of a boat. Children who are suffered to lie on their backs on

the bed or floor, and scramble about in their own way, a good deal, seldom have this strange appearance.

It may be said by some that these deformities only take place in the case of children who are rickety or otherwise enfeebled, since many strong children are maltreated in this way, and yet escape deformity. This is no doubt true ; but it only serves to enhance the importance of our rule.

As soon as children begin to utter their little monosyllables, they are not only permitted to utter them in a listless manner, but practically *taught* to do so. We use them ourselves in talking with them. No wonder their lungs remain feeble, and that the diaphragm hardly seems to move while they are speaking. No wonder the chest is narrow and contracted.

Let me be fully understood. I have no objection to monosyllables. Let children be children, and let their words be as small as they please. Let them be encouraged, however, both by example and precept, to speak with energy. I would have no unnecessarily bad articulation. Every thing should be well done that is done at all.

The parent need not, and should not, indulge in mere baby talk. What he says to the child, whether monosyllables or otherwise, should be spoken plainly and fully. He should speak with all his might, and encourage the child to do the same. He should speak not only with his throat, but with his lungs ; his diaphragm should move, and so should his very abdominal muscles.

Few parents are aware of the great good they might accomplish in this way, if they were but half as anxious to make men and women of their children as to transform them into monkeys and parrots, or at best into mere playthings. One third might be added to the capacity and power of the lungs by proper early cultivation.

Not only may the lungs be invigorated by proper attention to conversation, but also by early singing. It was a blessed day that first saw the Pestalozzian notions about singing fairly on our shores ; and were it for no other reason than that he was instrumental in this great work, the name of Woodbridge, the geographer, should be immortalized. He not only brought us the Pestalozzian system, but roused public attention to it.

When a child sings, as well as when he speaks, he should sing with all his might. I do not mean in either case that he should holla. There is a wide difference between speaking with a full voice and bawling. The lungs should be fully inflated with air in the beginning, and kept so.

I have watched many of our distinguished singers while they were performing, and have always found that they sung with their lungs full of air ; that they never suffered their stock of air to be exhausted ; and that they never sung with the top of their throat merely. The lungs are a kind of bellows. Good singers work the whole bellows, and not only the bellows, but the bellows handles — the abdominal muscles.

When a child is taught to read, — which, however, should be at a much later period, — he should pay the same attention to the right use of his lungs that is necessary in speaking and singing. Our reading aloud, both in family and in school, is almost any thing but what it should be. I am accustomed to attach almost as much importance to reading and speaking, as a means of strengthening the lungs, as the Germans are to singing.

Were these three things — speaking, singing, and reading — properly conducted, in family and school, I have not a doubt that the capacity and vigor of the lungs might be increased by it, in the progress of a century or two, some twenty or twenty-five per cent.

These remarks are applicable to after life, as well as to infancy and childhood. There are as few adults who can read or speak well, as there are of those who can sing well ; and I know not but the former are as susceptible of cultivation and improvement as the latter.

I have sometimes been led to the conclusion that one cause of bronchitis, in these latter days, is the lazy custom which prevails of reading at the top of the throat, instead of speaking in a more impassioned manner, and thus bringing into greater activity the diaphragm and the abdominal muscles.

It is a great mistake to dress children too tightly about the chest, or, indeed, any where else. It is like placing a weight on a door which we wish to have open freely. The motion of the lungs, as a whole, is upward and downward, like the rising and falling of a trap door. Happy for coming generations that common sense, in this particular, is beginning to prevail. Still there is error. I was credibly informed, not three years ago, of a young woman in the interior of Massachusetts, whose dress was so tight as to require the united strength of two adult female companions to bring it together and fasten it. I might allude to other and kindred facts.

Too little attention is paid to position of body in the case of the young, both at our employments and in school. We often find them sitting in a way not unlike that which is represented in the following engraving. The supervision of the young, in this and a thousand other particulars, should extend even to their amusements. We are not justified in permitting a child to injure his lungs at study, work, or play. Nor is this all ; not only is it our duty, as parents and teachers, to see that his lungs are not injured by any thing within our control, but we are under the highest possible obligation so

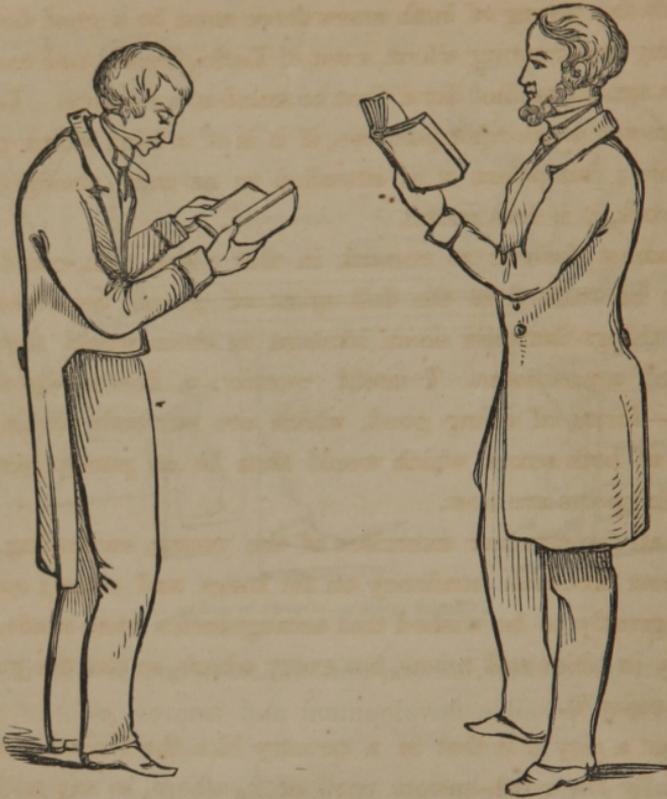


Different positions of body in sitting.

to direct his studies, labors, and amusements, as will lead to the highest possible development and improvement of those organs.

Thirty years ago, in one of our New England states, there were not, I think, a dozen school houses which contained seats, for the smaller children, with backs. We are going now to the other extreme. We require them to sit on their seats *because they have* backs till the internal organs are injured nearly as much as they were under the old system. For the work of making them "say A B and sit on a bench," we seem now fully licensed.

Sitting long and standing long are both injurious. I will not say they are *alike* injurious, for this I should not be authorized to do. The recumbent or reclining posture is often more favorable to health than either. Here is the representation of a bad position in standing.



Different positions of the body in standing.

When the young are permitted to run about entirely free from restraint, there is so much and such frequent change of posture that the internal organs are seldom compressed unduly, or otherwise injured. Nor is much evil likely to arise from mere walking or riding, unless the walk or ride is too long continued. But when the young come to sit even for a single hour, the muscles of the back grow tired, and the body is suffered to fall forward, which compresses, in a greater or less degree, nearly all the internal organs. Thus the lungs heart, stomach, liver, pancreas, and intestines all feel the pressure. The muscles of the back are also weakened.

With the young of both sexes there must be a good deal of romping and running about, even if Latin, Greek, and mathematics are compelled for a time to stand at a distance. Labor will answer a tolerable purpose, if it is of a kind which gives pleasure; but when it is attended to as mere drudgery or task work, it is less useful.

I cannot forbear to remark in this place, that, could the young be trained in the full spirit of gospel benevolence, many things that now seem irksome to them would then be deemed amusement. I could mention a dozen — perhaps fifty — forms of doing good, which are perfectly within the reach of both sexes, which would then be as purely pastime as their sports are now.

Of all the summer exercises of the young, swimming has the most favorable tendency on the lungs and chest; and it were greatly to be wished that arrangements were made, not merely in cities and towns, but every where, so that the young could enjoy it.

What a pity it is that in a country like the United States, especially the north-eastern parts of it, where, to say nothing of our numerous larger and smaller streams and ponds, we collect from the roofs of our houses every year several hundred, perhaps a thousand, hogsheads of water, — where we have to dig but a few feet, as it were, in the earth, and whole fountains of water rise up to meet us, — all cannot have their ponds and fonts for bathing and swimming at pleasure!

Perhaps the town in which I reside is as economical as the average of American towns; and yet I am fully prepared to show, whenever occasion shall require it, that we expend, for things that only injure us in the end, every ten years, quite enough to provide every one of our one thousand families with the means of swimming for both sexes.

Some persons, especially literary and professional men, endeavor to expand the lungs and increase their power of motion by artificial means of a very different nature from any I have yet mentioned. Among these is the use of a silver tube, through which air is drawn into the lungs, and then thrown out again. A little valve partly closes the opening in the tube as soon as the breath begins to pass out, so that we cannot empty the lungs as fast as we are accustomed. This keeps the air cells inflated longer than they would be otherwise.

Others have thought that the tube which the God of nature has given them is as good as a silver one, and have endeavored to contrive their own plans of expanding and strengthening the lungs. Some inflate them as much as possible, and then count one, two, &c., or repeat the names of the letters of the alphabet, as far as can be done without taking new breath. A most able and eloquent, and at present very healthy clergyman, whose lungs were once so small and weak that he could only repeat the letters of the alphabet *once* at a single breath, by long practice and effort became able to repeat them two or three times.

Many use dumb bells, saw wood, pitch quoits, climb ladders or trees, practise fencing, &c. All these exercises have their advantages; and, with a few, horseback exercise is preferable to every other.

One man, whom I well know, has, as he thinks, greatly strengthened his lungs by the following practice. Having inflated them by a full inspiration, he raises his body as high as possible on the tips of his toes, and then suddenly lets himself down as far as he can, so as to shake well the chest. This motion is repeated many times, sometimes with momentary intervals, for half an hour. I know of others who have been benefited in the same way.

LAW 3. *The Lungs require pure Air.*

Not only must the lungs be capacious, and have free motion, as indispensable conditions to health, but they must have an abundance of pure atmospheric air. Every admixture is, as was stated in the beginning of this lecture, more or less injurious.

But what *is* pure atmospheric air? Not oxygen, surely; for this, though the great supporter of animal life, is seldom found in a pure state, except in the hands of the chemist. Nor can any animal live long in it. A mouse placed in a jar of pure oxygen, though he is very lively at first, soon expires. A man would be thus affected as well as a mouse.

Chemistry assures us that, in its purest and best state, the atmosphere consists of about twenty-one parts of oxygen and seventy-eight parts of nitrogen; commingled with which is a very little carbonic acid gas. It should also hold in solution—probably always does hold in solution—a little water. There are, indeed, usually found in the atmosphere—though hardly constituting a part of it—other agents, such as electricity, light, and the odoriferous particles and effluvia of many bodies, both animal and vegetable.

When we inhale a quantity, greater or less, of atmospheric air, and throw it out again, a part of the oxygen—say one fourth—disappears; while there is an increase of carbonic acid gas in the same proportion, as well as of nitrogen and watery vapor. Inhale this same air a second time, and more of the oxygen disappears; more still at the third inhalation, and so on. Yet, in general, long before we have inhaled air twice over, we begin to feel languid and stupid; and if the same thing is continued, we suffer seriously in our health.

Franklin used to say that a healthy adult spoiled a gallon

of air a minute. But a gallon is only eight pints, and if we breathe eighteen times a minute, we should, at this rate, require two gallons and one fourth of air a minute, in order that none might be breathed but once. We shall see, in another place, that we injure air by breathing it much faster than all this.

The GAS which does most mischief to human health, every where, is carbonic acid gas. It is most mischievous because most constantly present, and yet least perceptible by the senses. It can neither be smelled nor tasted, whereas most of the deadly gases are perceptible by the sense of smell.

Carbonic acid gas destroys life by taking the place, for the time, in the lungs, of that space which should be occupied with atmospheric air containing oxygen. The blood is thus unable to get rid of its carbon fast enough, as well as to imbibe a sufficient supply of oxygen. But it also does harm *directly*. When in large quantity, it appears to irritate the lungs, and if it does not actually poison them, it seems to paralyze their efforts, and produce spasms about the top of the throat.

Carbonic acid is much heavier than common air; hence its tendency to the floors of rooms and the bottoms of cellars, wells, and caves, is so great that larger or taller animals may sometimes breathe, when those that are shorter or smaller soon perish. On this account the *Grotta del Cane*, or Dog Grotto, in Europe, has attracted much attention. The traveller walks through it with safety, while his dog expires, or is at least thrown into convulsions, by his side. So many a person has perished in other low places or cavities where this gas had accumulated from its mere weight.

What is called, by some, *choke damp*, as in wells, is the mere accumulation of carbonic acid. This acid is formed by

combustion as well as by respiration, and in nearly the same manner. The oxygen present is used up, and carbonic acid is left in its place. Wells are sometimes found abounding with this gas, just after there has been a fire near them.

It is this gas, also, which so often destroys life in tight bed rooms, cabins, &c. Accounts of these casualties are often headed "Death by Charcoal." The reason is, that the combustion of the charcoal — usually, in these cases, without a chimney or flue — greatly increases the quantity of carbonic acid formed by the breathing process. They should be called simply, "Death from breathing bad Air."

The gas, in these cases, fills up the room gradually, as water would a pail or tub, till those who are sleeping are immersed in it; and, unless they are roused by sensations of distress, or by a friendly voice or hand, they are suffocated. Thousands perish in this way every year — not a few of them in tight bed rooms. For one who actually *dies* in this way, however, some hundreds are only slightly injured, during any single night; but by repeating the injury, from night to night, disease is induced, or old tendencies to disease rendered more active, till health is completely lost; and yet the cause, to the careless, may seem to be obscure or "mysterious."

The loss of health and vigor thus experienced, in civilized society, every year, defies all human calculation. The majority of our race have their lives, in this way, somewhat shortened, as well as rendered less joyous and useful while they remain. I say less joyous; for no person can breathe this gas without some of the following symptoms, viz.:

1. Great heaviness, almost as though there were a weight resting on the head.
2. An inclination to sleep.
3. Pain in the head, or ringing in the ears.
4. Difficulty of breathing, and sometimes actual suspension of it.
5. Great loss of

power to move. 6. Palpitation of the heart. 7. A distressing thirst. 8. In severe or protracted cases, a raging fever.

I have said that these smaller sufferings, short of death, are immense. One is rendered a little more feeble; another much more so. One is already afflicted by scrofula, asthma, neuralgia, or some other chronic disease, which is gradually made worse by it. Another, still, has his system brought by it into such a state that a disease which overtakes him, and which he would otherwise have withstood, proves fatal. All these clippings, so to call them, from the sum total of what might have been life's duration and enjoyment, probably amount, in the United States alone, during the time usually allotted to a single generation, to many thousand lives. But this subject will be treated more fully hereafter.

But the law we are considering is violated by breathing several other gases besides that of which I have spoken; particularly carburetted hydrogen, sulphuric acid, and sulphuretted hydrogen. We will consider them separately.

Carburetted hydrogen is not only offensive to the smell, but positively and greatly poisonous. It is the gas which is called, by those who work in mines, the *fire damp*; and which, till Humphrey Davy invented the safety lamp, was very destructive to human life in those mines, by its frequent explosions.

This gas is formed by the spontaneous decomposition of vegetable substances. Hence it is found, in some instances, about our sinks, wells, and pumps. Some towns and cities are lighted by it. It is easily detected by the smell; and it is well for us that it is so, for otherwise it would be very destructive.

So poisonous is this gas to inhale, that when largely diluted with common air, as Dr. Dunglison affirms, it causes

giddiness, sickness, and much nervous and general prostration. In an undiluted state it can hardly be breathed at all; as one would be apt to judge who had ever been present when it has escaped from our fixtures for lighting.

Who has not seen small bubbles rise to the surface of a pond or mud puddle when stirred from the bottom? These bubbles are collections of carburetted hydrogen gas. Apply a torch to them, and they burn with a pale flame.

Poisonous as carburetted hydrogen is, however, we have another gas of kindred character which is still more so — I mean sulphuretted hydrogen. This last is much more frequently inhaled than the other. It does more mischief in society than most persons are aware. It is hardly necessary to describe it, except to say that it is the gas so often present in vaults, sinks, &c., and which exhales from putrid broken eggs. It is also sometimes formed in the diseased and debilitated alimentary canal of men and domestic animals. Like oxygen and several other gases, it is very penetrating, as well as offensive.

Atmospheric air which contains a thousandth part of sulphuretted hydrogen will, if inhaled, kill small birds instantly. In the proportion of a hundredth part it will destroy dogs; and in the proportion of a hundred and fiftieth part, horses. Such a gas should, of course, be assiduously avoided by all who value health and life.

When this gas is breathed by human beings, even in a very diluted state, it weakens the pulse, enfeebles the muscles, stupefies the brain, and greatly prostrates the whole system. It is a long time before those who are severely affected by it recover their usual strength and elasticity.

Sulphuretted hydrogen gas differs from carburetted hydrogen in one important particular. The latter is only about

half as heavy as common air, hence it soon rises above our heads, whenever the space permits it to do so; but the former is heavier than air, like carbonic acid. What shall we say, then, to the strange mistake of some people, that the power to eject this gas from the body with great force and noise, is a sign of health? The truth is, that if we were perfectly well, there could be no gases of any kind in the alimentary canal.

It may not be easy to determine which is most injurious to the individual himself—the presence of sulphuretted hydrogen in his body, or its presence in the atmosphere he breathes; since it pierces and penetrates all the tissues of the system. But he who retains it in his body does not so rapidly poison others as if it were set free.

A fourth gas, to be avoided with great care and solicitude, is sulphurous acid. It is more common, perhaps, than carburetted hydrogen, especially where anthracite coal is burned; but it is not more poisonous. Neither of them should be inhaled if possible to prevent it; though neither of these is so deadly as either of the other two I have mentioned.

The laws of ventilation, when we come to consider them, must have special reference to the character of these gases. Carbonic acid, sulphuretted hydrogen, and sulphurous acid, from their great density, require an arrangement entirely different from the other.

Next in the long list of substances whose inhalation is a gross and palpable violation of the laws concerning pure air, are what may be called EMANATIONS. By these I mean particles of matter flying off from animal and vegetable bodies, while in a state of change or decomposition. Two of the gases I have mentioned above might have been classed with emanations; but I preferred another arrangement. Those

which we are about to consider are of two classes, animal and vegetable. The former are most common.

It is generally supposed that purely animal substances, though they may, in a highly-concentrated form, be unpleasant to the smell, are not, after all, productive of disease, at least to any considerable extent.

This opinion, however, is doubted by some, and, as I think, justly. To say nothing of the presumptive evidence found in the fact that they are exceedingly offensive to the smell, which is usually a sign of deleterious character and tendency, they are avoided by the common sense of mankind, as if they were poisonous. Who is willing to live near a burying ground, or a slaughter house ?

But there are facts. A well in Connecticut, where I once resided, became highly offensive, and the members of a considerable family drank its water freely for some time. At last the well was cleaned, but the stench of the putrid reptiles at its bottom was so great, on uncovering them, that one could hardly breathe the contiguous air. During the autumn which followed, those three members of the family who had the feeblest constitutions sickened in a way somewhat peculiar, and yet somewhat similar. They recovered, after much and long suffering — two of them, however, having been given up by their physicians.

Now, I cannot say, positively, that these facts stood in the precise relation of cause and effect, much less that the offensive particles from the water were the sole cause of the sickness. Injury may have been done to the stomach as well as to the nasal organs. I will only say that the facts themselves took place, and then leave it to others to make their own inferences. But before they do this, let me present one fact more, closely allied in character to the former.

In Shrewsbury, Massachusetts, I found two families living in the same tenement, and using water from the same well. Some eight months before, the well had been cleaned, and putrid toads had been found in it, as in the one before mentioned. For a considerable time, every person but one who had used the water — she was a very robust woman — in both families, had been sufferers from a severe disease of the skin.

I will only add that sulphuretted hydrogen gas, which is, I think, one of the frequent products of animal decomposition, is, as we have just seen, one of the most deleterious substances in the whole catalogue of gaseous poisons. By what means, then, can it possibly be inert, merely because it is evolved from animal matter?

Emanations from putrefying vegetable matter have long been known to be injurious. On this point, I do not know that there is a dissenting scientific voice. Some of this class of substances have been called malaria, and are supposed to have originated or perpetuated particular forms of fever. Short of this, however, there can be no doubt that mischief is often done. When disease is not actually induced, the vital energies may be, and I have no doubt often are, more or less crippled; so that the system cannot so well withstand the influence of other injurious causes.

I think it not improbable, that in most cases of disease from these causes, both animal and vegetable emanations are present; and though the latter may be much more active than the former, I have not a doubt that both have their influence.

Let me illustrate the force and bearing of these last remarks, as well as prepare the inquiring mind for what I have to say, ere long, on ventilation.

In the early part of my career as a medical practitioner, I was called to the house of a wealthy farmer, whose numerous

family had been alarmed by the sudden appearance in their midst of a severe disease of the typhoid dysenteric character. I found the family in great trouble ; and, indeed, the whole neighborhood greatly agitated and distressed. On examination for local causes of what seemed to be a local disease, — it was the month of September, — I found the cellar, and, indeed, all the premises, in a condition which left little room for doubt.

The cellar had not been cleaned that year, if, indeed, in two or three years. It was full, so to speak, of half putrid cabbage and cabbage leaves, decayed potatoes and apples, cider lees, remnants of animal substances, — some of them quite putrescent, — and mouldy shelves and bins. The house, well, vault, sty, and I had almost said the barn and barn yard, were in a sort of concavity or basin ; and their filthy contents, when put in a liquid state by the rains or otherwise, appeared likely to have intercommunication. Besides this, the sink was close to the well, the water of which was low.

The premises were cleaned and ventilated ; the sick — what had not died — were taken care of, and no longer permitted to inhale carburetted and sulphuretted hydrogen gas ; the alarm ceased ; the rest of the patients, except one, recovered ; and no more disease prevailed among them, as far as I could learn, for many years.

In the town where I now reside (Newton, Massachusetts) is a large manufacturing village, which, till ten or twelve years ago, had the reputation of being sickly at the close of summer or beginning of autumn, every year. A leading citizen who had just removed to the village — a man of great influence — declared publicly that, from the nature of the case, the disease must be of local origin.

The result, after some delay, was a thorough depuration

and ventilation throughout the village. Cellars and wells were cleaned; bed rooms enlarged or ventilated; sties and vaults attended to or removed to a distant part of the premises, and arrangements made to have fewer occupants in each tenement. And mark, the sequel. For though I do not presume to say that the whole change has arisen from breathing a better atmosphere, yet I will state such facts in the case as can be substantiated. For about twelve years the "mysterious" annual visitor has neglected to pay his visits, and the villagers have enjoyed at least their average amount of health.

MEDICATED GASES, AIRS, AND VAPORS are sometimes deleterious. My remarks, under this head, will have very little reference to the use of substances for remedial purposes, except where I make a special application of this kind but rather to those abuses among us that have little to do, directly, with the medical profession in any of its schools or forms.

First in the list of medicated gases I shall place the nitrous oxide, sometimes called the *exhilarating* gas. It is the gas which is so often administered by a certain class of lecturers among us, whose twofold object is to make people stare, and to fill their own purses.

Chemists and physiologists, it is true, assure us that no exhaustion of any consequence follows the administration of this gas; and hence the idea has been eagerly grasped that it does no harm. But is this a fair conclusion from the premises? Many things might be inhaled or taken which produce no immediate exhaustion, and yet do immense remote mischief. It is testified by high authority, that "animals, when immersed in this gas, are soon killed," and that it "should not be taken by those who are predisposed to

pulmonary complaints." Will any one who receives this testimony contend longer for the safety of inhaling it?

Then there is ether, a very fashionable preparation, on which a good deal of stress is laid, both in the world of medicine and that of surgery. Indeed it has, for several past years, been quite common to allay pain by inhaling a portion of this quick, penetrating agent.

But chloroform is still more popular than ether, or was so at no distant period of time. What will be the effect on the public mind of the late sudden deaths which have resulted under the careless or misdirected use of this substance, I do not know. But I doubt whether many will be affected by them. They will probably go on in their folly.

That it may be right to use this article, as well as ether, for remedial purposes, and as a dernier resort, is not denied. Nay, I have not a doubt that, in judicious hands, they may both sometimes prove of inestimable value, especially in cases which properly belong to the department of surgery. What I now aim at is, to dissuade people from their use, except in those extreme cases. Chloroform is the more dangerous; but both of them are sufficiently so. Both of them — chloroform most certainly — have effects on the system not unlike those of a fit of alcoholic intoxication. And is it necessary or desirable that a person should get drunk merely to have a tooth extracted, or a simple wound dressed?

While lecturing, a few years ago, in a flourishing village in Massachusetts, a worthy young man came towards me, one day, reeling and staggering, exclaiming, "Doctor, I'm drunk." "How is that?" I inquired. "Why," said he, "I've been taking chloroform in order to have a tooth extracted."

Now, I have known men and women in the world, who, with only half the physical energy of this young man, have

had two sets of teeth extracted without the aid of chloroform ; and, wonderful to tell, they are yet alive ! Nor is this all ; for some of them are likely to live many years to come.

In fine, this perpetual running after chloroform is a wrong to surgeons, dentists, and physicians. I have heard them complain, most bitterly, of the necessity imposed on them of having chloroform and ether about them constantly, and of being thus compelled to inhale them till they were breaking down their health.

Of medicated vapors, such as some medical men are accustomed to administer, in connection with baths and otherwise, I purposely say nothing, because it does not belong to the province of hygiene. It is only when they are taken at random, and especially for amusement, and at improper hands, that I find it necessary to lift a warning voice.

But if gases, emanations, and medicated vapors, by injuring the lungs, destroy their thousands yearly, and greatly injure, for life, other thousands, — and I have little doubt that they do, — *dust* destroys its ten thousands. There is, however, one gas that should not be omitted in the comparison, viz., carbonic acid. This is probably a more deadly foe to the lungs than any thing else, because it is almost always present. Still, I repeat, dust, in its various forms, is exceedingly deleterious. It falls on a membrane, when it is inhaled, which was never made to receive dust. The lining of the lungs is almost as delicate as that of the eye, and every one knows how dust irritates the latter.

I must call attention, briefly, to four kinds of dust.

1. Common dust, or dirt.
2. Dust of minerals and fossils.
3. Dust of metallic substances.
4. Dust of tobacco.

1. There is a vulgar saying, that every individual, during

his lifetime, eats his "peck of dirt." But this saying is as untrue as that which indicates a necessity of breathing dirt in order to be healthy. The truth is, that no living being ever was benefited either by eating or breathing it. The most we can truly say, in this respect, of feeble people, is, that their health is improved by being out of doors, and engaged in certain dirty employments, in *spite* of the dirt, and not on *account* of it. They are healthier for the light, the air, and the exercise. The balance, at least, of health-giving circumstances is in their favor.

The German physicians have so thorough a conviction of the evils of breathing dust, that they object to carpets on floors. Treading upon them, they say, raises a cloud of dust which injures the lungs in a greater or less degree, and, with those who are at all predisposed to that disease, hastens on, apace, the consumption.

It is sometimes said that the dust we inhale does not reach the delicate lining membrane of the lungs, but is stopped in the larynx. Some of it is certainly retained there; but a considerable part of it reaches the interior of the lungs, after all. Thus deposited, it proves irritating; and if the process is often repeated, the lungs finally become diseased; and the most fearful consequences may ensue. This is the result even to those who are comparatively healthy; how much more so to those whose lungs are already enfeebled or diseased!

2. But if common dust is unhealthy, as we see it is, the dust of mineral and fossil substances is much more so. I refer to the dust which is inhaled in pursuing certain employments; such as stonecutting, brickmaking, grinding paints, preparing medicines, &c. In these last instances, as well as in former ones, the dust is deposited on the lining membrane

of the lungs, where it remains for some time. It can neither be absorbed — that is, taken up and carried out of the system by small vessels — nor removed readily by hemming and coughing.

Many, I know, are not convinced on this subject. Now my acquaintance with the world has been somewhat extensive, and I have endeavored to keep my eyes open as I have passed along through it; yet I can truly and confidently say, that never, to this hour, have I found a healthy stonecutter, who had followed his business for any considerable time. His position of body is, indeed, unfavorable, but the dust he inhales is not less so.

The axe grinders, in Douglass, Massachusetts, and elsewhere, last but a few years. Whether it is the particles of stone that adhere to the mucous lining of the bronchial tubes, or those of the steel, makes little practical difference as to the final result. Probably, however, it is the steel. The particles must be very fine.

3. Metallic dusts are worse still. Not of the pure metals, but their oxides. Particles of pure metal can have no effect, except a mechanical one. They operate, like mineral and fossil substances, simply by irritating and inflaming the delicate lining membrane of the bronchial tubes and the cells. I doubt whether even pure lead is poisonous in any other way. The oxides of metals, however, are not all poisonous. The red oxide — the carbonate — of iron is no more poisonous than a mineral or fossil; while the oxides of lead, copper, arsenic, &c., when breathed, are most fearfully destructive of health and life, even in very small quantity.

While residing in the suburbs of Boston, many years ago, I was in the habit of visiting the white lead factory in Roxbury. The operatives were generally aware of the danger

of their situation, but flattered themselves that, though others had fallen, they should escape. Yet I never found a healthy individual who had been there many years. Some, finding themselves declining in health, removed, and soon after died. Others, too poor to remove, remained on the spot, to droop and die there. A few of both these classes survived many years; but none, so far as I could learn, ever entirely recovered. Mr. Prince, the late worthy and respectable overseer of the establishment, who was not compelled, in order to the performance of his duty, to breathe the poisonous fumes much, told me he thought *he* could withstand the danger; but his remains are now covered with the sods of the valley.

There is one thing very deceptive in this matter. Because no part of the penalty of transgression, in certain instances, comes immediately, many fancy themselves exceptions to the general rule, and that it never will come. Whereas the whole history of the past should teach them that there is no possibility of escape. The lapse of twenty years would not render us secure. A man in Litchfield, Connecticut, perished of lead disease eighteen years after he had left his business entirely; and this, though he had taken special pains to be, as much as possible, in the open air.

The fumes of copper are little less dangerous than those of lead. The operatives in Taunton, Norton, and elsewhere in Massachusetts, are unable long to endure their employment. And while they remain, though only a few months, some of them suffer.

4. One species of dust, which is greatly injurious to the lungs, remains to be noticed. It is the dust of tobacco. Not the small amount of this substance which reaches the lungs of the snufftaker, — for this is in quantity so small as to be hardly appreciable, — but the dust made by the smoker

Some unreflecting person may say, "But is there dust, then, in tobacco smoke?" I reply by asking another question. What *is* smoke — the smoke of the fireplace, for example? Is it a mere nonentity? Or is it a *something*? Most unquestionably smoke is volatilized carbonaceous matter. Tobacco smoke is small dust. Tobacco smoke is tobacco.

But tobacco contains a most virulent poison. Dr. Mussey and others have found it so penetrating as to destroy the life of small animals in a very few minutes. This poison is *in* the tobacco. It is not produced by any fermentative process. It is, I say, in small quantity *in the tobacco*. The thousands, then, among us, that smoke tobacco, poison their lungs by it, and what is worse still, those of all other persons near them.

Of the twenty-five millions now in the United States, I suppose that at least twenty millions have inhaled more or less the smoke of tobacco. In truth, I do not know how any one can escape it entirely. But if this is so, every one is, in greater or less degree, poisoned by it.

How painful the thought that many, who would fain be Christian men and women, are not only poisoning themselves daily and hourly, but poisoning their families and friends — it may be their very wives and children! A father, for example, smoking in the room with a consumptive son or daughter! Does he love his children and wife? Why, then; does he poison them?

Some of our smokers, it will be said, live to old age. Yes, to what is *called* old age; that is, to sixty or seventy years. This, however, as was shown in my preliminary remarks, is not the utmost duration of human life. Drunkards occasionally live on to these periods, but they die with all the marks of violence, that is, of disease.

You will perhaps still say, in defence of smokers, "But

They enjoy pretty good health." *How good?* "Why, as good as other people." And what does this prove? Other people are but so many bundles of transgression, and perish before their time. The wicked — the transgressors of moral and physical law — do not, cannot, *should* not, live out half their days. And all mankind are in one way or another transgressors.

There is something more to be said in regard to this slow poisoning. Not only are the already enfeebled lungs of mankind rendered still more feeble by this poison, in the form of tobacco smoke, but the tone or energy of all the vital organs is impaired by it. There is no part of the system that does not participate in the suffering. And then, when we come to be sick from other causes, the effects of the tobacco smoke we have inhaled are still felt. They have so crippled or lowered our vital energies, that the disease is but the more severe and unmanageable. No matter what disease it is, the fearful consequences thus follow at a distance. Thousands who never held a pipe or cigar in their mouths as truly perish from tobacco as they who smoke or chew it. The disease with which they are afflicted is more severe than if no tobacco smoke had ever been inhaled; the medicine they take is more likely to operate unfavorably, and the disease more likely to prove fatal.

This last doctrine may be new to some; but this does not militate against its truth. New or old, it will bear investigation, and will be found as irrevocable as the law of the Medo-Persians. It is, moreover, a doctrine which ought to be inculcated from the rising to the setting sun, and from pole to pole. Wherever the command has been proclaimed, Thou shalt love thy neighbor as thyself, this should be placed beside it.

Let us think what becomes of the tobacco which mankind inhale. There are men — ay, and women too — who have drawn into their lungs, during a long course of years, whole ounces of volatilized tobacco. What became of it? I say. That which lodged on pipes, collars, cravats, books, white walls, &c., may be perceived. The smoke of our fireplaces blackens the jambs and the chimney; but the nose and windpipe, though transformed into chimneys ever so long, remain tolerably clean and white. Why do they not become blackened with soot, like any other chimneys? Why are they not, to say the least, as black as some of our old tobacco pipes? Simply because the tobacco deposited in these cavities is absorbed, carried into the circulation, and in the end carried out of the body. Not, however, till it has done its work of death in every part of the system in which the blood circulates. Not till it has poisoned us! Not till it has impaired our health by lowering the tone of our vital energies, and in a greater or less degree shortened our lives!

*LAW 4. The Air we breathe must be of proper Temperature and Moisture.*

The denser the air we breathe, the greater is the amount of oxygen it contains. Not the greater the amount in proportion to the volume, for this remains the same, — about twenty-one per cent., — but the greater absolutely.

Thus, if we inhale, foreexample, a pint of air at thirty-two degrees Fahr., we inhale, of course, nearly a gill of oxygen. If, now, we raise the temperature of that air till one pint becomes two, it is manifest that while the proportion of the oxygen remains the same in either pint of the heated and rarefied air, the absolute amount is only one half of what it was before, when cooler; and in order to inhale the same quantity of oxy-

gen, we should have to inhale two pints, instead of one. And, since it is true that the more oxygen we have in the lungs — provided always it is tempered with four fifths of nitrogen — the better it is for the purposes of respiration, it follows that the lower the temperature of the air we breathe, if it does not chill us, the better it is for our health.

There is, undoubtedly, a limit in this particular, but this limit is not to be ascertained by any arbitrary rule, so much as by the experience of the individual himself, aided, perhaps, by the suggestion of his physician. For one, however, who suffers from breathing air too cold, twenty suffer from breathing that which is too warm.

There can hardly be an error more fatal to those who have enfeebled or diseased lungs than that of keeping them habitually in too warm an atmosphere, whether natural or artificial. For though they may seem to thrive for a time in such circumstances, yet, like the mouse in a jar of oxygen, they soon perish. Many an individual, laboring under complicated difficulties, who might, perhaps, with proper pains, have survived five, ten, or fifteen years, has been sent to a warmer climate only to come back in a year or two, and be buried here, or, perchance, to die on the road. And some have made a warm climate by artificial means in their own houses, only to hasten their final exit.

Four or five years ago, I was called to see a young woman near Worcester, Massachusetts, who was bleeding at the lungs. I found her room at a temperature of about eighty degrees Fahr., in October. Her sleeping room was contiguous to it, and was purposely kept at a temperature almost as much elevated. No wonder she bled at the lungs.

My attention was directed principally to this very point, but without much hope of effecting a change in her habits.

Physicians, — one of whom was eminent, — to my surprise, did not oppose the change; and I have since learned that, after the lapse of some time, she recovered.

This error of keeping the rooms of persons who have diseases too warm is quite common, and is becoming more and more prevalent. It is hastening every consumptive tendency to a crisis, and sowing the seeds of new complaints where none existed before.

Is it asked, What is the right temperature? This can no more be answered, in a general rule, than the question, How much shall a person eat, or drink, or sleep, or take exercise? Still it is not impossible to present certain principles, which will greatly assist the earnest inquirer in answering the question for himself.

Since the lungs are the great fireplace of the human system, the better they perform their work, the more steady will be our heat. Where they begin to fail, our food should be improved, or a little more exercise should be taken; but if this should not be practicable, or should not succeed, a little more clothing should be added. The temperature of our rooms should not be raised, except as a last resort.

Here let me say that there are few greater errors, in regard to health, than that of relying, almost exclusively, on the direct radiating heat of fires and stoves to raise our temperature. Such external dependence always puts out the fires internally. The more we warm ourselves by means of the fire, the feebler the flame in the interior of our system.

Clothes, though necessary, should not be so abundant as to produce a similar effect by extinguishing the internal flame. They should be as few as possible, provided we are not chilly. Much flannel next the skin, habitually, is worse than none at all. If it does no other mischief, it throws water into nature's own fireplace.

Fires should never be made for us to crouch over, or huddle around, but to prevent any such necessity. We should build our fires not that we may stand or sit by them, but rather that we may keep at a distance from them. The temperature of the room should be raised to such a degree that, with proper food, drink, clothing, and mental condition, we can be warm enough at the most remote parts of it.

We ought so to eat, drink, sleep, dress, think, and feel as to be comfortable in the morning, even without much exercise at a temperature of about sixty degrees Fahr. Some persons, who are feeble, may require a few degrees of heat more. Towards evening, especially when much fatigued, the strongest and healthiest, as well as the feeble, will require a little more external heat than in the morning.

Great care — I repeat it — should be taken, by all, not to have the temperature, induced by clothing, fires, &c., too high. It is easy to increase our heat by these means, but not easy to lower it. I could be pretty comfortable, at any time, in ten or even twenty degrees more of heat than I really need, provided it is applied gradually; but reduce this high temperature but five degrees, even somewhat slowly, and I suffer.

Let me present a better illustration of this thought. Suppose a person perfectly comfortable at sixty degrees. It is just what he needs, but he needs no more. Raise the heat of his room gradually, in two hours, to eighty degrees, and he is still only comfortable. But why not? Because, while the external heat has been rising, the internal fire, as I have called it in my preceding remarks, has been growing feebler; and now that the external heat has arrived at eighty degrees, the calorific function, or the power of generating heat within, has been weakened in the same proportion, and he is no warmer than before.

Now, for explanation and proof, bring back the temperature of the room suddenly to sixty degrees. Is the occupant then comfortable? Not at all. He is quite chilly. But why? For reasons substantially just given. Nor will it mend the matter very much to lower the temperature from eighty to sixty degrees, gradually. It will do little more than prolong his suffering. Nature will, indeed, rally somewhat, if we give her time, but not at once. And in truth a single experiment of this kind is a draft upon the vital energies of the lungs that is never wholly paid.

It is stated in the memoirs of Cardinal Cheverus, of Boston, that he had no fires or other means of keeping up artificial heat in his room, either in summer or in winter. His object was twofold — to harden himself, and to save money for daily charities. But this course would tax too severely most constitutions in ordinary life, and was probably a little too severe, even for his. It doubtless exhausted, somewhat prematurely, his vital energy.

One evil, incident to a very high temperature in our rooms, is, that it reduces, quite too much, the proportion of moisture in the air. At a temperature of sixty degrees, the atmosphere should contain in vapor at least one grain of water for every cubic foot of air; and if we raise the temperature, more water still is necessary. In this way, the skin and lungs are subjected, quite too often, to the influence of an atmosphere so dry as to prove irritating. Who has not noticed the chapped hands of those persons who are compelled by custom, or habit, or employment, to occupy such dry rooms as I have alluded to, whether school rooms, parlors, or kitchens? But are not the hands tougher than the delicate lining of the lungs?

Constant evaporation, by extra arrangement, in all our

rooms, would be an improvement. Whether we use stoves or fireplaces makes little difference, except that we are apt to heat our rooms higher with the former than with the latter. Besides rendering the air less irritating, evaporation lowers, somewhat, the temperature.

#### IV. DISEASES OF THE LUNGS.

Connected with the usual violations of the foregoing laws, are their various penalties, in the form of disease, more or less severe, not only of the lungs themselves, but of parts contiguous, as well as those between which and the lungs there is a very strong sympathy. Among these diseases are colds, consumption, bronchitis, pleurisy, peripneumony, asthma, dropsy, apoplexy (pulmonary), goitre, croup, and fever. We are also accustomed to speak of other diseases of the lungs, or the cavity in which they are situated; such as hydrothorax, hæmorrhage, asphyxia, hepatization, cancer, and emphysema.

Besides, it should be well understood that, in general, whatever impedes, obstructs, or in any way deranges the heart, liver, and stomach, affects unfavorably, in greater or less degree, the lungs; and the contrary. The contents of the two cavities—the chest and the abdomen—are too near together to remain unaffected by each others' diseases.

Colds, though they have their origin, almost always, in neglect or disobedience of the laws of the skin, do, nevertheless, often fall upon the lungs. We shall see, in due time, that they may fall on any part lined with mucous membrane; but that they are most likely to fall on such parts, of this description, as are debilitated or already diseased. If that part is the lungs, as often happens, then we have colds of the lungs.

These colds on the lungs, if often repeated, may originate consumption, even in those who are not already predisposed to it. In general, however, they prove injurious by rousing into activity those latent tendencies to disease, which might otherwise have slumbered. But of all this I shall treat more fully when I come to a separate consideration of consumption.

Bronchitis is regarded by many as a species of consumption. In any event, it is a frequent and increasing disease. It is not now confined to public speakers. I have alluded, very briefly, to some of its causes already. Let us hope that correct physical education will in due time prevent it.

Many a pleurisy, peripneumony, and lung fever have originated in disobedience of the laws of the lungs. Nothing is more common than to find children who attend school in winter afflicted with severe lung diseases, many of which prove fatal.

While I was employed, many years ago, in visiting the schools in Hartford, Dr. S., a physician, asked permission of me and my associate to accompany us. He said he was anxious to know why so many of the school children suffered severely, at the end of winter and towards spring, from lung and brain diseases. He did not accompany us long, however, before he was satisfied. The school rooms of the city were heated in such a way that the heads of the pupils were frequently in a temperature of seventy-five or eighty degrees of Fahrenheit, while their feet were at the reduced temperature of forty-five or fifty degrees, and sometimes forty, inducing a tendency of the blood to the head and lungs.

This condition of things was greatly aggravated by the inactivity of the lower limbs. For though it is not easy to keep children entirely motionless in school, yet their feet and lower

limbs have comparatively little exercise — hardly enough to impel the blood in its due course in the veins. Then, too, the air they breathe is never too pure. And, finally, this tendency of the blood upward, so as to increase the natural liability of the young to acute diseases of the lungs, and heart, and brain, is made worse by their studies. We do not usually find the brains of children over active, I know; but whatever activity there is adds to the danger. Besides, there are a few children, — usually, as I suppose, precocious, — who study very hard.

When we can so heat our school rooms, and other rooms where children are, as to have their feet nearly as warm as their heads, or, if possible, a little warmer, there will be fewer lung diseases of every kind, and what there are will be less fatal. But before this blessed period fully arrives, we must make our floors hottest, and not our ceilings; or children must be out of the room, or in exercise more; or they must learn to sit with their feet upwards; or, finally, they must learn to think and study with their heels instead of their brains.

Asthma is a disease of the lungs, and very troublesome. In truth, when it has its origin in a bad constitution, or has been of long standing, I do not know that it is curable. It may, however, be greatly palliated. And yet those who suffer under it are very apt to run continually for medical aid. I knew a man in Hingham, Massachusetts, four or five years ago, who told me he had, in fourteen years, expended six hundred dollars for medicine, and was no better. Yet he was still trying every nostrum he could hear of.

The only thing which can safely and properly be done, in these terrible cases, is to avoid the causes and occasions that excite this disease, such as damp air, distressing odors or

dusts, and debilitating colds. Between the paroxysms, that is, when most free from the disease, the laws of health should be carefully studied and obeyed, especially the laws of the lungs.

Scrofula is not a disease of the lungs, but of the glandular system. And yet, in scrofulous cases, the lungs are quite apt to be diseased. In order, therefore, to prevent scrofula, care must be taken to have sound lungs. I shall say more of this in Lecture VI.

#### V. VENTILATION.

No one can ponder the subject of respiration, in the light of those facts which modern science reveals, without being deeply impressed with the importance and necessity of taking pains to purify or ventilate our rooms and buildings. Some of these require more attention, some less.

As long ago as the days of Franklin, this subject was beginning to be understood. His statement that we spoil a gallon of air a minute has been mentioned. It shows what his deep convictions were. So do his frequent exhortations to be much in the open air, as well as to change our air often, both by night and by day.

You remember, perhaps, his story of Methuselah. He does not tell us how he came by it. "It is recorded," he says; but *where*, except in his own curious and inventive imagination, it would puzzle a Jesuit himself to find out. The substance of the story is this:

When Methuselah had lived five hundred years, an angel appeared to him, and advised him to build a house; for, says he, you are to live five hundred years longer. But Methuselah said that, if he were to live only that short period, it was hardly worth the pains, and he would, in preference, continue to sleep in the open air.

But 'times are altered.' At present, few persons can even work or walk in the open air. Their delicate faces or lily hands might, perchance, be a little darkened by it; or their susceptible skins might be interrupted in the performance of their healthful and very useful labors; or, if the pure, cool air should reach their lungs, they might take cold.

Once we travelled in the open air; but now we are hardly wilung to do that. If we are so vulgar as to walk, we must be well protected with gloves, and umbrellas, and veils. Our carriages must be covered ones; and the windows, if they have any, must be kept closed. The greater part, however, travel in steamboats, canal boats, or railroad cars; which last are always closed, and sometimes heated. What will be the contrivance for shelter, when we come to ride midway between the earth and the sun, in balloons, or on electro-magnetic wires. it remains for human ingenuity to determine.

Many employments which were once carried on, either partly or wholly, in the open light and air, unsheltered, are now conducted within doors, or under cover. Such are ropemaking, stonecutting, carpentry, brickmaking, slaughtering, &c. Not a little farming is even done under shelter, and still more of fashionable gardening.

The housekeeper, that used, in days of yore, to be much in the open air, must now, it would seem, draw close her blinds and shutters, and cage herself up in her own domain almost as closely as she does her canary birds, her parrots, and her squirrels. She does not even give herself as much light as she does her pet plants and flowers; for these are *occasionally* placed in the sunshine.

If the housekeeper is caged up in this way, her children must be, of course; at least during the first years of their existence. And why not, the fond mother may perhaps say,

when it makes them so superlatively delicate and beautiful? For who that has any taste, or even any humanity, can bear to see the little cherubs with their skins tanned?

In my lecture on the skin, I shall show more fully why it is that this training in the shade is injurious, and why it is necessary to live more in the open air, even though the skin should be a little browned by it. Something has, indeed, been said on this subject already, but not enough.

More attention should be paid to the laws of health in the erection of our buildings, especially our dwellings, school houses, and factories. If neglect is ever justifiable, it is in the case of churches and other public buildings, which are but seldom occupied, and then only for a very short time. But in regard to buildings in which large numbers congregate, to remain many consecutive hours of every day, the case is altered. Neglect, by the way, is not *recommended* in the case of *public* buildings; but here it is unpardonable. Here it is, precisely, that the common mind needs monition.

Few persons of good sense will erect a dwelling, factory, or a school house near a stagnant pond or marsh. And yet not one in ten will take all the pains he might to build where he can enjoy the full benefit of air, light, and water, — three things so essential, and so abundantly bestowed by Heaven.

True it is, that in the full exercise of an enlightened free agency, we cannot all have our choice of place. Every one cannot, in the very nature of things, have an elevated spot, with pure water, dry cellar, &c. Yet it is equally true that many among us, who cannot have all they might desire, have it in their power to make a better selection than is actually made. And to do the best we can, in our circumstances, is obviously all that can be required of us.

In the case of school-houses and factories there is less of

difficulty than in the case of dwellings. The selection of a site for a school house is made with reference to the wants of many families. And surely there must be in the compass of several square miles, occupied by fifteen, twenty, or thirty families, one favored and highly-healthy spot.

Formerly it was the custom, I am well aware, to locate a school house near the centre of the district, at all hazards and all sacrifices. Every consideration of health, comfort, or agreeableness must yield (so many thought) to this one thing—mere centrality. But may we not reasonably hope that this day of ignorance and folly has passed away?

The location of factories has been a subject of far less thought. In general, they have been erected according to convenience, or supposed economy. The object has not been to accomplish the most good, but to make the greatest amount of money. Did the great law of love pervade the breast of every master manufacturer, factories would doubtless often stand in very different places from what they now do.

I am not, by any means, ignorant that, where the power to be employed is water, the factory must stand where that power can be applied. I do not say where it can *best* be applied; for its most favorable application might involve more of danger to the health of the operatives than one less favorable. Health is to be placed always before money making.

\*In selecting a spot for a dwelling house, not a few among us—I mean, of course, in country places—have it in our power to select a spot where we can have light, air, and water in the most healthful abundance. And where we have this power, are we not greatly culpable if we neglect to use it? Our duty, then, is plain. We must, in the first place, do all we can to prevent the necessity of paying

particular attention to the ventilation of buildings by observing the laws of health in their location. When we have done this, when we have done all that God has put in our power in a general way, we may and should go farther, and apply our knowledge and exercise our sense of duty in particulars.

In coming to these particulars, — what are commonly called the laws of ventilation, — I propose to speak according to the order indicated in the foregoing paragraphs: first, of school houses; secondly, of factories and shops; and thirdly, of dwelling houses. Some thoughts may be added concerning churches and public buildings.

Although increased attention has been paid, during the last twenty years, to the location and construction of school houses, there is still, in many places, a most unpardonable neglect. And they who have done most are in some instances behind the wants of the pupils and the spirit and demands of the age. Children should improve in *health* at school, as well as in knowledge and good behavior.

Let us suppose, however, that the school house is erected on an eminence where not only the light of the sun can reach it, but where Boreas can sweep over it at his pleasure. Let us suppose it to be well constructed, with this single exception, that ventilation, as happens in most cases, has been overlooked. What is to be done?

Dr. Jarvis supposes — I believe with good reason — that every adult person requires, in order to secure the best of health, at least *seven* cubic feet of air a minute. This can be had in the open air; but can it be obtained in the school room? Let us inquire.

Children at school need rather less air than adults, because their lungs are smaller. Suppose they need but *four* cubic feet a minute. This is two hundred and forty feet an hour.

Let a school of fifty scholars occupy a room twenty-four feet long by eighteen wide and ten high. This is a much larger allowance of space than is afforded by the average of our country school houses. Such a school room would contain four thousand three hundred and twenty cubic feet. Now, if every pupil requires, at the least, two hundred and forty feet of air an hour, fifty pupils would require twelve thousand feet. But four thousand three hundred and twenty are little more than one third of twelve thousand. If the last is 'required,' according to the testimony of Dr. J., is not the former quite insufficient?

I know well that our school houses are not, all of them, air tight. There is considerable change of air about the doors and windows, and perhaps elsewhere. They are sometimes very freely ventilated through crevices in the floor; yet there is not so much of change or ventilation in this way but that thousands suffer; and in not a few instances the rooms are nearly air tight.

Thousands, did I say? I might have said millions. There is no evidence abroad, on the face of things, going to prove that one scholar in a hundred, at school, breathes pure air the whole time. Is he not, then, injured? The injury may not be perceived for years, because the current of life is onward—God having made it so. But what then? Is it the less an injury?

Indeed, I might say, that, with many, the suffering is perceived at the time. The dulness and heaviness induced by bad air have been felt a thousand times, and the pain and mortification of a severe box on the ear, besides. Many a headache has been caused in the same way; nor has it been greatly diminished by the violent application of a wooden rule on the top of the cranium, or a hand or book at the side of it

Whenever it can be shown to be the plain duty of the seats or desks at school to resist the law of gravitation, and dance about, as it is said tables do, in modern times, at Rochester and elsewhere, then may it be right, perhaps, to box ears and break rules over the heads of those who are breathing the stupefying, life-destroying carbonic acid, and struggling under its influences.

Some, in their distress, — but without malice prepense, — have picked their faces, or their nails, or their books; or cut their seats with a knife, or written on them with a pencil; or, perchance, to “raise a breeze” of some sort, have pinched a companion or pulled his hair. It would take a huge volume — nay, many a “mighty tome” — to record all the facts of this kind that have occurred since the world of school houses began.

I am acquainted with an individual, who, more than fifty years ago, contracted a habit of picking his nails under circumstances like the foregoing, which has never yet been overcome; and concerning which it would be difficult to say whether it is most an annoyance to himself or to those around him.

Nothing is more easy than to prevent suffering of the kind alluded to, in our school rooms, whenever public attention can be so turned to the subject as to have every body feel its importance. For if it should still be true that not every one understands precisely what ought to be done, yet if all felt the necessity, somebody would be found who could remedy the evil.

In constructing a school house, it must be considered well what are to be the peculiar dangers of the children. Are they to be annoyed with dust — with emanations or exhalations — with fumes of metallic or other substances? Is

anthracite coal. to be used, so as to expose them to breathe sulphurous acid?

When a school house is properly located and constructed, and a due regard paid to the health of the children, there will be no dangers of this sort to encounter. The house will be warmed by a good fire, in an open fireplace or stove, or by a furnace in the cellar. In either case, except that of the furnace, the fuel used will be wood.

The gases to which children at school will be chiefly exposed are carbonic acid gas and sulphuretted hydrogen. The latter, however, it is desirable and possible chiefly to avoid. The carbonic acid will be present wherever there are lungs, skins, or fires.

To have a school room healthy, there should be a constant supply of pure air. If a furnace in the cellar is used, this will, in part, furnish the supply. If not, it must be introduced in some other way. Perhaps the best way is the following:—

Let an air conductor be used. It may be of wood, or some other substance. Let it communicate with the air outside of the house through the underpinning or the sill, and let a piece of wire gauze be fastened over it externally to prevent the introduction of small animals or any foreign substances. If there is a fireplace, let this conductor bring the air to the back part of the chimney near the hearth. Under the hearth, and behind the jambs, let there be hollow cavities, communicating with each other. The air from without, whenever there is a fire within, will be warmed in these cavities, and may be introduced by means of an opening and register at the side of the fireplace, as low down as possible. Fresh air may be introduced in a similar manner when a stove is used. In truth, whether we use a stove or a fireplace, a

supply of pure air will be constantly necessary ; and the above is the best way of introducing it, at a somewhat elevated temperature.

But in order to have the air circulate in the room, something more is necessary. We have seen that in the case of the furnace, as well as that of the fireplace or stove, there is a way to introduce pure air. But this is not enough. There must be a place for the bad air to escape. That our school rooms are not air tight, I have already admitted. So that, in any event, there will a *partial* circulation. Still it is not sufficient. Carbonic acid gas, heavy as it is, will linger and accumulate near the floor ; and after the lapse of an hour or so, — perhaps, in small rooms, in half an hour, — it will begin to be inhaled.

If a furnace is used, there must be an opening near the bottom of the room, somewhere. The fireplace is sufficient, where one exists, and is not closed. If there is no fireplace or stove pipe, an opening must be made ; and the nearer the floor of the school room the better. It may be five or six inches in diameter, and so constructed as to be opened and closed at pleasure. It should be as central as possible, in order that the air in the upward tube or flue through which it escapes may be duly rarified. It must not, of course, communicate directly with the external cold air.

The great principle to be kept in view is, to establish in our rooms free circulation of air. This is done by admitting purer and somewhat denser and heavier air at the bottom ; and, in part, by letting out the rarer and less pure air through the fireplace or stove pipe. This, however, is not all.

The upper layers of the air in the room will not, in this way, be sufficiently changed. On this account there should be an opening near the ceiling. A very common way, in

these days, is to erect a wooden flue or chimney at one end of the room, from the top of the room upward; but some merely have an opening with a valve into the chamber or attic. The flue, however, should not be at the end, but, as I have before said, more central.

With an arrangement something like this, there will be no great difficulty in ventilating school rooms, either in winter or in summer. The teacher must understand the general principles of the case, and must attend to his duty; never forgetting it for a single day or hour.

Where nothing more can be done, care should be taken to open all the doors and windows, at morning, noon, and night, — and, if practicable, at the recesses, — and let the wind sweep out the carbonic acid. If he has reason to suspect that a cloud of bad air still lingers above, let him make a hole through the wall close to the ceiling, or through the ceiling itself.\*

Some teachers lower their windows or raise them, or open doors, during the school hours. This is at times safe, at others unsafe. In general it is not to be relied on. Lowering windows from the top, in cold weather, especially if they are *much* lowered, does not work well; and by raising them, on the other hand, many colds have been caught at every season.

One or two more cautions to teachers may be necessary. Partly from ignorance, but still more from thoughtlessness, not a few individuals confound heat and impurity. For example, I spoke to a young woman, one hot summer day, in a gentle way, about the impurity of the air in her room, when she

\* This is recommended on the supposition of neglect on the part of the school committee.

replied, "Impossible, sir, that our air should be impure : we have the coolest school room in the city."

That impurities are more readily diffused abroad, where the temperature is elevated, I admit ; but we manufacture as much carbonic acid in cold weather, or in a cold room, as in any other circumstances, and it is, if breathed, about as deleterious in cold weather, or in cold rooms, as elsewhere.

This reminds me of another error. Many teachers, who have obtained a mere smattering on this subject, seem to suppose that because carbonic acid is heavier than common air, and fills up a room as water fills a vessel, therefore no injury can arise to their pupils if it does not rise as high as their heads. This is partly true and partly untrue : the fact is, that in a school room, the necessary motion stirs it up somewhat, so that if the main body of it were but three feet deep, for example, the lungs would not be safe from it at an elevation of four feet.

As things are in our schools, ventilation is seldom so much neglected that the pupils get sick at once ; but then, on the other hand, it is not so well attended to but that the seeds of disease are every day and hour sown, to germinate and grow in the future, when the occasion is forgotten. On the whole, the march of improvement in this matter is onward. Credit is due to many teachers and committees. Still it will be a long time before, as a general rule, children, while at school, will improve as much in health as they do in knowledge.

Practically I am less familiar with factories than with school houses ; and yet I know something of both. Those in Lowell have high reputation, comparatively ; yet I never visited them without excessive pain. And if it is painful to visit Lowell, how much more so many less favored cities of our country — saying nothing of the old world ! The rooms in most

manufacturing establishments are kept quite too hot. But this is not the worst: impure air is much worse than hot air. The health of the operatives suffers, and those who subsequently become the heads of families have diseased or suffering children. Besides an abundance of carbonic acid gas, and some sulphuretted hydrogen, there is occasionally an escape into these rooms of sulphurous acid. It is easily known by its sour smell. The bleachers of straw, &c., suffer most by it. But in those factories of every kind where anthracite coal is used, the suffering is considerable. In cotton mills and many other places there is much dust of various kinds present. How far this lighter, coarser dust, of which I now speak, descends in the passages to the lungs I am not able to say. In any event, there is not a little smaller and finer dust inhaled, that must inevitably reach the remotest air cells, and produce irritation. To what extent this condition of things is susceptible of improvement I do not say. I have seen an ivory comb factory in which the dust was blown away, so as not to be inhaled at all. The removal of other dusts, in a similar way, is a desideratum, and is, perhaps, attainable. A method has been devised, we are told, to blow away, or at least exclude, dust from railroad cars. Why not blow it away from factory rooms?

But if nothing of this kind can be done, so much greater is the necessity of doing what remains within our power. By following out the principles adverted to while I was speaking of school houses, I have no doubt the health of the operatives in most factories might be greatly improved.

The best possible fixtures for heating factory rooms, together with the best arrangement for ventilation, are obviously demanded every where, and cannot by those who mean to retain the character of Christians, or even of gentlemen, be

much longer denied. Such a denial were to act against their own pecuniary interest no less than against the laws of humanity.

So will it be in shops as well as in factories. So also in all our boarding houses and other places where great numbers of operatives are congregated. It is not for the interest of their keepers, even, to have sickness break out among them; and this will ere long be perceived and admitted.

Perhaps the means of properly ventilating our dwelling houses are, after all, more important than those of ventilating school houses, shops, or factories; for though larger numbers are thrown together in the latter, yet our earliest years — the season when we are most susceptible physically, no less than intellectually and morally — are spent in the former.

The danger is greatest of all in our sleeping rooms. It is here, as we have before seen, that we spend the greatest number of consecutive hours. The school-room exercises usually last only three hours of each half day, and these are broken in upon, for the most part, by a recess; but we immure ourselves in our sleeping rooms, without any *recess*, from six to ten hours.

This consideration alone should serve to convince us of the immense importance of having the air of these rooms pure. I have mentioned this necessity at page 123, but have not dwelt upon it so long as the urgency of the case requires. Let us then recur to the subject. I have said that we spend from six to ten consecutive hours in these rooms. We have seen, page 150, that we require seven cubic feet of air a minute. This would be three thousand three hundred and sixty feet in eight hours. Now, we have in our country many a sleeping room, which, from bottom to top, does not hold more than five or six hundred cubic feet; tens of thousands of these

rooms may be found that do not hold more than eight hundred, and the number is comparatively few that will hold much over one thousand.

Suppose, now, a person were shut up closely in one of these rooms, which was perfectly air tight. I will not take for an example the very smallest, but one of medium size, holding eight hundred feet of air. How long, at seven feet per minute, would this last him? Why, less than two hours! But suppose, for once, a more favorable case. Suppose the sleeping room to hold one thousand cubic feet of air — quite a luxury, since it does not fall to the lot of more than one in ten or twelve of our citizens. It would last the adult occupant only two hours and twenty-three minutes.

Let us remember, however, that a person reclining on a bed is not at the top of the room, but near the bottom. As the carbonic acid — the gas which we have chiefly to fear — is heavier than other air, it must necessarily accumulate at the bottom, and the room must fill gradually, like a vessel with water. In a perfectly tight room holding about one thousand feet, the occupant of a common bed would be immersed in air unfit for breathing in about one hour!

I do not say — neither does Dr. Jarvis — that a person cannot survive longer than one moment in seven cubic feet of air; but only that he is not so well off in it as he ought to be, any longer than one minute. In other words, he begins to suffer more or less, directly or indirectly, as soon as the one minute has expired.

The sum is this: The vast majority sleep — or at least remain — seven or eight hours or more, in places where, if air tight, there would be the beginning of suffering in about one hour. But as the tightest bed rooms are not perfectly air tight, we must make some allowance. We may say, then,

that suffering commences, at the farthest, in about *two* hours. This, when, taken for granted, there remain six hours of suffering; and this suffering becomes greater and greater every hour. If there is more than one person in the room, the suffering commences in one hour, and continues seven hours. If three or four persons, as sometimes happens, the bad air accumulates so much the faster; and it is to be borne so much the longer. If, in addition to the breathing of the occupants, there are plants in the room; or domestic animals, as cats and dogs; or, worse still, by far, a furnace of coals, or a foot stove, with no place for the escape of carbonic acid gas, or for the smoke, should there be any, then the occupants of the room will begin to suffer still sooner.

I have taken for granted that these sleeping rooms are without fireplaces or any other flues, which is generally the fact, though not universally. But the opening or flue, in connection with the stove or fireplace, is not so useful in the way of ventilation, as when there is fire in it, to rarefy the air and create a current upward.

Perhaps I have made it sufficiently plain that there is much of suffering in our sleeping rooms. Is it asked why do we not perceive it? For the same reason that we do not immediately perceive the same kind of suffering when we are awake. It makes us dull, at first, when awake; and probably makes us more sleepy, or, rather, more stupid, when asleep. But after an hour or two of increased soundness of sleep, nature, it is to be supposed, begins to rally, as if conscious of the presence of a foe, and our sleep begins to be unsound and dreamy. And it is by no means uncommon for persons sleeping thus to be conscious, towards morning, of suffering, and to awake with headache and other unpleasant feelings. Some, as before shown, sleep to wake no more.

Cornelius Sullivan, an Irishman, died suddenly in Broad Street, in Boston, a little while since. An inquest being made, the jury declared he came to his death by a fit, in a cellar; and pronounced the cellar unfit for a sleeping room for want of ventilation. It was only eighteen feet square, and five and a half feet high, and yet it was occupied every night by thirteen or fourteen persons.

But I know of nothing on record, of an entirely authentic kind, which better illustrates the tendency and influence of carbonic acid gas, whether in sleeping rooms or elsewhere, than the story of suffering in what has usually been called the Black Hole, at Calcutta, about a hundred years ago. It was at the capture of Fort William by the Nabob of Bengal.

One hundred and forty-six persons were confined in a room eighteen feet square, and of moderate height. This gave to each a space twenty-six and a half inches by twelve, just large enough to stand in without pressing hard on his neighbor. To this dungeon there was but one window, and that was very small; and the weather hot and sultry.

“In less than an hour, many of the prisoners were attacked with extreme difficulty of breathing; several were delirious; and the place was filled with incoherent ravings, in which the cry for water was predominant. This was handed to them by the sentinels, but without the effect of allaying their thirst. In less than four hours, many were suffocated, or died in violent delirium. In an hour more, that is, in five hours from the first, the survivors, except those at the grate, were frantic and outrageous. At length most of them became insensible. Eleven hours after they were imprisoned, twenty-three only, of the one hundred and forty-six who were shut up, came out alive, and these were in a highly putrid fever; from which,

however, by fresh air and proper attention, they finally recovered."\*

There are other instances on record, similar to this, only not quite so dreadful, because the number of sufferers was smaller. But the foregoing must suffice for our present purpose. No one who accredits this story will longer doubt of the deleterious nature of carbonic acid gas.

My former conjecture concerning the loss which must be sustained yearly, in the United States, from this source, will, moreover, be now better understood, as well as appear more credible. In estimating the aggregate yearly loss at "many thousand" lives, I do not think I exaggerated. Twenty millions of our population have their stock of health diminished more or less, and their lives more or less shortened, in this very way. Sleeping rooms are designed, legitimately, to be places of restoration. And yet how often we rise from them as weary, almost so, as when we lay down! Why is this? Why should not

"Tired nature's sweet restorer, balmy sleep"

accomplish its full and perfect work? Do our many aches and bad feelings spring out of the ground?

I believe I have not yet mentioned the very foolish custom of burning candles or lamps in sleeping rooms — into which so many fall. To say nothing of its danger by increasing our exposure to fire, it tends to diminish the purity of the air, and, except in particular cases of sickness, is inadmissible.

I have thus exposed, very fully, the evil which exists, and set forth the necessity of ventilation. The question arises, — and no question can be more appropriate, — What is to be

\* Elements of Hygiene, by Dr. Dunglison, p. 87.

done? In what manner shall our sleeping rooms be ventilated?

Let me say, then, in the first place, that all sleeping rooms should, if possible, be much larger than we now find them. It is certainly desirable to have our sitting rooms, dining rooms, and parlors—above all, our kitchens—large. Few of us will be willing to reduce their size. And yet there are none of them, except, perhaps, the kitchen, that need more to be spacious than the sleeping room. And even the kitchen, by means of its numerous doors, &c., is apt to be better ventilated.

Let us consider a moment. Some of the rooms alluded to are scarcely used once a week, and then only to receive a fashionable call of fifteen minutes or half an hour. But the kitchen is occupied many hours of the day; and the sleeping room a whole night without intermission, including, it may be, a part of the next day. It seems to me, therefore, absurd in the highest degree to make our spare rooms large, at the expense of those rooms which are constantly used. Have them all spacious, if you can afford it; but do not, on any account, turn your sleeping rooms into mere bird cages or pigeon boxes.

But if the present custom, in this particular, must be followed,—if these Black Holes, not of Calcutta, but of the United States, must be used,—let us see what can be done, taking them as they are, to render them more tolerable.

There is a dwelling house in Boston, built at an expense of seventy thousand dollars, every room of which has its own ventilator. A tube begins at the top, and extends along, in as much seclusion as possible, to the roof of the house, where it projects with scores of others, under cover of a kind of dome. But this is more expensive than is necessary; be

sides, it does not answer the purpose. The ventilating tube should make its exit at or near the bottom of the room, and not at the top. I know, indeed, that there will be a current or circulation in the room, even in this way, but it will not fully remove the carbonic acid.

One way to ventilate houses — bed rooms among the rest — is by means of openings at the top of each room, communicating through spaces which exist within the hollows at the sides of the house, between the furring and the wall. The rarefied bad air here ascends to the top of the house, and escapes. Still it does not *all* ascend; and cannot. Another method is to have a large wooden tube, from the bottom to the top of the house, into which there is an opening from each room, with a register. The rarefied impure air ascends through this tube. Another method still is to have the ventilating tube consist in a false flue in the chimney. Or if there are several chimneys, there should be one to each. The great advantage of this method is, that the heat of the chimney, whenever we have fires, facilitates the progress of the upward current.

Some have suggested what they regard as an improvement upon all these methods, especially as we do not always have fires in our houses. It is to ventilate through spaces between the partitions of our rooms. These ventilating flues, they suppose, would be less liable than most others to counter currents.

Let me say, once for all, that no method of ventilation is perfect which does not provide for the admission of pure air and the escape of carbonic acid at or near the bottoms of our rooms, in addition to which there ought to be a smaller opening near the top.

The question recurs, What shall be done where there are

no such means of ventilating our rooms — especially our sleeping rooms — as I have described? Is nothing to be accomplished by means of the doors and windows?

One door and one window are frequently as many as we seem able to afford to each sleeping room. The kitchen is more fortunate, and our health, as I hinted just now, is thus partly saved. Few sleeping chambers have any fireplaces, and some of them not even an opening for a stove pipe. Or if there are fireplaces, they are closed in the warm part of the season.

If a sleeping room is small, and without a fireplace or stove, or any opening in the form of flue or ventilator, we must be careful, on lying down, to leave open a door or window, or both. An open door is preferable, whenever it communicates with a large unoccupied room or spacious hall; because the carbonic acid which accumulates can be diffused over the floor of a larger space, and will not so soon endanger our health.

If otherwise, however, — if, as sometimes happens, the door cannot be left open, — then we must leave a window open. Not the upper division, when it is near the bed; though some have advised thus. The cooler, denser — perhaps damper — night air, by falling directly on the bed, “in full volley,” might give cold.

Experience and observation have led me to the following course, which I recommend to others: Raise the lower half of the window, and then place something before it, to serve as a screen by turning the current of air so that it may not fall directly on the bed. This, I admit, does not ventilate very perfectly, because it does not create a free current. But it is vastly better than no ventilation at all. Hundreds have tried it, and with great success. Nor is there so much

danger to be apprehended, as many suppose, of taking cold by it.

Among thousands who have been influenced by hints like these, I never knew but one instance of injury. This was a little child near Hartford, Connecticut. The father, having read my tract on "Breathing Bad Air," undertook to profit from it, by raising his window at night, and sleeping with it open. The father was benefited; the mother was not injured; but the child caught cold, and suffered considerably.

One of the individuals who have profited most from sleeping with his window open during the night is a son of Fisher Ames, of Dedham, Massachusetts. He has thus slept for nearly twenty years, both in summer and winter; and I cannot learn that he ever caught cold in this way in his life.

But let me be fully understood; I do not recommend the practice, except as a choice of evils. It is safer—very much safer—than no ventilation at all. It is, indeed, sometimes quite safe. It is better, however, in general, to have an opening near the bottom of the room, even if it is no larger than a common stove pipe; but the opening, if not into a chimney, should be central.

There will be far less of suffering for want of proper ventilation when we return to the good old custom of using fireplaces. Not such fireplaces as I have seen,—large enough almost to hold half a cord of wood,—but fireplaces of moderate dimensions.

One obvious advantage to be derived from the general use of fireplaces is this: When we can see the fire, we are far better satisfied with a lower temperature than when it is hid from our view. I think the majority of mankind would be as well satisfied with sixty degrees of Fahrenheit, when they

have a fire in sight, as with sixty-eight or seventy degrees in other circumstances.

Another advantage is, that they are healthier. For, say what we will, there are no fixtures for heating our rooms which are so conducive to health as the reasonable fireplace. Our rooms are not apt to become so hot under its use, and it ventilates better. We spend a little more for fuel, perhaps, but less for medicine, physicians, and grave diggers. Indeed, if an estimate could be made of the expense of all the stoves which have been made — old fashioned and new fashioned — during the last twenty-five years, and if this were added to the expense for fuel, I think the sum total would be greater than the expense of furnishing wood for fireplaces of reasonable dimensions for the same time.

Unpopular, therefore, as it may be, I do most earnestly and sincerely look forward to a period when there will be a return to the custom of depending chiefly on fireplaces for warming our rooms — not only the rooms of our dwelling houses, but our school rooms, counting rooms, &c. Not but that, in some few instances, here and there the stove will continue to be used; as, perhaps, the cooking stove or cooking range in our kitchens. To use the article, however, will not be, as now, the general rule, but only the exception.

As for the air-tight stove, of which so much is made by many, I can hardly believe it will be found indispensably necessary. In our efforts to retain the heat, we retain also the bad air; and in a proportion exactly commensurate. Of all our stoves, therefore, they are the worst.

Our churches — the main body of the buildings, I mean — are of late tolerably well ventilated. More improvement has taken place in this direction than in any other. Still there are ministers who have the reputation of delivering sleepy

sermons, and many more hearers who are reputed to be sleepy, when the fault is as much with the air as with any thing else, except, perhaps, heavy dinners. And yet, notwithstanding the increasing attention to our churches, thousands of lecture rooms or vestries, to say nothing of other public buildings, are as much neglected as our school houses and sleeping rooms. Sextons are nearly as ignorant of the laws of ventilation as teachers; and some of them appear to be still more reckless. We do not uniformly select this kind of public servants from the more intelligent of society, but frequently from a very different class.

## LECTURE IV.

## CIRCULATION AND RENOVATION.

## GENERAL REMARKS.

THE blood is a very important part of the human machinery ; and its nature and offices, as well as the means of preserving it in health, can never be too fully understood. It is usually said to amount to twenty-five or thirty pints or pounds ; and to constitute about a fifth of the whole weight. It varies, however, very greatly. Some adult individuals have little more than twenty pounds of blood in them ; others have twenty-five ; and others thirty, perhaps even more.

There are other fluids in the human system, most of which are secreted or made from the blood ; but they can hardly be considered as forming component parts of it. Reckoning up every thing which can, by possibility, be resolved into a liquid or semi-liquid, we have at least four fifths of the body liquid and only one fifth of it solid. Some place the fluid parts at *more than five sixths*. The particular character of this wonderful fluid, made from our food in so wonderful a manner, and performing offices apparently little short of miraculous, will appear more fully in the progress of my remarks.

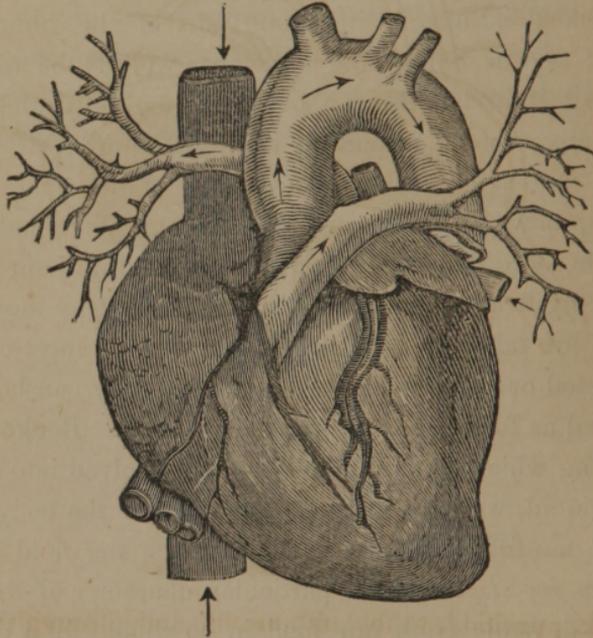
Let us, then, proceed to consider, 1. The *mechanism* of circulation ; 2. Its *offices* ; 3. Its *laws* ; and, 4. Its *diseases*. On all these points, however, I must be short.

## I. MECHANISM OF THE CIRCULATION.

The human circulation is performed chiefly by the *heart*,

the *arteries*, the *veins*, and the *capillaries*. There are other agents, but these are the principal.

The heart, in man, is double, as if two hearts, placed in close contact, were made to adhere. It is about the size of the clinched or doubled fist. In many of the lower animals, such as fishes and reptiles, the heart is single.



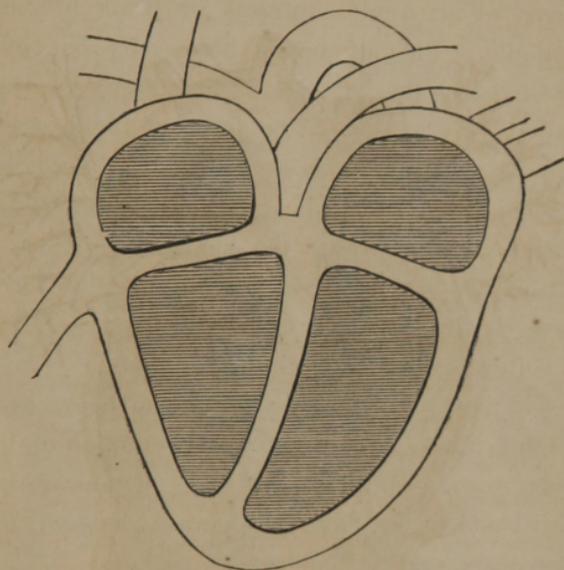
The Heart.

Each division of the human heart has two cavities or hollows. One is called the *auricle* the other the *ventricle*. The auricle is much smaller than the ventricle. Both, however, are fleshy in their construction, and very strong.

The right auricle and right ventricle contain what is called *venous* blood; the left, *arterial* blood. Except in a diseased state of this important organ, there is no connection or com-

munication, directly, between the two hearts or hollows, any more than there is between the eyes and the ears.

The venous blood, collected from all parts of the body into two great veins, is poured through the right auricle into the right ventricle. Two large vessels, called *pulmonary arteries*, carry it thence into the lungs. From the lungs, it is



Divisions of the heart and its cavities.

sent back, purified, to the left auricle, and through that into the left ventricle; from which it is sent, by one large artery, called the *aorta*, to all parts of the body.

The heart alternately contracts and relaxes, to facilitate this motion of the blood. Some have called it a great forcing and sucking pump. When it relaxes, the blood flows from the veins into the heart, and also from the lungs into the heart; and when it contracts, the blood rushes at once into the lungs and into the aorta.

The blood, therefore, performs a double circuit in the sys

tem, which might be represented by the figure 8 ; the upper circle represents the course of the blood from the right ventricle, through the lungs and back to the heart ; the lower one represents the circuit from the left ventricle through the arteries, capillaries, and veins, to the right auricle. The heart is placed at the junction of the two.

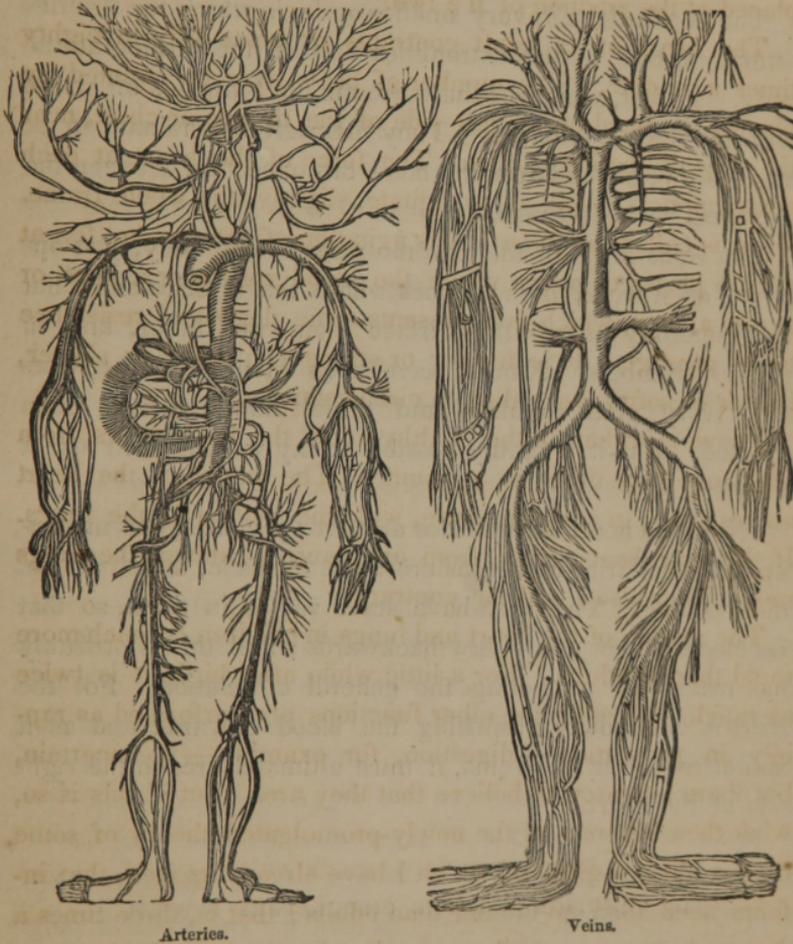
The heart of an adult contracts or beats fifty to eighty times a minute. The number of beats may be counted by placing the hand on the left side of the thorax or chest, near the edge of the lower ribs. The force of the heart at each contraction is such as to agitate, slightly, the whole frame. What is called the *pulse* is this agitation of the system, felt at certain places or points where the blood runs over a joint, or across a bone, which thus presents some degree of resistance to its passage. It is feebler or stronger, quicker or slower, harder or softer, according to circumstances.

I have said that, in the healthy adult, the heart beats from fifty to eighty times in a minute. The motion of the heart corresponds, in some measure, with the motion of the lungs. If the heart beats faster, from any cause whatever, the lungs move faster also ; and the contrary.

The motion of the heart and lungs in children is much more rapid than in adults. For a little while after birth, it is twice as rapid. Whether the other functions are performed as rapidly in proportion — digestion, for example — is uncertain, but there is reason to believe that they are. But if this is so, what then becomes of the newly-promulgated theory of some of our physiologists, of which I have already spoken, that infants need food no oftener than adults ; that is, three times a day ? Is it not, at the least, rendered quite improbable ?

I have alluded to the force of this organ in propelling the blood. The greatest variety of estimates concerning this

force has been made by different physiologists. Some have placed it at one hundred and eighty thousand pounds, others at only a few ounces. The general opinion at the present time is, that its propulsive power is equal to about fourteen pounds.



Arteries.

Veins.

The aorta, which carries the blood from the heart to all parts of the body, is very large at the beginning, but divides and subdivides into branches almost innumerable.

The arteries are branches of the great aorta, which, as I have before said, proceeds from the left ventricle. They separate wherever they are needed. They divide and subdivide almost without number. About one thousand have names. They terminate in the capillaries. (See preceding page.)

The capillaries are very small vessels, in which the arteries terminate, both in the extremities and on the surface of the body. In fact, wherever there are minute branches of an artery, there are capillaries. They themselves terminate in or begin the veins, and form the bond or connection between the two great sets of vessels.

The veins begin in all extreme parts of the body, just opposite, as it were, to the places where the arteries end; but are generally nearer the surface than the latter, and in greater numbers. Names have been given by anatomists to a very great number, and three thousand have been counted. But it is hardly possible to say what is their exact number.

While the heart and arteries are strong, elastic, and muscular, the capillaries and veins are more inelastic, membranous, and yielding. The veins have small valves in them, so that the blood cannot easily flow backwards; and this is probably one means of promoting the general circulation. For the heart is continually propelling the blood onward; and as it cannot recede in the veins, it must ultimately reach the right side of the heart.

## II. FUNCTIONS OF THE CIRCULATORY SYSTEM.

If the human blood were to remain stationary but a single day, we should become languid and diseased, and should probably perish. It is not only necessary that it should

nave motion, but this motion should be rapid, and should be extended to every part of the system.

The circulation of the blood accomplishes at least three or four great purposes. The first of these is to furnish every part of the human frame with material for its growth and renewal. It is to furnish blood, newly formed from chyle, as well as old but constantly-renewed blood, to all parts of the body.

The second office, or function, of the circulatory system is to carry off the waste particles which are constantly set free, and place them at such outposts and other parts of the body as may have facilities for getting them out of it.

A third office is to furnish material for the manufacture of certain fluids, to be used for various purposes in the system, such as tears, saliva, gastric and pancreatic juice, bile, &c. All these are made from the blood, and, what is vastly more important, depend upon it for their quality.

A fourth office of the circulatory system is to diffuse, through all parts of the body, a portion of the heat newly acquired in the lungs. For as the capacity of the blood for caloric diminishes just in proportion to its distance from the lungs and heart, so in the same proportion is the latent caloric set free to keep up our temperature.

But in order more fully to understand this subject, it may be necessary to go a little more into particulars concerning the nature of nutrition, growth, waste, and renovation.

We have already seen, more than once, that the blood is made from our food; and that, in order to have our blood what it should be, we must not only have good food wrought into good and healthy chyle, but this chyle must be submitted to the full action of pure air, in good and healthy lungs. So long, then, as we are yet immature, it is necessary, in order to

have our bodies grow, that the warm and fresh blood, just from the lungs, full of healthy particles, should be carried to every part of them, even to the very interior of the hardest and firmest bones.

Some few individuals, who have never been informed on this subject, may be a little surprised to know, for the first time, that there is blood in our bones ; but the bones are far enough from being solid, like a piece of marble. Large arteries enter them, obliquely, in several places. A part of them are hollow, with a substance in the hollows called *marrow*. And when they are not hollow, they are usually spongy, and small blood vessels are found even here. I do not say that there are as many blood vessels and as much blood in the bones as in the soft parts, but only that they *contain* blood, or the processes of growth and repair could not be accomplished.

The amount, then, is this : The heart sends out blood from its left ventricle to every part of the body ; and every part of the body thus receiving blood has power to select, from the mass of small arteries and capillaries found in its substance, just such particles as will build up that part, and no other. The skin, for example, has power to take out particles to make skin ; the flesh, or muscular parts, to take out particles to make flesh ; the bones those that will make bone, &c. Even the nails and hair must grow from their roots in the same way, or they could not grow at all.

This power of selecting particles from the blood, by a part through which the blood is passing, and of applying it in such a way as to build up or increase the size of that part, is called *nutrition*, and the enlargement which follows is called *growth*. The general work of preparing the particles of the blood for this purpose is sometimes called *assimilation*.

You see, therefore, that man — and it is the same with most other animals — does not grow as a tree does, not even his bones. Instead of adding a new layer, like a new ring or circle to a tree, he enlarges by a kind of swelling of every part. Still less is his growth like that of minerals, by having new matter, as it were, plastered on.

As the blood, in consequence of having its best particles constantly taken out by every part through which it passes, soon becomes deteriorated, it is necessary that every part should be frequently supplied with the new material, or pabulum; and the more frequently the better. And hence provision is made for a very rapid circulation.

This is accomplished, in part, by the forcing power of the heart. The organ sends out, from the left ventricle, something like two ounces of blood at every beat. It is obvious, therefore, that a quantity of blood equal to nearly thirty pounds, or more than a common pail full, passes through the heart in less than three minutes.

The work is *chiefly* done by the heart, as I have before intimated; and yet it is quite possible the capillaries afford to this organ a little aid. The late Professor Nathan Smith, of Yale College, was of opinion that the capillaries performed the whole work.

I would not be understood to say that all the nutritious particles which are applied to the various parts through which the blood flows are taken up at once, or even at all. Some are received, and some are rejected. Nor are all the particles which are presented, nutritious in their character. There are always waste particles in the blood, as well as those which are nutritious.

In these last paragraphs I have explained briefly the great principles of nutrition and growth; but at a certain age, it is

well known we cease to grow ; yet we continue to eat and drink, and to make chyme, and chyle, and blood ; and the heart continues to propel the latter to all parts of the system. What good purpose does it answer, then, if our bodies have now become nearly stationary ?

The truth is, — and it is a great and important truth, — that there is no standing still in the human body. Particles in us, every where, even in the most solid bones, at every instant of our lives, from the cradle to the grave, are losing their vitality — dying, as we should say, and becoming useless. These particles, moreover, not only become useless, but are in the way. They become, practically, foreign matter. Let them alone, and they would cause great trouble ; they might even produce irritation and inflammation ; they might putrefy in our bodies. They are, therefore, removed, as we have seen, from the system, and new particles put in their places. This, of course, will cause a change in our systems. The time must arrive — if a person lives long — when every old particle will have had its day, and will have perished, and been carried out of the body. The system, in other words, will have been renovated, or built up anew.

It was an old notion that we were thus changed every seven years. It is not improbable that we are changed, in early life, in a very few weeks. In later life, the change is slower ; and *very late* in life, exceedingly slow ; perhaps not once in twenty years. In any event, we are constantly changing. It is highly probable we are changed in our whole lives, if we live to the age of seventy, many times over.

These changes, moreover, ought always to be for the better. The new particles should always be healthier than the old ones. But whether they are so, will depend in no small degree on ourselves. If we are every day obeying, more and

more perfectly, the laws of health and life, then the house we live in will be every day improving.

Here, by the way, is one of the most glorious truths, in the world of health, which can possibly be presented to the mind of man. What though we come into existence with enfeebled constitutions? If we can but get safely over life's threshold, why should we not then go on to old age? If every new brick which is applied to the old edifice is preferable to that for which it is substituted, and if such changes of the old and deteriorated bricks for better ones are perpetually going on, must not a time come when the building will appear in a new and improved form?

To what extent this can be carried I do not know. I suppose there are limits, as to almost every thing else below the sun; but at present they are unknown. Nor need we inquire; we are in no immediate danger of overstepping them.

### III. LAWS OF THE CIRCULATION.

*LAW 1. The Machinery of Circulation, especially the Heart and great Arteries, in order to be healthy, must be free and unembarrassed.*

The heart beats some fifty to eighty times a minute, as we have already seen. In general, we say about sixty to seventy. It sends the blood through the great aorta and its branches to all parts of the body.

The aorta, at its commencement, is nearly an inch in diameter. It proceeds upwards, then backwards, and soon downwards, forming quite a curve. At the upper portion of this curve, it gives off branches to the head and upper extremities. In the abdomen, it divides and sends a very large branch to each

lower extremity. Now, any thing which serves to compress the chest directly over the region of the heart, by impeding in only a slight degree, its motion, will be injurious. It will be particularly injurious to those whose heart and arterial system are constitutionally feeble.

All tight clothing is of this description. They who wear a tight garment on the chest but a single hour do harm : what, then, shall I say of those who wear such clothing habitually ? Then, if the mere pressure of a tight garment is injurious, how much more so the constant compression which sometimes exists, not only from having the dress in general too tight, but also from bad position at study or occupation !

On the subject of dress, much might be said. Every form of compression is deeply injurious, though I doubt not that it is worse to compress the chest than any other part. But compression of the neck, limbs, wrists, ankles, and even of the feet and hands, is injurious to the circulation, as well as in other and various ways.

It is sometimes said, of late, that compression of the chest, by dress, is becoming unfashionable. It may be so ; indeed, I trust it is so. But the same story has always been told. In truth, I never found an individual who pleaded guilty, in this particular, at the time. They may have confessed to former guilt ; but insisted they were now wiser ! In general, however, it was not they, even, who *had* been guilty ; but somebody else, either in this world, or the world of the moon ! On this subject, facts might be given which, while they would excite surprise in some, would raise the smile of incredulity in others. But I forbear, only adding that several other forms of compression by dress are almost equally reprehensible. The dependence of the female dress upon the hips and lower part of the abdomen tends to obstruct the circu-

lation, besides being attended or followed by a long train of other evils.

Among the worst appendages of dress, since the days of corsets began to pass by, are elastics, or garters. The evil they produce manifests itself in many ways; but especially in preventing a free return of the venous blood of the lower limbs to the heart.

Nothing is plainer than that the blood of the lower limbs, in returning to the heart, is obliged to act against its own specific gravity. This renders its progress slow, at best; but especially so in those who are feeble. Hence the want of action in the capillary and venous system of these parts; and hence cold feet and many other difficulties. But when, in addition to all these natural difficulties to which I refer, we add artificial ones, the evil is greatly increased; and not only cold feet, are the consequence, but serious diseases. All ligatures, should be especially avoided. But I must not omit, in this place, a remark or two on that terrible evil, now extremely common — of varicose veins. They are, essentially, enlargements of these vessels, at various points below the hip. They are caused, or at least aggravated, by garters. Sometimes these swellings become open and extremely troublesome ulcers. They are incurable.

I have alluded to position. The seeds of heart diseases are often sown in early school life. Children are not only required to sit too long, but they are very apt to bend forward too much. They do so, in the first instance, from sheer carelessness or downright laziness.\* But they do so, in the second place, from the very fatigue a bad position induces. And the

\* Or from neglected ventilation, as was shown in the preceding lecture.

more they yield to the temptation, and sit badly, the more they think they must.

Many, who might otherwise avoid a bad position, are kept on the bench so long that the muscles of the back, though naturally strong enough, become fatigued, and they bend forward for relief. This is the condition of most of those who sit long, in school or elsewhere, on benches without backs.

I am no advocate for benches or seats with backs, simply that teachers may feel themselves fully licensed to compel their pupils to sit, without recess, two or three hours at a time. But if they must be confined in this barbarous way, let their backs, by all means, be supported.

Those who have their backs supported, and good desks before them, do not always sit in a position most favorable to the full and free action of the heart. They are very apt to sit in a crouching posture, notwithstanding; and thus to injure both the organs of the chest and those of the abdomen.

The heart has usually been called the seat of life. And it is so in many respects. I know of no organ that is so worthy of this name, except, perhaps, the brain. The latter is better guarded against external injury than the former. Here is one reason why extra care of the heart is demanded.

LAW 2. *The Circulatory System must not be irritated.*

Plain food and drink do not irritate. The chyle made from the former, being bland and congenial, passes at once into the circulation, and has an effect to soothe rather than to irritate. I have already shown, in another place, that what is called the *fever of digestion* is the result of irritation; and is, in fact, a state of disease.

Drinks are not digested. Pure and perfect water goes, at once, by the intervention of the absorbents in the walls of the

stomach, into the circulation. Hard water is slightly irritating, but not greatly so, as even this is soon disposed of. Water in large quantities, or at an improper temperature, may oppress the stomach, and irritate the heart, *indirectly*; but not very seriously.

I have not found those who drink large quantities of water, provided they do not use it at an improper temperature, much affected by it. A man near New Bedford, Massachusetts, will drink several quarts of water in a few successive moments of time. I have also seen men drink two quarts of mineral water at a time. In neither case was there any direct injury.

Very large quantities of plain food, though they injure the whole digestive system in a direct way, only injure the rest of the organs, as the brain and heart, in an indirect manner. But when we go beyond plain food and drink, we approach the region of direct injury. All our high seasonings, whether they are incorporated with the food previous to cookery or added to it afterwards, render it irritating to the delicate lining membrane of the heart and the blood vessels, and their still more delicate nerves.

When I speak of seasonings in our food, perhaps I ought to make a single exception. The use of salt, applied to our food after it comes to the table, is so common, and has so long been common, that it can hardly be dispensed with. But even this must be irritating when used in excess.

The worst dietetic use of salt is its application to various articles of food to *preserve* them. All pickled or long preserved meats or vegetables — such as pork, beef, mackerel, shad, or cod, and cucumbers — are exceedingly irritating to the circulatory system, and ought forever to go into disuse. But leaving, for the present, the moderate use of salt, with the restrictions aforesaid, it is necessary to say that the whole

tribe of heating condiments — aromatics, spices, pepper, mustard, catsup, saltpetre, and saleratus — are little less than rank poison to the blood, and to all the machinery of circulation.

Suppose a person has taken, with his dinner or his supper, a quantity of mustard, such as is frequently taken by our farmers at their meals. It is soon mingled with the food in the stomach, and carried into the duodenum with the chyme. It disturbs, though it does not wholly defeat, the work of digestion.

What becomes of it? Does it not go into the lacteals with the chyle, and thence into the circulation, to be spread, by hundreds of arteries and thousands of veins, — with, perhaps, millions of capillaries, — all over the system, irritating wherever it goes?

And do we consider what a vast amount of surface — of delicate mucous and serous membrane — is thus irritated? Do we consider well how many little nerves, having their terminations in these membranes, are sufferers at the same time, and send up a report of their suffering to the fountain head — the brain?

If any individual has doubts, let him but recur to the experiments I have suggested, at page 93. He will then see that at least one of the condiments — I mean mustard — is highly irritating to the skin; and, as we have reason to believe, to the stomach. Why, then, should it not be equally so to the circulatory organs?

These, however, — the condiments, — are by no means the only things taken into our stomachs that irritate the lining membrane of the circulatory tubes. Tea and coffee do this; perhaps chocolate. So do most of the other medicines — small and great — taken in these days, whatever may be their form, circumstances, or accompaniments.

There can be little doubt that the use of tea has a very ill effect on the heart and arteries, as well as on the nerves and brain. These remarks, however, are particularly applicable to green tea. Black tea is irritating, but in an inferior degree. So striking is the effect of tea on the delicate machinery of the human system, that Dr. Cole, an eminent English writer, who has made numerous experiments and still more numerous observations on this article, speaks of its effects, when long continued, under the name of the *tea disease*, in the following manner:—

“By degrees a fluttering, as of a bird, in the left side, comes on, and a feeling of fulness pervades the chest, with breathless and frequent sighing.” This, however, is the effect of black tea. In regard to green tea, he says, “If green tea has been taken, the pulse is feeble, quick, and fluttering, or slow and weak.” “This,” he adds, “is the mild form of the disease—the one which is most commonly seen; but occasionally a variety of aggravated symptoms arise. To the feeling of fulness in the chest and about the shoulder blades are added threatening of suffocation, insensibility, and convulsions. The fluttering at the heart becomes pain, violent palpitation, or enfeebled action, bringing on a syncope.”

Now, is it possible to doubt whether or not tea irritates the heart? Can an agent which has all these influences be otherwise than injurious? But if so, how many millions must every day be sowing the seeds of future suffering!

Coffee, in its attacks on the human being, levels its deadliest shafts at the liver and stomach; though even this article is not without its agency in those heart complaints which are already existing. Most of them it greatly aggravates, and some of them it renders fatal.

So it is, I repeat, with other medicines, as well as tea and

coffee. I do not mean by this that they all have an exactly similar effect. By no means. Coffee has a very different effect from tea; and tobacco in its effects is entirely unlike rum. All are injurious by irritating the blood vessels, and the parts through which they pass; but all do not irritate alike. Observe, however, I am not here speaking of medicine in its application to acute disease; this I leave, for the present, to the physician.

While writing this very article, a female friend of mine has been advised, by one of her neighbors, to take bark and wine. She is nearly worn out with care and labor, and her heart flutters, and she more than half believes her heart is already diseased; and yet ignorance and superstition would have her take medicine!

The medicine might indeed soothe her nerves and quiet her heart for a few minutes, or an hour — perhaps for a day. But should the same causes conspire to affect her again in the same way, her heart would flutter a little worse than it did before.

Nothing, then, as we see, should have a place in the healthy human stomach but plain, unstimulating, yet nutritious food, and soft and pure water. Starting in life with health, and obeying all the physical and moral laws, there could seldom be found such a thing in the world we live in as heart complaint.

*LAW 3. There should be Equality of Temperature in the System.*

A centrifugal tendency in the human system is, in every point of view, favorable; but it is especially so to the free and unembarrassed action of the heart and arteries. A good temperature of the system greatly contributes to this tendency by keeping the skin plump, active, and vigorous. This tem-

perature is best maintained, at least in our ever-varying climate, by that entire obedience to all the laws of health which inevitably secures the full and perfect performance of all the functions of the cutaneous system.

Hence it is that obedience to all the laws of the skin, as we shall see in the next lecture, is one of the best means of keeping up that equable temperature of the whole surface of the body which is so highly desirable. In a word, whatever is best for the skin is best also for the heart, arteries, capillaries, and blood.

Among these things is a proper attention to bathing, clothing, and quiet. The kind of bathing which may be best after the heart has become severely diseased, may not be at once obvious, and will require medical counsel.

Proper exercise of the locomotive system will also do much towards keeping up a proper and healthful equality of temperature. So will a proper state of the mind and heart.

*LAW 4. There must be a good Degree of what Medical Men call Innervation.*

No part of the human system, except perhaps the stomach, so soon suffers for want of its due proportion of what is called nervous or vital energy, as the circulatory system, especially the heart.

For when this stimulus is withheld for any considerable time, the heart beats more languidly, and the pulse is more feeble. Its frequency is not, indeed, always increased, but there is every other evidence of an enfeebled circulation. There is one evidence, in particular, viz., an enfeebled state of the capillaries.

The skin, in these cases, has a delicate, if not a pale appearance. It is also more shrunk than usual, and it is per-

haps rather softer. There may be a more free perspiration ; but then it is a mere leaking out of the watery parts or serum of the blood, rather than an active, healthy, vigorous, natural effort.

In order to insure the best action of the heart and other organs of circulation, the brain must not only be an active, but at the same time a vigorous working organ. It must be duly cultivated. This cultivation is desirable for a thousand reasons ; but our present concern is chiefly with its effects on a particular portion of the system.

Great care should be used, during the first years of human life, not to overtask the mental faculties — a thing which is, most unhappily, becoming quite common. In these cases, the circulation, instead of being increased in activity or energy, is rendered more feeble ; and the whole, as a consequence, suffers.

But these considerations trench very closely on another condition, or *law*, of healthy action in the circulatory system, upon which I must treat at considerable length.

LAW 5. *The Passions and Affections must be healthful.*

The state of the passions and affections — both occasionally and habitually — has much more to do in the way of preserving and promoting health than is usually supposed. Perhaps no one thing can be mentioned which deserves a larger share of our attention.

“The passions founded on pleasure,” says Sweetser,\* “cause a universal expansion, if it may be so expressed, of vital action. The blood, under their animating influence, flows more liberally to the superficies, and playing freely

\* See his work on Mental Hygiene, p. 86.

through the capillary vessels, the countenance becomes expanded; its expression brightens; and the whole surface acquires the ruddy and genial warmth of health.

“Nothing,” he adds, “contributes more to the healthful and harmonious action of our organism than an equal distribution of the blood to its various parts, and especially the free circulation of this fluid in the extreme vessels of the surface.” A truth which well nigh deserves to be written in letters of gold!

“Love, hope, and joy,” says Haller, in his work on physiology, “quicken the pulse, promote the circulation, increase the appetite, and facilitate the cure of diseases.” This is equally true of *all* the elevating affections and feelings, as well as of love, hope, and joy. It is particularly true of faith and moral courage.

That there is an excess of these feelings which is quite as injurious to health as their moderate indulgence is favorable, there can be no doubt. I could fill up an hour with facts of this kind, which would be pertinent, and some of them striking.

“Extravagant and unexpected joy,” says Sweetser, “increases unnaturally and unequally the circulation, and occasions a painful stricture of the heart and lungs, accompanied with sighing, sobbing, and panting. Under its influence even instant death may ensue.”

How amazingly important, then, to the well being of the heart, and the whole circulatory system, the proper restraint and due regulation and direction of the passions! Fear and grief have as much influence as hope and joy, and are, in their various shades and degrees, much more frequently operative.

How common it is, among us, to find persons of every

description giving way, not merely on those occasions when the voice of Providence calls us to grieve in moderation, but to an habitual indulgence in grief about that which cannot be helped, but which is only made worse by that very indulgence!

You may have heard the story related by Dr. Rush, of the rebuke administered by the kind Quaker. His much-valued friend and acquaintance had lost her husband, and the loss was severely felt. After the lapse of a reasonable time for her grief to subside, he called on her, and found her still in tears. A long time afterwards he called again, but she was still grieving. "Ah!" said he, "hast thou not yet done blaming the Almighty?"

He might have told her of the violence — the suicidal violence — she was doing to her whole frame, especially the nervous system and the heart. He might have spoken of the threads of life she was daily and hourly sundering, and of the account she must one day render for her every act of self-immolation.

This subject is one whose importance is so generally overlooked that I hardly need to apologize for dwelling on it a little longer than at first view might seem necessary.

Sweetser says, "On the first strong impulse of mental affliction, an agonizing sense of oppression and stricture is experienced at the heart and lungs, accompanied by a dreadful feeling of impending suffocation. The whole chest, indeed, will oftentimes seem as if it were bound tightly with a cord. The want of fresh air becomes at the same time most urgent, giving occasion to the deep and frequent sighing so commonly observed in those stricken with calamity.

"This act, or sighing, consists in a long-drawn or protracted inspiration, succeeded by a corresponding expiration, which,

besides furnishing an increased supply of air, may, by distending the lungs, facilitate the passage of blood through them, and thus serve, in a measure, to alleviate the painful oppression felt in these organs and at the heart.

“So distinct and remarkable is the suffering at the heart in deep grief, that the term *heartache* is used to express it, and its victims are said to die *broken-hearted*. Under its aggravated influence, even sharp pains of the heart, shooting, perhaps, to the shoulder, are experienced; and every pulsation of this organ is attended with the most thrilling distress.”

But the sensations in grief, which, though less deep, are more permanent, do not differ so essentially from these as might be supposed. There are thousands who have had their hearts almost suspend their motion on account of slight but sudden troubles.

I might call your attention, at great length, to the inroads which are made upon the blood and the organs of circulation, by the depressing passions. But it may be sufficient to say that what is so injurious, in large measure, as anger, fear, grief, hatred, &c., are found to be, cannot prove otherwise than injurious in those measures and degrees which, though much smaller, are more common.

Our Savior has said, “Be not anxious,” &c. How far he spoke with a wise reference to the physiological effects of that undue anxiety with which our earth is filled, cannot now be determined; but every student of human nature knows with what emphasis the injunction might be made; as well as the terrible consequences which its neglect brings to society.

The size of the heart was mentioned at page 170. But this is a general rule only, to which there may be some exceptions. The relative size of this organ depends much on the character of its owner. The greater the physical courage

and energy, the larger and stronger the machinery of circulation.

This difference is perceptible to the feeling, externally. Find a feeble person, — one to whom we are accustomed to apply the epithet *hen-hearted* or *chicken-hearted*, — and the heart is feeble, and the pulse beats feebly. On the other hand, a person of a contrary character has a strong heart, and firm and strong pulse.

Thus there is, as it were, a phrenology of the heart, as well as of the head, which deserves our study and attention. That the character depends, in no small degree, upon the due development and relative proportion of the different parts of the brain, I fully believe; but I believe also that much depends on the size and energy of the lungs, heart, stomach, liver, &c.

But be this as it may, there is certainly a mutual connection and dependence. The day may arrive when it will be possible to determine the character, especially some of its phases, by knowing the size and structure of the heart, and the general force and vigor of that and the arteries.

In visiting our schools, I sometimes amuse myself, and, as I trust, do the pupils a little good, by the following general train of instruction, having first shown them a diagram of the heart, or a coarse drawing of it on the blackboard.

“You have heard about hen-hearted people; shall I tell you what it is to be hen-hearted? Well, then, people who are hen-hearted have very small and feeble hearts, and their pulse beats very feebly and faintly. I have known some children who were chicken-hearted.

“On the other hand, there are persons who might be called lion-hearted. These have large and strong hearts, and a strong, bounding pulse. There are some of these to be

found in nearly every school. I trust there are some in this school.

“Those children who are resolute and decided about their lessons — who never say, I can’t, but always say, I’ll try, or at least think so — generally have strong hearts and arteries. Or if they are not very large and strong now, their resolution and courage will tend to make them so.

“In many instances, however, we find children hearted about their studies. They are almost always complaining about their lessons — that they are too long or too difficult. They allow themselves, very often, in saying, I can’t, or at least in thinking so.

“Now, if you wish to be strong and healthy, as long as you live, never indulge yourselves in saying, I can’t, when it is your duty to say, I can, or even, I’ll try. *I can’t* never accomplished any thing noble. *I’ll try* has done wonders.”

Remarks like these, by way of illustrating a broad, general, and important principle, have sometimes interested grown people, as well as children. They are founded on truth, and are very simple; why should they not be listened to with pleasure? More than this, why should they not be put in practice?

What has been said will serve to make known my meaning when I say that the influence of the elevating passions and affections is necessary to the proper development and energy of the circulatory system. It will also show what is meant when we affirm that the depressing passions and affections have a contrary tendency.

It is not too much to say that the application of pure Christianity in the education of the young will yet work wonders in the transformation of our world. Surely the apostle was

not mistaken when he said, "Godliness hath promise of the life that now is, and of that which is to come."

Nor was the wise man under a mistake when he said, "Train up a child in the way he should go, and when he is old he will not depart from it." We may safely challenge the world to produce an instance where this promise has failed.

#### IV. DISEASES OF THE BLOOD AND ORGANS OF CIRCULATION.

No error is more widely diffused than the doctrine that the blood is subject to disease. It is an error in which quackery loves to revel, and in which it seems likely to revel for some time to come.

The fanciful idea of purifying or cleansing the blood seems to have become a part of almost every human mind, in all states and stages of society. It is not confined to those who are generally uncultivated, nor, strange to say it, to those who are ignorant of the laws of physiology and hygiene.

Some rely on pills for the purpose; some on powders. Some use *old Doctor Townsend's* sarsaparilla, and some that of the *young* doctor. Some use "no medicine," but procure an alcoholic mixture, and drink of that seven or nine "mornings running." Some prepare a sirup, into which they make it a principle to put as many herbs and roots, "good for the blood," as they can find in all the fields and woods of the country. The virtue of the sirup is supposed to be in proportion to the number of strange ingredients of which it is composed. These sirups, moreover, are frequently regarded as greatly improved by adding a little spirits, "to make them keep;" and by being made according to the prescription of some seventh son of a seventh son, some female doctor, or a

half-drunken or quite worthless Indian. They have, moreover, a peculiar *vartu* in "the spring of the year."

Not a few of the popular nostrums of the day owe their success almost entirely to a supposed efficacy in purifying or cleansing the blood. Remove from the public mind their faith and hope in this property of the far-famed curative, and its hold on it would be as evanescent as the early clouds and morning dew.

But let us look into this matter for a moment — not, however, in the light of physiology exclusively, but also in that of common sense. Suppose it were possible for the blood to be really diseased, in a manner so independent of the solids as to require special treatment. Would there be the smallest probability of its restoration? For this fluid is scattered through a multitude of vessels which no naked eye can number, and perhaps no microscope. The anatomist can, indeed, reckon up some one thousand arteries and three thousand veins; but these are only the larger branches. All these vessels are so many small rivers of blood, coursing their way outward in the arteries, and inward — that is, towards the heart — in the veins and capillaries. Their course is exceedingly rapid — so rapid that the whole mass of blood, or a quantity equivalent to the whole mass, passes through the heart, as we have seen, every three or four minutes. This mass of blood, moreover, is continually changing — never for a moment the same. The best particles for building up the system are continually taken out and applied to repair the old wastes, or to increase the size of the body; the watery parts go off by perspiration and otherwise, and their place is as constantly supplied by new chyle made from new food and drink.

Suppose, I have said just now, that the contents of these rivers of blood could be diseased, and the diseased blood in them

have no influence on the vessels themselves ; suppose, too, you could throw into them some medicament which had really a cleansing power — how long would they remain cleansed ?

The blood of to-day will not be the blood of to-morrow. It will have passed away in part, and new currents will have been substituted. Will not these need cleansing, too ? For remember that the vessels are emptied and replenished by degrees only, and what shall hinder the new mass just made from new chyle, from becoming assimilated to the old diseased mass to which it is introduced ? And how long will it take, in this way, to complete the work of renovation ?

The idea — I repeat — of renovating or purifying the ever-changing mass of blood by *direct efforts applied to the blood itself* is utterly futile — almost ridiculous. You might as well think of changing the character of the mass of waters that constitute the mighty Mississippi. But who does not know that if he could change the Mississippi of to-day, it would not reach the Mississippi of to-morrow, and that his work must be repeated daily, without end ?

I do not say that nothing can be done in the way of purifying the blood. *Much* may be done ; but it must be done *indirectly*. The blood is not to be purified as we would clarify the foul, stagnant contents of a tub or vat. It can only be done to any practical purpose by invigorating the machinery by means of which blood is formed, and by making a wise selection in regard to the material from which we form it. In short, the only pill to be taken for the blood — and a bitter one it indeed proves to many — is obedience.

Thus, as you see, I admit that the blood may be purified by obedience to the whole code of divine law, physical and moral. This is equivalent to admitting that there are diseased

states or conditions of the blood, and that these conditions of this great mass of fluid are not wholly unworthy of our attention ; but it is not admitting the popular notions about cleansing it. I have known an intemperate man — one who had been intemperate in the use of cider, spirits, tobacco, &c., forty years — whose solids and fluids both seemed to be most sadly diseased. The blood which flowed from a cut or lacerated surface appeared to be in a watery, discolored, unnatural state, and the wound would be whole months — sometimes six months — in healing.

But let us come at once to diseases of the machinery of the circulation — the heart, arteries, veins, and capillaries. And, first, let us consider those of the heart.

The most troublesome disease of the heart is that which has been sometimes called *cyania* or blue skin. The skin is really more blue than is natural, owing to the fact that the blood is not well cleansed of its impurities. This disease is quite incurable ; though with regularity of the appetites and passions, the sufferer may live on for several years. The *cause* of this strange disease is born with the individual, and consists in a wrong formation of some portion of the heart. The most common of these wrong formations is that in which the heart, instead of being a double heart, with no communication between its right and left sides, is, to all intents and purposes, a single organ ; there being an opening in the partition between, which permits the venous or black blood to gurgle through into the arterial or left half, without being changed.

Another heart disease is called in books *hydrocardia*. In other words, it is a species of dropsy. The heart is naturally enclosed, like some of the other organs of the body, in a bag or sac ; and in the sac, fluid sometimes collects. The disease

is accompanied by violent palpitations, and many other troublesome symptoms, and is incurable.

Angina pectoris, a very painful disease, — one which is almost as difficult of cure as any other, — is now, by most, considered a disease of the heart; though it must be confessed that there is considerable doubt among medical men both with regard to its seat and general nature. The celebrated Dr. John Hunter is usually said to have died of it; though the immediate or exciting cause of his death was a fit of anger.

There is another species of disease to which the heart is liable, which is probably somewhat within human control. I refer to a gradual increase or diminution of thickness in the walls, or fleshy sides of this organ. The increase of thickness is sometimes so great that the heart appears to be twice as large as before. The disease is called *active aneurism*.

But the opposite condition is probably most common, and most fatal. In these circumstances, the walls of the ventricles may become so soft and thin as to give way under a violent effort, as in jumping, lifting, falling, &c., as well as in a violent fit of anger, the transports of joy, or the excesses of grief.

I have intimated that these last diseases are more within our control than the former. This is judged to be so because we understand better their causes. No person who comes into the world with a tolerable constitution, and obeys well those laws of circulation which I have elsewhere mentioned, will ever be likely to suffer in this way. Or, if suffering should come on, obedience to these laws would render it more tolerable.

Aneurism of the great aorta is one of the most common diseases of the circulatory system, and by far the most fatal. It consists in the bursting and protrusion of the blood through

one of the coats of the artery, so as ultimately to form a sac, of greater or smaller dimensions. These sacs themselves are also apt to burst, and when they do, the most certain and sudden death follows.

The bursting of an artery is caused remotely by ossification. There really ought to be no ossification, or change into bone, in any of these organs or parts; but it sometimes happens that, owing to ill health, intemperance, a permanently bad position of body, premature decline, or other causes, the muscular coats of the artery ossify, and it becomes so brittle as to break or burst. It is not the aorta alone, however, which is liable to this disease, though, from its nearness to the heart, aneurisms of this vessel are most fatal. All the arteries are liable to disease of this sort, but they are especially so at their acute angles, and at points where they are most exposed to compression.

Diseases of the heart, and such diseases of the aorta as have an immediate effect upon the heart, are becoming very common in all civilized countries which give free scope to the powers, passions, and appetites of mankind. Several thousand persons in Great Britain perish yearly in this way, and a number not much smaller in the United States. The mortality from this source is, moreover, every year increasing.

So far as I have observed, heart diseases are most common and dangerous among that class of sedentary persons whose position is bad, and who give up the reins to appetite and passion. Several popular editors of daily periodicals, especially in times of high political excitement, have fallen victims to ossification, and consequent aneurism.

Much is said of sudden death, as if it came by chance or haphazard. We frequently hear it spoken of as if the person, up to the moment of death, was in perfect health. Now,

it is obvious that death and perfect health are terms incompatible with each other. No person ever died in perfect health, except by miracle, accident, or exterior violence.

Many, however, die suddenly, — as Dr. Hunter and George II. did, — who appear externally free from disease: It is, however, very probable that a large proportion of these sudden deaths are from causes of the kind referred to in the preceding paragraph. Should not the hopelessness of cure, in these terrible diseases, be a powerful motive to impel us along in the path of obedience ?

Of diseases in the veins and capillaries I may have something to say when we come to consider the penalties which God, in nature, has attached to the violation of his laws of health, in relation to the moving powers of the system. For the present, I will only relate a single anecdote.

When I was a student of medicine, a man came to the office and desired to be bled. He did not give his reasons : he was one of those strong-headed men who deem it almost an insult to be asked, even by their family physician, to give reasons for any thing to which their fancy or inclination prompts them.

He was, however, near sixty years of age, of plethoric appearance and luxurious habits, laboring little, but living on high-seasoned food, and using some wine and cider. He was, moreover, a man of highly excitable passions. Attempts were made repeatedly to procure blood, but in vain ; and he went home with about as much “bad blood” in him as he brought. Had he changed his habits, even at this late hour, he might have been spared ; but he went on in his usual course a few months, when he died suddenly, as the world said, in perfect health.

I asked the physician what the reason was why the blood

did not flow, when he used his lancet on Mr. U. "Reason enough," said he; "his veins were all ossified!"

Now, I have no doubt he was ossified at every point where arteries and other vessels ever do ossify; but it is rather difficult for me to believe that the *veins* of the arm were ossified. However, I believed it then, and the statement may have been true! But if so, what a loud call on us to betake ourselves to plain living, active and industrious habits, and the cultivation of all the Christian graces and affections!

So common, and troublesome, and fatal are these diseases of the heart, that it should be made the duty of every parent and teacher to give full and free instruction on this subject at the earliest possible period. Or, rather, children should be formed to correct habits before they are old enough to have any physiological knowledge of their own. But as this training has been omitted with most of us, either for want of knowledge ourselves, or for want of *conscience*, it only remains to us, of the present generation, to reform and correct what has thus far been either wholly neglected or performed amiss.

A teacher, whom I knew, was accustomed to give, on the blackboard, a profile view of the body in two positions. One of these was the healthy sitting position; the other the dangerous one. When he found his pupils sitting in a bad position, he would direct their attention to the drawing.

An ingenious parent or teacher might be ever and anon devising methods for meeting and obviating this tendency in the young to sit in a crouching position. The great thing, I grant, is to remove the temptation as far as possible. In a world like this, however, it cannot, I fear, be removed entirely.

One who has but the slightest knowledge of the human frame may use the device already alluded to. We may have

blackboards in the family as well as in the school. And few parents can justly complain of want of time to perform such indispensable little offices for their children as these.

It is greatly useful, in many instances, to draw on the blackboard, both in family and school, an outline like that at page 106. It requires no special training; you need not, therefore, hesitate. The diagram may be sketched in a moment, as it were, and yet it is one of great importance, and may be made a source of much instruction. The situation of the heart, of the lungs, of the stomach, and the liver, might be thus shown at a single glance, and a brief account given of their various movements. Children are forgetful. I know; but there is not one child in a hundred so stupid as not to be interested in these subjects, for the time. And when they forget, the instruction must be repeated and reiterated. The old rule is "line upon line, precept upon precept, here a little and there a little."

With the aid of such a mere outline, any child may be shown, in five minutes, why and how he endangers his heart, his lungs, his stomach, or his liver, by sitting in a position which compresses the organ. A further illustration of the manner in which injury is done to the heart may be given with the aid of the diagram seen at page 117.

The great arch or curve of the aorta, with its upward branches, may be shown, and the natural and certain consequences may be pointed out, of compressing the aorta and thus compelling the struggling heart to force the blood through a passage rendered too narrow. And if the parent or teacher feels himself competent to the task, he may go still further, and teach his child or pupil something of the delicate internal construction of the heart itself, and show him how it may be injured by being crowded out of its place or

compelled to a constant struggle by the pressure of a constrained and unnatural posture.

It should be distinctly understood by all, that it is not by compressing the heart, for a moment, during a natural and necessary bend of the body, either in exercise or amusement, that mischief is done, but by a constraint or force which is long continued. And so of the compression of any other internal organ or part.

But this reminds me of a frequent parental error. It is that of confining young children of both sexes, but particularly boys, for ten, twelve, or fourteen hours a day, in a position which must inevitably injure their hearts, as well as their lungs, stomachs, &c.

This error is more common in the old world than in the new, but is becoming quite too common even among us. A father in Massachusetts, who has a son ten years old, — I believe an only son, — confines him, from morning to evening, at pegging the heels of boots; and consoles himself with the thought that he gives him his evenings! Yet his evenings are worth very little, after such a day of toil. I have seen him sit, at evening, as stupid almost as the mere machine or automaton, preferring the chimney corner to the bat and ball, the skating, or the coasting; and finally, “tired nature” overcome, sinking into rest, only to rise next morning and renew the same mill-horse round of toil.

The father had an apology, as well as a consolation. This was his poverty. Alas for the *causes* of his poverty! Theologians, statesmen, and politicians should see to this. But I will not digress. Did he not know that, by sowing the seeds of heart or pulmonary disease, he might be preparing the way for years of future suffering? Perhaps not. Thrice blessed then the day that, by its flood of light, shall compel parents

to think of such things! The deed of destruction may be done, even then; but it will be a deed which should consign to infamy eternal even a demon himself. A father might defraud himself, and be comparatively guiltless; but there is no name for a crime so black as that of robbing a son of half a life for the sake of indulgence in mere luxuries!

Shoe and boot makers, and perhaps tailors are more liable to heart diseases than any other class of mechanics or manufacturers with which I am acquainted. I have sometimes, when travelling as a lecturer, found from fifty to a hundred of them, in a single boot and shoe making village. I have prescribed for dozens, if not scores of them, in a day.

Of those who die of heart complaints outright, a large proportion are from those persons in society who are subjected not only to a bad position of body, but to much wear and tear of mind, much depressed feeling, and much deep anguish of the soul.

Fewer persons die of these complaints in plain than in high life, fewer in agricultural districts than among manufacturers, and fewer in town than in city. There are fewer, also, in despotic governments than in those which give the people more freedom of action. This, however, need not be an objection to freedom, in itself considered; but only to freedom without intelligence.

I must say, once more, in closing, that no one thing promises so much for heart complaints as the religion of Christ. This not only binds up the broken-hearted morally, but physically. It is more than any other medicine,—I may say, more than *all*. Yet even this cannot wholly cure. It will only prevent, and soothe, and allay. In the most glorious days of earth, when obedience, in the race, is universal, heart diseases will be unknown.

## LECTURE V.

## THE LAWS OF THE SKIN, AND OF BATHING.

## GENERAL REMARKS.

MANY persons regard the skin as a mere wrapper or covering. They have very little idea — perhaps the thought never entered their heads — that it is a highly important organ, fearfully and wonderfully made, like the rest of the organism it covers, and that it has highly important functions or offices to perform. A few among us have, indeed, risen a little higher, and have imbibed some general ideas of its usefulness; though their notions are very inadequate and unworthy. They may suppose it to be a sort of sieve or strainer, through which the fluid of perspiration oozes, as water out of a sponge, when pressed. Hence the common idea of pores in the skin, and of these being shut or opened. Hence, too, the common but erroneous idea that, in order to cure a cold, we must force open the pores.

Now, the skin is certainly a wrapper, — a strainer, too, if you choose to regard it as such, — but it is much more. It is a depurating or purifying apparatus. The lungs are, indeed, the more special depurating organs; but both the skin and kidneys greatly aid the lungs in their work of depuration. Whatever the lungs do, in other words, the skin aids in doing. We may, therefore, be said to respire or breathe all over. But this will be better understood presently.

The skin, both as an aid to the lungs and as an independent organ, may be regarded as having the same relation to

the system, generally, which the safety valve has to the boiler of the steamboat, or railroad engine. As the steamboat boiler, under heavy pressure, would often burst, were it not for the safety valve, so will there be many explosions of the human body, if the skin ceases to perform its offices.

There is one qualifying remark necessary here. I do not mean to say that the boiler will burst under a momentary compression for the first time. I mean only, that, when the boiler has been strained repeatedly and long, the attraction of cohesion in its substance becomes so much reduced, that the pressure at length overcomes the resistance, and there is an outburst.

Hence it is, that, in order to perfect health, the skin must perform, unremittingly, its great work of depuration. To accomplish this, it must be plump, active, and energetic; and, with the aid of other organs, must keep up constantly, in the body, a strong centrifugal or outward tendency. This centrifugal tendency exists, moreover, in the greatest possible degree, when the skin best performs the work or offices assigned to it. It must *absorb, secrete, excrete, and sympathize.*

To understand well our subject, let us look briefly, in the first place, at the MECHANISM of the skin; then at its OFFICES; afterwards at its LAWS; and, lastly, at the penalties annexed to the violation of those laws; or, in other words, at its DISEASES.

#### I. MECHANISM OF THE SKIN.

The skin is not a single layer, or membrane, but is made up of several. Different anatomists speak of a widely different number of these layers; but we usually say there are three; 1. The cuticle, or scarf skin; 2. The rete mucosum, or mucous layer; 3. The cutis vera, or true skin.

The cuticle is to the human body what the scarf covering of the shrub or tree is to the interior. It has no vessels or nerves of its own; and, consequently, has no life or feeling. It has only innumerable small openings. These openings, for want of a better name, are called *pores*. It is through them that the perspiratory fluid and the sebaceous matter (to be spoken of presently) find their way. They are hardly discernible by the naked eye.

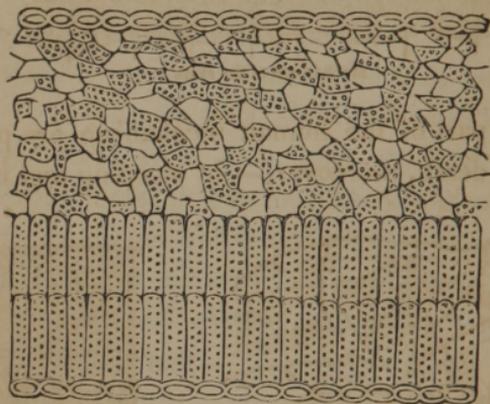
The cuticle is said to be scaly in its structure. It is easily removed — almost without pain, and without shedding blood. Thus we sometimes graze our skin, and remove large portions of it in a moment. It is renewed very rapidly — almost as soon as it has been destroyed. It is also easily detached by a blister.

Immediately under the cuticle, or, as some say, forming a part of it, is a species of thin and delicate network, in which are numerous little cells, containing coloring matter. In the African it is black, in our own European race it is white, &c. This layer of the skin is called *rete mucosum*.

The *cutis vera*, or true skin, — that alone from which, by tanning, leather can be formed, — is the third and most important of the several layers. It is principally by means of this and its machinery, that the skin performs its numerous and varied offices.

To give some faint idea of this layer or membrane, suppose only a square inch of it, while in healthful activity, could be brought to view through a microscope which magnifies three hundred thousand times, like Humboldt's, or many millions, like Lardner's. The vast amount of curious machinery would astonish, if not overwhelm, the mind. Why, the mechanism of a green leaf is astonishing; but that of the skin far more so.

Perhaps you have seen some huge factory, — say the gingham factory, at Clinton, Massachusetts, — where, at one view you can behold about an acre of spinning and weaving machinery, with the hundreds of operatives required to work it; or you may imagine yourself on the top of the famous Crystal Palace in New York, surveying the wonders collected there for public exhibition; or you may witness the dissection of a steam engine into its more than five thousand pieces; and yet, surprising and overwhelming as either view might be, what is it to the view alluded to through the micro-

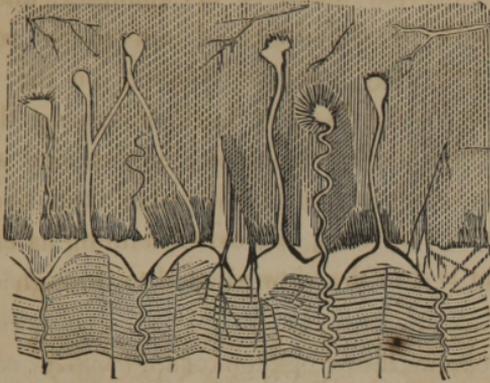


Internal structure of a green leaf.

scope? What is it compared with the sight of hundreds of rivers of blood coursing their way, and that, too, side by side, in opposite directions, with hundreds of nerves, lymphatics, perspiratory vessels, sebaceous glands, &c.? Is it too much to say that in this little spot — this square inch of human skin — there appears to be vastly more of living machinery than there is of dead machinery in a whole acre of spinning jennies and power looms? \*

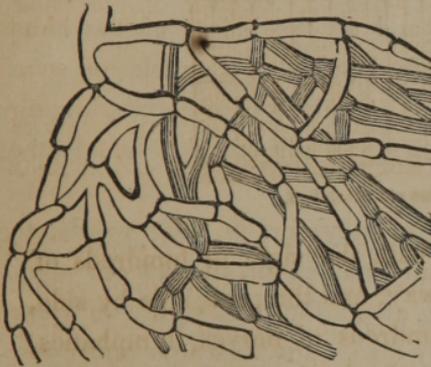
\* Carpenter in his Principles of Human Physiology, estimates the pores of the skin at seven millions, and "the length of the perspiratory

For here it is, as I just now observed, in the interior of this wonderful cutis vera, or true skin, that the various



Mechanism of the skin.

offices of this part of the human mechanism are performed. From birth to death, moreover, — in sleeping and in waking,



Lymphatics and capillaries.

— there is no suspension of the labor, unless in sickness or disease.

tubing” at one hundred and forty-five thousand eight hundred and eighty-three feet, or nearly twenty-eight miles. This, of itself, is something. It is seventy or eighty feet of tubing for a single square inch of skin.

The color and texture of this membrane, when the cuticle and mucous coat have been removed, are essentially the same. God has thus not only made of one blood all the nations of the earth, but, in strictness of physiological language, he has made them all of one skin.

The hairs do not originate in the skin, but merely pass through it. The nails are inserted into it, somewhat as the hand is inserted into a mitten or glove. The nail does not pass through it, like the hairs.

This whole triple membrane is connected loosely with the parts underneath it, by means of a cotton-looking substance, called, in the language of the books, *cellular membrane*. What appear like large veins in the skin, especially that of laborers, are usually found in this cellular membrane, underneath it.

Why the skin appears to be so much thicker on the back part of the body and limbs, and on the palms of the hands and soles of the feet, is chiefly because the cuticle, or scarf skin, is so much thicker there. On the feet of certain laborers who go barefooted, the skin seems almost like sole leather for thickness.

The surface of the human body, or, in other words, the extent of the skin, is generally spoken of, in books of anatomy and physiology, as being about fourteen or fifteen square feet, in an adult of ordinary size. Its thickness and consequent weight are very different, according to the difference of temperament, and various other circumstances.

## II. OFFICES OF THE SKIN.

The first office or function of the skin which I shall mention is its power of absorption. It is able to absorb or imbibe

many substances, especially when they are applied to it in a semi-solid or liquid state, and conduct them to the interior of the general system.

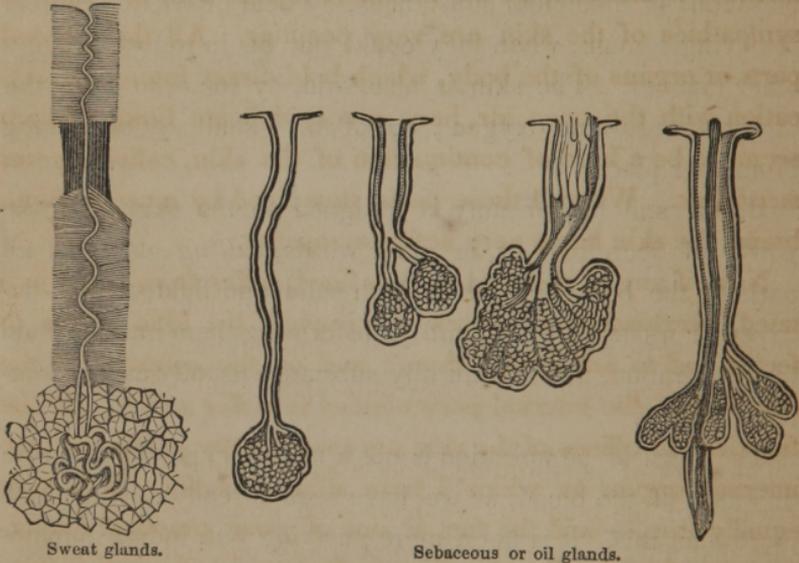
Thus the sailor, when destitute of fresh water, can allay his thirst, in some measure, by the application of cloths wet in salt water to his skin, when its presence in considerable quantity in his mouth, throat, and stomach, would only increase his tortures. Thus, too, the physician can introduce poisonous or medicinal substances, by heat or friction, within the living domain, when they could not be introduced in any other manner. The skin is also said, by some, to have the power of absorbing oxygen; but of this I shall say something in another place.

But a still higher duty is assigned to the skin, viz., the power of secreting, or, in other words, *culling out* from all parts of the body beneath it, both solid and fluid, certain decayed or waste particles, and transforming them into the fluid of perspiration, and into an oily substance usually called *sebaceous matter*.

The work of perspiration is not a *mere* escape of the serum or water of the blood, as we have seen already: it is much more than this. It is not a mere *pumping out*, indiscriminately, at the pores, such particles as can be reached. It is as if the skin had a sort of discretionary power to remove all effete or dead particles of matter, which, if not removed, would — so to speak — clog the internal system, become corrupt or putrid, and gradually destroy health and life. Nor is this, even, the whole which is done; for in removing dead particles from the internal parts of the system to its surface, the skin has power to change them either into the matter of perspiration, or into that oily substance found in the sebaceous glands. They are both entirely new substances.

The sebaceous matter appears to be designed to lubricate the skin, and is hence found most in those parts of the body and limbs where there is the most attrition or friction. Perspiration also aids in keeping the skin supple; but, still more, it serves to keep it cool.

But the secretion of both these substances, taking out, as it does, the waste particles of the body, is at the same time an excretion. Both the matter of perspiration and the sebaceous



matter are as truly excreted, or excluded from the body, — and intended to be so, — as the fæces.

In assisting the lungs, also, to get rid of the superfluous carbon found in the venous blood, the skin, like those organs, becomes an excreting agent, and thus proves itself to be a depurating organ of the very highest rank and importance.

The skin is, lastly, an organ of sympathy. I do not place this office last because it is of least importance, but because it is an office which may be regarded as somewhat extraordi-

nary, or out of the way, and which, to be perfectly understood, deserves a little anatomical and physiological explanation.

All parts of the human system are indeed sympathizing organs, since they have all the marks of brotherhood. The eye cannot say to the ear, nor the hand to the foot, "I have no need of you." Still more than even this is true, viz., that if one member suffers, all the members suffer with it; and if one member is honored, all the members rejoice with it. But the sympathies of the skin are very peculiar. All the internal parts or organs of the body, which hold direct intercommunication with the open air, have a very delicate lining, which seems to be a kind of continuation of the skin, called *mucous membrane*. With all these parts, thus lined by mucous membrane, the skin has a very active sympathy.

Now, if any of these parts, thus lined, suffer from being irritated, overloaded, or otherwise crippled, the skin seems to feel it, and to suffer with them; and on the contrary, if the skin suffers, the internal parts alluded to suffer with it. If the functions or offices of the skin are even tardily performed, the internal organs to which I have alluded suffer. It is also equally true,—and the fact is one of great practical importance,—that if either the skin on the one hand, or the parts lined by mucous membrane on the other, can by any means be made more vigorous and healthful, an improvement of condition is perceptible in both.

Besides these three or four leading offices of the skin, it has also several subsidiary or secondary uses, to which, in passing, I must be allowed to call your attention—promising, however, to be short.

1. The skin is an ornament, or would be so in a state of health. Unhappily, the true, healthful color of the human

skin is seldom seen. We more commonly find, on the one hand, a delicacy which amounts nearly to transparency; or, on the other, a deep red, or almost liver-colored skin, as if it were surcharged with dark, venous blood.

Both these, in their turn, have been mistaken for indications of health, while they more certainly indicate disease. The transparent or semi-transparent skin, so frequently seen among us, often denotes consumption or scrofula; while the turgid, liver-looking skin is quite as often the sign of disease in the region of the liver or stomach. As wise a man as the philosopher George Combe has called the American ladies beautiful because they have, many of them, a skin so delicate that you might almost see your face in it. And thousands make the mistake of calling the other class referred to healthy. It is a strange misnomer to call a diseased skin either beautiful or healthy.

Nor are the circumscribed red cheeks, so often met with, especially among children, to be considered beautiful. There is, of course, a native difference among mankind. Few, however, as I have before intimated, possess the true flesh-colored, healthy-looking skin. *They* do not possess it, in any event, whose cheeks look as if they were painted.

2. It should not be forgotten, by any means, that the skin is a covering and a defence of the larger nerves and vessels which abound immediately under it, and which would otherwise be frequently irritated or torn by contact. The veins that are so prominent on the skins of some people, especially emaciated laborers, are not, as we have already seen, *in* the skin, but under it. The veins of the skin can hardly be seen by the naked eye. They are so numerous that you cannot penetrate this organ with the finest needle without piercing one or more of them.

3. Nor should we forget, lastly, that by its very great extent, and the almost infinite number of its nerves, the skin is the seat of the general sense of feeling, thus enabling us to hold a ready communication with the external world, and to avoid many of its pains, as well as secure many of its pleasures.

### III. LAWS OF THE SKIN.

LAW 1. *We must avoid being long in Contact with such Things — solid, liquid, or aeriform — as ought not to be absorbed into the System.*

This first law of the skin is founded on what I have called its *first office*. True it is that the skin does not absorb every thing with equal readiness and facility. Pure water, from its mildness and want of irritation, is probably absorbed most readily, especially when warm or tepid. Poisonous substances, though often absorbed, appear to meet with more difficulty; and there are certain poisons I could name, which, by the skin of many individuals, cannot be absorbed at all.

When, however, the medical man is fully determined on getting his poisons into the human skin by force, he places them on the surface, and keeps them there as in the form of a plaster; or else he rubs the skin with them, in the shape of an ointment. In either case, a small portion of them is absorbed. Thus cantharides, (Spanish flies,) mercurial ointment, corrosive sublimate in solution, &c., have been introduced into the system by means of absorption.

For this and other reasons, great care should be taken by the healthy to avoid all cosmetics, medicated washes, and rouge. Some of these are highly poisonous, and if absorbed might do serious and even irreparable injury to the constitu-

tion. In truth, I do not doubt that a large amount of mischief has been done in this very way.

Who has not heard of the absorption of poisonous matter into a wound by handling an animal that died of disease? Many excellent surgeons and physicians have lost their lives in this very way. It is on this principle — that is, by absorption — that the vaccine disease is induced upon the human system.

Now, poisons which affect denuded surfaces may affect the sound and comparatively healthy skin, when long applied to it. Hence, I repeat, avoid the use of them. I am not certain even of the safety of some of our eye washes and tooth powders. The best eye wash is water; and I am not quite certain it is not the best and safest dentifrice.

There is a great fondness for ointments all over the country. Some are supposed to be healing; some drawing; some opening; some cleansing; and some discutient or scattering. In short, I could name a dozen different offices supposed to be performed by ointments or plasters of various descriptions. But I need not, for every body is perfectly familiar with them.

I never shall forget a lesson I received on this subject while quite a boy. A man had cut his foot badly at the instep, and according to the custom of the country, had applied a plaster to it. I met him, in a shop, soon afterwards, showing it to a common-sense but vulgar-tongued surgeon. "Take away," said he, "your filthy ointment. When you have wounded your flesh in this way, you have nothing to do but to put together the divided edges of the wound, and keep them together, and nature will take care of the rest."

He might have said much more. He might have said that Nature *no* only *will* do the work, if we will allow her to do

it, but she *must* perform it. It cannot be done by any thing else. An ointment or plaster can no more draw, or heal, or scatter, as these terms are generally understood, than it can ignite, or fuse, or weld. You may as well attempt to draw a nail or a wooden pin, from a board or tree, with one of them, as any thing from the human body.

If it is asked, how, then, such a prejudice in their favor had its origin, I cannot answer the question. It is possible it originated in the same way that it is perpetuated; that is, by *false experience*. A person with a wound or sore is anxious to be doing something. An ointment is applied, and reapplied. Meanwhile the diseased part improves. — The ointment is supposed to have wrought the cure, when the truth is, Nature has done it, notwithstanding the ointment; or, rather, in spite of it.

Occasionally, I grant, Nature is disturbed by the ointment, and even foiled in her curative efforts. A friend of mine placed a medicated ointment over a large portion of his child's abdomen. Absorption took place, convulsions came on, and the child sunk under them.

In my early boyhood, in leaping from a fence to the ground, one day, a small stump pierced my foot, and a piece of it remained imbedded in the flesh. A plaster of beef's gall, it was said, would draw it out. The plaster was applied, and in a few days the foreign body was removed.

But what was the real process? Why, simply and essentially, that which usually takes place, whenever foreign bodies are removed in this way. A suppuration or softening of the parts in contact with the foreign substance comes on, and Nature gradually pushes it out; after which she heals the wound, always beginning at the bottom. No plasters, or washes, or salves essentially aid her. It is sometimes well to keep the part warm, or perchance to cool it.

But suppose medicated substances thus applied *were* useful. Would not very great *caution* still be necessary? Would there not — must there not — always be much of hazard in applying medicated ointments to a surface which has such power to absorb?

Pure air and water, as a general thing, with clean and wholesome clothing, are nearly or quite the only substances which can be safely kept in contact with the human skin. Even the *filth* which accumulates on it, from neglect of proper ablution, or from wearing foul clothing, or sleeping in foul beds, may possibly be absorbed. I shall allude to this again.

LAW 2. *The Skin should not be compressed, but should have full, free, and extensive Motion.*

If the human skin is really as full of machinery as I have represented at page 207, is it not obviously quite hazardous to confine or embarrass it in its operations? Let a compress, for example, be placed upon the looms and jennies at Clinton, and let the whole mass of moving machinery be suddenly reduced to one half its present thickness. Must not derangement ensue? Could a single wheel or loom go on till it had undergone a repairing process? And has it no ill effect to compress, to half or two thirds its natural thickness, the complicated machinery of the human skin? Has it undergone the process of compression, till it has become used to it, as eels are vulgarly said to get used to being flayed alive?

There is one striking difference in the two cases. Remove the compress from the acre of factory machinery, still there will be no proper action again till the machinery has undergone extensive and costly repairs, which will take up weeks and months of time. But in the other instance, as soon as

the compression ceases, a sort of hobbling motion begins. The work of reparation, however, takes up more time, at least if the compression is a matter of habit, or thing of many years' standing. I do not know, even, that the injury is ever wholly repaired.

Much has been said of the evil consequences of dressing too tightly about the chest; nor have these, so far as I know, been exaggerated. But in making an estimate of the injury, in these cases, we have usually confined ourselves to a consideration of the results of this compression to the lungs, heart, stomach, liver, &c. Now, the injury done to these parts is indeed fearful, and cannot be undone in a dozen generations. But the skin is injured, as well as the internal organs. The habitual compression of several square feet of it has wrought changes in the health of thousands and millions — to be as lasting as life.

Compression of any part of the skin is hurtful, especially if permanently applied. Tight boots, stockings, cravats, pantaloons, and even tight hats and gloves, are very undesirable. I have had a most severe headache, many a time, from wearing my hat too tightly for some time, on the forehead. And many a sedentary and studious man, by sitting with a tight stock or cravat on, and with his head bent forward, has injured his health by impeding the circulation of the blood, or preventing its return from the brain to the heart.

The permanent influence of any one of the forms of compression alluded to in the last paragraph — though it may to some appear a trivial matter — is sufficient to derange the whole system. The clothing should be loose, if possible, every square inch of it.

One word here respecting hard beds. Some have said, from the days of Locke till now, that a hard bed is as good

as any, provided we get sound sleep. And a few, as if to enforce the opinion with more emphasis, have said that the soft side of a plank is as good for a bed as any thing else when we get a little used to it.

Now, although the evils of sleeping on a hard bed are not quite so great as they would be were we to lie in bed as long as we wear our clothes by day, yet it is even a slight evil, in itself considered, to sleep six or eight successive hours on a board. Contrasted with a bed of eider down, the latter may be preferable; but contrasted with the elastic wire bed — which allows the whole body to have a resting-place, as well as a few parts or points — it is at least undesirable.

Comparisons have been made, too, between hard and soft seats. Now, it is contrary to nature's plan — entirely so — for people to sit on any thing for hours together; and matters might be so contrived, in most instances, in school, in shop, in factory, in church, and every where, that we might stand, a part of the time. Better, however, to have soft seats than to sit on planks for hours together.

I have said, elsewhere, that one office of the skin is to serve as a bond of sympathy or brotherly love in the human system, and that, if certain parts suffer, the skin also suffers with them. But it is particularly to be noticed that if any part of the skin, be it ever so small, comes to suffer in consequence of compression, every other part participates in the suffering.

This law commends itself to all who live, and move, and breathe; but especially to all Christian parents. It is high time for reason, and science, and Christianity to triumph over the customs of ignorance, superstition, and heathenism. It is, indeed, true that the particular forms of bodily compression which prevailed half a century or a century ago

may have passed away, but the ignorance on which it was founded still remains; especially our neglect of health, and of those customs which conduce to health during infancy and childhood.

LAW 3. *The Skin must not be irritated.*

By this is meant that there must be no *internal* irritation. Of external irritation I have said something already. I might advert also to external irritation from another source — I mean harsh clothing. But this is of too little importance, comparatively, to require more than a mere passing allusion.

By internal irritation of the cutaneous system, or skin, I mean now, principally, that kind of irritation which is caused by the presence, in the system, of improper substances, introduced there in the blood. We have seen, at page 208, and also in the lecture on the circulation, that the skin is full of blood vessels. If these vessels hold blood which contains irritating substances, the skin must be irritated, of course.

I have already stated, with sufficient distinctness, in the preceding lecture, that mere liquids, and poisons or medicines, are not digested. As soon as they reach the stomach and small intestines, they are taken up, — the finer particles of them, — and carried at once into the circulation; traversing, of course, all parts of the skin. Take, for example, a small quantity of rum, cider, or beer. This is absorbed almost as soon as it reaches the interior of the stomach. The watery part — nearly one half of the whole in the rum, and almost all in the beer — dilutes the blood. But the alcohol and the acids irritate all the parts with which they come in contact.

The first effect of these irritants on the skin, I admit, is to quicken its action. \*But this is soon followed by a debilitated

or collapsed stage. In this condition, instead of performing its offices more rapidly than before, the skin does its work too feebly and slowly, if not more imperfectly. This increased activity, followed by a proportionate debility, will be likely to continue as long as the cause continues to be applied. And as long as it continues, the vital energy of this whole covering of the body will become more and more lowered, till its power to perform its functions or duties is greatly impaired. In these circumstances, it seems almost unable to propel the blood at all. Hence the latter assumes a dark-red or brownish appearance, as in the case of the strong drinker, or even the tobacco smoker or chewer.

So also, in some degree, with those who drink tea or coffee, or are addicted to a very free use of high seasonings in their food. Indeed, a few have gone so far as to say that the tan, or tannin, of green tea, by combining with the gelatine of the skin, produces a leathery appearance. I admit the effect, but regard the explanation wholly fanciful. Other things, which irritate the skin internally, produce this leathery appearance, without *tan*. Coffee will do this nearly as well as tea.

One class of poisons in the skin, instead of giving it that thick, turgid appearance of which I have spoken, as if the vessels were clogged with their contents, seem to dilute the blood, and give to the individual the delicate waxwork appearance — an appearance quite as far from that of true health as the other.

In intimating, just now, that the skin is injured by high seasonings, as well as by rum, wine, cider, beer, tobacco, opium, &c., it was by no means intended to affirm that it is equally so. All I intended to say was, that to a greater or less extent, and in every possible case, they do injury.

It is, I believe, generally understood and admitted that a part of these seasonings injure the skin. Thus the half-putrid liquid called vinegar has a well-known influence on the skin in rendering it more pale and semi-transparent. So also of long-salted flesh, fish, and butter. But it ought also to be known that all the contents of the castor have the same general effect, though the difference in degree may be very great. Salt in moderation, added to our food, while on our plates, injures the skin far less, if it injures it at all, than mustard, pepper, saleratus, &c. So tea and coffee injure it less than cider, beer, and other alcoholic drinks.

*LAW 4. The Skin, in order to do its Work well, should be kept, as a general Rule, at a proper Temperature.*

So important to be observed is this rule, that Nature herself has gone very far towards enforcing it. Perspiration and the excretion of sebaceous matter do much towards keeping down an excess of temperature. Every one knows how rapidly the moisture on the surface of the body evaporates, and that evaporation produces cold. In extreme cold, on the contrary, the calorific powers seem to exert themselves, and an increased amount of heat is generated.

When I say that the skin should be kept at a proper temperature, I do not mean to affirm that we must or can always graduate our heat by the thermometer, or that slight departures from what we might be tempted to regard as a standard temperature, in either direction, are greatly, if at all, injurious, especially when the change is only for a moment. Sir Charles Blagden, who entered an oven, and remained in it till it was heated to four hundred and eighty degrees of Fahrenheit, — till it would bake meats in a very short time, — was not materially injured. A copious perspiration, and conse-

quent large evaporation, served, in part, to keep down the great external heat.

In like manner, he who plunges into water at a temperature of thirty-two degrees—which is sixty-five to seventy degrees lower than the heat of his blood—may experience a sudden and temporary shrivelling of his skin, but the effect is *only* temporary. Indeed, as we shall see presently, there may be ultimate benefit from it.

It is, however, a very different thing to go permanently chilly. This can never, in any possible case, be desirable, or even safe, unless it were the case of insanity. And yet, in practical life, this idea is adhered to by hundreds and thousands, and is the cause of millions of colds, with their terrible consequences—pleurisies, lung fevers, consumptions, &c.

Many tell us, for example, during the progress of the cold, bleak, homely days of November, that they do not put on mittens, stockings, and flannel, because, if they do this now, thus early in the cold season, they shall be obliged to wear two sets of them by the middle of winter. Thus they go about with a pale, shrunk, and consequently inactive skin, and actually take cold, and bring upon themselves that very suffering that they so much dread, and which they would gladly avoid.

Now, there is hardly any thing in practical life more erroneous. He who would be chilly all winter may go chilly all the autumn. But he who would be comfortable in December, January, and February, must make himself comfortable in October and November. By keeping ourselves warm,—that is, free from any thing like a permanent chilliness in autumn,—we do not put ourselves in a condition to be more susceptible to the severe cold of the coming winter, but less

ro. It were far more safe to go chilly in January or February than in November.

Few persons are fully aware — though some are so — how this going chilly in autumn only makes us the more tender and susceptible of cold afterwards. An eminent physician of Boston has repeatedly told me that he once lost his way in the woods on a cold winter's night, and wandered about till he was nearly frozen; and that for many subsequent years — nay, even to the hour of his giving me this information — he had been compelled to wear twice the amount of clothing he had ever worn before!

I remember an anecdote in my own history which goes far towards confirming the opinion in question. Being about to set out in the mail stage from Boston to Hartford, late in the evening, some twenty years ago, I met the distinguished Jacob Abbott in the street, who jocosely observed to me, "Now, doctor, take care of yourself to-night. Remember that none go cold but fools and beggars." The caution was timely, but was not sufficiently heeded, for I was so chilled by the journey, that I did not get over the effects of it during the whole winter.

In general, the extremes of heat and cold should be avoided as much as possible. The evils of long-continued heat in excess may be worse than continued cold; but both are bad enough. Let no one think himself absolved, by his great strength and health, from obligation to pay a reasonable regard to this law; for repentance may come too late, even to him.

He who would have a healthy skin must keep it as cool as possible, provided it is not permanently chilly. On the basis of this single rule we might found all our fashions in regard to dress and clothing, all our arrangements for warming and

ventilating, &c. But we need not do so ; for there are other laws and considerations to be taken into the account.

I have said that the skin is a sort of handmaid to the lungs. It is so in one particular to which I believe I have not in this lecture adverted. It aids those organs, as I am compelled to believe, in the great work of generating heat.

The body, you know, in winter as well as in summer, is to be kept up to a heat of ninety-eight or one hundred degrees. Now, the power of the skin to perform this part of its mission will be always in proportion to its health and energy. But these last, too, will be greatest when it is left to itself, compelled to do its own work, and aided as little as possible by external sources of heat.

Let it not be hastily inferred that I would have mankind return to a savage state. The charge is sometimes made against me by the thoughtless or the malevolent. A savage state is no more a state of nature than that over-refined condition of things which prevails all around us. Both are in open violation of those laws which tend to the highest human advancement. I do, indeed, contend for a return to nature ; or, to express the idea more exactly, a gradual *ascent* to nature. Man's nature is intended, most certainly, to include art, and to be affected and modified by science. But in making our ascent up the mount whence we have fallen, it is by no means necessary that we should return to barbarism.

To apply these remarks closely to the subject before us : In order to keep the skin cool, I do not urge the necessity of going naked, by any means ; and yet it is necessary, always, to the best health of the skin, that we should wear as few and as light and porous clothes as possible.

In summer, even in our high northern latitudes, the clothes may be very light indeed. Even in winter, they may be

much lighter than is usually supposed, if we only manage right, in other particulars: I mean, if we do but obey the other laws, moral and physical.

The health of the skin depends in no small degree — need I repeat it? — on the health of the system generally; and this, of course, on our obedience to the whole code of the great Creator's laws. We should, therefore, keep up the warmth of our bodies at all seasons, as much as possible, by means of proper food, drink, and exercise, and a proper attention to and regulation of the mind and heart.

A very little clothing will suffice to prevent a too rapid escape of caloric from the human body, whenever we come to be trained, from our earliest years, in the way of obedience. But when it happens that our clothing is really insufficient, as in severely cold weather, or when we are so situated as to be unable to take but little exercise, or our food is poor or scanty, or our mind perplexed or jaded, more than “a very little” is sometimes necessary.

But there are circumstances, undoubtedly, when we are justified in resorting to external heat, at least for the moment. The skin is not materially injured by remaining in a room heated to fifty, sixty, or even seventy degrees for a very short time. It is the long-continued application of this agent, or very sudden changes, that do the mischief.

Sudden warming the skin, when we have been for some time subjected to extreme cold, is peculiarly hurtful in a great variety of ways. It renders it tender and delicate, and even irritable; and by its powerful sympathies with the internal organs, renders them also delicate, susceptible, and irritable.

The more we indulge in sudden warming, moreover, the more we must. They who begin the habit of crouching over the stove, or crowding around the fireplace, suddenly, every

time they come near it, soon find themselves compelled to do so. They have submitted to a slavery which becomes every day more and more severe, as well as more and more intolerable.

Special pains should be taken to keep the skin cool by night; yet no injunction is more universally disregarded than this. Under the fear of sleeping too cold, — a very reasonable fear, in itself considered, — many an individual goes to the opposite extreme, and swelters all night under one fourth or one third too much clothing.

The error consists in being in too great haste to get warm, immediately after they retire. They pile on clothing, or require it to be piled on them, in order, if possible, to be warm immediately, when, would they exercise a little patience, they would be happier, and much more refreshed by their sleep.

*LAW 5. In order to have the Skin healthy, it must have an Abundance of Air and Light.*

This, though a highly important law, is not based so directly on the laws of structure and function as the others. Here I make my appeal, not mainly to anatomy and physiology, but rather, for the most part, to analogy and to reasonings from fact.

It must be obvious, however, from mere attention to the laws of physiology, that the skin needs air. If it aids the lungs by throwing off carbon from the blood and receiving oxygen, then it as certainly requires pure air as the lungs. But that this is the fact we know from numerous experiments, among which the following is the most palpable, and to the public mind the most satisfactory: —

Suppose a person has slept long in a bed where there is little or no circulation of the air. If you raise the bed cloth-

ing quickly, but gently, and place a lamp or candle underneath, it will go out. Now, *why* will not combustion go on in such circumstances? Simply because the oxygen is used up, and the confined air consists chiefly of carbonic acid and nitrogen gas, neither of which can support either combustion or respiration. For proof, raise the clothing and jerk it down again, or throw open the bed a while, and combustion will then go on underneath the covering.

Then we reason, also, from comparison and analogy. The lower animals in the scale of being, not a few of them, breathe wholly by means of their skin. As we ascend in the scale, we come at length to those animals which have gills, or smaller lungs. In these the blood is partly depurated by the lungs, and partly by the skin. As we ascend still higher, we come at length to man, whose large lungs do the greater part of the work. But though the lungs perform nearly the whole of the work of depuration in man, the skin, as we have seen, does a small part of it. And what there is to be done by the skin, it is highly important the skin should do, else it suffers, and with it the whole system.

Finally, we know by observation how important the air is to health. They who are most abroad in it, as all experience testifies, are the most healthy; provided, always, they obey all the other physical and moral laws as perfectly as those individuals do with whom we compare them.

No reflecting person will doubt with regard to the influence of air on the skin. Whether light is equally indispensable, there may be more hesitancy. But let us look at the matter as it is, and trace its analogies. The vegetable that grows in seclusion and darkness — as the potato in a dark cellar — is uniformly pale, delicate, and feeble; expose it suddenly to

the influence of the air, the rain, the cold, or the heat, and it suffers. So does the animal, and probably for similar reasons. The light of the sun is necessary to both.

And as a plain matter of fact, they who are seldom abroad in the open air, or, when they are, very carefully protect themselves from the sunlight by broad-brimmed hats, bonnets, gloves, umbrellas, veils, and covered carriages, and, when within doors, close the shutters and draw close the blinds and curtains, have much more of that delicate, semi-transparent, waxwork appearance, of which I have spoken elsewhere, than they who are more exposed.

It is not so terrible an evil to have the skin a little browned or tanned as many suppose. It is, at the same time, a little thickened and hardened. Not a few individuals would be gainers in point of health, especially children and females, by being slightly tanned all over their surface.

Let no one construe these remarks into an encouragement to that sudden exposure which, in our own climate, in July and August, might sometimes blister the skin, and which, in a tropical climate, might be followed, immediately, by what is called *coup de soleil*, or a stroke of the sun. For, educated as we now are, we might, without due care, frequently suffer in both these ways, though the sunstroke is of rare occurrence. Some caution, in very hot weather, is certainly necessary. It were better still, however, if we were trained so that no such thing could possibly befall us.

There can be little doubt that, in order to the best of health, mankind require not only a certain amount of moral and intellectual light; but also a certain amount of sunlight. Light, moreover, does much to establish and perpetuate what I have elsewhere called a centrifugal tendency in the system.

**LAW 6.** *One of the most important Conditions of Health in the Skin is, that it should be kept clean.*

Here, again, I make my appeal to anatomy and physiology. For if the skin is a secretory organ, its surface, so long as life and health last, is covered with a mixture of perspirable matter, oil, and dust. Is it not obvious that it should be frequently cleansed from the foul remains of these deposits? The necessity is increased, if we suppose this filth liable to be absorbed and carried again into the system.

How often the skin should be washed, bathed, or cleansed is quite another question — one which has not, as yet, been fully settled. Some have insisted on daily ablution; others have supposed once a day too often. We shall consider the matter in detail.

Certain parts of the system undoubtedly demand more of our care than others. Thus the hands and face, and the various outlets of the body, require, and to some extent receive, attention daily. There are few in civilized life who do not wash their hands and face every day. At least they wash the palms of their hands and the tips of their noses and chins. They forget, however, — at least some of them, — that the neck, armpits, and wrists, together with all parts of the system where there are folds or flexures, require almost as much attention as the face and hands. More sebaceous matter and more dust accumulate on these parts; which create the necessity.

Employment is to be considered. He whose life is studious or in any way sedentary, who is almost wholly denied physical exercise, needs ablution, both general and particular, much oftener than he whose employment is more active. Children at school should bathe oftener than is absolutely

necessary to those who work or play all the while. All these should bathe daily, at least in warm weather.

I do not mean to say that they who have an abundance of active exercise in the open air have no need of daily bathing. All I wish now to affirm is, that, whatever others may do or refrain from doing in this matter, daily bathing is, to the studious and sedentary, absolutely indispensable.

Some people hear these last statements with a good deal of surprise, if not of scepticism, although they are based on sound physiological principles. "We thought," say they, "that the reverse was true. We thought that the farmer, the smith, the housekeeper, &c., were the persons who require frequent bathing, and not the sedentary and studious. But they forget or overlook one important fact, viz., that the active exercise of these laboring persons tends to break up that coating, or *varnish*, which, being constantly collecting on the skin, prevents its full and free action; while the sedentary and inactive remain, as it were, varnished over.

Another objection has been made by some who ought to have known better than to make it. "If we bathe daily," say they, "there is danger of removing, too often, from the skin, that oil which Nature has formed in it for very important purposes."

Such an objection is not only gratuitous, — wholly so, — but almost ridiculous. Has not Nature on hand, at all times, ample materials for furnishing new supplies of sebaceous matter, whenever such supplies are needed? And does she not delight thus to furnish it?

Something, in this particular, depends upon our food and drink. He who over-eats, and especially he who indulges in greasy and high-seasoned dishes requires more frequent and careful ablution than other men. So does he who uses, ha-

bitually, any medicinal substances — tobacco, opium, alcohol, and even coffee and tea. The carnivorous require more bathing than the frugivorous.

Something also depends on the *manner* of ablution or washing. For the mere purpose of cleanliness, warm water, with soap, will have a better effect than mere cold water; and it need not be used more than half as often.

But there are objections to the frequent and very general use of soap and water, especially by the young; and some of them have weight. Soap is rather too stimulating for the tender cutaneous vessels; and hence those who use it much are apt to have rough skins. Some parents and teachers entirely interdict its use. The Rev. Mr. Wells, once of the Moral Reform School at South Boston, was of this number. To me its use seems only necessary in those extreme cases where the skin has been long neglected.

Even the very frequent use of warm water, — say at ninety-five to one hundred degrees, — without the addition of soap, is of very doubtful utility, except for remedial purposes. It is apt to debilitate, in the end. If used at all, it is best at going to bed; and it should not be used, even in this way, more than three times a week.

Cold water, by which I mean water of the temperature which it acquires by contact with the atmosphere, is, for the most part, to be preferred, as an application to the human body, for every ordinary purpose of health, and for not a few forms of disease. “But will it be sufficient to keep the skin clean?” you may perhaps ask. It certainly will, if you begin, in early life, with a tolerably clean skin, and use it daily; especially if you follow it with a good flesh brush, crash mittens, a coarse towel, or even the hand.

Those who have never washed themselves may need, at

first, one thorough scouring of the surface with soap and warm water; after which, daily ablution with cold water, followed by a good deal of friction, will be sufficient.

The *hour* for ablution is of some importance. It should not immediately precede a meal; nor should it directly follow it. Nor is it so useful, as a general rule, in the afternoon as in the forenoon. The best time is about two or three hours after breakfast. "But *why* at this hour?" I may be asked. "We thought the hour of *rising* was the best." It is, for many, the most *convenient* hour; and to the strong and healthy, it is even a tolerably healthful hour; but for those who can choose their hour, it is seldom, if ever, quite the *best* hour, physiologically. I will give the reasons.

For every other purpose but that of mere cleanliness, a reaction after bathing is indispensable. And even where the only object is cleanliness, bathing cannot be long safely followed *without* a reaction. The system may bear up under it a few years, but will ultimately, in most instances, break down.

Does any one ask what is meant by a reaction? When the cold water strikes us, it seems to repress the natural activities of the system, at least for the moment. But in most cases of tolerable health, this state of things is followed by action somewhat increased. The mind and body seem brightened by it; and there is a warm glow over the whole surface. This reaction, I say, is the test of usefulness in cold bathing. If this is obtained, either with or without a little friction, we are generally benefited by it. If, on the contrary, we are languid in body and mind, and the skin looks blue on the one hand, or like marble on the other, we are probably somewhat injured.

The reason why an early hour of the forenoon is the best hour for cold bathing is, that we have more real vigor at that

time than at any other, and are therefore most sure of a reaction. Our arterial, muscular, cerebral, and digestive systems are then so strong that it may, with great truth, be said the system is at flood tide. From about the middle of the forenoon till we retire to rest, this tide of life is ebbing; so that the worst time for cold bathing is at bed time. We are partly restored by rest, but not wholly. For complete restoration we need a light breakfast, and a little exercise. These are the general rules. Still, for those who cannot choose their time, the hour of rising will do very well — I mean for many persons; and it will for most, when they once get accustomed to the use of water by beginning at another and a better hour.

Many are afraid of cold bathing in the middle of the forenoon, after they have had some exercise, lest it should give them cold. “For is it not dangerous,” they ask, “to apply cold water to the body when in a perspiration? Have not many lost their lives by it?”

The way in which so many have lost their health and life, by going into cold water when hot, is as follows: They go in when they are not only hot, but fatigued. Or, instead of remaining in the water but a few moments, — in which case they might have a reaction, — they stay so long that a reaction is impossible. Many have destroyed themselves in this way, after long afternoon or evening walks, hard days’ works in the heat and sun, or hard weeks’ works in the long, hot days of the summer. I might state a hundred facts of this kind, but it seems hardly necessary. I will detain you with a few only.

Alexander the Great, at the close of a day of great heat and fatigue, was approaching the city of Tarsus in Asia Minor, through which flows a stream of very cold water.

No entreaties could prevail to dissuade him from bathing in the Cydnus. The rash act threw him into a fever, which came near destroying his life.

Two students of Edinburgh, after some thirty miles or more of hard walking, in a most sultry day, came at about sunset to a stream, whose waters were so tempting that they ventured to bury themselves in them for a few moments. An acute disease immediately followed. They recovered, but with shattered constitutions.

When I was young, it was customary on Saturday evening, at sunset, to go and bathe in a very cold mill pond. Some, who were apprehensive of danger, sat down on their arrival at the borders of the pond, and cooled themselves before they ventured in. Many suffered; but those who plunged in on their arrival suffered less than those who first cooled themselves. They got a better reaction.

To go into the water early in the day, while the tide is — so to speak — rising in us, and we are not yet much fatigued, even if there is a little perspiration visible on the skin, will do no harm. The hard laborer might just plunge in, and come immediately out and resume his labors. It would probably do him good. So taught Rush and Coffin. So teach physiology and hygiene.

This may be the appropriate place for saying that they who use the warm, tepid, or vapor bath for its invigorating powers and purposes, and would so use it as not to take cold, should bathe on going to bed; that is, at precisely the contrary period from that in which the cold bath should be taken, and under exactly opposite circumstances of the system.

“But can water be made to invigorate the system?” some may be disposed to inquire. Most certainly it can. One prominent object in its use is, indeed, its cleansing efficacy,

and this it is that seems to fill the mind of most persons when they think of bathing, cold or warm — I mean unless they combine with it the idea of swimming as an amusement, or of cooling themselves.

But in the frequent and proper use of cold ablution we gain two great objects : 1. Depuration, or cleanliness ; 2. Strength and vigor of constitution. We do so, I mean, if we manage the matter well — on the strict principles of physiology and hygiene. Both these results are worth all they cost, and much more ; but in a world like our own, where there are so many debilitating or downhill tendencies, the invigorating effect is vastly more important than the other.

For let it ever be remembered, that when the cold bath, for example, invigorates us, it is not the skin merely that is invigorated, but all the parts and organs that readily and deeply sympathize with it, especially the cerebral and nervous systems, and all parts lined with mucous membrane.

In this view it is impossible to predict, or even to conjecture, how much good is yet to come to our diseased race through the instrumentality of bathing, especially cold bathing — begun, as it should be, at life's threshold, and continued to its termination.

The positive and positively invigorating effects of cold water, used both externally and internally, seem to me as yet hardly dreamed of. Hydropathy, I know, talks about the positive effects of water in disease ; but I refer now to its agency in the great work of prevention, and the still greater work of manufacturing health.

Appropriate directions might be given to those who have never used cold ablutions about the manner of making a beginning. To those who are already so strong and vigorous that nothing seems to hurt them, my advice is, simply, Begin

— begin immediately — without much regard to time or circumstance. But to those who are constitutionally feeble, who have hereditary or acquired ailments, or who are far advanced in life, certain precautions are requisite; for want of which, I have, in one or two instances, known slight temporary disadvantages to follow.

Begin, as I have before said, some two hours or more after breakfast, while the tide is still rising. It is even desirable that there should be a slightly-increased activity of the circulatory system at the time, as manifested by a moderate degree of redness of the skin, and of perspiration.

The timid may begin with what Franklin called the air bath. Thus, after removing the clothing, take something coarse, or, if you prefer it, the hand, rub the skin well, and then replace the clothing. The feeble may with profit make use of the hand of an assistant. The next day, repeat the process, with additions. Rub a little harder, or continue the process a little longer. The third day, besides using the air bath, apply a little water to the chest, and immediately wipe dry, and replace the clothing, as before. All this while — the reaction being thus secured — courage and confidence will be increasing.

The water may be applied to the chest, and at subsequent bathings may be extended, gradually, to the arms, one after the other, to the back, to the abdomen, and finally to the whole body. In applying the water over more or less surface, either use a cloth or a sponge. Some use the hand, but it is not so good at first.

Another caution: The colder the water first used in this way the better. Many imagine it preferable to have it a little tepid. This is quite a mistake. The first sensations, I grant, are more agreeable; but the reaction is not so

good. A chill is much more likely to follow. Use as little water as you please ; but remember to have it as cold as possible.

Many think it desirable to perform their ablutions by a fire, or at least in a warm room. For the feeble this may do ; but for those who can, it is better to bathe in a cool or cold room. There is no special harm to any but the very strong to stand in a warm room while applying the friction.

I may have spoken as if the hand bath or sponge bath, so far as mode is concerned, were preferable. To those who can withstand the shock, I think the shower bath best adapted. Few constitutions will bear the cold tub bath, except in very warm weather. For those, however, who feel oppressed, or in any way injured by showering, the wet towel, the sponge, and the hand remain.

The vapor bath, except for remedial purposes, has no special advantages, so far as I know, over the common warm bath ; and is subject to similar rules. With the medicated vapor baths I have but little acquaintance.

Much may be done, in the way of keeping the skin clean, by a proper and timely regard to clothing, both by night and day. It is perfectly astonishing to observe the neglect on this subject which prevails, even among intelligent Christian people. I wonder there is not much more sickness than we find.

Most persons, for example, within the range of my own acquaintance, wear the same clothing by night — a part of the same — that they have worn by day. Some very delicate persons, who wear two or three thicknesses of flannels and washleather underclothes, actually retain them all during the whole night. Now, every one should have a dress entirely separate from any part of his day attire. When he lies down at night, his underclothes should all be removed and hung

up, one by one, that they may be properly ventilated. In the morning, the same thing should be done with every article of night clothing.

Is this a digression? Let us return, then, to bathing. Many say, "But what is the advantage of bathing every day? Why may not every other day, or even twice a week, answer the purpose? To bathe every day is quite a heavy tax upon one's time."

My reply is, It is perfectly easy, as I know from experience, to wash ourselves every day at rising, if we can only feel its importance. It soon becomes a matter of mere habit, and the tax is not felt. Any thing short of this is apt to lead to irregularity, or even omission. Besides, I do not believe once a day, for most persons, is too often.

Others say, "If once a day is enough in warm weather, why will not once in two or three days do very well in winter?" This is a question less easily disposed of than the former.

It should be noticed, in the first place, that I have not affirmed once a day, in hot weather, to be sufficient, but only that at least once a day is indispensable. But then it is not yet proved that, for the purposes of mere cleanliness, we need bathing any oftener in summer than in winter. We certainly exercise less—the most of us—in winter than in summer; and we certainly load our skins with as many impurities, through the medium of the stomach. Then, too, we wear more clothing in the winter, and more flannel, and get varnished over more readily.

It is said by some that bathing is an unnatural process; that he who made the human frame, and fitted it for an abode in all countries and climes, in some of which very little water is found, could hardly have had in view the necessity

of washing every day : must it not, then, be a departure from nature ?

Let us inquire. If it is so, a part of the animals below us depart from nature ; for they bathe. But what is nature, especially *human* nature ? Does it not take in the arts of life ? These certainly bring with them the necessity of attending, more or less, to the law of cleanliness. He who objects to nature should, in order to be consistent, object also to civilization and the arts and conveniences of life. He should contend for remaining always mere children of nature. He should contend for having barbarism stereotyped.

*LAW 7. In order to have a healthy Skin, the internal or spiritual Part must be in a good and healthy Condition.*

The old maxim, A sound mind in a sound body, is also true in another form — A sound body to insure a sound mind. In any event, we can no more have a perfectly sound mind in connection with a sickly, crazy body, than we can have a railroad to Jupiter.

Dr. Darwin, in his *Zoönomia*, marks not only the excess of grief as a disease, which he calls *mæror*, but also the fear of poverty, the fear of death, the fear of hell, &c.,—I mean whenever this feeling is in excess. Now, I may safely say, in this connection, that no person under the protracted influence of grief, fear, hatred, envy, or any of the depressing passions or affections, can have his skin duly perform its offices.

Who has not, for example, observed the condition of the skin while influenced by fear ? Who has not seen the hairs which pierce it stand erect, surrounded by little prominences or hillocks ? Why this appearance ? Simply because the skin is shrunk or collapsed every where except at its connec-

tion with the roots of the hairs which pierce it, where it remains in its natural place and position, and thus, in contrast with the rest of the skin, in its shrunk or shrivelled state, appears like so many little papillæ or eminences.

Now, is it to be believed, that, in such a shrivelled or shrunk condition, the skin can perform its wonted offices? Could the wheelwork of a vast machine do this when shrunk or contracted to one half its diameter or thickness? Could the fluids in our trees and plants do this when they were so collapsed or shrunk as greatly to reduce the diameter of all their little vessels?

Not only fear and grief, but also hatred, envy, jealousy, discontent, melancholy, over-anxiety or fretfulness, and the whole tribe of depressing passions and tendencies, as I have before asserted, may, by their continued influence, and even by their occasional indulgence, be productive of the same results in a degree, and are to be studiously avoided.

The habit of being over-anxious or fretful — so touchingly referred to by our Savior on the mount — is as unfavorable to the proper and healthful activity of the whole cutaneous system as it is to the health and peace of the soul. Here I might again quote the apostle Paul, on the profitableness of godliness to both worlds; but I forbear.

It is most certain that the mere habit of fretting — not so much the occasional outburst — is of itself quite sufficient to break down the healthy action of the skin, and make a stout, robust person an invalid for the rest of his life. How much worse, then, the whole host of depressing tendencies!

I have said elsewhere, page 208, that a strong centrifugal tendency in the system, as manifested by a plump and healthy action of the skin, is desirable. It is, indeed, one of the best safeguards when we are exposed to contagion. I

know that amulets and charms, and other things equally frivolous, not to say ridiculous, have accomplished the same object ; but *how* did they do it ? Most certainly by inspiring confidence and reviving a degree of hope ; and this hope acted on the physical system to aid in giving it that centrifugal tendency of which I have often spoken.

But this brings us to one more important remark under this head. The proper cultivation of the intellectual, no less than the moral, faculties should be kept in view, by all parents and teachers who would wisely conduct and control the education of their children and pupils. The better the intellect, other things being equal, the better the health. To what heights, in this particular, the development and cultivation of body, head, and heart may yet carry us, is utterly unknown.

#### IV. DISEASES OF THE SKIN.

One of the most certain penalties attached to disobedience of the laws of the skin, is what is called a *cold*. A cold, it is true, is not itself a disease of the skin, but a penalty attached to violations of the laws of the skin, falling upon some part with which the skin is in sympathy, especially upon parts lined with mucous membrane.

The cold, in these cases, is particularly apt to fall on a part of the system which is already suffering under diseased tendencies, either inherited or acquired. Should any one regard this as not a little unfair, and be disposed to think that the cold ought to fall upon the stronger part, since that is better able to bear it, I have only to say that I cannot help it. I am not the maker, but only the expounder, of the law. Besides, we should never forget that any increase of vigor in the skin is transferred also to the weak part — so that the law after all, is just and good.

I have said that a cold is a disease, usually, of some part of the system which is lined by mucous membrane. Thus we may not only have colds of the head, as we call them, and of the lungs, but also of the eyes, ears, stomach, intestines, bladder, &c.

And whatever may be the common opinion on this subject, I have not a doubt that a very large proportion of our diarrhœas, our dysenteries, and even our choleras, are, in the beginning, neither more nor less than colds. Treated wrong on the one hand, or neglected on the other, they proceed to that termination of which I have spoken.

“But what is a cold?” you will perhaps say. I will not attempt an answer. This is not the place for it; nor is it necessary that I should present theories on this or any other subject. It is sufficient if I point out the causes of colds, and show you how to avoid them.

For every practical purpose it is sufficient to say, what I have already more than intimated, that under the influence of cold or catarrh, there is suffering, greater or less, of some part or parts lined with mucous membrane; and this happens as the divinely-appointed consequence of diminished or suspended action of the skin.

A cold is, of itself, a disease, as much as small-pox or cholera. There are not less, probably, than one hundred million colds, in the United States, every year. I should not be greatly surprised to know that, including every slight affection of the kind, the number was twice that.

But we are not only, in this climate, very large sufferers from colds directly, but also from numerous diseases which colds are apt to excite or aggravate. Among these are consumptions, pleurisies, peripneumonies, rheumatisms, fevers, and, as I have before said, diarrhœas, dysenteries, and choleras.

There is ample reason for believing that the skin, as an organ of excretion, should carry off, in the case of the adult, at least one hundred grains of azotized or waste matter daily. Now, whenever the proper activities of the skin are suspended, additional labor is thrown on the kidneys; and thus, at least in our climate, these organs are liable to almost continual derangement.

Nor must we forget that colds either produce or aggravate many diseases of the skin itself. I hardly know of a single eruptive disease of this organ that is not more troublesome, as well as more difficult of cure, in persons who habitually neglect the laws of the skin, than in other persons.

It was said that diarrhœa, dysentery, and cholera sometimes have their origin in colds. But habitual neglect of the skin has, in a thousand instances, transformed mild attacks of diarrhœa into severe chronic affections, incurable by medicine, but not always beyond the salutary influence of a speedy return "to the law and to the testimony."

Colds on the eyes have been alluded to. Those whose eyes are constitutionally weak, are extremely apt to take cold on these organs; and some individuals whom I know, whose skins are peculiarly susceptible, are almost always found complaining of their eyes.

One proof of the connection between the eyes and the skin is found in the fact that whatever invigorates the skin, and hardens persons against taking cold, does, at the same time, strengthen and invigorate the eyes. It is also true, to a moderate extent, that whatever materially improves the eyes at the same time benefits the skin.

I have not a doubt that one of the most serious evils resulting from sudden warming, when we are excessively cold, is the effects it has on the eyesight. No individual addicted

so this habit ever maintains, for any considerable time, good eyes. This evil of rushing to the fire when we are extremely cold, and of roasting over fires and stoves, and sweltering in hot rooms, is becoming so great in this country, and is besides so closely connected with the habit of taking cold, that I must be permitted to dwell on it for a few moments.

One of the severest mornings of the winter of 1851-2, at about half past nine o'clock, I went into a primary school room in Cleveland, Ohio; and as soon as I entered, I found a girl ten or twelve years old lying down, with her head supported by a pillow, and looking quite ill. It appeared that she came to the school room extremely cold, — almost, but not quite frozen, — went immediately to the stove, which was very large and hot, and stood as near it as possible, till suddenly she fell to the floor in convulsions. She was, however, now slowly recovering.

A somewhat similar occurrence took place at Seville, about forty miles southward of Cleveland, on the same day. The only difference in the two cases was, that in the last mentioned the individual only fainted. In truth, such occurrences are not at all uncommon. A case of instant death from this cause took place a few years ago in the State of Maine.

Most people understand, perfectly well, that if their extremities are quite frozen, it is unsafe to approach the fire too suddenly. They know that the temperature of the parts must be raised slowly. First they would apply ice, perhaps; then snow; then cold water, &c. But how few seem to know that there is but little difference between thirty-two and thirty-three degrees! That is, if the ears or toes are cooled down to thirty-two degrees, — frozen, as we say, — they dare not bring them suddenly to the fire; but if they are cooled to thirty-three degrees only, they seem to think themselves licensed to do so with impunity!

Now, I will not say that the difference between thirty-two and thirty-three is not greater than that between thirty-three and thirty-four degrees ; but I will say — for truth compels me to do so — that the difference is not so great as the practical errors of mankind would seem to suppose. The difference is not so great as to render sudden warming entirely unsafe in the one instance, and entirely safe in the other. For all sudden warming of colder parts endangers the vitality of those parts, and, if it produces no other mischief, has a tendency to render them delicate. I have met with individuals who would never go to a stove or fire at all for the whole winter, but would always remain at the back part of the room.

I have myself seen the time when I could say to young men around me, who were making themselves tender and effeminate by sitting with their feet at the fire, that I had not warmed my feet in that way for five years ; and, indeed, I have hardly done so half a dozen times in a quarter of a century.

When I was a teacher of youth, some thirty years ago, or more, I used to take notice of a little black-eyed girl, eight years old, who came a long way to school, and seldom lost a day, even in the severest winter. She often came to the school room in the morning with her feet very cold, and, when she did, she would always rush to the fire, unless forbidden. This poor girl was a great sufferer from chilblains, and almost always so from sore eyes and hard colds. At that time I had not so closely studied the relations of cause and effect as I have since, or I might have clearly seen that her troubles arose, in part at least, from sudden warming.

On this subject, I find the following excellent remarks from Dr. Dunglison. They are copied, verbatim, from his *Elements of Hygiene*, at pages 74 and 75. He had been giving directions with regard to the treatment of frozen parts, when he immediately added, —

“When the effect of depressed temperature upon the extremities is, to a less extent, diminishing merely the calibre of the vessels, and they are exposed, under such circumstances, to the heat of the fire, increased action takes place in the unaffected extremities of the blood vessels that are continuous with the affected capillaries; blood is forced into them in undue quantity, so as to over-distend them, and inflammation results, constituting the affection known by the name of *chilblains*.

“It need scarcely be added,” he observes, “that a sudden and rapid change from cold to heat may develop irritations and inflammations in various structures, according to their predisposition, at the time, to be morbidly affected; and that hæmorrhages and other affections, occasioned by heat, and by diminished atmospheric pressure, might be the result in such cases.”

But I shall have occasion to say more on this particular topic when I come to speak on the means which consumptive people should employ to harden themselves against the exciting causes of that fearful and generally fatal disease.

To conclude: Cold feet, sick headaches, many nervous affections, — in short, almost any complaint to which flesh is heir, — may have a very intimate connection with a foul or neglected skin. If the latter is not their sole cause, it is often a means of rendering them more habitual and more severe.

The penalties of transgressing the laws of the skin may for a time be evaded; but, like the penalties attached to the violation of the other physical laws, they must finally come. No medicine has power to avert them. Active treatment of a cold, though highly popular, for the most part only transfers the effects of the punishment to some other part, or postpones them to another occasion or season.

## LECTURE VI.

## HOW TO PREVENT CONSUMPTION.

ACCORDING to the best estimates I have seen, not far from seventy thousand persons die of consumption, in its various forms, in the United States, every year; and the mortality from this source is constantly increasing—in some places, with fearful rapidity.

Should the cholera take away seventy thousand persons but once in ten years, the voice of lamentation and woe would be heard all over the land, and much would be said about the causes of such a destructive disease. But consumption may take from us the same number every year, or seven hundred thousand in ten years, and hardly a word is said. As good Mohammedans, we submit to our fate.

It is now about twenty years since the cholera first reached our country. What our loss, during that time, from this terrible disease, may have been, I will not undertake to say; but I suppose it cannot possibly have exceeded two hundred thousand. Perhaps it is little more than one hundred thousand. Yet our loss from consumption, during the same period, cannot have been less than one million.

There is another striking point of comparison between the two diseases. Cholera takes from us that class of persons whom we can best spare. This is, at least, a general rule—to which I grant there are many apparent exceptions, and some few real ones. How was it in New York? How in Cincinnati? How in St. Louis and New Orleans?

This fact was most remarkable in Paris, in 1831. It seized,

first, at least very largely, the most abandoned. Next it fastened itself upon the other extreme of society — for extremes, as you know, are said sometimes to meet. The wine drinkers — among whom was Casimir Perier, the prime minister — now began to fall. The middling class very largely escaped.

But consumption does no such thing. If any thing in the world could justify the saying, that Death delights in a shining mark, it is pulmonary consumption. The most virtuous and promising, in large numbers, are among its first victims. A majority are females. What the proportion is of the two sexes, in the United States, is not exactly known. In Norwich, in Connecticut, it is nearly two females to one male. In other places, it is three females to two males. In general, however, the proportion of females is not probably so great as three fifths; but it is always greater than that of males.

The average age of those who die of this disease is not far from thirty — probably something less. This is about two thirds the average existence of our race in this country. Thus fifteen years to each person are cut off, as I have elsewhere said, from the lives of seventy thousand individuals, in active and useful life, every year.

There is another fact to be noticed in this connection. This terrible destroyer is every year extending its ravages. I can well remember when it was hardly known beyond Mason and Dixon's line, or the Alleghany. It is but little more than thirty years since I was quite a traveller in the Southern States, where I do not at present recollect ever having met with a case. Now, it is, in some places, becoming quite common. Up to ten years ago, even, consumption was rare in the Western States. Now, in Northern Ohio, it is almost

as common as in New England. The mortality in New York, Philadelphia, and Baltimore, from this cause,\* is relatively, as well as absolutely increasing, and though still less than in Boston, seems fast coming up with it.

What then is to be done? Shall we continue to fold our hands, like good Mussulmans, and blindly submit to fate? Or shall we, as Christians, — as believers in the relation of cause and effect, and in the general doctrine that disease is the penalty of transgression, — endeavor to do something?

It is the general belief that consumption cannot be cured, when once fairly seated — I mean when fairly seated on the lungs. That form of consumption which has sometimes been called dyspeptic consumption — with all those varieties of the disease in which this wasting away is not attended with positive and deep ulceration of parts so vital as the lungs — may sometimes, perhaps, be considered as within the reach of judicious medical treatment.

I know there is, in this particular, a wide difference of opinion. Dr. S. S. Fitch, on the title page of a sheet of recommendations to his Six Lectures on the Uses of the Lungs, says, “Five thousand persons, in one year, cured of consumption by following the teachings of this book.” Dr. Rose, of Philadelphia, makes large claims, but not so large as these. Out of one hundred and twenty or one hundred and thirty patients, he professes, I believe, to have cured about sixty.

Of the truth of the statement by Dr. Rose, I know noth-

\* During some of the summer and autumnal weeks of 1852, the mortality in Baltimore from consumption, as stated in the papers, was greater, in proportion to the population, than that of Boston or New York.

ing. But of Dr. Fitch I have known much for many years. I have travelled *with* him and *after* him. I have seen many of his patients, and heard, through accredited sources, of many more. Yet truth compels me to say that I have never *known* but one of his patients who was benefited permanently by his treatment, and her case was an equivocal one. I have indeed *heard* of one more, but I had reason to doubt whether it was a case of genuine consumption.

Others have made their boast of skill in curing consumption, and several books have been written declaring "consumption curable;" but I have not read them. Much has been said, of late years, about the virtues of cod liver oil; but in all my travels I have met with but two or three persons who would say, confidently, they believed themselves benefited by it.

It is certainly possible that different medical men and writers attach very different meanings to the word *cure*, when they speak of curing consumption. If they mean by it a mere palliation of symptoms, so as to enable a person to live on comfortably, five, ten, fifteen, or twenty years—sometimes still more, then I admit that consumption may be cured. But if it is pretended that when there have been large inroads made upon the substance of the lungs, and portions of them have actually perished by ulceration, these organs may grow again,—or if it is even pretended that those who have tubercles in their lungs, which have ulcerated extensively, can be so restored as to have no strong tendency to lung disease afterwards,—then I do not believe one word about it.

The lungs, in some instances, become hepatized, or rendered solid, somewhat like liver, especially at their upper part. This is quite a serious affair. If any one pretends, too, that

this state of the system can be changed, and perfect health restored to the parts, I must dissent from him.

If any man in the world can claim to have been cured of consumption, I can. The symptoms of this disease were threatening for many years, till I reached the most dangerous period of my existence. At length, by means of a general course of obedience to the physical and moral laws, I became partially restored; and have lived on very comfortably more than a quarter of a century. But am I therefore cured? Not at all. It is with the utmost care and the most rigid adherence to "law," that I live at all. I have, indeed, very seldom any consumptive symptoms about me; but should I take cold, I should soon suffer; and two or three severe colds, in rapid succession, would probably destroy me.

It is a very wrong thing to hold out the idea, unqualifiedly, that consumption can be cured; above all, that it can be cured as extensively and readily as some have represented. It leads to unreasonable expectations from medicine, and thus favors quackery and credulity. And any man who shall hold out such views, and talk about five thousand being cured of consumption in a year, without an explanation of his terms, will be suspected, by many, either of quackery or ignorance.

However, I am anticipating. I have not told you what consumption is, except that it is a disease of the lungs which is very general, and very generally increasing, and which it is almost, if not quite, impossible to cure. This, then, must, for a few moments, receive our attention.

Before proceeding to the subject, however, let me say to you that medical men, in speaking of the causes of disease, make a division of those causes, into predisposing and exciting. The predisposing cause is often beyond our control; the exciting cause is usually within our reach and direc-

tion, provided we are informed concerning it in due season.

Let me make a very simple, but a very intelligible comparison. A musket may be loaded in the very best manner — ball, powder, &c., all duly arranged, and the musket in good order; it may even be primed, as huntsmen call it; yet if this is all which is done, it will not go off for ages. It is only prepared for an explosion whenever an igniting spark is applied. It is only *predisposed* to go off.

The over-careful mother who said, "Don't meddle with that gun, Billy; it may go off and shoot you, without lock, stock, or barrel," would doubtless think otherwise. But she would be mistaken. No preparation or predisposition would make it go, till an exciting cause was applied — till the powder in the pan is ignited — till the musket is "touched off." In like manner, the human system may be prepared for disease by inheritance or wrong-acquired habits, and the preparation or predisposition may be ever so strong, and yet it may happen — it often does so happen — that without the application of an exciting cause, it will not "go off."

If a person has a tolerable constitution on coming into the world, and if he is trained in the way he should go, physically as well as intellectually, socially, and morally, I see not why there is the slightest necessity of his suffering from disease, till, of his own free will and accord, he departs from that course — till, in other words, he has by transgression exposed himself to disease, and the exciting spark has been applied.

True it is, that few are free from any disease or taint. Still fewer are trained, in early life, in the way they should go. And fewer still maintain even a partial integrity when they become old enough to take the responsibility of their

own management. I hardly know how far we should be obliged to go to find a person who is not predisposed to one disease or another.

— But admit an hereditary tendency to disease. Admit the child is feeble — consumptively inclined. Yet if he can be kept along without colds and other exciting causes of this terrible disease for one year, I see not why he cannot be for two years ; and if for two years, for six, ten, twenty, or fifty. Why should the predisposition ever be roused, if the exciting causes can be avoided ?

Here, then, precisely at this point, is the great difficulty. And it is, I admit, a very *serious* difficulty. Still it can be met, and, as I believe, partially overcome. The exciting causes may, to a very large extent, be avoided. And if *these* are avoided, the *disease* is avoided. A person may thus be predisposed to disease a thousand years, and yet never die of it. Let me be fully understood. I do not say — for I am unauthorized to say so — that by avoiding all the exciting causes of disease from the first, no one would ever *die* of disease ; but only that, *as a general rule*, no such thing would happen. A few come into the world with so strong a predisposing tendency to disease that it *will* be excited. Rather, they come into the world already diseased. In a few instances, there is such a formidable array of exciting causes, that the person is overcome unawares.

I am now prepared to state, briefly, in what the predisposition to pulmonary consumption exists — so far, I mean, as it has been ascertained. Some things in connection with this subject are still involved in not a little obscurity. I shall, of course, only attempt to state what is known and certain.

There is to be found in society a very large and increasing class of persons who incline to be tall and slender, — perhaps

prematurely so, — with fair skin, light or rosy complexion, light hair, and blue eyes. The neck is long and lean, the chest narrow, and often very thin, and the shoulders stand out from the body like wings. The eyes are also not unfrequently prominent. The temperament is usually what is called sanguine and nervous. Sometimes, however, there is a shade of the bilious temperament combined with the others. In this last case, the eyes, instead of being blue, will be black ; and the hair, instead of being light or reddish, will be dark also. In both cases there will be a readiness and aptness to take cold. These colds do not always fix themselves on the lungs. Sometimes they affect the head, or nasal cavities of the head, as frequently as they do the lungs. In other instances, the throat is apt to be affected with soreness, or swelling, or both, accompanied with a tendency to glandular swellings under the chin or in the groin, armpit, &c. It is seldom, however, that the lungs wholly escape.

The mind corresponds somewhat with the body. Both are apt to be forward, active, and delicate. There are exceptions to this rule, however. Some few consumptive people are, for many of their early years, the very reverse of precocious. They are stunted in mind and body. The temper, in either case, is usually excitable, not to say irritable.

All this is very frequently inherited. Not wholly, I grant ; for circumstances, during every year of existence, may continually increase or aggravate it. So far as I have observed, however, it is not common for all these appearances to be acquired. There is usually something inherited to begin with.

I have spoken of the external marks of a consumptive tendency or predisposition. The internal marks are not so obvious to those who are unaccustomed to disease, but are equally

well known to medical men, and equally striking ; though post mortem examination does not detect them so often during the first stage of life. But if a child, with the external conformation I have mentioned, dies at a later age than one or two years, there will usually be found in the substance of the lungs, imbedded as it were between the cells, a greater or smaller number of what are called *tubercles*. These are small tumors, which have the appearance of hardened glands, or as they are vulgarly called, *kernels*. They are frequently said to be of the size of millet seeds ; but the truth is, they are of various sizes. They are often found in clusters. When uninfamed, they are pretty firm, so that, if cut open, they appear of the consistence and even the color of gristle. When they are found in young persons who have had no cough of long standing, no pain or soreness in the chest, nor any symptoms of hectic fever, they appear to be quite harmless substances. In persons who are scrofulous as well as consumptive, they may be found in many other parts as well as the lungs.

Later in life, where the tendency to disease is more obvious and rapid, these tubercles are sometimes found ulcerated ; and several of them, running together, form an abscess or ulcer. They are oftener found in the left division of the lungs than in the right, and they are more dangerous there, partly because this division of the lungs is smaller than the other, and partly because of their nearness to the heart.

Yet notwithstanding all the signs, external and internal, of this fell disease, it is my most deliberate conviction that few persons would ever die of it, as was said just now, did they not increase the predisposition, or rouse it into activity. This may be done in various ways.

Among the causes which increase or aggravate the predis-

position to consumption are, 1. Certain diseases, such as syphilis, scrofula, small-pox, and measles. 2. The dusts which are inhaled by following certain employments, such as axe grinding, needle pointing, stone cutting, and, as some suppose, grinding grain. Even common dust is injurious. 3. The fumes of metals and minerals. 4. Impure air and want of light. 5. Depressing passions and affections. 6. Excessive and long-continued labor. 7. Abuse of medicine. 8. Too much exhaustion of the vital energies, by indulging the appetites too much, or by any thing which tends, permanently, to debilitate the system. 9. Too little use of the lungs.

A part of these causes not only predispose to pulmonary disease, but also rouse it into activity, or excite it. They are, therefore, both predisposing and exciting. But there are some which, when applied, rouse it into action almost immediately. Not that they immediately destroy; but consumption, under their influence, creeps on with a steady and certain pace. It is occasionally many years coming to a crisis, and its average duration is about two years.

Among the exciting causes, properly so called, are taking cold on the lungs, lung fevers, peripneumony, pleurisy, bleeding at the lungs, the use of mercurial medicine, sexual abuse, eating and drinking to excess, a scanty or meagre diet, night revels and debaucheries, profuse evacuations, as in diarrhœa, diabetes, &c., late night studies, violent passions, and the suppression of any evacuation to which the system has been long accustomed. Now, it must be obvious to any who will look carefully at the facts in the case, that if they *are* facts, consumption, though it cannot be cured, can usually be prevented, at least in part; and in some instances — perhaps in most — be palliated.

I have said elsewhere that the average duration of life, in consumptive people, is only thirty years; whereas others last to about forty-five. Now, I have not the slightest doubt that though the consumption cannot be cured, the average duration of the lives of its subjects may be lengthened ten years. Not simply that they may drag out a miserable existence, but that they may add to their lives ten years of usefulness.

It is not by palliation, however, that this result is to be accomplished, but chiefly by prevention. And this preventive course or treatment may be regarded as applicable in two ways. First, to the consumptive themselves. Secondly, to each rising generation. This terrible scourge, however, will never be removed, till we attend to both these things.

The first kind of prevention consists chiefly in five particulars. 1. Avoiding cold. 2. Invigorating the lungs. 3. Avoiding medicine. 4. Keeping the mind and heart right. 5. Hardening the constitution. I shall consider all these in their order.

1. Horace Mann, in one of his Reports on Education, has spoken of New England, with her variable — and, as many have called it, treacherous — climate, as the battle ground between the arctic and the torrid regions. And surely a region so changeable as to require of its inhabitants several acclimations in a year is not undeserving of this name. And yet New England is not the only country which has a variable climate. The late Professor Smith, of Yale College, used to speak of Virginia as being the worst part of the United States to winter in, on account of its sudden changes; and my own experience, in wintering both there and in the Western States, has by no means confirmed my early prejudices in this particular against New England.

Then, again, Old England, despite of her climate is but a little behind New England for colds and consumptions; the latter, most certainly. According to Dr. Clark, in his work on Consumption, the proportionate mortality from this disease is about as great there as it is with us. Almost one fourth of the population perish from consumption and scrofula. Some have even said the proportion is more nearly one third.

But the habit of taking cold — there or here — may be in a measure broken up; sometimes wholly so. I know of a very large number of individuals in the United States, who, by a discipline of from two or three to ten years, have become almost or quite proof against the vicissitudes of Mr. Mann's battle ground.

I was once singularly subject to the habit of taking cold. In winter and spring I was almost constantly a sufferer. In the end of the spring, I seemed to be in a confirmed consumption for many years. In summer and autumn, I suffered still, but not so much. My system rallied, in part, to meet the trials of another winter and spring. But, now, for many years, I have scarcely had one cold a year, and these few are the result of great carelessness. These colds, when they come, are very slight. I scarcely have one in ten years that affects my lungs severely, and it is well that I do not; for if I did, I should soon perish. I have, in one word, learned how to avoid them.

And what man has done, man may do. Myself, and those who, like me, have become emancipated from the unhappy bondage to which I allude, are made of the same general materials with other men. The same painstaking, guided by the same simple physiological principles, would lead to the same results.

Let me say, then, briefly, how the work is to be accom

plished. You do not forget what was said about cold bathing — its salutary effects. I believe I only just alluded to its effects in preventing cold. But this is one of its highest recommendations. It does this, usually, though it does much more than this. Habitual cold bathers have few colds, if any.

I have, indeed, met with a few who practised cold bathing, or said they did, who still suffered from cold, to some extent. But I always doubt, in such cases, whether they are as thorough in the matter as they should be; and whether there is not some error in regard to the *mode*, whose effects operate as a drawback upon its natural and legitimate benefits.

My doubts have been confirmed by observation. I have met with those who made it their practice, on rising in the morning, to take a cold or shower bath. But instead of rising with a strong resolution to do their duty, and do it with all their might, — with a kind of desperation, even, if need be, — they have been faint-hearted. It has been cold weather, or they have felt bad in the head, or the stomach; or they have been timid from some cause or other. Hence they have lain in bed a little while after they ought to have risen, dreading the operation. Then, with a feeble impulse, — perhaps with reluctance, — they have dragged themselves to the bath.

Others have risen and gone immediately to the bathing room, but have shivered a while, in dread, on the spot. And the more they have dreaded it, the more they have unfitted themselves for the process. Some have even warmed themselves at the fire before they ventured.

Others, still, have showered too long. In general, the quicker the process, and the more rapid the wiping and the friction, the better. Yet I have seen the very persons who were

most languid in body and mind, and most poorly prepared for securing a good reaction, remain in the water the longest.

Need I repeat that these three errors all stand in the way of effecting the object which it is desired to attain? The individual who goes to the bath hen-hearted must expect to come away from it with a feeble reaction. It would be almost a miracle were it otherwise. He will not only be more languid and feeble than before, but more liable to take cold.

I found a woman on Cape Cod, who, having received a few crude and imperfect ideas about the beneficial effects of cold bathing, and being a great sufferer from debilitating diseases, had begun the practice of bathing in the morning. But how? Why, after lying late, she would get up and remain in a cold tub from ten to fifteen minutes. She was not, indeed, so great a loser by the process as I should have expected. She had actually an iron constitution. She had abandoned medicine, and had unbounded faith in water. Her freedom from the effects of drugging, and her great faith, prevented her from being rapidly injured. A little good advice, carefully-heeded, was, however, of great service to her, and greatly facilitated her recovery.

I have met with some few, who, in spite of the light shed abroad on this subject, used the cold bath at evening, and wondered why they received no benefit from it. Others I have found using the warm bath in the forenoon, or late at evening, and then walking home a half a mile or so in the damp night air; and then denouncing the bath, because it made them take cold!

They, in short, who expect to harden their systems against cold, must use a little common sense about it. All blessings may be turned into curses. So efficient an agent as the cold

bath is like a sword with two edges, that, if it does not cut in the right direction, will be sure to cut wrong.

He who would break the habit of taking cold must set out with the *determination* to break it. He must count the cost. He must believe he shall succeed. And he must persevere till success is attained, whether it requires two years of effort, or ten, or twenty. With some it will require a longer, with others a shorter period. To the consumptive person the price paid could not be too great if it required twenty-five years.

But there are many more things to be done in order to prevent taking cold. At least there are many which *may* be done. Nothing is lost in this warfare. If the cold bathing, of itself, is sufficient, so far as mere taking cold is concerned, yet the other measures which I am about to recommend will invigorate the whole frame — a matter which, of itself, is vastly important to consumptive people.

Medicine must be avoided with great solicitude. There is a confused idea, in most men's minds who have come in contact with calomel at all, that its use exposes a person to take cold. And it certainly does so. It disturbs the functions or offices of the skin, and leaves this organ somewhat crippled; and whatever does this exposes us to colds.

But mercurial medicines are not the only medicines that have this effect. It is so, in a degree, with all medicines, from the strongest to the weakest. They disturb, somewhat, the action of the skin, and leave it, for the time at least, less active and energetic, and less able to resist the tendencies of sudden changes.

Or, if the first effect of some of them seems to be to increase the cutaneous action, as from their known character might be expected, yet they are followed at no great distance

by a degree of debility which only exposes us the more. Thus the drinker of hot tea has the action of the skin somewhat raised for the time, but it is only to be followed by a collapse, which increases his danger of taking cold.

And herein is one objection to the use of high-seasoned food. By its first or stimulating effect, we are indeed a little warmer for a short time, and a little less likely to take cold; but this stage of increased excitement soon passes away, and unless the same beverage or excitant is renewed, or some other extra stimulant substituted, we fall into a sort of collapse, under whose influence we are more likely to suffer than we were before. High seasonings are medicines, as truly so as mercury.

This leads me to say that they who will be thorough in their efforts to break the habit of taking cold must be careful to exclude from their tables all hot food and drink. Whatever is received, whether solid or fluid, or whatever its quality, should be cool and unirritating. Observe, however, I do not say *cold*, that is, as cold as ice, but cool.

It is surprising to observe how generally — how almost universally — consumptive people are fond of *hot* things; hot I mean in their internal character and nature, and also of an elevated temperature. But singular as it may be, the observation of every one who has his eyes at all open will confirm the statement. Well do I remember a consumptive man, who, in my earliest years, was a frequent guest at my father's table. No food was too hot for him, or too stimulating. Grahamism would have had no charms for him. High-seasoned meats, strong and hot tea, long-salted food, hot new bread and butter, hot shortcake, hot buckwheat cakes, hot doughnuts, — these were his element. He swam in them a little while, however, and perished.

And well do I remember an oft-repeated injunction of my own shrewd and honored mother, when she saw me so eager after hot and unwholesome food — “Beware ; consumptive people are always fond of that.” And O, how many a time has this injunction come to my mind, both in early and later life, and saved me from excess ! Would that it had saved me from its use entirely !

Consumptive people are usually fond of every form of sensual indulgence. This is the more surprising, as the indulgence of their appetites is, in just about the same proportion, more dangerous than in other people. They have no vital energies to spare in eating, drinking, or licentiousness. They are crushed by them almost immediately. Their colds are numerous, and severe in proportion to their indulgence, and consumption is hastened apace.

It will be difficult — though I grant not impossible — to break the habit of taking cold till obedience is secured to the physical laws generally. But to present all these in detail, and in this connection, would be both to *repeat* and to *anticipate*. I will, therefore, mention only one or two things more.

It is of the utmost importance, in order to be free from colds, that we train our systems — our calorific powers in particular — to the great work of generating their own heat. There is no one thing, perhaps, in which the practice of mankind differs more than in this particular. Some are constantly dependent for their heat on external sources — I mean as long as the temperature of the atmosphere is a little low ; others almost never.

And, what is particularly unfortunate in this matter, the more we yield to the inclination to indulge in hot rooms, hot beds, hot clothing, and hot food and drink, the more we may.

Give an inch and take an ell, is an old maxim ; and he who gives to perverted Nature but a single inch, soon finds her loudly demanding an ell.

A dealer in horses, of some repute, at least for veracity, in Hartford, Connecticut, was often heard to affirm that with only a good great coat and mittens he could drive sixty miles in the teeth of a north-west wind, on the coldest Vermont day ever known. On being asked the secret he had learned, he said it was only to stand up and face the cold without shrinking. The moment he began to shrink from it, as he said, that moment he began to be chilly.

This is one of the secrets of preventing cold. Stand up resolutely, and determine to be a live man, and the very elements will seem to bend their heads as you pass. But begin to yield to their demands, and look this way and that, with fear and trembling, and you are attacked and worsted.

The younger a person is, and the more he is so situated as to be much in the open air, the sooner, with equal effort, will he break the habit of which I am now speaking. Hence one reason why I recommend to all consumptive people to be as much as possible in the open air.

2. But in order more fully to inculcate the art of preventing consumption, it is necessary that I should speak not only of *general* methods and means, but also of *particular* measures, for invigorating the lungs.

There is one universal rule to be given, with regard to the means of strengthening the lungs. It is to *use* them. It is so with almost every part and organ of the system. It is to be improved and perfected by use. The cerebral system, the muscles, the senses, the teeth even, are made perfect by being, not abused, but properly used.

I have spoken of the education of the lungs already

although it is quite possible I may recur to it hereafter. But what I have to say here is addressed rather to those who are already arrived at the period of adolescence — or at least have begun to take upon themselves the “responsibility.”

At the close of a lecture in North Brookfield, Massachusetts, the late secretary of the state, Hon. Amasa Walker, came to me and inquired what I had done during the last twelve or fifteen years to strengthen my lungs; observing that my power of voice seemed to him to have been doubled during that time. My reply was, that I had done very little with my lungs, except to use them. He had known me chiefly as the teacher of a Bible class. Since our first acquaintance, I had been a traveller and lecturer, and an almost constant talker; and from having feeble lungs, in a slender and diseased chest, I had come to possess a good deal of power in this direction, and still more of endurance.

Twenty-five or thirty years ago, I could hardly hold an earnest conversation with a friend for half an hour without getting hoarse; now I can converse and lecture from morning till night, and rise next day to a repetition of the same course of toil. Occasionally, even now, I become slightly hoarse at night, but am perfectly restored next morning.

Within a few months, I have tried my powers of endurance, in this particular, very severely. In one instance, I gave, in all, including a number given in schools, thirteen lectures on hygiene in a day and evening. These lectures averaged forty minutes in length, making, in all, something more than eight hours of this exercise.

It is not, however, on the basis of a few isolated facts that I rest my assertion, when I speak of the great importance of invigorating the lungs by constant use. The world is, as it were, full of such facts. But I will not be tedious.

The Pestalozzian system of music has done much for this country, and still more for the old world, in this particular. True, it came too late to save the generation then on the stage; and the generation now appearing is, by the law of hereditary descent, so much affected, that little change for the better will be perceptible in our own day. But may we not hope that a better day is coming? If singing will not quite cure the consumption, — though not a few of the German physicians affirm this very strongly, — it will at least do much to prevent it, especially when it is begun at a very early period. I have spoken of this, and of reading and conversation, elsewhere.

The reflection has sometimes forced itself upon my mind, that our Savior never would have died of consumption, whatever might have been his physical inheritance. Not because he was taught vocal music; for of this we know nothing. Not because he was in the habit of reading aloud in the synagogues and elsewhere; though this may have had its effect. But, then, why not? Because he was constantly strengthening his lungs by constantly using them — as it were from morning till night; and that, too, much of the time, in the open air. Because, too, he did not spoil his constitution by indolence, effeminacy, indulgence, medicine, or any other forms of transgression.

Let his disciples be more like him, — let them be trained to do what he did, — not indeed to perform the very things he performed, or travel about just as he did, but to be as much in earnest as he was, and to be opening their mouths in his name to inculcate, every where, mercy, charity, justice, humanity, and piety to God; and we should probably soon see consumption on the wane.

3. I have treated of the tendency of medication to induce

or perpetuate the habit of taking cold, as well as — in a general way — of its other evils. But there are reasons why those who are predisposed to consumption should avoid it with a thousand times more care than other people. Some of these will be given.

In the *first place*, we are to remember their extreme susceptibility of impression. No class of our citizens, except the scrofulous and nervous, are half as sensitive — I mean half as susceptible of impression. Their thin skin, quick pulse, rapid breathing, and lively muscular movements, — to say nothing of the rapid movements of their minds, — would indicate this.

I have seldom known a consumptive person take medicine without receiving injury from it. The bilious and phlegmatic — they who are more inclined to disease of the stomach, liver, and bowels — endure it far better; not acrid medicines — calomel, gamboge, scammony, jalap, castor oil, &c. — alone, but every thing, or almost every thing, in the shape of medicine. Of course I do not affirm that these last are often benefited by medicine. I only say they bear up under it better than others. Few people are really benefited in the end by medicine — perhaps none. But if all the rest of the world were licensed to dose and drug themselves, or to be dosed and drugged, consumptive people should not be.

Then we must remember, in the *second place*, that they are peculiarly prone to this running after medicine. Few consumptive people really believe they have any mortal disease about them. Their digestive system is tolerably good, or at least pretty active; their natural temperament is favorable; their mind is cheerful and buoyant; and they are expecting to live, not to die. Under these circumstances, they are constantly annoyed by a set of human beings, who

seem to have nothing to do — or who are at least determined to do nothing else — but concern themselves with other people's business. One advises to take Ayer's Pectoral ; another Wistar's Balsam of Cherry ; another, something else ; and another, something else still.

Now, all this is done in kindness. The friends perceive the danger more readily than the patient himself, and, just in proportion to the improbability of its doing any good, are importunate in their entreaties to have something done. They will hardly be denied. They call those who hesitate reckless or obstinate.

And what is thus done in kindness is received in kindness — in truth, *too much* kindness. It is one of the misfortunes of consumptive people that they cannot say *no*. They can say it to themselves better than to other people — though even here they are a little below par, as we have seen in the case of hot food and hot drink.

They are not famous for self-denial. "I tremble for the man that does not tremble for himself." His consciousness of danger is his only security. In like manner I tremble for the consumptive person who does not understand, fully, how susceptible he is to external impressions, and how hard it is for him to say *no*.

Consumptive people, moreover, should be taught to consider another thing. They descend, too often, from families who know nothing, or almost nothing, of the blessedness of communicating good to others. They are, indeed, amiable and excellent ; as I have said before, they are among the shining ones. They smile on every body, speak kindly to every body, and wish well to every body. But beyond words and looks they are not apt to go. The reason is, they have not been trained to it. Their sympathies are too passive.

They end in sighs, and perhaps tears. They have worn soft clothing and lived on delicate fare. "A little, but nice," satisfies them, of clothing, food, society, books, &c. ; but that which they do have *must* be nice.

Their thoughts centre too much, therefore, on themselves. I repeat, they are not gluttonous, vain, sensual, or avaricious, in the worst sense of those terms ; and yet they care, practically, but very little for any body but themselves and their own circle of dear friends.

Constitutionally, they are formed for benevolence — for laboring for others. They were not framed by the plastic hand of the great Creator for a life of selfishness, of that refined sort which now so largely prevails. They were spoiled by education. I will say even more than this. A benevolent life — such a life as our Savior would direct them to follow, were he on earth — a life of going about and doing good — is the very life which even now, spoiled as they are by education, will save them from speedy and certain destruction. The gospel is adapted to all mankind ; but if it were adapted to none else, it is so to the consumptive.

What a pity it is, some may say, that this fatal disease should so often fasten itself upon the very persons who are least of all fitted to pursue the proper course under it ! Why, in the providence of God, should it not fall upon the actively benevolent ? Why not on some Hannah More or Mary Lyon, rather than on a Hemans or a Davidson ?

But I may seem to be digressing. My aim was to show why it is that the consumptive are so often found running for relief to medicine — leaning on a broken reed, which is sure to pierce them. It is because they are trained to think so much about themselves, — their food, drink, dress, pretty faces and

forms, — and to ask so assiduously, “ What *will* people say ? ” and to pay so much heed, in over-kindness, to what people *do* say.

4. We are now prepared to consider another item under the head of prevention of this terrible disease. It is this: The mind and heart must be kept right. I have trenched a little on one part of this subject in the preceding paragraphs; but more needs to be said.

Consumptive people are generally precocious. Bright, and active, and forward, they are ready to receive eagerly every attention and every impression. And as if to meet this tendency, most unfortunately, they are apt to be favorites. Their whole character, physical, mental, and moral, is hastened into prematurity. They are especially fond of books, music, and the fine arts. Sometimes they are fond of nature; but this depends more on those around them than on themselves — in other words, it is much more controlled by education. They are especially fond of the lighter sort of books and studies, and in these last they particularly excel.

As they are not fond of labor — continued labor — of any kind, and as they make ready and rapid progress in learning, of every sort, to which you can secure their attention, they are usually impelled forward in this line of direction. If young men, they are destined to a profession, as it is called; if young women, they go first to the fashionable high school for females, and afterwards to that family relation, for which, they are, of all their sex, most poorly prepared.

This, I mean to say, is their destination; but alas! they do not all reach the goal. Many break down during their studies, and are forced to some other employment; many times to one which is worse than study. Thus females who are scrofulous and consumptive often find their way into a factory, to

hasten on their troubles rather than to relieve them ; and to prove themselves, ultimately, the mothers of sickly families.

But some, who are highly stimulated by emulation or natural ambition, or both, push on with studies and novels till the brain gives way ; or, if not, till the lungs give out. Then, too late, a course of " doctoring " is tried ; till at length confirmed consumption is announced, and death closes the scene.

The common custom of pushing forward the intellect at the expense of the body and the moral powers is effeminating and weakening, every where. If there is no scrofula, nervousness, or consumption, it is highly injurious to the health in future years ; but if there is, it is the worst course which can possibly be taken.

My advice, in all cases of predisposition to consumption, is, Keep back the intellect. These precocious children will have more intellect than body or heart, when we have done the best we can to repress the former, and bring forward the latter. To do this effectually — I speak here from experience — will require the united wisdom of parents and teachers, and sometimes the united and absolute interposition of authority.

When in Hartford, one day, some twenty-four or five years ago, I sought the acquaintance of Rev. Mr. Woodbridge, the geographer. He had just returned from Europe, where he had spent several years studying the subject of education, that he might be thereby prepared to benefit his own countrymen. Till this interview we were strangers to each other. The first compliments over, he inquired what, in my view, was the capital error in American education. " This cultivation," said I, " of the intellect, at the expense of the health and the morals." The reply bound us together, as friends and fellow-laborers, forever.

But I do not wish to be misunderstood. To neglect the intellect wholly would be but to rush on an opposite extreme. There should be an harmonious education of the whole being; but the tendencies of things, in the consumptive, are forever against this. Our efforts should be to establish and perpetuate harmony.

That a *proper* cultivation of the intellect, in every one, even the scrofulous and consumptive, is highly conducive to health, I cannot, for one moment, bring myself to doubt. What is wanted is, to understand the subject of our education, — his character and tendencies, physiological and pathological, — and then proceed accordingly.

But if we must be guarded in the cultivation of the intellect, how much more in the regulation of the desires, the affections, and the passions! Not that the tendency of books, and school, and piano, and concert is so unfavorable to these as to the intellect; and yet it brings with it, in many instances, not a few errors. In order to have those who are predisposed to consumption receive the best possible direction in all which belongs to their moral education and conduct, they must bring themselves as much as possible under the dominion and influence of such feelings as are pleasurable, and cheerful, and elevating.

Most happy is it that the consumptive person is, in general, cheerful and full of hope. Were he not so, he would perish much sooner and much more certainly than he now does. And yet there are exceptions to the justice of this remark. There are those who are liable to seasons of depression and gloom, and a few who are habitually so. And yet full of hope as the consumptive person usually is, I have not found it to be what I would call a large and liberal hope. It is active, rather than large. The idea of doing something worthy

of himself, — something worth living for, — as I have before intimated, hardly enters into his mind. He is amiable and excellent, yet selfish. The heaven to which he aspires, either in this life or any other, is little more than a Mohammedan one.

It will be of great service, in these cases, not only to the lungs, but to all the functions of the body, — for the sake of the lungs, — if the individual can have something before him which is well calculated to rouse him, and call forth and concentrate all his energies — provided, however, it does not carry him so far as to prove exhausting beyond his physical power to endure it.

Few things are better calculated to prolong life, under tendencies to death from disease of any kind, — pulmonary consumption among the rest, — than the *expectation* of life, and such a hope of doing something as will carry the person out of and beyond himself. I repeat this idea by intention, that it may be firmly fixed, and will proceed to illustrate it.

Let a consumptive person, for example, become filled with that dream of so many fools, and of some wiser men — the desire to dig for gold in California. He is almost too feeble to enter upon the journey; at least his friends think so. But he thinks otherwise; and on the whole he determines to set out for the land of gold. Now, I do not say that he will certainly arrive there; but I do say, that if not too far gone, — that is, if his lungs are not so far disorganized that nature has no possible chance of holding out as long as the journey actually requires, — he will be more likely to recover than if he had staid at home with no high or commanding motive before him to make exertion.

Twenty-seven years ago, I was apparently going the usual way of the consumptive. The day of celebrating our na

tional independence came, and brought with it a new train of thought. I resolved on making one effort, one deathlike struggle, to save myself. And yet I was so far gone that it seemed like hoping against hope. However, I contrived to raise in my bosom a strong desire to see certain objects which apparently I had not strength to reach. But one of them *was* reached — though twelve or fifteen miles distant. This gave courage to make another attempt; success in that, another; and so on, till I found myself actually gaining strength, and some of the more threatening symptoms of consumption actually abating. And it was through this loophole, and a subsequent resolute adherence to “law,” that I escaped.

Cheering views of the way of God with man, and great faith in the final happy issues of all things, will do much for the consumptive. And to indulge such cheering views he has every encouragement. The gospel of our Lord and Savior is full of encouragement to faith and hope. “Though outwardly I perish, yet others will live,” the consumptive person should say to himself. “God lives, at any rate; and because he lives, I shall live also.”

But valuable as all these are, there is one more grace that exceeds them; to which, indeed, I have already adverted. It is the love of God and of his creatures, or general benevolence. There is nothing that will do more to keep down a forming hectic, prevent the increasing night sweats, or even allay the rising cough and pain, than that burning love of God and man, which, though much talked of, is, after all, but little known, especially as regards its good physical influence.

Finally, to prevent the progress of consumption in those who are predisposed to it, we must harden the constitution. Not, in the way, of some, by measures of an exclusive or

special character, that are expected to do the work in a very short time, — a few weeks or a few months, — but on the strict principles of physiology and hygiene.

Nearly all that I have recommended from the beginning of my lectures to the present time, if followed in the true spirit of reform, tends to harden the constitution. Several things, however, which I have said, deserve to be repeated; and there are other things which need to be particularly enforced.

I wish to speak more particularly of employments. If there be any one class of persons that more than all others need particular attention with regard to their daily employments, it is the consumptive and the scrofulous. Thousands perish for want of proper attention to this subject.

In general, it may be said that those employments are most healthy and most invigorating to the human constitution which are most useful and necessary. This is a wise provision; and yet, on reflection, it seems quite a natural one. Would the God of nature require his creatures to pursue employments directly and unavoidably calculated to injure their health? He has not done it, I say again, as a general rule; to which, however, there may seem to be a few exceptions. Let me make good my assertion, and, in this respect, vindicate the ways of God to man.

Air is indispensable; but this is made ready in the most ample and healthful abundance for all — provided they do not adulterate or otherwise spoil it. Surely there can be no suffering from this source in a world surrounded by an atmosphere forty-five miles high!

Our drink requires as little labor, or nearly so, as our air. For the most part, it is furnished in springs, and brooks, and rivers, whose main designs cannot be mistaken. Or if these

are impregnated too strongly with salts, or mineral substances, we need not deteriorate as a race, nor even as consumptive individuals, very greatly, before we can devise means for retaining and preserving rain water.

Hard water has been set down, time immemorial, as injurious to consumptive people; but the invigorating or hardening effects of pure soft water, like almost every thing else belonging to the department of prevention, seem to have been overlooked. No writer, that I can recollect, condescends to dwell much upon it.

It costs a little pains, I know, — a little of human labor, — to secure and preserve a supply of this necessary of life. But, then, rains come pretty often in this country; and if they did not, a cistern is easily and quickly made. Some are giving up the idea of having wells, and are beginning to depend wholly on cisterns for all purposes.

Food costs us a little more labor than drink. But this, in its simplest and most healthful forms, is not very costly. In the regions where man was first placed, and even half way, or nearly half way, from the equator to the pole, — as far, perhaps, as, in the present state of the arts and sciences, man is prepared to reside, — much of this food is furnished for him by his Creator and Benefactor.

Here, surely, employment is healthy. If laboring to gather up or pluck from vines and trees, in Heaven's own air and sunshine, those rich products which Nature has furnished, and in her own way and by her own processes rendered agreeable to every unperverted taste, be not healthful and health-giving to the consumptive, and every body else, I know not what is.

But suppose ploughing, hoeing, spading, setting out and pruning trees, and gathering corn, and grain, and esculent

roots, have become necessary by reason of greater contiguity to the polar regions, a denser population, or perverted tastes. These involve more of labor ; but is it not healthy labor still ? Is it not performed in the open air, in the sunshine, and with a great variety of muscular movement ? Is it not performed with cheerfulness ?

Then, when it comes to the kitchen, the processes of cooking, though not like nature's own, are still simple, and may be comparatively uninjurious. The simple boiling, baking, or parching of grain, either in whole kernels or in coarse meal, is not bad for health. It is complicated mixtures, involving, directly or indirectly, the use of seasonings, grease, &c., with the fumes of frying, steaming, and the like, that destroy much of the health of housekeepers.

If we need houses, — though, according to Franklin, Methuselah lived in open air, — to build these is by no means unhealthy. Whether made of brick, stone, wood, logs, or mud, they can be rendered very comfortable by means of labor chiefly performed in the open air. As for paint, inside or out, it is even now a mooted question, with competent and intelligent mechanics, whether it is good economy to use it. Certainly it is not healthy. Then our shoes and clothes need not be so made as to shorten the lives of every one concerned. I know from observation that a moderate supply of plain, necessary clothing for these bodies of ours, from top to toe, can be made by those who are not too far gone with consumption, and that, too, without much prejudice to their health. It is working in the fumes of white lead or copper, making cigars, snuff making, brewing, making fine flour, soap and candle making, singeing cloths, roasting coffee, blowing glass, sweeping chimneys, working in brass, distilling spirits, working in lime, dyeing cloth, painting houses, &c., prepar-

ing confectionery, and the like, that so much impair human health.

Do you say that some of these employments are indispensable to human happiness? Very few of them, indeed. And that small number which are, may be so modified as to make a world of difference in the result. Or, another thing, still, can be done. The healthy can pursue the more doubtful employments — the consumptive or otherwise enfeebled, only those whose healthful character is well known and established.

This brings me precisely to the main point now aimed at. In order to harden the constitution of those inclined to consumption, they should be placed at those occupations, and those alone, which are either healthy in themselves, or can easily be made so. The healthfulness of an employment, in deciding whether to follow it, should be our first inquiry — at least, it should be next to the inquiry about its morality and righteousness.

Some may say, “But have our preferences — our likes and dislikes — nothing to do in this matter? If a person engages in an employment which is perfectly and wholly disagreeable to him, will it still have a good effect on his health? Is not the feeling of contentment and pleasure, in our work, a very useful and healthful element?” It certainly is, as I have again and again said. It will do much to counteract a moderate degree of influence which is in the other direction. But it will not do every thing. Farming is, for example, the most healthful employment in the world. Suppose, now, a person dislikes it, but likes cigar making, or stone cutting. No likes or dislikes, though they may modify, will change nature, and render the latter employments as healthful as the former.

I am far from supposing that all consumptive and scrofulous people can be induced to follow farming — I mean at

once ; though I do look forward with confidence to a period in the world's history when the best interests of mankind, as a whole, will be seen to involve the necessity of agricultural or horticultural labor three or four hours a day, by every one who is old enough. Much, however, depends on motive. If a person, young or old, fully understands the necessities of the case, he must be strangely constituted, or it will have considerable influence on his mind to reconcile him to what might otherwise be more trying, or even disgusting. Satan is shrewd enough to observe that "all that a man hath he will give for his life."

I know that an agricultural life, in the old-fashioned, plain way, has been for half a century becoming unfashionable. So many men, who are not willing to earn their bread in the sweat of their face as long as they can get it by some kind of speculation, have been caressed, or at least allowed to hold up their heads as high as other men, that farming, for a time, was disreputable.

It is not necessary, however, to pursue it according to the old fashion. There are improvements among our modern innovations, and why not avail ourselves of them? With these, a person will not be quite out of fashion. Agriculture, like housekeeping, in *some* shape or other, must always be in fashion as long as men have palates and stomachs. One thing besides. Addison — and Pythagoras before him — has said, in regard to the small matters in life, that it is well to fix on that which is best for us, and custom will soon render it agreeable. The remark might be applicable in the case before us. An agricultural life is so true to nature — so congenial — that he who should pursue it a few years, from a mere sense of duty, would probably come, at length, to relish it.

I have dwelt on this point at considerable length, because I regard it as a matter of no ordinary consequence. There are other employments for the consumptive, such as carpentry, cabinet making, engineering, coopering, practising medicine, &c., which will do very well; but after all which can be said in their favor, they cannot for one moment, for hardening the constitution, be compared with agriculture. So for females, while there are various employments which will be more safe for them than working in cotton factories, painting, bonnet making and bleaching, sewing, weaving, knitting, and the like, there are none like housekeeping — provided always the housekeeping is conducted in a truly rational and “physiological” manner.

I have alluded faintly to cotton factories for females, as I did formerly to axe factories and lead factories for males. Both these prove the graves of thousands. The former however, as I am persuaded, may be rendered much more healthy than they now are, were human ingenuity to be applied to the subject with half the earnestness which resulted in Sir Humphrey Davy’s discovery of the safety lamp.

I have elsewhere doubted whether there is any insurmountable difficulty in blowing aside the dust in cotton mills, as well as in most other places where dust is slowly destroying the operatives. If this can be done, scrofulous and consumptive patients may, for a time, continue to exist in factories; but they cannot be greatly hardened.

Having alluded to the unpopularity of agricultural life, it may not be amiss to allude to one of the causes which are in continual operation to perpetuate it, which I fear is not likely very soon to be removed. For, since few parents themselves relish rural or agricultural life, but are enamoured of pomp, and show, and bustle, they very naturally transmit to

their children, in a thousand ways, — but especially by that example which is always vastly more efficient than precept, — the same feeling and spirit.

Let me remind you of a very common case. A father shall have in his hand a new book, — say one of Peter Parley's, — and his little child shall be leaning against him looking at the pictures. To which of these will the parent call the attention of his child — to those which represent agricultural life, the ploughman, the load of hay, threshing grain, &c., or to something which pertains to more fashionable life? Or, in conversation at the table, where the parent, if beloved, is a sort of demigod to his children, to which subject will the conversation most readily turn — to fashionable employments, or to the primitive occupation of agriculture? Can there be a possible doubt? Can we doubt, therefore, where children obtain a bias?

Then what shall we say to those who take for granted that our tastes and predilections in this matter are uncontrollable, — practically that they are instamped upon us by the great Creator, — and that if the consumptive person has a taste which would lead him to a wrong employment, that taste and inclination cannot be overcome?

In thus freely and unqualifiedly recommending to the consumptive and scrofulous, as a means of hardening their systems and preventing consumption, an agricultural life, I do not forget the dangers to which they are at the same time exposed. I do not forget that they are thereby the more certainly tempted, taking society as it now is, to break a large number of the general laws of health. But it ought not to be so; and, in truth, it need not be so. If any body can have proper clothing, exercise, food and drink, it is the farmer, provided he will only take the necessary pains. He is

not compelled to long-salted flesh, fish, and butter, nor to greasy or pasty compounds of every sort. He might have the very best, while men of other occupation are often forced to Hobson's choice — what they can get or none.

All I have said with respect to the lungs and skin, in former lectures, — especially with respect to their laws, — is to be studied and obeyed by those who would harden themselves against consumptive disease; so, also, what is to be said by and by, in lectures on clothing and temperature, exercise and rest, and food and cookery. In short, whatever makes healthy at the same time hardens.

We must never forget the great principle of renovation, which I have elsewhere fully explained. Let us obey and trust to this, even if we can do no more. Let us possess our souls in patience. If we can live on a year without deterioration, why should we not live longer still? Will not the house we live in be better than now? So of two years — of three — of thirty.

The question will be asked, — it often is, — “What do you think of a change of climate?” The inquiry is an important one. Many go to a southern clime; some partially recover; some are better, set out for home, but are worse on their return; others still are hastened out of the world by migration.

My judgment in the matter is just this. If a consumptive person can go to Santa Cruz, San Francisco, or some such place, make it a permanent residence, and be contented, it may prolong his life, in some particular cases, and add greatly to his usefulness; but if he goes to stay one winter, and then returns, perhaps in the teeth of a cold north-eastern storm, let him beware. Or if, in order to go there, he must relinquish all the little things which he has been accustomed

to call the comforts of life, as well as his family and friends, — perhaps a family of his own, — and be a sort of exile, surrounded only by hirelings, and deprived of all sympathy but a sympathy with his purse, I must still say, “Better to stay at home.”

I have doubts whether climate has as much to do with consumption as many suppose. Were I to recommend a climate to the consumptive, I should hesitate long before expressing my preference for a southern, or especially a tropical climate, except, as I have just now said, in particular cases, and by way of exchange.

There is a very common belief abroad that Eastern New England — Cape Cod especially — is peculiarly unfavorable to the consumptive. It may be so to some; yet it has hardened me — so I believe.

Almost a quarter of a century ago, I came to Boston, and made it my residence, near which I have for the most part ever since resided. My friends foretold my dissolution within six months. Yet here I am still. Two successive winters, moreover, during the time, I have spent on Cape Cod.

When I first visited the latter place, I stopped for a few weeks at Sandwich, at the gateway, as it were, of the cape. While there, inquiries were daily made of those who belong below, as they came up to Sandwich, “What is the news?” &c. “No news,” was the frequent reply, “except that we are all dying of consumption.” And when I proceeded along the cape to these towns, so fatal to phthisical people, it was at first with a kind of latent dread, lest I should run down; for I heard every where, in explanation of the general prevalence of lung disease, “O, this wretched climate!”

But it was not necessary for me to stay in that region two winters, nor even one, in order to come to the conclusion

that what was attributed to climate could be referred to other causes; and I was compelled to fall back on the good old inquiry, whether it is philosophical to seek for another cause of a given effect, when well-known causes are fully adequate to its production.

It is certainly true that pulmonary consumption is very common and very fatal on Cape Cod; but I doubt whether it is more so than in many other parts of New England which are not maritime. I examined the bills of mortality, and could not find that the proportion of deaths from this cause varied greatly from those of Worcester and Providence.

But, admitting it were so, there are, as I have said, other causes than climate. The people of Cape Cod are fishermen, and have the habits of fishermen. In the summer they have, of course, many privations; in the winter, they are at home generally, where they mean to enjoy themselves. They have money, and they expend it as freely as any other sailors.

But how? Why, they procure from Boston and other places the richest materials for their table; and their families work them up. Wednesday and Saturday of each week seem to be specially set apart for cooking processes. And the housekeepers compete with each other in the matter of extravagant cookery. It is not true — though many have imbibed the idea — that the people of Cape Cod subsist miserably. I have been a traveller one third of a century, and a more luxurious or a more extravagant people in their eating and drinking I have never seen.

True it is that there may not be many drunkards; but they live high. The wives not only cook, but the husbands and children eat. They visit much, and by families, and prolong their visits often for nearly the whole day and evening. Other items of indulgence might be mentioned. They are

thus prepared for a gradual approach of that formidable disease which prevails all over that region — I mean dyspepsia. Captain W., of Fairhaven, told me he hardly knew of a ship master all the way from New Bedford to Provincetown that was not more or less afflicted with it.

They begin to suffer from it early, and are seldom rid of it. Their habits at sea do not, on the whole, improve them — I mean while they have families. These follow the laws of hereditary descent, and as sure as they take the constitution of a dyspeptic father, they are themselves scrofulous. They may, indeed, follow the mother, or some other relative, and thus escape, but many are sufferers. But scrofula paves the way for consumption, either in the individual himself, or in the next generation; and the inhabitants of the cape have now reached this point of inherited scrofula and consumption. Dyspepsia is the grandparent, scrofula the parent, and pulmonary consumption the child. Consumption, therefore, is now fed from three sources, consumption itself, scrofula, and dyspepsia.

My own belief is, that consumption, all over the country, may be traced very largely to these united sources. But if so, the remedy lies not in a change of climate, but in a change of habits. It lies not in going deeper and deeper in luxury, but in abstemious living. It lies in hardening the constitution.

But such considerations as these bring us to another division of the great subject of prevention of which I promised to speak. I was to say something of the means to be employed to save from this fell destroyer the rising generation.

I have spoken of the great importance of correct physical education, in all its various departments — of educating the

lungs, in conversing, singing, reading, and public speaking. I have also alluded to the importance of particular exercises and amusements for the chest—sawing wood, spading, climbing, swinging, running, swimming, &c. Some of these last, however, require more than a passing recommendation.

Sawing wood is an admirable exercise for the chest. It brings into activity a very large number of muscles, which have something to do in expanding the chest; besides encouraging those deep and strong inspirations which compel us to work, well, the handle of the bellows—the abdominal muscles. If the saw is not too heavy, children of both sexes might saw wood very early.

Spading is too severe an exercise for very young children, or for females at any age. For boys who are somewhat advanced, it is admirable. It may be alternated with amusements and with lighter exercises.

Climbing, for boys whose caution is largely developed, is an admirable exercise. It tends greatly to strengthen the chest, and harden the constitution. Clinging to the rounds of a horizontal ladder, and passing along under it hand over hand, is still better for the shoulders and chest, and, indeed, for the whole frame. Consumptive people are frequently known by their tendency to stoop. The horizontal ladder will turn the shoulders backward, but it should be followed up by correct walking and sitting. The youth who sits or walks in a crouching position, with the shoulders projecting forward, can never “endure hardness as a good soldier.”

Artificial aid, in keeping the shoulders backward and the body erect, is worse than nothing at all, *as a permanent support*. It only increases the necessity which it temporarily supplies. All it can safely do is to serve as a monitor to the

unwilling or forgetful. When it has prompted us till the memory and the will perform their office, it has done its work.

But in regard to preventing consumption in society, there is one thing lying back of all this, in what might, for want of a better name, be called prospective education. I refer to the tendency given in the very first formation of the child's constitution.

On this subject, till the appearance of Willich, an old English writer, the world seemed shrouded in thick darkness, such as might almost, like that of ancient Egypt, be felt. One cause of the increasing debility and scrofulous tendency of each rising generation was unveiled in his work; and the Fowlers, of New York, have followed up his idea — perhaps a little too far.

Dr. Clark, to whose work on consumption I have before alluded, has shown, most conclusively, that every thing which tends to lower the strength of a parent, or of one who is *to be* a parent, below its natural line, tends to sow the seeds of a tuberculous constitution in offspring. *This* is true, without doubt, to its utmost limit. And yet who thinks of it? Who has been taught to think of it? Who among us realizes that, as a parent, he is, by his indulgences of every kind, — I mean his over-indulgences, — prospectively undermining the physical constitution of all who are to come after him?

Should this exposition of a general law, designed for the general good of mankind, and, therefore, made obligatory upon all, raise a sneer from some individual who is solacing himself with the idea that the world is to be neither better nor worse for any progeny of his, he only has our pity and contempt. He does not, however, deserve the protection of those wise and good laws which in his heart he despises.

But there is a class of individuals—thank Heaven—who are not, as yet, so callous to the voice of God or humanity. There are those who are not invested by a moral coating—rather an *immoral* one—which, like the cuticle of the rhinoceros, is impenetrable. Bring truth before their minds, and they will for the moment, at least, listen to it.

Such individuals should know—they *shall* know, if I can bring these words to their ears—that for every act, at every age, which weakens their constitution, they are answerable, if not to any human tribunal, at least to a divine. Physical law—the law of hereditary descent among the rest—is God's law, and must be obeyed, or the world must suffer—a world made up of individuals who have but one common interest.

There is more to be said, were this the place for it. The world is old enough to attend to something more than mere negatives. Prevention, though acknowledged to be worth many times as much as cure, does not look high enough, at least from the stand point which is usually taken. It looks high, indeed; but there is something beyond its ordinary ken.

With the known fact before us, that every thing tending to weaken our physical constitutions, and bring our strength below par, is injurious, and even remotely a cause of tuberculous disease, and hence sinful, should be coupled, in our minds, the kindred or affirmative fact, that not to do every thing in our power to raise the physical constitution still higher than it is, is sinful also. How much can be done to improve the constitution, and how great the measure of guilt incurred by such sins of omission, it is, of course, utterly out of our power to determine; but that there is guilt in degree, as truly as there is when we violate any of the commands of the decalogue, can neither be gainsaid nor denied.

## LECTURE VII.

## CLOTHING AND TEMPERATURE.

## GENERAL REMARKS.

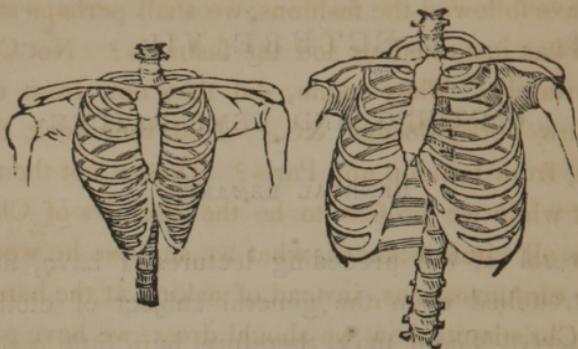
IN several of the preceding lectures, I have, at various points, trenched upon the general subject of clothing and temperature. There may, therefore, be a little repetition in what now follows. I will, however, avoid repetition as much as possible.

The general object of dress is threefold : 1. To serve as a covering. 2. To defend us. 3. To assist in regulating our temperature. A fourth use of clothing — one on which some good men and women, who have written on this subject for the young, seem inclined to say much, — is, to ornament us ; or rather to improve our appearance.

In truth, I know of no very strong objection to making use of clothing to cover personal deformities. If a wicked nurse or careless mother has left the bony cavity of the thorax more in the shape of the keel of a boat than of a proper depository of these most important vital organs, is there any wrong in so arranging our dress as to cover up the deformity ?

Where the wrong shape of the chest is such as I have sometimes seen, — such as might be better represented by the letter V than by an old-fashioned beehive, — it may, perhaps, be otherwise. The sin of dressing too tightly, and spoiling the chest thereby, even though it were the sin of the owner, and not of the parents, is of too deep a dye to be concealed.

Here, on the left, is a representation of the deformity **some** times induced by dress.



The subject of dress and clothing has not received that attention which its importance deserves. In truth, it has received no attention at all, except from a few. Among these last there is a diversity of opinion. Part of us worship dress, and part go to the opposite extreme of despising it. Others of the same "few" care for it only to take the lead in the fashion.

We profess to be a Christian people — a consecrated people. We have consecrated, "before God, angels, and men," not only ourselves, but all that pertains to us. In doing this, we mean — if we mean any thing — to include our possessions, from the largest to the smallest. Is there aught that we can reserve? If so, what is it?

Such, I say, are our professions. Now, what is the reality? Have we consecrated our dress? Has it been — so to speak — "baptized"? Has "Holiness to the Lord" ever been written on it? If so, when, where, and how? I have yet to learn that we have taken the first step in this direction. So far are we, as a general rule, from asking at the hands of Christianity, or even of Science, her handmaid, how we shall dress, that we have not asked a single question of either

We have asked — if we have asked at all — at quite another source.

We have followed the fashions, we shall perhaps say. Yes, and who has instituted or led the fashions? Not Christians, most certainly. They came, did they not, from our large cities, New York, Boston, &c.? And they took them, did they not, from London and Paris? Does it not then come to this, that while we profess to be the disciples of Christ, and to do, in all circumstances, what we suppose he would do in the *same* circumstances, instead of asking at the hands of science or Christianity how we should dress, we have practically been directed by the dandies and prostitutes of the old world?

No wonder some, who see this thing as it truly is, are a little disposed to rebel. No wonder we have Bloomer dresses and pseudo-Bloomer dresses. No wonder would it be, if we should even go to the opposite extreme of that which physiology and religion would direct. The wonder is rather that we have not done this long ago.

In order that our clothing may accomplish the three legitimate and most important purposes of dress, we must study the FORM, the MATERIAL, and the QUANTITY. And as *quantity* is influenced very much by habit, especially early habit, it will be advisable to look at the subject as a matter of early education.

#### I. THE FORM OF OUR DRESS.

In this particular I shall be compelled to depart not a little from the current of received opinion on this subject — or rather from the fashion. For the infant, at least, I must entirely dissent from the prevailing custom. The young, above all, should not be sacrificed at folly's shrine.

Canova, the sculptor, says, that the ancient artists threw all their energies into an endeavor to make the countenance and attitude expressive, with but little regard to the dress; whereas the moderns place all their skill in what might be called the expression and movement of their garments.

So it is with modern education, especially female education. The infant must look pretty, whether he is comfortable, secure, and healthful, or not. Consecrated to God or not, he must be made a doll of, with no earthly advantage at all — to say nothing of heavenly tendencies — but that he may be a mere plaything.

If a good deal of boldness on this subject was called for seventeen years ago, when I wrote my *Young Mother*, it is needed still more at this time. As I ventured to declare the truth then, why should I not be bold enough to declare it now? Besides, ought I not to gather courage from the fact that others have since come to my support? Indeed, almost every writer of any note, from that day to this, has sustained my views. I began, at that time, with a quotation from the *London Literary Gazette*, then of eight or ten years' standing. That writer said as follows: —

“All that a child requires, so far as regards clothing, during the first month of its existence, is a simple covering for the trunk and extremities of the body, made of a material soft and agreeable to the skin, and which can retain in an equable degree the animal temperature. These qualities are to be found in perfection in fine flannel, and I recommend that the only clothing, for the first month or six weeks, be a square piece of flannel, large enough to involve fully and overlap the whole of the babe, with the exception of the head, which should be left totally uncovered. This wrapper should be fixed by a button near the breast, and left so loose as to per-

mit the arms and legs to be freely stretched and moved in every direction. It should be succeeded by a loose flannel gown with sleeves, which should be worn till the end of the second month, after which it may be changed to the common clothing used by children of this age."

Was I not right in quoting this writer, and making his directions the basis of my own? This doctrine, you see, is now of more than a quarter of a century's standing. Besides, it was corroborated, the very next year, by Dr. Dick, in his work on the Mental Illumination and Moral Improvement of Mankind. The doctor says,—

"The time has not long gone by (if it have yet passed) since a poor child, as soon as it breathed the vital air, had as many rollers and wrappers — sometimes ten feet in length — applied to its body as if every bone had been fractured in the birth, and these were often drawn so tight as to gall its tender frame, and even obstruct its vital organs.

"This is a piece of folly so repugnant to the dictates of nature, that even savage nations never commit it, and hence deformed children are seldom or never found among them. By the weight and pressure, moreover, of stays, bandages, heavy and tight clothes, children who were well proportioned at their birth have afterwards appeared with flat breasts, high shoulders, crooked spines, and other deformities. For when a child is cramped in its clothes, it naturally shrinks from the part that is hurt, and puts its body into unnatural postures; and every part of it, even the bones themselves, being soft and flexible, deformity, of some kind or other, is the natural result. To this cause physicians have ascribed the numerous instances of children dying of convulsions, soon after their birth.

"The general rule which reason suggests, in regard to the

clothing of children is, that a child have no more clothes than are necessary to keep it warm, and that they be quite easy for its body. In conformity to this rule, the dress of children should be simple, clean, light, and cheap — free, wide and open, so as neither to impede the vital functions, nor the free and easy motions of the body, nor prevent the access of fresh air, and be easily put on or taken off.”



Rational dress for the young.

After exhibiting, by means of a cut, what he conceives to be the simple and appropriate dress of a little girl, which, by the way, does not, as it happens, differ greatly from the more simple of the Bloomer dresses, the doctor adds, —

“ Pins should be used as little as possible, and the clothes chiefly fastened with strings, which would prevent the occasional scratching of their tender skins, and those alarming cries which so frequently proceed from this cause. Such a light and simple dress would induce children to live with less restraint in the society of each other, and check that silly pride which leads them to ape the fashions of their superiors, and to value themselves on account of the finery of their clothes.”

I am not given to long quotations, but these are so apposite that I could hardly deny myself. I am obliged to dissent from the writer in the London Literary Gazette, when he tells us that, after the second month of a child's existence, he would have it dressed in the usual manner. I would *never* have it thus dressed. I would continue the simple mode through life. One caution is, indeed, necessary on this subject. Under the idea that we use too much clothing — than which nothing can be more true, — some writers have recommended that we should *begin* with very little, in infancy. And there seems to be a popular leaning to this notion. Now, no error can be greater, as we shall see presently.

The simple garment recommended by the transatlantic writer from whom I have quoted is sufficient for the climate of England in summer, and perhaps also in winter, when the nursery is kept night and day at a temperature of sixty-two or sixty-five degrees. But in our United States, and in the cold season, — indeed, in any season but midsummer, — it would hardly be sufficient.

The greatest care, in short, is required in the management of infants, and the most profound knowledge of their physiological character and hygienic relations. Parents who are ignorant may indeed blunder along, do something in a plain

but unskilful way, and raise to adult years a part of their rising charge. But, as I have shown elsewhere, only about three fifths of them survive the fifth year of life. And herein is one of the greatest common mysteries I meet with in life's journey. The divine command is, "Train up a child in the way he should go, and when he is old he will not depart from it;" and yet *how* to train them, the divine Lawgiver seems not to have shown!

True it is that few, if any, act up to the knowledge they possess; but then it is equally true that few have an opportunity of gaining that knowledge which would seem indispensable, especially in regard to physical education. Eliot, the Indian apostle, certainly thought so, when, two hundred years ago, he tried in vain to get a professor from England to teach anatomy and physiology to the Natick Indians.

It is a consolation, however, to reflect that we live under an administration where nothing more is required of us than a right use of the talents — few or many — which are committed to us; with a childlike confidence and trust in Him who is able to afford us wisdom from above, whenever, in the right spirit, we ask for it.

My belief is, that while the child is in its mother's arms, and sleeps at her side, about three pieces of clothing — the shirt, petticoat, and frock — are all that are needed. All these should be loose, very loose. At four or five years of age — possibly a little sooner — loose trousers, for boys, may be substituted for the petticoat.

The Rev. Ezekiel Rich, a distinguished teacher and original thinker, in a communication to the *Water Cure Journal*, of New York, about the middle of the year 1852, recommends to people of every age a form of dress quite as simple as that which other writers and myself have recommended

for children. It is among the curiosities of the day; but the communication is long, and yet is of such a nature that it cannot well be abridged. I will only say here, that it consists, essentially, of only two pieces of cloth, fastened loosely around the body, together with very simple shoes and head-dress.

I am not, however, without fear that there is one sad omission more or less pervading the views of almost all our writers on dress. They seem to forget or overlook the necessity which exists of using a very considerable amount of clothing, in the winter season, from the time the child begins to be out of the nursery till he has reached his eighth or tenth year, and can run and face a good north-west wind.

For during this period, — the beginning of what Dr. Johnson would call the second septenniad of human life, — the child is left to run about and expose himself to all sorts of weather; indeed, it is indispensably necessary that he should be in the open air, while his power to generate heat is, as yet, comparatively feeble.

Now, at this period, — the time at which he is being weaned, as it were, from the mother's watch-care and the nursery, — he needs a good deal of clothing in winter, more than at any other period in his life. He also needs, for the same reason, less than at any other period in summer. The form is of less consequence. But in speaking of quantity I am somewhat anticipating.

As to the headdress for either sex, I think with Dr. Dick, that, "as soon as the hair is sufficiently long to afford protection, there is little necessity for either caps or hats, unless in seasons of rain or cold," or in the case of peculiar diseased tendencies.

With regard to the dress of the feet, much more needs to

be said. The form of the socks or stockings is usually well enough, but that of the boots and shoes is as bad as bad can be. Thousands suffer in various ways on account of the unnatural form of these coverings. They are wrongly shaped from the very first.

The truth is, that children who are able to run about, and who have reached seven years of age, require shoes but a part of the year. It is far better for them, in every point of view, to go barefooted. It would be better for us all, at later periods, to go barefooted a considerable part of each year.

As, however, there is a part of each year in which shoes ought to be worn,—and as there are circumstances at all times of the year, and at every age, which may require it, since shoes and boots are a defence in many cases where they are not needed for warmth,—it is important to speak of their form more fully.

Says Dr. Dick, “The form of the human foot is such that at the toes it is broad, at the heel narrow, and the inside of the foot is longer than the outside—a form which was evidently intended by nature to enable us to stand and walk with firmness and ease. It is therefore a dictate of nature that shoes should be made in the same form as the feet, and be sufficiently roomy for the toes to move with ease. And in order to this they must be formed on two separate lasts, corresponding to the right and left foot. (See the engraving at page 312.)

“How shoes at first came to be made tapering to a point at the toes, almost like a bodkin; how high heels became the daily fashion of the ladies; and how a small foot came to be genteel,—I pretend not to determine; but certainly nothing can be more absurd and preposterous.”

Mr. Rich says, “Let the feet be kept dry, have plenty of

room, and be well ventilated." But to keep the feet dry, as a principal means of preserving health, had been the advice of the medical world long before Mr. Rich. However, Mr. Rich's cogitations on the subject are highly valuable ; the best covering for the feet he knows of is this : —

"The soles should be of light, pliant, tough leather, with no increase of thickness at the heel, being connected with strips of upper leather of three inches wide at the ends, gradually diminishing towards the middle to an inch and a half wide. These should be connected with stout porous cloth, — perhaps knit stuff, — to extend up as far as requisite, and answering for footings as well as shoes."

It is obvious that something more than this is required at certain seasons, in this country, if we would keep the feet dry ; but the subject will be further discussed presently, under another head. It is desirable to banish leather, for the most part, from general use ; we may then see, perhaps, whether it can be done.

## II. AMOUNT OF CLOTHING.

In general, as we have elsewhere seen, the leading object of clothing is to entangle or retain the caloric which is constantly passing from our bodies, and prevent that sensation of chilliness which otherwise we should be apt to experience.

Few are aware of the immense power which the human body possesses of generating heat. This power to generate heat — this calorific office or function — must be exercised, in order to the best of health. And yet it may be, and often is, *over-exercised*. The general temperature of the human body, as you know, is about ninety-eight or one hundred degrees. Now, it is no trifling task for the calorific function — the internal fireplace — to keep up a flame that will preserve

a mass of one hundred and fifty pounds of solids and fluids, at this degree of heat, while the air and every thing else is cooled down to zero.

Yet this is done, in some instances, for many hours in succession. I know not but some strong men might live twenty-four hours in such a temperature; though it is not easy to conceive how. Many feeble persons would perish in one half that time.

One of the most remarkable cases of endurance is found in the *iron man*, as he is sometimes called, on Lake Erie. He stood at the helm of the steamboat *Mayflower* on Lake Erie, at the time she was driven ashore, in the fall of 1851, for thirteen hours, in a degree of cold which no one on board but himself could have withstood for half that time.

In order to conceive of the power which the calorific function exerts in such instances, we may suppose the case of a man killed accidentally in the street, when the mercury is down to zero. How long would his lifeless body remain at ninety-eight degrees? And what an amount of external heat it would take to keep that lifeless mass up to the living standard! You might, in such a case, put on to the dead body a dozen of the warmest suits of clothing which could be found, and it would make no difference. Why not? Because they could not communicate any heat of their own, and there would be none radiating from the dead body for them to retard or imprison.

This illustration, besides giving us some idea of the amazing amount of heat which the human body, in an emergency, can generate, shows us the legitimate end and object of clothing, fires, and other external appliances for warming us, as we are wont to call it. These things do *not* really warm us; they only prevent our cooling too fast, and save our

systems the necessity of working too hard. For, as I said just now, the calorific function may be overworked. The strongest man in the world could not endure the cold of zero very long, without other means of preventing the heat from passing from his body than ordinary clothing. He would be worn out and exhausted. The "iron man" could not have survived many hours longer.

Now, the necessity of clothing is in just proportion to the degree of cold which exists, and the strength and vigor of the calorific function. Extreme cold, if long continued, and we are long exposed to it, requires more clothing; and so does feeble health. So, also, early infancy and extreme age.

In general, then, we see what is to determine the amount or quantity of our clothing. There are no rules so fixed and arbitrary that one might be told by another, at a distance, without taking into account any circumstances, except, perhaps, size and sex, just how much clothing, and of what kind, he needed.

We must seek the golden mean in this matter, as in a thousand others. We must avoid, on the one hand, the extreme of so dressing as to tax the calorific function too much; and, on the other hand, — an extreme which is quite as bad, if not worse, — that of taxing it too little. On one of those extremes the far greater part of mankind make shipwreck of a large portion of their health and happiness. Clothing and temperature are matters of very great moment. In general, the danger consists in taxing our calorific powers too much in early life, and too little ever afterwards.

I have said before that I am not one of those who believe in the propriety or necessity — or even the safety — of a state of complete nudity. Such a state would certainly have its advantages; but I am compelled to think that the disadvantages would overbalance, and more than overbalance them.

There is much false reasoning in the world. Alexander, it is said, asked the Scythian ambassador how, in his cold climate, he could go naked. "How can you go with your face naked?" was the reply. "O, we are used to that," said the conqueror. "Think us, then, *all face*," said the ambassador.

Now, the false reasoning of the ambassador — rather his inconclusive reasoning — has deceived thousands, as it probably did himself. There is an almost infinite difference between going with the face and hands bare, and exposing the whole body.

Suppose the face to occupy one fifteenth of the whole surface of the body; it by no means follows that it costs one fifteenth as much internal vigor to keep it warm as it does to keep the whole surface warm. The energy demanded is *more than doubled* when we *double the extent of exposed surface*.

True it is that the Scythian had brought himself by the power of habit, and in the progress of several generations, or, it may be, of several centuries, to manufacture internal heat somewhat in proportion to the supply which was demanded; but then it had not been done at once, and could not be again. The calorific power necessary to do it would not be in the ratio of fifteen to one, as was probably supposed, but a ratio much greater. Another thing: That ambassador was not aware that, in thus compelling the system to manufacture heat, both they and all savage nations, in similar climes, are living at the expense of life, and gradually shortening their existence as a race, if not individually. This is one cause — though not the only one — of the decline and disappearance of our North American savages.

The conclusion then — the legitimate conclusion, I mean —

of the whole matter must be, that we should decide on the amount of clothing necessary to each individual, according to the circumstances in which he is placed. There are general rules, as we have seen, applicable to all; but there are particular rules to be observed by each individual.

Experience is the best schoolmaster, in this as in every thing else, as far as experience goes, and is *true*. But it happens, most unfortunately for a race that has not yet been taught to reason very closely, that much which is called experience is not truly such. Or, as Dr. Cullen used to say there were many false facts in the world, so there is not a little false experience. Besides, one's own experience does not go very far, after all. We have no method of transferring the experience of one generation to another, except in matters of pure science; so that when a person dies, his experience, mostly, dies with him; and every individual and every generation have to begin the work of life anew.

I must recur once more to parents. They need to know much concerning physical education, of which they are now ignorant, and of which, hitherto, it has not been regarded as the office or duty of physicians to inform them. But they need especially to use the power of observation which they now possess.

As I shall give some general directions in regard to the appropriate means of enlightening parents on this subject, in my last lecture, it must suffice for the present to throw out a few brief hints of the most truly simple and elementary sort, by way of preparation.

The scrofulous, consumptive, and dyspeptic at every age, but especially in early life, manufacture heat very slowly, and consequently need a greater supply of clothing by night and by day than many other persons, unless, indeed, they

spend their time in highly-heated rooms, which would, of course, be much worse than additional clothing. And yet these are the very first persons to be injured by any more clothing than is just necessary, either in summer or winter, and by night or by day. So that the greatest care is necessary here, as well as elsewhere, lest, in avoiding one rock of practical error, we run on another.

It is ever worthy of our inquiry whether the languor which such persons feel on the arrival of the first warm days of spring is not owing to a fact which has not hitherto been noticed, but which properly belongs to this part of our subject. Having been obliged all winter long to wear a great deal of clothing, in order to imprison the caloric, we come to the warm days of spring with an amount of it which is burdensome. The atmosphere being warmer, there is less of heat radiated from our bodies, and we feel oppressed by the internal heat.

Under these circumstances, most persons are afraid to remove any part of their winter clothing, lest they should be chilly at evening. I admit there is a difficulty, but it is a difficulty which with most persons may be overcome, especially if their sense of the value of health is high enough to induce them to pay the tax of securing it.

I knew one man who made it his practice, in our variable climate, to change his clothes, at every season, particularly in the spring, several times a day. Yet he was unusually free from colds, and considering the fact that he was addicted to many habits positively bad, his health was remarkable.

Now, a large proportion of our busy community — busy as they are — might do the very same thing. They must, indeed, lay their plans for it at rising in the morning. They must have their changes of clothing at the field or shop where their labor is to be performed. That simplicity of form in

dress which has been recommended in the preceding pages will be much in their favor.

Many are in the habit of covering the face and throat, whenever they go out in the open air. There are a few individuals who, after speaking much, are liable to cold, unless they protect themselves in this way, especially if they ride when they go out. I am as much exposed in this way as any person, and yet seldom do more than barely to turn up the collar of my overcoat. But, then, I never ride after speaking. I always walk or *run* home. Habit, in this respect, is almost omnipotent. Some nations go with the neck bare, even in high northern latitudes, and yet have fewer colds than we — the Prussians, for example. In general, the more we expose ourselves to cold, the better.

One principle must never be lost sight of. All the work which the calorific powers of the system can perform without being overtasked — that is, tasked in such a way as to prove injurious, in the end, to the individual or to the race — should be performed. All our organs and parts are made to be — so to speak — working men.

Those who are fed with high-seasoned food, — food, in particular, which contains much shortening or grease, — and on the contrary, those whose food is too meagre and innutritious, will, for the time, at least, require more clothing than would be required in other circumstances.

Then, again, sudden changes in our diet do, for a short time, impose upon us the very same necessity. The steady burning of the fire within us is very much affected by habit. The man of simple diet — the mere consumer of bread and fruits — finds nearly the same difficulty in passing suddenly from his accustomed diet to a more luxurious one, that the high liver does in passing to simplicity.

The man of sluggish temperament, especially if, with that temperament, there is — and we almost always find it so — a tinge of the bilious habit, will require more clothing, other things being equal, than the individual who possesses a more active and more energetic temperament.

Some persons inherit such diseased tendencies as render it necessary they should wear more clothing in the morning than towards evening. The same class of persons frequently require but little clothing when they retire to rest, but need additional covering towards morning.

They who exercise but little require more clothing than the active. Those who exercise too much, on the other hand, and especially those who have, at times, profuse perspirations, have weakened calorific powers, and consequently require a larger amount of clothing in proportion.

Living or sleeping in a bad atmosphere puts out the internal fire. Hence it is that factory people, and students, and clerks often find themselves chilly, and often take cold ; while those who are employed chiefly in the open air are comfortable with a much smaller amount of clothing.

I know a stage driver on Cape Cod, who assured me, when I last saw him, that for twelve years, during which time he had driven his coach every day from Chatham to Harwich, he had worn no stockings with his boots, and yet had been as comfortable as he was formerly when he wore them. I have known several similar instances.

Many wonder how it is that the laborer can endure the cold so well. They forget that, like the stage driver, he always has an abundance of pure air. There are, indeed, other reasons for the fact ; but this is one, and is a highly important one.

Mr. Rich says, "Let as little headdress be worn as will

comport with the common ideas of decency ; and of whatever shape it may be, let it be light and porous." The latter part of the remark might be applied to dress in general. Every thing should sit loosely.

### III. MATERIALS FOR CLOTHING.

I wish it were practicable to return to the custom of raising flax and manufacturing linen, as they did in Solomon's time.\* Not for the sake of a few kings and princes, merely ; but that every body might be kings and princes in the summer season — such kings and princes, I mean, as Christianity was designed to render us.

For nothing could be more healthy in hot weather, except for those who, by reason of feebleness or violent exertion, perspire too freely, than linen clothing. It is a good conductor both of heat and electricity. Hence we call it cooler.

But for those who are, from any cause whatever, enfeebled in their constitutions, and especially so enfeebled as to be liable to profuse perspiration, light, soft flannel, or at least cotton, will be preferable, even in midsummer, and in the hottest climate. The linen such persons wear should be worn externally.

Cotton is a worse conductor of heat and electricity ; and is, therefore, in general, a better material of dress, except for hot weather, than linen. Besides, its cheapness is a temptation which even some of the friends of free labor know not how to overcome. Some individuals find cotton, next to the skin, to be irritating, though less so than woollen. Such per-

\* There are at the present moment indications of such a return. Success to those who have set the ball in motion.

sons are obliged to use linen underclothes. But I have usually found this class of persons much more able to bear cotton and woollen after abandoning a high-seasoned and overstimulating diet.

I am strongly inclined to believe that, when mankind have lived in strict accordance with all the laws of health for a few generations, linen may and will be made a staple article, and will constitute one fourth or one third of all the clothing worn among us.

The time, however, is not far distant when cotton cloth will be the product, for the most part, of free labor, so that, as far as health requires it, the most scrupulous can use it in preference to linen, and, if they choose, as a substitute for nearly every other material.

Woollen clothing, trained as we are, and in our very changeable and cold climate, will be for some time in very large demand, notwithstanding the cheapness and availability of cotton.

Some individuals among us have supposed the use of woollen clothing not only unnecessary, but wrong. They reason in this way: "A state of society," they tell us, "is fast approaching, when wool cannot be had in any considerable quantity; and does not this indicate," they ask, "that the Author of nature did not intend its use?"

They refer to a future condition of the world, when, its population being increased fifty or a hundred fold, there will be, as it now is in Japan, no room for domestic animals or, if any, for very few. So that precisely at the time when fifty or a hundred times the present amount of woollen clothing would seem to be needed, not a fiftieth or a hundredth part of what we now have can be obtained.

It would be difficult to show the fallacy of such reasoning

and yet mankind will generally reject the conclusions. "Such a dense population," they say, "may never exist. And suppose it should — why should I deny myself, at the present time, what is a manifest enjoyment, because people may be compelled to make the denial a hundred generations hence?"

But it is not *claimed* that such denial should be *compelled*. The object of this train of reasoning is to suggest important thoughts on a subject which most certainly demands consideration. The question such reasoners would raise is this: If in the latter-day ages woollen clothing cannot be had, — at least none worth mentioning, for so amazing a population, — has the Creator made it indispensable to human happiness now?

One argument in favor of the substitution of cotton, linen, and silk for woollen, is the consideration that it would involve less of bloodshed and other cruelties. If sheep could be dispensed with, how many lambs might be spared from the knife of the butcher!

Some, however, tell us wool might be had without murder. The sheep sheds its wool without our interference, and can there be any great harm in picking it up? They that say this should consider how small the quantity of wool we shall thus find will probably be, when we cease to domesticate the animal that furnishes it.

Besides, the use of silk involves the destruction of much life of a certain kind, though not, I grant, in the same way. Yet who would deny himself silk vests and pocket handkerchiefs, or his wife and daughters silk dresses? Or if it were worn next the skin only, as is the custom with some, it would be an article we should be slow to relinquish entirely.

In general, silk, from its non-conducting character, is but a very indifferent material for underclothing. Yet there are seasons of the year, such as a portion of the spring, and par-

ticular days at almost every season, when its non-conducting qualities are desirable. Thus, when the weather is warm and the air moist, — surcharged with vapor, — and the electricity is conducted too rapidly from the body, so that we lose our elasticity of body and mind, and complain of faintness and languor, silk next the skin has a most happy and healthful effect, and can hardly be too much commended.

For my own part, I have very little doubt that we might train ourselves, in a few generations, to the disuse of wool-



Improper shape of our shoes illustrated.

lens, were it likely to be beneficial to do so. But if it were both beneficial and desirable, as I think it is, what shall we do for shoes, stockings, mittens, and hats ?

There are few persons who need any thing more than Mr. Rich's contrivances for the feet, except for a very few times in the winter ; and some would hardly need any thing else all winter long. Or a shoe might be made, partly on his plan and partly on that of a friend of mine, of gutta percha, and perhaps a little India rubber and cloth.

But whatever the material may be, they should be large

and loose, and shaped like the foot. Only a few days since a mother was complaining that the middle toes of her little daughter's foot were inclined to overlap the others. On looking at the foot, and comparing it with the shoe, the mystery stood revealed. The former was almost twice as broad as the shoe. (See the engraving.)

If at eight, ten, or twelve years of age, a proper beginning were made, I have very little doubt that by the age of twenty-five or thirty, a person might be disciplined into a condition which would require but very little clothing on ordinary occasions. But the process must be slow — never hurried.

I must not close this lecture without protesting against several errors in relation to the dress of both sexes. One is the use of thick, heavy hats. The thick wool hat keeps the head hot, even when the hair is closely cut; but when both are worn, — the hat and the hair, — the danger to the brain is quite considerable, and sometimes imminent.

Boots are often too tight. In truth, tight and narrow shoes and boots are quite the order of the day. Besides producing what are called *corns*, they have other evils. They deform the feet, and retard the venous circulation. They are especially to be avoided by the young.

Tight coats, stocks, cravats, vests, and pants are all of evil tendency. They have not a single redeeming quality. So tight garters. These are worse than the rest. They do infinite mischief. They are one cause of those terrible enlargements in the lower limbs, called *varicose veins*. But I have treated of these elsewhere.

I must call attention, particularly that of parents, to another evil. Young women go out at evening with thin shoes, and other light and thin garments, when they have worn thicker, and stouter, and warmer garments, in the house, all day long.

Thousands and thousands, who have died of consumption, owed their death to the indulgence of that kind of vanity to which these remarks refer.

But of all the abominations connected with this subject, tight dressing, bracing, and padding are the most reprehensible. There is no apology for compressing the surface of the body. Let me sum up what I have to say on tight clothing in the following words: —

1. Clothes moderately loose are warmest.
2. Tight clothes impede the venous circulation.
3. They obstruct perspiration.
4. They injure the internal organs by compression.
5. Other parts are injured by sympathy.
6. They interfere with free muscular motion.
7. They obstruct the free circulation of the air on the surface of the body.

The philosophy of braces has, perhaps, been fully explained. They are designed to support the body, but in the end weaken it. Edward VI. is said to have worn iron boots to support his ankles, which were weak; but the more he wore them, the weaker and more crooked his legs became. This might have been expected, had his friends known any thing of physiology and hygiene.

## LECTURE VIII.

## FOOD AND COOKERY.

## GENERAL REMARKS.

THERE is a prejudice abroad against discussing the question, What shall we eat, or what shall we drink, or what shall we put on? Now, as regards our dress, I have shown, in my last lecture, that such prejudice is wholly unworthy and unreasonable; to which I might have added, that the objections made to a conscientious consideration of that subject come from a wrong quarter. It is somewhat so with the prejudice against talking about what we shall eat, and how we shall eat it. They who quote Paul so fluently, and tell us of his injunction, "Eat and drink what is set before you, asking no questions for conscience' sake," are seldom the first to obey his other injunction, "Whether, therefore, ye eat or drink, or whatsoever ye do, do all to the glory of God."

There is here no contradiction in the apostle's mind, nor is there any in the words ascribed to him. In the first instance, he is not talking of any qualities of the food, other than its having been set apart for idolatrous purposes: this, he practically says, does not injure it. But the last injunction covers the whole ground of food and cookery; and not only permits, but requires, a reasonable consideration of *whatever* is set before us.

There are those who, notwithstanding their zeal to glorify God, practically regard the human appetites, in themselves, as mean and vicious, and incapable of sanctification and

honor. They would tread them beneath their feet,—or, in other words, exterminate them,—and still think they were doing God service.

True, I do not believe the number to be very large of those who think thus meanly of the Creator—who regard him, in a practical point of view, as having made a mistake in our formation. Most men of sense believe the appetites, as well as the affections, when duly “baptized” into Christianity, to be an aid in the performance of our duty.

And some believe even more than this—that in a moral and religious, as well as social and intellectual view, the stronger our appetites are, the better. This I have affirmed and illustrated in my second lecture; it is, therefore, only necessary, in this place, to repeat the statement.

The appetites, then, we may safely say, are given to promote our happiness and usefulness. The more perfectly correct they are, the better they fulfil the divine purposes concerning them. And can such an attention to the laws of health and life as will preserve them in a state of integrity be unworthy of our conscientious regard?

I might say even more than I have yet said, either here or elsewhere. I might say that, instead of being wrong to talk about our food, and think about it, and discuss the question, in our own minds, whether we will take this article or reject that, there are great moral advantages to be derived from it.

One reason why Christians are not Christians, after all,—why they do not deny themselves more, in their every-day walk and conversation,—is precisely this: that they have never been trained to it. Dr. Emmons, of Massachusetts, it is said, never sat down to eat without agitating the question, at least in his own bosom, what he should eat; and when he had decided, no circumstances could prevent his acting

according to his convictions. The man who has been trained to be able to put a knife to his throat at the table and elsewhere, when temptations arise, is the only man who can — or rather will — govern himself in the larger matters of human life. As are the sources of the Mississippi, so is the Mississippi.

It is quite another thing to watch over ourselves with fear and trembling ; this is always hurtful. So it is to think much about it after we have eaten ; but the question, “ What shall we eat ? ” properly and calmly discussed before eating and during a meal, and above all, an adherence to the judgment of the mind as to what is right for us, are almost indispensable to the formation of Christian character.

It is thus that the question, “ What shall we eat ? ” is placed on high ground. It assumes a religious aspect. It becomes, as it ought, a matter of conscience — of duty — a matter between us and God our Creator. It becomes to us one of those “ deeds ” which are to be performed, as Paul again says, to the “ glory of God.” Neither our Savior nor Paul ever intended to set aside consideration, but only over-anxiety and superstition.

In pursuance of this subject, as a semi-religious concern, I shall endeavor to show, 1. Under what circumstances the preparation of food by culinary and other processes is legitimate ; 2. What are proper and what improper articles of food ; 3. I shall present a list of domestic poisons.

#### WHEN COOKERY IS PROPER, AND WHEN IMPROPER.

The preparation or cooking of food is legitimate when it renders it more *agreeable*, more *nutritious*, and more *digestible*, or any one of these ; provided, however, the cooking process is not too expensive. For if the gain by cooking is so

trivial as to be unworthy of the time and money required by the process, then it may become unlawful, or illegitimate.

The potato will serve as an illustration. It is the concurrent testimony of all men of large experience, that the cooked potato is much more valuable as food, even for domestic animals, than the uncooked. The difference is believed to consist chiefly in an increase, by cookery, of the nutrient principles. Why we believe thus is, that some of our domestic animals find it as agreeable to their taste — perhaps more so — when raw as when cooked; and yet they do not thrive so well on it. Here, at least, is the testimony of analogy. As a plain matter of fact, too, we know that for man it is much more palatable, somewhat more nutritious, and vastly more digestible, when boiled, baked, or roasted, than in a raw state. Here, then, is still higher testimony, which I suppose will not be controverted.

Take, for a second illustration, the article of rice. This, for aught I know, is as nutrient in its uncooked state, and perhaps nearly as agreeable, as when subjected to culinary processes; but it is not, in its uncooked state, very easy of digestion. Still we believe the cookery of rice to be perfectly legitimate.

Take, again, wheat, corn, or rye. Now, these can be eaten, by those who have good teeth, without any preparation, and they are by no means disagreeable to one who has a good appetite. Yet they are *more* agreeable when cooked, and, as is generally believed, rather more nutritious; and if cooked properly, quite as digestible. Here, then, is some little gain from cookery, and no known loss; I deem it, therefore, legitimate.

Again, still, take peas or beans. These can be eaten raw; they are thus eaten by Dr. Schlemmer and his followers. But they are at once more palatable, more nutritious,

and more digestible, when cooked. I need not say that the preparation of these vegetables, by boiling or otherwise, is legitimate. There are few this side the Atlantic that would eat them otherwise.

Finally, the ripe, mellow apple, cooked — so to speak — in nature's own way, though more agreeable to the strong, healthy adult than when cooked, and nearly or quite as nutritive and digestible, is yet, for young children and feeble adults, somewhat improved by the simple process of baking. Is not this, too, legitimate?

But, on the other hand, take wheat flour, and rich, ripe apples. Instead of making the flour into good bread, and either baking the apples or eating them raw, let a housekeeper toil several hours — nay, one hour; for that is too much — to make them into pies. Are the apples improved? Is the pie crust an improved article?

Take the rich marrow squash, that, when simply boiled, is like a mass of meal, only sweeter, and is fit to stand before kings, as Solomon would say, and after rolling out some paste from wheat flour, and adding other ingredients, put them together to make a pie. Is either article improved?

Some may say, "But the pies, both of them, are made more *agreeable* by the cooking process; and did you not say that, when a thing was made more agreeable by cooking, the process was legitimate?" Yes, certainly, whenever it does not occasion a wicked waste of time or money; and whenever, too, it is not made the worse in other respects. But when pies are made, they involve such a waste of precious time, and they are rendered so indigestible, that their preparation can never be right.

So, once more, take milk. Immediately from the cow, it is tolerable food for the young, and not very bad food for

adults ; but when it has stood long enough for the cream to rise, it is less perfect in both divisions, the milk and the cream. When, however, we go still further, and spend time in manufacturing the cream into butter, we do what is so palpably wrong, as, in my own view, to admit of no apology. For let us recur to our rules. Is any thing gained to our palates ? Not unless they are strangely perverted. Is the food rendered more nutritious ? Not at all. More digestible ? On the contrary, far less. And the time spent is lost, wholly so, to say nothing of the loss by permitting the milk itself to deteriorate.

But many set their milk for cheese. This is still worse than making butter. Why so ? Because it wastes more time, and nothing is gained which is worth naming. It would take one person nearly a whole summer to make three thousand pounds of cheese ; and what an immense amount of positive good might a well-trained and benevolent female accomplish in that time !

I have given these as mere examples of what is before us daily, in a thousand shapes. I have not presented the worst cases I could think of ; but, rather, *average* ones. Mrs. Leslie, as I have before told you, gives a receipt for making a mince pie, into which enter eighteen different ingredients. She who would make such a pie must have very little regard for a world lying in wickedness, or for a judgment to come.

Though I am neither a preacher nor the son of a preacher, allow me to discuss this subject for a few moments. For I am quite aware of a supposed objection that is brought, at least in the minds of housekeepers, when they listen at all to such reasoning. "Why, females, as things are, can do but little if any good in the world," they say, "and is it not

better that they should spend their time in cooking than in idleness?"

But *can* they do no good? Have they no brothers, sisters, uncles, aunts, parents, or grandparents, whom they might solace by their conversation, reading, &c., or even by kind and cheerful looks? Have they no sick, or ignorant, or vicious neighbors? Have they no friends, sick or well, at a distance, to whom they could write, or in some way communicate good? Should it ever become true that a female who is competent to make pies, cakes, puddings, fritters, jams, and I know not what, is incompetent to perform any of these acts of benevolence, or is unable to find any body in the wide world who needs charity, then let her, if she will, make pies and cakes.

Let her do this, did I say? Certainly I would, if I could not convince her that, besides doing no good, it was doing a great deal of harm. Let her do it, if she dare do it, with a knowledge of the laws of health. Let her do it, if she dare do it, in a world for which Christ lived and died.

Should the *true* reasons for this fashionable cookery ever be given, they will be found very different from all this. They will be found not unlike those which the drinker of spirits, wine, cider, beer, tea, and coffee would give, if he spoke the truth, for using those beverages, viz., "We like them." Another reason will be, "We like to *cook*." Or, rather, "We have been so trained as to be ambitious of setting out a table in good style. Our hearts are not on politics, or trade, or commerce, or money, even. But we cannot help having some pride in a well-set — that is, a fashionable — array of dishes."

Yet Christian housekeepers ought to know — some of them do know — better. They understand, perfectly well, that to

him that knoweth how and where to do good, and doeth it not, to him it is sin. And yet they will sin on! They would sin on — some of them — even if the grave yawned beneath their very feet!

If they were to cook as they know is best for health and economy, nobody, they tell us, would eat. Woman is to please others. Yes; but she *might* please others by setting before them rum and tobacco; for some females have even done this. *Will* she therefore do it? She did it formerly; why not do it again? But I will not dwell.

Suppose a family, one or two of whose members are severely sick, with a disease so alarming that they cannot obtain the necessary help. The mothers and daughters are compelled to expend every pound of strength they have to spare on their sick sons and brothers. Suppose, moreover, they are already supplied, or can be readily furnished with good, plain, wholesome food — that, too, which very well satisfies all their appetites. Will they suffer themselves to be drawn away from those duties to the sick, on which life appears to depend, for the sake of fashionable cookery?

But if plain food — bread, meats, potatoes, rice, peas, beans, beets, turnips, fruits, milk, &c. — is sufficient to satisfy the appetite and sustain the body in good health, even in unfavorable circumstances, why should it not answer the purpose at all times? Why should any other be prepared? The “dinner of herbs,” as Solomon calls it, is not only better “where love is,” but always and in all circumstances. Is it said that we are not always compelled by sickness to deny ourselves? It ought to be no self-denial to Christian men and women to do right. Besides, do we remember that we are all brethren of one great family? What if we have no sick brother or sister under our own roof; have we none in

the neighborhood—in the town—in the world? Or if none who are sick in body, are there none who are sick in mind or heart?

Not only is it true that mankind are one great family, but it is true, also, that the world is one great building for us to live in. Does it make as much difference as many people seem to suppose, whether the partitions between our various rooms are one inch, one mile, or ten thousand miles thick?

Will it, again, be said, “God made us for enjoyment, and who wants to do penance all his life long?” There is no penance about it. Some say there is no such thing as self-denial. But there is. There is a denial of self for the present moment, to insure a future good. And there are those who can testify from experience—and their testimony is worth something, because it is positive, and that of all others is negative—that enjoyment in this world, so far as eating is concerned, is altogether in favor of those who are self-denying.

## II. WHAT IS PROPER AND WHAT IMPROPER FOOD.

The best practical classification of food, I know, is the following: 1. *Farinaceous articles, or breadstuffs.* 2. *Fruits.* 3. *Esculent roots.* 4. *Oily substances.* Of these I will speak in their order.

1. **FARINACEOUS OR MEALY ARTICLES.**—These are so numerous that I shall not attempt to speak of them all. Wheat, rye, barley, Indian corn, oats, peas, beans, rice, buckwheat, millet, chestnuts, potatoes, sago, tapioca, and the marrow squash are among the more important. These are essentially *bread* stuffs—commonly called *the staff of life*. I doubt, however, whether they are much better entitled to this name

than fruits. Life can be well sustained by either ; but a selection from the two is preferable. (See Appendix, Note A.)

Most of these articles of *bread corn*, as they were once familiarly called, may be eaten raw, by those who choose to use them in that way. They are generally rich in nutrient particles, but are believed to be, for the most part, richer when cooked in a rational and healthful manner.

A part of them, especially corn and buckwheat, are often parched. Others of the catalogue are roasted or torrefied. Parched grain is of very ancient date, and to most persons wholesome. South American armies sometimes subsist on it, during forced marches of many hundred miles. So, in substance, the North American Indians.

Boiling these articles is by no means uncommon. Thus we boil rice, peas, beans, chestnuts, squashes, sago, tapioca, potatoes, wheat, and sometimes corn and rye. And I know no reason why a part of the other farinaceous articles might not be boiled with advantage. Boiling renders them easy of digestion.

This third kind of bread (using the term in its enlarged sense) is believed to be, on the whole, preferable to the other two I have mentioned, for general use, and deserves to be brought into more extensive notice than it has been. Wheat, rye, and chestnuts, boiled properly, deserve to be staple articles at all our tables. I do not, of course, mean to say that we should have them at every meal, or either of them, unless we prefer to do so ; though there is no particular objection to such an arrangement. The world will be great gainers, however, when any one of the three shall find its way to every table *once* a day.

Closely related to this is a fourth kind of bread. It has obtained the very general name of *hominy*. It is grain

bruised, or cracked, and then boiled. Indian corn and wheat are oftenest prepared in this way ; but there would be no objection to making hominy from several of the others, were it but customary.

But we must come to those preparations which have, more commonly than the others, been *called* bread. They consist, essentially, of masses of flour or meal, coarser or finer, mixed up with water or some other liquid, and baked in the shape either of cakes or loaves. To make these in greatest perfection, they should be ground coarsely — cracked, rather — and baked in thin parcels or flakes. They should be baked quickly. The grain, moreover, should, in the first place, be washed clean. It is also an improvement to run it through a mill, as some do, and scrape off and blow away a part of the cuticle.

If the question is still asked, “ Why bake, or in any way cook, our grains at all ? If trained to eat them raw, would it not answer every purpose ? The Schlemmerites eat them so, as you have already told us. We should, then, be compelled to the work of mastication ; and this would certainly be an advantage.” Yes, if we all had good teeth, and were willing and contented to use them freely, it is highly probable they would last longer for it. Dr. Schlemmer claims this in behalf of his system. But if our cakes are firmly baked, and thin, I think we shall be likely to masticate them very well, almost as well as we should the grains.

Then I think that, as it is with the potato, in boiling, so it is with meal in baking. There is, somehow or other, a gain in nutrient particles quite sufficient to compensate for the loss of time and strength in preparing it. (See Appendix, Note B.)

I have said that these cakes, of coarse meal, should be thin.

They are best so, for two reasons. First, there is more of the crust in proportion to the whole contents ; and the crust, you know, is both sweetest and most digestible. Secondly, they seem more light and porous when baked quickly ; which, with many, would be quite a recommendation, and to no one at all objectionable.

If, however, any one chooses, he may make loaves of considerable thickness, from wheat, rye, and corn meal — taking for granted it is ground coarsely. Finely bolted flour, and perhaps buckwheat meal in any form, will be rather hard and heavy made into cakes or loaves of much thickness, if made in a simple way without yeast, or leaven.

“ Do you not, then, raise your bread at all ? ” some one will here ask. Not this kind of which I am now speaking — this *best* form of bread. Indeed, neither leaven nor yeast ought ever to have been known. They are a filthy concern. Besides, *fermented* bread is *semi-putrid* bread ; that is, it has advanced one step in the highway to putrefaction. Lastly, it involves waste. (See Appendix, Note C.)

“ But is not bread which is not raised in any way rather hard of digestion ? ” I do not know. I think it is *slow* of digestion ; but whether its digestion is hard or difficult is quite another question. To dyspeptics it may be rather hard. They ought, perhaps, to have the attraction of cohesion a little diminished, as happens in the process of baking after raising it. For this purpose, and for the accommodation of thousands of others whose stomachs have always been babied, — so to speak, — I prefer some of the effervescing mixtures of the day ; such, for example, as consist, essentially, of muriatic acid and carbonate of soda.

The chemical change which takes place in the mass, when these two ingredients are introduced, results in the disengage-

ment of a good deal of carbonic acid gas, which, in its efforts to escape, inflates the loaf, and the deposition, in the mass, of a little muriate of soda, or common salt.

Let me be fully understood. The difference between fermentation and effervescence is just this: In fermentation, a portion of the saccharine matter — the life or vitality — of the bread is used up, and carried off as wine and carbonic acid gas; while, in mere effervescence, the loaf is inflated without taking any thing away, and without adding any thing but a little salt.

Observe, also, that I am not *recommending* the preparation of bread by any effervescing mixture. Only, as it was of old that certain things were allowed for the hardness of the heart, so now certain things are allowed on account of the weakness of the stomach. From the beginning, however, in both cases, it was not so; nor does true science indicate that it should be so. It is, however, most fully admitted that, did no individual transgress the physical code any farther than by eating good raised wheat meal, or rye meal bread, the world would not be as guilty before God as we now find it. But I must state the abstract truth, whether or not men are ready to come up to it.

If people are not satisfied with unfermented bread of wheat, rye, or corn meal, coarsely ground, or if they are tired of them, and wish for a change, as they say, they may use certain sorts of mixed bread — rye and wheat, corn and wheat, corn and rye, wheat, corn, and rye, &c. I shall be interrupted, here, by some supposed shrewd observer. “Now you are caught in at least one contradiction,” he will say. “You are professedly a great enemy to mixed dishes, and a great stickler for simplicity; yet here you gravely tell us to mix the various grains, to render them a little more palatable.”

And have I not a high example for making certain allowances for "hardness of heart"? I verily thought so. In the present case, however, I have not availed myself of such an example. There is no mixture of opposites here recommended. It is only the mixture of farina with farina, after all. You may mix ground rice with the grains, — rather with their meal, — or, if you choose, chestnuts or potatoes, after the manner of the Southern Europeans. So you may add sago, or tapioca, or peas, or beans, or squash, to your meal. Some mix baked or boiled apples with their bread, but this I do not like so well. You may waste time in this way, I admit; but you alone must take the responsibility.

The next form of bread I shall mention is that which is made of fine bolted meal. This is the only bread supposed, by most, in these days of pseudo-refinement, to be at all tolerable. But it is, at best, a third-rate or fourth-rate article. It is objectionable for many reasons. Besides those already alluded to, viz., that it has been robbed of a part of its vitality, and that the coarser, innutritious particles of the grain, which are so necessary to health, are removed, it has a bad effect on the stomach and bowels. It tends readily to fermentation and to constipation. Still, if well baked, and kept till it is a day or two old, many stomachs are strong enough to get along with it. At least it is not worse than three fourths of the articles which come to our tables. Most of our cakes and pies, even the plainest, are more apt to run into paste in the stomach than stale flour bread.

I have said "stale" bread. There are few worse things of the bread kind than hot bread and butter. It is not only hurtful to consumptive people, but to every body. Alone, it is *almost* intolerable; but when butter is added, or any other greasy substance, it is *quite* so.

Ship bread, or, as it is sometimes called, pilot bread, is rather better, because it is made hard, and is not fermented. This is favorable to a good deal of mastication; besides, we save all the sweetness. Common fine flour bread is almost always fermented. Unleavened cakes would not, by most persons, be tolerated at all.

Crackers are usually a vile mixture of fine flour, lard, or miserable butter, and I know not what else. I seldom taste them, unless driven to very close quarters. I have, however, seen coarse meal water crackers, and Graham wafers, but these are becoming unfashionable. When well made, they are, however, very tolerable food.

Gingerbread was once common, and not very objectionable. It was made of rye meal, or rye and wheat, — for pure wheat flour, it was thought, could not be afforded, — and a little ginger and molasses. But since the days of fine wheat, saleratus, and butter, it has most sadly deteriorated.

Beyond this, I am sure I need not go. There is good sense enough left in the world to forbid the necessity. You know well, that if crackers and gingerbread are doubtful, the rest of our pastry cannot be safe. All cakes are bread; that is, of the bread family; but they are so vilely compounded as to deserve, if not execration, at least reprobation.

Much is said, by many of our writers, on the subject of buckwheat cakes. As I suppose I shall not prevail with many to lay them aside, even till they are cool, let me here say, that, if eaten at all, they should be eaten alone, or with a very little sugar. They should have no other accompaniment.

Once more: The objections which have been mentioned to the use of hot bread apply less forcibly whenever that bread is made of coarse meal. Hence it is that hot cakes made of Indian corn, (johnny cakes,) unbolted wheat meal,

and oatmeal, are comparatively uninjurious. These, however, to the normal appetite, are quite tolerable when cold, and much more healthy.

We come, now, to the world of puddings. These are numerous; but there are few which deserve notice, except to condemn them. They are much more liable to produce fermentation and acidity than breadstuffs, which are more solid, and which require, for that very reason, more mastication.

Of all the puddings I have seen,—for there is a vast variety in the old countries, if not in our own, which I have not yet seen,—the common bread pudding is the best.

A loaf of bread, whatever the material may be from which it is made, requires more or less of age—a species of ripeness. Then, too, it has its period of old age, or decay, when it is not so good. It may not yet be mouldy, but it is not so sweet as it once was.

Now, it is precisely at this stage that it makes a good pudding. In other words, it takes the loaf when it would otherwise begin to be worthless, and not only redeems it to the world, but furnishes us with a new, palatable, and wholesome dish. No seasoning is required, to those who have stomachs of integrity; but to those who have not, the world of condiments is open, though milk, molasses, cream, &c., are not so good as sugar. All sauces and gravies are to be positively interdicted.

Oatmeal puddings are comparatively excellent. The oatmeal cake or bread, made from half an inch to an inch thick, like the wheat meal cake, or the johnny cake, is certainly preferable on the score of health; but he who does no worse than to eat good oatmeal pudding, either alone or with a little sugar, will not materially transgress.

The Indian pudding is made in various ways. The old

fashioned way is the best. This is to boil it in a bag or close vessel till thoroughly cooked. It is eaten with sauce, or with cream, or molasses and butter. Better, however, with dry sugar, and better still alone. This pudding is one of those articles of food that have been in vogue from a period "beyond which the memory of man runneth not." It is said, jocosely, to have been considered perfectly prepared in olden time, when it could be taken from the kettle, and thrown over the house without breaking it!

Then comes the hasty pudding. This is not so good. It is prepared by stirring Indian meal into boiling water till of a proper consistence; which is usually thin. As a consequence, it is not very well cooked, and is never well masticated. It is, for the most part, eaten with milk, and at evening. It would not be so objectionable eaten alone, or even with something dry added.

Intermediately between this and what is usually called hominy, was, in former times, another coarse dish. It consisted of corn plucked before it is ripe enough to grind very finely, and only broken to pieces in a mill or a mortar. It is healthier than hasty pudding, but should not be eaten with milk at evening. Either of these last dishes, taken in the morning, by the strong and healthy, after standing over night and gradually cooling and consolidating, and taken alone or with a little sugar, will answer a tolerable purpose. Still, I say again, food which requires more mastication would be preferable. But the worst way of eating hasty pudding is that of frying it, and eating it with molasses. They who take such a dish as this, ought to expect what they call rising of their food on the stomach, and heartburn. The stomach must be made — so to speak — of whalebone, that can manage fried pudding.

There are minute puddings, plum puddings, batter puddings, bird's nest puddings, suet puddings, rice puddings, and a score, if not a thousand, other sorts of puddings. Dumplings belong to the same family. So do porridge and gruel; but the latter forms of bread are so diluted as hardly to deserve the name.

The most common way of eating peas, beans, sago, and tapioca is when boiled. After boiling, they are sometimes set in the oven and baked. It was customary, once, to bake pork with dried beans, whenever we cooked them; but people have found out that they can be relished by hungry stomachs when cooked alone.\*

It is still quite customary to add butter to some of these last-mentioned articles. But the custom is semi-barbarous. Whatever other uses may be made of butter, it should not be eaten with green peas, or beans, or squashes. Nobody thinks of putting butter into chestnuts, though ever so dry and mealy, or on baked apples.

The potato, both the common and the sweet potato, is almost bread. If of good quality, it is exceedingly rich and mealy. It lies on the confines between the great class of

\* Fifteen or twenty years ago, a wealthy family in Marblehead, Massachusetts, found out, in some way, that beans were very tolerable baked without pork. Yet they hardly dared to speak of it to their neighbors, lest it should be misconstrued. They were afraid the idea of vulgarity or meanness would attach to it.

This, by the way, is like the boasted independence of thousands in our country, especially of those who consider themselves people of influence. They are not satisfied to do a thing because it is right, but must watch the weathercock of public opinion. They ask, first and above all, what people will say about it. Were this class of our citizens a little bolder — had they more of Christianity — the latter glorious days of the world we live in would come much earlier.

food of which I am speaking, and the esculent roots, though it is usually regarded as belonging to the bread family; and some have called it nature's own loaf.

Something has been said, of late years, about the artichoke, and the root of the garden comfrey. When the potato was thought about to be lost by disease, it was hoped, by many, that one of these might prove a substitute. But artichokes are, at best, a very inferior article of food. They hardly seem entitled to a place alongside of the potato, and the comfrey root is more doubtful still.

I have spoken freely of the farinaceous articles; for their importance demanded it. I might have said much more. This, however, is all I can do in a single lecture.

2. FRUITS.—The fruits of greatest importance in this country are the apple, pear, peach, nectarine, apricot, grape, plum, quince, strawberry, blackberry, raspberry, whortleberry, cherry, currant, gooseberry, mulberry, cranberry, melon, cucumber, and tomato. Some class the squash and pumpkin among the fruits; others do not.

I have spoken of our domestic fruits alone. Among the foreign fruits are the orange, fig, date, banana, pineapple, tamarind, prune, lemon, citron, shaddock, the dried grape or raisin, and the currant. Some of these are raised in the southern sections of this country; but in general they are imported.

Preliminary to every other remark, allow me to say that fruits are *food*, and not mere indulgences. If made to be eaten at all, they are to be eaten as other things are. If we have set meals, they are to form a part of them. They are not to be eaten according to fancy and inclination, at all hours of the day and in all circumstances. And he who eats them thus must suffer the just penalty. Neither are they to be

used at the end of a meal, after we have eaten quite enough, if not too much, of something else. This is the way in which fruit has, for the most part, been eaten. If this use of it were only a wicked waste, it would be more tolerable ; but it is a source of much disease.

An old adage says, Fruit is gold in the morning, silver at noon, and lead at night. With Dr. Trall and others, I think this saying adapted to man as he is, rather than as he should be. Taking him as he is, the morning and noon meals are certainly the most appropriate seasons for fruit eating.

There are a few individuals to be met with, who, from idiosyncrasy, age, luxurious living, tobacco chewing, or some other unnatural habit or circumstance, have no natural relish for fruits, and vainly try to make mankind believe that, as a part of human diet, they have, by Liebig, Graham, and others, been thought too highly of. But there are many strong reasons for encouraging the dietetic use of fruit. The following are a few of them :—

First. As a general thing, it is highly agreeable. Our first parents, as Locke says, ventured Paradise for it ; and children, even before their powers of digestion are sufficiently strong, are so greedy for it, that they will sometimes greatly injure themselves by its use. There is, perhaps, nothing, except milk in infancy, and bread in adult life, of which mankind, where the taste is not perverted, are so universally fond.

Secondly. The juices of fruits are so diluting and cooling to the blood, that he who reflects, can scarcely help thinking the great Author of nature had in view this very thing, when he created or caused them to grow. If in this general adaptation of fruit to the wants of the human system, there is not proof of design, I know not where to seek for it.

Thirdly. The particular adaptation of fruits to the wants of particular seasons, is another evidence, at least to my own mind, — and a very striking one, too, — of the divine intention concerning it. The strawberry, for example, with very little acid in its composition, comes early, when the keener acids are less needed. Nearly the same thing may be said of the cherry, raspberry, and blackberry. But in July and August, when the heat becomes great, and the blood thick, and numerous causes tend to deteriorate it, the currant comes with its strong acid, and the melon with its abundance of water and mucilage, to meet the exigency. A little later, we have the early apple, pear, and peach. These are digested with more difficulty than the smaller fruits, and therefore present themselves after the great heat and other causes have ceased to debilitate us, when our systems have begun to react. If they came sooner, we could hardly digest them.

Fourthly. It has been thought that the use of fruits invited disease. The abuse of them — a thing fearfully common — has this effect, most certainly. But their right use has a reverse tendency. It is a preventive of disease. This is a most admirable proof of its dietetic usefulness. How much better to eat fruit than calomel, or rhubarb, or quinine! I might even say than mustard, pepper, and saleratus!

One or two authors have spoken of the grape as being the most valuable fruit among us. I regard the apple as by far the most valuable, in every country where it can be profitably raised; and it may even be sent in tolerable condition to foreign countries. I once sent a quantity of apples to Trebizond, and though they were sadly delayed, a part of them arrived in good condition.

One excellence of the apple is its composition. It is not stringy on the one hand, nor too watery on the other. It has

some sugar in it, with a good share of the acetic and malic acids. When digestion is too feeble for the apple in its raw state, it is well to bake or boil it. Another thing in favor of the apple is its durability. By good management we may have this excellent product of the orchard nearly perfect for about eight months of the year, beginning with September; several kinds do not seem to be fairly ripe till nearly winter; and some writers have even spoken of them as ripening in midwinter itself.

In general, the sweet apple is the best; not solely because it is the richest in nutrient principles, but because, also, it is the easiest of digestion. Dr. Beaumont says it digests — he means, is changed into chyme \* — in about three fourths of the time required to chymify the sour apple.

Children under the age of two years are said, by Dr. Dewees and others, to be almost wholly incapable of digesting fruits, especially the apple. So with dyspeptics, and some other persons who are debilitated. In such cases, the apple, and several other fruits, may be either baked or roasted. A small quantity of baked sweet apple may be digested even by children one or two years old.

Much use is made of the apple in preparing pies. For this purpose the sour apple is usually preferred. When apples first come into market, and for a long time afterwards, I have observed that the sour apple, even if only half ripe, sells better than the sweet one. Sweet apples are seldom used for this purpose. The reason, as I suppose, is, the housekeeper

\* I have hitherto forgotten to say that the experiments of Dr. Beaumont on digestion, as they are called, though deeply interesting and important, are, after all, little more than experiments on mere chymification. (See Appendix, Note D.)

or cook has little opportunity of displaying her skill on chopped or sliced sweet apples. There would not be room enough for sugar or molasses. The compound, when finished, would be too tame ; or, in other and fewer words, sweet apples for pies are unfashionable.

The plain matter of fact is, that no apple pie ought to be tolerated. If there were no loss in substituting the coarse, sour apple for the sweet one, and paying a larger price for a worse article, there would be loss to health in adding that miserable compound called *pie crust*.

Stewed apple is not objectionable, where no additions are made but water ; and yet where do we find any such simplicity ? Lemon peel, orange peel, or some of the aromatics are not unfrequently commingled with the apple. How seldom does it escape poisoning in one way or another !

Worse, still, is the common apple sauce of the country. Sweet cider is first boiled down to a considerable thickness, and then the apples, properly prepared, are added. The result is a compound quite difficult of digestion. Stewed in simple, new, unfermented cider, apples would be tolerable ; it is the boiling that spoils apple sauce.

But of all the abominations connected with cooking the apple, — except putting it into mince pies, — the process of frying it is worst. Commodore Nicholson, of revolutionary memory, would never have a frying pan in his house ; and I honor his memory, were it for no other reason.

Next to the apple, in point of importance, as an item of human diet, is the pear. It has, indeed, one advantage over the apple itself. When perfectly ripe, it melts more readily in the mouth. This is not, indeed, a certain test of excellence ; but it is an almost infallible test of ease of digestion, or, at least, of solution. There is, however, an immense differ-

ence in the quality of pears. Some of them — as the Bartlett, for example — are tender, and exceedingly easy of solution, while others, especially several kinds of late or winter pears, are equally tough and insoluble, until they have been long boiled. Some pears are improved by baking.

One objection usually made to the pear is, that the tree is exceedingly slow in its growth. If the comparison be made with the peach, it certainly is of slow growth. But I have seen it come forward as fast as the apple. Besides, the dwarf pear may be cultivated, which gives us fruit almost immediately.

There will be a wide difference between the health of two men, whose constitutions and habits are otherwise alike, one of whom, during the months of August, September, and October, of each year, for ten years, shall, at every dinner, eat a good Bartlett pear, and the other shall take, in its stead, the same amount in weight of mince pie, or rich pudding, or costly cake. The one will have the full benefit of the chyle of six or seven hundred pounds of rich fruit pulp, diffused through his system to cool the feverish tendencies, allay the rising irritation of the alimentary canal, and prevent disease; the other will suffer all the accumulated evils resulting from compelling his system to overcome and reduce to something in the shape of chyle and blood six or seven hundred pounds of a substance which is almost rank poison to him.

The peach is excellent, but is usually eaten with so little mastication that it is by no means a wonder if we find some persons on whose stomachs it sits badly, and lies coldly. Much depends on the manner of eating it. The same remark might have been made concerning the apple and pear. If swift eating were any where to be tolerated, it is not so here.

The peach, like the apple and pear, may be stewed, and I have occasionally seen it boiled. In some parts of the United States, peach sauce, in the winter, is used in very large quantities; and a table is scarcely set without it. The usual difficulty with it is, it is made too rich by means of extras.

Dried peaches are very common in particular portions of the country, but neither so common nor so good as dried apples. Pickled peaches I find, also, very frequently; but they are no better than other pickled vegetables — indeed, I think they are more thoroughly unfitted for the digestive machinery than pickled cucumbers. Some of our peaches are stringy, and not very palatable, especially the very late native peaches. I hardly need to repeat that all stone fruits, with stringy or fibrous pulp, are difficult of digestion, but none more so than the autumnal peach.

Of the nectarine and apricot I know but little. The apricot so closely resembles the peach that any remarks concerning *that* fruit will apply here. Dr. Paris speaks of the liability of the nectarine to derange certain stomachs; but the presumption is, that for healthfulness it is about on a par with the peach.

The juice of the grape is exceedingly nutritious, cooling, and healthful. It should not, however, be used, unless the grapes from which it is expressed are perfectly ripe. The skin and seeds, say Dr. Pereira and other writers on the subject, are indigestible, and should be rejected.

The Portugal or Madeira grape, that comes to us packed in saw dust, and is of a pale-green color, is probably the most digestible of the grape family. It is large, fleshy, sweet, and at the same time very slightly acid. The Isabella and several others are tolerable. Some of our domestic or native grapes are exactly the reverse of the Madeira, though

a few are tolerable. And yet our people eat them, and *will* eat them. And worst of all, they swallow the central, solid, sour, and bitter mass, containing the seeds; usually without the slightest mastication. Hardly any thing could be more unwise. If punishment always followed closely upon the heels of transgression, *these* grape eaters would perish by hundreds and thousands.

Raisins are sometimes made by dipping the ripe clusters in a mixture of water and ashes, with a little sweet oil, and afterwards drying them in the sun. By this treatment, however, the juice exudes and candies on the fruit. Those made by simply drying them slowly in the sun are preferable. They are more nutritious than fresh grapes, for they abound more in sugar; but they are less cooling. Raisins have suffered more reproach than they really deserve. True it is, that eaten with the skins and seeds, as is the custom with many children and thoughtless older people, they are very indigestible. But when subjected to cookery, in a proper manner, they are as healthy as almost any foreign fruit, and more so than those fruits which are collected when in an unripe state.

Take good box raisins, at a season when other fruit is scarce, say in April and May, and stew them slowly in a very small quantity of water, and few fruits can be more delicious, or, indeed, more wholesome. The skins are perfectly digestible; but the stones or seeds must be rejected by those whose stomachs are not peculiarly strong.

There is a wide difference of opinion among the proper authorities in regard to the plum. Pereira says, "Taken in moderate quantity, fresh, ripe plums are wholesome and nutritive, but when eaten freely are apt to disease the bowels." Dr. Bell says, "At best it [the plum] is more grateful to

the taste than wholesome." Several other fruits are doubtless preferable.

The prune is a species of plum slowly dried in the sun; or in cold countries by artificial heat. Stewed properly, it is as good as any of the stone fruits — perhaps the best. I hardly know how it happens, but all stone fruits have a bad reputation, even to the peach. Perhaps it is because they have so often a stringy pulp.

I do not think highly of the quince; and yet I raise it, partly for its beauty. Baked or boiled slowly, or stewed, with much sugar added afterwards, it makes a tolerable article of food, when better fruits cannot be had. Quince sauce, like other complicated sauces and preserves, is unhealthy.

Strawberries are among the most delicious of our summer fruits. They are the more agreeable to the taste, and much more welcome visitors at our tables, from the fact that they are the first fruits that arrive after the long winter. They do not contain much nutriment. They are soluble, however, and easily disposed of, though in feeble stomachs the grains or seeds sometimes irritate. They are not very digestible. The usual additions made to them, such as wine, milk, sugar, and cream — particularly the latter — render them still more so.

Nothing is more common where strawberries are abundant than to eat them with milk, at the morning meal. Now, they should be eaten as a part of our meals, most certainly; and they are best for health either in the morning or at noon, but they are not a suitable accompaniment of a bowl of milk.

It is high time the custom of eating fruits, of any kind, with milk, were abandoned. There is a presumptive reason against combining the two articles, at the outset. Milk is undoubtedly the food of infancy, while fruits are the food of

adult life. The latter are known to be but poorly adapted to children under two years; why should the former be adapted to adults? And if their adaptation to different periods of life is so obvious as to raise a doubt whether little children ought to eat fruit at all, or adults milk, is it at all probable the two articles should come together at the same meal? But we have facts. Many a person whose digestive powers are not strong, has found the combination to be wrong by his experience.

I do not say there is no choice to be exercised. If fruits and milk *must* be eaten together, the sweetest of the fruits are the best, such as the baked sweet apple, the whortleberry, the raspberry, the blackberry, and the mulberry; and the sourest, such as the currant, sour apple, and cranberry, are the worst. Nor do I mean to say that strong, healthy adults should not eat milk. I only say that it cannot be the first and most important article for them. To feeble, infantile stomachs, such as we too often find in full-grown men and women, I have elsewhere said that bread and milk are a very tolerable combination.

The raspberry, like the strawberry, contains very little nourishment; but it is highly agreeable, and sits well on delicate stomachs. With breakfast or dinner — used occasionally, but not *too* often — it is deserving of much attention and very great regard.

One thing in favor of strawberries and raspberries is the great ease with which they are raised. Only procure a handful of the plants, such as come well recommended; make your soil mellow, and tolerably rich; and set them, and keep out the weeds, and in two or three years you will have enough and to spare.

One thing more. The labor of taking care of the vines

and gathering the fruit may be chiefly done by female members of the family, — at least in many instances, — to whom the exercise will be precisely what their health demands, while it will give them a certain and very agreeable reward for their industry.

The blackberry is an excellent fruit; but it has not yet been extensively cultivated. The dewberry is small. The whortleberry is in some respects preferable to the blackberry; at least it is sweeter and more nutritious. The bilberry is extremely acid, as well as sweet, but in moderate quantities is wholesome. The mulberry is so sweet as to be, to many, disagreeable.

The cherry is an early fruit—almost or quite next, in order of appearance, to the strawberry. It is beautiful, but its reputation is not so high as that of the strawberry. Some of its varieties are much larger, as well as much richer in nutrient particles, than others.

It has been said of cherries, in former times, that, in any quantity whatever, nobody would be injured by them, if they would but swallow the stones. But these days of ignorance are beginning to pass by. Some still swallow cherry stones, from sheer indolence or carelessness; but there are few who would defend the practice.

There has been another strange error about cherries, viz., that we might overload the stomach with them, and yet suffer no penalty, if we would follow up the indulgence by a free draught of brandy. I do not deny that brandy is, to some extent, a remedy in such cases, but am inclined to think the remedy worse for the constitution than the disease.

Cherries are stone fruits, and these, as I have already told you, more than once, have long been proscribed. There is one reason, at least, why they should be so. I allude to the

great danger of letting the stones fall into the windpipe. Many valuable lives have been lost in this very way.\*

I have said, in my *Young Housekeeper*, that in eating cherries, care should be had to select those which have the thinnest skin and the driest pulp. Or, whatever may be the thickness of the skin, be careful to secure as mealy or dry a pulp as possible, and, above all, be careful not to swallow the stones or kernels. Cherries, moreover, should never be cooked. It completely spoils them. Yet we have cherry pies, cherry puddings, and many more preparations from cherries. The best use which can be made of these last dishes is to throw them away.

Bell speaks of one use of cherries, which he calls *devilish*. It was customary, in former times, to put them in rum. When the liquor was drunk off, the cherries were distributed among the younger members of the family. If any thing in early education would deserve such an appellation as Dr. Bell has given, surely it is an abomination like this.

The currant is a more important item in the list of fruits for our tables than many suppose. Of course it should not be eaten with milk, but, like most other fruits, with some member or members of the farinaceous family; and it should never be eaten till it is perfectly ripe. I mention this because thousands among us mistake redness for ripeness, and by beginning to eat them too soon, they disorder their stomachs, and cannot receive them when they are ripe. I speak here, of course, of the common or red and white varieties; for there are other kinds.

\* I am by no means certain that the prejudice against the stone fruits may not have arisen from the well-known fact that some of those stones contain a bitter poison, called *prussic acid*. Such is the fact with regard to the kernel or stone of the peach, as well as the stones of some kinds of cherries.

The custom of picking them while quite green, and stewing them, or even making them into pies, is still worse. If they must be eaten green, it may be well to cook them; but cooked or uncooked, they never ought to be eaten till they are quite ripe — nor, indeed, any other fruit.

Jellies are sometimes made from currants, as they are also from apples, strawberries, raspberries, and quinces. I do not like them; and yet, I must confess, they are not very objectionable, except that their preparation seems to me like a wicked waste of time. Dissolved in water, they make a very pleasant — I will not say drink, but — mixture. They are also made into jams. These, being more concentrated and more thoroughly impregnated with, and changed by, the sugar, are less wholesome. If jellies are tolerated, these should not be. They have indigestible properties. Indeed, they are not in general use, except in high life.

The cranberry has come into use, within a few years, in this country, to an extent which has justified many persons, in particular situations, in laying themselves out very largely to raise it. The culture is very profitable. I do not regard this fruit as very healthy, though it is certainly very palatable. The barberry is still more doubtful.

The tomato came into vogue a few years since, under the sanction of a certain medical professor, on the ground, if I recollect right, of its supposed antibilious properties. And I have very lately seen a long analysis of the fruit, with many good things said in its favor. It contains an acid and a quantity of mucilage.

The fact that it contains medicinal — that is, anti-vital — properties, would, if established, seem to be against its dietetic use rather than in favor of it. It certainly would, if food and medicine do not belong together. Besides, I doubt whether

aside from its novelty, it is, intrinsically, better than a sour apple. People are mostly but children of a larger growth, and, like other children, are fond of new things. They become tired of the same articles of diet, and desire new ones. Hence they like the tomato. Hence, too, they like macaroni, or vermicelli, or farina. They like any new thing. A thousand other new things will probably come up, and have their day — and their exit, too.

As long as we persist in a diet as highly stimulating as the present fashionable course, we shall be apt to become tired of the old, and fond of the new. And it is, perhaps, wisely ordered that it should be so; for otherwise I see not how, as a race, we should ever be likely to lay aside the wrong, and betake ourselves to the right.

The cucumber is a fruit which has been in use from the earliest known period of the world's history; and yet it has by the medical faculty, time immemorial, been condemned. I think the reason is obvious. The cucumber is a fruit whose ripeness is not so readily discernible as that of most other fruits. And then the fondness which most persons have for something green and crispy has led them to forget or overlook ripeness, and to eat it more and more early, till they have gone to that extreme which common sense and science every where condemn.

Now, I have not a doubt that the cucumber is a legitimate article of human diet, and that it should occupy a small space at our tables for a very short time. It comes at a season when its cooling properties are certainly useful. It should, however, soon give way to the melons, which are preferable. But while I would restore the cucumber to its rights and to its proper place, I wish to be distinctly understood. I do not recommend the article in an unripe state, and without any

cookery. Still worse is it when used not only in a green state, but in company with heating condiments and vinegar.

Some of the Oriental nations boil the cucumber. I have eaten it in this way. It is quite as palatable and as wholesome as the common summer squash, which is ordinarily prepared in the same manner. But I apprehend there is a more excellent way than even this. It is simply to eat it, as we do other fruits, in a ripe state. By ripeness I do not mean decay. There is a short period in the history of every cucumber, when it is in a ripe condition; being neither hard and indigestible on the one hand, nor acid and unpleasant or offensive on the other. That period, I grant, is very short; and it requires some little skill to detect it. But it can be done. And though, as I have before affirmed, the cucumber is far inferior to the melon, it yet has a degree of sweetness, when exactly ripe, of which few persons are aware.

Suffer me to digress a moment to speak on this very point — the ripeness of fruits. The great law concerning them is, that they should be eaten ripe. Before, they are unwholesome, and tend to disease; afterwards, there is a tendency to decay and decomposition, which also renders them unfit to be eaten. What is wanted, then, is to confine ourselves, in their use, to the short period of their natural ripeness.

This period in the mulberry is only a few minutes. In the raspberry it is rather more, but not, in all probability, an hour. In the cherry and blackberry, it is a few hours only. In the whortleberry and currant, it is several days. In the peach, it is a very few days — if, indeed, it is, in some kinds, more than one. In the apple and quince, it is several weeks or months. In the melon and cucumber, the season of perfect ripeness, though not so short as that of the mulberry and

strawberry, is yet very short — probably a few hours only. Delay too long, and there is acidity. Eaten a few hours too soon, and there is no saccharine matter — no sweetness.

I think the cucumber best at the noon meal or dinner. To those who are accustomed to its use, however, the morning will answer very well. I use it at either meal. And it is a singular, but certainly undesigned coincidence, that I have made my breakfast of cucumbers while writing these paragraphs.

“But *how* shall it be eaten?” some will ask. “Would you pare it, as is customary with the green cucumber? We know you would not add the condiments, — pepper, salt, vinegar, &c., — but what *would* you dress it with? Surely you eat it with simple salt, if nothing more.” No, not even that; though you, as free agents, can, of course, do as you please. I no more use condiments or dressings, in preparing it, than in preparing a watermelon. And if you know how to eat a watermelon, you know how to eat a cucumber. Simplicity is very simple.

I am accustomed to take a common caseknife, and cut it in two across the middle, and then with the knife scoop out the soft middle part. In a good-sized cucumber, you thus obtain of pulp — including mucilage and seeds — a little more than half a gill; or, say, three fourths of a gill.

Half a dozen cucumbers, with a little bread, thus make a tolerable breakfast. The veriest gormandizer, who should confine himself to cucumbers, would hardly require more than a dozen at a time. Some, however, eat fifteen or twenty. They are best eaten with bread; though I have made many a meal of the cucumber alone.

“But can laborers work on mere fruit?” you will perhaps ask. “I should think the cucumber would not be nutritious

enough." Well, for many successive meals it probably would not be ; but I do not recommend any such thing. Besides, remember that the man who eats a dinner of cucumbers, labors, for the afternoon, on the strength derived from his breakfast, rather than from that derived from his dinner. You are apt to forget this.

Do you eat the seeds ? This question I have often heard ; and it deserves an answer. The seeds are yet soft, and are but consolidated mucilage. They are not difficult of digestion, even when swallowed almost whole. But you may chew them as finely as you please. They are very sweet. Or, if you prefer it, you may reject them.

Of the watermelon, as an article of diet, I need not say much, because I suppose every body, or almost every body, will admit this to their table, in a perfectly ripe state. I never knew it eaten unripe, or with condiments. It is excellent in hot weather, though not very nutritious.

To the muskmelon many have objections — I know not why. We are easily misled, in early life, by improper associations. It is possible that the frequent prejudice against this most excellent fruit has its source in this way. Its ripeness may be mistaken, by some, for putrescency. A strong will, however, in general, soon overcomes the difficulty.

Of one or two of the foreign fruits — the raisin and the Madeira grape — I have already incidentally spoken. In general, let me repeat, the foreign and tropical fruits, for us in America, are far inferior to our own. There is, however, a wide difference. Those which are collected unripe are the worst. These are the orange, lemon, pineapple, banana, shaddock, &c. The other and better class are the raisin, fig, prune, date, &c. It is to be observed that I only mention the leading articles of the respective classes. The number and

variety of foreign fruits, brought to our shores, at the present day, is very great.

The fig, eaten with bread, and well masticated, is comparatively wholesome, and is much used by the laborers of Southern Europe and Western Asia. Bread, figs, and a herring, to them, as we have seen, make quite a lordly dish. The fig is said to be sometimes cooked — I believe boiled; but of this I have no knowledge from experience.

The date is a tolerable article, but rather cloying in its nature. This, too, should be eaten with bread. It is very nutritious. Perhaps this fact is the greatest objection to its use, as it comes to us. The Author of nature does not seem inclined to give us a very large proportion of nutriment in our fruits. It is not, usually, till we torture them in some way, that they are injurious.

The tamarind is a tolerable article of food, were it not for the expense which attends its use. In general, it is bought only for the sick room, to which it is admirably adapted. It is cooling, diluting, moderately laxative, agreeably acid, and not very nutritive.

In regard to fruits, generally, I see no way of having a good supply of perfect fruit for family use, but by raising it for ourselves. And to this, most happily, both in the old world and the new, the public attention is at length turning. Let us then thank God and take courage. No man or woman, whatever may be their mode of employment, — not even the professional man, the mechanic, or the manufacturer, — should fail of working in the open air at least three or four hours a day. And, in general, much of this work may be applied to the cultivation of fruits for the table.

The fruits are sometimes diseased. I stated, in the lecture on digestion, that I had once known the apples of a certain

orchard diseased. How extensively the fruits are subject to disease is, I believe, not yet fully understood.

The summer fruits — I mean, in particular, the products of the vines — are somewhat injured and rendered irritating by the acrid recent manures which are applied to force their growth. One might think it bad enough that hothouse fruits should be forced into disease, by the contents of the vault and the sty ; but when our field fruits — our melons, squashes, cucumbers, and strawberries — are poisoned in the same way, it is high time to complain.

Perhaps Boston market, in proportion to its extent, has as many healthy vegetables as any market in this country ; and yet I should not, in one case of a hundred, dare to guaranty the perfect healthfulness of the vegetables found there. If they are not absolutely diseased, they have been plucked unripe, or are beginning to decay. Am I not, then, fully justified in the conclusion that they who value fruits, as the second great class of substances God has designed for our tables, should leave no stone unturned in endeavoring to raise with their own hands, and in their own way, a good supply of those which are most needful and most indispensable ? (See Appendix, Note A.)

One or two thoughts may be useful on the preservation of fruits. I have spoken, very fully, of the sin of making pies, preserves, &c., which involve such a waste of time ; and have also said, in the same connection, that we injure the properties of the articles themselves. But are there no methods of preserving them which are legitimate ?

Three ways have been recommended. The first is, by drying. Almost every fruit may be preserved in this way, though it costs a great deal of trouble. Some of them are not much injured by the drying process ; but others lose

nearly all their peculiar distinctive properties. The apple, quince, peach, plum, grape, and whortleberry may, by great pains, be preserved in tolerable perfection; and perhaps also the pear. To drying several of these I have already alluded. The berries, generally, are injured by drying; and some of them, such as the blackberry and raspberry, nearly spoiled.

There is a curious way of preserving the cucumber — were it but worth the pains — which is practised in the Oriental countries. When fully ripe, it is cut in pieces, and dried in the sun, or by artificial heat, and finally reduced, by grinding, to a coarse meal. This is eaten with fat, oil, butter, or some other abomination.

The second way of preserving fruit is, by keeping it in a temperature so low that no chemical changes can pass over it. Theoretically, this is a most beautiful method, and promises to be useful. Fermentation, it is well known, cannot take place unless the temperature of the substance is as high as about sixty degrees. All we have to do, then, as it would seem, is to place fruit in large icehouses, and take it thence whenever we want it. Dr. Ross, of New York, in a recent work on health, speaks of the facility and usefulness of this method, in terms of the highest praise. Future experience will determine on the excellence of the plan. As yet neither science nor experience has decided against it.

The other plan for preserving fruits consists in placing them in proper vessels, and pumping out the air. How far this method has been tried in the spirit of candor and carefulness, I am not informed. It seems to me, however, that the second plan proposed is the easier, and on many accounts preferable.

3. ESCULENT ROOTS. — One or two of the more important of these have been included under the head Breadstuffs. I need not, therefore, again advert to them. Besides these, the

more important are beets, turnips, carrots, and parsnips. The radish and onion, though much used, are worthy of very little notice, except for medicinal purposes.

Beets are very nutritious, but yet not remarkably wholesome. It is commonly said in their favor, that they abound in sugar, which is true. But this alone does not determine with regard to their dietetic excellence. Perhaps they contain too large a proportion of sugar for the amount of starch and other ingredients. For while the good beet contains only fourteen parts of starch, and thirteen of albuminous matter, in a thousand, it has twelve per cent. of saccharine substance.

The beet has a high reputation — perhaps for its beauty, at least in part. It is most healthy when boiled. Some of its varieties are much richer than others. Many eat it with vinegar, as they do baked beans. The practice, in either case, is wretched. Cold boiled beets, with vinegar, are almost as indigestible as cast iron. They are not, even, easily soluble.

The turnip is, in some of its varieties, a more wholesome article than the beet, though not one third as nutritious, except the Swedish turnip, which is believed to be nearly half as rich as the beet. Ninety-two and a half per cent. of the turnip is water. It contains but little starch or sugar,\* and yet it has an agreeable sweetness.

To those who live chiefly on succulent food — good bread and fruits — the turnip is hardly necessary. But for those whose food is alkaline and dry, and who use a large proportion of flesh meat, the turnip becomes almost indispensable. Hence the association of beef and turnips; beef, turnips, and

\* Drapier, however, says it contains nine per cent. of sugar — a percentage equal to that of Indian corn.

potatoes, &c. The longer we accustom ourselves to flesh meat, the more attached we become to turnips.

One precaution should be used by those who prepare the turnip for the table. It should be peeled. There is an acrid principle, we are told by Bell,\* residing in the peel of the turnip, which is analogous to that in the radish, and in mustard, and which should be got rid of if possible. The turnip is best when boiled, and next best roasted.

“In 1629 and 1630, when there was a dearth in England, good, white, wholesome bread,” says Dr. Bell, “was made of boiled turnips, deprived of their moisture by pressure, and then kneaded with an equal quantity of wheaten flour.” But it is natural to inquire whether an article so watery is very well adapted to the purposes of bread making.

The carrot is rather richer than the turnip, and nearly as nutritious. It is light and wholesome to those whose stomachs can endure, undisturbed, so much sweet as this and the beet contain. It is used for domestic animals more than for men; and is, on the whole, deserving of the reputation it has obtained. The carrot is usually boiled, and eaten like the turnip. Some, however, prepare pies from it, and even puddings. A few fry it. Fried carrot is delicate, but not wholesome. In some countries it is pickled. It is much used by nursing mothers, and, for a similar reason, for milch cows.

Of the parsnip I know, by experience, very little. It has some slight resemblance, in its properties, to the carrot, but is rather more aromatic. It is usually boiled, though some prefer roasting it slowly in the ashes. The latter method of roasting vegetables, but for its vulgar appearance, would be

\* Regimen and Longevity, p. 181.

highly commendatory. The potato, roasted in the ashes, is far better than when prepared in any other way whatever.

I have so frequently alluded to saccharine matter, — its proportion in vegetables, fruits, &c., — that I have not a doubt the inquiry must have arisen, in many minds, whether sugar, when extracted from the substances with which it is usually found incorporated, is wholesome.

Now, it is my opinion — an opinion which has not been taken up in haste — that, as a general rule, the addition of sugar to such articles of food as are already rich in this product cannot be desirable. The Creator must have known, most certainly, in what proportion it was best to mingle it with other ingredients. Whether it is equally undesirable that sugar should be mingled, in small quantity, with those vegetable substances that do not contain it, is a question I am not able to answer. The thought already referred to, that the divine Former knew best how to make them, and had his reasons for omitting it, very naturally arises to our minds.

Sugar is pure nutriment, or almost so; and a very small quantity of it suffices to nourish the human body. In traversing vast deserts, it is said the Arabs and other Orientals sometimes take with them a small quantity of sugar or gum Arabic, on which they contrive to subsist for a long time. And yet the North American Indian of two centuries ago would subsist nearly as long and as well on a small amount of *nokake*, — which was essentially Indian meal, — a substance not more than two thirds as nutritious as sugar. This fact, as far as it goes, serves to show that our digestive powers are not always able to extract nutriment from a substance in the exact proportion in which it exists in that article.

And while sugar is so highly nutritious, it is a fact well established by the experiments of Magendie and others

that this substance alone will not long sustain animal life, or at least the lives of animals below man. Whether the experiment has been tried on man, I do not now recollect.

The old notion that sugar spoils the teeth is partly true and partly untrue. It is true that it makes the stomach foul, and that the gums become spongy and the teeth carious, as the consequence of the bad condition of the gums; but it is not true that it injures the teeth merely by coming in contact with them. Molasses, honey, and all other concentrated sweets are injurious to the teeth in the same way; that is, by first injuring the lining membrane of the stomach, and then, by sympathy, affecting unfavorably the gums and teeth. Calomel and most other strong medicines probably injure teeth in the same way.

If I were to lay down a rule in regard to sugar and other highly-concentrated sweets, it would be never to use them in food, or with it, except by way of compensation, as in the case of rice, which is almost destitute of saccharine matter, or baker's bread which has been overraised, in order to procure a large loaf, and thus robbed of all its saccharine substance. Any further use of them should be the same as that which I have advised with regard to the other condiments. If sugar, for example, must be eaten, I would make a whole meal of it. We might not be able to make a very large meal of it, but I think we may be well assured that what we cannot receive at once is just so much more than our necessities require.

Finally, however, if we are determined to eat concentrated sweets, let it be in their most simple forms. Candy, even molasses candy, is unwholesome; but how much worse is confectionery! Some kinds of confectionery are not only injurious by reason of the sweets they contain, but by reason

of poisons superadded in the way of coloring matter. How many persons have been poisoned during the last ten years by confectionery ! It is usual to point out the tendency of physical excitements, when much indulged, to the grosser and coarser immoralities ; but my limits forbid doing so in this place.

4. OILY SUBSTANCES. — These I shall speak of under two heads. First, oily nuts, such as almonds, walnuts, butternuts, hazelnuts, filberts, cashew nuts, cocoanuts, and olives — to which Pereira adds the pistachio nut, and the stone pine nut. Secondly, animal food and animal products — milk, butter, cheese, lard, eggs, &c.

*Oily Nuts.* — The almond is first on the list. Of this there are two kinds — the sweet and the bitter. The kernel or stone of the latter is very oily ; but it is rather a medicine than an article of daily sustenance. I am but little acquainted with it.

The walnut is common and abundant. It is quite oily, but less so than the butternut. It is exceedingly difficult of digestion to any but the very healthy. It should be eaten as a part of our meals, and not as an addition to a meal already too large ; nor late in the evening.

The butternut is, to most persons, very palatable ; but from the great abundance as well as from the internal character of its oil, few persons of our modern, deteriorated generations can either dissolve or digest it. Much, however, depends, in this particular, on habit. Some will digest them better than others.

Hazelnuts and filberts are less oily than walnuts and butternuts. They are more like the chestnut and chincopin. Still they have some oil, while the chestnut can hardly be said to have any. Of the remainder of the nuts I have

scarcely any knowledge; and the information I can obtain from them through books is very limited.

Perhaps I ought, in passing, to notice the acorn. Dr. Dunglison says, that "in time of scarcity it has served for food, notwithstanding its astringent properties;" and we have other accounts of its being used for food, both in ancient and modern times. It is disagreeable, indigestible, and rather innutritious.

Much is said, by Dunglison and others, of the tendency of oily nuts to produce stomach and liver disease; and as mankind now are, and as these substances are generally used, I have no doubt they are very hurtful. Still I think they were divinely intended to be a part of human diet. I am pretty sure some oil is necessary.

Admitting this, however, to be true, is any thing more natural than the inference that nuts were made to be eaten — not merely by squirrels, but also by man? Our stomachs are fallen stomachs; is it not more than probable that, in a normal state of the digestive system, they would bear them in moderate quantity perfectly well?

Olive oil, when not rancid, can hardly be very objectionable. I used it, at one time, as a bridge from butter to substances which required neither. I think it more digestible than butter, or, at least, somewhat less irritating. Perhaps it is the best substance of the condiment kind. Particular care, however, should be had to procure it in a perfect state.

*Animal Food and Animal Products.* — For reasons which will be seen by and by, I propose to begin my remarks, under this head, with the animal products, rather than with animal food itself. The first of these, in a natural order is milk.

There is a vast difference in the kinds of milk used as

food, as well as a very considerable difference in that of the same animal. The milk of the cow is most used as an article of human diet, except, of course, in the merest infancy; though in some countries considerable use is made of that of the mare, goat, ass, and sheep.

The three most important ingredients in all these five kinds of milk, are butter, sugar, and caseine. These, together, make up little more than one seventh of the whole. The remainder, varying, in the different kinds of milk, from eighty-five to ninety-two per cent., is water. So, at least, the French chemists Henri and Chevallier tell us.

Human milk is richest in sugar and butter, or oil, except that of the ewe; and it is even much richer in sugar than the latter. In the ass's milk there is almost no oil or butter at all. The milk of the cow is tolerably well supplied with butter — containing something over three per cent. All milk is provided for the food of young animals, till they have teeth and opportunity for obtaining other food. And, at every age, there is reason to believe it might be used, in part at least, by most animals, though probably at a disadvantage. Strong meat appears to belong to those of full age; milk is the food of babes. A man in Barnstable county, in Massachusetts, has made two persevering experiments of feeding his horse with milk, but always with ill success. “But why should not the horse live on milk as well as the ox or cow?” you will ask; “for these thrive very well kept in this manner.”

This last is easier said than proved. I know of no facts to substantiate the statement. The only one that seems to bear in that direction is the case of certain mammoth calves — so to call them — that have been reared to the age of two or three years on milk. First they sucked one cow; next two; then three; and so on. But these petted creatures were monsters

for size and fatness, and were reared in this way that they might be exhibited as such. We do not know how healthy they were, nor how healthy their progeny were. We know they were monsters. Is a monster a fair sample of his species? Suppose Benjamin Pritchard or Daniel Lambert had attained to their monstrous size on milk; would you at once and for that reason have pronounced milk a healthy diet for adults generally? Who would be willing to be as fat as they, or to have a son or a daughter so?

I do not mean to say that, *taking us as we are*, we should not *eat* milk. Human diet is, every where, imperfect. It may be nearly as good in the United States as any where. Yet even here there are so many dietetic errors that a gradual change from the present to a bread and milk diet might be an improvement. But along with this concession, I should still say it remains to be proved that milk, for the healthy adult, is, by any means, the *best* food. I should still believe, with Paul, that stronger food is required for full age, especially for full age normally.

But I have spoken of milk, incidentally, before, and of butter and cheese still more frequently. I must therefore pass to eggs, merely stopping a moment to throw another missile or two at butter, and those vile compounds into which butter enters. And I make this attack, in passing, not so much on account of the small amount of this article used in our community in the old-fashioned way, that is, spread over slices of well-baked dry bread of suitable age, and well masticated, as on account of the general invasion it has made, these late years, of all our dietetic territories.

I might fortify my statement by authorities innumerable — but I forbear to do so. I will only present the statement of Professor Hare, of London, in his admirable work on the

stomach, at page 190. "Butter," he says, expressly, "in every state and shape, is a most active promoter of nausea, heartburn, and indigestion." But it is with this as with a thousand other things, that we cannot judge of their ill effects, in our own experience, till we have been for a considerable time emancipated from our slavery to them.

Though man is required, as I think, to use some oil, yet I must think olive oil, — sweet oil, as it is usually called, — the oil contained in milk, or even the cream separated from the milk, far preferable to butter, especially salted butter. And as for rancid butter, that is worst of all.

The French are said to have six hundred and eighty-five mixed dishes into which eggs enter as a component part, or a condiment. And the English, and their descendants, the Americans, are not very far behind the French in this career of egg eating. They have been, ever since the days of Lafayette, fast coming up with them.

I am not disposed to ridicule the use of the egg, eaten as an egg, *boiled*, *stewed*, or even raw. It is this foolery of commingling it with almost every known substance, if not in the heaven above, at least in the earth beneath, at which I laugh. It is this making every thing, or almost every thing, smack of egg. But then, if eaten even by itself, it should be cooked properly, which is seldom done. There is but one method, by the way, of cooking an egg. If you choose to eat it raw, do so; but if you cook it at all, place it, without breaking the shell, in water, at one hundred and fifty to one hundred and sixty degrees, — never beyond one hundred and sixty-five, — and let it remain from twenty to thirty minutes.

If you wish to know the reasons why, ask chemistry. She will tell you that the white of an egg is albumen; that it co-

agulates at one hundred and sixty-five degrees, and that when coagulated it is utterly insoluble in any common menstruum, and, of course, is insoluble in the stomach. By the time you have heard her answer thus far, you will guess the rest.

Lard I must say a word about, having recently visited Cincinnati, the land of hog killing and lard oil making. Now, if nothing else were done with this strong, foul stuff but make it into candles, thus killing the swine and saving the whales alive, I would not say so much against it. But when it comes into our families, and alternates, for variety's sake, with butter, — and when it comes to this, that one can hardly get a mouthful of food, even at the kind hands of vegetarians themselves, but what smells or even tastes of lard, — I cannot refrain from entering my protest. Let others swallow hog's grease who will, but, in mercy's name, spare me.

We are come now to animal food proper ; I mean flesh, fish, and fowl. Of these there is a great variety, though, after all, it is a few only that may properly be regarded as the staples. The rest are introduced as occasional friends only.

These, in some shape or other, occupy the centre of all our tables, at least in Britain and America, where they can be obtained. In most countries, I know, they cannot be had, except as an occasional treat on Sundays or at Christmas. And if we speak numerically, I suppose that to a majority of the world they are wholly inaccessible.

To us, in a country which uses more animal food than almost any other, it would seem very strange not to find the flesh platter, at least once or twice a day, occupying a conspicuous place. Every one knows that this and the medicine chest, of which I have before spoken, occupy the centre of the table. And yet, how happens this ? Bread, time im-

memorial, has been called *the staff of life*; why, then, is it not treated as such? Why should it not stand, instead of the flesh meats, centrally?

Corn, wine, and oil are the Old Testament order. Not oil, corn, and wine, nor oil, wine, and corn, nor yet wine, oil, and corn; but corn stands first. Corn is the representative of the farinacea, wine of the fruits, or rather of the fruit juices, and oil of the substances into which it enters as a component part.

But whether you regard this arrangement as authoritative, or a mere play of the fancy, — I mean so far as the present argument is concerned, — one thing is certain — that bread, in some of its various, but legitimate shapes, is entitled to stand in the middle of the table, the place now assigned by universal consent to the flesh platter. I will say even more than this. The man who shall go through the world, — or even through our own little United States, — and persuade mankind to set their bread on the centre of the table will perform a greater work of benevolence than was ever done before by mere man — Howard himself not excepted.

*This* is the order more fully: Bread, in some shape, in the centre; fruits next; and the oily substances — a little milk, a little olive oil, or a few nuts, or a little flesh and fish — next, unless, indeed, you should take it into your head to rebel against a custom of four thousand years standing, and crowd the latter dishes off the table.

But we must be patient and “bide our time.” Christianity will not linger always. The diet assigned by high Heaven six thousand years ago, and which still stands as a broad bill of fare on Heaven’s own first immortal page, places bread not only first, in order, at the table, but gives it the predominance every where. I do not mean to intimate that Chris

tianity, or even Judaism, furnishes us, in as many words, with a system of diet and regimen. But it does give us a benevolent system. It gives us humanity. It does not compel us to be accessory to that which directly or indirectly "makes countless thousands mourn." It does not teach us any principles which should lead us to fill our domestic retirements — those dear resorts of peace, harmony, and love — with relics of the slain. It does not aim to convert our kitchens into slaughter houses, nor our tables into vast repositories of mangled bodies.

But if, as the monarchs of the world, we must do all we can to eat up the world, lest the world should eat us up, — for Darwin says that "Eat or be eaten is the great law of nature," — if we must continue to bespread our table in such a way that it resembles more the dungeon of Bunyan's Doubting Castle than the table of a Christian, then let us make ourselves as acceptable monarchs and tyrants as we can.

Animal food, as we have seen, should be healthy. But this is not enough. The healthier the animal the better. The flesh of full-grown animals is better, all things considered, than that of animals immature or old. Ripe animals, — so to say, — as well as ripe fruits, are to be preferred. On this point I have at least one authority, Dr. Whitlaw; I believe, also, half a dozen others.

Then they are not to be fattened by any forcing process. They should be taken from the open, healthy field, or from the woods, sky, or sea; never from the crowded pen, or cage, or coop, or even from the well or artificial pond. They are to live free and die free, in order to be worth eating.

Again: animal food is not to be corned, salted, spiced, or poisoned. As long as we can keep it without casks, saltpetre pyroligneous acid, smoke, suet skins, or the skins of other

animal's intestines, why, very well; but when we can no longer keep it in an eatable state without these and kindred abominations, let it go.

Then, in cookery, do not, in the first place, *over* cook it. Do not cook it in any other substance, nor add to it any other substance after it is cooked, unless it is a little salt. Do not besmear it with gravies, or sprinkle it with pepper, garden herbs, or snuff; or scent it with musk or assafœtida.

Here follow a couple of anecdotes, which you may or may not have heard. A foreigner, sitting at a table, it is said, where one person had taken from the castor the pepper box, and after besprinkling a platter of food with it, had said, "I take it, gentlemen, you all like pepper," took from his pocket his snuffbox, and after sprinkling its contents over the same dish, said, "I take it, gentlemen, you all like snuff."

One of the professors in Yale College told me of a cook, in Philadelphia, who had a wonderful reputation for preparing beefsteak. She was at length prevailed on to part with the secret of her success. She was accustomed, as she said, to rub over the surface of the warm dish, before she laid the cooked steak on it, with a piece of assafœtida.

Boiling is, on the whole, the best way of preparing flesh, fish, or fowl. It is the best, both because it is the simplest, and because it does not ordinarily expose us to the danger of any new play of chemical affinities. If it be objectionable in any way, it is on the ground that it dissipates, if not wastes, a small portion of the nutriment.

Next to this is roasting by the fire. It is customary, in some places, to suspend a piece of meat by a string before a hot fire, with a dripping pan underneath, and frequently turn it till it is done. The surface becoming somewhat dried

or crisped, the juices are nearly all retained in the meat. This, next to boiling, is most truly physiological.

Frying is the worst of all known processes for preparing food of any kind, animal or vegetable. A part of the fat, in frying, becomes changed, and new and unwholesome developments take place, which would be intolerable to the nasal organs, but for the influence of long habit.

One might speak of endless abuses in cookery, a large portion of which pertain to the preparation of animal food, or its products, and eggs. I have alluded to some of these, and it seems needless to repeat. Sausages, mince pies, fritters, &c., are at the head of the list. I will only speak of one abuse more in this department; indeed, it is enough to mention on any single day.

A friend of mine was dyspeptic; she knew what her disease was, and how to manage herself. And yet, occasionally, after days, and perhaps weeks, of denial, she would go back to certain abuses which would prostrate her for a long season, and which she knew would do so beforehand. Such is the power of ungoverned appetite.

On some of these occasions, for example, she would take a ball of butter, place it at the end of a stick or spit, and after turning it frequently and rapidly, she would dip it, with the surface all melted, into flour. Then she would roast it again a few seconds, till it was all moist on the surface with the butter, then dip it again; and thus she would proceed, till she had a ball of flour, permeated completely with fat. This, feeble as she was, she would take for her dinner. I hardly need say that it made her sick, for it could not have been otherwise. She expected to be confined to her bed for one day, and sometimes for two or three.

## III. DOMESTIC POISONS.

There is a very strange notion abroad, to some extent, that unless an article of food contains a little poison, it is good for nothing. Some, no doubt, advance this opinion as an oblique defence of their own intemperate indulgences; but there are a few adherents to this opinion, who can hardly be called intemperate.

I need only say that such an opinion is entirely unfounded. For although it may be true that men can go on for years — for, indeed, the whole of a short life — in the habitual use of alcoholic beverages, opium, tobacco, coffee, or even arsenic, and yet not appear to suffer greatly, it is also true that there is a tendency — in themselves or their offspring — to disease, as the consequence. Much of our scrofula and consumption, as we have seen, come in this very way.

The more we avoid poison of every kind, solid, liquid, and aeriform, the better. Hence the necessity of introducing this subject in connection with food and cookery. For so strangely departed from every scientific principle are our modern forms of cookery, that we are exposed to poison almost every day of our lives.

We are exposed to poison from animal food. So many cases of this kind have already been alluded to, that in this particular I shall be brief.

I spoke of diseased or poisonous sausages in the kingdom of Wurtemberg. Two hundred and thirty-four cases of this poisoning in that country, in the course of about thirty years, are mentioned by Christison, in his work on Poisons, of which no less than one hundred and ten proved fatal.

Christison also mentions, in the same work, a family of five persons, at Macclesfield, England, who were all poisoned by

eating beef which, before cooking, had a dark appearance, and had been suspected. One of the number actually died, and two others barely escaped with their lives.

True, it is doubtful, in this case, whether the poisoning had any thing to do with the cookery of the meat · but as it stood thus connected in the public mind, it is desirable to mention it in this connection. There was the best of evidence that the trouble originated with the beef in some way.

Chevallier, in his *Journal de Chimie Medicale*, for 1831–2, gives several examples of disease produced by eating flesh, which, before being submitted to the process of cookery, had undergone a degree, greater or less, of decomposition. The following are some of his more striking cases:—

“A female, in May, 1832, after purchasing and eating some pork, was seized with violent vomiting, purging, &c. The utensils in which it was cooked underwent a rigorous examination; the meat which was left was analyzed by three skilful chemists, and every thing was done, apparently, that could be done to lead to the detection of the poison. The conclusion of the matter was, that it was not a change which the meat underwent in cookery, that did the mischief, but an incipient decomposition. A part of the unconsumed meat was mouldy, and the whole extremely filthy; and yet it is quite possible that unscientific cookery had something to do in the matter.”

Another case was that of a physician, who, with his family of five persons, was poisoned by pork, though none of the family died. Several other persons, who bought pork of the same butcher, and from the same animal, were also made sick in a similar manner.

M. Chevallier mentions two cases more—a family at Paris, that became dangerously sick after eating a ham pie.

and a family of seven persons elsewhere who were also taken violently ill; and three of them died after eating Italian cheese. In the cases of poisoning by cheese, already adverted to, I am not aware that the poison has ever been detected by the most skilful chemists.

M. Chevallier believes that these and kindred evils are more likely to arise from the use of pork than from that of any other article; and he declares loudly against its extravagant use, saying, that the value of the pork used in Paris, yearly, is eight million pounds sterling. Is there no mistake here? Why, this would be six hundred to eight hundred pounds of pork a year, for a family of five persons. If this is so, the inhabitants may *expect* to suffer!

The London Repository says, that, in 1826, four adults and ten children, living on the Galloway coast, partook, at dinner, of a stew from a calf found dead on the sea shore. All were made sick by it about three hours afterwards, and one of them died.

A French report, drawn up by three highly-intelligent men, relates to a meat pie which caused the sickness of eight persons, and which they were deputed to examine. After a long investigation, they came to the conclusion that the sickness was caused solely "by an incipient decomposition of the pie, which had been kept too long in a warm place."\*

Cases of this same general character might be produced almost without end. They are reported in the papers every

\* I have noticed a conjecture in the papers that Sir John Franklin and his men, though they may not have lost their lives from the use of bad meats, must have been sufferers from them. Developments in England seem to confirm this opinion. There is little doubt that a part, at least, of his stock of meats was in a diseased, semi-putrid, or poisoned condition.

year. But I have given enough for my present purpose. I need only add, that the cases of poisoning from the animal kingdom are more fatal, with few exceptions, than any other, — which is a reason of no little weight against the too liberal use of this species of food ; and one of still greater weight in favor of cooking it in a simple manner.

Of poisoning by cheese I have spoken at sufficient length already. Of irritation — it might as well be called poisoning — by salted or pickled butter, I have also cited one or two cases. Whether eggs are ever rendered quite poisonous in this way, is not so certain ; but according to the testimony of Dr. Dunglison, there is reason for suspecting it.

That milk is often rendered poisonous in consequence of the food of the cow, there can be no doubt. The fact is abundantly proved by Dr. Whitlaw and others. The buttercup, in particular, is a source of much irritation and disease, in this way, especially in the neighborhood of large cities and towns, where an extensive use is made of recent and acrid manures. On this subject a few facts will be presented in the Appendix, Note E.

Christison, who is high authority on the subject of poisons, tells us in his work, that “ the effect of disease, in general, is to impair the activity of poisons.” He says their *activity*, not their strength. Hence, for aught I see, the healthier we are, the greater the probability that we shall experience the effects of poison immediately ; and the more unhealthy, the more remotely.

Will not this account for the fact that rum, opium, and even arsenic, may be taken for many long years, provided we increase the dose gradually, without any apparent evil effects ? Does not this “ Mithridation,” as some have called it, of the human system, operate by gradually deranging it in

such a manner that though there is a constant increase of mischief, yet the effects are not perceptible till there comes an outburst or explosion? For Christison himself testifies, as do all who have examined facts, — from Solomon's day to this, — that “a person may be carried off by a malady, the seeds of which may have been sown by the operation of poison many years before.” “*Because* sentence is not speedily executed, therefore the heart of the sons of men is set in them to do evil.”

We are exposed to poison both from mineral food and from the mineral kingdom in the way of cookery. You may be surprised to hear me speak of mineral food; but by what other name shall I call nitre, saleratus, salt, and arsenic?

I will begin with salt. Not that it is worst in its nature, by any means; quite the contrary. But its constant use, in almost every thing that comes to our tables, renders us more frequently exposed to its ill effects, if any such can be shown, than almost any other article which could be named — certainly among minerals.

The dangers which arise from the *excessive* use of salt are well known to the scientific world. Professor Gohier, of the Veterinary School of Lyons, in a series of experiments on animals, found that the muriate of soda, or common salt, given to the horse in the dose of two or three pounds, causes great disorder, and even death.

Christison speaks of a glutton in London, who one day proposed to take a pound of salt in a pint of ale; and though he had an attack of vomiting before he was half through his feat, he persevered in his foolhardiness. He was soon afterwards seized with all the symptoms of irritant poisoning, and died within twenty-four hours. The stomach and intestines were found, after death, excessively inflamed.

In 1829, in the month of July, no less than one hundred and fifty persons, in two parishes of France, were attacked, some with pain in the stomach, nausea, slimy and even bloody purging; others with tension of the stomach, puffiness of the face, inflammation of the eyes, and swelling of the legs. In another region, one sixth of the inhabitants were affected in the same way. The salt they used being suspected, it was analyzed, and found to contain a hundredth part of its weight of hydriodate of soda.

In the last case, the suffering is not, of course, to be attributed to pure muriate of soda; but in the former cases it was so. Now, if a pound of salt — nay, much less, since some of it was vomited up — would produce such mischief, can it be that smaller quantities, even though they should not exceed a teaspoonful, at once, are perfectly harmless? But you must answer this question for yourselves. All I know from observation is, that they who use salt very freely, from day to day, grow thin and pale, and suffer considerably from debility. I have personally observed no other ill effects from salt than this. One danger, at all events, we should guard against — which is its adulteration.

You will say, “But if salt is poisonous, how comes it to pass that men and animals, especially the latter, thrive under its use?” I might reply by asking another question: “How comes it to pass that they thrive under the use of arsenic?” But that they do, we have what I regard as ample and unequivocal testimony.

That the use of wine, and cider, and beer, may be so moderated, and so cautiously applied, as for a time to improve the appearance of a person, and that this is the fact with regard to coffee, is, I believe, well known. But that the same effect can be produced by arsenic, as well as alcohol,

is not so well known as it should be. Yet we have it stated in the *Annual of Scientific Discovery*, for 1852, and indorsed by *Chambers's Journal*, that the custom of eating arsenic prevails extensively in Lower Austria and Styria, where it is taken for the express purpose of giving the person a fresh, plump, healthy appearance. It is true, that when taken in excess, as sometimes happens, it destroys life, as do alcoholic drinks or opium; but in moderation the first effects are the reverse.

In a late poisoning trial in Vienna, one of the most eminent physicians of that place was called upon to testify in regard to this very point. He repeated what has been said; viz., that the poison eaters are distinguished for their blooming complexion and appearance of exuberant health. He spoke of some who, by increasing the dose gradually, had succeeded in producing this effect to comparative old age.\*

I am not about to compare the use of common salt with that of arsenic. But when the question comes up how an article can be poisonous, and yet produce immediate good effects, it is well to answer it. The truth is, that all extra stimulants, in a certain amount, — coffee, alcohol, and arsenic, — improve the condition of the individual at the expense of the race, if not of the future portion of the life of the individual himself.

Now, if this is the fact with regard to salt, what shall we say? Yet Mr. Cline, a distinguished breeder in Great Britain, gives it as his opinion that it is so in the case of domestic

\* Some dozen or fifteen years ago, a family in Boston sickened suddenly, and the cause was referred to a cheese they had eaten, made in Grafton, where, it was said, the housekeepers used a little arsenic in their cheese, to give it a particular flavor. I do not know whether the fact was ever established.

animals. Others incline to the same opinion. Is it not true that effort is required, in crossing breeds, &c., in order to prevent deterioration, just in proportion to the quantity of salt which is used? You will ask, "What, then, shall we do?" My reply is, that I do not know, except to eat as little salt as possible. If we eat none — changing our habits very suddenly — we may suffer. The arsenic eater does, whether man or horse; for they give it to horses, too, for the same reason that they give it to men, and for the same purpose that *salt* is given — to improve the appearance. Yes; I know of one thing more, still, which can be done. If it is so difficult to leave off the use of alcohol, arsenic, salt, and other stimulants, whenever we get enslaved to them, we can at least see that each rising generation is trained to more perfect freedom than the preceding one.

You will still ask, "But is not salt needed in the human economy?" Pereira says, "Though salt is a constituent of most of our foods and drinks, we do not, in this way, obtain a sufficient supply of it to satisfy the wants of the system." How does he know this? Some of the savage tribes, that use no salt, are as vigorous and healthy as any other savage tribes in similar circumstances. Pereira indeed says that nature has furnished us with an appetite for salt; but he offers no proof of this. What becomes of nature's appetite for salt in the Camanches Indians, who never use, but abhor it? What becomes of it in the flocks and herds of Upper Hindostan, that never have any salt, and yet are among the best cattle in all that country? What became of nature's appetite in the case of Methuselah?

But it is not so much the *moderate* use of salt, in the present generation, of which I complain, as the general impression in its favor — when there is every reason to suspect it to

be, in its nature, a poison to the human system, and as certainly injurious, in a degree, as the other table medicines, which are so freely and largely used.

“Nitro,” otherwise called saltpetre, “is,” says Christison, “a dangerous poison.” Cases are on record of poisoning from an ounce or an ounce and a half. In general, it is a dangerous and rapid poison in the dose of an ounce. What, then, shall we say of its safety for culinary purposes?

Some of our learned men in the United States have written on this subject, and have cautioned the public mind in regard to its application in the way of preserving meats. In my own view, the caution should be repeated, and applied to its use in every thing which has any thing to do with human diet or drink.

Saleratus, or pearlash, (for they are essentially the same thing, except that the former is a little stronger as an alkali,) enters into our food, nowadays, almost as frequently and as largely as butter, eggs, or salt. If a poison at all, it must therefore have a very great effect. It must poison its hundreds, and thousands, and millions.

Let us, then, inquire into the matter. Orfila, in his work on Poisons, sets down the subcarbonate of potash or pearlash, which is but half as strong, in potash, as the bicarbonate, or saleratus, as one of the concentrated alkalies; which he calls poisons.

The following are the symptoms which he says follow the use of a considerable dose either of a concentrated acid or a concentrated alkali; some degree of which must, in the nature of things, attach to the use of saleratus or pearlash. I will quote his own words, and the public may judge for themselves whether they indicate the existence of poison.

“A disagreeable, acid, burning taste; heat in the throat and stomach; acute pain in the throat, which soon descends

to the bowels ; insupportable fetor of the breath ; frequent risings ; inclination to vomit ; abundant vomiting of different colored matters, sometimes mixed with blood ; hiccough ; constipation, but more frequently copious, and, more or less, bloody stools ; colic ; burning thirst ; cold and clammy sweats," &c.

The physicians of New Brunswick are wont to say that mothers there kill half their children with saleratus. How is this ? Are they poisoned outright ? Is their dissolution preceded by such a cluster of symptoms as the foregoing ? Or does the saleratus destroy by uniting itself with other injurious agents ?

Most unquestionably in the latter way. When they buy a barrel of flour, they buy also a smaller bucket of saleratus.\* It is used liberally in all sorts of bread, cake, &c. The children, of course, eat it freely. It irritates the lining membrane of the alimentary canal, and sometimes not only inflames, but actually corrodes it. The result is, that, the system being thus prepared for it, the bowel diseases of August and September become severe, unmanageable, and dangerous, and what would otherwise have been a comparatively mild form of diarrhœa, dysentery, or cholera becomes almost certainly and immediately fatal.

If the use of this strange medicament in human food — this bitter, nauseous thing, that should almost remind us of an infernal, rather than a benevolent origin — were confined to New Brunswick, I might say less concerning it. But its use has spread, and is still spreading. New England is but little behind in the " march ;" and the west and south are coming on.

At the close of a lecture in Fitchburg, Massachusetts, in

\* A respectable merchant in Boston, who deals much with the New Brunswick and Nova Scotia people, confirms this statement.

which I had spoken of the frequent consumption of ten or twelve pounds of saleratus in a family in a year, a gentleman observed that his family, as he thought, used fifty pounds. His wife, who was present, doubted whether they used half that amount. They discussed the matter, and came to a conclusion that they used about twenty-five pounds. It was a family of ten persons.

Throughout New England it is quite common to find families of five persons that consume ten pounds of this poison yearly in their food. Even in Ohio I found families of ordinary size that used six or eight pounds. Whereas, fifty years ago, a quarter of a pound of pearlash was deemed a yearly supply for many a family.

These remarks are not applicable, in all their severity, to the use of saleratus, where the object is merely to neutralize acetic acid, as in the case of over-risen bread. For here, the saleratus, if not applied in excess, induces a chemical change. The acetic acid combines with the potash to form a new substance, called *acetate of potash*, which is less irritating than saleratus; while the carbonic acid escapes, causing a degree of effervescence.

I do not mean to say that even this process is desirable. I do not mean to say that even the acetate of potash is salutary. Only, if we are not willing to eat bread with acetic acid or vinegar in it, we have a way of getting rid of the vinegar, without substituting another poison in its stead.

“Worse, and still worse!” some may exclaim; “and is vinegar, too, a poison?” This brings us to the confines of vegetable poisons. I will, therefore, proceed to say that, though this article has not generally been regarded as a poison, Orfila speaks of it as such. Four or five ounces of it given to a dog proved fatal in ten to fifteen hours.

Spurred rye is one of the worst vegetable poisons with which we ordinarily come in contact in domestic life. Indeed, it can hardly be said to be very commonly encountered, since the public begin to understand its properties, and to avoid it. Most happily, it is easily seen and easily separated. What also renders it less necessary that I should speak of it very fully, is the consideration that it is not much found in New England, and but rarely in other parts of the United States. Many years ago, it was thought to do mischief in the State of New York; but I have heard nothing about it lately. I have seen it but once in the rye fields of Massachusetts.

Spurred corn has occasionally been found to produce the most terrible results; but I believe not in our own country. In Colombia, in South America, men and other animals are made sick with it. The black rust of wheat, according to the French chemists, is also slightly poisonous.

Unripe grain, according to Christison, Bouvier, and other French writers, is more or less injurious — I might almost say poisonous. Epidemic diseases have been ascribed to it. In the year 1793, an epidemic dysentery laid waste several departments of the Oise, in France, which was referred to the use of unripe grain. (See the Appendix, Note F.)

Lettuce is poisonous. Why should it not be so? It contains a substance called *lactucarium*, which is narcotic, and is of the opium family. Galen, it is said, used to eat it at supper, because its narcotic properties were favorable to sound sleep. Yet people eat it, as they do arsenic, with seeming impunity.

Mushrooms are, in some places, a very fashionable article of food. There are several species of them, some of which are hardly poisonous at all, while others are very deadly. The poisonous may be distinguished from those which are

regarded as innocuous; but the safest way is to let them all alone.

Annatto is procured from the seeds of a Mexican plant. It is chiefly used as a medicine. How it came to be deemed safe to color butter and cheese with it, is unknown. It is not greatly poisonous, but only slightly so; still it should be rejected, except by the physician and apothecary.

Exposed potatoes are poisonous. These are generally distinguishable by their dark-green appearance. The potato, as is well known, belongs to a poisonous family of the name of *solanum*, and there seems to be a tendency, when the plant is less cultivated, to revert to its natural state. Decayed potatoes are believed to be poisonous. (See Appendix, Note G.)

Bread mould has a bad name. Were it necessary, I could present a long list of cases of poisoning of this sort. They would be principally gleaned from English papers, but would be entitled to credit; but I will not inflict so heavy a tax upon your patience. Whether the alum, and other kindred substances, — so much used by bakers, in order to procure a large loaf, and for other purposes, — ever actually poison those who use them, is a question which I am at present unable to solve; they should not, in any event, be tolerated.

Much mischief has been produced, as I have before intimated, by the well-known plant *ranunculus*, or *buttercup*. It grows with the greatest luxuriance where the soil has been enriched by hot, rank, recent manures, as around our houses and barns, and in the immediate vicinity of a dense population. It may be known by its beautiful yellow blossoms. Nothing is better proved than that this plant, whenever eaten by our domestic animals, poisons them. In a time of abundance of food, they will not usually taste it, except by accident, though in a time of scarcity they sometimes will; they

will also eat it when mixed with the hay on which they feed in midwinter.

It is also a well-established fact that it produces inflammation and ulceration in the stomachs of the animals that eat it. And must not the flesh and milk of animals thus poisoned be productive of irritation when received into the human stomach? How many thousands of us, then, must be more or less poisoned by buttercup!

I suppose it to be generally known that the milk of an animal is liable to contain, unchanged, more or less of the substances on which she feeds. How many times have I detected the common bitter weed in milk! How many times the carrot! But this is not all. Poison taken by an animal that gives milk must, of course, affect that milk. The poison eaten by a cow or sheep may destroy the calf or lamb, while the mother remains almost or quite uninjured. And are we, who use milk of this kind in our families, entirely unscathed?

Whether the flesh of fattened animals that have eaten more or less of the buttercup can affect seriously those who use it, is not so certain as that milk will produce these effects; nevertheless, I do not believe there can be much doubt on the subject.

There is one more species of domestic poisoning which is worthy of our notice for a few moments. It might have been conjoined with the consideration of what I have called mineral poisons; but I chose to defer it. I speak here of poisoning through the medium of the vessels used in cookery, and in eating and drinking.

The various preparations of lead, in all probability, do as much mischief in domestic life — especially in the line of cookery — as any one class of substances which we have to do with. Among them are the mere oxide of lead, acetate of

lead, commonly called sugar of lead, red lead, litharge, and white lead.

Red earthen ware is usually glazed with melted oxide of lead. This is the reason why so many people have been poisoned by eating pickles, sauces, &c., which had been kept in these vessels. The acid — oftentimes the acetic acid — acted upon the lead, and combined with it to form a new and poisonous substance.

The most remarkable instance of this kind of poisoning I have ever known, took place at Elizabethtown, in Pennsylvania, in the year 1814. The people had just supplied themselves with red earthen vessels from a new pottery, into which they put what they called their apple butter. The acid in it united with the oxide of lead in the glazing, and produced acetate of lead. A severe colic prevailed in the neighborhood, to which many fell victims before the cause of the disease could be finally traced out, and its progress fully arrested.

Many people set their milk — or formerly did — in red earthen pans. This is highly dangerous; for the slightest change in the milk will generate acidity, a portion of the lead of the glazing will be dissolved, and a diseased state of the stomach and bowels will be the inevitable consequence. The mother of a child seven days old, in a family with which I was intimately acquainted, having drunk water from a pail just painted on the inside with a paint prepared from white lead, the child was taken the following night with nausea, pain, and vomiting, and suffered severely.

Red lead is an oxide of lead, is much used in painting, and is a component part of some of our red wafers. I have known clerks and others made sick by eating these wafers; and have not a doubt that the stomachs of many knights of the quill become diseased in this very way.

The London Lancet states that the secretary of a well-known institution in England was twice attacked with a violent salivation, so severely as to render medical aid indispensable, from his having wafered five hundred circulars with red wafers, which he had wetted with his mouth. I have known some of our American clerks suffer in the same way.

Litharge is an orange-red substance prepared also from lead, by oxidizing it, and is equally poisonous. It is used in making confectionery. Indeed, red lead, and another leading substance called *massicot*, are both used for the same purpose. Whether our confectioners *know* that they are using poison, in these cases, I have not the means of determining.

Many a time have individuals, and sometimes a whole family, been so poisoned by the frosting, as it is called, of our confectionery, as to be sick, several of them at once. In general, the quantity used in coloring small toys is so inconsiderable, that the poisonous effects are not immediately obvious, especially in children who are so tenacious of life.

A family of five persons, in New York, were all severely sick, and some of them came very near dying, in the year 1835, in consequence of eating the frosting of a confectionery cake. Drs. Hosack and Rogers analyzed the colored ornaments of the part of the cake that remained of it, and found one fifth of it rank poison.

There has been great trouble in our country from lead pipes. Some of these cases have come under my own observation. Many attempts have been made to explain the matter, but they are not wholly satisfactory. One thing, however, all are agreed in, viz., that lead pipes are very unsafe.

Poisonous substances are sometimes developed during the process of cookery. Thus I have many times seen vegetables taken from a common iron pot or kettle, almost as black as if they had been boiled in ink. What was the cause? I have suspected the presence of a little sulphuric acid and a little oxide of iron, or iron rust, in the kettle, which being united, produce sulphate of iron, or common copperas.

Passing through Hartford, in Connecticut, one day in my early life, I saw at a corner some maple sugar. It was dark colored, unusually so. I bought and ate a few ounces of it; but it poisoned my mouth and œsophagus so that I could scarcely speak or swallow for several days.

There are two kinds of verdigris. We are more or less exposed to them both in modern cookery, and they are both extremely poisonous. One is, in chemical language, the carbonate of copper, the other the subacetate of copper. The last will dissolve in water, and is very poisonous, in every shape and form.

Too much care can hardly be taken to prevent the formation of this substance in kitchen utensils; and yet, through the neglect of housekeepers, hardly any thing is more common. Saucepans, whether of copper or brass, — for brass contains much copper, — if well tinned and kept perfectly clean, are not at all dangerous, whatever may be cooked in them. But when they are badly tinned, or not well cleaned, not only wine, cider, vinegar, currant and gooseberry juice, but oil, and all greasy substances, cause the formation of verdigris, and may occasion the most fatal accidents.

When the substances of which I have been speaking, especially oily or greasy food, are not only prepared in copper vessels, but also left to cool in them, the quantity of verdigris formed is apt to be considerable. It is, therefore, of

the utmost importance to pour off whatever we cook in these vessels while it is still boiling.

It is stated in our more elaborate works on poisons, that people are sometimes made sick by eating salads seasoned with vinegar, in consequence of the previous exposure of the vinegar, in some way, to copper.

In the Boston Journal for January 1, 1852, is an account of poisoning with copper, which, though taken from an English paper, seems to bear the marks of authenticity. A female cook, about to die, confessed that she had carelessly sent a stew to a table, a part of which had stood some time in copper, till it was green. The mixture was eaten, and several died. Afraid she should be held accountable as a murderer, though without intending to be so, she had not dared to confess the fact till she lay on her death bed.

Pure tin is not much used for culinary utensils. What is usually called tin is an alloy of tin and iron. To form it, very thin plates or sheets of iron are dipped into melted tin, which not only coats the iron plates, but penetrates them. There is no danger in the use of this substance as long as it does not rust or oxidate. But the moment either this tinned ware, or the genuine tin, or britannia, becomes rusted or oxidated, it is extremely poisonous.

But I must close. Should any housekeeper, who considers well this whole subject, longer doubt of the usefulness to her profession of a knowledge of chemistry and the laws of life, she must be differently constructed, at least mentally, from most persons who possess a thinking apparatus. Her scepticism or her stupidity must be beyond the reach of hope. (See Appendix, Note H.)

## LECTURE IX.

## EXERCISE AND REST.

## I. ACTION OR EXERCISE.

POPE has said that "order is Heaven's first law;" but I have sometimes been inclined to question his "orthodoxy." Action or motion — confused and chaotic though it should be — seems to me, in the divine arrangement of things, to be first. Order, indeed, comes next, and is the wise and appropriate direction of that action, so that it may tend to "universal good."

To what part of the Creator's vast domain shall we repair to find no action — no motion — in a word, absolute quiescence? Shall we turn our eyes to the everlasting hills? Not, surely, to the granite hills of New England; for these are by no means stationary. They are continually changing — crumbling away with the action of the sun, air, and rain — to say nothing of any internal changes. Their surfaces are wasting *here*, or gaining, by accretion, *there*. Are not the beds of our rivers and oceans hourly receiving, from the firmest rocks on the globe, fresh deposits?

What is crystallization, that curious and wonderful process, but a motion of the parts of solids, directed by law? Nay, does not the geologist tell us of changes mightier than these, perpetually going on? Are not many of our firmest solids resolvable, in the crucible of the chemist, to liquids, and even to gases; and our liquids and gases to solids? But how much more frequently do these results take place in Nature's

great crucible, and in the hands of a Chemist whose skill and power are almighty!

But if the most solid parts of the great globe we tread on are not quite solid, after all, — if even here there is perpetual action or motion, — how much more is this the case with its less solid portions, the oceans and their numerous tributaries! What action — what mighty and incessant action — is here!

Even in the world's chaotic state, the Spirit of the Almighty *moved* upon the waters. How much more obvious are motion and change now! Ever since the decree of the Eternal divided the waters from the waters, and made an ocean in the atmosphere as well as on the earth's surface, a most surprising current of action has been going on, which, though it may elude the eye of sense, is as real as the recurrence of day and night. The ambient atmosphere, forty-five miles high, as truly holds a world of water in solution as the bed of the ocean itself. For, according to the estimates of some, the average amount of water in solution, in the atmosphere, at a common summer temperature, could it be precipitated at once, would cover the surface of the earth to the depth of more than three feet, and if gathered to the oceans, would cover them to the depth of five feet. Surely, then, there is a smaller ocean above us, as well as a larger one below us; and what is more curious still, these oceans are forever interchanging commodities.

Here, if nowhere else, is free trade. The ocean below is constantly giving off, from its mighty mass, by evaporation, to the ocean above — the atmosphere; while the latter is, ever and anon, precipitating what it has received, in the form of rain, hail, or snow, upon the earth's surface, to fertilize it, to form springs, brooks, and rivers, which again return to

their mother ocean, whence they came. Whether there is any secret, under-ground communication between the oceans and the springs; by means of which a portion of the water of the former finds its way to the latter, like the venous blood, against all natural law, except it be that of capillary attraction, to the heart, is not so certain.

The waters of the earth are kept in incessant agitation, in a degree also, by the atmosphere. Their surface is, nearly every where, more or less in action; and they mutually give and receive. This mutual action and reaction, among other things, contribute to prevent that stagnation of the great aqueous mass, which, notwithstanding the laws of evaporation and motion, might otherwise be inevitable.

This should serve to remind us of the incessant motion going on in the atmosphere itself. Rarefied at the tropics or elsewhere by heat, portions of air continually ascend from the earth's surface, and are as continually replaced by those which are heavier and colder. On this great fact is based the modern theory of winds, by which a circulation takes place, as important as that of the mighty mass of waters — and, like the latter, resembling, in no small degree, the circulation of that world in miniature, the human body.

Thus we see that the various portions of the inorganic and inanimate world — solid, fluid, and aeriform — demand exercise, and demand it, too, continually; and for what is so necessary to their well being and our own, the great Creator has made effectual provision. Nay, more than even all this; not only are the various parts of the earth in almost incessant motion, but so also are those, as we have good reason to believe, of all the bodies of our solar system. Made, as they most certainly are, of materials not unlike those of which our globe is composed, and subject, in general, to the same laws,

is not perpetual motion — action — exercise — a first and most important law of Heaven in them, too ?

And then — onward in our march — if we extend our imagination to those myriads of worlds, those systems on systems with which all space, visible and invisible, is replenished, are not these same laws, in all probability, still in operation ?

Once more. Not only are the component parts of the world we inhabit, and of other worlds, in perpetual motion, but also the worlds themselves. It would be as hard to find a world quiescent, as an atom. Has not our world — have not its sister worlds — their twofold motion, annual and diurnal ? Think of the velocity with which they move on their own axes ! But think still more of the amazing velocity with which they are whirled in their orbits around their respective centres or suns ; and these last, each, perhaps, with its retinue around another centre ; and then, perhaps, still, a host of these systems on systems revolving around the great centre of centres, the throne of God ! What incessant, what mighty motion is here ! What specimens these of the importance which Jehovah attaches to action, or exercise, as well as to order, the secondary law to direct that motion !

But to return to our own little planet. I have spoken of the necessity of action or motion in the inanimate portions of the globe we inhabit ; but how much more curious are the laws which prevail when we rise a step higher, to the notice of organic bodies !

The moment we come to the vegetable domain, we perceive, much more than in the world of mere inanimate matter, the importance and necessity of motion. Here is a cluster of atoms arranged in a new and wonderful manner, and endowed with a wonderful property, called *vitality* or *life* !

In other words, here is a particular form of matter endued with a particular structure, and invested with powers which enable it, for a time, to resist the tendency to those changes it would be compelled to undergo, were it merely inert or dead substance. Though filled with juices, and covered with leaves or fruits full of the same, and subject to stagnation, decay, putrefaction, &c., or to be destroyed by the sun's keen rays, or by some new play of chemical affinities, it lives on, resisting all these influences, and maintaining its station, properties, and relations — in other words, maintaining life — for months and years, and sometimes, as in the case of the oak, for centuries.

How is this accomplished? Though we do not fully understand the nature of life, even in its simplest forms, we *do* understand, very well, that motion — motion, too, in great abundance — is indispensable. Grasses, plants, and trees could never thrive were there not a circulation of fluids within them, and this circulation is carried on through ten thousand little vessels. The circulating fluid, or sap, analogous to the material of circulation in the human body, the blood, demands motion almost as incessant, though not quite so rapid, as the latter fluid does; and suffering or evil — I will not call it punishment — as inevitably follows when this motion is interrupted.

But to obstruct this vegetable motion is no easy task. Here the Creator has kept the reins of government in his own hands — not delegating it, as in our case, to free agency. Besides establishing his laws within their structure, he has made permanent provision, in the nature of things around, for their fulfilment. The light of day and the darkness of night; the vicissitudes of summer and winter, and heat and cold; the rain and the breezes, — all perform an important

mission in respect to the vegetable. Not a ray from the sun reaches it, not a drop of rain from the clouds falls on it, nor a breeze of wind stirs it, without exerting an important agency in regard to the simplest and smallest vegetable; and I have been often delighted, as I have seen the tall tree tops waving in the breeze, to consider the provision made by Heaven, in this mode of exercise, for their health and vigor!

From vegetation, we come, at last, to animal life. Here, from the merest polypus to man,—the highest in the scale,—the same almighty hand which has so bountifully provided action or exercise for the other kingdoms of nature, is still seen, and even more distinctly than before.

So wonderful, in truth, are the laws of animated nature,—so curious, yet varied are its instincts,—that Addison, in the caption to a chapter in the Spectator, has the following remarkable words: “God himself the soul of brutes.” And we must not blame him too much for the expression. For who has reflected on the laws of motion and the importance of action or exercise, and witnessed the sports of the finny and scaly tribes, the gambols of the lamb, the playfulness of the kitten, and the movements and songs of the feathered tribes, without saying within himself,—and this, too, without incurring the charge of pantheism,—Surely God himself is here!

Nor is man, by birthright, and at birth, less an animal—whatever higher qualities he may possess—than the rest of the tribes. His whole nature, under the guidance of instinct, calls for exercise, and that, too, almost perpetual. No sooner is he possessed of the machinery of motion than he commences his exercise; and whether in an aquatic, a terrestrial, or a celestial state, motion is, to him, Heaven’s first law. Such motion, or action, in order to be right action, must, indeed, be *directed*; and here the second law of Heaven—due

order — comes in. But, I repeat it, action or motion is the bent of his nature, from first to last, whether obedient or disobedient, whether happy or miserable, whether here or hereafter. He loves action in the cradle; his cries are action; the gratification of his appetite for food is action; his grasping for the candle is action; his gambols of every sort are action; the studies and employments of later years are action; life is the continuance of his action, and so is eternity.

The redeemed, before the throne of God, are represented as active in the highest degree. If they are not spoken of in every instance, as *flying* through the midst of heaven, on Heaven's important errands, they are at least represented as saying, "Holy, holy, Lord God Almighty!" Nor is there less of activity — a terrible activity though it should be — in the world of the lost!

In short, whether we study the material or the immaterial world; whether we are at home, or take to ourselves the wings of the morning and fly to the uttermost parts of the earth; whether we look around us or within us, above or below us, — all is and must be ever-during activity.

No being, however, belonging to this terrestrial sphere, demands action or exercise more than man. What is true of all other worlds and beings is especially true of him for whom — as the poet Young has said — all other worlds, if not beings, were made. No one has a more complicated system of machinery than he. He has been called a world in miniature. Within the narrow domain of the human body are performed several processes as much more curious than the processes of vegetable circulation as those are more curious than the mere formation of a crystal. These internal processes, moreover, are best performed when he has a full

supply — not, indeed, an over supply, but a *full* — of pleasant and healthful exercise or motion of another kind.

I should like to take up and treat of these internal processes, involving such a variety and extent of motion, or at least of the machinery connected with the performance of these processes. But it would be foreign to my present purpose to do so. Besides, it would involve much repetition of what has already been said under other heads.

The Creator has given us, as he has the brutes also, but not the vegetables, a locomotive power — the ability of moving from place to place at our pleasure. With the proper exercise and right direction of this power, he has kindly connected a large measure of our happiness. To that instinct, moreover, which he has given both to us and to the brutes, he has superadded reason. In the exercise of this reason, that is, in the capacity of free agents, it is obvious to those who have made the inquiry, carefully, that the more our bodies are exercised, within certain limits, the better it is for our health. I have already said that the internal processes themselves will be better performed in proportion.

For when we exercise ourselves properly, — that is, when we move ourselves from place to place as much as we ought, and thus agitate, gently, all the machinery within, — then is the object of that machinery best accomplished. In other words, then is our health best preserved, and our happiness in the highest possible degree promoted.

It is true that there are cases on record of persons without the power of moving from place to place, and who have been moved but little by others, who have yet lived on to twenty or thirty years of age. It was stated in the papers, a few years since, — probably with truth, — that there was a female in North Carolina, whose whole frame consisted of mere head

and trunk, as destitute of limbs — the chief agents of locomotion — as a log for the fireplace. She only moved as she was taken up and carried from chair to chair, or to and from the table or the bed. Yet, said the papers, she was healthy. They said, however, she was very corpulent. Now, such remarkable corpulence is disease; and this young woman, healthy as she was said to be, no doubt long ago paid the debt to nature.

The slightest inspection of the human locomotive apparatus is sufficient to convince any candid inquirer after truth that the Creator has not made it without intending it for a very important use. Let us, therefore, for a few moments, make this slight examination; it may at the least amuse us.

The human body, whose weight averages, in the male adult, one hundred and forty pounds or more, is prevented from being crushed to the earth by a strong framework, called, when detached from the body, a *skeleton*; but when *in* the living body, simply *the bones*. This framework, though it seems very simple, and made up of a very few pieces, is really quite complicated.

It consists of at least two hundred and forty bones, or pieces. The brain case, or skull, which looks like one smooth, globular piece, is made up of as many as eight pieces, which, in the young, are as separable as the bones of the fingers. Each hand and wrist, too, have no less than twenty-seven. Indeed, in childhood and youth, the number of separate bones and pieces of bone are much greater than two hundred and forty, as there are then found, at the end of most of the long bones, other shorter pieces, which afterwards, in later life, adhere to and become a part of them. Some also, as the breast bone, are in several divisions during infancy; but in maturer life they become consolidated into one.

Some of the bones are joined together in one way, some in another. The eight pieces of skull bone, as we advance in life, are fitted together by serrated or saw-tooth edges. The teeth seem driven like nails into a ridge, or jaw bone. Most, however, are fastened by a sort of hinge; and in some the hinge is very perfect.

The ribs have a slight, but very complicated motion, which, if not disturbed by compression, greatly favors the healthy action of the lungs and heart, which they enclose as in a cavity. I have dwelt on this before, and alluded to some of the errors of modern training, which interfere greatly with this full and free motion.

The sixty bones of the arms and hands, sixty more of the legs, feet, and knees, twenty-four of the spine, and some twelve to twenty more connected with the jaws and elsewhere, amounting in all to more than one hundred and forty, *should* have — and *do* have, if we are not greatly in fault — a very free and full, and even frequent and rapid, motion.

These bones are coated, or lined all over, with a thick and rather tough membrane, called *periosteum*. This is still tougher at their ends, which are often surrounded with a kind of purse, or sac. In this sac a liquid is formed and poured out, gradually, to keep the joints from wearing. It is called *synovia*. Some have compared it with the tar which the wagoner uses on his wheels for a similar purpose.

All these bones are at first mere pieces and lumps of jelly; they are converted into bone by degrees. First, a small speck of bony matter is left — culled out or secreted — where the bone should be; then more is added: this is called *ossification*. It begins about the middle of the long bones, and near the centre of the flat ones.

It happens, by the way, that Nature — ever true to her

trust when not abused or trifled with — sometimes takes on an unnatural process, and forms bony matter where there should be none. Such a result is becoming quite common in later years; but I have spoken of this in treating of diseases of the heart.

Human transgression, moreover, in various shapes, throws upon nature the necessity of making other efforts. Thus, where there is a rickety tendency in the system, we find a deficiency of the work of ossification, and the bones become soft, and yield under pressure. This is because there is not power in the system to apply new particles to the parts, when the old or waste particles are taken away.

A more dreadful disease than even rickets sometimes occurs. All the bones become soft: this is called, in books, *mollities ossium*. The system loses the power to make any new bony particles, and when the old ones are one by one taken away, nothing is at length left but mere gristle, as in infancy.

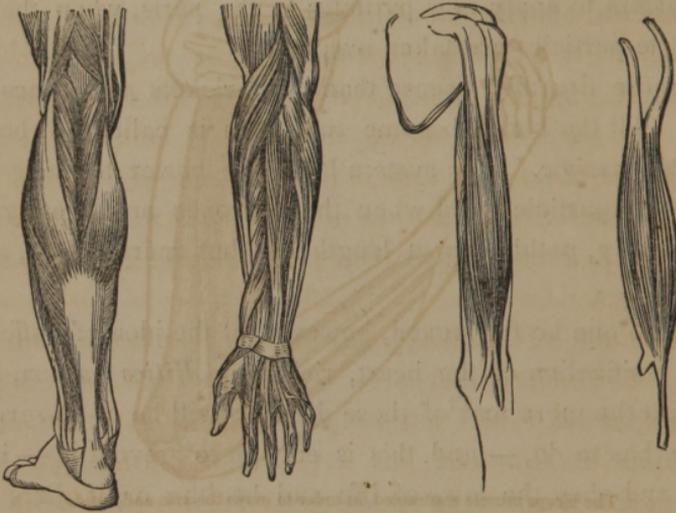
Let no one be frightened, however, at the idea of suffering from ossification of the heart, rickets, *mollities ossium*, &c., because the mere fear of these diseases will be of no service. All he has to do, — and this is enough to prevent it, — is to learn and obey the laws of life and health; or, if there are already diseased tendencies in consequence of inheritance, obedience will probably check or arrest their progress.

But as the bones — however well adapted at their ends, and indeed throughout, for motion — will not move of themselves; how are they to be moved? How are the arms to be raised, and the legs carried forward? Or, if we attempt to give motion to the bones in any way, how is that motion to be regulated?

The work is performed by means of muscles. A muscle

is a strip of lean flesh, somewhat enlarged, usually, in the middle, but tapering towards each end. What we call lean meat consists of muscles — or, more correctly, as they are seldom found single, of a package or parcel of them.

The fleshy part of the arm below the shoulder, for example, is composed of several muscles ; they are so connected with each other, that when we cut off a large portion of the flesh, it appears like a solid mass rather than like a package of small bundles — as it really is — of fleshy fibres, sliding among one another. Here is a view of some of them.



Specimens of muscles and their tendons.

But how do these packages of fleshy fibres move the bone ? is still the question. The muscles are larger in the middle, and tapering towards their ends, where they usually terminate in broad, flat, whitish straps, called *tendons*. The ends of these tendons are attached to the bones, so that, when the muscles shrink, motion is effected.

Thus, in the present case, suppose I *will* to bring my hand to my head. The muscles of the arm shrink, which

must of necessity bring the shoulder nearer the hand, or the hand nearer the shoulder. As the last result is easiest, the hand comes towards the head. Place your hand on your arm while the muscle shrinks, and you will perceive the swelling.

When I wish to carry my hand back again, the muscles, which were before contracted or shrunk, begin to relax or yield, and the muscles on the back side of the arm, in their turn, contract and extend the arm, and carry the hand, of



The biceps muscle contracted, in order to move the arm and hand.

course, along with it. This is, briefly, an account of muscular motion.

The movements of the legs and every other part of the body are effected essentially in the same way. There are usually two sets of muscles to a part — called flexors and extensors. Flexors bend the part, and extensors carry it back or extend it. The bones and muscles, moreover, make a set of levers and pulleys; and most of our locomotion simply consists in being pried about. Whether we walk, run, creep, climb, or

swim, we are still pried from place to place ; and if we could fly, it would be the same thing, essentially. The birds are pried along, as well as we.

There are about four hundred and fifty muscles, usually in pairs, employed in moving the body about ; of which the far greater part are exceedingly active. Except in case of disease, they obey the will. In chorea, and in the case of cramp or spasms, they are not obedient to the will in every instance ; and in sound sleep, we have not much power over them.

Thus there are from one hundred and thirty to one hundred and fifty muscles concerned in keeping the body in an erect posture ; from fifty to one hundred in moving it in any desired direction, forward, backwards, or sidewise ; from eighty to ninety in moving the arm and hand ; about one hundred should be employed in moving the chest — in breathing, speaking, singing, &c. ; and about forty in performing the various motions of the face. I should also add to these the various ligaments or straps which hold the joints in their places, of which there are three or four hundred of importance. What a wonderful apparatus this — of two hundred and forty bones, four hundred and fifty muscles, and three hundred ligaments, contrived, by the great Creator, for effecting human motion, and promoting our happiness !

Now, I say again, that we find those who most use this locomotive apparatus, if they do not use it unreasonably and abusively, — if, too, all other things are as they should be, — the most healthy. The strong and robust, as a general fact, have firm, strong, and even active muscles ; while the feeble individual has his muscles thick, small, soft, and weak.

It is admitted that there are a few apparent exceptions to this rule ; but they are only a few. When people are healthy

without good muscles, they are probably so by inheritance, and in spite of their want of muscular vigor, rather than on account of it; or the vast majority of their habits are correct, and the neglect of locomotion, as an error, stands almost alone.

Nor is this all. The vigor, if not the activity, of the brain — the organ of the mind — will always be in due proportion to the muscular vigor and energy of the body, according to the old Roman notion that a sound mind can only be had in a sound body. Hence the importance of knowing how to secure muscular power.

A contrary doctrine has, I know, prevailed, even among physiologists. It is asserted, by some of them, that a strong body is absolutely at variance with the development and manifestation of strong mental powers. Those who wish to know what has been said — and with much seeming plausibility — on this subject, may consult Richerand's *Physiology*, in the article on *Temperaments*. The error referred to has probably had its origin in the fact that a few men with giant intellect, — or at least with giant brilliancy, — with bodies perhaps originally strong, have early wasted their physical energies, and at the period when they were most distinguished in the literary world, have been equally distinguished for broken-down frames and feeble constitutions.

There is, however, a wide difference between intellectual strength and intellectual activity. These "giant intellects" have been more remarkable for the latter than for the former. No truth can be better substantiated than that the strongest, soundest minds are, as a general fact, lodged in the strongest, soundest bodies.

For though we may find, both among the ancients and the moderns, a few sickly or deformed Æsops, Pascals, and Popes,

with mental powers rising somewhat above mediocrity, how much oftener do we find the contrary! Moses, David, Alexander, and Julius Cæsar were men of great bodily power. Who but Alexander could mount and manage Bucephalus? And, in later periods, Franklin had twice the strength of an ordinary London printer, and Washington, for muscular strength, hardly had an equal. Spurzheim, too, had great muscular power; nor was George Combe, in his better days, in this respect deficient. Napoleon, even, to whom intellectual power is usually awarded, was by no means deficient in muscular vigor.

I might even come to the mighty men — intellectually — of our own time. But I forbear; only adding what I do not think will be disputed, that there are not six men with feeble frames at all distinguished in history; and that I do not know of a greater number among the living.

As the general vigor of the body and the mind, in all their functions and faculties, taken as a whole, is usually in due proportion to the health and vigor of the muscles and bones, — the moving powers, — so the health and vigor of every part is always in proportion to the muscular force and activity of that part. Thus, the strength and vigor of the lungs are, in no small degree, in proportion to the vigor and power of the muscles concerned in the work of respiration, and in voice and speech. Hence the importance of that early discipline of the lungs for which I have already contended.

Hence, too, the importance of recreations and employments that have the same tendency. And hereon is founded — more, perhaps, than most people are aware — the necessity of numerous athletic sports and recreations for children and young people, and of having them, too, in the open air.

Were the indications of Nature properly studied, and her

voice duly regarded, I have not a doubt that we should find our children could easily be led to seek the very forms of amusement that their opening and expanding minds and bodies would demand.

In selecting amusements for ourselves and our children, some regard should always be had to the nature of our occupations. A boy who has been on the bench, at school or at home, six hours of the day, should neither be required nor permitted to sit on a bench the rest of the day; or, indeed, any considerable part of it. Let him have exercise which is more active than morris, dice, or Chinese puzzles; or reading a novel or a story book; or sitting on a shoe bench or a tailor's bench; or setting card teeth, or performing any other manual labor that requires the sitting position, or even the standing one — especially where there is a temptation to sit or stand long. Let him have exercise which will bring into action as many muscles as possible, especially those which have been longest inactive or quiescent. In all cases, it should be unconstrained and joyous, and never fettered or depressed. Recreation, to be profitable, should, as it were, *re-create* the subject of it.

Those who use the forty muscles of the face as they ought have countenances more strongly marked, and, as a general fact, more interesting, than those who do not. This is not mere imagination; it is sober fact — a fact, however, which is but little regarded, practically, in early education.

Some individuals have their countenances so grave and staid, — so destitute of the least expression, — that, however well formed their features naturally may be, we cannot regard them as beautiful; hardly interesting. Yet they have the same number of muscles in their faces, or at least once had, that others have whose countenances are full of expression, and

who, wherever they go, win golden opinions. I have seen those whose features were, by inheritance, rather ugly, become, by long cultivation of the tender and benevolent feelings, nearly handsome.\* Is it too much to say that our beauty is almost put in our own power? Dr. Mussey, of Cincinnati, is wont to say of Adam and Eve, that they were exceedingly beautiful.

Again: those who use the muscles of their backs and lower limbs properly, acquire thereby a degree of strength in those parts which is truly surprising. Many porters will carry from four hundred to one thousand pounds on their backs at once; and Captain Williams, of Boston, assures me he knew a Mediterranean porter who would carry more than one thousand pounds.

Many an individual has walked two hundred miles a week, or thirty-three and a third a day, not only without loss of energy in the muscles and other parts chiefly concerned, but with a considerable increase of vigor, both local and general. This is wonderful, when we consider the following estimates and statements.

In order to travel thirty-three and one third miles, each

\* As an indication of the power which education and habit possess over the muscles of the face, suffer me to relate an anecdote.

Some twenty-five years ago, at an exhibition of the deaf and dumb, in New Haven, Connecticut, Rev. Mr. Gallaudet, their teacher, proposed to relate a story with his mere face, in such a manner as to be intelligible to them. He folded his arms, and without a single gesture — with the mere motion of the face and eyes — related the story of Peter walking on the water to go to Jesus; and one or two of the pupils wrote it down. There is every reason for believing that there was no deception in the case, or exaggeration. Yet it was curious to observe — for I was present — the movements of Mr. G.'s face, and the intense interest of the pupils.

lower limb must probably be moved about forty thousand times, or both of them eighty thousand. The arms, in swinging at his side, would move as many. The aggregate is one hundred and sixty thousand. This sum, multiplied by the two hundred muscles which are brought into greater or less action at every step, would give a product equal to thirty-two millions.

Can it then be that our systems are so constituted as to be able to expend, daily, vital energy enough to perform all these thirty-two millions of muscular actions or motions, not only with no loss by "wear or tear," but with advantage? Why, no iron or steel would endure so much attrition as our joints thus do. No wonder Galen was cured of atheism by the study of anatomy!

But we have ample evidence of the importance of muscular motion in the effects which uniformly follow from its neglect. For want of due exercise we see, every where, immense suffering. Let us dwell, for a few moments, on this subject.

I have elsewhere endeavored to show you not only that the internal action of the system — digestion, breathing, circulation, innervation, secretion, and even thinking — can be carried on to better advantage when the frame is properly agitated by large and varied muscular motion, but also that it will render the bones and muscles themselves more healthy and vigorous.

It follows, almost of course, then, that, for want of this, there must be an experience of greater or less suffering. Accordingly we find the flesh of the lower limbs of those who sit too much at their employments soon become soft and flabby, the joints weak, and the whole frame and limbs comparatively feeble and inefficient.

And again : bind up an arm, and carry it in a sling from

day to day and from month to month, and you will at length find it becoming soft and flabby, if not actually feebler and smaller than the other. Does not every body know this to be the fact? Why is the right arm often larger, and almost always stronger, than the left? \* Why do children of every age, particularly very young children, grow pale, and often lean and feeble, from sitting too long at the school bench? Why, especially, does the back grow weak and become crooked, and the limbs less vigorous, active, and sprightly?

Let it not be said, as it sometimes has been, it is because they walk too far to school, or play too hard at recess or intermission, or, perchance, study too hard. Some of these causes *may* have contributed to the result; but this is not very probable. If children are to fare, at the school room, for a century to come, as they have for a century past, it were a mercy if every child was obliged to walk two miles every day to school, and play, not indeed violently, but briskly, an hour or two while there.

Muscular power is greatly increased by habit. It is a law of the human system, that if an organ—a muscle among the rest—is exerted, over and over again, to the utmost healthy extent, both as regards energy and activity, it becomes more and more easy to exert it, and the part actually gains strength by it. Who has not heard the story of Milo and the ox? Now, whether this story is, in any part of it, or in whole, fictitious, is of little consequence; it illustrates a great and important truth, and every one who will may profit by it.

\* I do not forget that there is a difference, anatomically, in the manner of distributing blood to the two arms; but this will not wholly account for the fact alluded to.

This law — the increase of power, as well as activity, in a part, by habitual use — is a great and important law of our natures. Would to God it was better understood, and more sacredly regarded. Were mankind duly enlightened on this subject, and would they practise more in accordance with their knowledge, it would prevent an ocean of suffering in the world we inhabit.

Some of the ancients not only held, like the moderns, that appropriate exercise from the cradle upwards, and even to the grave, would prevent the acquisition of disease from new sources, and keep down all the tendencies in that direction from inheritance, but that it would even cure *nearly* all diseases after they had arisen. I have in my possession an English book, printed in 1705, entitled *Medicina Gymastica*, in which the author goes very far towards advancing the idea that almost every disease can be cured by exercise. And Plato, it is said, in his day, went still further, and affirmed, gravely and seriously, that it would cure even a wounded conscience !

There is, however, no necessity of making every thing of what is, obviously, only a part. Still I do not hesitate to say that, in the present state of human knowledge, we can neither set limits to the local and general strength which exercise may be made to impart, nor to its remedial agency and power, especially when combined with cheerful and appropriate mental employment and exercise.

Hundreds of people sit, as it were, in sackcloth and ashes, or, if they go abroad, have to hold up their stomachs all the while, or some other debilitated or wretched organ, who might have their health again, in a year or two, could they but be persuaded to let medicine alone, look on the bright side of things, and take proper exercise. But, as I have already intimated,

exercise, to be useful, to its full extent, must be agreeable. To walk, or ride, or saw wood, or plough, for the mere sake of recovering health, while our hearts are not in the employment, and, above all, when we perfectly hate it, as we would a dose of rhubarb or calomel, will do comparatively little good.

I will not affirm positively that it will do *no* good; for a mass of fluid will not stagnate as soon when *forced* into action a few times, or even once, daily, as when let alone entirely. I will not say it will do no good to walk every day to a certain tree, or post, or bridge, and then walk back again, even though it were in the attitude and habiliments of woe. But it would do *more* good — I might almost say, infinitely more — if it were accompanied with cheerful conversation, favorite and choice thoughts, or some new scheme for doing or communicating good, either during the journey or at the end of it.

There must be something to keep the mind out of the old, beaten, often painful, mill-horse track, to which it has been accustomed, as well as to prevent it from preying upon itself. And blessed are those invalids who take hold of exercise with this key to unlock its principal benefits.\*

It may be inferred, and very naturally, that I prefer walking to nearly every other form of exercise. It is certainly *one* of the best, on certain conditions. It is certainly all *but* the best; and there are not wanting instances in which it will be found quite the best which can be adopted and pursued.

\* He who can "bury his business" while he amuses himself or uses exercise, will most surely be benefited. In being absent from my study table only three or four days, I have actually forgotten, on my return, at what point I left off. I seemed to have been absent for months or years.

But to render walking a means of accomplishing *all* the good of which it is susceptible, there must be conjoined with it a hungering and thirsting to do good. They who possess this heavenly appetite, and are now in tolerable health, can hardly sicken. Our Savior could hardly fail to keep his health; nor could any one else who should walk about with his spirit and desire of communicating good. Nor could many invalids, who should follow him, fail to recover their health, even without miracle.

But of all the forms of exercise, short of this, with which I am acquainted, agriculture and horticulture seem to me most useful; and to those whose education is any thing like what it should be, it is one of the most agreeable. It is to be preferred, when the mind can be made to go along with it, for many reasons. It is performed in the open air — where, if any where, the air is pure. It calls into action a great variety of muscles. This renders it less probable that any particular muscle, or set of muscles, will become overburdened or over-fatigued. The eye, too, is agreeably influenced and employed, which all experience shows to be healthful in its tendency.

“But do you still adhere to the opinion already expressed, that females, as well as males, need this species of exercise?” some will say. Most certainly I do, with this limitation or exception, that females shall not be employed in the *severer* labors of the field, but in the lighter ones. If our females were now trained, as once they were, to handle the broom and duster, to spin at the larger wheel, to perform all the labors of the kitchen, and while young to romp and play freely, the necessity to which I refer would not be so imperative. As they are, the lighter agricultural and horticultural

employments, for a few hours of each day, are more needed by them, if possible, than by our own sex.

Some, I know, may smile to think how a young woman of fashion would appear, while pruning grape vines, cultivating strawberries or gathering them, or budding or grafting trees, with tawny hands, and sunburnt cheeks; but had they the most distant conception of the advantages it would secure to her, they would smile rather at the superlative folly of those present customs which deny her their pleasures as well as their benefits.

Did professional men, students, and all our public teachers, know half the advantages which are to be derived from devoting but a few hours, daily, to these same exercises, they would not, as it seems to me, be half as often weighed down to the ground with a load of nervousness, hypochondria, dyspepsia, scrofula, and consumption. Did our factory people understand this subject better than they do, and would they, in these days of improvement and "striking" for certain supposed privileges, strike also for time and means of laboring four hours a day on some little spot which they could either buy or hire at a reasonable rate, they would not so often break down their constitutions, and become sufferers for life.

There is one thing to be remembered. Those who labor in this way should labor for pay. This would lead them to take an interest in their employments. Some may deride the idea, and say the prospect of a reward, either in money or in a part or the whole of the crop, would make little difference with them.

So thought a young man to whom the late venerable Dr. Cogswell once recommended manual labor. He worked one

whole summer, but was not much improved. My friend Dr. C. bade him try it another summer, and receive for compensation one half the produce of his labor. His health, under this new regimen, greatly improved.

Our mechanics of almost every description might derive several important hints from the foregoing remarks. Our tailors, shoemakers, millers, hatters, printers, painters, druggists, stonecutters, engravers, watch makers, glass blowers, &c., &c., might all gain large percentage of health, by better obeying the physical laws, especially the laws of exercise. I know there are difficulties, for I have myself had to encounter them. But I know they may often be overcome. "Whatever ought to be done can be done," is, with me, a maxim. Is it not founded in truth? Or is man the greatest puzzle in the whole universe?

Horseback exercise, to some persons, is exceedingly valuable. Many an incipient consumption has been shaken off on horseback. In those cases where there is much bleeding at the lungs, it may not be advisable, though some have insisted on it even here. My own experience of a quarter of a century ago is greatly in its favor.

Sailing, as a passive exercise, is one of the best. I have sent many an invalid on a sailing excursion, but especially on a fishing voyage. I have usually preferred an arrangement which gave them full employment. Dr. Rush used to require his patients to go at once before the mast, if their strength would possibly permit.

But I forget that I am teaching prevention, and not cure; though, by the way, it often happens that both can be accomplished at the same time. There are many more forms of exercise, but I have, directly or indirectly, spoken of several of them already.

I do not like the pleasures of the chase, as they are called, on account of their immoral tendency. The more I reflect on them, the more my whole soul revolts against them. The same remark and sentiments are applicable to angling, and other forms of amusement in which the lives of poor animals are at stake, and must be sacrificed. There is room enough in the world for exercise without coupling with it either cruelty or murder.

The best hour for physical exercise is the morning, or rather, as I should say, the early part of the day. Some constitutions will not endure walking, &c., before breakfast. About two hours after breakfast, to such persons, is a very favorable season. Next to this is the afternoon hour, say at two hours before sunset.

I do not forget that we are met here with a difficulty, which to some may seem almost insurmountable. "Why, the morning," they will say, "is the best for study, too, and for devotion and labor; the labor, in particular, must not be omitted. But how is this? We cannot do every thing at once." Certainly not; but every one must judge for himself which of these various morning duties shall give way. That they seem thus to interfere a little is not my fault, if, indeed, it were a fault at all. I only point to an arrangement which I did not make. All we have to do in such cases is, to conform as nearly to the law as we can.

But every thing, or almost every thing, has its opposite. If we have muscular exercise, we must have rest. This is especially true of all muscles which are under the power or control of the will — what we call voluntary muscles. We will come then at once to that subject.

## II. REST AND SLEEP.

In the former part of this lecture, I have spoken of action and exercise, and have attempted to show that action, or exercise, is the first law of the Creator. I have shown that in this world, and, so far as we have any information, in all others, it is incessant, or almost incessant. I have shown that whether we study matter or spirit, — the mineral, vegetable, or animal kingdom, — it is difficult to find any thing in a state of absolute quiescence; that is to say, for any considerable length of time. There are, indeed, suspensions or intermissions of action, but they are not permanent. Crystallization has its apparent interruptions; and so has vegetation.

Yet even here, at least in the vegetable kingdom, we do not know that the cessation of action is entire. The circulation in our shrubs and trees is, indeed, impeded by the cold and frost; but is it ever wholly stopped, even in our own frozen climate? For if it were so, would not life be extinguished? Do not vegetables sleep during the winter, rather than expire?

In passing from vegetables to man, we find some of the lower, cold-blooded animals, in whom life seems to be almost as much extinct, during the winter, as in vegetables. I refer, here, to the snake, toad, frog, tortoise, &c. Nay, there is a sleep more entire than even the ordinary hybernation of these animals. The toad has been repeatedly found imbedded in the heart of huge trees, and even of solid rocks, far below the surface of the earth, where he must have lain for centuries. Yet, though utterly motionless, so far as the naked eye could discern, he has usually regained life and motion, on being gradually exposed to the action and warmth of atmospheric air.

It is difficult, however, to believe that action, in these

instances, entirely ceases. It is still sleep, though it seems like the sleep of death. We have even hibernating animals among those of warmer blood, as the woodchuck, the hedgehog, the marmot, the bat, and perhaps a few others; but they are not very numerous.

Let us consider rest and sleep in man. For some of the internal organs not subject to the immediate control of the will, the Creator has made special provision. Thus the heart, after a contraction, may be said to rest about as long a time as was taken up by the contraction. So the whole arterial system, receiving a shock, as it does at each beat of the heart, rests during each intermission.

Again: the lungs may be said to have their season of rest. The dilatation and contraction of the chest occupies, in an adult, about two seconds, after which there is a rest of one or two seconds before the next motion begins. I might cite other examples.

But though the internal or nutritive organs all require their seasons of rest, and this rest is thus provided for, there are no organs which are very sensibly and strikingly affected by sleep, except the brain and nerves, the locomotive system,—the bones, muscles, &c.,—and the organs of sensation—of sight, hearing, taste, smell, and touch. These constitute what are called the *animal functions*.

I have said already that, in the most perfect sleep, the animal functions are completely suspended. So, for the most part, the senses. Though our eyes should be open, we see not, except in the rare case of somnambulism; though our ears are open, we hear not; and though our organs of taste, smell, and hearing remain the same, their action for the time appears to be wholly suspended.

Were we to attempt to dispense with sleep too long, we

should experience considerable lassitude and fatigue. As the fatigue continues to increase, the muscles lose the power to contract, — to pry us about from place to place, as usual, — the brain and nervous system begin to lose their power of perceiving, or communicating impressions, — in common language, grow dull, — the senses, sight and hearing especially, grow more and more obtuse, and we at length become exceedingly torpid. Or, if we are prevented from sleep by excitements, such as intense anxiety, or care, or stimulating drugs, the body becomes pale and somewhat emaciated, a feverish state is induced, digestion is impaired, thought is disturbed, and in some persons there is a tendency to a species of insanity. In truth, there is not a function of the system that does not soon suffer, more or less, if the watchfulness is long continued, while the nervous prostration is extreme. Much, indeed, depends on constitution and habit, but the strongest are at length compelled to succumb.

But the evils resulting from too great indulgence in sleep, as Dr. Dunglison very justly remarks, are not less signal than those arising from its privation. “The whole nervous system becomes blunted, so that the muscular energy is enfeebled, and the sensations and moral and intellectual manifestations are obtunded.” More than this, “All the bad effects of inaction become developed; the functions are exerted with less energy; digestion is torpid; the excretions are diminished, while the secretion of fat, accumulates (in some instances) to an inordinate extent.” But I must break my quotation from Dr. Dunglison, to make a remark or two about fatness.

Dr. Dunglison here speaks of the rapid or extraordinary accumulation of fat, as one of the *bad* effects of inaction. I am glad to find this concession. Contrary to what is supposed by many, an inordinate accumulation of fat, in man or

any other animal, is disease or the consequence of disease ; as much so as inordinate leanness. The books include it under the name of *plethora*.

Thus we hear of beautifully fat babies, just as if fatness here, if nowhere else, was desirable. Whereas, beyond a certain degree of plumpness, fat, even here, is indicative of disease. Extreme fatness, in the infant, is often followed, sooner or later, by the other extreme of leanness. It is, moreover, a common saying that fat babies are particularly subject to croup ; which could not be so, if fatness was a sign of health.

But to return to the effects of too much inaction and sleep. "The memory is repaired, the powers of the imagination are dormant, and the mind falls into a kind of hebetude, chiefly because the functions of the intellect are not sufficiently exerted when sleep is too prolonged, or too often repeated."

Magendie indeed asserts that protracted indulgence in sleep sometimes occasions serious diseases, as idiocy and lunacy. Willich says that by too long sleep the solids become relaxed ; the blood becomes thickened and impeded in its circulation, and remains particularly long in the head ; \* perspiration is disordered ; the fluids are all thickened ; the body increases in fat and thick humors ; the memory is enfeebled ; and we are apt to be afflicted with costiveness and obstructions.

In short, there is hardly a single disease in the whole catalogue of human ills which may not fall to the lot, either of too much watchfulness, on the one hand, or too much indulgence in sleep, on the other. So important to human happi-

\* Inducing a sensation in the head, when we first wake, after too much sleep, and are about to rise, which most of us have felt, but which it would be difficult to describe.

ness is the proper adjustment of this temporary suspension of the animal functions.

Here the question naturally arises, "If a due amount of sleep is thus important to human happiness, what is that just amount? What is the medium quantity of this 'tired Nature's sweet restorer' — this winder-up of the human machine — which is necessary?" But to answer this question in few words is no easy task. One will tell you four hours in twenty-four are enough; another thinks five necessary. Another says six are indispensable for adults, and eight for children. Another very sensible writer will tell you that no person ought to be considered as wasting his time, who does not sleep more than eight hours.

Now, the truth is about this: As it is with regard to food, and almost every thing else, so with sleep — that man is, to a very great extent, the creature of habit. He can accustom himself, from the very first, to an extremely small quantity of food, or to as much as a Siberian receives. So, I say again, in regard to sleep, he may accustom himself to sleep much or little.

He may habituate himself to eat one pound of food a day, or twelve; and may seem for the time — observe, I only say *for the time* — to be about as well nourished or sustained in the one case as in the other. He may accustom himself to four or five hours of sleep in a day, or he may bring himself to consume, and apparently to enjoy, eight, or nine, or ten.

This custom, of which I speak, is second nature, and second nature is admitted to be stronger than first nature. Hence — that is, from custom or habit — arise many of those differences of physical character which are so generally attributed to our first nature, and which, when they involve us in misery, men are practically apt to charge back on the great Creator.

This tendency of custom or habit — however abused at present — is susceptible of being turned, as may easily be seen, to a good account as well as a bad one. For it is not less strong in intellectual and moral matters than in physical. The proper course is to bring it to bear, with all its force, in the formation of good habits.

Addison, I say again, has told us that, in manners and common every-day morals, it is well to fix on a course that we know will be best, and custom will soon make it agreeable. And just so it is in physical matters. We are here the creatures of habit, as much as elsewhere.

Take the custom or habit of chewing tobacco, for example. Now, I know of but three animals on earth that will eat this vile plant; viz., a species of goat, the tobacco worm, and man. All other animals, so far as I know, regard it with the utmost abhorrence, as they would the rankest poison. And so does man, at first. Led on, however, step by step, in the usual fashionable course, he comes at length to be so fond of it that he will forego his regular meal of food for it. Is not second nature here stronger than first nature?

But let us recur to sleep. All healthy children, who have been correctly trained, like to rise early. But teach a child to lie late, or even be in bed late, and let him come to the age of forty in the habit of sleeping from ten o'clock in the evening to eight the next morning, and will he not cling very closely to his pillow? Will he not prefer it to his breakfast? It matters little whether you bring him to this point in one way or another — whether by scolding him largely, or dragging him out of bed, or in some other way. It will amount to the same thing. He will cling to his pillow. He will tell you he believes his constitution requires a great deal of sleep. Is not *second* nature, here, stronger than *first* nature?

Children may be trained — and so may adults, only with more difficulty — to consume almost any desired amount of time in bed ; in sleep, too. That children require more sleep than adults, it is hardly necessary that I should stop here to say ; but that they are often indulged in much more than they actually need, is equally undoubted. Our wisdom in training them in the way they should go — and ourselves, too — will be best shown in forming habits of sleeping enough ; for nothing is more indispensable than a sufficiency of sleep, at the same time, that we avoid sleeping too much. It consists, as elsewhere, in hitting the golden mean.

But here the original question recurs, “ How much *is* enough ? ” The same answer, however, recurs with it, so far at least as I am concerned, viz., that I do not know. If an aged individual could be found among us, who had always, from birth, enjoyed perfect health, it is most likely that individual’s habits would be perfectly correct habits ; and his habits in regard to sleep would be so, among the rest.

One healthy individual might be taken as a standard, by which or from which to measure out the real natural wants of others — allowance of course being made for difference of age, sex, temperament, &c. But there is no such perfect individual to be found among us. And not only is there no person whose habits, as a whole, are correct, — perfectly so, — but there is no individual of whom we can say with certainty, that any one of his habits is as correct as it could be made. There is not, probably, one person of the race of Adam, whose digestion, nutrition, respiration, perspiration, exercise, or sleep, is so perfect that it could not be more or less improved ; and consequently we possess, as I have already asserted, no perfect standard.

Besides this, the measure of sleep required — I mean the

number of hours — will depend very much upon its quality whereas, in this respect, there is almost as much variety as there is of individuals. No two persons, in strict physiological truth, will sleep the same amount or quantity in the same time, unless — what could rarely happen — their previous habits and condition as to exhaustion, fatigue, general health, age, and sex were the same. In other and fewer words : One person will really sleep as much — that is, his constitution will be really as much restored or renovated by five hours of slumber, perhaps even by four — as another will by six.

The truth is, that there is not so great an inequality in the amount of actual sleep procured by individuals of the same age and general habits as is sometimes supposed. Nature is not so easily cheated out of her rights, after all. If a person sleeps but little, — that is, but a few hours, — she contrives to wind up the system faster in proportion, or at least somewhat so. If, on the contrary, an individual lies in bed a great deal, — that is, many more hours than are really necessary, — his sleep is less sound and restorative, and, in all probability, very much disturbed by dreams. But I have a fact or two to corroborate what might otherwise be regarded as mere theory.

Sir Gilbert Blane, in his *Medical Logic*, speaks of certain missionaries, who, in order to save time, contrived to sleep but little, in the following manner : They went to sleep with a small weight in their hands, over a basin. On falling to sleep, the weight would drop from their hands on the basin, and wake them. This, repeated a few times, seemed to restore them, and thus saved a vast amount of time for translating, &c. Sir Gilbert accounted for the fact by supposing that the restoration of the system is vastly more rapid when we first fall asleep than afterwards. This will partly account for it

but, as I think, not wholly. The principle above should also be involved ; and it may also be conjectured that they had a greater number of short naps than Sir Gilbert supposes.

Notwithstanding all the difficulties in the way of determining how many hours of sleep the system ought to be accustomed to, — that is, how many are really necessary, — we may make an approximation to the truth ; and this in various ways. One of the safest is the following : —

By comparing results in men of different habits, — especially the healthiest men, — and at the same time studying the physiological nature, general character, and condition of the race, we shall probably be led to the conclusion, that about six hours of actual sleep, when we become fairly accustomed to it, is the least *best* quantity for adults, as a general rule ; and that more than eight is too much.

In order, however, to get six hours of sleep, it is necessary to remain in bed something more than six hours ; for it usually happens that he who, under the idea of sleeping just six hours, lies down at nine and rises at three, will rarely get more than five hours and a half of really sound sleep, and sometimes not more than five. He will not always fall asleep as soon as he lies down, and there will also sometimes be small inroads upon his time in the morning. A certain student undertook once, in order to get five hours' sleep, to lie in bed only just five hours. The result was, that he had only about four hours of sleep, upon the average. I repeat, therefore, he who would sleep fully six hours, must lie in bed something more than this. He must either go to bed at eight and a half and rise at three, or retire at nine and rise at three and a half. This indulgence is the more necessary, as it is morally if not physically, important to be exactly true to our hours, whatever they may be ; never continuing in bed a minute, or even a

quarter of a minute, after our appointed hour for rising has arrived.

It will here, perhaps, be asked, "If the human system is so accommodating that the same amount of sleep — or of that restoration which sleep affords — can be obtained in four hours, as in six, why should we not form our habits to that number of hours as soon as possible? Why waste two additional hours of valuable time?" The proper reply to this question is, that when we compel nature to make up by unnatural or over effort what is wanted in time, — that is, when we crowd into four hours what ought to be the sleep of six, — we cause a waste of vital power or energy.

It is as if we should compel the digestive system to a habit of working up our food into chyme and chyle sooner than otherwise it would — a result which condiments and sauces, and perhaps a little wine, would accomplish. But what we gain by the over-stimulus, in both cases, is more than lost by the disturbance or debility which follows; or, at any rate, by the loss of vital energy which is almost or quite inevitable. Or if this should not be admitted, it is at least true, that we sleep *too soundly* when we crowd the appropriate rest of six hours into four, and we are never so well refreshed and restored by sleep which is either too profound or not profound enough, as by that which is exactly right.

The notion that, because the system is accommodating, all her efforts at accommodation are safe, is a most erroneous one; and is fraught with almost infinite mischief to the human constitution. All these accommodations are made at a sacrifice of vital power; and though they afford present relief or aid, they do it at our future expense.

It is on this principle that we explain the paradox of the medical man, in the country, who, though so frequently dis-

turbed in regard to his rest, seems at length to get accustomed to it, and often lasts on to considerable age. Yet he will, after all, break down several years sooner, — that is, he will abridge his life several years, — by his unnatural course. Were it not for this almost necessary hygienic error, most of the other habits of physicians in this country are such as are calculated greatly to promote their health, and increase their longevity; whereas we find few of them attain to a greater age than sixty-three or sixty-five.

It is generally thought that those whose bodily fatigue is very great, require sleep in proportion; and great mental fatigue, as well as the depressing passions, — grief, fear, and the like, — when they operate strongly upon us, seem to make the same demand; and it is an undoubted fact that under all these circumstances our sleep *will* often be more than usually profound. But whether we really *need* more of healthy sleep in these circumstances, is quite another question.

I believe it would be useful to recline, after unusual bodily fatigue, even if we do not sleep. An easy, recumbent position appears to rest the body greatly, even if it is of no service to the mind. Probably six hours of sleep, and two hours in a recumbent posture without sleep, after great fatigue, are worth as much as seven hours of sound sleep, and far more than eight.

It is a very common opinion that, if we are kept awake — say by the sickness of friends — the whole of a night, we ought to sleep enough the following night to make it up. Now, after fasting a whole day, who would think of eating enough the next day to make up the loss? If any indulgence should be allowed in either case, it should be but little.

Indeed, I do not think there should be any indulgence at all. I suppose that in both cases it would be better for the

system, in the end, that we should eat and sleep no more after the privation than if nothing at all had happened ; and if the privation has been great and lasting, not quite so much. There would be an advantage in lying down longer, but not, as it seems to me, in sleeping longer.

There is a curious fact, — at least I believe it to be a fact, — which deserves to be mentioned in this place, viz., that the less alive a person is, that is, the more sluggish and inactive he is in body and mind, the more sleep he appears to require.

Thus the most dull and stupid animals, as every one who will observe for himself may see, sleep the most, and their sluggish natures appear to require it. So among individuals of our own species. Those who are most indolent and most vacant minded seem to require most sleep. They seem not only to avail themselves of it, but to require it. Whereas, on the contrary, they who are most active in body and mind, provided both are active in about the same degree, appear to require less sleep than others.

Now, if what appears to be a fact is *really* such, we see why such men as Napoleon and Brougham do not break down sooner than they are accustomed. We also see one glorious advantage to be derived from improvement in knowledge and virtue.

Many good men have regretted that necessity of our natures, which requires us to spend so much of a life already too short in such a low and semi-bestial condition. But if it be true that in proportion as we improve body and mind, and truly refine and elevate our race, so as to render them worthy of receiving the boon, we can safely encroach upon the hours which, in a more degraded condition, have been allotted to necessary rest and sleep, and thus really prolong our lives, we ought certainly to take courage. The time may

come, for aught we now know, — that is, if the principle in question is correct, — when very little time will be needed for rest and sleep. At any rate, it is impossible, in the present state of our knowledge, to set limits, in this respect, to our progress and advancement.

There is one more general fact with regard to sleep. It is said by authors that not only are those species of animals that sleep much, apt to be colder than other animals, but this is even true of individuals of the same species. Those adults and children, it is said, who sleep most, find most difficulty in enduring the cold. The idea is certainly a very natural one, since we understand full well the tendency that too much soaking in beds has to relax the solids; but I am not able to attest its truth from actual observation. I know, indeed, that late risers are apt to be but ill able to endure the cold; but late risers do not always sleep most. Some go to bed so late, that though they lie late the next morning, they do not get their full allowance of sleep, especially of a natural and healthy kind.

But I must enter with a little more of particularity upon the conditions of sound and healthy sleep. They are numerous, but I shall only select four or five of the more important.

1. Our sleep should be as much as possible in the night. Some may suppose, at first thought, that it makes little difference how and where sleep is obtained, if it is only actually obtained. But those who have followed the spirit of my remarks thus far will see that, according to the views I have presented, there is such a difference in the quality of sleep as renders this supposition wholly untrue.

I presume the experience of every one who has slept much in the daytime will bear me out in the assertion, that a given number of hours devoted to sleep during the day are far less refreshing and restorative than the same number in the night.

But to those who think otherwise, the following anecdote may be interesting : —

Two distinguished European generals were discussing this very subject. Unable to agree, they resolved on an experiment. They were about to perform a march of several hundred leagues ; it was agreed that the one should march his army in the night, and sleep in the daytime, and the other should march in the daytime, as usual, and sleep by night. The result was, that the soldiers in the first division reached their journey's end enfeebled and sickly ; while those who slept in the night, according to their usual custom, were in good condition ; and this, too, although their rations, and all other circumstances, were as nearly as possible the same.

This experiment is not conclusive, for obvious reasons ; but it proves something. There were, doubtless, other differences, not easily distinguishable ; still I have seen so many smaller cases of a similar general character, having the same bearing and termination, that I feel assured of the truth of the conclusion which has been made.

Now, if night is the best time for sleep, he who sleeps at all in the daytime, when night will as well answer his purpose, is so far wrong. What, then, shall we say of him who sleeps away an hour or two in the morning after it is broad daylight, when he might just as well go to bed an hour or two earlier at evening, and thus prevent any such necessity ?

It is an old maxim, that an hour's sleep before midnight is worth two afterwards ; but I have already had occasion to say, I believe more than once, that old maxims are not always founded in truth. Such, I imagine, is the case with that now in question. I suppose it is one of those white, or good-natured lies, told to do good, of which there have been usually quite enough in the world. It was probably told to the

ignorant, or the infantile, to drive them to bed early, for convenience' sake, rather than for the sake of their health.

For my own part, I see no reason why an hour's sleep, if it be true sleep, should not be worth as much an hour or two after midnight as just before it. If the time be removed to six or eight hours from midnight, or so far as to carry it into daylight, in either direction, it is easy to see that the sleep would not be so good, for reasons which have already been given.

It is always unwise to bring doubtful arguments in support of our views, when we have an abundance of those which are *not* doubtful. The true reasons for going to bed early are, that we may be ready to get up early, and because we ought to place our midnight, as nearly as possible, where God in nature has placed it. In other and better words : As God has placed midnight in the *middle* of the night, it is but reasonable to suppose that we ought to be in the midst of our slumbers at that time ; and that he who gets much more than half his sleep either before or after that hour is physiologically and practically in error.

Not that the slight variation of half an hour or a quarter of an hour from that practice which should grow out of this rule would produce large or immediate mischief. Still it would be wrong as far as it went, and the course of conduct which is exactly right would be better.

If we need seven hours' sleep, it is probably better that we should go to bed at half past eight, and rise at half past three, than that we should go to bed at nine, and get up at four ; although I cannot say that the difference is very considerable. If, however, a difference is made either way, — if we must sleep more than half our allotted number of hours either

before or after midnight, — it is better that it should be *before* than *after*, for the following reason : —

The human system is not only debilitated, and more or less irritable, as soon as the darkness of the evening comes on, but it is actually feverish. The pulse is quicker and more frequent, and there is apt to be more heat and thirst, which are indications of fever. Now, there is nothing which will so soon and so happily remove this miniature fever as sleep.

But people take so much comfort, I shall be told, in sitting round a blazing fire and enjoying the evening, especially the long winter's evening, that they will be loath to receive such a doctrine as this. All this may be so ; but it does not alter facts. The question is not so much whether the doctrine will be acceptable, as whether it is true.

Permit me, however, to ask whether the evening is any longer than the morning, and whether our social joys would be less in sitting round a blazing fire four hours before the morning light, in winter, than four hours of the evening ? Would they not be heightened in the morning, inasmuch as sleep may be supposed to have restored our bodies and minds to their wonted activity and vigor ?

“ But the eyes are injured by the morning light,” I shall be told ; and the sentiment will be sustained, perhaps, by the sage remark of some individual who claims the character of a physician. I grant there may be an evil here. I admit, most cheerfully, — for it is true, — that if we get up and expose our eyes suddenly to the full glare of the lamp or candle, and the firelight and heat too, it may not be well for us.

But if we come to the light gradually, there will be less injury to the eyes in the morning than in the evening ; because, like the rest of the system, they are strongest in the morning, and best able to resist injurious impressions ; and

as to the glare of a firelight, however pleasant it may be to many on account of early associations, or for other reasons, it ought never to be allowed. If a fireplace or open stove is used, a screen should be interposed whenever we sit long around it, or we should turn our backs to it.

Inquiry is often made about the healthfulness of taking a nap after dinner. There are a few diseased persons who may require this, — perhaps also a smaller number who are comparatively healthy. As a general rule, however, it is to be avoided. There are many objections to it. One of the strongest of these is, that our sleep, the following night, will be less natural. He who is up by three or four o'clock, and sufficiently active all day, in body and mind, will be likely, on going to bed at eight or nine o'clock, to be sleepy. He knows not the pleasure of going to bed early, and enjoying the most quiet and happy rest, who does not rise early and keep awake all day.

On the contrary, he will never be likely to form the habit of getting up early, who does not retire early. Thousands who tell us they cannot wake in the morning, or, if they wake, cannot get up, would cease this song, very soon, if they would only go to bed in good season. It cannot be expected that they should rise at four who sit up till midnight. And I have not a doubt that one hour between eleven and twelve, in these cases, is worth two after sunrise next morning.

2. One important condition of sound and good sleep is a healthful supper — or third meal. Many persons take no third meal at all. But of these I have told you before.

If supper, or a third meal, is taken at all, it should be very light and dry, and at the distance of three hours, if possible, from the hour of retiring to rest. Thousands and tens of thousands suffer for want of heeding advice like this. "Suppers,"

says an old maxim, "kill more than the greatest doctor ever cured." But it is late suppers and bad suppers that do the mischief.

Even Dr. Dunglison, who in many things pertaining to diet is quite a latitudinarian, goes so far as to say, "A hearty supper, especially if it have consisted of materials difficult of digestion, may occasion a disturbed rest, frightful dreams, and — in those who are predisposed to it — somnambulism." And as if to make the sentiment strike deeper still, he adds, that sleep is more frequently broken by internal irritants — that is, by something in the stomach which should not be there — than by those which are external.

Nay, he even goes much further still, and illustrates his position by accounting for all sorts of frightful dreams on this very principle. Willich, too, in his excellent work on Diet, very justly observes that sleep may be impeded by hot, spicy, and other stimulating drinks.

It would be difficult to say which class of persons injure themselves most, in respect to healthy, quiet sleep — the fashionable in our towns and cities, by their late, hot, stimulating suppers, or the farming community, by their heavy and indigestible ones, at the end, often, of a very hard day's work.

How common is it for laboring men, when they are exceedingly exhausted by the combined powers of heat, long-continued toil, drenching perspiration, and excessive eating and drinking, to sit down to an exceedingly heavy supper of flesh meat and vegetables, covered with mustard, vinegar, and salt, and perhaps blackened with pepper into the bargain !

Nor is this all ; for I was brought up among them, and only testify of what I have seen. Some of them eke out their supper with at least a quart of bread and milk, or hasty

pudding and milk, with cheese, and perhaps pie, besides. And if a quantity of green cucumbers and vinegar should be added, it would not be stranger than things that have happened. Some there are, who, not trusting to the mustard and other powerful condiments to sharpen — madden, rather — the appetite, preface the whole with a dram; and I have heard men, who passed for oracles in the neighborhood where they resided, gravely, and indeed eloquently, defend its necessity. This, however, was thirty years ago.

Can we wonder that, despite of their numerous healthy habits tending to counteract it, this late gormandizing should cause a foul mouth or dull headache, and a general feeling of exhaustion on attempting to rise the next morning; and that a dram to cut away the cobwebs was once deemed as necessary as a cup of tea or coffee now is? Can we wonder, moreover, that such persons have distempered and distressing dreams\* — that a rock detached from a precipice is about to roll on them, or that a monster has them almost in his very jaws, while they have no power to escape? Can

\* The great physiologist Haller considered all dreaming as symptomatic of disease; in which view he is supported by Willich and many others. There is, it must be acknowledged, a wide difference of opinion on this subject. Those who maintain that the soul always thinks will, of course, be likely to deny such a doctrine; while those who hold that the soul, like the body, needs a species of repose, at least while *with* the body, maintain, almost, of course, that we never dream while we have perfectly sound, healthy sleep. I am compelled to incline to the latter opinion; but the full discussion of the subject would carry us far off into the world of metaphysics. One thing, however, seems to me certain — that, if we have dreams, we forget them in exact proportion to our “temperance in all things;” — in other words, just in proportion as we comply in all respects with the moral, social, and physical laws of God, and with the conditions or laws of sleep in particular.

any body wonder that nightmare should afflict such persons with all its horrors ?

With those who place any value on time, there is another circumstance in favor of light suppers, which can hardly fail to have weight, but which has not often been urged. It is the fact that light and plain food, both at suppers and at all other times, require less sleep than that which is more heavy and indigestible.

How much I wish this fact were better understood, by mankind at large, than we have reason to think it is ! Although it furnishes an argument which, as I have already said, is seldom, if ever, urged in favor of plain and simple eating and drinking, it is one of immense weight.

There is much of trouble short of nightmare. How many millions wake in the morning with a sort of half consciousness that they must get up, and yet feeling as if they had scarcely slept at all, and must sleep longer ! How many raise their heads, to begin ; but, O, the bad feelings that crowd upon them, and they lie down ! They try again and again ; and it is only after many trials that they succeed. Such persons should know the cause.

3. But if plain and cool food and cool blood are so exceedingly important to sound sleep, general tranquillity of body and mind is scarcely less so. The circulation of the blood should be calm and tranquil ; the brain and nerves should be tranquil ; and all the faculties and functions of the system should be at ease. On this account, it is highly desirable, not only that all excitants should be avoided at supper, but also during the whole evening.

Let us suppose the supper, or third meal, to have been taken at six o'clock, and that the family do not retire till nine o'clock. Now, how is it desirable that the intervening three

hours should be spent, in order that "tired nature's sweet restorer, balmy sleep" may perform its full and perfect mission?

It is much easier to answer this question negatively than affirmatively. It is much easier, at any time, to tell what we should *not* do, than to say what it is desirable we should *do*. The world is full of Thou shalt nots. In the present case, however, perhaps a few negatives are nearly all that can reasonably be expected.

First. We should not sit, during the evening, around a very hot fire; or, indeed, in a very hot room, even though there should be no fireplace in it. Secondly. There should be no eating of nuts, condiments, fruits, oysters; or drinking of cider, wine, beer, tea, or coffee. Thirdly. There should be no exciting company, nor any very exciting books or papers.

Willich says that to read interesting letters received late in the evening, usually occasions an unquiet sleep. He also adds, — what is almost equally pertinent — that the mind ought to be serene and cheerful previous to going to rest; we should, therefore, as much as possible, avoid gloomy thoughts which require reflection and exertion. It is, also, a pernicious and dangerous practice to read ourselves asleep in bed.

This advice is of the highest importance. As to the practice of reading ourselves to sleep in bed, it is, as it is commonly managed, so dangerous that I had not thought it necessary to speak of its unquiet tendencies, or even to mention it at all. He who knows how many precious lives have been lost in this way will be cautious about indulging in it.

All meetings, except the occasional enlargement of the family circle for social cheer, seem to me undesirable at

these hours, especially all crowded meetings. It were far better that meetings of the latter description should be attended in the afternoon. If they are not of sufficient consequence to induce an attendance in the afternoon, the question may fairly be raised whether we ought not to omit them altogether. There is, however, one other resort. Meetings for scientific and religious purposes have been held in the morning, and, if necessary, could be again.

A thousand frivolous objections would immediately spring up, I know, in most minds, to such a suggestion. But they might almost all be resolved into one word — *inconvenience*. The strongest, that we have not the time, may be met by saying that an hour is no longer in the morning than in the evening. That it is *worth* more I grant; but is not this a strong reason which benevolence might urge, why we should give it to social or religious purposes — to our fellow-men or to the Lord? Shall we continue to give to God and others that which is almost good for nothing to ourselves?

Some of the most spirited and permanent meetings for prayer I have ever known were held in the morning. One in Taunton, Massachusetts, was kept up without intermission many years. Scientific lectures have also been delivered successfully in the morning; as at Portland, Maine, and other places.

Thus far I have spoken as if I were almost or quite unable to answer, in an affirmative manner, how the evening hours ought to be spent. There is one species of social meeting, however, which, it must be obvious on the barest inspection, might serve as a preparation for quiet and healthful sleep. I refer to family religious exercises. These should be commenced soon after the evening meal; that is, by about seven o'clock. This secures the attendance of the children, who will

gradually disappear soon afterwards. The hour from seven to eight might be spent in a review of the day — something after the Pythagorean manner.

From eight to nine, or till the time of retiring, might be a season of the most entire relaxation. Light reading, light conversation, — I do not mean trifling or sinful, — light exercise, the warm bath and friction, for such members of the family as use it, might all have a place.

The occasional use of the pediluvion, or warm foot bath, on going to bed, by equalizing the circulation, or at least quickening capillary action, seems to have a most happy effect on the nervous system, and, if properly managed, to secure a healthful and undisturbed night of rest. If the general warm bath is taken, it should be at this hour.

Franklin long ago said to those who were desirous of procuring pleasant dreams, — which is *next* to sound sleep, — that a good conscience was indispensable. Now, I go a little farther than Franklin, and endeavor to secure a sleep that shall have no dreams at all.

A cool room, but especially a pure room, is another of the indispensables to sound and healthy sleep. A spacious room is indeed desirable ; but if we cannot have quite so much of space, we must make up for the want of it by due regard to ventilation.

I do not like very *warm* rooms for sleeping rooms ; but there is less objection to a temperature not exceeding fifty or fifty-five degrees, than there is to impurity. He that would be perfect, in this matter, should have a large, dry room, — one which is unoccupied during the day, — with free access to light when he chooses to admit it, and with the means and implements of excluding it.

The ceiling should be high ; there should be a chimney

flue ; and the bed should stand out a little from the wall. A distant door or window should be left open during the hours of repose, taking care to prevent the possibility of the fresh night air falling in a current directly on the bed. There should be but one bed in the room, and that should have but one occupant.

Still there is always a *second* best, when circumstances do not permit any thing more. A smaller room may answer very well the purposes of health, when every thing else is favorable. Two beds in a very *large* room, or two occupants of a very *broad* bed, may also be allowed, when circumstances render it indispensable.

I have, incidentally, discussed all these topics in a former lecture ; but it seems needful to review. I will, however, be short.

The bed should be plain, and, if the spiral wire bed cannot be had, may be made of corn husks, well hatchelled ; of dried straw or hay ; of palmetto, Manilla grass, moss, wood shavings, &c. Mattresses of horsehair and other similar substances answer a very good purpose. Some use cotton ; but I do not like it. It may, indeed, be true that cotton is better than feathers ; but it is by no means cleanly or easily ventilated. As to feathers, they seem wholly inadmissible, not because they are soft, but for other reasons. Mere softness, as I have shown elsewhere, would be a recommendation.

It is on this account, more than any other, that I prefer the elastic wire bed, so lately come into fashion. It was alluded to at page 220. It secures all the advantages of feathers, without retaining any of their disadvantages. It will, most undoubtedly, ere long, come into very general use.

Willich attaches great importance to the right preparation and condition of beds and bed clothing. He recommends, as

I do, that a bed should be soft, but made of cool and light materials, and that it should be protected by porous covering. He says that, if the bed is what it should be, the occupant will not be apt to sleep in it too long, but "will generally awake in six hours, feel himself refreshed, rise with cheerfulness, and be fit to undertake his usual tasks, either of body or mind."

All this may be true to the letter; but I confess I have not quite so much faith in the efficacy of a single choice arrangement in human circumstances to restore human nature to its original integrity.

Some people allow themselves to sleep with their heads covered by the bed clothing. This is a bad practice for several reasons. 1. The head is kept too warm. 2. We are not so apt to awake promptly. 3. A still stronger objection is found in the fact that we are thus liable to breathe, over and over again, the poisonous gas which is formed on the surface of our bodies. To nightcaps I am also strongly opposed, unless in the case of the aged and those who are destitute of hair. If they are used by other persons, however, as by females, they should be as thin and light as possible.

Lamps or candles, left burning in a room, after the English fashion, render the air impure, to say nothing of any other danger or accident to which they expose us. So does the respiration of domestic animals, as cats and dogs. And the same might be said of plants left in the room during night.

I have known a few parents, who, ignorant of its unhealthy tendency, allowed the favorite cat or dog to sleep, not only *on*, but sometimes *in* the beds of their children. A few have supposed the breath of the dog quite sanitary. No mere mistake could be more reprehensible.

Darkness favors sleep; it has therefore been recommended,

by many writers on health, to render a sleeping room as dark as possible. In many circumstances, this does not seem desirable. On the contrary, I have supposed that the ordinary darkness of the night, whatever that might be, was sufficient.

Much importance has been attached to the position of the head, while we sleep; and indeed of the whole body. Perhaps, as a general rule, the head ought to be a little elevated. Something depends upon shape. Persons with projecting shoulders need higher pillows than others, at least if they sleep on their sides.

Perhaps, too, as a general rule, it is well to sleep either on the right side or on the back. I would be able to sleep in any position; but there are physiological reasons for not often sleeping on the left side. He who gets the sleep is the favorite of high Heaven, whether he sleep in one position or another.

Many have trained themselves to the habit of sleeping on their backs, in order to straighten their round shoulders. In one instance, I have known this to succeed. Others do it to strengthen, as they say, a chest already feeble by inheritance. Some, however, are unable to do it, if they would.

I know a young student near Boston, who belongs to a round-shouldered family, and who found himself, at the age of sixteen, becoming round shouldered, like the rest of his friends. To prevent such a result, he betook himself to the habit of sleeping on his back, with a pillow under it. Not one young man in ten is as straight as he now is.

A man in Lancaster, Massachusetts, assures me that he was once consumptively inclined, and among other measures which he pursued, he slept, for eight years, on his back, on a plank. In summer he used the plank with little or no covering; but in cold weather, he interposed a comfortable or thick coverlet between.

But whether we sleep in one way or another, or on one side or another, or on our backs, a little contrivance, on retiring to rest, will save us many uncomfortable feelings, if not many sleepless hours. The following is an example of the contrivance to which I refer: —

As I seldom rest all night in the position which I take when I first lie down, I have devised the following plan for securing sound sleep. Thus, supposing it to be my intention to sleep on my right side, I first lie down on my left side, or on my back. After lying in this position as long as I dare lest I should fall asleep in it, I turn myself upon my right side, and sleep quietly for several hours — sometimes almost the whole night. Whereas if I lie down on my right side, and go to sleep in that position, I am apt to be restless, and change sides sooner than if I first spend a little time on my left side.

A good deal depends, with reference to sound sleep, on the position of our body and limbs. Thus, if one limb rests on the other, the weight sometimes causes sleeplessness and dreaming. Or if the bed is too soft, so as to sink the hips or body too low for the head, or give a crooked shape to the frame, or if we lie too straight, our sleep may be less sound and less refreshing.

If we lie on either side, the body and all the limbs should be gently bent, so as to be in an easy position. In this way all the muscles — both the flexors and the extensors — appear to have a season of quiet rest.

I make these statements with many misgivings, because I know, full well, that they will be made, for most persons, in vain. They are not willing to pay the tax required. They are not willing to take the necessary pains for securing sound and refreshing sleep. But if I arrest and secure the attention of even a few, I shall not think my labor lost.

Do females require more sleep than males? This is a question often gravely put by grave men, and as often answered. It is, however, answered both ways. My opinion is, that they do not; for I see no physiological reason for believing otherwise. That children need more sleep than adults will not by many be disputed. There is no respectable authority that thinks otherwise, so far as I know. Still I have no doubt that we educate them to sleep a great deal more than is really necessary.

It is so convenient to busy mothers to have their children out of the way, that they are too generally overcome by the temptation, and the child is thrown upon the bed. I have, however, seen little children that did not sleep more at a very early age than adults, and yet their health did not appear to suffer from it.

The following table, presented by M. Friedlander, in a late work dedicated to M. Guizot, shows the number of hours which he supposes it necessary to consume in sleep, between the seventh and fifteenth year of life. It is also exceedingly curious on account of other items it contains. Let it be remembered, in passing, that M. Friedlander is one of those who hold that mental instruction should not begin before the seventh year.

Age.	Hours of Sleep.	Hours of Exercise.	Hours of Occupation.	Hours of Repose.
7.....	9 to 10.....	10.....	1.....	4
8.....	9.....	9.....	2.....	4
9.....	9.....	8.....	3.....	4
10.....	8 to 9.....	8.....	4.....	4
11.....	8.....	7.....	5.....	4
12.....	8.....	6.....	6.....	4
13.....	8.....	5.....	7.....	4
14.....	7.....	5.....	8.....	4
15.....	7.....	4.....	9.....	4

What he means by "hours of repose," I do not exactly understand; but the rest of his table is perfectly intelligible, and, on the whole, instructive. It is said, also, by the author, that it is something more than mere theory; as it contains, practically, the experience of many instructors and educators.

My own observation and reflection would lead me to make a single criticism. Instead of sleeping seven hours at fifteen years of age, the children in our own country sleep eight or nine, and in winter much more; and though I think this too much, it is believed that seven would be rather too little. I believe that eight would be preferable.

There are many things, both curious and useful, connected with the philosophy of sleep, which have been purposely omitted. No man can do entire justice to so important a subject, in a single popular lecture. Macnish has given us a volume of about three hundred pages on this subject, without exhausting it.

Somnambulism has attracted great attention within the last twenty-five years. The story of Jane Ryder was written by one of my classmates; the subject is interesting, but cannot be discussed here. There is some fancy work about it, but a good deal of truth. Nor ought I to dwell for a moment on mesmerism. Those who wish to inform themselves on that wonderful subject must go elsewhere. But they need not go far; almost every neighborhood has somebody in it who can mesmerize; and perhaps act the clairvoyant, and communicate with the spirit world besides!!!

I ought not to close this lecture without saying that the quantity and quality of our sleep will both be determined, in no small degree, by the tendency to diseases which various individuals either inherit or have acquired. Thus a consump-

tive person will need less sleep — other things being equal — than one of a bilious or dropsical habit.

This part of our subject is left out of this lecture, both because it belongs to pathology rather than hygiene, and also because some things will be said bearing closely upon it in my remaining lecture, to which I must beg leave for the present to refer you.

## LECTURE X.

## THE RIGHT USE OF PHYSICIANS.

MANKIND, in almost every thing, seem prone to extremes. *Now*, the tendency is wholly to the *right* hand, till they come to some barrier which appears insurmountable; *now*, again, they go to the *left*, till they meet with an obstruction in that direction, when, like the pendulum, they vibrate once more to the opposite extreme.

Time was, for example, when, as a general rule, we were accustomed to reverence the clergy — I had almost said worship them. Now, and for some time past, the tendency has been in the opposite direction; and there is a growing inclination to throw them all “overboard.” How soon we shall get sick of that idea, and vibrate to the first extreme, remains to be seen.

The public opinion with respect to physicians and medicine has not formed an exception to the truth of this remark. From the disposition to regard the medical man as a sort of magician, and his medicines as incantations, we are passing rapidly to the theoretical belief that all physicians are worse than useless; and that true wisdom would teach us to have every man become his own doctor.

Are mankind always to be, in this respect, children? Are we destined to a zigzag movement of this sort, forever, without making any real progress? or, will the pendulum, in some truly favored golden period of the world's history, cease to vibrate, and remain midway between these extremes?

There are those who believe that our race, for the last

three or four thousand years, at the least, — have remained stationary. They do not believe at all in the so much boasted march of the human mind. They believe, as Solomon, at one period of his life, was inclined to believe, that all things come alike, in every respect, to all men. These are generally middle-aged men.

Another class believe the world is going “ahead,” at a rapid rate. They are a favored generation, and the old were fools. The improvements already made, and such others as these seem to guaranty, will whirl us on at a most rapid rate to the bliss of Eden — to the long-lost paradise. These, of course, are the young.

But another class regard the world as, in every respect, retrograding. They place the golden age in the past. The present is a most sad departure from that blissful state which was once ours; and of the future they have still less hope. Most happy would they be, could all that pertains to our deteriorated planet, on some December night, be suddenly congealed, to prevent any further deterioration. It is hardly necessary to say who these are.

Now, although you may be inclined to consign me to the latter class, I do not really belong to it. I believe most fully in human progress, both as a principle and as a fact. Some progress, I believe, has been made; and much more *may and will* be made. Not by miracle either; but, under God, by those capabilities which he has himself delegated.

I believe, even, that we shall one day or another learn to make a steady, onward march. It is probable that something has even been gained by each past zigzag. Still our gains will be greater when we can rise beyond this painful practical necessity. And the day when we can do this is not now very distant. The signs of the times can hardly be mistaken.

I have said that there is abroad a theoretic belief that physicians are useless. Why I call this belief theoretical is, that the individuals who proclaim their faith most loudly, are the very persons to act contrary to it in practice. For suppose they are ill, or their friends. While in health, they would not go for a physician, especially a "regular" one, for their lives. Nor will they now, as long as they are not *very* sick. But let one and another and another of their friends come in, and say, with a woe-begone countenance, "How dreadfully sick you are! Why do you not have a doctor?" and it is ten to one but they will send, post haste — perhaps for the very man whom, but a few days before, they were sneering at.

Others, however, are *wiser*, or at least more *prudent*. They will die sooner than have an "apothecary doctor," even though he "does not give calomel." But let some seventh son of a seventh son come along, or some drunken Indian, — sober, perhaps, just at the moment of his call, — with whom they would not trust a sixpence of their property, and they place their own lives and those of their children at once in his hands.

Or, still more to the disparagement of poor human nature, let some one come in with Mrs. Somebody's cordial. The patient has had within a month — certainly in his whole lifetime — one alvine movement, and he has, forsooth, a bowel complaint! The cordial has cured its thousands who were just as he is. No one present knows so much as the A B C of the human constitution, or the nature of medicine or disease; but they know what ails the patient, and they know the cordial will cure him! Such, I mean, is their self-confidence — the result of their ignorance. And the patient believes; and his faith is in proportion to their impudent assurances. Science is modest, and wishes to ask a hundred

questions; but ignorance knows, *because* she knows. She talks large, and looks learned; and the doctor hater at once takes it all for gospel, and down goes the medicine. If the patient gets well notwithstanding, the latter is immortalized; if the patient dies, he dies of the disease, not that the medicine destroyed him!

My master in medicine, when I began to ride abroad with him among his patients, used to arrest my attention, suddenly, at times, by this question: "Do you know how to insure success as a physician?" "Why, no, not exactly." "Well, you must learn to look very wise."

It is a pity — but so it is — that the greater the fool, who attempts at all to prescribe for you, the greater his confidence in himself and in his medicine. And the contrary is equally true, that the wiser the man whom you consult, the more he is conscious of and feels his own fallibility and the "glorious uncertainty" of medicine.

You will forestall my inference. It is, however, this. If you are sick, and cannot confide in your own judgment longer, and consequently need advice, consult a wise man in your own and the public estimation, and not a fool. The more he understands of the human constitution and the nature and power of medicine, — provided he is not a mere book worm, — the better.

And hence the FIRST RIGHT USE OF PHYSICIANS — to patch us up, as I have before styled it. They may not be able to do much; perhaps not much ought to be done. But what ought to be done they will be as likely as any body to find out; and what they believe ought to be done, they will be as likely as any body to do. They may not — probably will not — give much medicine. Physicians, all who are worthy of the name, all who are *progressives*, have greatly improved

their practice within the last twenty-five years. They do not give one fourth as much active medicine — perhaps not one tenth — as they then did ; and they are giving less and less every year.

They may not pledge themselves to avoid, entirely, any particular medicine, or make use of any special favorite. Like the pilot to whom, on a dangerous coast, you commit unreservedly the care of your vessel, the wise physician will expect to do as seems to him best, in the circumstances. He will not concede to you — you should not claim — any reserved rights. And what he advises, you must implicitly hearken to and follow, as nearly as you can, or else dismiss him.

He may not pledge himself to the exclusive use of even as good a remedial agent as water ; for though there may be individuals so situated as to deem it their duty — partly, perhaps, to inspire public confidence in pure water — to confine themselves to it for a time, yet there are few who could be expected long to do this without becoming the disciples of empiricism.

Your physician — if he is the right man — will be what I would call an eclectic. I do not know what idea the public mind has already attached to this term, but I mean, by it, a man who acts according to the circumstances before him ; who seldom, if ever, finds two cases of disease alike ; and therefore, seldom, if ever, prescribes exactly the same course for two persons.

In short, the true physician of nature endeavors to follow nature ; and if, in doing so, he comes to the conclusion that it is best to give no medicine at all, but simply place his patient under law, and keep him so, and then leave the rest to wiser direction than his own, you need not marvel. Such

medical men are to be found ; they will be still more numerous a century hence.

I have said "leave the rest." It is an old saying that a good nurse or attendant of the sick is worth half as much as a physician. The wise physician will fully subscribe to the truth of this saying ; and even to such a modification of it as should make the words *half as much* read *quite as much*. Competent, well-educated nurses, at the present day, are exceedingly rare ; and blessed is the plan of modern times of educating a class of females for this special purpose. All who love their species, or value health, will hail this as one of the omens of a better and happier day about to dawn on our dark world.

But a SECOND and more important DUTY OF THE ENLIGHTENED PHYSICIAN is to *teach* mankind, as fast as possible, to let alone medicine — I mean to let alone prescribing it for themselves or others. The task will be a heavy one, and will require long time and much patience. It is, however, a department of the great work of human improvement which demands our attention.

At the present time, if a person is ill, especially an ignorant person — and who is *not* ignorant in this matter of health and disease ? — the cry is, "What shall we do ?" No matter if it is nothing but a cold, or a surfeit — when the question might more properly be, "What shall we *not* do ?" — in other words, "What shall we refrain from doing ?" — the inquiry is still the same, and is made with the same blind confidence. And there are always at hand fools enough to respond to the inquiry. They can tell you the very remedy for your disease, and where it is to be found. The apothecary sells ten times as much of his poison without the prescription of any physician, old school or new school, before him, as

with it. And he is quite a sober, legitimate, moderate seller, compared with many of those who sell medicine around him.

Then there is another species of apothecary shops, which the enlightened physician must endeavor, by all means, to put down; although his motives, in this as well as his other duties, may be variously construed. For my own part, I am persuaded that here, if nowhere else, he must, in acting his proper part, act against his own interest. I refer to the apothecary's shops in dwelling houses. Many a mother has been so effectually trained, at maternal hands, to maternal drugging and dosing, that she has introduced this medicine, and that, and the other into her closet, till one might find it difficult to mention a potent article of the whole materia medica, which, in an emergency, she could not furnish.

It was my own lot, in early medical life, to be a boarder in a family of this description. The wife had received a training somewhat peculiar. She was an only daughter, and constitutionally feeble; and her mother, being greatly fearful about the future, had doctored her from fourteen years of age to twenty-four—till she had literally learned to live on medicine. I found her feeble, scarcely able to sit up half the day, and unable to do any work but a little light sewing and knitting. Her skin, not accustomed to see the sun, was so pale, and withal so transparent, that one might almost see through it. Her lungs were feeble, her appetite bad, and all the functions of her frame were very imperfectly performed.

When I first sat at the table, it was no uncommon thing for a little Stoughton's Bitters, or some other medicament, "good to give an appetite," to appear at the table, and to be taken before the dinner could either be received or relished. And of what I have elsewhere called table medicines, there was the most liberal abundance.

And there were more where both of these came from. It was difficult to say which had the best assortment of drugs, the wife in her closet, or the husband — who was an apothecary by profession — in his shop. The latter, no doubt, had a few larger parcels, and had them labelled in a more glaring style. The wife, however, was, in this respect, fast coming on!

Need I say that this maternal apothecary's shop was not only kept, but used? The husband, moreover, was a doser as well as his wife, only he had not learned it of his mother in early life, and as yet he had a somewhat better constitution.

I left them, after a residence in the family of a year or so, and did not see them again to know much of their habits till something like eight years had elapsed. Meanwhile they had reflected on my often-repeated remarks, and partly reformed. Besides, fortune — so to speak — had been in their favor; for, by unforeseen calamities, they had been obliged to labor.

On calling on them after the aforesaid long absence, I met first with the husband. "How do you do?" I said, familiarly, looking at his brown skin and ruddy countenance. He comprehended my meaning, and replied, most emphatically, "Perfectly well; I can eat my allowance now;" and burst into a loud laugh. While I stood talking with him, along came a matronly-looking woman, with her sleeves rolled up, — it was washing day, — and a sunburnt appearance, whom I was glad to call his wife. Yet, O, how changed! Eight years before, she could not have stood before the wash tub and ironing table, to save her life. Up came a little girl, too. "What, is this yours?" I said. "Indeed it is," was the reply. I was more surprised than ever to see her, for, though very young, she was quite promising; whereas, till

they abandoned medicine, they never had but one living child, and that did not survive a month.

In short, there had been a very great reform, and the whole family were now reaping the reward of their deeds. They took little medicine, and therefore needed little—just as others take much, and therefore need much. For the more we take medicine, the oftener we feel ourselves under the necessity of taking it; and the contrary.

This is a strong case; but it is only a specimen, in kind, of what our country abounds with. I could give a hundred similar instances of similar general character, but must confine myself to one or two.

A family in Boston had for its maternal head a young woman who had been brought up in the family of a physician of high reputation, whose mantle, as she supposed, had fallen on her. She was always dosing, and, as she said, always curing. Her children, at the least, recovered in spite of her; but they were always getting sick again. In this family, also, I became a boarder. Instead of a closet full of drugs, here was a regularly-built medicine chest; and it was used, too, with a vengeance. Sometimes, especially in the spring, the husband had sick turns, and these were cured as successfully as those of the children. In other words, the husband, like the children, lived through it. Nature is tough.

Here I plied my no-medicine doctrines; but here, too, for the time, with little apparent effect. But the hour of separation came. I went elsewhere, and they removed into the country. Here the seed I had sown began to germinate, and finally to bring forth fruit. Within ten years, an entire change was effected. No medicine was given, and none appeared to be needed. From that day to this—now some ten or twelve years—I do not believe a dollar's worth of

medicine has been taken in the whole family, which is considerably large. They appear to be almost entirely emancipated. And not only so, but they have become preachers of the faith they once destroyed.

My own family have their ill turns, and occasionally their severe diseases; but we give no medicine. We leave all to nature, taking care only that no further violations of nature's laws take place. We do not even use water, except to give them their regular daily bath, and to furnish them with drink.

One evening, several years since, a distinguished hydropathic physician came to see me. Our little boy was getting sick. "If that boy were mine," said he, "I would give him a tepid bath." "It might be well enough," was the reply, "but as it is somewhat late in the evening to begin the work of preparation, and early sleep will do him more good than late sleep and the bath together, I think I will leave him to nature." In the morning he was better; and the following day nearly well. Had we followed either hydropathy or allopathy, I do not know how a more rapid cure, under the circumstances, could have been effected. And if any, who heard that Dr. S. was at our house, attributed the cure of the boy to hydropathy, I do not see that it can be helped. The doctor certainly looked at him, and expressed his benevolent desires!

We have just now — while this work has been going through the press — had a "touch" of the prevailing epidemic. All the family have been sick but myself — some of them quite sick. Have we taken medicine? We have scarcely thought of it. We have tried to be obedient to nature. One night, and one only, the children bathed their feet in warm water.

These are specimens of family reform such as can be

found all over the country. Such and similar instances the wise physician can bring to his people, in order to show them the superlative folly of maternal dosing and drugging. He may do much more. He may tell them the consequences of this wretched habit; to the race. He may tell them how fast we are sowing the seeds of neuralgia and scrofula.

The physician of the soul teaches us to pray that we may not be led into temptation. The physician of the body should endeavor to persuade us to suit the act to the word, and remove temptations as far as possible out of the way. No medicine should be kept in our houses; my family keep none; and others may do the same. What man has done, man may do.

A thousand difficulties will be started with regard to the practicability of having families who live remote from an apothecary's shop, banish medicine wholly. But to all of them I have but one answer: Make the experiment for the next ten years, and if at the end of this time you are not satisfied, I have no more to say.

Quacks of all sorts — thicker than frogs ever were in Egypt — have come among us of late years, and their influence is most deadly. But make this quackery as bad as you may, — as bad, if you please, as the reality, — and what is it, in its consequences, in comparison with the evils which mothers inflict? For these last should remember that a little mischief, — a slight morbid tendency, — implanted in the constitution at a very tender age, may grow with its growth and strengthen with its strength, till it becomes a huge tree, so deeply rooted that it can hardly be destroyed.

Mothers, I know, are apt to think they understand their children's constitutions better than any body else; but this cannot be so, and the medical man can easily show them

their mistake. If life is not long enough to enable the professional man to understand "constitutions," how can others know much about them?

ANOTHER RIGHT USE OF MEDICAL MEN consists in teaching, every where, how to prevent disease. The good old maxim, "An ounce of prevention is worth a pound of cure," is universally applicable, but nowhere more so than in its application to the art of preventing disease.

1. Much may be done by the physician at the houses of his patients. For during the progress of disease, or the stage of convalescence, nothing will be more natural than the inquiry how the disease originated. It certainly did not grow out of the ground. It certainly had its cause, or causes, like other effects. Now, what were they?

I grant that, in order to this end, a physician must be moved by principle. He must be essentially a missionary of health. He must feel that to preach this part of the everlasting gospel, as well as that of the moral or religious teacher, is indirectly to spread the gospel of the soul. And he must be assiduous in his efforts to do his duty, *in season and out of season*. Moved thus, as other ministers of the gospel are, by the Holy Ghost, he can hardly fail to sow his seed wherever he goes, in the house and by the wayside. For even when sown as he passes along the public highway, some of it will take root, and grow to such a size as to defy the future storm and tempest.

In regard to teaching our patients to trace effects to causes, the foundation of this work ought to be laid, as I have elsewhere said, in early life. It should be a part of our education. But since it is not so, the medical man has the greater obligation imposed on him; and happy is he who discharges faithfully his duty.

2. He should visit schools, either officially or otherwise. It would be an admirable arrangement that should secure at least monthly visits from some competent medical man to every school ; and I hardly know how money could be more judiciously applied than in the payment of such services.

But in the absence of such an arrangement, at least as a general rule, I am again about to appeal to his philanthropy. Let him visit schools, whether paid for it or not. Let him attend to the school house, its construction, location, and healthfulness. Let him have a particularly watchful eye on the interior. Let him observe the habits both of the teacher and his pupils. Let him make his suggestions in regard to improvements, whenever they are needed. They may be made to the teacher privately, and still oftener to the committee. They may be made verbally, or in writing. Whenever it is an unofficial matter, perhaps the former mode would be preferable.

Physicians to schools are as needful an appendage as physicians to workshops and houses of correction or almshouses ; and if prevention is worth more than cure, still more so. Were there such an office, and were it duly filled, we should not so often find our children suffering in point of health, while at school, as we now do. We should not have so much disease, and so many premature deaths.

The Germans are said to be quite before us in this important particular. We are told that they take measures to find out whether their children are improving at school, physically, no less than intellectually and morally. If they are not, and the existing evil cannot be removed, they withdraw them. It is well to avail ourselves of these lessons of wisdom, though they happen to come to us across the Atlantic.

If a boy is pale and languid for want of breathing pure air

at school ; if he has his nose bleed frequently in consequence of sitting with his feet cold and his head hot ; if he exercises too violently when out of school, or, on the contrary, neglects his exercise ; or if he studies beyond his strength, — it is alike the interest of parent and teacher to be informed of it.

Teachers are usually so ignorant on all these points as greatly to need information from somebody. And from no person, if given in a kind manner, do they receive it so willingly as at the hands of a judicious and respectable physician. So, too, in regard to parents.

Little girls are sometimes made unsymmetrical and crooked for life — to say nothing of physical maternal sufferings — by a bad position of the spine or the shoulders, or by the application of undue excitements to study, or by sitting with cold feet, and highly-heated head and upper extremities.

But my object was merely to *hint* at what a physician could do, and ought to do, in relation to schools. A volume on school physiology would hardly include too many particulars. Perhaps the physician should himself be the very volume needed.

3. There should be physicians to factories. For say what we may about the excellent condition of our factories, there is hardly any limit to the mischiefs to human health that grow out of them directly and indirectly. Some of these evils, I grant, are inseparable from the necessary condition of the operatives ; but others might be gradually removed.

A better system of ventilation might be adopted, beyond a doubt. More time might be allowed to exercise in the open air. Systematic, vigorous, and profitable exercises might and should be provided ; and there are not wanting those who should be compelled to use them — I mean when all other motives but compulsion fail.

Much might be done, too, with regard to the health of boarding houses, dormitories, wells, and cellars. You doubtless remember an anecdote I gave you of a raging epidemic in Newton Upper Falls, in Massachusetts, which was at once put to flight by a man who knew very little of disease or hygiene. What he could do in his ignorance, an aged and respected physician could do still better.

The diet of the inmates of our factories is often as wrong as wrong can be. How to remedy this evil, even with the aid of a missionary of health in some form or other, I hardly know. But without medical effort, as a general rule, it will never be attempted. I wait, therefore, with considerable anxiety, to see what can be done, in this particular as well as many others, by physicians to factories.

4. Some have supposed we need physicians to churches, conference rooms, vestries, lecture rooms, town halls, court houses, &c. I could give a long list of human ills that might have been prevented, had there been such an officer, and had he faithfully performed his duty. "Jail fevers, hospital fevers, camp fevers, all owe their origin," says Dunglison, "to the deteriorated air of those places." Why, then, do we not have a more thorough oversight of all these places, and such arrangements with regard to cleanliness, ventilation, &c., &c., as shall render such terrible results impossible?

Who is there that has not read or heard of the Black Assize, at Oxford, England, in 1577? It received its name from the great mortality produced in court by the effluvia from a prisoner brought to the bar after having been some time confined in a small dungeon. On one side of the culprit was an open window, and almost all the judges, counsel, jury, and others, who were placed to the lee of the prisoner, were attacked with putrid fever, of which many died.

At Exeter, also, in 1586, and at Taunton, in 1730, the same thing occurred, and from similar causes. And in 1750, the contagious jail fever, introduced into the court destroyed the lord mayor, two judges, and several spectators. Why were prisoners permitted to be confined in an air so pestiferous? Why no physicians to the jails and other places of confinement?

But ANOTHER RIGHT USE OF PHYSICIANS consists in requiring them to give public instruction on such parts of anatomy, physiology, and hygiene — especially the latter — as may be most important to the mass of the community, and as they may be best prepared to receive. Especially should public instruction be given on the best means of promoting, or, as I have all along called it, manufacturing health.

Of the importance — the indispensable importance — of this kind of information, there can be, at present, but one opinion. Whether we regard its bearing on the social circle, public life, intellectual cultivation, or moral and religious progress, it is, as it were, in the present state of the world, the one thing needful.

It is more than two centuries since the venerable Indian apostle, John Eliot, made an effort, as I have before intimated, to induce a learned teacher from the old world to come to New England and teach anatomy and physiology to the native American Indians! Such a fact may seem strange, but it is well attested. The attempt, it is true, proved a failure.

Zeno Scudder, a distinguished member in Congress from Massachusetts, has been heard to say that weekly lectures on these subjects were needed throughout the year, all over that commonwealth. But if needful in Massachusetts, I am sure they are so elsewhere. Lectures of this sort have, during

the last twelve or fifteen years, been somewhat frequent in this country. And yet they have not exactly accomplished the whole object desired. Some have been too purely anatomical; some have been too learned; some have had mingled with them much which did not belong, of necessity, to the subject; and some have neither had nor deserved the public confidence and favor.

It is highly desirable that this department of public instruction should be in the hands of good men whom we know, and not in the hands of strangers, or of men in whom we cannot confide. It should not be done for money solely, nor for display; nor to gratify a prurient and never gratified curiosity. In short, it belongs to physicians, provided they can be obtained. I know there are difficulties, for I have myself been compelled to encounter them. To one of these difficulties I have already had occasion to allude. Physicians who are worthy of the name are modest men. It will be hard to enlist them. But they must be pressed into the harness if possible. Encourage them by the purchase of a manikin. It will cost something, but you will never regret your efforts, or your contributions. But if this cannot be done, let them at least collect such dried preparations as may be within their reach — to which they may add cheap diagrams.

In their public ministrations, medical men should keep prominent one great idea, that to a much wider extent than almost any one is aware, health is the product of manufacture just as much as any thing else, and that God has, as a general rule, made it optional with us, when we know his laws, to manufacture health or disease.

There *has* been much of infidelity — or rather of irreverence — abroad in regard to this whole subject. Practically

we have been inclined to shift the responsibility, in regard to health, upon every body else rather than ourselves—especially upon our Father who is in heaven. This great error ought to be removed immediately; and no man can do this service to God and humanity better than the medical teacher.

Salzman, a distinguished German educator, has said that whenever we find evils rising up among the children of our charge, we must look for the cause in ourselves; and there, very often, we shall find it. It is somewhat so in the matter before us. The cause of our illnesses and those of our families will generally be found at home, if we look deep enough. Would that this view, so far as it is correct, could be spread abroad, from one end of the land to the other! Would that when sickness prevails—*influenza*, *consumption*, or *cholera*—people might look in themselves for the cause, and not behind the clouds, nor in the first, third, or seventh heaven.

While a person is laboring, correctly, to prevent disease, he is at the same time practically doing much to manufacture health. Still there should be special effort for this purpose. Remember that in the decalogue of the Christian there are not only a list of *Thou shalt nots*, but also many *Thou shalt*s.

Nor can the moral laws of any decalogue, ancient or modern, be fully obeyed, to the largest extent, till the physical code has its place. I pity those who, in the great work of preventing disease and manufacturing health, see nothing but what is secular. It is high time these things were made matters of conscience towards God.

But there is ONE MORE RIGHT USE OF MEDICAL MEN, on which I must dwell a little more particularly than I have on any of the others—both on account of its intrinsic importance, and because it has hitherto been almost wholly neglect-

ed. I refer to the work of making physiological examinations. Some of our phrenologists have done a little of this sort of work. But there have been here two difficulties. First, the public have regarded them quite too much as a new sort of mountebanks, or, at most, of magicians, and have not laid up their incidental counsels in their hearts; and, secondly, many of them have proved themselves unworthy of being regarded as any thing else.

It is the family physician alone, next to the beloved minister of the gospel, who should so far have our confidence as to be admitted to the *sanctum sanctorum* of this divine temple. Let mere head feelers stand at a distance.

By physiological examinations I mean this: Physicians should sit down, and, as it were, dissect the physical constitution of a person, and ascertain, as near as possible, how he is made up; and then, either verbally or in writing, — but the latter is preferable, — give him a chart of himself, accompanied by the necessary rules of hygiene.

They should examine all classes. The most prominent class will be those in our own families who are already diseased, either by inheritance or acquisition. The physician must ascertain how far they are diseased; what has been the medical treatment hitherto, if any; what their temperament, idiosyncrasies, diet and regimen, employment, studies, amusements, hopes, fears, &c.

It is only by this minute dissection, as I have called it, of the physical constitution, — this entering into the very *sanctum sanctorum* of the living temple, — that the physician can hope or expect to be prepared to render an individual that aid to which the spirit of these remarks has reference, and which next to the very salvation of the soul, is to him most important.

Without such aid and advice — such is the popular igno-

rance at the present time — he may be in the daily habit of that which is as diametrically unfavorable, as if it were aimed solely at his temporal destruction. For want of such advice, millions, and hundreds of millions, have verified the truth of the declaration of God by the son of Beerî, “My people are destroyed for lack of knowledge.”

But there is a particular class, which, though usually less prominent, when these examinations are proposed, are far more important, because here you come to the stream whose waters you would analyze, that you may purify and direct them much nearer the fountain. I speak, of course, of our children.

No matter how healthy they are — the more physical capital we have to work with, the greater will be our gains. No matter how young; the younger the better. They are our sheet anchor. They are our hope, and the world’s. “Give me the ballad making of a country,” some one has said, “and I care not who makes the laws.” Give me the health of the children, and I care not who has care of the adults.

No two children in a family require exactly the same treatment, whether we have reference to their diet and regimen, their dress and clothing, or their exercise, amusement, and employment. There needs to be, at least, a shade of difference in the treatment, varying according to the temperament, strength or debility of body, or mental conformation.

Now, I do not believe there is one parent in fifty who aims at the slightest diversity of this kind, or even so much as dreams of its necessity. Some indulgence is indeed, at times, granted to a delicate or sickly person, or child — precisely the one which should *not* be treated in this manner; but in general there is the same thing for all who are considered to be in their usual health.

The same dress, essentially, is applied from the first, whether they are strong or weak, and whether it is summer or winter. The same form of ablution is used, — cold or warm, showering or plunging, or sponging, — and whatever may be the temperament or tendencies, healthy or diseased; and if ill, the same form and dose of elixir, or senna and salts.

The same food and drink, essentially, are given to all; indeed, so far as drink is concerned, it should be so. And as to food, the difference required in early life is so trifling, that we need not be over-solicitous on this point, unless there is a particular diseased tendency; especially if the diet is plain farinacea and milk. After two years of age, and especially after seven, more attention to this subject will be necessary.

And then at just such an age all go to school, where they pursue about the same routine of study, under the influence of nearly the same sort of excitements. And as they advance beyond life's merest threshold, and are beginning to think of employment for life, this subject is in general disposed of according to parental convenience, and the whims of the children themselves.

Now, these things ought not to be so. Every wise physician *knows* they ought not to be so. Every parent *ought* to know it. It is for the life of his child. It is more than for his life, merely, in this world. It is for his usefulness here, and his happiness here and hereafter.

Take, for example, the matter of school going. Now, there may be in many of our families, here and there, an individual who can go to school, say A B once or twice, and sit on a hard bench, midway between earth and heaven, five or six hours a day, and escape uninjured. But for one who can do this, there are probably a dozen who cannot.

Much, I admit, will depend upon the wisdom displayed in the arrangements for their reception there. If the teacher and the visiting and superintending committee or physician are physiologists, many more of our little ones can be allowed to go to school at four years of age, than as circumstances usually are. In general, however, a majority of the young will be far better off in the end not to go to school till they are six or seven years of age; and some should not see the inside of a school house till they are at least ten. And when a child is scrofulous, or consumptive, or rickety, I would hesitate long, before, as a physician, I would advise their being immured in bad air, at school or any where else, even as early as at ten years of age.

Then, too, the studies presented to their minds first in order, and the *incentives* to study, should be various. Some need, as a motive to activity, the simple token of approbation, only, that Pestalozzi meted out to all alike — “That’s right.” Others, however, need something else. And in regard to their studies, some should begin with geometry, some with drawing, some with reading, others with botany, according to genius and temperament.

In deciding upon all this, wise, and judicious, and kind physiological advice is valuable beyond all possible price. Yet here is a field of influence, in the formation of human character, almost wholly unoccupied. More parents have thought of the right education of the children of the Sandwich Islanders than of this department of the education of their own children; though the great difficulty with most is, they do not think at all.

Another example of the need of physiological examinations and hygienic advice, in early life, is found in the fact that the vast majority of our race are directed wrong in

regard to employment. Thousands and millions, in every period of the world's history, have been almost entirely inefficient in life, who might have been greatly useful but for this misdirection. Other thousands and millions, though they set out right, are not educated to their profession.

One of the most important professions among us — perhaps I should say *the most* important — has been often despoiled of its beauty, and half defeated in its intentions of good to men, either because parents have not known the will of God during the period of early education, or, knowing it, have not done it.

In most families there is at least one boy who is scrofulous. This is early manifested, not so much externally as by his fondness for learning, his active conscientiousness, and his great physical sensibility — in a word, by his mental precocity. He is, perhaps, unwilling to labor, and almost unfitted for it, — for he is not muscular, but rather delicate, — though he would study and read, if he might, all night long. This son, so fond of books, so brilliant, and, as it is supposed, so promising, *must have an education*. The parents would, indeed, be glad to give what they call a good education to all their children; but as they are not able, they are content to make a learned man of one of them. Nor are they long in deciding which it shall be.

The boy is prepared for college at fourteen, and through it by eighteen — perhaps with the highest of college honors. But alas! alas! his *health*. This began to fail before he entered; but too great ambition, too little exercise, a bad diet, haste in eating, too little sleep, and sundry other bad habits, have made it worse. In short, he is either dyspeptic or consumptive.

But he is eighteen, and has graduated, and must begin to

think of a proper sphere of action. What shall he do? He is conscientious, and would gladly be useful. Perhaps he is religious, and would gladly serve God and mankind. He reflects on the subject. He must live by learning, and not by work. At length he decides to be a minister, which brings him to the theological school one, two, or three years. His health here is still more seriously impaired, but his desire of usefulness is increased — his impatience, too, for entering upon life's great theatre. Perhaps he believes he has the key to a new mode of explaining, to human comprehension, those things which have hitherto been received by faith alone; and he longs to go out and spread his new light over the fair face of society.

Well, he has a call; as he is a *young* man, perhaps several of them. He is soon settled in the ministry, as both pastor and preacher — a task sufficient for Samson and Hercules united. He can write two sermons a week, and commit them both to memory; at least with the aid of tea and coffee. All this, too, at the immature age of twenty-one or two, besides having the care of a family.

But he has already seen his best years, physically. Before his bony frame is consolidated into physiological manhood, he is completely crippled, and his days, instead of being what his early youth seemed to promise, are days of sorrow. He goes either to a premature grave, or he is compelled to spend a large portion of his precious time, through a moderately long life, patching up his nerves or his stomach.

And now I appeal to those who have had much experience and observation in this world to say if I have not presented — painful though the task has been — a faithful picture of the life and sufferings of a very large number belonging to this important and useful profession. And if a loss there is

to the world, — such a loss as I have described, — “that loss how great!”

The suffering and the loss — though always greater than a world like ours can well afford to bear — are not quite so great when the precocious and diseased young man happens to fall into another profession — one which gives him more exercise in the open air, with less, at the first, of responsibility. We have, it is true, quite enough dyspeptic and consumptive lawyers and doctors, but not so many as of ministers.

Now, then, one right use of physicians would be to assist parents in the education of precocious children. If one of them is to become a scholar, what is the best method of accomplishing his object? No son, nor any parent, wishes to secure eminence at the expense of health and life. It is paying too dear, as Dr. Franklin would say, for the whistle.

Perhaps the young man may accomplish his purpose by delaying his studies a little, and in the mean time endeavoring to harden his constitution. He is disinclined to exercise, it is true; but so much the greater is its necessity. If the family physician says so, moreover, he will surely much rather hoe or plough than take the blue pill. He will much rather work than die.

A young man of this description might far better delay the work of education a little while than destroy his usefulness for the whole of his after life. It is by no means certain that he who commences a professional career at twenty-nine or thirty, — as our Savior did, — having his mind well prepared and lodged in a sound and vigorous body, — will not accomplish more in the world than he who begins earlier.

And from what I have seen, I have very little doubt that

many a scrofulous young man, by proper general management, by a due alternation of labor and study, and by marrying, and entering upon his profession at twenty-eight or thirty, might secure to himself a life of tolerable health and vigor, and of much usefulness to the world, instead of passing away from the world almost at its very threshold, or being buried while yet alive.

In some cases, however, a judicious medical adviser would labor to dissuade the scrofulous young man from pursuing a studious life, and to reconcile both him and his friends to agriculture or the mechanic arts, as a course which would render him more efficient, and probably more useful. It is a mistake into which many fall, that a feeble person cannot be useful any where except in one of the learned professions, or in mercantile life. And if Satan has an agency in these matters, I have not a doubt that he delights to aid in the diffusion of such a sentiment. For are knowledge and piety, and the influences of the Holy Spirit, of no use, or almost none, in any of the more common and humble spheres of human action? For my own part, I wish every farmer and mechanic could be, for knowledge, a Cuvier or a Newton; and every one for piety an Edwards, a Brainard, or a Payson.

It will be asked whether a physician could be of any service in changing the tastes of young men. For it is probable that most young men have their predilections and tastes about going to college, and parents do not think it safe to cross them in their inclinations. I am well aware of the force of this objection. And yet it seems to me no sensible parent or young man would suffer himself to be led, by fancy or inclination, too far. I certainly would not be forward to oppose either; but neither would I be backward to do so

where reason seemed to require it. Mere feeling or inclination is blind. The head should be the helmsman.

The judicious medical adviser could have no motive that would be likely to urge him onward in a path which would not be safe. His great question would not be, "What is for the parents' convenience? — or what would gratify his pride, or the young man's inclination," — but rather, "What is right?"

It is not, however, the learned professions alone that suffer in the way I have alluded to, but others. There is suffering in the mercantile world. Let me give one or two cases, which came under my own observation, and which will illustrate the subject I am endeavoring to enforce upon your attention.

A father in Massachusetts and in the ministry, having a family of sons, without much reflection sends one to college, one to the farm, and another to merchandise. The farmer succeeds; the young man at college has not yet had time to show what his course is to be, except that his health is somewhat impaired. But the young man who goes to mercantile life, pure, honest, enterprising, and even pious, applies himself with all diligence to his business, but neglects exercise. His constitution, naturally delicate, begins to wane. But he has a good stand for business, and he must drive it, sink or swim — so he supposes. His head, as well as his hands, is employed in his business, and he dreams about it at night.

He does not ask counsel of his father; and *he*, alas! never asked counsel of science — hardly of God. He consulted his own convenience. Had he permitted God to rule, — that is, had he found out, by wise medical counsel, what God had said in his son's constitution, — had he, in one word, consulted God's convenience, and not his own, his son might have been long useful.

But his history is that of thousands in the metropolis. He persists in violating the physical laws of God, till return to the path of hygiene is impossible; and he sinks to the grave at a premature age, to add another to the long catalogue of what are called *mysterious providences*.

Another father, with only one son, finds it very convenient to have him become a mercantile man. He has a spinal complaint, which he seems to suppose will disable him for manual labor; besides, he has no farm for him to work upon, if he desired it. So, after much reflection, but without medical consultation, he sends him to the city. This father, too, is a minister. He knows his son to be scrofulous; and knows, too, his danger, for he is rather indolent at home. And yet, in view of all this, he leads him into temptation, moral and physical. Or, rather, he permits him to go in the way of temptation, when he knows, or might know, he will be likely to fall; which is about the same thing.

Now, would this have happened had there been a medical man at hand, to whom the public were accustomed to look in such cases, and in whom they were willing to confide? Would it have happened in a neighborhood where the right use of physicians was fully understood? This last young man appears very well, thus far; but the end is yet to come. I have no doubt — it is impossible for me to have — about the final results. He will lose his elasticity and vigor entirely, within a few years; and perhaps, too late, be ordered away to a farm, in hopes of a restoration.

But a better day is coming. The hearts of fathers are beginning to be turned towards children. In other words, the importance of early education is beginning to be acknowledged. I do not say it is beginning to be *felt*; but it is something gained to a good cause, when men begin to compliment it.

Physical education, I grant, lags behind the rest, and I fear will do so till the truest, noblest offices of the medical man are better understood. It will do so till they who know its value; and possess a good share of the true missionary spirit, make more sacrifices in its behalf than they have yet been willing to make.

Parents, as yet, have very little idea of the manifold advantages they would derive from being able to sit down at the very threshold of their little ones' lives, and ask how they shall manage them. A good physiological chart of an infant child would be worth more to the wise and docile parent — at least might be made so — than hundreds of dollars.

The physician, with such information as the parent could furnish, will be able to determine, almost to a certainty, to what diseases a child is inclined by inheritance, as well as to what other diseases he will, by his temperament and constitution, and probable education, be exposed hereafter. He will be able, also, with such facts as the foregoing to aid him in setting out, to direct as regards dress, clothing by night and day, amusements, studies, diet and regimen, bathing and cleanliness, and medicine. For though the general principles I have laid down in these Lectures are applicable to all, there are particular modifications and directions to be made to meet the circumstances of each individual.

Parents must not suppose they understand the particular constitutions of their own children better than the physician of hygiene. They may know something; but the physician, who is worthy of the name, will know much more, because he is better able to dissect their character than parents, in general, possibly *can* be.

Thus, suppose the question to be raised in regard to a child's food. Now, divine Providence has settled what that shall be

till he has teeth ; but after that, what shall he take ? O, “ he likes this,” and “ he likes that ;” and “ this agrees with him,” and “ that does not ;” we are told. Parents should know, in the outset, that all these likes and dislikes do not amount to much. Not, by any means, that they are to be turned out of doors. They are to be remembered, and to some extent regarded ; but our appetites are *fallen* appetites. A child who is a year old may be very fond of peaches, for example ; but if his digestive powers, by reason of a scrofulous constitution, are feeble, he cannot bear them. They will cause acidity and flatulence, and diminish the amount of elasticity and vigor.

The parent may not know this, and may even think the peaches agree with him ; and that the acidity, instead of being caused by the fruit, is caused by something else, or perchance *comes of itself*. So in regard to other things. The physician, along with the parents, will judge far better than the parents can alone.

You see, therefore, how much ground these physiological examinations of which I have spoken should cover, especially in the case of very young children, to whom, of course, they are most important. You see that they would cover the whole ground of physical education—a subject which can never be too much magnified.

But it is not *little* children, alone, who may be made the subjects of physiological examination. Nor is it one examination, merely, to which I would call public attention. Some dentists examine teeth quarterly. I will not say whether *these* examinations should be quarterly or yearly ; but they might profitably be frequent, and might include older persons as well as younger ones.

“ Is the physician to do this gratuitously ? ” you will ask.

Not at all. You must expect to pay him. And if prevention is worth more than cure, you can well afford to pay him. A reasonable compensation for a reasonable amount of this kind of instruction would be one of the most profitable investments a parent could possibly make. There is no fee I would so willingly pay as that of a wise physician, for sitting down with me and my family, and assisting, once a year or so, in these physical and physiological examinations.

In regard to older children, and adults generally, I suppose the importance of their own experience will be still insisted on. And be it remembered, I do not reject this experience. Yet much of it, by reason of our having been trained wrong, physiologically and morally, is false experience, and is worth very little. Any wise man who has studied this subject to the bottom, and made a sound physical examination, can tell an individual how and what he should eat, drink, wear, &c., and how he ought to exercise, sleep, &c., a hundred times better than he can himself tell, in his depravity and ignorance. I know this doctrine will by fools be sneered at; but truth has been sneered at before.

In giving to parents for the sake of their children, or to them or any other individuals for their own sake, what I have called a chart, whether verbal or written, I would have particular reference to those habits, and that course of life, which should be likely to harden and thoroughly renovate the constitution. The particulars of such directions, of course, cannot be given in a lecture; but the main idea may be illustrated by practical examinations, at the homes and firesides of those concerned. More time is required than can usually be given in examinations which are made public.

There is one application of this great principle of physiological examinations which would be productive of immense

benefit to the world, without waiting for a new generation. I refer to the examination every where of candidates for the gospel ministry. There are more Timothies and fewer Pauls now than there were eighteen hundred years ago; and yet the ability to "endure hardness" has diminished, while the necessity has increased.

Connected, therefore, with each of our "schools of the prophets," should be a BOARD OF PHYSIOLOGICAL EXAMINATION; and no young man should be permitted to pursue a theological course of study till he has passed the ordeal, and been approved. Along with his certificate of approbation should also be a prescription with regard to his future course as regards diet and regimen, for a certain number of years; and if after being approbated, he should depart from the general tenor and spirit of the prescription, he should be liable to be refused a license to preach. These examinations should of course include the candidate for a foreign missionary field, to whom, by the way, it would be peculiarly applicable. Something like this, had it been put in operation thirty years ago, might have saved hundreds of valuable lives, to say nothing of its pecuniary advantages. It might have placed the cause of foreign missions on a footing which, at the present rate of proceeding, it will take at least a century to attain, if not a thousand years.

The question may have often come to your minds while I have been speaking, "Why has not the kind of work you mention always been done by medical men? They must see its importance; they cannot help it. How, then, is their long neglect of it to be accounted for?"

In the first place, they follow their profession as the mere tradesman or mechanic does his — to get a living by it. They do not follow it as a means of doing good. They do

not pursue it as a matter of mere philanthropy. They do not even pursue it as a means of personal improvement, though that were still mere selfishness.

A young man who had just set up business, and who was as little inclined to a benevolent course of life as almost any other physician that could be named, said to me, one day, "No man ever ought to practise medicine for money. He should do it from pure benevolence."

But young men soon become older ones, and fall into a routine of business that excludes, almost entirely, all thoughts higher than, "Who will show us any good?" The idea of improving themselves and their profession is the highest aim they have, and very few of them ever soar as high as that.

Secondly. As they pass on, the love of money begins to grow, as it not unfrequently does in old men. The love of pleasure had probably obtained a lodgment long before. But now the desire of accumulating property has come in; and not merely come in, but has taken possession. In short, they are miserly.

The one great object, now, is to accumulate property; not, indeed, to become greatly wealthy: from all such thoughts they would shrink at first. But the aim would be to obtain a competence, a sum sufficient for all the purposes of an ordinary family. Not the necessaries of life merely, but its luxuries — such, at least, as may happen to be in fashion. But their desires grow quite as fast as their gains, and probably a little faster, unless the gold, silver, houses, lands, and stocks of medical men are unlike those of other people. And the result is, that, instead of having more leisure for philanthropic effort than they had at first, they seem to themselves to have less and less.

Thirdly. Prior to all this, however, one thing is to be

recollected — that their medical education has been such as to unfit them entirely for performing what I have shown to be their right and proper offices, except so far as mere cure is concerned. Is this doubted? Let us then look at it.

To teach mankind the art of preventing disease, and manufacturing health, they must of course understand those laws which govern the human frame in health as well as in sickness. In other words, they must have a good practical knowledge of hygiene; but this they usually have not obtained.

Is it so, then, you will say, that physicians are not taught, as a part of their profession, the laws of health? It certainly is so. Not that every one is destitute of this knowledge, entirely; for here and there an individual acquires it after what is usually called his course of study is completed. But few, if any, acquire it at the medical schools.

They study anatomy and physiology, it is true. These are, often, the first lessons assigned them; but the physiology gives way, usually, to anatomy, and that to a little knowledge of the body through the medium of dissections, with a view to its pathology. The student, instead of fixing his eye on the great facts before him, and making the proper deductions, is continually looking forward, and, as he supposes, higher. He studies physiology, but it is as a mere illustration of anatomy, and as a preparation for surgery, materia medica, and pathology. He knows something of structure, a little of functions, but almost nothing of relations. Nor do his after studies add much to his stock of hygiene, or even of physiology.

Fourthly. But if physicians are duly prepared for the performance of this noblest part of their office, it would seem to avail little at present, since the public are trained to demand nothing more than what they now receive. They seem

willing to blunder along as they have hitherto done, time immemorial. They are willing to go on in their transgressions; but when the penalty comes to be imposed, — whether the death penalty or something short of that, — they cry out. They make good the old couplet, —

“No man e'er felt the halter draw  
With good opinion of the law.”

They blunder on, and when they are deep in the slough, are ready to call on Hercules for assistance.

I grant that physicians ought to be self-denying enough to step out of the ordinary routine of public demand, and offer, gratuitously, what is not yet called for. But this self-denial — it might even amount to self-sacrifice — can, after all, hardly be expected. They are not prepared for this, and they know it.

Do you ask when they *will* be prepared? Just when there is a strong public demand, and not one moment before. No profession will ever reform itself — certainly no one which is situated like the medical. The priest will be graduated by the people. If the people love to be humbugged out of money, and health, and life, they can and will be.

But let them but make a strong demand that physicians shall teach the laws of health and life, and manifest a willingness to pay them, and the difficulty will soon be got over. If it should not be so, the circumstances will present an anomaly in the history of the world and of human nature. For it has hitherto been a well-known fact, that in a country like our own — a Yankee country — there is a tendency in the market to supply the demand. Let any thing be demanded which, in the nature of things, the country can produce, and it will soon be found. So with regard to preventive

physicians. Let there be but a strong demand for them, and they will be forthcoming. They will study anatomy, and physiology, and hygiene, with a view to understand and teach them, at least as far as they can be taught with profit to the world.

Fifthly. There is, however, one more very important reason why medical men have not (and in the present state of things are not likely to do it) attended to the matter under discussion. Perhaps this has a more paralyzing tendency than any other.

They are paid in a way which presents no motive to sanitary efforts. The more sickness, the greater their receipts, and the contrary. In order to interest them in the means of preventing disease and promoting health, we should pay them according to the degree of exemption from sickness in society, and not according to the amount of disease.

It is said that in some of the Oriental countries they are beforehand with us in this important particular. It is said — though I know not with how much of truth — that physicians have a salary which is varied according to the rise and fall of the scale of public health. If general health prevails and increases, their salary rises; if sickness prevails and increases, it is lowered in proportion. Under these circumstances, no intelligent body of physicians, in any country of the wide earth, would ever remain long stationary in the mere ranks of the curative. The prevention of disease would immediately become a matter of pecuniary interest, and would receive a full share of attention.

I do not, of course, place implicit credence in the received opinion that medical men are accustomed to make their patients worse, and keep them so, for the sake of making out a long bill against them for services and medicine. I do not

believe such a charge against physicians of any school could often be substantiated. On the contrary, I think it argues very much in their favor, as a profession, that this does not often happen, especially as our mode of employing and paying them presents the highest possible motive to such conduct — so far, I mean, as mere pecuniary interests are concerned. Few of the professions or occupations of mankind would be proof, I fear, against temptations so powerful.

Here, I am well aware, I shall not be able to excite the sympathy of “priest or people.” Medical men of the different schools, though they would not themselves make such a charge against their opponents, are rather apt to pander to a perverted public sentiment, and leave untouched an impression which they might do much to remove. These, of course, will not sympathize with me. And as for the mass of the non-professional, they will say, “O, he is an old-school man, after all; at least he was educated so. Can the Ethiopian change his skin or the leopard his spots? We know he is pretty liberal, but he will always retain a spice of partiality for his profession.”

Be it so, then; for of this the public must judge. Old school or new school, I am not conscious of any partialities that would lead to misrepresentation or concealment. I ask the favor of no man any further than I deserve it; nor his good opinion of my aim and intention. In truth, I have nothing to do with different schools of medicine. I am as entirely aloof from them as if I had never belonged to a medical society. If I but do my duty to the generation to which I belong, it will hardly be asked, a hundred years hence, what my views were of disease — of pathology or therapeutics.

But I have said already — and have no desire to retract

any thing I have said on the subject — that, owing to the position of medical men, both individually and socially, there is no hope of reform from any efforts of theirs. At least, they will never be the first to move. When the reform is fairly under way, some of them will be ready and willing to join in it.

“Where, then,” you will again ask, “shall the reform begin, and what is our hope? For if medical men will not move to enlighten the public mind, and that mind, being unenlightened, will not move, we see not but we must sit down in despair. Or are we to hope, in these days, for miraculous interposition?”

As to miracle, that is out of the question. We shall have no millenniums, except such as, under God, we ourselves make. We shall have no reform in regard to the right use and right employment of physicians, either now or at any future time, in any other way than by our own exertions, accompanied, or rather followed by, the divine blessing.

Observe, however, I have not said that there is *no possibility of any* aid from medical men. I only say it is not to be expected — hardly to be hoped for. And yet God, in his infinite wisdom and goodness, may yet move the hearts of some of our leading physicians to make the self-denial and self-sacrifice to which, as it seems to me, both philanthropy and religion loudly call them. Let us devoutly labor and pray for a consummation so highly conducive to human happiness.

## APPENDIX.

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NOTE A. Pages 324, 351.

### FRUITS AS FOOD.

WHEN I speak of bread or breadstuffs, as of the first importance in human diet — as occupying the centre of the table, &c. and of fruits, as occupying the second place or rank, I mean only that the former is the stronger kind of food, and should be, as it were, the basis. It were a very different question, which should be consumed in greatest quantity, though by no means a question difficult of solution.

Some have contended that the word *bread*, which figures so largely in holy writ, and is almost always placed first in order, either, for the most part, means fruit, or includes it. How this may be, I do not know. That mankind, if trained properly, might subsist almost entirely on well-selected fruits, I have no doubt; but whether it would conduce to the best interests, physical, intellectual, and moral, of the race, is less certain. For one, I do not believe it would. I have, indeed, among many other experiments in hygiene, made one which has a bearing in this direction. I lived on fruit almost wholly for nine successive days of the year 1852, with no inconvenience, and with even an increase of gustatory enjoyment, and of intellectual and animal vigor. But I commenced the experiment with a slight bowel complaint, (and, in truth, recovered under it,) so that the circumstances were not favorable for making those inferences which would be of much service to the healthy. I may safely say this, however — that the more I live on fruits, provided I do not use them in excessive quantities, — which from my great fondness for them I am liable to do, — the better and stronger I am. And I have observed the same result in others. My most decided opinion, therefore, is, that, in this country of abundance of fruit, both

domestic and foreign, every adult might advantageously be trained to make three fourths of his diet, by weight, of fruits. His breakfast might, as a general rule, be made almost wholly on fruit. For my own part, I prefer such a breakfast for the year together. The dinner, as I think, might and should include some of our farinaceous or mealy vegetables, such as potatoes, rice, peas, beans, chestnuts, or squashes. Of course these should be boiled, and *well* boiled. Or at least they should be *cooked*. But here, even, at the dinner table, fruits should constitute, in bulk, more than one half. In the present state of society, trained as we are, I would omit them almost entirely at the third or evening meal. That should consist of dry bread, or some other comparatively dry farinaceous substance.

My reasons for supposing that neither the farinacea alone, nor fruits alone, are adapted to the best interests of man, are various. Some of them have appeared in the foregoing lectures; but others have not yet been adverted to. The food assigned us at the creation appears to have been fruits and farinacea; and the frequent allusion, in the Scriptures, to "corn and wine" seems to sustain, as it were, the divine decree — wine being the representative of the fruits or their unfermented juices. Then, again, most of the farinacea are too nutritious to be used for many meals in succession, without a due admixture of something far less so. The potato and several esculent roots do, indeed, meet this necessity of the system, to some extent; but not in every particular. The cooling, antiseptic or antiputrescent properties of the fruits are greatly needed to correct that heat of the blood and overfulness of the vessels which are apt to occur in summer and autumn, and are ever liable to follow from living too exclusively on such highly nutritious articles as bread, rice, peas, beans, &c. Nor is this all. There is a positive as well as a negative effect on the living organism produced by fruit, which, in the present state of our knowledge, it may not be easy to account for, or explain, but of which he who has had experience in its use is most fully assured. In short, did the limits of a work like this, and my original plan, permit, I should like to present a birdseye view of the whole argument. Has the reader, by the way, read a new English work entitled "Fruits and Farinacea the proper Food for Man," by John Smith?

## NOTE B. Page 325.

## NUTRITIVE PROPERTIES OF DIFFERENT KINDS OF FOOD.

In speaking of the comparative amount of nutritive matters contained in different articles of food, it is usual to refer to the experiments of MM. Percy and Vauquelin, of France, and Sir Humphrey Davy, of England. The following table was prepared for my work on Vegetable Diet, and may be seen at page 269 of the last edition of that volume:—

Of nutritious matter, —

Wheat contains	85 pounds	in 100.	Bread (average)	80 pounds	in 100.
Rice	90	“	Meat (average)	35	“
Rye	80	“	Potatoes	25	“
Barley	83	“	Beets	14	“
Peas	93	“	Carrots	10 to 14	“
Lentils	94	“	Cabbage	7	“
Beans	89 to 92	“	Greens & turnips	4 to 8	“

It must be obvious, on the least reflection, that these are only approximations to the truth; and that, in a brief space, we can have nothing more. Thus the potato is here said to contain twenty-five per cent. of nutriment; but it may, and doubtless does, vary from ten to twenty-five; the latter being the probable maximum. The soft, watery, sodden potato has not half the nutriment of the fine-grained, mealy article. The same remark is applicable to most other farinaceous articles. Again: it does not follow that he who receives these various articles of food is able to extract all the nutriment they contain. Much depends on the state of his stomach as regards emptiness, tone, vigor, &c. And probably no one ever extracts all the nutriment from several articles in the list, such as rice, beans, peas, &c. Of fat, which is pure nutriment, few persons can extract one fiftieth.

When I say *probably*, I use too mild a term. It is pretty well settled, by the experiments of Goss, Whitlaw, and Beaumont, that the stomach does not attempt to manufacture into chyme all that is crowded into it. What gastric juice it has energy to form, it *does* form, and no more. So that, when it has finished its work, if one fourth or one half the contents of the stomach remain unchanged, there is no remedy.

This portion, then, of the contents of the stomach remains there for a time, — I mean in the case of feeble stomachs, —

and causes sensations of dulness, heaviness, or uneasiness. There may also be flatulence, acidity, heartburn, or even pain. In general, however, in those who are tolerably healthy, there is no report sent up to the brain, of any sort, at least directly. The mass of which I have spoken is gradually dissolved by such fluids as happen to be present in the stomach, after the gastric juice is withheld, or which are introduced afterward, and without being acted upon by the gastric juice, is propelled slowly, and from time to time, into the small intestines. Here, in the form of a half-liquid substance, it is absorbed, — except such portions as the system has no power to dissolve, — and carried into the circulation, to be conducted away, through the kidneys and skin. The stones, skins, and seeds of fruits, the hulls and skins of grain, and *jackknives* are disposed of in another manner.

NOTE C. Page 326.

#### SUPERIORITY OF UNFERMENTED BREAD.

MY views of the superiority of unfermented bread are not new. Dr. Cullen, who will not be suspected of dietetic heresy, — since he wrote almost seventy years ago, — says as follows : —

“ In Scotland, nine tenths of the lower class of people — and that is the greater part of the whole — live upon unfermented bread, and unfermented farinacea in other forms ; and at the same time, I am of opinion that there are not a more healthy people any where to be found. In the course of fifty years that I have practised among them, I have had occasion to know this, and have hardly met with a disease, of any consequence, that I could impute to the use of unfermented farinacea.”

Dr. Whitlaw, in his *New Medical Discoveries*, after quoting Dr. Cullen, says thus : —

“ In America, Asia, and Africa, and some parts of Europe, rice, Indian corn, peas, beans, and barley are used in an unfermented state, notwithstanding the people enjoy as good health as those who eat fermented bread.”

Mr. Graham, in his *Science of Human Life*, has the following remarks : —

“ Aside from the changes that are produced by the process of fermentation, there are many other considerations why

unleavened bread, of a proper quality and age, is better adapted than any other to sustain the alimentary organs and general constitution of man in their best and highest condition."

A more recent authority is that of Professor Thomson, of Glasgow, in his work on the Food of Animals, at page 161. After alluding to the facts referred to above by Dr. Cullen, and many other kindred facts, he thus observes:—

"With such an experience under our daily observation, it seems almost unnecessary to remark that the Jew does not labor under indigestion, when he has substituted, during his passover, unleavened cakes for his usual fermented bread; that biscuits are even employed when fermented bread is not considered sufficiently digestible for the sick; and that the inhabitants of the northern parts of India and of Afghanistan very generally make use of unfermented cakes.

"Such, then," he adds, "being sufficient evidence in favor of the wholesomeness of unfermented bread, it becomes important to discover in what respect it differs from fermented bread. The result gained by this process (fermentation) may be considered to be merely the expansion of the particles of which the loaf is composed, so as to render the mass more readily divisible by the preparatory organs of digestion. But as this object is gained at a sacrifice of the integrity of the flour, it becomes a matter of interest to ascertain the amount of loss sustained in the process. To determine this point, I had comparative experiments made, upon a large scale, with fermented and unfermented bread."

One of the parcels upon which he experimented was fermented in the usual manner, by a process in which saccharine matter is changed into carbonic acid and wine, and thus much of the vitality of the bread lost; and the other by means of hydrochloric or muriatic acid, and carbonate of soda, which leaves in the bread a mere residuum of common salt.

"The result of my experiments upon the bread produced by the action of hydrochloric acid upon carbonate of soda has been, that, in a sack of flour, there was a difference in favor of the unfermented bread to the amount of thirty pounds thirteen ounces; or, in round numbers, a sack of flour would produce one hundred and seven loaves of unfermented bread, and only one hundred loaves of fermented bread of the same weight. Hence it appears that, in the sack of flour, by the common process of baking, *seven loaves, or six and a half per cent. of the flour*, are driven into the air and lost."

The italicising in the last paragraph is my own, for it is an important point. Here is a dead loss, by the common or fermenting process, of more than one sixteenth of the nutriment in a sack of flour, or three hundred and sixty-four pounds, to say nothing of the gain in having the loaves duly salted, — which some would *think* an advantage, — while there is no gain to set off against all this loss, according to Dr. T., but the saving of a little labor to the teeth and salivary glands. A very doubtful gain, even this — small as it is!

NOTE D. Page 336.

#### EXPERIMENTS IN CHYMIFICATION.

I HAVE alluded, at page 55, to the experiments of Dr. Beaumont, of Plattsburg. As was there stated, I have witnessed some of them. I have also before me, in his book entitled *Experiments on the Gastric Juice*, a table, of which I make the following abridgment.

But before directing the reader's attention to the curious and instructive facts it contains, I must warn him against making too much of them. They do not prove all they seem to prove. The rapidity of digestion, (chymification,) as the author himself shows, and as Dr. Pereira has stated after him, varies greatly, according to the quality eaten, the amount and nature of the previous exercise, the interval of the preceding meal, the state of health, &c. ; also of the weather, and the state of the mind. Whereas in hardly any of the experiments have these conditions been complied with. And, then, finally, a thing may be slower of chymification, and yet, for that very reason, less irritating and more healthful. It does not follow that because a thing is changed sooner, it is changed better.

Nor is this the worst. Dr. Beaumont had access to the *stomach* only ; and all his observations have reference to the mere *chymification* of food. This, as you know already, is only *one process* of the work of digestion. An equally important part of this great work is performed by aid of the bile and pancreatic juice, in the small intestines, quite beyond the stomach — a region which Dr. B. was not permitted to explore. Really, therefore, his table, and in truth his whole work, is nearly worthless, except to a very few, who have the leisure and the ability to make the proper deduction and discrimination.

But let us come at once to the table I promised ; only pre-mising that other experiments, made by Goss, of Geneva, and Whitlaw, of Scotland, go far towards sustaining the same views with those of Beaumont.

Articles.	Preparation.	Time.	
		Hours.	Min.
Apples, sweet, mellow,	Raw,	1	30
Apples, sour, mellow,	"	2	00
" " hard,	"	2	50
Aponeurosis,	Boiled,	3	00
Bass, striped, fresh,	Broiled,	3	00
Barley, bolted,	Boiled,	2	00
Beans, pod,	"	2	30
Beef, fresh, lean, rare,	Roasted,	3	00
" " " dry,	"	3	30
Beefsteak,	Broiled,	3	00
" with salt only,	Boiled,	3	36
" with mustard,	"	3	10
" fresh, lean,	Fried,	4	00
" old, hard, salted,	Boiled,	4	15
Beets,	"	3	45
Brains,	"	1	45
Bread, wheat, fresh,	Baked,	3	30
Bread, corn,	"	3	15
Butter,	Melted,	3	30
Cabbage, head,	Raw,	2	30
" with vinegar,	"	2	00
Cake, sponge,	Baked,	3	20
Carrot, orange,	Boiled,	3	15
Cartilage, (gristle,)	"	4	15
Catfish, fresh,	Fried,	3	30
Cheese, old, strong,	Raw,	3	30
Chicken, full grown,	Fricasseed,	2	45
Codfish, cured, dry,	Boiled,	2	00
Corn, green, and beans,	"	3	45
Custard,	Baked,	2	45
Ducks, domesticated,	Roasted,	4	00
" wild,	"	4	30
Eggs, fresh,	Boiled hard,	3	30
" " "	" soft,	3	00
" " "	Fried,	3	30
" " "	Raw,	2	00
" " "	Whipped,	1	30
Flounder, fresh,	Fried,	3	30
Fowl, domestic,	Boiled,	4	00
Gelatine, "	"	2	30
Goose,	Roasted,	2	30
Heart,	Fried,	4	00
Lamb, fresh,	Boiled,	2	30
Liver, beef,	Broiled,	2	00
Milk,	Boiled,	2	00

Articles.	Preparation.	Time.	
		Hours.	Min.
Milk, . . . . .	Raw,	2	15
Mutton, fresh, . . . . .	Roasted,	3	15
“ “ . . . . .	Broiled,	3	00
“ “ . . . . .	Boiled,	3	00
Oysters, fresh, . . . . .	Raw,	2	55
“ “ . . . . .	Roasted,	3	15
“ “ . . . . .	Stewed,	3	30
Parsnips, . . . . .	Boiled,	2	30
Pig, sucking, . . . . .	Roasted,	2	30
Pigs' feet, soused, . . . . .	Boiled,	1	00
Pork, fat and lean, . . . . .	Roasted,	5	15
“ recently salted, . . . . .	Boiled,	4	30
“ . . . . .	Fried,	4	15
“ steak, . . . . .	Broiled,	3	15
Potatoes, Irish, . . . . .	Boiled,	3	30
“ “ . . . . .	Roasted,	2	30
“ “ . . . . .	Baked,	2	30
Rice, . . . . .	Boiled,	1	00
Sago, . . . . .	“	1	45
Salmon, salted, . . . . .	“	4	00
Sausage, fresh, . . . . .	Broiled,	3	20
Soup, barley, . . . . .	Boiled,	1	30
“ bean, . . . . .	“	3	00
“ beef, vegetables, and bread, . . . . .	“	4	00
“ chicken, . . . . .	“	3	00
“ marrow bone, . . . . .	“	4	15
“ mutton, . . . . .	“	3	30
“ oyster, . . . . .	“	3	30
Suet, beef, fresh, . . . . .	“	5	30
“ mutton, . . . . .	“	4	30
Tapioca, . . . . .	“	2	00
Tendons, (whitleather,) . . . . .	“	5	30
Trout, salmon, fresh, . . . . .	“	1	30
“ “ “ . . . . .	Fried,	1	30
Tripe, soused, . . . . .	Boiled,	1	00
Turkey, domesticated, . . . . .	Roasted,	2	30
“ wild, . . . . .	“	2	18
“ domesticated, . . . . .	Boiled,	2	25
Turnips, flat, . . . . .	“	3	30
Veal, fresh, . . . . .	“	4	00
“ “ . . . . .	Fried,	4	30
Venison steak, . . . . .	Broiled,	1	35

The candid and careful reader can hardly fail to make the following deductions from the foregoing, in corroboration of what I have stated in the progress of my lectures.

1. That, so far as reliance can be placed on these “approximations,” animal food is slower of chymification than

vegetable. The abridgment was made indiscriminately -- all the omissions were of articles not much in use, without any reference to their character, whether animal or vegetable. Yet, on a fair comparison, it will be found that the average time required for the chymification of dishes prepared from flesh and fish and the products of animals is three hours and two minutes, while the average time required for the chymification of vegetable dishes is only two hours and eight minutes, making a difference of fifty-four minutes, or almost an hour, — or nearly one third of the whole time, — in favor of the latter. I find, however, by examining the whole table, without abridgment, the difference is only about twenty-five minutes. But even this is very considerable.

2. That soups are slower of chymification than more solid food. Seven kinds of soup consume an average time of three hours and thirteen minutes. This is more than the average time required for the chymification of animal food.

3. It will be also seen that green vegetables, such as cabbage, are changed in the stomach more rapidly when condiments are added than when alone. So also meats, such as beefsteak.

4. It will be seen, once more, that, other things being equal, meats are generally rather quicker of chymification when boiled than when cooked in any other manner.

5. That fruits, so far as experimented on, are quicker of chymification when mellow and sweet than when hard or sour.

NOTE E. Page 370.

POISONED MILK, BUTTER, &c.

IN Lecture II., as well as in the passage to which this note refers, I have spoken of the poisonous character of cheese. But it is not easy to conceive of cheese as injurious, and yet butter and milk innocuous. Reasoning *a priori*, we should expect to find them at times deteriorated, if not absolutely hurtful.

But we have facts and testimonies; and some of these have been gathered since my lecture on digestion went to press, otherwise they might have been appended to it in a note. It appears most clearly, that many plants and grasses, especially when the ground is stimulated by strong, acrid,

recent manures, if eaten by animals, poison them in a degree and sometimes cause death. This is particularly true of the poison sumach, the poppy, the spurge, and the buttercup.

But where the animal gives milk, it appears that, instead of suffering in its own system from the poison, the latter is absorbed and carried into that fluid, to poison the calf or the human being that receives it — whether it is received in the form of milk, butter, or cheese. Whether the milk disease, as it was called, of the west, which was common a few years ago, — and perhaps still exists, — had its origin in any such source, I am not informed. But I promised facts, and facts you shall have.

In the year 1825, Dr. Renick, of Chillicothe, Ohio, wrote to Governor De Witt Clinton, concerning a certain vegetable in that region, as follows : —

“ This vine or weed, whatever it may be called, grows in moist land, or round the edge of swamps, and perhaps is the most poisonous vegetable that grows. Horses, cattle, and sheep feed on it in the fall. It very often proves fatal in a few hours. The first symptom is a trembling and weakness in the limbs. The cow that gives milk is not affected with it so long as she is regularly milked ; but the milk is certain death to any animal, human or brute, that uses it to any extent. The flesh of any animal that dies with it also becomes fatal to the dog, the wolf, the eagle, or the buzzard, that takes a full meal of it. The use of the milk has proved fatal to a great number of people.”

These views of Dr. Renick are very striking, but doubtless perfectly reliable. I was, I confess, not a little surprised to find that domestic animals would eat this species of rhus, or sumach, — for this it proved to be, — for it is not usually so at the eastward and northward. But in Western New York and Upper Canada, a few years later, Dr. Whitlaw informs us he learned of the same result. “ I was informed,” says he, “ that infants on the breast had been poisoned through their mothers’ using the milk of cattle which had been fed on the rhus, while the mothers themselves received no injury.” It is worthy of note, too, that, according to Dr. R., the flesh of animals that eat poisonous food is not very healthy.

The buttercup, or *ranunculus*, is not so poisonous as the sumach, but according to Dr. Bigelow, of Boston, Dr. Murray, and others, is a very active poison, and before cantharides

began to be used for blisters, was applied to the skin by physicians, for similar purposes. It is even said that the fresh juice of it will produce a blister almost immediately. Orfila, who is high authority, and who has made experiments on it, confirms the general opinion of its poisonous character. So also Haller, the physiologist.

Dr. Whitlaw says, "The dairy cows of London feed on buttercups and other poisonous plants, cut in the summer for food: there is not one out of twenty but have diseased livers. When the cattle are fed as above, the stomach, bowels, liver, and the whole viscera become inflamed and ulcerated; the matter and bile mingle with the chyme and chyle, pass into the circulation, and form part of the body of the animal, rendering the flesh a corrupt mass of disease, and highly injurious to those who eat it. The milk, butter, and cheese are still more pernicious."

He goes on to say, "I will give the result of an experiment I made on the milk of a number of cows fed on the best pasture in Hyde Park, where a poisonous weed is not to be seen, and the milk of a number of cows fed on the above poisonous weeds, cut and carted to them in their green state. The two sorts of milk were mixed in separate dishes, with a proper quantity of rice in each, and put into the oven to bake, without any other ingredients. The first sort, the whole of its properties combined with the rice, and made an excellent pudding; even the oil was scarcely observable on the top; and when taken out of the oven, it had an agreeable smell. The poisonous milk, the properties of which separated in the baking, parted with a portion of its oil, and it floated on the top, and had a loathsome, disagreeable smell. The albumen appeared in acrid, indigestible curds, and the whey tasted like mustard whey, and was strongly impregnated with bile.

"When we consider that such milk forms the principal food of children, as well as the corrupt milk of their mothers, composed of the assimilated juices of bad food, the use of such milk and animal food, given in their infancy, I pronounce to be one of the most fruitful sources of disease that can be imagined."

"The true cause of gastric fever is," he says elsewhere, "the use of milk, butter, and the fat of diseased butcher's meat, when sheep and cattle are fed on pasture where the ranunculus or buttercup and other poisonous plants abound."

Speaking of cancers, which are becoming common in all densely-populated regions, he says, "The next fatal disorder [to bronchitis] is cancer. As to its chief cause, I boldly assert it to be buttercup, and pledge myself to prove it; and will challenge the faculty to produce a case of cancer where the buttercup does not grow. I could immediately excite inflammation and cancer, by giving the buttercup, butter, and butcher's meat to eat."

But the poppy is much at fault, it would seem, as well as the buttercup. It grows largely in the mowing fields about London and the large cities of the East. Orfila has shown that it is poisonous. Dr. Whitlaw says, —

"I have travelled over a large portion of the globe, but never witnessed a parallel to what I have seen in England — the horses, like the people, with diseased blood vessels, and the veins of the legs of the former varicose. It is common to see cartloads of green clover and poppies, and grain and poppies, brought into town to feed the milch cows. It is true the cows are not so much affected as the horses, for the poison passes off by the milk vessels, and the milk is regularly served out to the inhabitants of this great city, [London,] particularly the children. A portion of green fodder is free from the above plants; and if all fodder were, it would be a fortunate thing for the public, especially for the cooks, who would rejoice at getting the milk free from the poison, as it would prevent many a mishap to their puddings, pies, &c., that contain a portion of the milk from cattle fed on poppies."

Euphorbium, or spurge, is another plant which is said by Orfila and others to be extremely poisonous. There can be no doubt that, when eaten by cows and fattening cattle, it poisons the milk of the former and the flesh of the latter. The results of Orfila's experiments are very striking; but I cannot enter into further detail.

Butter, as it will be perceived by the above extract and authorities, comes in as one of the accused. In a list of diseases and their predisposing causes prepared by the last-mentioned writer, it figures more largely still. Here is a specimen: —

"*Chicken Pox.* Caused by milk.

"*Cold and Cough.* Acrid food, salt, bad butter, and fat.

"*Bilious Fever.* Bad butter, the fat of meat, and other acrid substances.

"*Miliary Fever.* Poisonous substances contained in the

milk, butter, and the fat of meat, excited by hot liquids and regimen.

“*Scarlet Fever.* Poisons received through the mother’s milk.

“*Rheumatic Gout.* Wine, salt, bad butter, and cold damp.

“*Bleeding at the Lungs.* Acrid substances, particularly the poppy and the buttercup.

“*Measles.* The poisonous virus received through the mother’s milk and that of the cow.

“*Strangury.* Buttercups, cantharides, and other acrid substances.”

At page 226 of his *New Medical Discoveries*, Dr. Whitlaw says, —

“Butter is liable to variety. During the three summer months, its general quality is of a very poisonous nature, and will produce the most acrid fermentation, and, of course, inflammation of the stomach and viscera, severe bilious headaches, bilious fevers, diseased livers, indigestion, and its attendants, terminating, very frequently, in cancer, diseases of the nerves, — particularly that formidable disorder *tic douloureux*, — which, from the most attentive inquiries and observations I have made, proceeds from butter and the fat of meat — the produce of cattle that have been fed on food in which a great proportion of the buttercup and other poisonous plants might be found, — and aggravated by mercury and other drugs so frequently employed by the faculty.”

Of cheese I need not say more than I have said already, unless to close with the following extract from the *New Medical Discoveries*: —

“Millions of seeds, as well as the animalculæ of insects eaten by cattle, after they have passed through the milk vessels of cows, may be found in butter and cheese. They are, of course, in a dormant state, and only require heat and moisture to start them into existence.”

#### NOTE F. Page 378.

##### DISEASED RICE.

“IN 1816,” says Dr. Whitlaw, “I was lecturing at Savannah, in Georgia; and in the winter they began to thresh out the rice on the plantations. Much of the rice was diseased

by insects depositing their eggs in the grain, which changed it to a black or dark-brown color; which might have pointed out to the most superficial observer that the grain was poisonous and unfit for food. The negroes were ordered to pick out the black grain, as it spoiled its sale. Not being the best judges of the qualities of rice, they began to eat what they picked out. All who ate of it were immediately seized with the cholera of India. Many of them, after a hearty breakfast, in good health, were dead by noon.

“The cholera-phobia at once seized the public, more particularly the doctors. They had it dancing in the air like an ignis fatuus; and woe to the man who came in contact with the deadly blast. The people were afraid to breathe, although the weather was clear and cold. They were running from place to place with handkerchiefs at their mouths, and frequently the water streaming out of their eyes, for fear the cholera should leap down their throats. Even the physicians that visited them stood at a distance, and looked askance at the unfortunate children of Ham, but would not come in contact with them.

“A planter came to my room, and told me that the physicians had refused to come to his negroes, and he was afraid he should lose the whole of them; and he wished me to go with him, and see if I could administer any thing to their relief; which I at once consented to do. The first thing I asked was, what they had been eating. A parcel of rice was shown me. The moment I examined the color, I pronounced it to be a perfect poison. The planter doubted; but as they were cooking some of it for their breakfast, to convince them that it was poisonous, I gave some of it to the hounds. They were shy of eating it, but I had some milk mixed with it, when they ate the whole. I tied their mouths to keep them from retching. They all took the cholera that day.

“It was painful to witness the agony the poor hounds suffered. Their bowels became powerfully relaxed. I took off the muzzles from two of them, to see if they would eat any thing to cure themselves. They retched, but the poison had such firm hold of them that they would not move from the place; their faculties seemed to be completely destroyed. They howled most piteously; they grew weaker and weaker, till death closed the scene.

“Had the diseased rice been sent to London and eaten, it

would have produced the cholera; and I have no doubt a cordon of troops would have been placed round the city to prevent the inhabitants from making their escape."

NOTE G. Page 379.

POTATO DISEASE.

DR. WHITLAW speaks of travelling, in 1830, between Belfast, in Ireland, and Stewartstown, where, he says, the land is fertile beyond any he ever saw, but completely covered with weeds. Among these weeds were the buttercup, the scorpion grass, and the dog's mercury — three plants sufficient to disease all the animals and people that inhabit the country. "The pasture fields," he observes, "were covered, in most places, with buttercups and ragweed, growing three or four feet high; and where the cows were wading through them, their backs only could be seen. Large fields of potatoes were mostly covered with water; a man with only a spade might have let it off in two days, and saved the crop. The potatoes from such fields are sure to affect the people with typhus fever — a disease they are now grievously afflicted with."

"The Clutterback fever is nothing more than the potato fever of Ireland. The learned professor might have observed persons who lived chiefly on potatoes, how irritable they become, more particularly when they use ardent spirits, as it stimulates their brain to madness, especially if the potatoes that are made use of were raised in wet or clay soil."

Again he says, "I went to Dublin. I found the practical remarks I had made on the pernicious effects of recent manure verified to a most awful extent in the mountains near Dublin, where the peasantry are in the habit of raising pigs. They save their manure and the manure from the horse, and put it into the beds and rows of potatoes, in a recent state. The potatoes thus manured are sure to give them the typhus fever."

We learn two or three important facts from these statements — the ill effect of water on potatoes; the bad effects of recent manure; and the certainty that potatoes may, from known and obvious causes, become diseased.

## NOTE H. Page 384.

## ULTRA VIEWS ON DIET.

In preparing the foregoing lectures for the press, it was no part of my intention to depart widely from the original text. In other words, it was my object to present to the public, for the most part, a correct transcript of what has actually been given a hundred, if not a thousand times over.

Some, who know my ultra views on dietetics, may be a little surprised that I have not made them more prominent. But I have had my reasons. The public mind has been placed in a peculiar attitude, in relation to this subject, during the last quarter of a century; and though the wheels of revolution are not apt to go backwards, there was, a few years ago, a retrograde motion, which it seemed as useless to oppose, just then, as the downward tendency of a mountain torrent, or of Niagara. I have therefore lectured on other topics, rather than on pure dietetics. And the two lectures in the foregoing series, which occupy a part of the ground, and embrace the general principles of diet, though they go deep enough, for such a course as this, do not go to the bottom of several subjects. The great and weighty arguments in favor of a well-selected vegetable diet, in preference to a mixed one, are not, of course, to be found there. Neither are those which I hold with regard to avoiding medicine, and using no drink but water. A course of lectures on the principles of human diet, independent of the foregoing, may yet appear.

In the mean time, and to show that the friends of a more radical reform in diet are not "behind the age," and have not forgotten its scientific benefactors, — Liebig, Playfair, Boussingault, &c., — I subjoin a table which is founded on the principles and experiments of the above-named gentlemen, and may be relied on as substantially correct. It was copied, in the present article, from Smith's Fruits and Farinacea.

*Proximate Principles and Value of Various Kinds of Grain,  
Roots, &c.*

	Solid matter per cent.	Flesh-forming principle.	Heat-forming principle.	Price per stone of 14 lbs.		Nutri-ment per stone.		Flesh-forming principle pr stone.	
				s.	d.	s.	d.	s.	d.
Wheat, . . . . .	85	21	62	1	6	1	9	7	2
Oats, . . . . .	82	11	68	1	0	1	2	9	0
Peas, . . . . .	84	29	51	1	6	1	9	5	2
Beans, . . . . .	86	31	51	1	6	1	9	5	0
Barley meal, . . . . .	84	14	68	1	2	1	5	8	4
Maize meal, . . . . .	90	11	77	1	0	1	1	9	0
Rice, . . . . .	92	8	82	3	6	3	9	41	1
Sago, . . . . .	88	3,4	84	4	0	4	6	117	8
Potatoes, . . . . .	28	2	25	0	6	1	9	25	0
Beef, . . . . .	25	25	0	7	0	28	0	28	0
Carrots, . . . . .	13	2	10	0	3	1	11	12	6
Turnips, . . . . .	11	1	9	0	1½	1	2	12	6
Beet root, . . . . .	11	1,6	8,5	0	2	1	6	11	1

The first column in the table shows the amount of nutriment per cent. in the various articles; the remainder of the hundred being water. Wheat, for example, contains eighty-five per cent. of solid nutriment, and, of course, fifteen per cent. of water.

In the second and third columns, we may see how this nutriment is divided into flesh-forming and heat-forming principles, according to the views entertained by Liebig and others. The ashes supposed to form the bones vary from one to three per cent., and are omitted in the table.

In the fourth column is given the price of each article in its marketable state per stone. These prices may be regarded as the average for a number of years, in England.

In the fifth column is seen the price of real nutriment, free from water.

In the sixth column, we have the price, per stone, of the flesh-forming principle, rejecting, altogether, the amount of the heat-forming principle.

If the prices in the last column be considered as the real value of each article, then sago and rice are the dearest, beef next, and beans the cheapest. But, until we are better acquainted with the real principles of nutrition, and with the changes effected upon food by the assimilating processes of the animal economy, it will be nearer the truth to estimate all the articles used for human food by the amount of solid

nutriment, including both the heat-forming and flesh-forming principles.

I hardly need to add that the prices are in sterling money, of which one penny is equal to about two cents.

One thing in this table will be a little startling to some. Beef, it will be seen, is put down as containing only twenty-five per cent. of solid matter, and that is wholly nutritious — not a particle of it going to furnish heat, or, as the chemists say, to burn in the lungs. “How is that?” will be the inquiry. “Do our senses deceive us? Does not beefsteak warm us, at least for the moment, more than potatoes or bread?”

There is probably no error in the conclusions of the chemists, as adopted into the foregoing table; but there is certainly much need of qualification and explanation. Beefsteak, pure muscle, — when the fat is all removed, — as the table says, contains only twenty-five per cent. of solid matter, the rest being water. But then, in a natural state, — that is, before the muscle is macerated and blanched, — lean flesh or muscle almost always contains, in the cellular membrane, with which it is every where interspersed, more or less of fatty matter; and fat, as you know, is nearly all carbon, or fuel for the lungs. So that what is true in theory, is not exactly true in practice. Beefsteak, as commonly eaten, does contain a little of the heat-forming principle, perhaps from one to five or six per cent.

But this alone will not account for the sensation of heat, to which most flesh eaters refer, when they compare the immediate effects of a meal of beefsteak and a meal of bread and potatoes. A part of this is, no doubt, referable to habit. It is highly probable that the potato dinner of the Irishman warms him more, for the moment, than would a beefsteak dinner, to which he was as yet unaccustomed. And then, again, the flesh meat dinner is usually accompanied by more exciting and heating condiments than the dinner of bread or potatoes. Let the dinner of bread or potatoes be surrounded by all the cousins and cousins-german which accompany flesh pots, and let the prejudices be removed which flesh eaters are wont to feel when they think of a vegetarian dinner, — enough, in a world of cannibals, to make one shiver at first, — and the temperature of the stomach and of the whole system would be greatly altered. Innervation, after eating and consequent

gastric activity, has much to do with the feeling of satisfaction which the flesh eater always has, but which, too, the vegetarian has before he has had any experience beyond.

But the greatest difficulties which the readers of the foregoing Lectures will feel is of quite another kind. A man, who had seen some of the proof sheets, said to me, the other day, "Your system may be true, sir, but it cuts us off from almost every thing to which we have been accustomed, (alluding to the two lectures which involve remarks on Diet and Cookery,) and leaves us little more than prisoner's fare." I endeavored to show him that, on the contrary, the world of farinaceous vegetables and fruits was so extensive that my great difficulty was in making a selection. He admitted it, but said I made objections to the form or accompaniments of almost every thing. "Why," said he, "I wish to eat and drink what is set before me, asking no questions for conscience' sake. I don't wish to think about my food." It is quite as inconvenient to us, to think about what we shall eat morally. How troublesome to have a conscience! Why not leave every body to enjoy their own opinions, morally and religiously? Why even give the matter any thought? The thoughtless impatient man, is he not the very man to be envied? The moment you wake him up to thought about the future, you only make him miserable. Let him eat and drink, for he dies tomorrow. Is not this true wisdom?

But stop, my friend, and in the fear of God, and the judgment that is to come, here and hereafter, review such opinions as thou wilt then be ashamed of. Has not God made thee susceptible of progress, morally and physically? To this end has he not given thee a gospel? But is not this gospel for the body as well as for the soul? Dost thou not know that it is they who are least conscious of the necessity of a gospel who most require it? And wilt thou, by thy stupidity about the necessity of redeeming the body from its bondage to appetite, and bringing it under law, prove that thou art the very person for whom the gospel was sent — that whatever may be thy fancied attainments, thou art not yet entered, heart and hand, upon the road of progress, but art, physically, if not morally, wretched, and miserable, and poor, and blind, and naked?

But apostrophe apart — it is a well-known fact that from the days of Hippocrates to the present hour there has been

but one opinion among medical men in regard to the importance of diet, in its connection with health and disease, while there has been but one voice among the multitude who have been addressed on the subject, viz., a plea to be let alone, that they may continue their erroneous habits and indulgences. The plea made assumes many forms; but its true intent is, after all, about the same. It is, I say, a plea to be let alone in their sins. Their god is their stomach; and its worship must be undisturbed!

One of the more common and specious forms in which the half-enlightened man is wont to cloak his aversion to freedom from the dominion and slavery of appetite is an expression not unlike the following: "Every person, of much observation, can tell what food or drink agrees with him, both as regards quantity and quality." Yet to what does this statement amount? There is no error in the world of dietetics, which is ever so injurious or intolerable, but may find license under its covert. Somebody will be found with whom the worst articles—judging by such a rule as this—seem to agree. Many things, I admit, are found to disagree, and these it is right and even necessary to avoid; but as to things which *appear to agree* with us, there may be, and undoubtedly is, much error abroad. *Much*, did I say? The world is full of it. It is as impossible, for the most part, to ascertain what agrees with us beyond the limit at which a thing received into the stomach causes irritation or disturbance, as it would be to calculate an eclipse by experience. On this point, the whole world, as it were, lies in ignorance.

Let me illustrate the subject by a familiar example or two. Many a person cannot use strong coffee without perceptible injury. He knows its use to be wrong, by experience. He abstains from it, and he does right. But others do not know that it injures them. On the contrary, they suppose it agrees with them. But *does* it therefore agree with them? They may not be under obligation to abandon its use, merely because some person, even a person in whom they are accustomed to confide, says it is hurtful to them. Whether they should or should not do this, is quite another question. But does it follow that their experience alone determines its usefulness to them? What, then, becomes of science, which establishes the fact that coffee always acts injuriously, in a greater or less degree, on the liver, and that, though it is more

hurtful — i. e., more immediately so—to some persons than to others, it is nevertheless of more or less evil, in its effects, to all who use it?

The confirmed tea drinker often thinks her favorite beverage is not only uninjurious to her constitution, but that it agrees with it. It relieves her pains and nervous affections almost immediately. Can she, then, be mistaken, in regard to its beneficial tendency? Yet science shows that she *is* mistaken. For though it relieves her pains, it prepares the way for acuter suffering at the next recurrence, or for a longer continuance of it. Nay, more than this might be said. It is those, for the most part, with whom tea or coffee seems best to agree—judging of it by mere experience—who are, in the end, most injured by it.

So it is with a hundred other things, at least in a degree. The principle is the same. Some thirty years ago, I drank a small quantity of French brandy, for some time, with my dinner. Judging from experience, merely,—a very limited one,—it agreed with me most admirably. My digestion appeared to be improved by it. Was it, therefore, beneficial? Did it agree with me? Science, and even a more extended experience, would say no, most decidedly. Judging in the same way, I might mention other things that seem to agree with me. Among them is a small quantity of opium daily. The Austrian might say the same of his arsenic, and the Russian of his brandy.

The truth is, that, though we can tell something by our own experience, it does not, and cannot, tell the whole story. It should never be despised—never, above all, turned out of doors. On the contrary, it should go for what it is worth. It should even be most sacredly regarded. But the wise and enlightened man will understand that it covers only a part of the ground. It leaves a vast field of practical life to be corrected by the experience of others, or by science, which is about the same thing.

Need I repeat that dietetics, as a branch of hygiene,—as a matter of science,—have never, yet, been much studied? Prejudice, error, lust, and appetite have prevented it. There is, it must be confessed, not a little error connected with the subject, in which prejudice has delighted to revel, and in which one would think she might legitimately do so. Most who have been roused to pay any degree of attention to their diet

have been miserable invalids, — very often dyspeptics, — whose minds were about as much crippled as their bodies. What they have done has been by fits and starts, and not in a steady, persevering manner. Betaking themselves to a change, or to some new article of diet, they have only used it a few days, perhaps, and then turned to something else. And in endeavoring to ascertain its effects by an isolated and limited experience, they have fallen into a habit of watching their own feelings and sensations in a manner which, as a whole, is, if possible, more hurtful than the disease they were desirous of removing. They have become filled with whims and caprices. Indeed, it is very difficult to attend to this subject in later life, for the first time, without running upon this very rock of practical error; and I see no remedy for such a condition of things but a different training of several successive generations.

This, then, — I mean, now, early and correct physical culture, — is the great desideratum of our day. This would pioneer the way to something efficient and truly worthy of the race. It would prepare for a general and highly-important reformation. Our eating and drinking, like our exercise, clothing, sleep, &c., — indeed, our whole nature, — must be baptized into science and Christianity. Whether we eat or drink, or whatever we do, we must do all to the glory of God. Thrice happy that state of human society which learns the practical blessedness of an injunction as much in accordance with true reason as it is with revelation.







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