

*Temperance*

TEETOTALISM EXAMINED  
BY THE  
LIGHT OF SCIENCE;  
OR,  
AN ANTIDOTE TO OBJECTIONS  
TO THE  
PRACTICE OF TOTAL-ABSTINENCE.  
THREE LECTURES,

By JOHN DYER,

AUTHOR OF "LECTURES ON DIGESTION," "THE INFLUENCE OF ALCOHOL  
ON THE HUMAN SYSTEM SIMPLIFIED," ETC. ETC.

Price Eightpence.

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KERSHAW, Leeds; FLINN, Manchester; CUTLER, Liverpool; and all Temperance  
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Physical Effects*

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## ADVERTISEMENT.

THE following Lectures were delivered before public meetings of the Northampton Temperance Society, in reply to an assertion of Mr. Wood, Surgeon, of that town—that a “person had injured his health through being a Teetotaler.” The substance of the Lectures have subsequently been given in several towns in Lancashire and Yorkshire, where Mr. D. was requested to publish them. Portions of them having previously appeared in *The National Temperance Magazine*, the publishers of that work have struck off a limited number in a separate form, hoping that the important scientific truths which they contain may be found generally useful.

Mr. Dyer has obtained a good reputation as a writer on physiology and digestion, as will be seen by quotations from reviews of his previous pamphlets on the wrapper.

LEICESTER, Oct. 1, 1846.

### ERRATA:—

- LINE 9. PAGE 7.—For “that that,” read “that which.”  
 “ 23. “ 7.—For “camels,” read “canals.”  
 “ 22. “ 8.—For “coat,” read “coal.”  
 “ 34. “ 10.—For “will be felt,” read “heat will be felt.”

## AN ANTIDOTE,

&c.

### LECTURE I.

THE circumstances which have given rise to the lectures which are about to be delivered are the following:—At a previous committee meeting of this Society, it was stated that one of its members had lately died, and that Mr. Wood, Surgeon of this place, who attended him, had said that the “deceased person injured his health through being a teetotaler;” and that in consequence of what Mr. Wood had said, one or two persons had left the society.

This appeared to the committee such a severe charge against the principle of entire abstinence from all intoxicating drinks—and coming from a medical man—that, if allowed to pass unnoticed might materially injure the progress of temperance in the neighborhood, and to a considerable extent shake the faith of the members generally. And the assertion being of a general character, and believing that Mr. Wood had some reasons for making it, which reasons, it was thought he would willingly give if requested, it was, in justice to the members and for the benefit of those who are not, decided to appoint a deputation to wait on Mr. Wood, to ascertain whether or not he had made the assertion, and if so, to request him to state his grounds for so doing.

The deputation was appointed, and waited upon Mr. Wood, who



acknowledged having made the assertion; and when requested to assign his reasons for so saying, replied—"That the man wanted *stamina*." And when desired to explain what he meant by *stamina*, said—"He needed something strengthening—something nourishing." They were desirous of going a little into particulars, but as it was evident from Mr. Wood's manner he did not feel disposed to do so, the deputation did not feel at liberty to put any more questions.

The committee considered the report of the deputation so very unsatisfactory, and deeming the matter of considerable importance, that they appointed another deputation to wait on Mr. Wood, to solicit him to come to any meeting or meetings of the society, and state publicly what he had said respecting the deceased person, and also any reasons he might think proper to give in justification of so doing, in a more explicit manner than he had hitherto done.

But this, the committee regret, Mr. Wood at once declined doing.

Under these circumstances, the only way left open whereby the committee could ascertain the truth or falsehood of Mr. Wood's assertion was—an appeal to science, the experience of teetotalers, and the testimony of medical men; and for this purpose we have met here this evening.

Before proceeding to the consideration of our subject, we must settle in what sense we are to understand Mr. Wood's words; of this there is no difficulty. Mr. Wood said that "The individual injured his health through being a teetotaler:" that is, (as every one knows) through totally abstaining from all intoxicating liquors. Now, consider this assertion in connection with what he stated to the deputation, viz, "that he needed something strengthening—something nourishing," and you will not hesitate a moment to conclude that Mr. Wood spoke of alcoholic liquors in the capacity of a thing that would give strength to the body; or in other words, that which would nourish—that which would repair the waste of the system.

This being evidently Mr. Wood's meaning, we have, then, to ascertain, from an investigation of what the system requires, and the nature and effects of alcoholic liquors, or rather alcohol, (for this it is for which these liquors are used as a beverage, and recommended by some medical men as nutritious), whether it is possible that these drinks should nourish the body; and if we can show (of which we have not the least doubt), from the physiological laws of man's constitution, and chemical analysis, that they should not nourish or strengthen, or in any way whatever benefit the system, of course entire abstinence therefrom cannot be attended with injury; and, consequently, the unqualified assertion of Mr. Wood proved to be false.

For the healthy continuance of man's physical constitution, and the discharge of its functions, four things are necessary, viz.—solids, fluids, heat, and air.

We shall notice each of these in the order in which they have been mentioned.

I doubt not but most present have heard from me before, and others who have addressed you upon the effects of alcoholic liquors upon the human system, how the food taken becomes incorporated into the living organism; but as there may be some few here who have no knowledge of that wonderful process, and as we shall have occasion to refer to it in the following lectures, perhaps you will bear with me while I give just a bird's-eye view of it.

The body of man, like all other animals, is in a continual oscillating state; it is never at rest; the materials of which it is made up are always changing,—decay and renovation are the accompaniments of life. It is necessary for the healthy discharge of its functions that the body should be often receiving accessions from without in the shape of food, and that this food should be prepared to form part of the living machine, and for this purpose the apparatus of digestion is provided, which consists of the mouth, stomach, intestines, and lungs (for the preparation is not completed till it has passed through the latter); and also, that the waste particles which have answered their purpose, and now become poisonous, should be removed from the system, and for this the lungs skin, kidneys, and intestines are furnished.

Before the food is fitted to nourish the body and become a part thereof, great and important changes are effected upon it. After the food has been masticated it is conveyed, by means of a pipe, called the esophagus, into the stomach, which is a continuation of the same pipe greatly enlarged. Here the food is stayed in its progress, and by means of a juice (termed the gastric juice), which exudes from the inner coat of the stomach, (called the mucous membrane) when stimulated by its presence, it is changed into a soft pulpy mass termed chyme. The time which is occupied in effecting this change is various, depending in a great measure upon the digestibility of the food, that is, its readiness to be converted into chyme, the healthy state of the organ and system generally, and a good supply of gastric fluid. When this change has been completed, the food, or, as it is now called, chyme, again commences its progress along the pipe, but before it can leave the stomach it must pass the pylorus, which is the opposite opening in the stomach to that at which the food entered from the gullet, or more properly, the esophagus, and where the mucous membrane is disposed into a valve for the prevention of undigested food getting into the duodenum. After the enlargement



of this tube to form the stomach, it again contracts into what is termed the intestines (which in man are about six times the length of his body) the first part, or that next the stomach, being named the duodenum.

In the duodenum the food is again arrested in its course, and by the combined operation of the bile from the liver and the pancreatic juice, from what is commonly called the sweet-bread, the chyme is changed into chyle, a substance resembling cream, which is the nutritious part of the food separated from that which is merely useless. After this change has been effected, the chyle, together with the excrementitious part of the food, moves onward, and as it pursues its course along the small intestines (the name given to that portion next the duodenum), the chyle is taken up by a vast number of vessels, called lacteals, ramifying the inner coat of the intestines, called here, as in the stomach the mucous coat (which is disposed into folds, or as sometimes termed, puckered up, to prevent the too rapid progress of the chyle, and also of giving greater extent of surface to the absorbent vessels) which converge to form, with other vessels, named lymphatics, the thoracic duct, a large pipe which goes up by the side of the spine or back bone, and opens into a vein bringing blood from the arm, where that is joined by one returning blood from the left side of the head: from hence, together with the blood, the chyle is taken to the heart, which, with the lungs, occupy the cavity of the chest or thorax; the heart being placed between the right and left lung.

From the heart, in union with the venous blood (blood which has been over the system, becomes dark and acquired deliterious properties) the chyle is sent to the lungs, the organs of respiration, where, through the influence of the oxygen contained in the air, it is finally converted into blood, and the venous blood changed into a bright red colour, now called arterial blood.

After this it is again returned to the heart, but not by the same set of vessels, and from the heart, by means of the arteries (which arise from the left side of the heart by one large trunk, termed the aorta, which, soon after leaving the heart, divides and sub-divides into a sufficient number of vessels as to be capable of going to every part of the body) the blood is communicated to every organ and tissue of the system; and as the blood thus pursues its course along the arteries, the various parts absorb therefrom the nourishment peculiar to each. But when the blood has been over the body and parted with its nutritious particles for the repair of the waste consequent upon life, it has, by the absorption of carbon, become unfit for further circulation, and is therefore, for a fresh supply of chyle and purification, sent back again to the heart and lungs. The blood is returned to the heart by another system

of vessels, called veins, which are a continuation of the invisible arteries (which, when thus invisible, are termed capillaries), and, unlike the arteries, as they pursue their course towards the heart, lessen in number and increase in size, till, immediately before entering the right side of the heart, have become two large trunks, one bringing the blood from the head, and upper part of the body, and the other returning the blood from the legs and lower part of the body. In the heart the blood is supplied with fresh chyle from the thoracic duct, after which it is sent to the lungs for the purpose of purification, which is accomplished by the abstraction of its superabundant carbon and the absorption of oxygen from the inspired air; after which it is again returned to the left side of the heart, and from thence, by means of the arteries, over the system as before described.

This is the uninterrupted course things are taking in connexion with the body from the commencement of life to its extinction by the hand of death, when the organized compounds resolve themselves into their inorganic elements—the body returns to the earth from whence it was taken and the spirit to God who gave it. In a certain sense death is coeval with life, for it has scarce had time to make its appearance on the stage of time than we behold death close upon its heels; or rather life or action (for all we know of life, as it respects its nature, is that it is a moving, acting, principle—never exhibiting itself only in the phenomenon of motion) may be said to be, so far as the organic part of man is concerned, a destructive principle: for, however paradoxical it may appear, life is expended in maintaining life, that is, the vitality of the tissues is spent in vitalizing other compounds which are to form part of the living machine, and in sustaining the strength available for mechanical and other purposes. And when the tissues have thus resigned their vitality, they are of no further use for the purposes of force, and that they might not become a hindrance to the functions of the body, are, by means of the oxygen of the inspired air (which may not inaptly be termed the scavenger of the system) absorbed by the blood in its passage through the lungs, resolved into other compounds, such as carbonic acid, perspiration, &c., and safely removed from the system by means of the skin, lungs, kidneys, &c.

As it is impossible to perform the least labor or put forth the slightest exertion of the body, not even a bend of the finger or a turn of the eye without the sacrifice of some portion of vitality in its performance, and as it is also impossible for respiration to go on without the absorption of oxygen by the blood, and as, further, it is not possible for oxygen to come in contact with the spent tissues of the system without forming an union with them and taking them out of the body in the forms just



mentioned, we see it is absolutely necessary that the fabric should be supplied with solids in the shape of food. But it is not every kind of solid food that will repair the waste consequent upon mechanical efforts and the absorption of oxygen. And how do we know what description of food will answer this end? By an analysis of the organized tissues themselves, "no part of which," says Professor Liebig, "contains less than 17 per cent of nitrogen"—(Animal Chemistry, p. 43)—a fact I am anxious you should bear in mind.

The principal elements of which the solids of the body are composed are the following, viz. oxygen, nitrogen, carbon, hydrogen, lime, and small portions of sulphur and phosphorus; but it will be sufficient for our purpose that you remember the four first. No substance that does not contain these four elements is capable of forming blood, and as the repair of the human fabric is dependent on that fluid, if food of this description be withheld the body must suffer; only those substances, therefore, which are capable of this conversion can be strictly called nutritious, nourishing, or strengthening.

"If we hold," remarks Professor Liebig, "that the increase of mass in the animal body, the development of its organs, and the supply of waste,—that all this depends on the blood, that is, on the ingredients of the blood, then only those substances can be properly called nutritious or considered as food which are capable of conversion into blood."—(Animal Chemistry, p. 40.)

It may be thought by some, perhaps, that the body is capable of forming an element that may be deficient out of others that might be in excess; but as a proof to the contrary, let the same high authority testify:—"The most recent convincing experiments and observations have proved that the animal body is absolutely incapable of producing an elementary body, such as carbon or nitrogen, out of substances which do not contain it; and it obviously follows that all kinds of food fit for the production of either—of blood or cellular tissue, membranes, skin, hair, muscular fibre, &c., must contain a certain amount of nitrogen,—because that element is essential to the composition of the above named organs; because the organs cannot create it from the other elements presented to them; and, finally, because no nitrogen is absorbed from the atmosphere in the vital process."—(Animal Chemistry, 45.)

But although no substance destitute of nitrogen is capable of forming an organ or any part of one, yet we shall find, when we come to speak of animal heat, that other substances, wanting that element, are requisite to support that important necessary of life, if the most be made of the force available for mechanical purposes.

*Fluids.*—We now pass on to notice the second indispensable requisite

to animal life, viz., fluids or water, for all owe their fluidity to that liquid; and so necessary is water, that not a single function can be performed without its aid. Notwithstanding the derision in which water is held by those whose tastes for it have been corrupted by narcotic and stimulating drinks, it is that which enables us to masticate our food; it is that which enables the stomach to digest it; it is by means of that (in the form of blood, in 100 parts of which 80 are water) that the nutritious particles of food are carried to every part of the system; it is that that floats the waste materials of the body back again to the lungs, to be expelled from the body; and it is by the help of that fluid that every secretion of the system is performed: yes, it is by the aid of water—that fluid which satiates the thirst of every animal, from the blood-thirsty tiger that roams the forest to the fly that dances in the sun-beam that waked it into life, from the wide-spreading cedar, under whose branches the weary traveller finds a safe retreat from the burning rays of a tropical sun, to the green moss that covers the thatch of yonder cottage, and by its winding and silvery streams beautifies the face of nature, presenting thereby a means for the interchange of our merchandise, and channel of communication between the tribes of mankind—that every movement of the body is performed, and without which the fabric would collapse into a mass of dry inanimate flesh and bone, in no way susceptible of the phenomena of life.

Like a number of <sup>na</sup>camels, emanating from some mighty city, and bearing upon their surfaces, the food, and utensils, to supply the continually recurring wants of the inhabitants of the towns and hamlets around, the water of the blood within the canals (arteries) of the body, serves to convey to every part of the system, the materials to repair the waste, which is continually going on; and after thus floating to every organ and tissue of the body the food each requires, it collects the poisonous compounds, always forming in the organism, and takes them to the excreting organs, the lungs, skin, and kidneys, and in divers forms removes them out of the system. From which you will see, the body is continually being drained of its moisture, and also, the necessity of fresh supplies. And this supply must be in proportion to the change of matter, which is in proportion to the strength, or force, expended for mechanical purposes; hence the increased demand for liquids during hard labor.

*Animal Heat.*—We come now to the consideration of the third requisite, necessary for keeping the animal machine in motion, namely, animal heat; that imponderable agent, said to be always the result of motion, or the chemical combination of two or more substances.

Respecting heat, the body obeys the same laws as the surrounding



objects, parting with it when hotter than they, and receiving it when colder than they. But for the purpose of sustaining the heat peculiar to warm blooded animals, that of 99 degrees, (above or below which the functions of the body cannot be healthily performed,) the system possesses the power of generating it, independent of the surrounding medium, in a beautiful and interesting manner.

In most chemical combinations, heat is disengaged, but in the union of oxygen with carbon, or coal, (the Latin name for which is *carbo*) it is strikingly so, and when this takes place very rapidly, it gives rise to what is called fire. The oxygen is derived from the atmosphere, which is composed of oxygen and nitrogen, in the proportion of one of the former, to four of the latter. You can have no fire, therefore, without the oxygen of the air, that being the element with which the coal unites in producing heat, and in proportion to the access of oxygen, your fire will be dull or bright. Where the fire is small, and the objects in contact cold, the rarefaction of the air near the fire, and rush of that at a distance will be slow, and, consequently, will burn dimly; but when the fire is large, the objects in contact warm, the rarefaction round the fire will be great, and, to supply its place, the rush of that at a distance will be proportionately great; the result will be, a bright and blazing fire.

The heat from that Arnott stove yonder, is not very great now, because the access of oxygen to the combustible coat, is small, owing to the damper being closed; but open that, and immediately the amount of oxygen will be increased, and in a short time, the union between it and the coat, will be so great, that the sides of the stove will be red with heat. It will be doubtless, obvious to your minds, that the combustion or consumption of fuel, must be in proportion to the quantity of oxygen admitted, and the heat liberated; you will not expect to have a large fire sustained, for any length of time, with the same amount of combustible matter that would suffice for only a small one.

There are other substances equally well adapted for combustion as coal, such as fat, tallow, and oil, in 100 parts of which, there are nearly 90 that will burn, their principal elements being carbon and hydrogen: hence then, the fitness of these substances for candles and lamps. You perceive the light of this room is much greater than usual, notwithstanding the means (candles) employed is that usually adopted. The reason is that the candles now burning are the patent ones, requiring no snuffing, and the increased light evolved over those in common use, arises from the increased combination of oxygen with the tallow of the candles. Of course they will not burn so long as the common ones.

No doubt you have observed lately that the gas light in the middle of the market square is much brighter than it formerly was. This is

in consequence of throwing a stream of oxygen into the middle of the flame, thereby consuming a little more gas, and that which, in the old burner, escaped in the form of smoke. The gas burnt in the streets and shops is a composition of carbon and hydrogen.

But the chemical combination of substances often exhibits itself under other aspects, giving rise to the phenomenon termed heat, in which case the union is much slower; instances of which we have in the heating of a newly made hay rick, the close packing of goods in a ship or warehouse, in which cases the heat is sometimes so great as to cause them to take fire; the dung-hill, and in the fermentation of beer, or other saccharine solution, giving rise to carbonic acid and alcohol.

The heat of the body is produced in the same manner, as that from the stove yonder or this candle, namely, by the combination of oxygen with a carbonaceous substance; but instead of the union being so rapid as in those instances, giving rise to fire, it is much slower, similar to the cases just noticed. It is found, that iron is diffused through the blood, and the purpose it serves there is, according to Professor Liebig, and others of high standing in the chemical and medical professions, to supply the system with oxygen, necessary to maintain the heat of the body. Oxygen has a strong attraction for iron, so strong, that notwithstanding the numerous means devised to counteract it, the consumption of iron, in the form of rust, called by the chemist, oxide of iron, is many thousands annually. In the passage of the blood through the lungs the iron attracts the oxygen of the air breathed, and, by means of the circulation of the blood, is carried to every part of the body, where it unites with those substances destitute of nitrogen, such as starch, gum, sugar, fat, and oil, which, as before remarked, cannot form any part of the body, and also with the spent tissues of the system, forming thereby, carbonic acid and water; in which union the heat peculiar to the organism is produced.

These compounds are afterwards taken out of the system, the water, in the form of perspiration, by the skin, and the carbonic acid by the lungs; to which it is conveyed by the iron, together with the venous blood.

Here the carbonic acid is expired, in union with the nitrogen of the air, and the watery particles given off by those organs; and after the iron has resigned its carbonic acid it again attracts oxygen from the air (by which means the blood is changed from venous to arterial), which is distributed over the system as before, an union is formed between it and what are termed the elements of respiration, and the waste tissues of the body, heat is again evolved, and carbonic acid again formed, which, as before, is, by the iron, taken to the lungs and finally expelled from the system.



These, then, are the continually recurring phenomena by which the heat of the body is produced, and of course they may take place with more or less rapidity, the heat evolved being in the same proportion. As in the case of the fire, when more oxygen is taken into the system, as is always the case when respiration is increased, the combination of the carbonaceous principles will be accelerated, and as a consequence, the heat liberated will be augmented; the products, carbonic acid and water, being also increased.

The demand, therefore, for fuel (substances destitute of nitrogen) will be in proportion to the oxygen received, which is the case in laborious exertion and when the temperature is cold; in which cases you are well aware, the appetite is proportionally keen. Every one is conscious that in summer the edge of his appetite is gone, and that the food he ate with a relish in the month of December, is turned from with disgust in the month of June; and *vice versa*. This is explained by the fact that the surrounding temperature being warmer, the body parts with its heat more slowly, thereby rendering exertion unnecessary for the purpose of supplying the system with more oxygen than is received during ordinary respiration; the supply of oxygen, the supporter of combustion, therefore, being diminished, the demand for fuel (the combustible) is also lessened: hence the absence of a keen appetite in warm weather. Whereas in winter, the cold obliging us to take more exercise, by which means the quantity of oxygen taken into the system is increased, and as this never enters the body, without carrying away some part of it, and burning some portion of the elements of respiration, the demand for food is consequently greater: hence the keen appetite in winter. Upon the same principle, parlour-bred, sedentary, and indolent persons, seldom experience the luxury of a good appetite; their grate (body) has too much fuel in it, and the draft holes are choked up with the ashes of previous burnings, and before they can have what their money cannot purchase, that is, an appetite which will relish a homely dish, the poker (labour or exercise of some kind) must be well handled to open the vent holes, and then oxygen will soon ease the grate of its ponderous load, the fire will burn briskly, will be felt, and in a short time a good shovel-full of fuel may be thrown on with impunity.

Notice, with what surprise, and often disgust, those persons will sometimes stand looking at a labouring man, with his fist full of hard brown bread and fat bacon, which, with his big pocket knife, he is cutting up and eating with a greater relish than they could the nicest tart that ever felt the heat of the confectioner's oven; and at the same time exclaiming, "How in the name of fortune, can the man eat *that*, what a wonderful stomach and strange appetite he must have! I am sure I could never eat, and my stomach would never digest the like."

But they are out in their reckoning; let them live according to nature's laws by breathing the breath of early morn, instead of the perfumed and contaminated atmosphere of the bed-room and parlour, wait till they have an appetite for plain wholesome food, in the room of wasting half their time, and stretching their intellects in stuffing and preparing dainties and nice dishes, with which to gorge themselves, and employ those bodies with which providence has blessed them in some useful calling that will benefit themselves and others, instead of allowing productive force to lie idle in inglorious ease. And they would soon find, that the appetite which could relish with a zest brown bread and fat bacon, was not peculiar to the man they beheld the other day with so much astonishment.

He that would always have a good appetite for plain wholesome food must supply his grate (body) with plenty of oxygen.

We have said that the heat of the body is about 99 degrees, and this is true of all mankind, notwithstanding the difference of temperature in different parts of the globe; and strange as it may appear, the heat of body peculiar to the inhabitants of the torrid zone, where vegetation is often burnt up by the rays of a vertical sun, and the surrounding temperature frequently as high as the body itself, it is no greater than that found to obtain in the bodies of the inhabitants of the arctic regions, where, for nine months of the year, vegetation is stayed, the face of nature presents one unbroken aspect of ice and snow, and where the temperature of the atmosphere is many degrees below the freezing point of water.

But you will say, how is this, a difference must obtain somewhere.

This is provided for in a most beautiful and complete manner, strikingly illustrative of the wise provisions of God for the wants of his creatures, and that too by very simple means. In a similar manner in which you would maintain the temperature of a room throughout the year, viz., by increasing the heat in winter, when it is carried off rapidly by the surrounding cold medium, and by lessening it in summer, when the abstraction by the atmosphere around is decreased. In the torrid zone and warm parts of the earth, where the temperature is high, the abstraction of heat, from the body by the surrounding medium is small, the necessity, therefore, for a large supply within the system, is unnecessary; and we find that in those circumstances, the requisites necessary (fuel and oxygen) for the production of a great amount of heat, are wanting. The atmosphere being very rare, the oxygen, consequently, is diminished, and the fruits upon which the inhabitants of those parts feed to a considerable extent, containing not more than 12 per cent of carbonaceous matter than is necessary for the repair of the system. This state of things is reversed in the polar regions of the earth. Here



the surrounding atmosphere being very cold the abstraction of heat from the body is proportionally great, and to supply this heat carried off by external cooling the materials (oxygen and food destitute of nitrogen) are in greater demand, and to supply which they are here found in increased quantities. The atmosphere being very dense the oxygen is in proportion, and the fat and oil upon which the inhabitants live to a great extent, contain nearly 80 per cent. of combustible matter.

Another source of animal heat is found in the lifeless compounds of the tissues and organs of the body, which, as already remarked, when they have given their vitality to supply strength for mechanical purposes, combine with the oxygen received into the system during the passage of blood through the lungs; and as the matter of which the organs and tissues is composed resigns its capacity of life in proportion to the amount of labor put forth, and as this is greatest in those northern regions (the severe cold obliging persons to take extra exercise) where the temperature is low, the amount of spent materials will be here at its maximum. It is frequently the case that the supply of materials destitute of nitrogen, is more than the oxygen received into the system can burn up; in which case, in order that the presence of these matters in the blood might not prevent its healthy flow along the arteries, and in other respects endanger the working of the machine, they are put on one side in the form of fat, which, in addition to insinuating itself among the muscular tissues, forms thick layers about the pericardium of the heart, the walls of the chest, the intestines, and kidneys, so much so that life is often endangered thereby.

Notice what labor it is for a fat person to walk smartly, and especially if it be up a hill, or perform any other physical exertion; while another person, destitute of such a *warm coating*, would go through the same amount of labor with comparative ease and pleasure, his lusty companion would be sweating, panting, and with his hands to his side, begging him to stop a few minutes in order that he might get a little *breath*. And how is this? Why cannot that massive body perform the same amount of labor with as much ease and comfort as this lean person sitting before me?

The reason is that although his body is of such amazing size, the capacity of his chest, by being thickened with fat, is rendered smaller than others, and thereby not capable of receiving the same amount of air at each inspiration. The deposition of fat, therefore, in man, and in such animals as are stall fed, as the ox, the pig, &c., arise from a deficiency of oxygen. Let the fat ox or the pig which has been confined be set at liberty, and be allowed the range of hill and dale, and you will soon find, to your surprise, perhaps, that instead of becoming fatter, it

got leaner, the fat having served to combine with the extra oxygen received by means of increased exercise; and now, instead of it being on the animal's ribs, it is in the form of carbonic acid, diffused through the air, or serving to nourish some towering poplar, or the hardy oak. But although the fat is gone, the muscles are stronger and finer flavored, and which will account for the lean but highly prized flavor of the Westmorland hams, the pigs of which county are, I have been told, allowed to wander at pleasure upon its commons the greater part of their time.

However desirable some persons may deem fat for the purpose of giving plumpness to their bodies, it is no friend to health and vigor, and is by Professor Liebig and others considered a state of disease: and the only redeeming quality about it is, that should you by some untoward event be doomed to starvation, it would be a means of prolonging for a short time, your existence, by supporting the respiratory process. In animals which hybernate, the deposition of fat on their bodies is a provision to support their sluggish respiration during the long sleep of three or four months.

On the other hand, when the elements of respiration are not supplied in sufficient quantity, the muscles and tissues of the system suffer by the oxygen striving to unite with them before they have completed the end they were designed to answer; and when the vital force is weak, and the digestive or assimilating power impaired, the effects of oxygen is proportionally increased, and the person is seen to waste in flesh and die of consumption.

Our stay upon this subject has been long, and perhaps to some we have been tedious; but from a desire to be understood, the great importance which is now attached to this subject, and because we shall have to refer to it again in the course of these lectures, we have felt ourselves justified in so doing.

And from what has now been advanced, little more need be said upon the fourth and last requisite necessary for the healthy working of the machine, viz., Air.

From the fact that the heat of the body and the purification of the system are dependent on the air, every one will see how obvious a plentiful supply of that vivifying fluid is.

Having noticed what we conceive to be necessary for the healthy continuance of the animal machine, we will now call in the authority of Professor Müller, as a proof that we are correct in stating that the only things necessary for the life of the body are solids, fluids, heat, and air.

Speaking of those agents,—viz., solids, fluids, heat and air, as reno-



vating stimuli—he says, “The true and most important vital stimuli themselves, the constant operation of which on the tissues is the *sole cause of the manifestation of life, and of the increase of the vital force*; the vital stimuli, namely, a certain degree of external heat, atmospheric air, water, and nutriment, not merely produce a change in the composition of the organic structures, and stimulate by distributing the balance in the system, *but renovate the tissues, by entering, in a manner indispensable to life, into their composition.*” (Physiology, 60.)

And now let us look at alcohol, and see if that is necessary for, or can in any way benefit, the constitution.

And first, is it possible for the organs and tissues of the system to be repaired by it? We unhesitatingly answer, no. It has already been shown, when speaking upon that which will nourish the body, that nothing but what contains oxygen, carbon, nitrogen, and hydrogen, can accomplish that object.

But alcohol is minus one of these, namely, nitrogen, the principle peculiar to the animal kingdom; it is, therefore, impossible for the system, every organ of which contains not less than 17 per cent. of that element, should be built up with it, and no principle that is incapable of answering this purpose is nutritious or strengthening, in the capacity of which Mr. Wood spoke of alcoholic liquors.

Another thing which renders it impossible for alcohol to repair the continually recurring waste of the system is, that it is a liquid, out of which it is not possible to construct the solid fabric of the body. With equal propriety might a person attempt to repair the walls of his house with buckets of water from the river as think of restoring the solid parts of the body by alcohol.

Professor Liebig bears testimony to the impossibility of alcoholic liquors being nutrition, that is, capable of forming any part of the living organism. He remarks that “Beer, wine and spirits, &c., furnish no elements capable of entering into the composition of the blood, muscular fibre, or any part which is the seat of the vital principle.” (Letters on Chemistry, 57.)

The witness of Kirby O’Sullivan, Esq., of the laboratory of Liebig, is to the same effect. He says “It is a mistaken notion that beer, wine, and spirits, communicate strength; and it is disgraceful to see medical men endeavoring to propagate the error. Meat affords tissue, and consequently strength; starch and sugar are only useful for the production of fat, and by their production of animal heat; but spirits, and all alcoholic liquors, although they possess the latter quality in an eminent degree, possess also another property, which is infinitely better known of the two, viz., their narcotic action on the brain. This narcotic action is caused by the spirit preventing the blood which goes to the brain

from becoming arterialised, by its vapor diffusing itself through the lungs, and thus preventing access of air, by which means the functions of the brain are perfectly carried on.” (Medical Times.)

Endeavor to remember, therefore, what has been advanced as indisputable facts, namely, that for a thing to be nutritious and capable of strengthening the system, it must contain oxygen, nitrogen, hydrogen, and carbon, and that it must be a solid; but that alcohol is composed of only three of those elements, viz., oxygen, carbon, and hydrogen (nitrogen being absent)—that it is a fluid, and that no fluid can supply the place of a solid; and you will be enabled to smile at the erroneous idea, such as Mr. Wood entertains, that alcoholic liquors are capable of nourishing the system.

We have now appealed to science and the highest chemical and physiological authorities, as to whether alcoholic liquors are entitled to the appellation of nutritious, and the unanimous testimony of all is No.

*The Testimony of Teetotalers.*—But the strongest evidence, perhaps, that alcoholic liquors are not nutritious, is the experience of teetotalers themselves, of which, in the United Kingdom of Great Britain and Ireland, there are now some millions, the length of whose abstinence ranges from one to ten years duration. And what is the testimony these bear as to its practicability? They all, from the lady who never soils her fingers, down through all the trades and professions you can name, except perhaps those whose business it is to convert God’s good grain into some of the deadliest poisons, unite in exclaiming, “We are as strong, healthy, and vigorous, as when we drunk the waters of death;” nay, more, thousands are ready to assert that they are much better; that in addition to their homes being made comfortable, the hearts of their wives and children made to rejoice, their shattered constitutions are repaired, and they able to perform labor which would have been impossible during their drunken days.

Notwithstanding it is not possible for alcoholic liquors to strengthen or nourish the system, are they *necessary* for any purpose whatever in the system? If they are, it will mitigate a little what we deem the folly of occupying one million acres of the best land for growing forty million bushels of nutritious grain to be converted into two poisons, one of which is allowed to escape into the atmosphere, and the other, because palatable to an educated taste, is preserved with scrupulous care in strong tubs and barrels, and these in still stronger vaults and cellars; and when required, which is far too often, or, as we should say, not at all, put on the table, drank with avidity, and talked of before the rising race as the good creatures of God, and a panacea for almost every ill to which flesh is heir.

But we at once deny that intoxicating liquors are good for any purpose whatever within the system in a healthy state; and there is no



justifiable reason why so much surface of the earth should be occupied, and nutritious grain destroyed, for the purpose of obtaining a principle that only stimulates prematurely, without at the same time renovating the vital force—which only irritates and inflames whatever it touches within the body—which wakes up the dormant passions and evil propensities of man's nature—changes the loving husband and affectionate father into a demon upon earth, and primes him for the perpetration of the blackest deeds that have ever disgraced the annals of time.

But stop; we have no wish to put declamation in the place of argument: can it answer the purpose of water, that universal solvent of the solids of the body, and by which they are taken to their destination, and when of no further service in the system, removed out of the way of others that are; that bland and unirritating fluid, which calms and cools the fevered brow, lowers the beating pulse, slackens the speed of the vital current, and composes the mind that was but a short time since bordering upon the freaks and follies of the maniac, to quietness, rationality, and reason?

And does, or can, alcohol do this? Not it, indeed: the effects of that are totally different.

Where water dissolves, alcohol hardens; where that cools, this inflames; where the former allays irritation, the latter produces it; by that fever is assuaged, by this it is excited; and where the former calms and cools the brain, the latter heats and bewilders it.

But supposing it possible, which it is not, for alcohol to answer the purposes of water in the above respects, the putting it in the place of that element is beyond all question, for it is now pretty evident that after it has spread itself throughout the body, committing the depredations peculiar to its progress, it no longer remains a fluid, but is decomposed, by its elements uniting with the oxygen of the blood, and forming thereby carbonic acid and water. Of course it cannot serve the purposes of the air.

But now, last, can it answer the purpose of heat? Heat is thought to be evolved in the union of its elements with that of oxygen in the blood; but that alcohol is *necessary* for that purpose we cannot admit. But as this subject will require more time and attention than we at present can devote to it, and as the development of heat by the combination of alcohol with oxygen is now urged as a justifiable reason why intoxicating liquors should be taken, we shall reserve the consideration of this question, and also others, such as, whether the digestion of food in the stomach is effected by means of the fermentative process, such as occurs in a solution of sugar out of the stomach, producing alcohol and carbonic-acid gas, and the stimulant and tonic theories, for our next Lecture.

## LECTURE II.

As there may be some present this evening who were not here last Monday, we will just run over the chief topics of the first lecture:—

After describing the digestion of food—that is, its conversion into blood by means of the stomach, the first part of the intestines and the lungs—for the purpose of ascertaining whether it were possible for alcoholic liquors to nourish the system, we first inquired what the organism was composed of, and what would suffice to repair its waste; and found that solid food (containing not less than the four elements, oxygen, nitrogen, hydrogen, and carbon), water, heat, and air, were the only things necessary for carrying on the vital functions. Second: that alcohol, being composed of only three of these elements, viz., oxygen, hydrogen, and carbon, and that the body is not capable of forming an element out of others which may be in excess, we naturally concluded that alcohol was not capable of repairing the continual waste of the organs and tissues, and that which is incapable of doing this cannot be considered nutritious or strengthening. Third; we then appealed to Professor Liebig and Kirby O'Sullivan, Esq., as to whether it were possible alcoholic liquors should repair the waste of the tissues, and we found their testimony against it both decided and unequivocal; and as the extracts are short, and as it is desirable every one should know them, we will now read them again.

Professor Liebig observes that “beer, wine, spirits, &c., furnish no elements capable of entering into the composition of the blood, muscular fibre, or any part which is the seat of the vital principle.” (Letters on Chemistry, 57.)

And Kirby O'Sullivan, Esq. who is still more emphatic, says “It is a mistaken notion that beer, wine, and spirits, communicate strength; and it is disgraceful to see medical men endeavoring to propagate the error. Meat affords tissue, and consequently, strength; starch and



sugar are only useful for the production of fat, and by their productions of animal heat; but spirits, and all alcoholic liquors, although they possess the latter qualities in an eminent degree, possess also another property which is infinitely better known of the two, viz., their narcotic action on the brain. The narcotic action is caused by the spirit preventing the blood, which goes to the brain, from becoming perfectly arterialised, by its vapor diffusing itself through the lungs, and thus preventing access of air, by which means the functions of the brain are perfectly carried on." (Medical Times.)

We then appealed to the experience of teetotalers, and this, as you are well aware, was found against the notion which Mr. Wood entertains, namely, that alcoholic liquors are nutritious.

We were willing, however, to go further, and see if alcohol could in any other way whatever benefit the system; and therefore inquired whether it were possible for it to answer the purposes of water, air, or heat. We found that it could not answer the purposes of air and water, but admitted that heat is evolved in the union of oxygen with its elements; but denied that it was necessary to take alcoholic liquors for the production of heat, as Providence had provided materials in abundance in the food of mankind, that were amply sufficient for the production of heat, without the employment of that which had proved one of the greatest curses of the human race.

The examination of this subject, however, has been reserved for this evening's consideration, together with others, such as the digestion of food in the stomach being fermentation, and whether alcohol is necessary as a stimulant or a tonic.

Before entering upon the subject of animal heat, we may just notice, in passing, that our friend Mr. Wood is far in arrears of his brother opponents to the humane principles of abstinence from all intoxicating liquors. The notion so prevalent when total abstinence was first promulgated, viz., that alcoholic liquors were nutritious, and that a hard-working man could not do without them, has been gradually renounced as erroneous by most medical and scientific men; and the strongest argument now urged in their favor is, that they are elements of respiration, that is, that heat is disengaged by their union with oxygen. But Mr. Wood seems unwilling to give up this once favorite but now antiquated notion, and fall back upon the mere question of heat.

He is not yet satisfied to sacrifice the tangible, the ponderable for the inponderable; but however reluctant he may be to part with his darling idea that intoxicating drinks are nutritious, and therefore, strengthening, he must submit to the demands of TRUTH.

And now for this question of heat; that which has fired afresh the

lovers of strong drink, and roused to such a height the indignation of the makers and venders of the same, that they are ready to frown the poor teetotaler to shame and confusion for the presumption and audacity of preaching entire abstinence from that which they say is necessary to support the temperature of the body. But never mind, friends, be not dismayed by the ugly visage of the man that would rob your back to clothe his own, fill his stomach at the sacrifice of yours, and deck his house and family at the cost of others; and as it is the only kind of argument with which he can now meet you, let him frown, stamp, and rave, and the more the better, for it will be the sooner over, and by and by, when his paroxysm of rage is over, he will become as cool and mild as a lamb, and look back upon the time of his ignorance when he treated the teetotaler as the greatest enemy of mankind, with sorrow of heart.

But we must be cool and collected, for we have a *hot subject* to handle.

It is the province of animal chemistry to investigate the nature, properties, and composition of the organs and tissues of the human and all other animal beings — to explain what phenomena take place of a chemical nature, and to inform us what external supplies are required, and, as far as that science will go, how these supplies are disposed of, and to what purposes they are put.

Of any, Professor Liebig has been the most successful in this department of science, whose works on Animal and Vegetable Chemistry are held in admiration by all the learned and scientific men of every country, as being the most practical, and based upon theories the most rational that has yet appeared.

He finds that the body, for its healthy continuance, is dependent from without upon the supply of materials to repair the waste tissues, and also for the permanent production of a heat of about 100 degrees; that food necessary for the accomplishment of the former must, as already observed, contain oxygen, hydrogen, nitrogen, and carbon, which he terms plastic elements of nutrition, or nitrogenised elements of food; and that for the purpose of answering the latter, materials destitute of nitrogen, composed of oxygen, hydrogen, and carbon are needed, and which he calls elements of respiration, because they can only serve the purpose of uniting with the respired air, or rather, oxygen of the air, in the production, as was noticed in the first lecture, of heat.

It is not the object of Professor Liebig, nor does he profess, to lay down rules for eating and drinking, or state in what particular forms food must be taken; but from an analysis of the organs and tissues of



the body, to make known what are the real wants of the system, and also to explain in what manner the organism disposes of other materials received into the body not required for the healthy discharge of its functions. And alcoholic liquors being among those materials not required for the purposes of life, but extensively used by the masses of mankind, and also finding from good evidence that their elements combine with the oxygen of the blood, and that heat is thereby evolved, he classes them with the non-nitrogenised constituents of food, and calls them elements of respiration; without once intimating that they are *necessary*, as some have asserted, for that purpose.

At page 95 of his "Animal Chemistry," Professor Liebig observes, "According to what has been laid down in the preceding pages, the substances of which the food of man is composed may be divided into two classes; into *nitrogenised* and *non-nitrogenised*. The former are capable of conversion into blood; the latter incapable of this transformation. "Out of those substances which are adapted to the formation of blood are formed all the organised tissues. The other class of substances, in the normal state of health, serve to support the process of respiration.

"The former may be called *plastic elements of nutrition*; and the latter, *elements of respiration*.

"Among the former we reckon, vegetable fibrine, vegetable albumen, vegetable caseine, animal flesh, animal blood.

"Among the elements of respiration in our food are—fat, starch, gum, cane sugar, grape sugar, sugar of milk, pectine, bassorine, wine, beer, spirits."

Others, long ago, observed that the blood was carbonized, that is, changed from arterial to venous, by the use of alcoholic liquors; but Professor Liebig was the first, we believe, who gave a rational theory of how that is produced by the use of those liquors.

Till the opinion of Professor Liebig was propounded, the general belief was, that alcohol passed through the system, without being at all affected or decomposed by it: that it penetrated every organ, permeated every membrane and tissue, waging a deadly war with every fibre, destroying the nervous sensibility, paralyzing the muscles, accelerating the vital current, and after feverizing the whole, and inflaming certain organs, leaving, like a triumphant conqueror, the system a drivelling idiot, or smarting under the paroxysm its presence there had set up. But he is of opinion that after it has committed these depredations, it is decomposed, its elements uniting with the oxygen of the blood, and that heat is thereby produced.

His words (which you will find at page 238 of the second edition of the work already named), are, "The production of heat and the change

of matter are closely related to each other; but although heat can be produced in the body without any change of matter in the living tissues, yet the change of matter cannot be supposed to take place without the co-operation of oxygen.

"According to all observations hithertomade, neither the expired air, nor the perspiration, nor the urine, contains any trace of alcohol, after indulgence in spirituous liquors; and there can be no doubt that the elements of alcohol combine with oxygen in the blood; that its carbon and hydrogen are given off as carbonic acid and water."

It betrays a sad state of the moral feelings, and a very lax philanthropy, when men are found advocating and bolstering up by every possible means, a custom which, though it squares with their views and suits their tastes, is, from daily experience, found to be injurious both to themselves and others.

And in no case is this state of things more strikingly manifested than in the advocacy, by whatever means, of the use of intoxicating liquors. Notwithstanding their make, sale, and use, are attended with such fearful, mental, and physical consequences; notwithstanding 40 millions of pounds are annually spent in intoxicating liquors; notwithstanding one million, fifty-six thousand acres of the best land are occupied in growing barley and hops, and 40 million bushels of good grain are consumed in the manufacture of those liquors; notwithstanding 60 thousand drunkards die annually, and 60 thousand more are made to fill up their places; notwithstanding Judge Erskine declared at Salisbury Assizes, that 99 out of every 100 criminal cases were from drunkenness; notwithstanding Judge Coleridge, at the Oxford Assizes, said, he scarcely ever knew a case brought before him which was not directly or indirectly connected with intoxicating liquors; notwithstanding Judge Patteson, at the Norwich Assizes, said to the grand jury, "If it were not for this drinking, you and I should have nothing to do;" notwithstanding happy homes are made desolate, wives hearts broken, and children beggared; notwithstanding thousands are sporting with their soul's eternal interest on the verge of the grave; notwithstanding the cause of God is impeded in its triumphant progress through the earth; notwithstanding the many wretched homes made comfortable, the broken hearted wife made glad, and the thousands of once miserable children respectably clad and plentifully fed through the adoption of total abstinence; notwithstanding thousands of wretched drunkards are reformed, and many of them now sitting at the feet of Jesus and in their right minds; notwithstanding the evidence of science, and the testimony of the highest authorities, and the unanimous experience of millions, of persons now in the United Kingdom, that they are quite as well, and



thousands of them better, since they totally abstained from intoxicating liquors. We say, notwithstanding this overwhelming cloud of witnesses, there are not wanting persons professing great philanthropy, and priding themselves upon their literary and scientific acquirements, who will embrace any flimsy excuse, in order to stifle an awakened conscience and lay the flattering unction to their souls, that alcoholic liquors are needful for man in a state of health.

And, having been reluctantly driven from the vantage ground, which the supporters of intoxicating drinks supposed they possessed in the consideration that those liquors were nutritious—were strengthening, they, because the celebrated organic chemist of Giessen, considers that heat is generated by the combination of the elements of alcohol with the oxygen of the blood, have asserted, reckless of the consequences, and which the Professor most minutely and clearly points out, that wine, beer, and spirits are necessary to support the process of respiration, and also that a saving will be effected by using them for that purpose!!

This we must at once contradict, and assert, on the contrary, that he has not, nor could he consistently, say any such thing. That alcohol is an element of respiration, we are quite willing to admit, but that it is necessary or can serve that purpose innocently, or that Professor Liebig any where intimates as much, must be denied; in fact he could not with propriety do so after what he has advanced, which is as follows, and to which I beg your serious attention.

"The oxygen" he says "which has accomplished this change" (of the elements of alcohol into carbonic acid and water), "must have been taken from the arterial blood; for we know of no channel, save the circulation of the blood, by which oxygen can penetrate into the interior of the body. Owing to its volatility and the ease with which its vapour permeates animal membranes and tissues, alcohol can spread throughout the body in all directions. \* \* \* \*

"It is, consequently, obvious, that by the use of alcohol a limit must be rapidly put to the change of matter in certain parts of the body. The oxygen of the arterial blood, which, in the absence of alcohol, would have combined with the matter of the tissues, or with that formed by the metamorphosis of these tissues, now combines with the elements of alcohol. The arterial blood becomes venous without the substance of the muscles having taken any part in the transformation." (Animal Chemistry, 289.) And at page 179, speaking of the effects of brandy on the American Indians, he observes, "that he" (the Indian) "cannot withstand the effects of brandy, which, acting as an element of respiration, puts a stop to the change of matter, by performing the function which properly belongs to the products of the metamorphosed tissues."

To comprehend fully the force of Professor Liebig's words, such as "that by the use of alcohol a limit must be rapidly put to the change of matter in certain parts of the body," and "the arterial blood becomes venous without the substance of the muscles having taken any share in the transformation," &c., you must call to mind what was said in our first lecture respecting the part oxygen performs in the body, namely, that it combines with the food destitute of nitrogen in the production of heat, and also with the tissues of the body when their vitality is expended in sustaining the strength of the body, in which also heat is evolved; and that it is by the conversion of these carbonaceous principles and the spent tissues of the body into carbonic acid and water, that the blood is changed from arterial to venous—from a bright to a dark red—from nutritious and vitalizing to innutritious and poisonous. By which you will see, that in addition to oxygen being the means of sustaining the heat of the body, by combining with these matters, it also acts as the scavenger of the system, the agent by which the useless materials are removed from the organism out of the way of others which, by the digestive apparatus and the vital force, have been prepared to occupy their place.

I have no doubt you understand me; but in order that it might appear as forcible to your minds as it does to my own, I will illustrate the office of oxygen by a simile. Suppose twelve horses are employed to drag a very heavy stone to the top of Huntsbury Hill yonder, which you know is rather long and steep, but that only three of them are employed at a time, the others accompanying them, ready to supply their places when tired, on one side of the road, led by a person whom we will name Vital Force; and on the other, a person whose business shall be to remove the exhausted horses, and whom we will name Oxygen. Now picture to yourselves a large stone in the middle of the road just by the toll-gate, with three strong horses attached, ready to commence pulling when the word of command is given; on the left nine horses being conducted by Mr. Vital Force, and on the right Mr. Oxygen, who also accompanies the operation to the end. The horses now begin dragging the stone, and for some time it moves at a pretty good rate; but when they have arrived to about one-fourth part up the hill the horses are exhausted, and can go no further; when up comes Oxygen with all the promptitude imaginable, and takes them away, and Vital Force, with equal readiness, puts three more in their places. The stone again goes briskly along for a time, but when half-way up the hill these are fatigued, and must be removed, which is very readily done by Oxygen on the right, and their places again occupied by others from the left. Again the stone moves on with increased speed till it has



reached three parts up the hill, when exhaustion obliges them to be removed; and for the purpose of taking the stone to the top of the hill, the remaining three on the left are placed there by Vital Force. The work is now completed, which we will suppose occupied a day; the horses are all fatigued and unfit for further labor till they have had a night's rest. Morning comes, and by means of rest and food, the horses are again prepared for work; and now let us suppose another stone, similar to the one on the previous day, has to be taken to the top of the hill, and for the purpose of doing it the course then adopted is again repeated. But the work is no sooner commenced than it is found that some evil disposed persons from the other sides of the hedges have been throwing large stones in the middle of the road, which prevent the work going successfully on, and to remove which occupies the whole of the time of the person we have named Oxygen, on the right, whose sole business is to remove the horses from the work when exhausted; the consequence is, the work is stopped for want of fresh force, while the fatigued horses are anxiously looking for some one to remove them, and those on the left waiting to occupy their places; which cannot be done till the others are first dispatched.

Now let the stone to be dragged represent a day's work, or any other amount of physical exertion to be put forth, the twelve horses the nutritious particles of the food prepared by the digestive apparatus, and now under the control of the vital force, and the man on the right the oxygen of the blood which accompanies it to every part of the system. The day's work, we will suppose, has now begun, the particles of the muscles are losing their vitality in supplying the strength necessary to perform the labor, and now they are quite exhausted, that is, their life is gone, at which juncture the oxygen comes up, converts them, or rather by uniting with it, they are converted into carbonic acid and water, and removed clean out of the system; while the vital force is busily engaged in supplying their places with new and living ones: from this subtraction of old and the addition of new matter to the system, labor is again put forth with increasing energy, till these, by the exhaustion consequent upon the loss of vitality, are of no further use; when again oxygen comes and takes them away in the manner just described, and their places occupied by others prepared to continue the supply of force necessary for mechanical purposes; and after thus continuing through the day, labor for a time is discontinued, the body, now fatigued, retires to rest, and during that time it is, although we have supposed it to take place upon the separation of the spent tissues by the oxygen, that the vital force is engaged in recruiting the system with new materials for those whose life had been resigned in maintaining the strength of body.

During the day, therefore, in the putting forth of force for mechanical purposes, the muscles lose a part of their vitality and are diminished in size by the separation of the waste particles by the action of oxygen; which is the cause of that fatigue experienced after a hard day's work, or after the performance of any thing laborious.

"A living part," remarks Professor Liebig, "cannot increase in volume at the same moment in which a portion of it loses the vital condition, and is expelled from the organ in the form of lifeless compounds; on the contrary, its volume must diminish. The continual application of the momentum of force in the living tissues to mechanical effects determines, therefore, a continual separation of matter; and only from the period at which the cause of waste ceases to operate, can the capacity of growth be manifested."—*Animal Chemistry*, page 227.

After the hours of sleep, therefore, during which time the organs of the body under the control of the mind suffer no waste, the system, by the supply of new matter and augmentation of the vital force, which on the previous evening was quite exhausted, now rises with energy and vigor, and now again finds a pleasure in the performance of physical exertion. But before commencing the day's labor, the man perhaps has been advised to take a pint or two of beer, and others again during his temporary cessation from labor, by a person who imagines that thereby his strength will be supported, and he capable of performing his day's work with greater ease and comfort to himself, and give over at night in a better condition than he otherwise would did he not take any thing of the kind. The man, we will suppose, follows the advice offered, as too many do, and what is the consequence? He, by having his tissues recruited with new matter, and thereby his force for mechanical purposes increased, is quite sufficient for his day's labor; but having taken plentifully of the liquor recommended, which, by stimulating the nervous system, the strength of his muscles is prematurely called forth, and for a few hours, work is pursued with greater energy;—but the waste of his tissues and expenditure of force being in proportion to the strength put forth, a greater amount of lifeless compounds has occurred than would have taken place had he depended upon the spontaneous flow of force as circumstances required for the support of his strength. And now, for the purpose of removing from the system the extra amount of waste matter consequent upon the extra exertion put forth, an increased quantity of oxygen is necessary; but is it there? No, indeed. It is nowhere to be found: but what has become of it? for the supply of oxygen is in proportion to the change of living into dead matter.

The liquor drunk will explain the mystery,—the alcohol of which has disposed of it; or rather, like the man on the right side of the road



whose business was to remove the horses when exhausted, but finding some evil disposed persons had thrown a quantity of large stones in the middle of the road, and which occupied his whole time and attention in removing, it has been engaged with other matters—viz., that of removing from the body the alcohol, by combining with its elements; thereby forming carbonic-acid and water, as the blood will testify; and by means of which it has become venous—that is, dark and poisonous, without the transformed tissues having taken any share in so doing, as would have been the case in the absence of alcohol; and which is always the case when that compound is kept out of the way of the oxygen. But when that is introduced to its notice, a conspiracy takes place between them (the oxygen having a greater liking for alcohol than for the dead compounds of the tissues), to rob the machine of the means by which the spent materials are removed out of the way of its healthy working. These compounds, therefore, which once imparted strength and vigor to the fabric, having exhausted themselves in so doing, now, for the want of being put out of the way, are a source of obstruction, irritation, and disease: for there they are, and must remain, till removed by the agent (oxygen) stationed in the body for that purpose. "For if," says Professor Liebig, "oxygen were not conveyed to it (the waste matter) the organ would maintain its condition, but without any manifestation of vitality."—*Animal Chemistry*, 222. In the same manner as our supposed horses, after dragging the stone as far as their strength would permit, remained horses—a mass of flesh, but without, or very little, strength or vitality remaining.

And this poor man, who was prevailed upon to take a few pints of good home-brewed beer before going to work, is now much in the same condition; what little good resulted to him from the prematurely calling forth of his strength by means of the liquor drank, he now has to pay back with compound interest, in the shape of extra fatigue and exhaustion. But now comes the delusion; he does as he was told in having recourse to the bottle when exhausted—drinks freely, the little vitality yet remaining in his system is thereby called forth, he forgets his fatigue, feels as strong as a giant, and is off to his work with fresh energy and vigor, laying the flattering unction to his soul that it is just the thing for a working-man, thinks his friend's advice the best in the world, and therefore intends to follow it. Ah! but the time of reckoning is at hand;—night approaches, and with it a degree of relapse and exhaustion that almost prevent him reaching home, or at least in such a manner that betokens the vitality of the system at its lowest possible ebb.

And having arrived by the side of his hearth, he seats himself in his arm-chair; and still believing in the magic effects of his bottle, that it

puts strength into his system, as he has fondly fancied several times during the day, rather than that it merely rouses what remains of force there is yet in the system, he again sips of the deceitful bowl; is somewhat revived, eats his supper, and goes to bed, thinking to rest quietly, sleep soundly, and rise in the morning divested of all his present feelings of exhaustion.

But is it likely his expectations will be realized? Not at all. The state of his body forbids it; and what is that state? The following, as near as can be. The greater part of the waste tissues, which, owing to the labor performed, is considerable, remains in the system, of which it would have been relieved had not the oxygen been employed in removing the alcohol;—the blood, by the great amount of carbonic acid diffused through it, is much darker (bordering on venous) than it otherwise would have been, had not alcoholic liquors been taken; and the vital force, by means of which, during sleep, the new materials formed from the food are incorporated into, and become part of the living organism, is reduced to such a low state that it is not equal to the duties it has to perform, were the waste compounds removed out of the way of its labors, which is not the case,—and until that is accomplished, repair cannot take place.

And the state (repose) in which the man is now, is unfavorable to the removal of those spent materials of his organs, because during that condition, respiration being low—and it is rendered still lower, as Drs. Prout and Fyfe showed, by the use of alcoholic liquors—little oxygen finds its way into the system, without which, as we have seen, those matters cannot be removed. A state of motion or labor is also incompatible with the condition which the body is now in; for, from its exhaustion, it is unable to take exercise or perform labor,—and was it equal to this, the vital force in the repair of the tissues and organs would be arrested, as that can only work during rest. So that what would tend to rid the body of the spent compounds would be fatal to the repair of the tissues, and that condition which would remove these from the system, would hinder the vital force from recruiting the organs with new matter. Hence, then, the consequence of perverting the laws of nature.

God has made provision that the lifeless matters, as fast as they are formed by the putting forth of strength for mechanical purposes, shall be removed from the system; and that during sleep, provided the exertion be not carried beyond due bounds, the vitality yet remaining in the system shall replace those dead materials by others more suited for the continuance of life. But man, by the use of intoxicating liquors, steps in and counteracts this wise provision, thinking thereby to supply a de-



sideratum omitted by the Author of nature, as is intimated by a writer in the *Citizen* for July 1st, 1845, who says "it is plain that, until the discovery of wine making, a very *profitable and innocent* (profitable and innocent are put in italics) way of warming the body was unknown;—that men who get their bread by the sweat of their brow were, until then, without very good means to keep their spirits in, and the cold out; and that the discovery is nearly as old as the fruits themselves from which wine is obtained."

But the man has not been asleep long before a state of restlessness and fever comes over him, which, together with tormenting dreams, continue till morning—when he awakes, or rather is awake—for when he has to rise, the system, after struggling hard all night long against the evils it has had to contend, is just beginning to right itself,—and if allowed to remain, would set things pretty well in order.

But this cannot be:—the man must be up and away to his toil, and toil indeed it is, notwithstanding a parched tongue, an aching head, without spirits, and very little strength, for the master wants his work done, and it may be, a large family require feeding. But before work can be in earnest begun, the small amount of force must be aroused; and for this purpose, nothing is so effectual as the contents of the bottle, which is soon applied: and now, again, the man fancies he is himself—the draught has banished every unpleasant feeling, and to work he goes, always connecting his exhaustion with the work, and the energy and spirits with the liquor drunk. But, from the state of his system, it is not long before fatigue creeps over him with surprising effects, to rid himself of which the beer-bottle is had recourse to; again a little energy is called forth—again fatigue takes hold of him, and thus the day is passed, in alternate depression and exhilaration, when he again directs his weary feet towards home, there to go with increasing severity the round he went the night before. Do not think this is an overdrawn picture; it is the condition of thousands, but especially of many of our farm-laborers during the time of harvest, when all is hurry and bustle, when the bodies of men are nothing in comparison to a few sheaves of corn, and when the farmer is willing to open the cellar and distribute its contents among those from whom he expects to receive an ample reward in return. But woe to that man, be he whom he may, that will do this designedly! It is well for our fellow-men that the harvest does not last all the year,—if it did many would soon cease gathering it. But it is a question, whether in the end the farmer, whose men have worked under the influence of alcohol, is a gainer over the one who has well fed and housed his laborers during that season. I am of opinion that were the farmer to feed his men with good wholesome food, give them milk and water to drink,

and allow them reasonable time for rest, he would have his harvest gathered quite as soon and much better, than by plying them with that which stimulates, but does not strengthen. And it is pleasing to reflect, that this is found to be the case where it has been fairly tried. And how this would tell upon the constitution of the laborer! instead of the state of things just described, in which the operations of nature are counteracted, the laws which regulate the waste and supply of the system would go healthily on; there would be fatigue, but it would not be extreme—there would be exhaustion, but it would not be beyond the powers of the system to make good; and men would leave the field in the evening and enter it again in the morning, as has been repeatedly proved by those acting upon the principles of entire abstinence, in quite a different state to the one described.

And how pleasing to a christian and philanthropic mind to know, that while his barn is being filled it is not at the cost of his neighbor's constitution.

But if to the laboring man whose respiration is rapid and the oxygen absorbed great, those liquors are bad, to the confined and sedentary, whose respiration is slow and oxygen absorbed small, they are much worse; because by increased respiration more oxygen is received, and thereby alcohol is disposed of more readily; whereas in the latter case, this takes place more slowly and the spirit thereby allowed more time to commit its depredations upon the system; which, in many instances are most alarming, before it is burnt therein.

The retention of the waste tissues in the system, we remarked, is not only a cause of irritation and obstruction, but also of disease. This will be evident when you reflect upon the vast number of changes and movements which are continually taking place within the system, for the healthy performance of which, the greatest freedom of space and balance among the various organs and tissues of the body are required. Among which may be named the wonderful operations of the mind, whose healthy manifestations are dependent on the normal state of the brain, whose healthy condition, again, is dependent upon the purity of the blood, of which it receives more than any other organ of the body; the mysterious nervous influence, upon whose agency the contraction and relaxation of the muscles depends, and many other vital phenomena; the digestion of food in the stomach, from which the wants of the system are supplied; the absorption of oxygen and the liberation of carbonic acid; the various secretions of the body, such as the gastric juice, the solvent of the food eaten, the saliva which moistens the food in the mouth, the mucous, which keeps in a moist state all those membranes which are exposed to the action of air—such as the



lining membrane of the mouth, the gullet, the wind-pipe, the cells of the lungs, the internal coat of the stomach, intestines, and nose; the serous secretions which lubricate the membranes to which the atmosphere has not excess, of which may be named the external membrane of the intestines, stomach, and other organs of the abdomen, by means of which they glide over each other with the greatest freedom and ease; the bag in which the heart is, and the internal sides of the chest, and also the external covering of the lungs; the tears which flow from the eyes, the bile from the liver, and the oil which lubricates the joints of the body; the purity of all and the facility with which they are secreted being dependent on the blood and normal state of the body.

And although last, yet not least, may be mentioned the wonderful phenomenon by which the food eaten becomes vitalized and incorporated into the living fabric, and again, when its vitality has been expended, converted into various compounds and removed from the system.

One would imagine that the consideration of the extreme fineness of the mechanism, the tenderness of every part, and the great susceptibility of putting this instrument of a thousand strings out of tune, would deter mankind from treating so recklessly as they do the constitution upon which the handy-work of God is so palpably marked.

Surely, if they entertained such ideas of the human frame as did the Psalmist, or even as a friend of the writer, who is fearful of knowing much about it lest the consideration of its construction should prevent him from performing the daily occupations of life, from the apprehension that, in so doing, he should mar some part of its fine mechanism. And I must confess that when on the one hand my mind is vividly impressed with the delicate structure of the human machine, and on the other with the carelessness with which it is treated,—the many obstacles thrown in the way of its healthy working, I am astonished that it withstands so much before giving way. And was it not for the kind provision established in connection therewith, viz., that of repairing itself when out of order, the machine would stop long before it does, and the fabric fall to pieces upon the least disorganization of its parts.

But this provision acts only within certain limits; if the injury sustained be beyond the restorative powers of the system to repair, the consequence is fatal either in part or in whole.

Mankind should beware that they cannot with impunity tamper with and wantonly treat the body a kind providence has given them, without sooner or later suffering the penalty due.

It would be impossible for me to notice a tithe of the evil consequent upon the retention of the waste compounds of the tissues in the system by the use of alcoholic liquors, but there are two or three obser-

vations I cannot forbear further making, before leaving this part of the subject.

Besides the irritation and inflammation caused by the alcohol before it is burnt in the "vital lamp," upon the several organs with which it comes in contact, perhaps no individual parts are more affected by the presence of those waste matters, than the glandular and lymphatic systems; of which some parts are immoderately excited, while others are arrested in the discharge of their functions: an instance of which is seen in the accumulation of water in various parts of the body, such as the legs, abdomen, chest, especially about the heart, giving rise to the disease termed dropsy, which often proves so fatal, especially when found in the two last-mentioned parts; and of which disease, according to Dr. Bright, not less than 500 die annually in London.

Another condition of the system induced by this state of things is, that termed gout; which mostly exhibits itself among the sedentary and indolent, and which is the result of insufficient oxygen, want of exercise, drinking alcoholic liquors, and over eating. A third consequence of this wrong appropriation of oxygen is, a deposition of fat; which results from those elements destitute of nitrogen being deprived of the oxygen, which in the absence of alcohol, would have been consumed.

The healthy circulation of the blood being incompatible with the presence of these matters, it has been wisely ordered that when oxygen is deficient, they shall be put out of its way in the form of fat, which is pointed to by the lovers of strong drink as evidence of health and strength, but which Professor Liebig says is a state of disease.

His words are,—“Every substance or matter, every chemical or mechanical agency, which changes or disturbs the restoration of the equilibrium between the manifestations of waste and supply, is called a cause of disease.”—254, *Animal Chemistry*. “In medicine,” he again observes, “every abnormal condition of supply or waste, in all parts, or in any single part of the body, is called a disease.” And again, “The action of a cause of disease exhibits itself in the disproportion between waste and supply, which is proper to each period of life.”

“That condition of the body,” he also remarks, “which is called health, induces the conception of an equilibrium among all the causes of waste and supply; and thus animal life is recognised as the mutual action of both; and appears as an alternating destruction and restoration of the state of equilibrium.”—245, *Animal Chemistry*.

Fat is not, nor can it form any part of the body; on the contrary, it is a serious cause of obstruction, impeding the use of the muscles, intestines, and heart; and also prevents the full play of the lungs, by partially filling the cavity in which they are found; thereby throwing



an obstruction in the way of oxygen, the only medium which can relieve the system of such a ponderous weight upon its organs. It must be evident also, that by the deposition of fat, the spent materials of the system cannot be thoroughly removed from the body, for if the supply of oxygen be not equal to the combustion of the elements of respiration, the lifeless compounds of the organs must go short of that element; but this is especially the case where, in addition to deficient oxygen, or the introduction into the system of too much food destitute of nitrogen, intoxicating liquors are used.

The deposition, however, which takes place under those circumstances, is not true fat—it is puff; a heterogenous compound of fat and dead animal matter hanging about the system, which, instead of giving forth the hue so peculiar to health and strength, wears the garb of jaundice and sickness.

Subjects belonging to this class you will find among the publicans, whose business is to drink, eat, sleep, and give in exchange for the hard-earned cash of the artizan, the maddening, exciting, stimulating, stupefying compound of alcohol and dirty water; and when he has emptied your pocket into his own, and his butt into yours, and you by the exchange become rather troublesome, turns round upon you, calls you vile names—as rascal, rogue, vagabond, wretch, drunkard; and kicks, or, in case the weight he has given you to carry should prove too heavy for you to bear up under, drags you into the gutter,—when the policeman comes up, takes you under his care for the night, and charges you five shillings for the lodging; and in case you or your friends cannot pay the sum, takes care of you for a fortnight within big walls and little windows. But stop, stop,—we have taken the wrong road; our business is not with *men*, but *measures*: such cases, however, are not few and far between, as your knowledge, and I may say experience in some cases can testify. Be that as it may, you may depend upon one thing—that so long as there are drinkers, there will be makers of alcoholic liquors.

You will also meet with those characters among the wealthy hangers on at the public-house and tavern,—those who make a point of spending their evenings there with parties like themselves, in drinking brandy and water, and burning the tobacco-weed,—among brewers and brewers' dray-men, persons so often pointed to as fine specimens of health.

But the great evil, and to which I beg more especially to direct your attention, of retaining in the system those waste compounds is—that of diminishing the restorative powers of the body, those powers by which the cure of every disease, that is curable at all, must be effected, and not the medicine taken, as is fondly believed; that only helps the sys-

tem in these efforts by removing obstructions, &c., out of the way of its operations.

The Author of nature, well knowing that man, either from ignorance, or carelessness, or both, would violate the laws of his physical constitution, and thereby endanger his well-being, has wisely and mercifully provided for it, in making provisions by which, when the injury is not beyond certain bounds, the breach shall be healed.

You have all seen, and most here perhaps have experienced, in a lesser or greater degree, striking instances of this, in the rapid healing of a cut finger or a broken bone, when every thing exciting—such as dirt, is removed, and the system in a healthy condition. But there is nothing, as I am aware of, that counteracts or prevents the manifestation of this force more than the use of alcoholic liquors, according to the proportion, other things being equal, in which they are taken.

This power being in proportion to the vital force, and that again being in proportion to the life and newness of the organs and tissues of the system, it follows that in the use of those drinks this power must be diminished in force; and to such an extent is this force often reduced, that instead of anything like healing taking place, in cases of accident or disease, it only requires the least scratch or cut to set up a sore that not unfrequently ends in death. And indeed it would be wonderful if restoration did take place under those circumstances, when the system is composed, to a considerable extent, of dead and useless matter, instead of young and vital compounds, in which life is at its maximum, and when the phenomenon of restoration is most energetic. Such a state of things may be said to place the person in whom they are found to exist upon the verge of eternity; for owing to the great liability of such taking disease, or the formation of disease from the most trivial circumstance, which, when once set up, not all the skill and medicine in the world are capable of arresting. How often is this exemplified! and in none more than in the dray-men of London, respecting whom Sir A. Cooper once said, that of all persons he most dreaded in a surgical operation, brewers' draymen were the individuals.

I knew a gentleman of respectability and influence about six years ago, who died from a disease which was first induced by a slight wound he received on one leg. He was steady, attended church constantly, and never, to my knowledge, was seen intoxicated; but although never intoxicated, he used, to my knowledge, to love the social glass, and always seemed at home and happy when sipping his pint of ale with others of the same cloth.

A member of this society informed me a short time since, after I had been noticing the tendency of alcoholic liquors to prevent the restorative



powers of the system taking place, that some years ago, when in a state of intoxication, he wounded his leg; and that whenever he happened to hurt it afterwards, which he did several times, he had either to discontinue his work or was confined to his bed for a fortnight or three weeks, and a doctor's bill to pay; but that since he has been a teetotaler, he has not lain by a day, and had of course no doctor to pay, although he had hurt the same leg several times since he first signed the pledge.

A short time since I was walking to a village a few miles distant, and was overtaken by a publican's horse and cart, the driver of which (who was known to me) offered me a seat therein, which I accepted; and had not been long thereon before he, knowing me a year or two back to have been a teetotaler, enquired if I was one still, to which I replied in the affirmative; when he said "I was one myself a short time, not long since." When I remarked how he, a publican's man, came to be a teetotaler? In reply, he informed me as follows: that some time since his leg was bad, and all the means made use of, failed in working a cure; and finding the place did not improve and becoming very troublesome, his master told him to go home and he would send the doctor; who, when he came, said I must not take any beer or spirits of any kind, if so, my leg would not get well. I did as he told me, and by taking the medicine sent, and staying at home a week or two, my leg got well, and I was enabled to go to my work. Here you perceive, is a striking instance of the obstinacy (if I may be allowed the expression), of the restorative powers of the system against performing their duty till the excitement of strong drink had been removed.

About nine months after this circumstance was related to me, this man's master (who, when I introduced the principles of abstinence into the village alluded to, was so offended thereby, that he withdrew his subscription from an institution with which I was intimately connected), died rather suddenly of a disease of the liver, induced by alcoholic liquors; and a little before this death, his (the master's) mother died of diseases brought on by the same means.

No doubt many other instances, illustrative of the same principle, will readily recur to most minds present. The great reduction of the restorative powers of the system, will help to explain many otherwise doubtful expressions of medical men, such as the following, from the pen of Dr. Sewell, of America, to whom the world is greatly indebted for drawing attention to the morbid states of the stomach, and other organs, caused by the use of intoxicating liquors. "From careful observation," he remarks, "of this subject, during many years of practice, I am persuaded, that tens of thousands of temperate drinkers die annually, from diseases, through which the abstemious would pass in safety."  
—Pathology of Drunkenness.

In striking contrast to this state of things, is the rapid and extraordinary cures in temperate and healthy persons; but none more so than among those nations, where alcoholic liquors have not been introduced. An instance of which, we have in the case of the New Zealanders, of whom Dr. Grindrod, in the "National Temperance Magazine" observes that, "Hawkesworth, in his voyages, informs us, with respect to the natives of New Zealand, who use water only for their beverage, that they enjoy perfect and uninterrupted health; that among all classes, young and old, they never witnessed a single person who appeared to have any bodily complaint; nor did they once perceive the slightest eruption upon the skin, or any marks that an eruption had left behind.

"Among other proofs of vigorous health, as existed among these interesting people, was the facility with which the wounds healed that had left scars behind them, and that we saw in a recent state; and a further proof that human nature is here untainted with disease is the great number of old men that we saw, many of whom, by loss of their hair and teeth, appeared very ancient, yet none of them decrepid; and although not equal to the young in muscular strength, were not a whit behind them in cheerfulness and vivacity."

A similar testimony is borne by E. Spencer, Esq., respecting the Circassians, who are a remarkably temperate nation, and whose bravery for the last two or three years, has been signally tested in repelling the Russian invasion of their country. "Owing," he remarks, "to the robust firmness and temperate manner of living, the Circassians generally attain an advanced age; their diseases being neither numerous nor dangerous. This must be attributed, independently of their simple diet, to their constant exercise, pure air, &c.—Travels in Circassia, &c.

But we have no occasion to go to Circassia, New Zealand, or any other part of the globe, for a confirmation of the beneficial effects of abstinence on the restorative powers of the system. An interesting instance of this is, no doubt, fresh in the recollection of some present to-night, in the case of a teetotaler, who, from a hurt he received from the fall of a bar of iron on a railroad, was obliged to have his arm cut off; and Mr. Perceval, who performed the operation at the infirmary, declared, as I was informed, that he never saw a finer arm or knew one to heal so rapidly; and which he said was owing to the man's temperate habits. I have met with one or two other instances of the kind, but cannot call them to mind at the present moment; of the fact, however, that entire abstinence from all alcoholic liquors is a great auxiliary to the restorative powers of the system, no one, I apprehend, will deny.

Professor Dieffenbeck, of Berlin—as stated by Drs. Wilson and Gully, at page 63 of their *Water Cure*—bears testimony to the use of



water and abstinence from alcoholic liquors giving firmness and contractility to the muscular system. They say "the first surgeon in Europe—Dieffenbeck, of Berlin, recently stated that, in amputating limbs after accidents, he invariably found the several muscles of those who had been treated by water, and were habitual water-drinkers, of much more vivid red color, of greater compactness and more contractility, than in any other individuals."

Another thing of which I have not the least doubt is,—that by the use of alcoholic liquors the vital force becomes gradually, but certainly, weakened in its power, and that, as a result of this, the machine stops much sooner than we have any reason to believe it would have done had no obstacles been introduced among its works, and man, instead of dying prematurely, as three-fourths are known to do, would arrive at a good old age. How great is the number of those who, by their appearance and gait, betray the man of sixty or seventy, but whose real ages range between forty and fifty! And how melancholy to reflect upon the immense loss the world sustains by the prematurely shortening the days of those whose life would be a great blessing. This is one principal means by which man, when he should be on the summit of the hill of life, enjoying a wide and intelligent prospect both of the past and future, finds himself at the base, with the view contracted and destitute of interest; one of those means which hurries mankind over the period of manhood, the season of usefulness, vigor of mind, and strength of body, and which, in the normal state of things, is the longest period of man's stay here, and hushes him into the scenes of the second childhood, the period of mental and bodily weakness, decrepitude, and burthen, and when he is more in the way than use to others.

And yet, notwithstanding these stubborn facts, and they could be greatly augmented, there are not wanting those who say that—because heat is disengaged in the union of the elements of alcohol with oxygen, "they (fermented and spirituous liquors) were intended by the Creator for man's use;" and also "to a hard-working man, in addition to what he may eat, beer will be a great comfort, and, indirectly, a saving; more than that, it will benefit him."—(Citizen) It is sometimes remarked, that what the palate likes the judgment advocates; I will not take upon me to say that it is so in the present instance,—but this I will say, that the writer referred to will have a hard job to prove his assertions.

It is but reasonable to suppose, that if the Creator intended alcohol for man's use, he would have given him a stomach, intestines, liver, nervous system, &c., &c., which would have withstood its effects a little better than they are at present known to do; and also provided, as He

most bountifully has everything else necessary for man's use, alcohol in some shape or form either in the vegetable or animal kingdom. But this he has not seen fit to do, in anything living, from which, coupled with its injurious effects upon every organ of the body, we should say He did not intend it for the use of man.

Perhaps some may be disposed to doubt the truth of what has just been stated—that alcohol is not to be met with in any thing living, and therefore we will call in the aid of Professor Turner to substantiate the fact. "Alcohol," he remarks, "is the intoxicating ingredient of all spirituous liquors. It does not exist ready formed in plants, but is the product of vinous fermentation"—(Chemistry, 193).

And in case it should be further supposed—as is, or was, the case with the Bishop of Norwich—that sugar is an exception, and that it contains alcohol, we will appeal to the authority, already several times referred to—namely, of Professor Liebig, upon that question. "Sugar," he observes, "contains neither alcohol nor carbonic acid; so that these bodies must be produced by a different arrangement of its atoms, and by their union with the elements of water"—(Animal Chemistry, 283).

But admitting a saving to be effected by the use of alcohol as an element of respiration, would that justify its use as such in the face of all the ill effects consequent thereupon? We think not. But the fact of the case go to prove the opposite of this; that in place of its being a cheap, it is a very expensive combustible.

Sugar or saccharine matter, the only substance from which alcohol can be obtained, is a good element of respiration, that is, it is well suited to produce heat, by combining with the inspired oxygen of the air. But in the process of fermentation, the elements of sugar, oxygen, carbon, and hydrogen, separate,—re-unite again in different proportions, and form *two new compounds*—namely, alcohol and carbonic acid. To form the latter nearly half of the sugar is taken, and when formed, makes its escape out of the solution in the form of air; for the truth of which let the following authorities vouch:—

Professor Turner says "that forty-five parts of sugar are capable of forming twenty-three parts of alcohol, and twenty-two of carbonic-acid" (Chemistry, 848).

Professor Liebig says, "in the transformation of sugar, which is called fermentation, its elements are divided into two portions; the one carbonic-acid, which contains two thirds of the oxygen of sugar; and the other alcohol, which contains all the hydrogen"—(Vegetable Chemistry, 275).

Gay Lussac says that "100 parts of sugar, when made to undergo the process of fermentation, are converted into 51.34 parts, by weight, of alcohol, and 48.66 of carbonic-acid."



And lastly—Professor Donovan says, “the 95.278 grains of sugar are converted by fermentation into 46.5973 grains of carbonic-acid, and 48.6807 grains of alcohol”—(Chemistry, 337).

If it is a saving to waste half of one good element of respiration in the formation of another (which is done in the fermentation of sugar), then I don't understand what saving is. I should say it was no such thing, but on the contrary, a great and wilful waste. And if it is a saving to convert the sugar into alcohol, why does not nature save a little by taking another step (instead of resting satisfied with changing the starch of the seed sown into sugar for the food of the young plant till it can provide for itself), and convert the sugar into alcohol? But this is not all the saving, or rather as we should say waste, effected in the conversion of good wholesome grain into alcohol.

In addition to the starch, also an element of respiration, in barley, it contains the elements of nutrition, that which will build up the organs and the tissues of the body; but alcohol (all that the brewer desires to obtain in the conversion of barley into beer or spirits), will only answer the first of those purposes. Sir H. Davey ascertained that 1000 parts of barley contained 920 parts that are nutritious, or that 23 parts out of 25 are substantial food; so that in barley there are only 8 parts out of 100 but what will afford food for man. But what is the consequence of malting and brewing barley—to what is this nutritious grain reduced by converting it into alcohol? Let Dr. Thompson answer that question. He says that “the loss of barley in malting is one-eighth out of every 100; and in brewing 67;” so that the whole loss sustained by the barley in these processes is 75 out of every 100, or 3 parts out of 4!! Let us simplify this a little. “It is allowed by brewers on all hands, that 6lbs. of barley will make a gallon of ale. In these 6lbs. we have 96 ozs., and in these at least 88 of solid nourishment. But in a gallon of beer there is only 10ozs. of nourishment, and that too of a very inferior sort; so that in changing the barley into beer nearly 80 parts of the nourishing properties of the barley are gone, and for it we have about 3 ozs. of alcohol.” Here, you perceive, there is nothing in the shape of saving, but, on the contrary, a dead loss, by the conversion of barley into beer. And as to alcohol being a very dear rather than a cheap combustible, let Dr. Pereira, the examiner of *Materia Medica* at the London University, and who has published a work on that subject, testify. “If,” he remarks, “I had to point out the injurious qualities of alcohol, I think I could soon prove, that though it evolves heat in burning, it is an *obnoxious and most expensive fuel*. Consider its volatility, and the facility with which it permeates animal membranes and tissues, and its injurious operation before it is burnt, in the lungs, on the stomach, the brain, and liver.

Remember, that though spirits burn and evolve heat, there are, under ordinary circumstances, *other better, safer, and cheaper* combustibles to be burned in the vital lamp.” Certainly, and this the advocates of the use of alcohol as an element of respiration must have known. The Author of nature has provided in the food of man everything requisite both for the repair of the tissues and the supply of heat, and that too, *better, safer, and cheaper* combustibles, than the irritating, exciting, and stupifying compound of alcohol. With the exception of animal flesh, the greater proportion of food eaten is composed of the elements of respiration, such as fat, lard, oil, starch, gum, sugar of various kinds, pectine, bassorine, &c., as you see stated on this diagram (which I have copied from the National Temperance Magazine, drawn up by Mr. Morris of Spalding, that polite opponent of Dr. Grindrod, and who is one of those sticklers for the use of alcohol as an element of respiration, and which, though coming from the hands of an enemy, we have no objection of using when it suits our purpose.)

In this diagram you have matters more minutely described, and without pledging ourselves for the accuracy of every statement, the division here made of the ordinary food of man into elements of nutrition and respiration, is such, that you will see there is no lack of substances to support the respiratory process.

Nutritious Substances Containing nitrogen in union with carbon, oxygen, and hydrogen, in—				Non-nutritious Substances, Or generators of heat, composed of carbon, oxygen, and hydrogen (no nitrogen) in—
Lean meat .....	1. Fibrine 2. Albumen, like white of egg 3. Gelatine or isinglass (jellies are made from this, it abounds in calves' feet &c.)	...	...	Fat or oil
Fat ...	...	...	...	...
Flour .....	1. Fibrine 2. Albumen 3. ...	...	...	Starch (in flour)
Milk .....	1. Casein (or curd) 2. ... 3. ...	...	...	Butter Sugar Gum
Tapioca ...	...	...	...	...
Potatoes .....	1. Albumen, &c. 2. ...	...	...	Starch Starch Sugar
Arrow root ...	...	...	...	Sugar
Sugar ...	...	...	...	Gum
Ale and wine ...	...	...	...	Alcohol!!!!!!

Lean meat, you perceive, is composed wholly of the elements of nutrition, fat, wholly an element of respiration (and in domestic animals



killed for the service of man, the fat, I should think, equals the lean, and in some more); in flour we have three of the elements of nutrition and three of respiration; in milk one of nutrition and five of respiration; tapioca wholly an element of respiration; potatoes one of nutrition and two of respiration; arrow-root wholly an element of respiration; and sugar also wholly an element of respiration.

But this is not all, the lean of meat, the casein and albumen of flour, the casein of milk, and the albumen of potatoes, although they first repair and nourish the tissues of the system, are eventually burned therein; and like other elements of respiration, when their life is extinct, go to maintain the temperature of the body.

I trust enough has now been said to shew that, to use the words of Dr. Perira, "Although alcohol evolves heat in burning, it is an *obnoxious* and most expensive fuel; and that there are, under ordinary circumstances, *other better, safer, and cheaper* combustibles to be burned in the vital lamp." And also, rather than alcohol being a benefit to a hard working man, according to the writer before alluded to, it has been proved to be, although he may not know it, one of the greatest enemies he has to contend with.

*Digestion of Food being Fermentation.*—We must now hastily pass on to the subject of the digestion of food, being that of fermentation; the same as that which takes place out of the body in a saccharine solution, producing alcohol and carbonic acid.

And here, again, as in that of animal heat, the advocates of this theory have taken shelter under the name of Professor Liebig; but as with that subject so with this, we shall find the security of which they boast is only imaginary, existing in their own credulous heads, rather than in the facts of the case, which, as we shall find, are opposed to the notion, and likewise the authority of Professor Liebig.

A wise man once said, "There is nothing new under the sun;" and so far as the theory of digestion being that of fermentation goes, it would seem correct; for this now popular and darling notion of the lovers of strong drink is of very ancient date, and with persons of authority, has been long since laid aside as one of the baubles that served to amuse the minds of the ancients, and which now bewilders the intellect of the prejudiced and ill-informed.

How completely and easily this bothering subject of abstinence, and you who make so much noise about it to the great annoyance of many of your neighbors, who like to enjoy in quiet their glass and pipe, would be disposed of, if it could but once be proved, as many wish, that the stomach is a fermenting vat, and that the food you eat therein, goes through the process of fermentation, giving rise to the very thing

you are so anxious to shun; and, in addition, that deadly compound—carbonic-acid gas, which as they suppose, you would escape by first allowing your bread, barley, gum, sugar, and starch, to ferment before taking them.

But it is one thing to assert and another thing to prove; and this, as yet, never has, and we venture to say, never will be proved. But we have no time to lose, and must, therefore, address ourselves to the facts of the case. And first, let us see what Professor Liebig has to say upon the subject; as he is *the supposed* authority adduced in support of this notion.

To those who have not read Professor Liebig's works, and therefore cannot be acquainted with his peculiar manner of expression, it will be necessary for me to say that he uses the word fermentation in a general sense, signifying many chemical phenomena—the breaking up of various compounds,—and making it synonymous with transposition, transformation, putrefaction, &c., under which heads nearly every chemical change may be classed; and therefore not restricting the meaning, as among us, to signify that kind of change only of a saccharine solution, resulting in the formation of alcohol and carbonic-acid; and of which you will perceive proofs in the extracts we shall read. Professor Liebig is of opinion that the digestion of food in the stomach is purely a chemical operation, and that it takes place independent of the vitality of that organ; and that the moving agent in this change is the spent tissues of the stomach, whilst undergoing a transformation, carried away by the gastric juice; and which, being brought in contact with the food in the stomach, they induce its particles to resign their hold of each other, and dissolve in that fluid.

He says, "The most decisive experiments of physiologists have shown that the process of chemification" (that is, the change the food undergoes in the stomach) "is independent of vital force; and that it takes place by virtue of a purely chemical action, exactly similar to those processes of decomposition or transformation, which are known as putrefaction, fermentation, or decay."

"When expressed in the simplest form, fermentation or putrefaction may be described as a process of transformation, that is, a new arrangement of the elementary particles, or atoms, of a compound, yielding two or more new groups or compounds, and caused by contact with other substances, the elementary particles of which are themselves in a state of transformation or decomposition. It is a communication or imparting of a sense of motion, which the atoms of a body in a state of motion are capable of producing in other bodies, whose elementary particles are held together only by a feeble attraction."



"Thus, clear gastric juice contains a substance in a state of transformation, by the contact of which with those constituents of the food which 'by themselves' are insoluble in water, the latter (constituents of the food) acquire, in virtue of a new grouping of their atoms, the property of dissolving in that fluid' (the gastric juice)....." "That the food is rendered soluble quite independently of the vitality of the digestive organs has been proved by a number of the most beautiful experiments. Food, enclosed in perforated metallic tubes, so that it could not come in contact with the stomach, was found to disappear as rapidly (?), and to be as perfectly digested, as if the covering had been absent; and fresh gastric juice, out of the body, when boiled white of egg or muscular fibre was kept in contact with it for a time at the temperature of the body, caused these substances to lose the solid form, and to dissolve in the liquid."—108.

This latter experiment was repeatedly performed by Dr. Beaumont, of America, with gastric juice—which he obtained from the stomach of a person by the name of Martin, a young Canadian, who, as many of you are aware, received a gun-shot wound in his side—which penetrated his stomach, and left an opening—which healed round—but not closed; and through this perforation of the stomach, digestion of food could be seen, food enclosed in metallic tubes admitted, and gastric juice obtained.

Professor Liebig goes on to state that "It can hardly be doubted that the substance which is present in the gastric juice in a state of change, is a product of the stomach itself. No substances possess, in so high a degree as those arising from the progressive decomposition of the tissues containing gelatine or chondrine, the property of exciting a change in the arrangement of the elements of other compounds.—*Animal Chemistry*, 110.

And at page 118 of the same work he remarks, "In the same way as muscular fibre, when separated from the body, communicates the state of decomposition existing in the elements to the peroxide of hydrogen; so a certain product, arising by means of the vital force, and in consequence of a transformation of the elements of parts of the stomach, and of other digestive organs, while its own metamorphosis is accomplished in the stomach, acts on the food. The insoluble matters become soluble—they are digested.

Before proceeding further with the extracts, we will make a remark or two upon the phenomena which always accompany the fermentation of sugar, or a saccharine solution; by which you will be able to form a correct idea of that chemical change, and whether the digestion of food in the stomach is performed by precisely the same or some other chemical transformation.

1st.—In that fermentation which has been denominated the vinous fermentation, the sugar not only dissolves, but its elements separate, reunite again in different proportions, and give rise to the two well-known products—alcohol and carbonic-acid; the former remaining the intoxicating principle of the liquor, while the latter makes its escape in the form of air.

Whereas, the food in the stomach is merely dissolved in the gastric juice, without the formation of two new compounds, as in the fermentation of sugar; an evident proof that the change which affects the digestion of food is different from that which results in the formation of alcohol and carbonic acid.

2nd.—In the vinous fermentation, air, or rather oxygen, is absolutely necessary before the process can commence; but in the digestive process no oxygen is required. A second proof that the chemical changes are different, though Liebig often employs the same word for both.

3rd.—The temperature necessary for the fermentative process, and under and above which it is not found to take place, is between 50 and 80 degrees of heat; whereas that of the human body is 99, and that of the stomach during digestion, I should say, is 100, or more. A third proof that fermentation does not take place during healthy digestion.

4th.—Another proof that digestion is not fermentation is,—that the gastric juice is known to prevent, and even arrest, the fermentative process.

And does the Professor of Giessen favor these statements? Favor! he distinctly asserts the two first. Hear him:—

It is certainly remarkable," he observes, "that hard-boiled white of egg, or fibrine, when rendered soluble in certain liquors, by organic acids, or weak alkaline solution, retain all their properties except the solid form (cohesion) without the slightest change. Their elementary molecules, without doubt, assume a new arrangement: *they do not, however, separate into two or more new groups*" (as the elements of sugar in fermentation) "*but remain united together.*"

And now listen:—

"The very same thing occurs," he remarks, "*in the digestive process; in the normal (that is, healthy) state, the food only undergoes a change in its state of cohesion, becoming fluid without any other change of properties.*"—*Animal Chemistry*, 119.

We are satisfied; this is quite enough for our purpose,—and so long as we have the testimony of the great organic chemist of the day, that the "particles of the food retain all their properties except the solid form; that they do not separate into two or more new groups, but remain united together," we may rest contented that the digestion of food



in the stomach is not effected by the same chemical process as is known to produce alcohol and carbonic-acid from the elements of sugar. But as we have one or two other authorities at hand on the subject, we may as well give them :—

And the first is that of the justly celebrated German physiologist, Professor Müller. He says—"This theory" (namely, that of digestion being fermentation) "has never been confirmed by proofs, and can now, indeed, be refuted; the fermentation, if it exists, must be different from all other known kinds of fermentation: for, as we shall presently show, none of the usual phenomena of that process are present when digestion is performed artificially....."

"Moreover, no carbonic acid is evolved during artificial digestion, and not the smallest quantity of oxygen is necessary to the process."—*Physiology*, 583.

"The gastric juice," remarks Sir Charles Bell, "like most other secretions, having in a remarkable degree the power of retarding putrefaction, and dissolving the food." The same testimony is borne by Dr. Beaumont, of America.

"It is now demonstrated," observes Dr. A. Combe, "that the tendency of healthy digestion is rather to arrest than induce fermentation."—*Physiology of Digestion*, 110.

And yet, notwithstanding these facts and testimonies of the highest authorities to the contrary, there are not wanting medical men who assert, as "Veritas" in the *Citizen*, "that the process by which the food taken into the stomach is digested, is one of *true fermentation*." The two last words are put in italics. The conduct of individuals who are perpetually ringing in the ears of the multitude, the authority of Professor Liebig for this obsolete notion is most reprehensible, and either betrays a lamentable ignorance of that man's writings, or of their intention to deceive. Because he has classed the change which food undergoes in the stomach among those chemical transformations termed fermentation, putrefaction, decomposition, metamorphosis, &c.; they have jumped to the conclusion that it must be what they say it is, viz., the same as the vinous fermentation, without once stopping to notice the peculiarity he has so evidently marked of that process, in which two or more new compounds are formed, and digestion, wherein the food only undergoes a change in the state of its cohesion, becoming fluid without any other change of properties. But fearing, perhaps, that this mistake would be made—and knowing the proneness of some to draw conclusions without first examining the premises, Professor Liebig has appended the following cautionary remarks upon the subject.

"The greatest obstacle," he remarks, "to forming a clear conception

of the nature of the digestive process, which is here reckoned among those chemical metamorphoses which have been called fermentation and putrefaction, consists in our voluntary recollection of the phenomena which accompany the fermentation of sugar and animal substances, (putrefaction) which phenomena we naturally associate with any other similar change; but there are numberless cases in which a complete metamorphosis of the elements of a compound occurs without the smallest disengagement of gas, and it is chiefly these which must be borne in mind if we would acquire a clear and accurate idea of the chemical notion or conception of the digestive process." (*Animal Chemistry*, 119.)

But where some are wanting in discretion, the noted Spalding doctor is wanting in candor, and would arrive at the same conclusion, namely, that the change effected in the food is by means of the fermentative process, in a covert manner, and leave an impression on the reader's mind never intended by Professor Liebig. Speaking of the permeability of animal membranes and tissues to gases, Professor Liebig produces as an illustration of the fact, the fatal effects of drinking wine in a state of fermentation, upon persons in wine countries; and notices that the process is accelerated by the heat of the stomach.

For a short time we have no doubt it might be, but from the great heat of the stomach, the counteracting tendency of the gastric juice, and other causes, the process must soon be arrested.

From this circumstance, Mr. Morris, when propagating the notion that sugar and saccharine substances ferment in the stomach, producing alcohol and carbonic acid, makes the ambiguous assertion, "that Liebig likewise states that wine will ferment in the living stomach;" thereby producing the erroneous impression that the fermentation of saccharine substances in the stomach in a state of health is asserted by that chemist; or that the digestion of food is effected by the transformation termed fermentation, which as we have seen, he does no such thing; but, on the contrary, states it to be merely a solution in the gastric fluid without the formation of two or more new compounds. The following is the passage referred to in Liebig's work. "Finally," he remarks, "if we consider the fatal accidents which so frequently occur in wine countries from the drinking of what is called feather white wine, we can no longer doubt that gases of every kind, whether soluble or insoluble in water, possess the property of permeating animal tissues, as water penetrates unsized paper. This poisonous wine is wine in a state of fermentation, which is increased by the heat of the stomach.

The carbonic-acid gas which is disengaged penetrates through the cavities of the stomach, through the diaphragm, and through all the intervening membranes, into the air-cells of the lungs. The patient dies



with all the symptoms of asphyxia caused by an irrespirable gas; and the surest proof of the presence of carbonic-acid in the lungs is the fact, that the inhalation of ammonia (which combines with it) is recognized as the best antidote against this kind of poisoning."—*Animal Chemistry*, 115.

But is the increase of fermentation of wine, when undergoing that process, any proof that sugar or a saccharine solution not in that state, ferments in the stomach in a normal state? If it is, where are the proofs? Whoever heard of a person being poisoned by the escape of carbonic acid during the fermentation of saccharine substances not undergoing that process when taken into the stomach? If so, who—when—and where! For certainly, from the great quantity of saccharine substances often eaten by persons, something of the kind should follow, did they undergo that transformation in the stomach; for be it remembered, the formation and escape of this deadly gas always accompanies fermentation.

When more food is introduced into the stomach than the gastric juice can dissolve, or when the stomach and gastric secretion are not in a healthy condition, there is no doubt but that other changes than those peculiar to that organ in a normal state, are induced; but that these, or any one of the abnormal changes which the food undergoes is that which we term the vinous fermentation, is, I think very doubtful; though I am aware that Dr. A. Combe and some others, are of opinion that that change does take place in an abnormal condition. But be this as it may, it will not affect our position in the least, as we are only concerned with digestion in a normal state; and there is not the shadow of proof that in that condition saccharine substances go through the fermentative process.

Another ambiguous remark is made by Mr. Morris as coming from the pen of Dr. Beaumont, of America, respecting fermentation of food in the stomach. He (Mr. Morris) says—"In Dr. Beaumont's work it is stated that fermentation *does take place* in the human stomach!"—"Does take place" is put in italics.

It is some time since we read Dr. A. Combe's edition of Dr. Beaumont's book, entitled *Experiments and Observations on the Gastric Juice, and on the Physiology of Digestion*; but we challenge Mr. Morris to produce the passage from that work wherein it is stated that "fermentation," as we understand the term, "does take place in the human stomach" in a healthy state, whatever the Dr. may say of digestion under other conditions.

It does not tell much for a cause, or the state of a man's moral feelings, when, in the place of chapter and verse for quotations, we have mere empty assertions.

We do not stand here, however, as the apologists of Dr. Grindrod; for he, it is well known, is quite able to defend himself: it is to disabuse the public mind of those floating fallacies of the times against the temperance movement; and as far as possible, to fortify the minds of the members against the ambiguous assertions and under-handed dealing of those who would gladly shake their faith.

We shall now dismiss this *fermenting* for a *stimulating* subject, by the following remark:—If it be true that the food is reduced to chyme in the stomach by the true fermentative process, how is it the advocates of this theory are not recommending throughout the country for the make and sale of alcoholic liquors, as entirely useless and expensive? How is it, if alcohol be generated in the stomach during digestion, or rather, as they should call it, fermentation, their zeal for this notion will allow them to stand quietly by whilst one million acres of the best land, and forty million bushels of good grain, are consumed annually in the manufacture of strong drinks? Certainly He who constructed man's constitution must be the best judge as to what are its wants; and if the healthy laws of digestion produce this fiery principle, the supply is no doubt proportionate to the wants of the system; wherefore, then, this waste of land, wholesome food, and almost everything else near and dear to the human heart, in the production of that which nature provides independent of man's agency.

Where is the use of malt-houses, brew-houses, and public-houses, if man's stomach is a fermenting vat? Surely, in advocating this theory, and upholding the present establishment for making and selling those vile compounds, our enemies prove rather to much.

*Stimulants.*—The nature of stimulants and their operation upon the system, having been so well described by much abler persons than myself, I shall do little more than present to your notice a few extracts bearing upon these subjects; and this I do the more readily as what has been advanced by some of the highest authorities respecting those questions has never, to my knowledge, been made known in any of our temperance publications.

The arguments urged for the use of intoxicating drinks are gradually, but most certainly, diminishing. The bold stand which was once made by the lovers of those liquors is now no longer maintained; and instead of intrenching themselves within a supposed impregnable fortress, have been forced to make a long retreat, and the defence they still imagine surrounds them is penetrable in every direction to their daily increasing foes; and of this they are conscious.

It is pleasing to reflect upon the rapid progress the principle of ab-



stinence has made since 1835; then the army of teetotalers was small and weak, and their enemies comparatively numerous and strong, to what it is now; then we were at the foot of the hill and our enemies, menacing us from above; but now the tables are turned, we occupy the vantage ground they then held, so that now our position is most commanding and cheering; with the delightful thought occupying our minds that, although here and there may be seen small detachments of the defeated army showing fight, the day is not far distant when no one shall be found bold enough to advocate the cause of Bacchus. Then the main argument we had to meet was, that alcoholic liquors were nutritious, and that it was not possible to follow a laborious occupation without their help; but having visited the laboratory of the chemist and the lecture room of the physiologist, and what is better than all, tested by experience, we found the opinion fallacious, and soon the sound was heard through the length and breadth of the land, (and we may now say, the world, for there is scarcely a habited part where total abstinence is not preached), that henceforth the word nutritious must be disassociated with intoxicating liquors, for that they possess nothing that will entitle them to such an endearing appellation.

But although driven from this their stronghold, the abettors of those drinks were soon after seen coming boldly forward with, as they thought, the argument that these liquors were necessary for the purposes of digestion, and that the spirit we were crusading against, was actually generated in the stomach, during that process, namely, digestion!!

That the Author of nature should make healthy digestion dependant upon that which he had nowhere provided in any thing living, (and had he, it would have rendered health indebted to death, for alcohol, as every one knows, is the product of decay), was thought wonderfully strange, as in no part of his works could it be seen that he had left anything else, supposing that to be the case, in so unfinished a state; but this, too, after a little scientific inquiry, was found to be erroneous. Our opponents were not yet beaten; they next, and with some appearance of argument, asserted that alcoholic liquors were necessary for the production of animal heat. But this, likewise, which at first seemed to promise support, has, by the light of modern chemistry, proved a broken reed; and that they, although admitted to, generate heat, are entirely unnecessary for that purpose, other things as we have shown, much more suitable, having been provided in abundance.

But yet show of fight is maintained; and what for? Why, (would you believe it?) that they are necessary as stimulants, tonics, stomachics, &c.; as though, here again, the author of nature had left things pertaining to man's well being in an unfinished state, and could only be sup-

plied by the rotting of the food He has provided for the support of animal existence. This is implied if it is meant that these liquors are necessary for those purposes in a state of health; if not, but that they are only necessary in diseased conditions, why then the affair is settled; for this is ground we do not pretend to meddle with—it is only for the purposes of health that we fight about. As man in a state of health stands in need of no artificial stimulant, tonic, or stomachic, the former of these notions cannot be for one moment entertained; and as for the latter, it is not one for the consideration of teetotalers, but for the medical profession. Our opponents, therefore, in having recourse to these liquors as stimulants, tonics, and stomachics, have fairly ceded the question at issue; for as we only contend they are not necessary in a state of health, and as they have nothing more to offer why they should be taken for that purpose, they must confess themselves honestly beaten. But as stimulation is often taken for sustentation on the part of non-teetotalers, and as there is a little misconception respecting it on the part of teetotalers themselves, we have thought well to make a few brief remarks upon it.

Well, and what is a stimulant? A stimulant is that which excites to action an organ, any particular set of organs, or the whole body itself. And what substances possess this property? Many—or, we may say, most—according to the manner in which they are presented or applied, and the condition of the body at the time being. Our life may be said almost to be made up of stimulation or excitement, for there is scarcely a person or thing but which exerts some influence or other either on the mind or body.

Among other stimulants may be mentioned fear, anger, good news, the sudden appearance of a friend, the state of the public funds, the sound of music, light, heat, cold, food, alcoholic liquors, pepper, mustard, &c.; some of which are good to a certain extent—such as food, light, heat, &c.; while others—such as alcoholic liquors, mustard, pepper, &c., are injurious. Stimulants are divided into local and diffusible: mustard, pepper, and many others, belong to the first class; while alcohol belongs to the second. They are again divided into restorative and exhausting stimulants, and this is the division we are anxious more particularly to direct your attention to, as it is the confounding of this that has led to many grievous errors respecting intoxicating drinks.

All stimulants, as such, from their nature must exhaust the vital power when applied to the body; because that which excites the body or any part thereof to action, without at the same time, or shortly after, replenishing the force consumed, must leave the system minus so much force as was necessary to perform the action. Food, while it excites certain phenomena in the system, by its nourishing properties supplies,



and more than supplies, the force expended in the actions called forth; and is, therefore, denominated an exhilarating stimulant: whereas, alcohol merely stimulates, that is—excites to action without at the same time, or shortly after, as is the case with food, replenishing the force consumed in the phenomena induced; and hence, alcohol is named an exhausting stimulant.

It must be evident that whatever consumes your strength, without at the same time furnishing means to replenish it, must in the end exhaust it, and leave the body in a worse condition than before the excitement occurred.

But I promised to give you authorities, and to say but little myself upon these subjects:—

And the first authority I shall introduce to your notice will be Dr. Müller, a physiologist at the head of his profession, and one in whom great confidence is placed by most medical men:—"The true and most important stimuli," he remarks, "are the vital stimuli themselves, the constant operation of which on the tissues is the sole cause of the manifestations of life, and of the increase of the vital force. The vital stimuli—namely, a certain degree of external heat, atmospheric air, water, and nutriment—not merely produce a change in the composition of the organic structures, and stimulate by disturbing the balance in the system; but they renovate the tissues, by entering, in a manner indispensable to life, into their composition.

"..... The external vital stimuli are not the only agents which give rise to the vital actions; everything which disturbs the elementary composition of the organs, and the balance in the distribution of the imponderable matters in the organic tissues, may also modify the action of the organism and of the separate organs. Such a modification, when considerable, is called reaction.

"The influence which produces this reaction in the organism is called irritation, and the cause exciting the irritation, a stimulus or irritant.

"There are other stimuli which excite reaction, but are not essentially renovating, and indeed for the most part have no restorative action on the organs; and which, excepting in producing symptoms or phenomena of reaction, have no vivifying influence; but, on the contrary, are injurious in proportion to the change effected by them in the organic composition."—*Physiology*, p. 57 & 60.

Again he observes—"The action of an organ being excited by stimulants, and every increase of action, without simultaneous increase of organic force, being attended with exhaustion of this force, stimulants themselves must exhaust, or, as it were, consume the organic force; unless, like the general vital stimuli, they have at the same time a restora-

tive action, a temporary cessation of the action they have themselves excited will follow, although their influence be continued."—59.

And again—"Modern medicine has ceased to expect any benefit from medicinal substances in the way of strengthening the nervous energy: the pretended virtues of such remedies are displayed nowhere but in treatises on *Materia Medica*. There are stimulants in abundance; but they can strengthen the nerves only by promoting the re-productive process of nutrition in them. A large class of substances, in a state of solution, have a specific influence on the nerves, destroying their power—these are the narcotics."—675 & 676.

The testimony of Dr. Wilson is to the same effect. He says—"Physiological experiments show abundantly, that the first effect of a stimulating agent applied to the capillary blood-vessels, is to cause them to contract—to diminish their calibre. To this property of acting on the application of a stimulant, the name of irritability is given; and as the organic nerves "(that is, nerves not under the control of the mind)" are everywhere in contact with the blood-vessels, the former have been generally believed by physiologists to endue the latter with that property. Wherever, then, a stimulus is applied to any part of the body, it raises the irritability of that part, as represented by the organic nerves and blood-vessels. And, as I have said, the first evidence of irritability is contraction of the blood-vessels, and the expulsion of the blood they contained. But as this contraction is a state of action, of effort, it sooner or later ceases, and relaxation of the vessels ensues; and just as fatigue is in proportion to the previous exertion, so is the relaxation to the previous contraction, and this again to the amount of stimulus supplied."—*Truth Seeker*, Jan. 1845.

To the next quotation I beg your special attention, as it explains why alcoholic liquors, both by medical and non-medical persons, have been considered nutritious:—"A great error," remarks Professor Müller, "has been committed in classifying the vivifying stimuli with other stimuli, which do not really contribute to the composition of organic bodies, and do not renovate their power. A mechanical stimulus, for example, pressure, condition of a membrane endowed with sensibility, for example, pressure, excites, it is true, a vital phenomenon—sensation; but does not vivify, does not invigorate the organic force; while, on the contrary, the essential vital stimuli, viz.—nutriment, water, air, and heat, really contribute to the formation of organic matter. The nutriment, in the first place, is not merely a stimulus of the organic body—it is itself susceptible of life; it is a stimulus which vivifies, and can itself receive vitality."

He also remarks that "An endless injury has been done to medicine, and many lives have been lost, through the error of confounding all agents which excite reaction in the system with those which are absolutely



essential to life, and which renovate while they stimulate the organs; the false notion having been thereby induced, that because certain stimuli feed, as it were, the flame of life, stimulating agents generally are necessary."—*Physiology*, 32 & 66.

This is the stone of stumbling and rock of offence; here we have the reason of that almost universal belief, that alcoholic stimulants are necessary and nutritive; that because phenomena are excited in the system by the use of intoxicating drinks similar to those induced by the taking of wholesome food, therefore the conclusion has been drawn that they are nutritious and strengthening: but a more absurd and erroneous belief is scarcely possible.

Were it possible for alcohol to nourish the system, it must be possessed of most extraordinary powers of assimilation, to impart to the body nourishment in so short a time as its effects are experienced after its introduction into the system.

From the many changes food has to undergo, it must necessarily be some hours before any part can be incorporated into the living organism.

That pleasurable sensation experienced on the taking of a meal does not arise from the food directly supplying the waste of body, but from a sense of satisfaction diffused over the system by its introduction. The notion that alcoholic liquors are nutritive, from their exciting sensations analagous to those produced by the taking of food, constitutes one of the greatest obstacles to the spread of the principles of abstinence; and I am fearful it will be long ere the belief will be eradicated from the public mind. Let us not be discouraged, however, but from the unparalleled success which has accompanied our past efforts be animated to still greater exertions, and to do what we can to transmit to coming generations the fact that alcoholic liquors are not only unnecessary, but pernicious to the physical and mental well-being of man.

But if persons stand in need of artificial stimulants, and take alcoholic liquors as such, it proves, as we before hinted, that they are not in health, for in that state nothing more is needed than the ordinary vital stimuli provided by nature—namely, food, water, air, heat, and exercise; and one would think that, in these times of bustle and excitement, men had quite enough, if not too much, stimulation, without having recourse to that which, to a considerable extent, has caused the fall of nations, the ruin of families, and the disgrace and premature death of thousands, some of whom have been the brightest characters ever seen.

Besides, every one conversant with stimulants and medicinal substances, knows that the excitability of the system decreases by their continuance; so that to produce the same amount of action that was called forth on the first application of a stimulant, greater and greater quantities

must be taken, and, at length, the system will become so accustomed to its influence, that no perceptible effects will follow, unless administered in so large a quantity, that had it been taken at first, before the healthy excitability of the system was destroyed, death would have been the inevitable result. Every great drinker and medicine taker is a proof of this.

The same high authority, Professor Müller, already, several times quoted, observes upon this subject, that "A stimulant too often repeated deadens the excitability of the organ, and renders it insensible to the same stimulus for a long time. Hence may be explained a part of the phenomena observed in the effects of habit; although many things, to the action of which after long repetition we become thus insensible, produce at first not merely the phenomena of excitement, but a durable structural change, whence alone their subsequent inefficiency can be explained."—*Physiology*, 60.

So that to reap the advantage desired, the stimulant should be often changed, and not continued for years, as is the case with those who take alcoholic liquors, the use of the same stimulant, when by so doing, it ceases to act as such.

It is no business of teetotalers to interfere with the medical profession or man in a state of disease, but as there is much diversity of opinion among doctors themselves, and as it is confessed that much harm has arisen from the use of alcoholic liquors as medicine, perhaps I shall be pardoned if I give you one or two short extracts from authorities upon the subject.

"To those naturally good stamina," remarks Dr. Mayo, late surgeon of the Middlesex Hospital, "who are convalescent after fever, or inflammatory attacks, the lightest nutriment is commonly necessary; gruel—arrow-root—beef tea, with dry toast—calves' foot jelly—boiled whiting—and the like. The stomach does not want, and will not bear stimulating; but it is weak and can chymify the most digestible food; and that in small quantities. Its tone is sure to return spontaneously."—*Philosophy of living*, 59.

"These influences," (nutriment, water, air, and heat) says Dr. Müller, "which are constantly in action, and which, while they stimulate, leave no exhaustion after them, are the only efficient means of restoring the powers of the body after illness."—*Physiology*, page 69.

Again, he observes, "In cases of rapid sinking of the vital force, all our stimulant remedies are of no avail, and the greater part of such remedies excite the system and do not add to its strength. \* \* \* There are however some agents, in addition to the general vital stimuli, which under certain conditions, excite a local vivifying and strengthening



influence, either by restoring the composition of the organ, or by so changing its composition that the renovation by the general vital stimuli is facilitated. All this, however, depends on the state of the diseased organ; and the cases in which the so-called stimulant and tonic remedies have really their supposed effect are very rare. On the other hand, many patients have been stimulated to death by a host of remedies which, under the circumstances of the case, do indeed stimulate, but produce only a tumult in the system which they fail to strengthen."—*Physiology*, p. 60, 61, 63.

"During the efforts of the system," remarks Drs. Wilson and Gully, "thus aroused for so beneficial an end, if agents be employed which divert those effects and tend to centre stimulus on the more important organs, augmented mischief is the result. Such agents are to be found in alcoholic and medicinal stimulants, applied to the internal skin and nerves."—*Water Cure*.

"I fear," observes Dr. Beaumont, "that thousands have been sent to a premature grave through the injudicious administration of alcoholic liquors. I can most readily believe that many recoveries have been protracted, if not prevented, by seizing the first opportunity that has presented itself, on the subsidence of the more active symptoms, for commencing a course of stimulation, by which, in many cases, the dying embers of disease have again been established, which have either terminated in death, or in a difficult and uncertain recovery."—*National Temperance Advocate*.

Leaving you to draw your own conclusions from these extracts, I shall dismiss the subject of stimulation with just one cautionary remark to teetotalers.

I have sometimes heard—and, if I mistake not, seen it in print—total abstinents argue and urge, as a reason why alcoholic liquors should be discontinued, that they are stimulants; and when it has been with individuals who have understood and applied the principle laid down—and, be it remembered, all true principles are of universal application—they have but too soon found themselves in a corner, and in some cases with no other reason, supposing that to be one, to advance for their conduct. Now the fact of alcohol being a stimulant is no argument at all why it should be abstained from, because upon the same principle every thing else should be given up—such as good wholesome food, water, air, heat, light, and a thousand other things upon which our life and well-being depend; because, as we have already seen, they all more or less possess this property,—to escape which, therefore, we must go out of existence.

The reason why I and many thousands beside abstain from alcohol is, because it is not possible for it to nourish the body—because it robs the

blood of oxygen—because, when brought in contact with the living tissues, it acts as an acrid poison, and eventually ulcerates the part touched—because it prevents digestion, by hardening the food; and, according to Dr. Thompson, decomposes the gastric juice, the solvent nature has provided for its dissolution—because it paralyzes the nerves—because, by its action on the brain, it renders the sane insane, the man a child, and the philosopher a fool.

Or with others, equally conscientious and philanthropic, who, like myself, when first I became a teetotaler, give up the use of alcoholic liquors as a beverage for the sake of others; because, by personal abstinence, those to whom they had, or were likely to become, a snare—the means of disgrace, ruin, and it may be, as in too many cases it had already, proved the highroad to the gallows, might be saved to their friends and country. Let some such reasons as these be given for your abstinence from all intoxicating drinks, and you need have little fear of being beaten by the most subtle enemy to the spread of true sobriety.

*Tonics*.—A short time ago, I was conversing with a highly respected Minister of the Gospel upon the subject of abstinence; and in reply to some questions why he did not adopt the principle, said, "I take it as a tonic."

And what is a tonic? "Tonic," says Dr. Hooper, "is applied to that which increases the tone of the muscular fibre, and imparts vigor to the whole system."—*Dictionary*.

But if that be a definition of a tonic, there is nothing in alcohol worthy of such a name, or capable of answering such an end; and without doing violence to language, it may be called an anti-tonic—the means of destroying that which it is taken to produce, and which I believe it has done in three cases out of four where recourse has been had to it for that purpose. Nor have I any hesitation in asserting, that were an impartial testimony given by the faculty generally, the majority would say that alcoholic liquors have been the most faithful source in producing that want of tone of the stomach and other organs at present complained of by the votaries of Bacchus; but who, through the authority of Dr. Graham, and others of his school, are still continuing their use, fondly believing they are using means to invigorate and strengthen their constitutions. From the first effects of alcohol upon the system, I can readily believe that persons unacquainted with its nature and operation, would conclude that it increases the tone and adds vigor to the body; but from the certain collapse and increased exhaustion which always follow its use, it must be obvious to an unprejudiced mind that it merely acts as an exhausting stimulant—calling forth, as we have already seen, the little force yet in the system, without at the same time, as is the case with food, &c., replenishing that force.



If your stomach is the subject of atony—that is, want of tone—it is evident you have been transgressing some of nature's laws; for man in a state of health has sufficient tone and vigor to enable every organ of his body to perform what nature requires;—I say nature requires, for it is too often the case that more work is imposed than what she at first designed should be done, and especially upon the stomach (the storehouse of the system), by over-eating, eating undigestible things; and then, for the purpose of getting rid of the load with more present ease and comfort, alcoholic liquors are had recourse to, thinking thereby to help the stomach a little under the ponderous burdens it has to carry off; and after they have exerted their magic influence, and the stomach become insensible to their power, the doctor is called in,—and he, good soul, instead of removing the disease-producing cause, thereby putting the system in a fair way of setting things right, ten chances to one but he subjects the already debilitated stomach to the potent effects of minerals and metals in the form of medicine; and could the thousands of stomachs now subject to this treatment—namely, of overloading, stimulation, and medication—speak, they would give one unanimous and hearty burst—AMEN! to what has just been said. I have no wish to be hard upon individuals, but there is no doubt in my mind but that the publicans and doctors (doubtless undesignedly) play into each other's hands; and thus man's constitution is made a sort of football, giving employment, if not pleasure, in some cases, for the one to damage and the other to mend.

Depend upon it, friends, by the spread of our principles we shall be killing two birds with one stone—we shall not only shut up the public-shops, but the doctors' shops; and for these the baker's, the butcher's, and every other shop will be opened that can in any way contribute to the health and well-being of the community. Would you believe it—that the number of medical men in London is more than the butchers, and nearly as many as the bakers. Would you credit the statement—that the number of hospitals, infirmaries, and dispensaries in the Metropolis, is ONE HUNDRED AND FIFTY; one of which in the year 1844, admitted no less than FORTY THOUSAND patients?

Would you suppose, from the number of gentlemen practising the healing art, that half of the children born in Great Britain die before they are five years of age? Would you imagine that, with all the schools of medicine, and the thousands of hospitals, infirmaries, dispensaries &c., in the land, that in England and Wales one hundred and twenty thousand persons are slowly dying of consumption?

Would you have supposed that out of the one hundred and twenty-five persons who die every day in London, only nine die of old age? Were you strangers just arrived from a far, and apparently, more healthy part of the world, and on your landing these appalling facts were made

you, methinks the countenance of every one would turn pale at the thought, and without a moment's hesitation mark again for the more healthy regions it was your happy lot to be born in. But we must return from this digression. "Modern pathology," remarks Drs. Wilson and Gully, "has placed beyond all doubt the important facts, that atony of the stomach is invariably the consequence of long-continued irritation of its nerves and mucous lining. There is no more certain way of producing and maintaining such irritation than by taking improper food, alcoholic liquors, and medicines of any kind."—*Water Cure*, p. 75.

"Medical men," observes Dr. Oxley, "have been educated to use and recommend alcoholic liquors as stomachics and tonics."

Sir Astley Cooper had recently said to him, "We have all been mistaken; we have called these drinks stomachics and tonics, when we should have called them stimulants."

"I would ask," remarks Dr. Higginbottom, "what is alcohol, the basis of our intoxicating drinks? The medical answer would be—a powerful narcotic poison. In its various combinations, in which it undergoes no change, it has been misnamed stomachic and tonic."

"Tonics are medicines which restore the tension and vigor of the muscular fibre, when it is weakened or relaxed—substances whose continual administration give strength and vigor to the body. As the action of a tonic is gradual, so its operation is not followed by that exhaustion consequent upon the use of diffusible stimulants. Alcohol, on the contrary, is a stimulant and a narcotic, paralyzing the muscular fibre, promising strength from the temporary stimulus and excitement it gives, but adds no permanent strength; but, on the contrary, increased debility. I prefer the word irritant in the place of stimulus, for alcohol."—*National Temperance Advocate*.

If you want to impart tone and vigor to your system, go where thousands have been, in quest of the same object, and returned home healthy and strong, viz., to Graefenberg, Malvern, Ramsgate, or any other hydro-pathic establishment, where, instead of giving you the various alcoholic compounds so generally recommended in those cases, they send you to the crystal fountain, where the horse and the ox satiate their thirst; where, instead of nursing you up as a tender plant that will not bear the breeze by the side of large fires in close confined carpeted rooms, they send you to ramble among hill and dale, to inhale the breath of the sea, and balmy eve, and regale your olfactories with the flowers of the field; rather than confine you to the fainting fumes of the parlor or the sick-room; where, instead of disgusting you with all kinds of noxious and nauseous things from the shelves of the drug doctor, (thereby in most cases, taking away your appetite, if it is not already gone, and rendering



you what is termed NICE), sweat and exercise you for the pur-  
 lieving the system of what is poisonous and giving you an ap-  
 good wholesome food, and then setting you down to a table spread with  
 with the dainties of artificial life, but with substantial joints of meat and other  
 dishes, capable of imparting strength as well as tone to your system; and  
 where, instead of the cast of gloom and look of despair, the accompaniments  
 of most diseases, you behold the sparkling eye, the cheerful countenance,  
 and the chamber of sickness turned into the hall of mirth and gladness  
 from the delightful thought that, in all probability, they shall soon enjoy  
 the blessings of health again.

*Stomachics.*—Others, again, will give as an excuse for the use of  
 alcoholic liquors as a beverage, "that they take them as stomachics."

"Stomachic" says Dr. Hooper "is applied to that which excites  
 and strengthens the action of the stomach."

That alcoholic liquors excite, in the first instance, the action of the  
 stomach we readily admit, but that they support and strengthen that  
 action we as readily deny, and refer to what has already been advanced in  
 these lectures as a proof that no such thing is possible; but, on the con-  
 trary, that they are one very fruitful source of destruction of the healthy  
 action of that all-important organ. As what has been advanced upon the  
 subject of tonics will apply with equal propriety to this, we shall say no-  
 thing more here than simply observe, what we have already remarked,  
 that to excite any organ of the body to action—and that repeated,  
 as is the case in the use of those liquors, without at the same time fur-  
 nishing means to supply the force consumed, must eventually exhaust it.  
 If necessary, and your patience would permit, much more might be said;  
 but from what has been already advanced, we think it must be evident  
 that alcoholic liquors can be of no service whatever to the constitution of  
 man in a state of health. In conclusion, allow me to congratulate you  
 and the friends of temperance generally, upon the progress the simple but  
 efficacious principle of abstinence has made; and that there is not, to my  
 knowledge, one solid argument remaining why man in a state of health  
 should continue the use of these drinks as a beverage. True, it has been  
 by hard and continual fighting the heights we now occupy have been  
 gained; but let the victories achieved, and the trophies won, compensate  
 for all the obloquy and scorn we have had to bear,—and taking courage from  
 the past, let us press forward with the determination that no foe before  
 in us lies, with the help of Providence, we will never cease to fight for  
 the cause of humanity, truth, and holiness.

dispensaries &c.,  
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d twenty-