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Thomas Garnett**

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Produced by R. L. Garnett

A LECTURE ON THE PRESERVATION OF *HEALTH.*

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Royal Institution of Great Britain &c.

SECOND EDITION.

[Figure]

Such the reward of rude and sober life;
Of labour such. By *health* the peasant's toil
Is well repaid; if *exercise* were pain
Indeed, and *temperance* pain. *Armstrong.*

LONDON:

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To ERASMUS DARWIN, M.D.

Dear Sir,

THE first edition of this pamphlet having been introduced to the world under the sanction of your name, I take the liberty of prefixing it to the second; and am happy in having another public opportunity of expressing my thanks for the high gratification and instruction which I have received

from the perusal of your medical and philosophical works.

I am, Dear Sir, With much esteem, Your very obedient servant,

THO. GARNETT.

Royal Institution, April 8th, 1800.

PREFACE.

Most medical gentlemen will, it is supposed, agree that the greater part of the numerous train of diseases to which their patients are subject, have been brought on by improper conduct and imprudence. That this conduct often proceeds from ignorance of its bad effects, may be presumed; for though it cannot be denied that some persons are perfectly regardless with respect to their health, yet the great mass of mankind are too sensible of the enjoyment and loss of this greatest of blessings, to run headlong into danger with their eyes open.

It was with the hope of making the laws of life more generally known, and better understood, and from thence deducing such rules for the preservation of health, as would be evident to every capacity, that the author was induced to deliver this lecture. It has been honoured with the attention of numerous audiences, in some of the most populous towns in England, where it has generally been read for the benefit of charitable institutions.

The author flatters himself, that besides the benefit produced by his humble endeavours to serve these institutions, those endeavours have not totally failed in the grand object of preserving health; and with the hope that the influence of the precepts here given, may be farther extended, he has concurred in the ideas of those who have advised the publication of this lecture.

It is to be feared, that notwithstanding all which can be done, disease will continue to be a heavy tax, which civilized society must pay for its comforts; and the valetudinarian will often be tempted to envy the savage the strength and soundness of his constitution. Much however may be done towards the prevention of a number of diseases. If this lecture should contribute to the attainment of so desirable an end, it will afford the highest gratification to the author.

*The first part of the lecture is the substance of an essay which was read by the author before the Royal Medical Society of Edinburgh, intended as a defence of the general principles of the system of Dr. Brown, whose pupil he then was. It was, according to custom, transcribed into the books of the society, and the public have now an opportunity of judging how far Dr. Girtanner, in his first essay published in the *Journal de Physique*, about two years after, in which he gives the theory as his own, without the least acknowledgment to the much injured and unfortunate author of the *Elementa Medicinae*, has borrowed from this essay.*

In public lectures, novelty is not to be expected, the principal object of the lecturer being to place in a proper point of view, what has been before discovered. The author has therefore freely availed himself of the labours of others, particularly of the popular publications of Dr. Beddoes, which he takes this opportunity of acknowledging.

This lecture is published almost verbatim as it was delivered. On this account the experiments mentioned are not minutely described, the reader being supposed to see them performed.

* * * * *

A LECTURE, &c.

THE greatest blessing we enjoy is health, without it, wealth, honors, and every other consideration, would be insipid, and even irksome; the preservation of this state therefore, naturally concerns us all. In this lecture, I shall not attempt to teach you to become your own physicians, for when the barriers of health are once broken down, and disease has established itself, it requires the deepest attention, and an accurate acquaintance with the extensive science of medicine, to combat it; to attain this knowledge demands the labour of years. But, a majority of the diseases to which we are subject, are the effects of our own ignorance or imprudence, and it is often very easy to prevent them; mere precepts however, have seldom much effect, unless the reasoning upon them be rendered evident; on this account, I shall first endeavour, in as plain and easy a manner as possible, to explain to you the laws by which life is governed; and when we see in what health consists, we shall be better enabled to take such methods as may preserve it. Health is the easy and pleasant exercise of all the functions of the body and mind; and disease consists in the uneasy and disproportioned exercise of all, or some of the functions.

When dead matter acts upon dead matter, the only effects we perceive are mechanical, or chemical;

for though there may appear to be other kinds of attraction, or repulsion, such as electric and magnetic, yet these come under the head of mechanical attraction, as producing motion; we may therefore lay it down as a law, that when dead, or inanimate bodies act upon each other, no other than mechanical, or chemical effects are produced; that is, either motion, or the decomposition, and new combination of their parts. If one ball strike another, it communicates to it a certain quantity of motion, this is called mechanical action; and if a quantity of salt, or sugar, be put into water, the particles of the salt or sugar will separate from each other, and join themselves to the particles of the water; the salt and water in these instances, are said to act on each other chemically; and in all cases whatever, in which inanimate, or dead bodies act on each other, the effects produced are, motion, or chemical attraction.

But, when dead matter acts on those bodies which we call living, the effects are much different; let us take for example a very simple instance.—Snakes, at least some species of them, pass the winter in a torpid state, which has all the appearance of death; now heat, if applied to dead matter, will only produce motion, or chemical combination; but if it be applied to the snake, let us see what will be the consequence; the reptile first begins to move, and opens its eyes and mouth; when the heat has been applied for some time, it crawls about in search of food, and performs all the functions of life. Here then, dead matter, when applied to a living body, produces living functions; for if the heat had not been applied, the snake would have continued senseless, and apparently lifeless. In more perfect animals, the effects produced by the action of dead matter on them, are more numerous, and are different in different living systems, but are in general the following—sense and motion in almost all animals, and in many the power of thinking, and other affections of the mind. The powers, or dead matters, which are applied, and which produce these functions, are chiefly, heat, food, and air. The proof that these powers do produce the living functions, is in my opinion a very convincing one, namely, that when their actions are suspended, the living functions cease; take away, for instance, heat, air, and food from animals, and they soon become dead matter, and it is not necessary that an animal should be deprived of all these to put a stop to the living functions; if any one of them be taken away, the body sooner or later becomes dead matter: it is found by experience, that if a man be deprived of air, he dies in about three or four minutes; for instance, if he be immersed under water; if he be deprived of heat, or in other words, exposed to a very severe degree of cold, he likewise soon dies; or if he be deprived of food, his death is equally certain, though more slow. It is sufficiently evident then, that the living functions are owing to the action of these external powers upon the body. What I have here said, is not confined to animals, but the living functions of vegetables are likewise caused by the action of dead matter upon them. The dead matters, which by their action produce these functions, are principally heat, moisture, light, and air. It clearly follows therefore, from what I have said, that living bodies must have some property different from dead matter, which renders them capable of being acted upon by these external powers, so as to produce the living functions; for if they had not, the only effects which these powers could produce, would be mechanical, or chemical. Though we know not exactly in what this property consists, or in what manner it is acted on, yet we see, that when bodies are possessed of it, they become capable of being acted upon by external powers, and thus the living functions are produced; we shall therefore call this property *excitability*, and in using this term it is necessary to mention, that I mean only to express a fact, without the least intention of pointing out the nature of that property which distinguishes living from dead matter, and in this we have the example of the great Newton, who called the property which causes bodies in certain situations to approach each other, *gravitation*, without in the least hinting at its nature; yet, though he knew not what gravitation was, he investigated the laws by which bodies were acted on by it, in the same manner, though we are ignorant of excitability, or the nature of that property which distinguishes living from dead matter, we can investigate the laws by which dead matter acts on living bodies through this medium. We know not what magnetic attraction is, and yet we can investigate its laws; the same holds good with regard to electricity; if we ever should attain a knowledge of the nature of this property, it would make no alteration in the laws which we had before discovered.

I shall now proceed to the investigation of the laws by which the excitability is acted on; but I must first define some terms which it will be necessary to use, to avoid circumlocution, and at the same time to give us more distinct ideas on the subject.

When the excitability is in such a state as to be very susceptible of the action of external powers, I shall call it *abundant*, or *accumulated*; but when it is found not very capable of receiving their action, I shall say, it is *deficient*, or *exhausted*. I would not wish however, to have it thought, that by these terms I mean in the least to hint at the *nature* of excitability, nor that it is *really* one while increased, and at another diminished in quantity, for the abstract question is in no shape considered; we know not whether the excitability, or the vital principle, depends on a particular arrangement of matter, or from whatever cause it may originate; by the terms here used, I mean only to say, that the excitability is easily acted on when I call it abundant, or accumulated; at other times the living body is with more difficulty excited, and then I say, the vital principle is deficient, or exhausted.

The laws by which external powers act on living bodies, will, on a careful examination, be found to be the following—

First, when the powerful action of the exciting powers ceases for some time, the excitability accumulates, or becomes more capable of receiving their action, and is more powerfully affected by them.

If we examine separately the different exciting powers, which act on the body, we shall find abundant confirmation of this law. Let us first consider Light; if a person be kept in darkness for some time, and be then brought into a room in which there is only an ordinary degree of light, it will be almost too oppressive for him, and appear excessively bright; and if he have been kept for a considerable time in a very dark place, the sensation will be very painful. In this case, while the retina, or optic nerve, was deprived of light, its excitability accumulated, or became more easily affected by light; for if a person goes out of one room, into another which has an equal degree of light, he will feel no effect. You may convince yourselves of this law by a very simple experiment—shut your eyes, and cover them for a minute or two with your hand, and endeavour not to think of the light, or of what you are doing; then open them, and the day-light will for a short time appear brighter. If you look attentively at a window, for about two minutes, and then cast your eyes upon a sheet of white paper, the shape of the window-frames will be perfectly visible upon the paper; those parts which express the wood-work, appearing brighter than the other parts. The parts of the optic nerve on which the image of the frame falls, are covered by the wood-work from the action of the light; the excitability of these portions of the nerve will therefore accumulate, and the parts of the paper which fall upon them, must of course appear brighter. If a person be brought out of a dark room where he has been confined, into a field covered with snow, when the sun shines, it has been known to affect him so much, as to deprive him of sight altogether.

Let us next consider what happens with respect to heat; if heat be for some time abstracted, the excitability accumulates; or in other words, if the body be for some time exposed to cold, it is more liable to be affected by heat, afterwards applied; of this also you may be convinced by an easy experiment—put one of your hands into cold water, and then put both into water which is considerably warm; the hand which has been in cold water, will feel much warmer than the other. If you handle some snow with one hand, while you keep the other in your bosom, that it may be of the same heat as the body, and then bring both within the same distance of the fire, the heat will affect the cold hand infinitely more than the warm one. This is a circumstance of the utmost importance, and ought always to be carefully attended to. When a person has been exposed to a severe degree of cold for some time, he ought to be cautious how he comes near a fire, for his excitability will be so much accumulated, that the heat will act violently; often producing a great degree of inflammation, and even sometimes mortification. We may by the way observe, that this is a very common cause of chilblains, and other inflammations. When the hands, or any other parts of the body have been exposed to violent cold, they ought first to be put into cold water, or even rubbed with the snow, and exposed to warmth in the gentlest manner possible.

Exactly the same takes place with respect to food, if a person have for some time been deprived of food, or have taken it in small quantity, whether it be meat or drink; or if he have taken it of a less stimulating quality, he will find, that when he returns to his ordinary mode of living, it will have more effect upon him than before he lived abstemiously.

Persons who have been shut up in a coal-work from the falling in of the pit, and have had nothing to eat for two or three days, have been as much intoxicated by a bason of broth, as a person in common circumstances with two or three bottles of wine; and we all know that spirituous, or vinous liquors affect the head more in the morning, than after dinner.

This circumstance was particularly evident among the poor sailors who were in the boat with Captain Bligh after the mutiny. The captain was sent by government to convey some plants of the bread-fruit tree from Otaheite, to the West-Indies; soon after he left Otaheite, the crew mutinied, and put the captain and most of the officers, with some of the men, on board the ship's boat, with a very short allowance of provisions, and particularly of liquors, for they had only six quarts of rum, and six bottles of wine, for nineteen people, who were driven by storms about the south-sea, exposed to wet and cold all the time, for nearly a month; each man was allowed only a tea-spoon full of rum a-day, but this tea-spoon full refreshed the poor men, benumbed as they were with cold, and faint with hunger, more than twenty times the quantity would have done those who were warm, and well fed; and had it not been for the spirit having such power to act upon men, in their condition, they never could have outlived the hardships they experienced. All these facts, and many others which might be brought, establish beyond a doubt the truth of the law I have mentioned, namely, that when the powerful action of the exciting powers ceases for some time, the excitability accumulates, or becomes more capable of receiving their actions.

The second law is, that when the exciting powers have acted with violence, or for a considerable time, the excitability becomes exhausted, or less fit to be acted on, and this we shall be able to prove by a similar induction. Let us take the effects of light upon the eye; when it has acted violently for some time upon the optic nerve, it diminishes the excitability of that nerve, and renders it incapable of being affected by a quantity of light that would at other times affect it. When you have been walking out in the snow, if you come into your room, you will scarcely be able to see any thing for some minutes. Look stedfastly at a candle for a minute or two, and you will with difficulty discern the letters of a book, which you were before reading distinctly; and if you happen to cast your eyes upon the sun, you will not see any thing distinctly for some time afterwards.

Let us next consider the matter of heat: suppose water to be heated lukewarm, if you put one hand into it, it will feel warm; if you now put the other hand into water, heated for instance to 120 degrees or 130 degrees, and keep it there some time, we will say, two minutes; if then you take it out, and put it into the lukewarm water, that water will feel cold, though still it will seem warm to the other hand; for, the hand which had been in the heated water, has had its excitability exhausted by the application of heat. Before you go into a warm bath, the temperature of the air may seem warm and agreeable to you, but after you have remained for some time in a bath that is rather hot, when you come out, you feel the air uncommonly cool and chilling.

Let us now examine the effects of substances taken into the stomach; and as the effects of spirituous, and vinous liquors, are a little more remarkable than food, we shall make our observations upon them.

A person who is unaccustomed to drink these liquors, will be intoxicated by a quantity that will produce no effect upon one who has been for some time accustomed to take them; and when a person has used himself to these stimulants for some time, the ordinary powers which in common support life, will not have their proper effects upon him, because his excitability has been in some measure exhausted by the stimulants.

The same holds good with respect to tobacco and opium; a person accustomed to take opium will not be affected by a quantity that would completely intoxicate one not used to it; because the excitability has been so far exhausted by the use of that drug, that it cannot be acted on by a small quantity.

These facts, with innumerable others, which will easily suggest themselves to you, prove the truth of our second proposition, namely, that when the exciting powers have acted violently, or for a considerable time, the excitability is exhausted, or less fit to be acted on.

This exhaustion of the excitability, may, however, be either finite, or temporary; we see animals, while the exciting powers continue to act, at first appear in their greatest vigour, then gradually decay, and at last come into that state, in which, from the long continued action of the exciting powers, the excitability is entirely exhausted, and death takes place.

We likewise see plants in the spring, while the exciting powers have acted on them, moderately, and for a short time, arrayed in their verdant robes, and adorned with flowers of "many mingling hues;" but, as the exciting powers which support the life of the plant, continue to be applied, and some of them, for instance heat, as the summer advances become increased, they first lose their verdure, then grow brown, and at the end of summer cease to live; because their excitability is exhausted by the long continued action of the exciting powers; and this does not happen merely in consequence of the heat of summer decreasing, for they grow brown and die, even in a greater degree of heat than that which in spring made them grow luxuriantly.

These are examples of the finite, or irreparable exhaustion of the excitability, but we find also, that it may be exhausted for a time, and accumulated again. Though the eye has been so dazzled by the splendour of light, that it cannot see an object moderately illuminated, yet, if it be shut for some time, the excitability of the optic nerve accumulates again, and we are again capable of seeing with an ordinary light.

We find, that we are not always equally capable of performing the functions of life. When we have been engaged in any exertion, either mental or corporeal, for some hours only, we find ourselves fatigued, and unfit to pursue our labours much longer; if in this state, several of the exciting powers, particularly light and noise, be withdrawn; and if we are laid in a posture which does not require much muscular exertion, we soon fall into that state which nature intended for the accumulation of the excitability, and which we call Sleep. In this state, many of the exciting powers cannot act upon us, unless applied with some violence, for we are insensible to their moderate action. A moderate light, or a moderate noise, does not affect us, and the power of thinking, which exhausts the excitability very much, is in a great measure suspended. When the action of these powers has been suspended for six or eight hours, the excitability is again capable of being acted on, and we rise fresh, and vigorous, and fit to engage in our occupations.

Sleep then, is the method which nature has provided to repair the exhausted constitution, and restore the vital energy; without its refreshing aid, our worn-out habits would scarcely be able to drag on a few days, or at most a few weeks, before the vital spring was quite run down; how properly therefore has the great poet of nature called sleep the chief nourisher in life's feast.—

'Sleep, that knits up the ravell'd sleeve of care, 'the death of each day's life, sore labour's bath, 'balm of hurt minds, great Nature's second course, 'chief nourisher in life's feast.'

From the internal sensations often excited, it is natural to conclude that the nerves of sense are not torpid during sleep; but that they are only precluded from the perception of external objects, by the external organs being rendered unfit to transmit to them the impulses of bodies, during the suspension of the power of volition; thus, the eye-lids are closed in sleep, to prevent the impulse of the light from acting on the optic nerve; and it is very probable that the drum of the ear is not stretched; it is likewise probable that something similar happens to the external apparatus of all our organs of sense, which may make them unfit for their office of perception during sleep.

The more violently the exciting powers have acted, the sooner is sleep brought on; because the excitability is sooner exhausted, and therefore, sooner requires the means of renewing it; and on the contrary, the more weakly the exciting powers have acted, the less is a person inclined to sleep. Instances of the first are, excess of exercise, strong liquors, or study, and of the latter, an under proportion of these.

A person who has been daily accustomed to much exercise, whether mental or corporeal, if he omit it, will find little or no inclination to sleep; he may however be made to sleep by taking a little diffusible stimulus; for instance, a little warm punch, or opium: these act entirely by exhausting the excitability to that degree which is compatible with sleep; and when their stimulant effect is over, the person soon falls into that state.

But though the excitability may have been sufficiently exhausted, and the action of the external powers considerably moderated, yet there are some things within ourselves, which stimulate violently, and prevent sleep; such as pain, thirst, and strong passions and emotions of the mind. These all tend to drive away sleep, but it may be induced, by withdrawing the mind from these impressions; particularly from uneasy emotions, and employing it on something which makes a less impression; sleep, in such cases, is frequently brought on by listening to the humming of bees, [1] or the murmuring of a rivulet; by employing the mind on subjects which do not require much exertion, nor produce too much commotion; such as counting to a thousand, or counting drops of water which fall slowly.

It sometimes happens, as has been well observed by Dr. Franklin, that an uneasy heat of the skin, from a want of perspiration, occasioned by the heat of the bed-cloaths, will prevent sleep; in this case, he recommends a method, which I believe will often succeed—namely, to get up and walk about the room till you are considerably cooled; when you get into bed again, the heat of the skin will be diminished, and perspiration become more free, and you will probably sleep in a very few minutes. [2]

By induction we have discovered two of the principal laws by which living bodies are governed; the first is, that when the ordinary powers which support life have been suspended, or their action lessened for a time, the excitability, or vital principle accumulates, or becomes more fit to receive their actions; and secondly, when these powers have been acted upon violently, or for a considerable time, the excitability is exhausted, or becomes less fit to receive their actions. There are therefore three states in which living bodies exist.—

First, a state of accumulated excitability.

Second, a state of exhausted excitability.

Third, when it is in such a state as to produce the strongest and most healthy actions, when acted upon by the external powers.

From what I have said, it must appear, that life is a forced state, depending on the action of external powers upon the excitability; and that, by their continued action, if they are properly regulated, the excitability will be gradually and insensibly exhausted; and life will be resigned into the hands of him who gave it, without a struggle, and without a groan.

We see then, that nature operates in supporting the living part of the creation, by laws as simple and beautiful as those by which the inanimate world is governed. In the latter we see the order and harmony which is observed by the planets, and their satellites, in their revolution round the great source of heat and light.

'—All combin'd 'and ruled unerring, by that single power 'which draws

the stone projected, to the ground.'

In the animated part of the creation, we observe those beautiful phenomena which are exhibited by an almost infinite variety of individuals, all depending upon one simple law, the action of the exciting powers on the excitability.

I cannot express my admiration of the wisdom of the creator better than in the words of Thomson.

'O unprofuse magnificence divine! 'O wisdom truly perfect! thus to call 'from a few causes, such a scheme of things; 'effects so various, beautiful, and great.'

Life then, or those functions which we call living, are the effects of certain exciting powers, acting on the excitability, or property distinguishing living from dead matter. When those effects, namely, the functions, flow easily, pleasantly, and completely, from the action of the exciting powers, they indicate that state which we call Health.

I have detained you a long time on this subject, but it is of importance to make you acquainted with these laws; for it is from a knowledge of them, that the rules for preserving health must be deduced; and having rendered them, as I hope, intelligible to you, I shall proceed to point out such necessary cautions for your conduct, as are easily deduced from them; and which experience confirms; and I shall follow an arrangement in the consideration of the subject, which naturally presents itself to us. The chief exciting powers which act upon us are, air and food; these I shall respectively consider, and afterwards make a few remarks on exercise.

The air is the main-spring in the animal machine; the source of heat and activity, without which our blood would soon become a black and stagnant mass, and life would soon stop.

It is now known, that only a part of atmospheric air, is necessary for respiration: the atmosphere near the surface of the earth, consists of two kinds of air; one, which is highly proper for respiration, and combustion, and in which, an animal immersed, will live much longer than in the same quantity of common air; and one, which is perfectly improper for supporting respiration, or combustion, for an instant.

The first of these airs, has been called vital air, from its property of supporting life, and constitutes about one fourth of the atmosphere. [3] The other, from its property of destroying life, is called azote, and forms of course the remaining three fourths of the atmosphere.

These two airs may be separated from each other by various methods. If a candle be inclosed in a given quantity of atmospheric air, it will burn only for a certain time, and then be extinguished; and from the rising of the water in the vessel in which it is inclosed, it is evident that a quantity of air has been absorbed. What has been absorbed is the vital air, and what remains, the azote, which is incapable of supporting flame. If an animal be immersed in a given quantity of common air, it will live only a certain time; at the end of this time, the air will be found diminished, about one fourth being extracted from it, and the remainder will neither support flame nor animal life; this experiment might easily be made, but it seems a piece of unnecessary cruelty.

By similar experiments to those I have mentioned, we get the azote pure; here is some, in which a candle has burnt out, and in which nothing but azote, or the impure part of the atmosphere is left. [4] I shall plunge a lighted match into it, and you see it is instantly extinguished.

Some metals, and particularly manganese, when exposed to the atmosphere, attract the vital air from it, without touching the azote; and it may be procured from these metals by the application of heat, in very great purity. Here is a bottle of that kind of air, which I have expelled by heat from manganese; I shall plunge a taper into it, and you will perceive that it burns with great brilliancy. An animal shut up in it, would live about four times as long as if shut up in an equal quantity of atmospheric air.

If I take three parts of azote, and one of vital air, I shall form a compound which is similar to the atmosphere, and which is the mixture best suited to support the health of the body; for if there were a much greater proportion of vital air, it would act too powerfully upon the system, and bring on inflammatory diseases; it would likewise by its stimulus exhaust the excitability, and bring us sooner to death; and in the same manner that a candle burns brighter in vital air, and would therefore be sooner exhausted, so would the flame of life be sooner burnt out.

On the contrary, if the atmosphere contained a much less proportion of vital air, it would not stimulate the body sufficiently; the excitability would morbidly accumulate, and diseases of debility would occur.

Combustion, putrefaction, and the breathing of animals, are processes which are continually

diminishing the quantity of vital air contained in the atmosphere; and if the all-wise author of nature had not provided for its continual re-production, the atmosphere would in all probability have long since become too impure to support life; but this is guarded against in a most beautiful manner.

Water is not a simple element, as has been supposed, but is composed of vital air, and a particular kind of air which is called *inflammable*; the same that is used to fill balloons. It has been found by experiment, that one hundred pounds of water, are composed of eighty-five pounds of vital air, and fifteen of inflammable air. [5]

Water may be decomposed by a variety of means, and its component parts separated from each other.

Vegetables effect this decomposition; they absorb water, and decompose it in their glands; and taking the inflammable air for their nourishment, breathe out the vital air in a state of very great purity; this may be ascertained by a very easy experiment.

This vital air is received by animals into their lungs, gives them their heat, and communicates a red colour to their blood; when animals die for want of vital air, their blood is always found black.

From what I have said, it is evident, that in large and populous towns, where combustion and respiration are continually performed on a large scale, the air must be much less pure than in the country, where there are few of these causes to contaminate the atmosphere, and where vegetables are continually tending to render it more pure; and if it was not for the winds which agitate this element, and constantly occasion its change of place, the air of large towns would probably soon become unfit for respiration. Winds bring us the pure air of the country, and take away that from which the vital air has been in a great measure extracted; but still, from the immense quantity of fuel which is daily burnt, and the number of people breathing in large towns, the air very soon becomes impure.

From the greater purity of the air in the country, proceeds the rosy bloom found in the rural cottage, which we in vain look for in the stately palace, or the splendid drawing room. Here then are reasons for preferring the country, which no one will dispute, and whenever it can be done, such a situation ought always to be chosen in preference to a large town: this cannot be better enforced than in the words of Dr. Armstrong.—

'Ye, who amid the feverish world would wear 'a body free of pain, of cares a mind; 'fly the rank city, shun its turbid air; 'breathe not the chaos of eternal smoke, 'and volatile corruption, from the dead, 'the dying, sick'ning, and the living world 'exhaled, to sully heaven's transparent dome 'with dim mortality.

'While yet you breathe, away; the rural wilds 'invite; the mountains call you, and the vales; 'the woods, the streams, and each ambrosial breeze 'that fans the ever undulating sky.'

But there are many whose occupations oblige them to reside in large towns; they, therefore, should make frequent excursions into the country, or to such situations as will enable them to enjoy, and to breathe air of a little more purity. I say *enjoy*, for who that has been for some time shut up in the town, without breathing the pure air of the country, does not feel his spirits revived the moment he emerges from the azote of the town. Let not therefore, if possible, a single day pass, without enjoying, if but for an hour, the pure air of the country. Doing this, only for a short time *every* day, would be much more effectual than spending whole days, or even weeks in the country, and then returning into the corrupt atmosphere of the town; for when you have for a long time breathed an impure air, the excitability becomes so morbidly accumulated, from the want of the stimulus of pure air, that the air of the country will have too great an effect upon you; it will frequently, in the course of a day or two, bring on an inflammatory fever, attended with stuffing of the nose, hoarseness, a great degree of heat, and dryness of the skin, with other symptoms of a violent cold.

Large towns are the graves of the human species; they would perish in a few generations, if not constantly recruited from the country. The confined, putrid air, which most of their inhabitants breathe, their want of natural exercise, but above all their dissipation, shorten their lives, and ruin their constitutions.

Children particularly, require a pure air; every circumstance points out the country as the proper place for their education; the purity of the air, the variety of rustic sports, the plainness of diet, the simplicity and innocence of manners, all concur to recommend it. It is a melancholy fact, that above half the children born in London, die before they are two years old.

To shew how indispensable fresh air is to children, I shall mention one example which sets the fact in the clearest light. In the lying-in hospital at Dublin, 2944 infants, out of 7650, died in the year 1782,

within the first fortnight after their birth, which is nearly every third child; they almost all died in convulsions; many of them foamed at the mouth, their thumbs were drawn into the palms of their hands, their jaws were locked, the face was swelled and looked blue, as though they were choaked. This last circumstance led the physicians to conclude that the rooms in the hospital were too close, and hence, that the infants had not a sufficient quantity of good air to breathe; they therefore set about ventilating them better, which was done very completely. The consequence has been, that not one child dies now where three used to die.

Fewer children indeed die convulsed now, than formerly; this is because the rich learn, either from books, or conversation with physicians, how necessary fresh air is to life and health; hence they keep their houses well aired; but the poor, and servants, are not made to comprehend this matter properly; and therefore from neglecting to open their windows, and breathing a foul, tainted air, the greatest part of their time, many disorders are brought on, and others rendered worse than they naturally would be. [6]

Having considered the purity of the air, let us next take a view of the changes in temperature which it undergoes, and the effects which these have upon the constitution.

We find the air sometimes considerably below the freezing point; nay, even so much as 20 or 30 degrees; it is then intensely cold; and on the other hand, the thermometer sometimes indicates a great degree of heat. We then find ourselves much relaxed, and our constitutions exhausted.

To understand how this happens, let us consider for a moment the nature of heat, and cold.—Heat is one of those stimuli which act upon the excitability, and support life: for if it was totally withdrawn, we should not be able to exist even a few minutes; and cold is only a diminution of heat. When heat is present, in a proper degree, or the atmosphere is about that degree of heat which we call temperate, it just gives such a stimulus, and keeps the excitability exhausted to such a degree, as to preserve the body in health; but if it continue for a considerable time to be much warmer than this temperature, the consequence must be, from the laws already laid down, an exhaustion of the excitability, and a consequent relaxation and debility; for, when the excitability has been exhausted by the violent application of heat, long continued, the common stimulant powers which support life, cannot produce a sufficient effect upon it, to give to the body that tone which is compatible with health. On the contrary, when the heat of the air falls below what we call temperate, or when cold is applied to the body, from the accustomed stimulus of heat being diminished, the excitability must accumulate, or become more liable to be affected by the action of the external powers.

This, however, very seldom produces bad effects, unless the exciting powers be improperly or quickly applied; for we can bear a considerable diminution of heat without any bad consequences; and in all cases I hope I shall be able to make it appear, that much more mischief arises from the too great action of heat, than from the diminution of it. Nature never made any country too cold for its inhabitants. In cold climates, she has made exercise, and even fatigue habitual to them, not only from the necessity of their situation, but from choice; their natural diversions being all of the athletic or violent kind. But the softness and effeminacy of modern manners, has both deprived us of our natural defence against the diseases most incident to our climate, and subjected us to all the inconveniencies of a warm one.

People are afraid of going out into the cold air; but if they conduct themselves properly afterwards, they will never be in the least danger from it. Indeed the action of cold, unless it be excessive, never produces any bad effects.

Many of you will, no doubt, think me here in an error; but I hope you will not long entertain that opinion. You will say that you have had frequent experience to the contrary; that you have often gone out into the cold air, and have caught dreadful colds. That this is owing to the action of cold, I will deny; nay, I will assert, that if a person go out into air which is very cold, *and remain in it* for a very long time, he will never perceive any symptoms of what is called a cold so long as he remains there.

A common cold is attended with a running of the nose, hoarseness, and cough, with a considerable degree of feverish heat, an dryness of the skin.—Now it is universally agreed, that this disorder is an inflammation, or is of an inflammatory nature; it is an inflammation of the smooth, moist skin which lines the nostrils, and goes down the wind-pipe into the lungs; but as cold is only a diminution of heat, or a diminution of a stimulus acting upon the body, it is impossible that such a diminution can cause a greater action or excitement; we might as well expect to fill a vessel by taking water out of it. But let us see how a cold, as it is commonly called, is usually produced. When a person in cold weather goes out into the air, every time he draws in his breath, the cold air passes through his nostrils and windpipe into the lungs, and in thus diminishing the heat of the parts, allows their excitability to accumulate, and renders them more liable to be affected by the succeeding heat. So long as that person continues in the cold air, he feels no bad effects; but if he come into a warm room, he first perceives a glow within his nostrils and breast, as well as all over the surface of the body. Soon afterwards, a disagreeable dryness

and huskiness will be felt in the nostrils and breast. By and by a short, dry, tickling cough comes on. He feels a shivering, which makes him draw nearer to the fire, but all to no purpose; the more he tries to heat himself, the more chill he becomes. All the mischief is here caused by the violent action of the heat on the accumulated excitability. For want of a knowledge of this law, these disagreeable, and often dangerous complaints are brought on; when they might be avoided with the greatest ease.

When you take a ride into the country on a cold day, you find yourselves very cold; as soon as you go into a house, you are invited to come to the fire, and warm yourselves; and what is still worse, to drink something warm and comfortable, to keep out the cold, as the saying is. The inevitable consequence of this, is, to bring on the complaints which I have just described, which might with more propriety be called, heats than colds. But how easily might these complaints have been avoided! When you come out of a very cold atmosphere, you should not at first go into a room that has a fire in it, or if you cannot avoid that, you should keep for a considerable time at as great a distance from the fire as possible, that the accumulated excitability may be gradually exhausted, by the moderate and gentle action of heat; and then you may bear the heat of the fire without any danger: but, above all, refrain from taking warm or strong liquors while you are cold. If a person have his hands or feet exposed to a very severe cold, the excitability of those parts will be so much accumulated, that if they should be brought suddenly near the fire, a violent inflammation, and even a mortification will take place, which has often happened; or, at any rate, that inflammation called Chilblains will be produced, from the violent action of the heat upon the accumulated excitability of those parts; but, if a person so circumstanced, was to put his hands or feet into cold water, very little warmer than the atmosphere to which he had been exposed, or rub them with snow, which is not often colder than 32 or 30 degrees, the morbid excitability will be gradually exhausted, and no bad consequences will ensue.

When a part of the body only has been exposed to the action of cold, and the rest kept heated; if, for instance, a person in a warm room sits so that a current of air coming through a broken pane, should fall upon any part of the body, that part will be soon affected with an inflammation, which is usually called a rheumatic inflammation. From what has been said, it will be easy to account for this circumstance. The excitability of the part is accumulated by the diminution of its heat; but at the same time, the rest of the body and blood is warm; and this warm blood acting upon a part where the excitability is accumulated, will cause an inflammation; to which, the more you apply heat, the worse you make it.—From these considerations, we may lay it down as a fact, and experience supports us in so doing, that you may in general go out of warm into cold air without much danger; but, that you can never return suddenly from the cold into the warm air with perfect impunity.

Hence, we may lay down the following rule, which, if strictly observed, would prevent the frequent colds we meet with in winter. *When the whole body, or any part of it, is chilled, bring it to its natural feeling and warmth by degrees.*

But if, for want of observing this necessary caution, a cold, as it is called, should have seized a person, let us consider what is proper to be done.

It will, from the preceding reasoning, appear very improper to make the room where you sit warmer than usual, to increase the quantity of bed-clothes, to wrap yourself up in flannel, or particularly to drink a large quantity of barley-water, gruel, or tea, almost boiling hot, by way of diluting, as it is called, and forcing a perspiration; this will infallibly make the disorder worse, in the same manner as confining inoculated persons in warm rooms would make their small-pox more violent.

Perhaps there would be scarcely such a thing as a bad cold, if people, when they found it coming on, were to keep cool, and avoid wine and strong liquors, and confine themselves for a short time to a simple diet of vegetable food, drinking only toast and water. Instances are by no means uncommon, where a heat of the nostrils, difficulty of breathing, a short, tickling cough, and other symptoms, threatening a violent cold, have gone off entirely in consequence of this plan being pursued.

Colds would be much less frequent, were we to take more pains to accommodate our dress to the season: if we were warmly clothed in cold weather, our excitability would not be accumulated by the action of the cold. If a greater proportion of females fall victims to this disease, is it not because, losing sight, more than men, of its primary purpose, they regulate their dress solely by fantastic ideas of elegance? If happily, as is observed by Dr. Beddoes, our regret should recall the age of chivalry, to break the spell of fashion would be an achievement worthy the most gallant of our future knights. Common sense has always failed in the adventure; and our ladies, alas! are still compelled, whenever the enchantress waves her wand, to expose themselves half undressed, to the fogs and frosts of our climate.

Besides the effects of the air, we ought by no means to be indifferent with regard to what we take into the stomach as food and drink; since these have even a greater influence on our health, than the circumstances I have already mentioned. Among the causes which excite the body, and support life, I

have formerly mentioned food, or the matters taken into the stomach. It is from these matters that all the animal solids and fluids are formed; these are stimuli, which if totally withdrawn, we could not exist many days. These stimuli are subject to the same laws with all the others which act upon the body. When they act properly in concert with the other powers, they produce the healthy state; but if they act in an undue degree, whether that action be too great or too little, disease will be the consequence. When they act too feebly, the excitability will accumulate; and diseases of debility, attended with a very great degree of irritability, will take place: this has been instanced in those who have been without food for some time. Persons who have been shut up in a coal-work by the falling-in of the pit, and have consequently been without food for some days, have had their excitability so much accumulated, as to be intoxicated with a bason of broth.

To this source we may attribute many of the diseases with which the poor are afflicted; but they are by no means so common as diseases of an opposite nature, which arise from a too free use of food. I shall confine myself here to the consideration of what is more strictly called food, and afterwards consider the effects of strong liquors.

When we take food in too great quantity, or of too nourishing a quality, it will either produce inflammatory diseases, such as pleurisy; or by exhausting the excitability, it will bring on stomach complaints, gout, and all the symptoms of premature old age. This follows so evidently from the laws we have investigated, that it is scarcely necessary to say more on the subject; and I am sure there are few who have not seen examples of it.

Be therefore temperate in eating, and eat only of such foods as are the plainest; and let a proper quantity of vegetable food be mixed with animal. If you value the preservation of health, never satiate yourselves with eating; but let it be a rule from which you ought never to depart, always to rise from table with some remains of appetite: for, when the stomach is loaded with more food than it can easily digest, a crude and unassimilated chyle is taken into the blood, pregnant with diseases. Nor is the quantity the only object of attention; the quality of the food is to be carefully studied; made dishes, enriched with hot sauces, stimulate infinitely more than plain food, and therefore exhaust the excitability, bringing on diseases of indirect debility; such as the worst kind of gout, apoplexy, and paralytic complaints. "For my part," says an elegant writer, "when I behold a fashionable table set out in all its magnificence, I fancy that I see gout and dropsies, fevers and lethargies, with other innumerable distempers, lying in ambuscade among the dishes." Let it be therefore laid down as a rule by those who wish to preserve their health, and I have nothing to say to those who are indifferent on that head, to make their chief repast on one plain dish, and trifle with the rest.

It is by no means uncommon for a medical man to have patients, chiefly among people of fashion and fortune, who complain of being hot and restless all night, and having a foul taste in the mouth every morning: on examination it is found, that in nineteen cases out of twenty, it has arisen from their having overloaded their stomachs, and at the same time neglected to take proper exercise; for it must always be observed, that more may be eaten with safety, nay, more is even necessary, when a person takes a good deal of exercise.

When people take little exercise, and overload their stomachs, there lies within them a fermenting mass of undigested aliment; and it is not surprizing that this should irritate and heat the body during the night. This is likewise the foundation of stomach complaints, flatulencies, and all other symptoms of indigestion; which more frequently proceed from intemperance in eating and drinking than any other cause. The benefits arising from temperance are set in a striking light in the following allegory, which may be found in the Adventurer.

Esculapius, after his deification or admittance among the gods, having revisited his native country, and being one day (as curiosity led him a rambling,) in danger of being benighted, made the best of his way to a house he saw at some distance, where he was hospitably received by the master of it. Cremes, for that was the master's name, though but a young man, was infirm and sickly. Of several dishes served up to supper, Cremes observed that his guest ate but of one, and that the most simple; nor could all his intreaties prevail upon him to do otherwise. He was, notwithstanding, highly delighted with Esculapius's conversation, in which he observed a cheerfulness and knowledge superior to any thing he had hitherto met with.

The next morning, Esculapius took his leave, but not till he had engaged his good-natured host to pay him a visit at a small villa, a few miles from thence. Cremes came accordingly, and was most kindly received; but how great was his amazement when supper was served up, to see nothing but milk, honey, and a few roots, dressed in the plainest, but neatest manner, to which hunger, cheerfulness, and good sense, were the only sauces. Esculapius seemed to eat with pleasure, while Cremes scarcely tasted of them. On which a repast was ordered more suitable to the taste of our guest. Immediately there succeeded a banquet composed of the most artful dishes that luxury could invent, with great

plenty and variety of the richest and most intoxicating wines. These too were accompanied by damsels of the most bewitching beauty. Cremes now gave a loose to his appetites, and every thing he tasted raised ecstasies beyond what he had ever known. During the repast, the damsels sung and danced to entertain them; their charms enchanted the enraptured guest, already flushed with what he had drank; his senses were lost in ecstatic confusion. Every thing around him seemed Elysium, and he was on the point of indulging the most boundless freedoms, when on a sudden their beauty, which was but a vizard, fell off, and discovered forms the most hideous and forbidding imaginable. Lust, revenge, folly, murder, meagre poverty, and despair, now appeared in the most odious shapes, and the place instantly became a most dire scene of misery and confusion. How often did Cremes wish himself far distant from such a diabolical company, and now dreaded the fatal consequence which threatened him. His blood ran chill at his heart, and joy and rapture were perverted to amazement and horror!—When Esculapius perceived it had made a sufficient impression on his guest, he thus addressed him: "Know, Cremes, it is Esculapius who has thus entertained you, and what you have beheld is a true image of the deceitfulness and misery inseparable from luxury and intemperance. Would you be happy, be temperate: temperance is the parent of health, virtue, wisdom, plenty, and every thing that can make you happy in this or the world to come. It is indeed the true luxury of life, for without it life cannot be enjoyed." This said, he disappeared, and left Cremes (instead of an elegant apartment) in an open plain, full of ideas quite different from those he had brought with him.

On his return home, from the most luxurious, he became one of the most temperate men, by which wise method he soon regained health. Frugality produced riches, and from an infirm and crazy constitution, and almost ruined estate, by virtue of this infallible elixir, he became one of the happiest men breathing, and lived to a healthy old age, revered as an oracle for his wisdom throughout all Greece.

If temperance be necessary with regard to food, it is still more so with respect to strong liquors; these diffusible stimuli, by quickly exhausting the excitability, soon blast the vigour, and sap the foundation of the strongest constitution. Their immediate effects you know are stimulant; they raise the animal spirits, produce a cheerful state of mind, and if taken in greater quantity, cause intoxication, or that temporary derangement of the thinking powers which arises from too great a degree of excitement: but let us see what happens the next day; the animal spirits are exhausted, and the person thus situated, finds himself languid and enervated to a great degree; for it seems a law of the human body, that the spirits are never artificially raised, without being afterwards proportionably depressed; and to shew clearly that in this state the excitability is exhausted, the ordinary powers which in general support life, will not have their due effect; and a person thus situated finds most relief the next day, from taking some of the same stimulus which occasioned the exhaustion; because the common exciting powers can scarcely act upon his exhausted excitability.

But though the excitability be in this way exhausted, it will in the course of a day or two be again accumulated, and it may, perhaps, be suspected that this exhaustion can do no harm to the constitution; but this is a premature conclusion, and quite contrary to fact and experience, as well as to reason; for, just in the same manner that a pendulum, made to vibrate in the arc of a circle, will never return exactly to the same height, but fall a little short of it every time; so, though the excitability may be again accumulated, it never can be brought back to what it was before; and every fresh debauch will shorten life, probably two or three weeks at least, besides debilitating the body, and bringing on a variety of diseases, with premature old age.

Those who drink only a moderate quantity of wine, so as to make them cheerful, as they call it, but not absolutely to intoxicate, may imagine that it will do them no harm. The strong and robust may enjoy the pleasures of the bottle and table with seeming impunity, and sometimes for many years may not find any bad effects from them; but depend upon it, if a full diet of animal food be every day indulged in, with only a moderate portion of wine, its baneful influence will blast the vigour of the strongest constitution.

While we are eating, water is the best beverage. The custom of drinking fermented liquors, and particularly wine, during dinner, is a very pernicious one. The idea that it assists digestion, is false; those who are acquainted with chemistry know, that food is hardened, and rendered less digestible by these means, and the stimulus which wine gives to the stomach is not necessary, excepting to those who have exhausted the excitability of that organ by the excessive use of strong liquors. In these. The stomach can scarcely be excited to any action without the assistance of such a stimulus. If food wants diluting, water is the best diluent, and will prevent the rising, as it is called, of strong food, much better than wine or spirits.

Before I finish this subject, I shall say a few words on the pernicious custom of suffering children to drink wine, or other fermented liquors. Nothing is more common than to see, even very young children come to the table after dinner, to drink a glass of wine. The least quantity produces violent effects on

their accumulated excitability, and by quickly exhausting it, ruins their constitutions through life, and often renders them habitual drinkers.

I can scarcely help attributing in some degree the many stomach complaints we meet with, among young people in the present age, and which were unknown to our forefathers, to the abominable practice of suffering children to drink fermented, or spirituous liquors. You must all have observed how soon children are intoxicated and inflamed by spirituous liquors; you may judge then, that if these liquors be only a slow poison to us, they are a very quick one to them. A glass of wine, on account of the accumulated excitability of children, will have more effect upon them, than a bottle will have upon an adult accustomed to drink wine. If therefore, the health of a child, and its happiness through life be an object, never suffer it to taste fermented, or spirituous liquors, till it be fifteen or sixteen years of age, unless a little wine be necessary as a medicine.

It now only remains for me to take some notice of exercise. Of all the various methods of preserving health, and of preventing diseases, which nature has suggested, there is none more efficacious than exercise; it puts the fluids all in motion, strengthens the solids, promotes perspiration, and occasions the decomposition of a larger quantity of atmospheric air in the lungs. Hence, in order to preserve the health of the body, the author of nature has made exercise absolutely necessary to the greater part of mankind for obtaining the means of existence.—Had not exercise been absolutely necessary for our well-being, says the elegant Addison, nature would not have made the body so proper for it, by giving such an activity to the limbs, and such a pliancy to every part, as necessarily produce those compressions, extensions, contortions, dilatations, and all other kinds of motions, that are necessary for the preservation of such a system of tubes and glands.—And that we might not want inducement to engage us in such exercise of the body as is proper for its welfare, it is so ordered, that nothing valuable can be procured without it. Not to mention riches and honors, even food and raiment are not to be come at without the toil of the hands and sweat of the brow. Providence furnishes materials, but expects that we should work them up ourselves. The earth must be laboured before it gives its increase, and when it is forced into its several products, how many hands must they pass through before they are fit for use? Manufactures, trade, and agriculture, naturally employ more than nineteen parts of the species out of twenty; and as for those who are not obliged to labour by the condition in which they are born, they are more miserable than the rest of mankind, unless they indulge themselves in that voluntary labour which goes by the name of exercise.

Of all the different kinds of exercise, there is none that conduces so much to health as riding; it is not attended with the fatigue of walking, and the free air is more enjoyed in this way than by any other mode of exercise. Where it cannot be used, walking, or exercise in a carriage, ought to be substituted.

The best time for taking exercise is before dinner, for the body is then more vigorous and alert, and the mind more cheerful, and better disposed to enjoy the pleasure of a ride or walk. Exercise after a full meal disturbs digestion, and causes painful sensations in the stomach and bowels, with heart-burn, and acid eructations.

But whatever mode of exercise you use, it ought not at first to be too violent. Dr. Armstrong has given us an excellent rule—

'Begin with gentle toils, and as your nerves 'grow firm, to hardier, by just steps aspire. 'The prudent, even in every moderate walk, 'at first but saunter, and by slow degrees 'increase their pace.'

THE END.

R. NOBLE. Printer,
Old Bailey.

NOTES.

[1] Hinc tibi, quae semper vicino ab limine sepes
Hyblaeis apibus florem depasta salicti,
Saepe levi *somnum* suadebit inire susurro.
VIRG.

[2] May not the heat, and want of perspiration, depend on an exhausted irritability of the subcutaneous vessels, which will be accumulated by the method here recommended?

[3] Oxygen gas, according to the new Nomenclature.

[4] The fixed air, or carbonic acid gas, formed during the combustion, having been separated by agitation in contact with lime water.

[5] Strictly speaking, water is composed of the bases of these airs, the greatest part of the caloric being given out on their union.

[6] Where manufactures are carried on to a great extent, the air is rendered still worse, and every precaution ought to be used to preserve the health of the inhabitants. Places where manufactures are carried on, ought, therefore, to be constructed in such a manner as to be very lofty, and capable of being easily ventilated. Night-working is undoubtedly a perversion of the laws of nature, renders the constitution feeble, and lays a foundation for bad health and disease: for it not only gives no time for ventilation, and in consequence the quantity of oxygen becomes more and more exhausted; but the number of candles used, contributes very much to contaminate the air. It has been found by experiment that a candle contaminates more air than a man. By persons who are interested in the welfare of the succeeding generations, night-work will never be urged, and it will be right to ventilate the manufactories every night, as well as during breakfast and dinner.

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The frontispiece contains the following text, and a portrait of the author:

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In line 241 of this text, the word transcribed as too appears as o in the original text, with blank space indicating the omission of the first two letters of the word. In Lecture IX of Dr. Garnett's *Zoonomia*, where the same example of the reaction of the eye to light is given, the word appears as too.

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